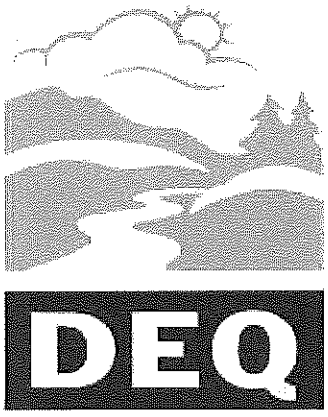
OREGON
ENVIRONMENTAL QUALITY
COMMISSION MEETING
MATERIALS 07/11/1996



State of Oregon
Department of Environmental Quality

AGENDA

Environmental Quality Commission Meeting
July 11 - 12, 1996

Notes:

Because of the uncertain length of time needed for each agenda item, the Commission may deal with any item at any time in the meeting. If a specific time is indicated for an agenda item, an effort will be made to consider that item as close to that time as possible. However, scheduled times may be modified if agreeable with participants. Anyone wishing to listen to the discussion on any item should arrive at the beginning of the meeting to avoid missing the item of interest.

Public Forum: The Commission will break the meeting at approximately **11:30 a.m.** for the Public Forum if there are people signed up to speak. The Public Forum is an opportunity for citizens to speak to the Commission on environmental issues and concerns not a part of the agenda for this meeting. **The public comment period has already closed for the Rule Adoption items and, in accordance with ORS 183.335(13), no comments can be presented to the Commission on those agenda items**. Individual presentations will be limited to 5 minutes. The Commission may discontinue this forum after a reasonable time if an exceptionally large number of speakers wish to appear.

July 11, 1996
811 SW Sixth, Conference Room 3A
1:00 - 5:00 pm
Work Session

1:00 - 2:00 pm:	Hazardous Waste Program Overview and Rule Amendment Background
2:00 - 3:00 pm:	Umatilla Army Depot: DEQ/Ecology and Environment Response to Risk Assessment Issues
3:00 - 5:00 pm:	Umatilla Army Depot: US Army Response to EQC Questions Regarding Safety and Alternative Permitting Scenarios

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July 12, 1996
811 SW Sixth, Conference Room 3A
Regular Meeting Beginning at 8:30 am

A. Approval of Minutes

B. Approval of Tax Credits

C. †**Rule Adoption**: Portland Area Carbon Monoxide Maintenance Plan

D. **†Rule Adoption**: Portland Area Ozone Maintenance Plan

E. **†Rule Adoption**: Revisions to the Portland Area Motor Vehicle Inspection and Maintenance Boundary

F. **†Rule Adoption**: Employee Commute Options Program

G. **†Rule Adoption**: Voluntary Regional Maximum Parking Ratio Program

H. **†Rule Adoption**: Industrial Emission Management Rules for Portland Area Ozone Maintenance Plan

I. **†Rule Adoption**: Air Quality Industrial Rules (Crematory Incinerators, Excess Emissions, Title V Fee Assessment, Housekeeping)

J. **†Rule Adoption**: Proposed Rules for a Pollution Prevention Tax Credit Pilot Program

K. **†Rule Adoption**: Hazardous Waste Rule Amendments

L. **†Rule Adoption**: On-site Sewage System Temporary Rule

M. **Action Item**: EPA/DEQ Environmental Performance Partnership Agreement

N. Commissioners' Reports (Oral)

O. Director's Report (Oral)

Hearings have already been held on the Rule Adoption items and the public comment period has closed. In accordance with ORS 183.335(13), no comments can be presented by any party to either the Commission or the Department on these items at any time during this meeting.

The Commission has set aside August 22-23, 1996, for their next meeting. The location is the Hermiston Community Center, 415 Highway 395, Hermiston, Oregon 97838.

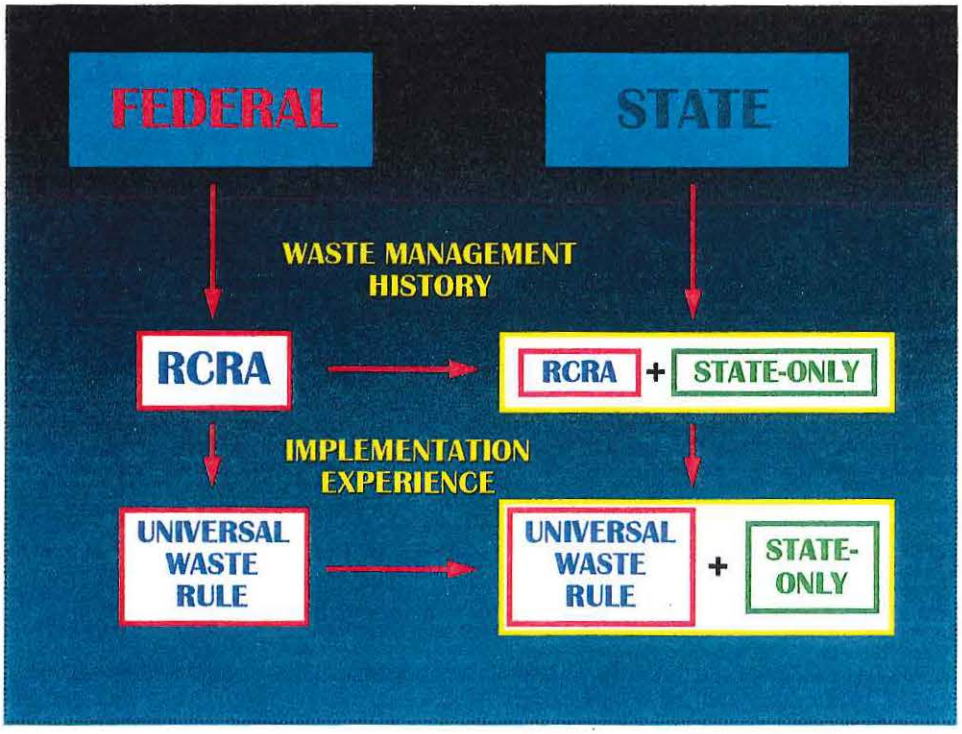
Copies of staff reports for individual agenda items are available by contacting the Director's Office of the Department of Environmental Quality, 811 S. W. Sixth Avenue, Portland, Oregon 97204, telephone 229-5395, or toll-free 1-800-452-4011. Please specify the agenda item letter when requesting.

If special physical, language or other accommodations are needed for this meeting, please advise the Director's Office, (503)229-5395 (voice)/(503)229-6993 (TTY) as soon as possible but at least 48 hours in advance of the meeting.

June 24, 1996

SESSION GOALS

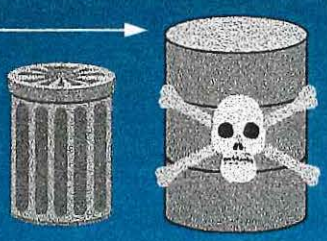
- To provide background on the Resource Conservation and Recovery Act (RCRA) and the federal hazardous waste program
- To highlight Oregon's hazardous waste program differences
- To describe the regulatory changes in today's rule package
- To explain the impact on Oregon's hazardous waste program



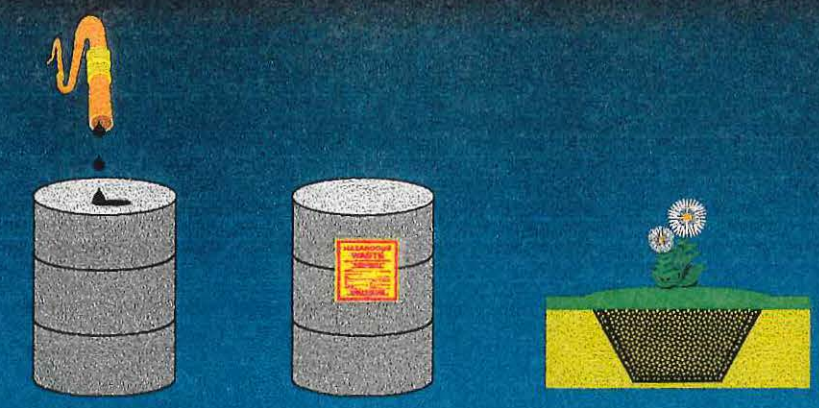
WHY THE RESOURCE CONSERVATION AND RECOVERY ACT?

RESOURCE CONSERVATION & RECOVERY ACT of 1976 (RCRA)

- Prevent future cleanups
- Address management of materials
  - Hazardous Waste
  - Solid Waste (Municipal Garbage)



CRADLE TO GRAVE



GENERATION MANAGEMENT DISPOSAL

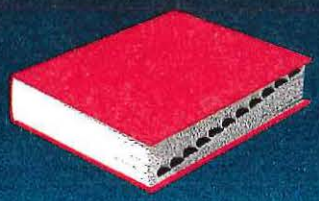
GENERATOR REQUIREMENTS

- Hazardous waste determination
- Notification of hazardous waste generator
- EPA/State identification number
- Generator size determines management requirements

SOLID & HAZARDOUS WASTE UNIVERSE

WHAT IS A HAZARDOUS WASTE ?

- Specifically listed



- Exhibits a characteristic:
  - Ignitable

  - Corrosive

  - Reactive

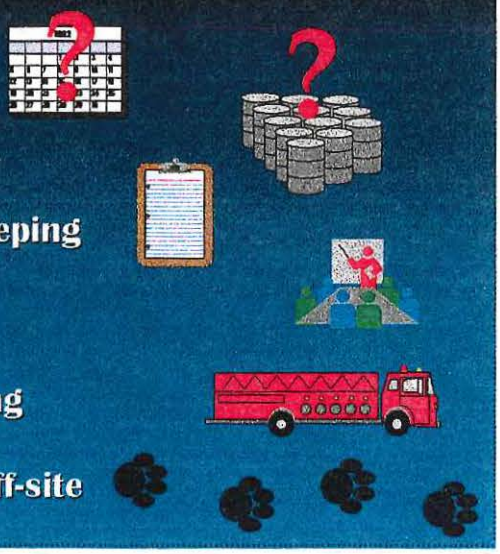
  - Toxic

WHO GENERATES HAZARDOUS WASTE?

- Large Quantity Generators
  More than 1,000Kg./month
  or
- Small Quantity Generators
  More than 100Kg., but less than 1,000Kg./month
  or
- Conditionally Exempt Generators
  100Kg. or less per month

HAZARDOUS WASTE MANAGEMENT REQUIREMENTS

- Time on-site
- Quantity on-site
- Reports/record keeping
- Training
- Emergency planning
- Track movement off-site



HAZARDOUS WASTE MAY BE :

- Treated
- Stored
- Recycled
- Disposed

OREGON'S HAZARDOUS WASTE PROGRAM

RCRA + STATE-ONLY

OREGON'S HAZARDOUS WASTE PROGRAM

- Toxic use reduction
- Technical assistance
- Permitting
- Inspections/enforcement
- Corrective action

HAZARDOUS WASTE MANAGEMENT HIERARCHY

- Toxics use reduction
- Hazardous waste reduction
- Hazardous waste minimization
- Beneficial use
- Recycling
- Treatment
- Disposal

ADDITIONAL HAZARDOUS WASTE IN OREGON

- Mixtures of chemicals
- Nerve agents
- Blister agents
  - Added today
- Nerve/blister agent treatment residues
  - Added today
- Pesticide residues from:
  - Pesticide application
  - Wood treatment
  - Manufacturing
  - Formulation

OREGON'S PESTICIDE RESIDUE WASTE MANAGEMENT HISTORY

- Alkali Lake
- Wood treaters
- Pesticide waste releases
- No federal regulations

RCRA IMPLEMENTATION EXPERIENCE

- Complexity of regulations
- Lack of flexibility
- Disincentives to good management

SOLID/HAZARDOUS/UNIVERSAL WASTES

CHARACTERISTICS OF A UNIVERSAL WASTE

- Generated in a wide variety of settings
- Generated by a vast community
- May be present in significant volumes in non-hazardous waste stream

FEDERAL UNIVERSAL WASTES

- Batteries
- Recalled & banned pesticides & pesticides collected in collection programs
- Mercury-containing thermostats

MODIFICATIONS TO RCRA -- THE UNIVERSAL WASTE RULE

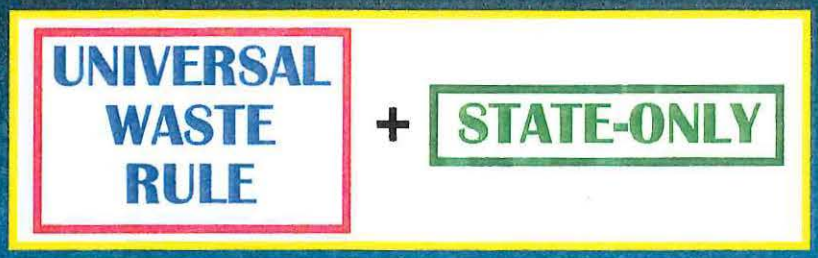
GOALS:

- To encourage resource conservation
- To improve hazardous waste regulation implementation
- To provide incentives to move hazardous waste out of the municipal solid waste stream

BENEFITS OF UNIVERSAL WASTE RULE

- Universal wastes do not count toward hazardous waste generator category
- No reporting required
- More time to have on-site
- Encourages collection from all generators
- Wastes still managed properly as a hazardous waste

OREGON MODIFIES THE UNIVERSAL WASTE RULE



OREGON MODIFICATIONS TO THE UNIVERSAL WASTE RULE

- Add off-site universal waste management requirements
- Add mercury-containing lamps as universal wastes
- Manage pesticide residues using universal waste management standards

OFF-SITE UNIVERSAL WASTE HANDLERS COLLECTING OVER 1000KG

	STATE	FEDERAL
NOTIFICATION	If more than 1,000 Kg	If more than 5,000 Kg
ACCUMULATION TIME	6 months with extensions	1 year with extensions
SHIPMENT	Only to a destination facility	Allowed to another off-site handler
REPORTING	Waste receipt and waste shipment	NONE

Requirements will be evaluated in 2 years.

WHY ADD MERCURY-CONTAINING LAMPS AS A UNIVERSAL WASTE?

- Large number and variety of generators
- Federal influences
- Represents 25% of mercury in the municipal solid waste stream
- Need to encourage better management

Green Lights

OREGON'S PESTICIDE RESIDUE IMPLEMENTATION EXPERIENCE

- Complexity of regulations
- Lack of flexibility
- Disincentives to good management

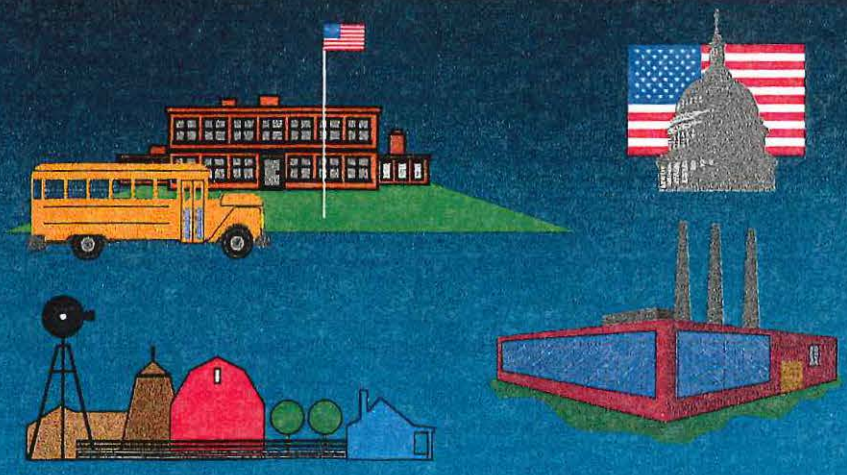
CHANGES TO PESTICIDE RESIDUE MANAGEMENT

- Eliminate regulation under RCRA if conditions are met
- Manage under the universal waste standards
- Exclude residues containing legally applied pesticide from hazardous waste regulation
- Allow disposal in a municipal landfill if certain environmental criteria are met

BENEFITS OF PESTICIDE RESIDUE MANAGEMENT AS UNIVERSAL WASTE

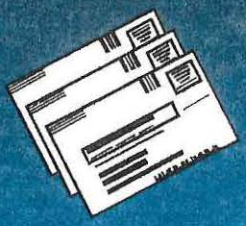
- Provides management flexibility
- Promotes private infrastructure to manage pesticide residue
- Eliminates stigma of hazardous waste management structure
- Promotes good "housekeeping" practices
- Results in environmental controls

WHO IS AFFECTED BY THE UNIVERSAL WASTE RULE?



DEQ IMPLEMENTATION OUTREACH EFFORTS

- Factsheets
- Notice to all registered hazardous waste generators, trade associations and industry groups



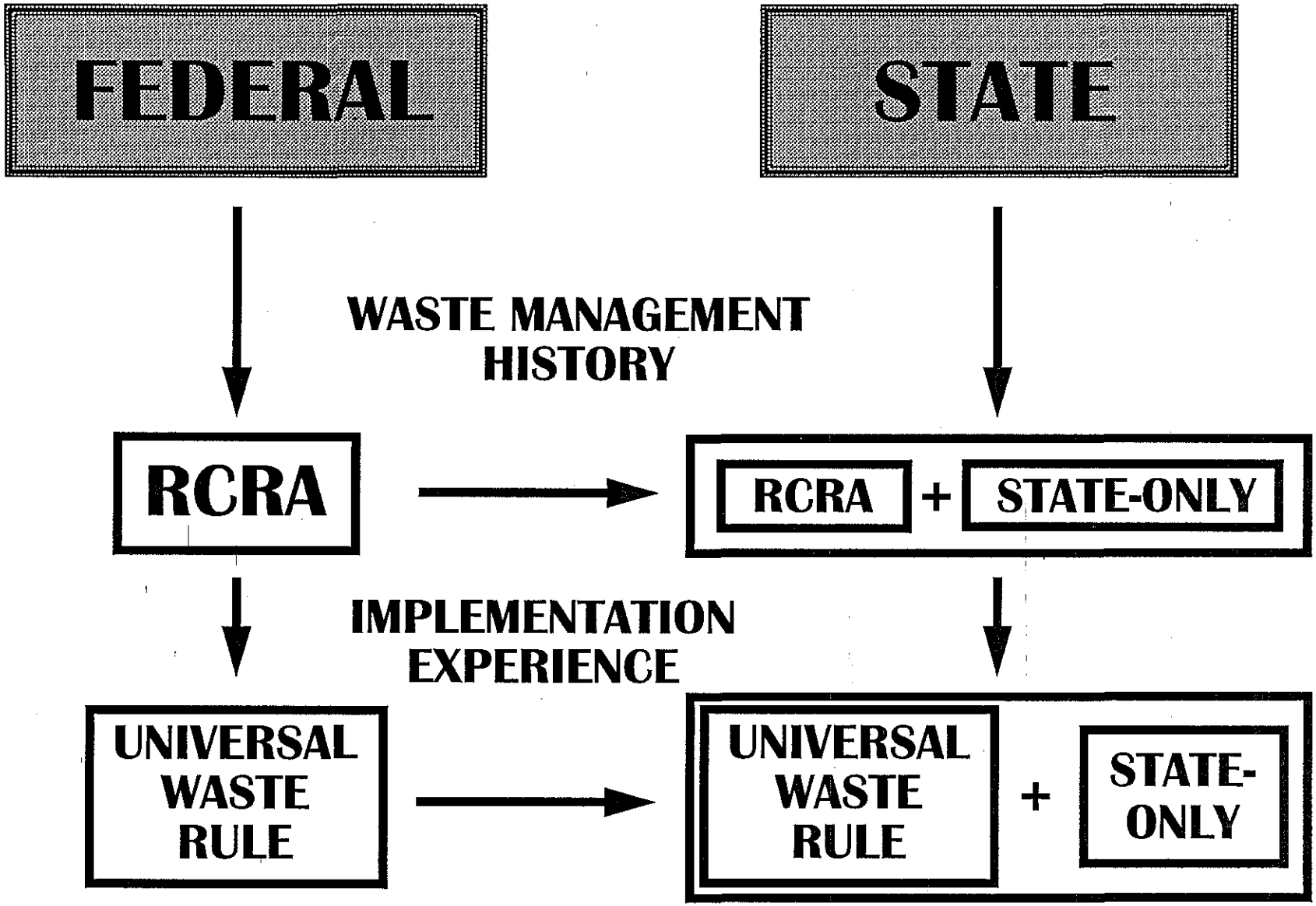
- Coordinate with industry and government associations
- DEQ sponsored workshops

ADDITIONAL UNIVERSAL WASTES?

- Petition process
- Must meet goals of rule and certain criteria:
  - Widely-dispersed waste
  - Improved management
  - Risks during accumulation and transport are low

UNIVERSAL WASTE CANDIDATES

- Used mercury-containing equipment
- Antifreeze
- Paint waste
- Solvent rags
- Lead contaminated debris & soil


FEDERAL
STATE
WASTE MANAGEMENT HISTORY
RCRA
RCRA + STATE-ONLY
IMPLEMENTATION EXPERIENCE
UNIVERSAL WASTE RULE
UNIVERSAL WASTE RULE + STATE-ONLY

U.S. Army's Alternative Demilitarization Technology Report for Congress

Executive Summary

Department of the Army
Program Manager for
Chemical Demilitarization

April 11, 1994

Assessment of the U.S. Chemical Weapons Stockpile: Integrity and Risk Analysis

MTR 93W000080
April 1993

John Perry
Gary Nelson
David Tripler

Evaluation of the GB Rocket Campaign:
Johnston Atoll Chemical Agent
Disposal System
Operational Verification Testing

John L. Menke
Hans M. Carlson
Michael H. Flinn
Scott R. MacRae
Douglas M. Medville

Recommendations

for the
Disposal of
Chemical Agents
and Munitions

NATIONAL RESEARCH COUNCIL

The documents shown on the insides of both covers depict some of the resources available on the U.S. Army's chemical weapons demilitarization progam.

Introduction

By law, the U.S. chemical munitions stockpile must be destroyed by the end of the year 2004. The Army is poised to execute the final phases of chemical weapons stockpile destruction using the Baseline incineration technology that has been developed and proven through a series of programs since 1969. The current Chemical Stockpile Disposal Program (CSDP) would destroy stockpiled agent and munitions at each of the eight sites in the continental United States, using Baseline incineration facilities which would be constructed and operated at each site.

The Army has evaluated the recommendations of the National Academy of Sciences and considered comments offered by concerned citizens residing near each of the stockpile sites, with emphasis placed on the criteria specified in PL 102-484: safety, environmental protection, and cost effectiveness.

The programmatic approach to the CSDP and the Baseline incineration technology has been developed through frequent and intensive consultation with the Congress and the National Academy of Sciences. Although other technologies for destruction of the stockpile have been extensively reviewed and evaluated, in 1969, 1984, and in 1988 when incineration was selected for full-scale demonstration, recent expressions of public concern have resulted in the Army and the National Research Council (the principal operating agent of the National Academy of Sciences) mutually agreeing to reexamine the subject of alternative technologies.

The National Defense Authorization Act for Fiscal Year 1993 (Public Law [PL] 102-484) directed the Secretary of the Army to report to Congress on potential alternatives to the Army's Baseline disassembly and incineration process for the disposal of lethal chemical agents and munitions.

The legislation requires that a comparison be performed of the Baseline disassembly and incineration process with each alternative technology recommended for use by the National Academy of Sciences. In particular, the Army is required to implement an alternative technology at a low-volume site if demilitarization operations at that site can be completed by 31 December 2004, and if the alternative technology is determined to be significantly safer and equally or more cost-effective than the Baseline process. Low-volume sites are defined as chemical weapons storage sites at which there are 5 percent or less of the total United States stockpile of unitary chemical weapons.

The Army has evaluated the recommendations of the National Academy of Sciences and considered comments offered by concerned citizens residing near each of the stockpile sites, with emphasis placed on the criteria specified in PL 102-484: safety, environmental protection, and cost effectiveness. Thorough analyses of all technical and programmatic alternatives suggested by the Academy have been conducted. The results of these analyses, and the Army's conclusions and recommendations derived from them, are presented in this report.

This report is the Army's response to PL 102-484. It was prepared by the Office of the Program Manager for Chemical Demilitarization under Mr. Charles Baronian, Program Manager, and the United States Army Chemical Materiel Destruction Agency, Brigadier General Walter Busbee, Commander/Director.

The *Executive Summary* provides a brief history and background of the Chemical Demilitarization Program and summarizes the Army's analyses, conclusions, and recommendations regarding Alternative Technologies for Chemical Demilitarization.

The *Alternative Technologies for Demilitarizing the U.S. Stockpile of Chemical Warfare Agents and Munitions* section provides a more detailed introduction to the program and also provides the Army's complete responses to the provisions of PL 102-484.

Technical Appendixes are included as a compendium of data packages containing the facts, figures, calculations, methods, descriptions, and other technical information upon which the Army based its conclusions.

History and Background: The Chemical Demilitarization Program

Summary History

The United States stockpile of unitary chemical warfare agents and munitions has been maintained primarily as a deterrent to other countries' use of chemical weapons against our military personnel. As components of the chemical weapons stockpile became obsolete or unserviceable, they were disposed of by a number of methods. Since 1969, the Army has placed emphasis on developing and deploying the safest, most environmentally responsible disposal methods supported by available technology. The Army's chemical weapons demilitarization program has been heavily influenced by legislative direction, by evolving federal and state regulatory requirements, and by international treaty considerations.

The NRC has concluded that the Baseline, which employs a number of preparation steps followed by four incineration process streams, has been demonstrated as safe and effective.

The Army first requested the National Academy of Sciences (NAS) to review chemical agent and munition demilitarization alternatives in 1969. The Academy initiated a study of the issue, and in 1972 a NAS Senior Advisory Panel recommended a dual approach consisting of chemical neutralization of the nerve agent GB and continued evaluation of incineration for destruction of both GB and the nerve agent VX. Since incineration was already successfully in use for destruction of H, HD, and other agents at the Rocky Mountain Arsenal in Colorado, the Army's initial efforts in response to the 1972 NAS report focused on chemical neutralization of the inventory of bulk GB. Although technical difficulties were encountered, nearly 4,200 tons of GB were destroyed by chemical neutralization at Rocky Mountain Arsenal between 1973 and 1976. Research into chemical methods for destroying H, HD, and VX met with only limited success.

In the spring of 1981, the Army began testing at the Chemical Agent Munitions Disposal System (CAMDS) at Tooele, Utah, employing incineration and thermal deactivation and decontamination of munitions and agent storage containers. The mission of CAMDS is to test and evaluate equipment and processes proposed for chemical agent and munitions demilitarization facilities. From 1981 to 1986, approximately 38 tons of bulk agent, munitions and contaminated metal parts were treated using thermal processes with extremely high agent destruction efficiencies.

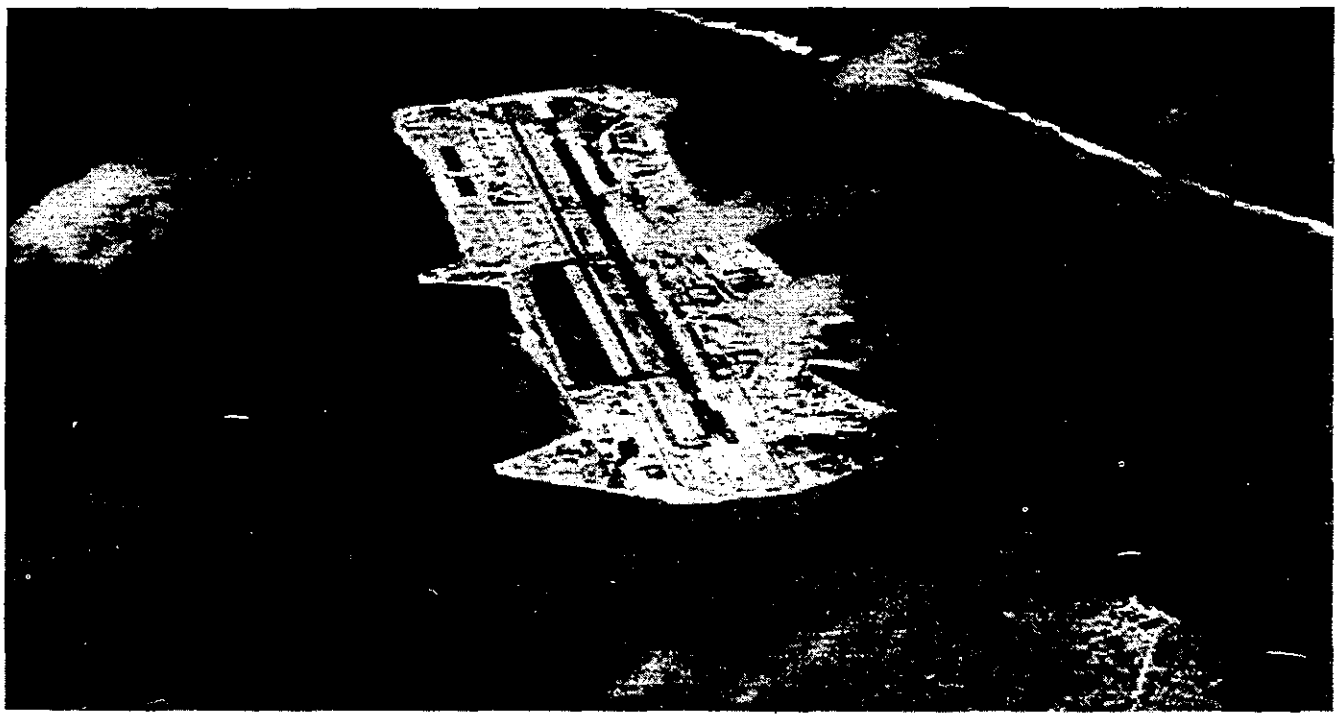
The Army approached the NAS in 1982 to independently review demilitarization plans and to evaluate the safety of continued storage. A 1984 report from the National Research Council (NRC) reviewed a number of alternative demilitarization technologies and endorsed the Army's choice of munitions disassembly, incineration of agent, and thermal treatment of energetics and metal parts. The NRC determined that the Army should continue to maintain the storage of the majority of munitions and agents, proceed with destruction of M55 rockets, and analyze incineration and thermal treatment as the primary means for destroying the remainder of the stockpile. During this period, tests at CAMDS demonstrated the capability of incineration to destroy VX.

Construction of the Johnston Atoll Chemical Agent Disposal System (JACADS) was begun in the mid-1980's. JACADS serves the dual purpose of being a demonstration plant for incineration and thermal treatment technology while providing the means to destroy agent and munitions stockpiled on Johnston Atoll. In November 1985, Congress enacted PL 99-195 which required the Army to develop a program for the disposal of all stockpiled chemical agents and munitions. This plan was submitted to Congress in 1986, selecting incineration and thermal treatment as the Baseline technology. Congress then directed that siting studies be performed. The *Final Programmatic Environmental Impact Statement*, published in January 1988, documented the selection of on-site disposal as offering the least-risk alternative.

Congress enacted PL 100-456 in 1988 requiring that operational verification tests (OVTs) be used to demonstrate the efficiency and safety of JACADS before full-scale operations could begin and before any destruction facility could be operated in the U.S. A series of four OVT campaigns was successfully completed in March 1993. The NRC has concluded that the Baseline, which employs a number of preparation steps followed by four incineration process streams, has been demonstrated as safe and effective. Experience gained in operating JACADS has resulted in refinements that will be implemented at the CSDP facilities.

As verification testing was underway at JACADS, public concern intensified over the safety of incineration as the principal method for destruction of the stockpile on Johnston Atoll and at the eight stockpile sites in the continental U.S. Critics claimed that incineration poses health risks to nearby populations and that these health risks could be avoided by the use of alternative technologies. By enacting the Alternative Technologies provisions of PL 102-484, Congress is addressing those concerns.

Johnston Atoll



Specific Requirements of PL 102-484

The legislative requirements to which the Army is responding are summarized as follows:

Section 173

The Secretary of the Army shall submit to the Congress a report on the potential alternatives to the use of the Army's Baseline disassembly and incineration process for disposal of lethal chemical agents and munitions. The report shall include:

"1. An analysis of the report of the Committee on Alternative Chemical Demilitarization Technologies of the National Research Council of the National Academy of Sciences.

2. Any recommendations that the National Academy of Sciences makes to the Army regarding the report of that committee, together with the Secretary's evaluation of those recommendations.

3. A comparison of the Baseline disassembly and incineration process with each alternative technology evaluated in the report of such committee that the National Academy of Sciences recommends for use in the Army Chemical Stockpile Disposal Program, taking into consideration each of the following factors:

   (A) Safety
   (B) Environmental protection
   (C) Cost effectiveness.

4. For each alternative technology recommended by the National Academy of Sciences, the date by which the Army could reasonably be expected to systematize, construct, and test the technology, obtain all necessary environmental and other permits necessary for using that technology for the disposal of lethal chemical agents and munitions, and have the technology available for full-scale chemical weapons destruction and demilitarization operations.

5. A description of alternatives to incineration that are being developed by Russia for use in its chemical demilitarization program and an assessment of the extent to which such alternatives could be used to destroy lethal chemical weapons in the United States inventory of such weapons.

6. Consideration of appropriate concerns arising from meetings of the Chemical Demilitarization Citizens' Advisory Commissions established pursuant to section 172.

7. In any case in which the criteria specified in section 174 are met, notification that the Secretary intends to implement an alternative technology disposal process at a low-volume site."

Section 174

If the date by which chemical weapons destruction and demilitarization operations can be completed at a low-volume site using an alternative technology process evaluated by the Secretary of the Army is no later than 31 December 2004 and the Secretary determines that the use of that alternative technology process for the destruction of chemical weapons at the site is significantly safer and equally or more cost-effective than the use of the Baseline disassembly and incineration process, then the Secretary of the Army shall carry out the disposal of chemical weapons at that site using such alternative technology process. In addition, the Secretary may carry out the disposal of chemical weapons at sites other than low-volume sites using an alternative technology process (rather than the Baseline process) after notifying Congress of the Secretary's intent to do so.

Baseline Disassembly and Incineration Technology

The Baseline disassembly and incineration technology, as most recently embodied in the Army's design for its Anniston facility, uses incineration and thermal treatment for chemical weapon destruction. The Anniston design includes refinements introduced as a result of operating and construction experience from JACADS and the Tooele Chemical Agent Disposal Facility (TOCDF). Typically munitions and containers of agent are removed from storage, placed in airtight containers, and transported a very short distance to the facility for processing. A negative pressure cascading ventilation system confines the agent to the separation and incineration zones in the facility. Ventilation exhaust gases pass through activated carbon filters as a third safeguard against release.

The Baseline chemical weapon destruction process has three stages: separation, incineration, and treatment and disposal of effluents. The operations that constitute these stages are illustrated in Figure ES-1 and briefly described in the following paragraphs.

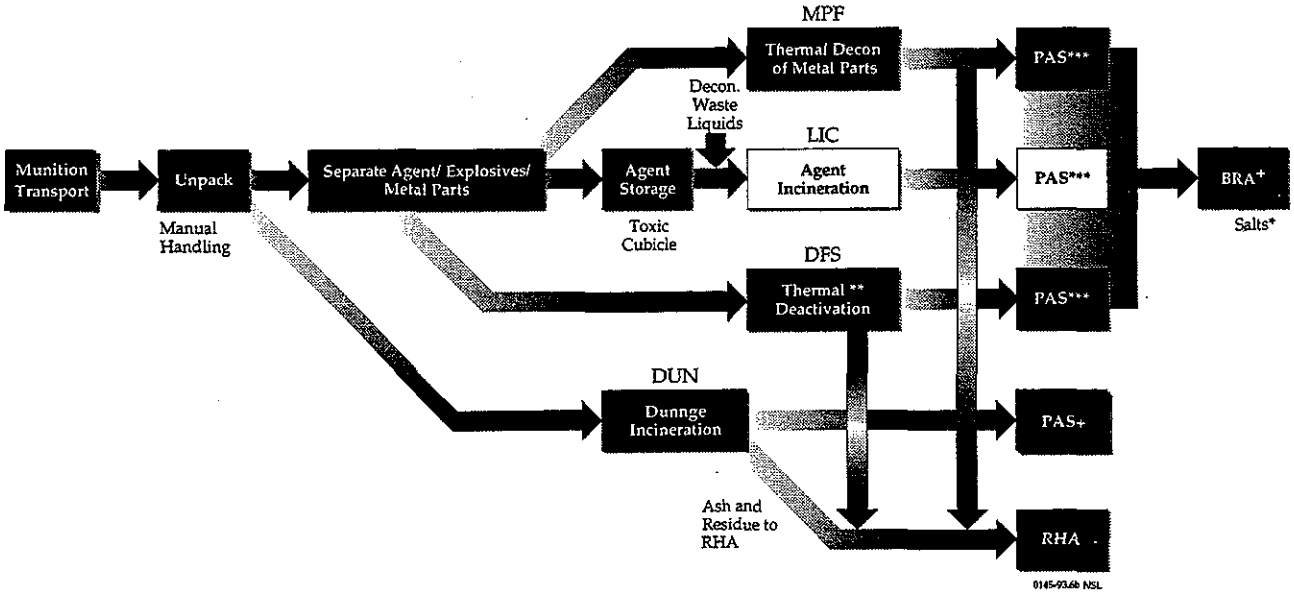


Figure ES-1. Simplified Process Configuration for Baseline Process

Separation

In the demilitarization facility, the agent is removed from munitions and containers by automated handling equipment. The result of this separation process is normally four streams for incineration. Bulk agent munitions and containers do not have energetic explosives and propellants. The four streams are: liquid agent, energetic explosives and propellants, agent-contaminated metal parts and containers, and dunnage (potentially contaminated packing materials).

Incineration

Liquid chemical agent is collected in storage tanks from which agent is fed into a high-temperature incinerator and burned at a temperature of 1482°C (2700°F). The offgases generated by the high-temperature combustion process pass into a secondary combustion chamber, or afterburner, to ensure the destruction of any trace amounts of agent or organics that were not incinerated in the primary incinerator. Using similar layouts there are three other furnaces: a roller hearth furnace for decontaminating metal parts, a thick-wall rotary kiln for burning explosives and propellants, and a stationary hearth furnace for dunnage. Figure ES-2 illustrates the equipment relationships for a liquid incinerator and its pollution abatement system.

Treatment of Effluent and Disposal of Waste

This stage is composed of three categories of systems. The first of these are the incinerator pollution abatement systems (PAS) which cool the flue gas, scrub out acid gases, and remove fine particulate matter. The second system treats brine from the PAS by evaporating the water and drying the dissolved salts. As a result, there are no liquid effluents from the Baseline process. The third system consists of the solids handling and treatment facilities needed to prepare the solid residues for ultimate disposal. Each of these categories is comprised of a number of different subsystems that prevent harmful emissions.

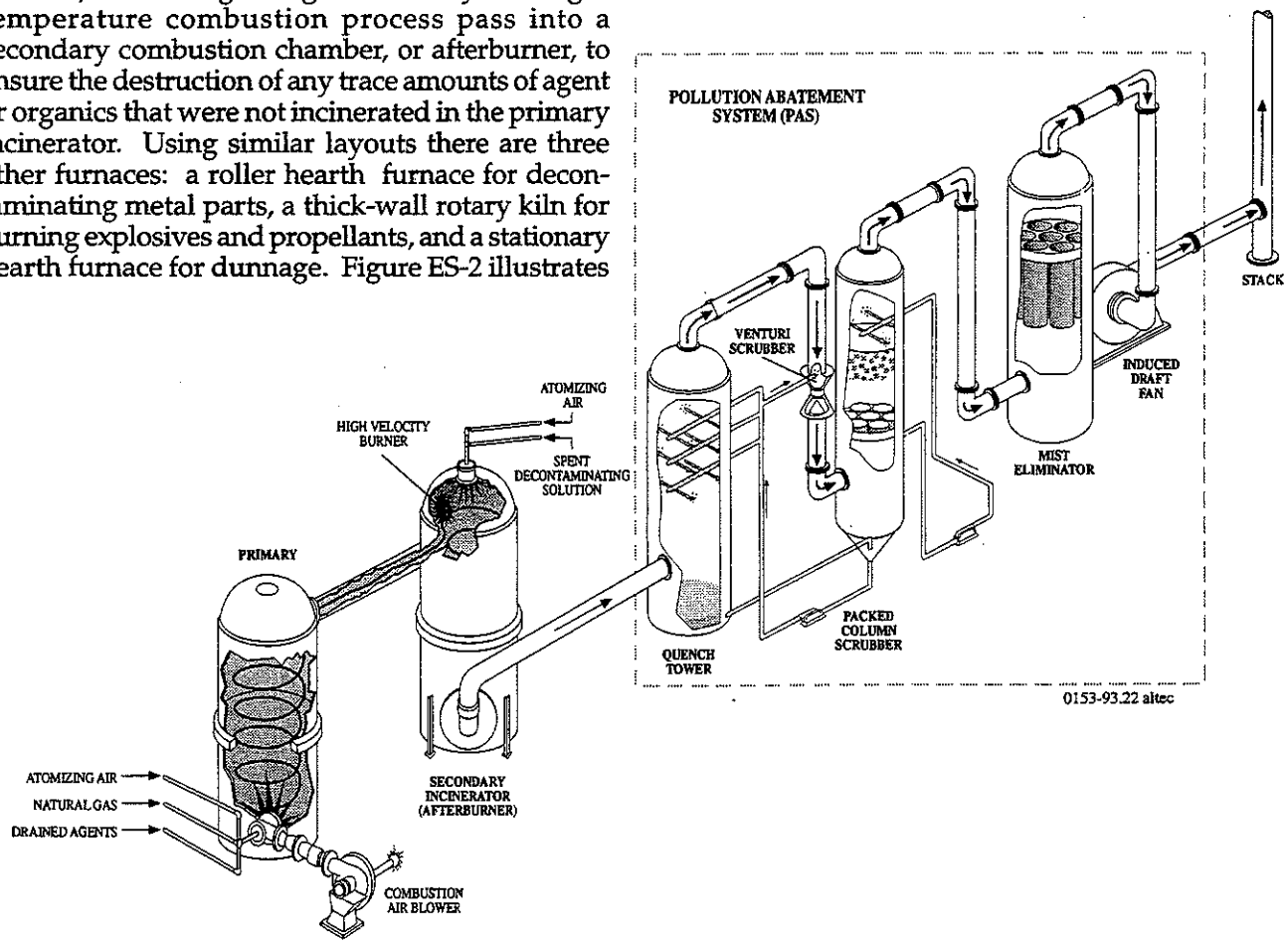


Figure ES-2. The Baseline Liquid Incinerator

The Current Baseline Program

The U.S. currently has five types of chemical agents in the stockpile: the nerve agents GB and VX and the blister agents, H, HD and HT, commonly known as mustard. These agents are stored at Johnson Atoll in the Pacific and at eight sites in the continental United States, distributed as shown in Figure ES-3. Approximately 60 percent of these chemical agents are stored in bulk containers which have no explosive components. The remaining agent inventory is contained in munitions. These munitions are stored with and without explosive components and consist of mines, bombs, spray tanks, rockets, mortar shells, and artillery projectiles. The Army is currently conducting a program to demilitarize all chemical agents and munitions in the stockpile, to be completed before the Congressionally-mandated deadline of 31 December 2004. Demilitarization facilities that utilize the Baseline disassembly and incineration process have been constructed on Johnston Atoll (JACADS) and at Tooele, Utah (TOCDF) and are planned for each of the remaining seven stockpile sites in the continental United States. Figure ES - 3 shows the sequence of planned Baseline construction and operation activities for the eight sites in the continental U.S. Award of the construction contract for the next facility at Anniston, Alabama is on hold pending acceptance of this report to Congress and further guidance.

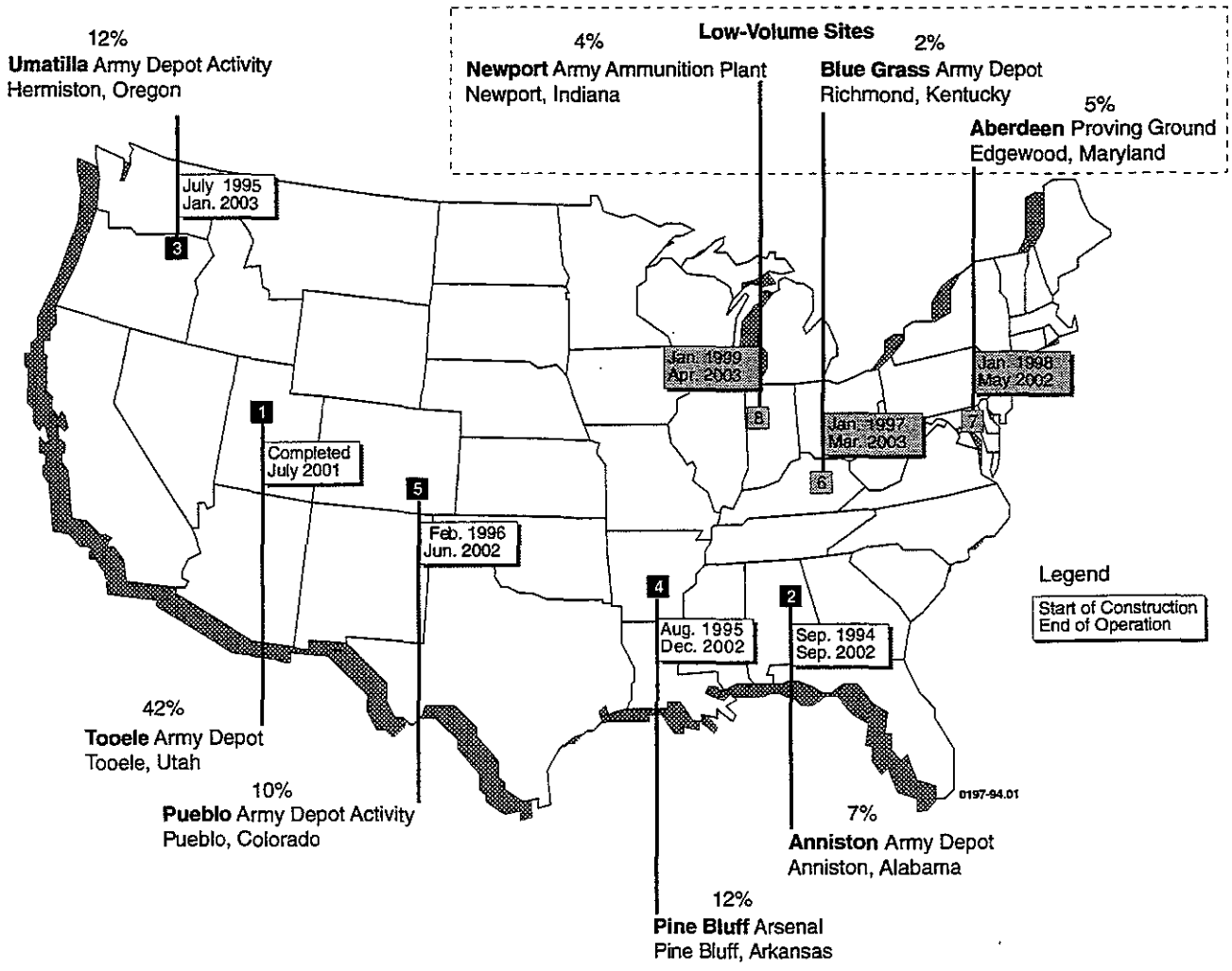


Figure ES-3. Chemical Stockpile Sites and Planned Site Activity Dates

Supporting Rationale for the Army's Recommendations

Evaluation of the NRC Recommendations

The National Research Council is comprised of members of the National Academy of Sciences, invited scholars and disciplinary experts. The NRC's Committee on Review and Evaluation of the Army Chemical Stockpile Disposal Program, or Stockpile Committee, includes experts in various disciplines which are pertinent to the demilitarization program, regardless of the specific disposal technology utilized. Recommendations made by this prestigious group must be given serious consideration.

None of the Congressionally-mandated criteria for adoption of an alternative technology can be met. The disposal program should not be delayed pending development of detailed information on alternative technologies.

The Army has reviewed and considered each of the findings and recommendations offered by the NRC in their 1994 report. Several of the more significant issues raised by the NRC findings and the Army's evaluations are discussed below.

The NRC has clearly indicated that all proposed changes in the demilitarization program should be assessed primarily in terms of the impact on total risk. This assessment of risk should be performed on a site-specific basis to account for the individual features of each site. The Army is in full agreement with this principle.

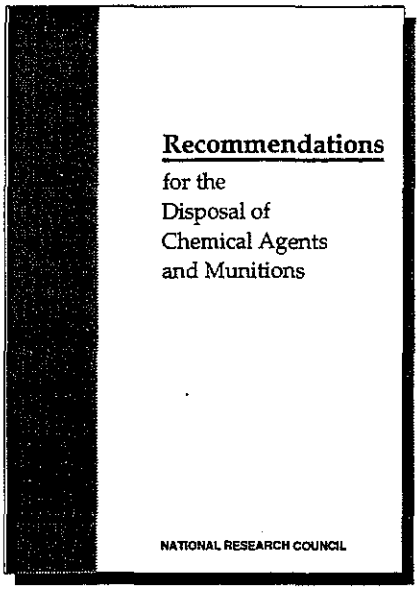
The NRC has reviewed the performance of the Baseline prototype plant at Johnston Island and has concluded that the process is fundamentally sound. The NRC's conclusion is supported by both the Department of Health and Human Services and by the Environmental Protection Agency. The Committee also noted that improvements recommended from the Johnston Atoll Chemical Agent Disposal System (JACADS) experience should be implemented before commencement of agent operations at Tooele. The Army agrees with the NRC's assessment of Baseline performance and will continue to incorporate lessons-learned from the JACADS facility into all future demilitarization plants.

The NRC, based upon the data available today, has concluded that any reduction in disposal risk afforded by alternative technology will be more than offset by the larger cumulative risk from extended storage. The Army's review and assessment of alternative technologies fully supports the NRC's position.

The state of the art for performing risk analyses has advanced since the comprehensive assessment performed by the Army as part of the Environmental Impact Statement process. With a program of this complexity dealing with chemical agents and energetics, the NRC has recommended that the Army update their analyses to ensure that the latest methods are being utilized. The Stockpile Committee also stated that they are confident that the updates will confirm the wisdom of proceeding promptly and that the disposal program should not be delayed pending completion. The Army agrees and will update the risk analyses on a site-specific basis. In addition, as recommended by the NRC, possible stockpile reconfiguration will be considered upon review of the risk analyses.

The NRC has reviewed possible alternatives for the "reverse assembly" portion of the Baseline process and has found no acceptable alternative. Similarly, the Stockpile Committee concluded that incineration should be utilized for treatment of three of the four major process streams. The Army's review of alternatives is consistent with that of the NRC. The Army agrees with the NRC's findings and recommendations in this area.

The 1993 NRC report stated that the addition of carbon filters would virtually eliminate the risk of toxic air emission. Based on their assessment of the 1993 report, the Stockpile Committee has recommended that the Army fully evaluate the addition on a site-specific basis. The Army agrees with this evaluation. The preliminary assessment fully supports the NRC's conclusions regarding carbon filtration. The Army is proposing a demonstration test at Tooele while implementing in parallel a carbon treatment system at Anniston and follow-on sites.



The NRC recommended neutralization followed by either incineration, wet air oxidation and biological processing, supercritical water oxidation, or biological processing as the four candidates for research. The Army has concluded that there is no advantage to the neutralization/incineration combination and has inserted stand-alone neutralization into the R&D program instead. The Army developed a comprehensive four-technology RDT&E program to determine cost and schedule implications and the ability of such a program to meet Congressional criteria. Further evaluation of the technical, cost, and schedule implications of the four-technology RDT&E program has led the Army to recommend pursuance of a two-technology program focused on stand-alone neutralization and neutralization followed by biological treatment.

The NRC has stated that the current chemical stockpile disposal program may provide time for site-specific substitution or integration of proven alternative technology disposal processes if research and development efforts are accelerated and the results are favorable. It is with great reluctance that the Army concludes that it cannot support this NRC finding. The current schedule for execution of the stockpile program specifies that construction of the last site will be started in early 1999, while the pilot program testing on the first agent type will not be completed until 18 months later at the earliest (for stand-alone neutralization). This time period for development is driven by the time required to prepare and obtain the required environmental permits and to implement the necessary facility modifications at CAMDS. Therefore, the Army cannot support the NRC's finding. If research is to be performed on alternative technologies in the hope of developing a replacement for the Liquid Incinerator, site work for the bulk-only sites should be delayed.

The NRC observed that the Army may not be sufficiently well-informed regarding the views of the public and that the Army should do more to develop a program of increased scope to ensure that the public is well-informed and has the opportunity for full participation. The Army recognizes the role that the public must play in the demilitarization program and is committed to improving public interaction. The programs outlined in this report are intended to provide information to assist public participation in future demilitarization efforts. In addition, an increased public outreach program is proposed to further foster the necessary working relationship between the Army and the citizens at each stockpile site.

The 24 NRC Recommendations have been evaluated, and the results of those evaluations were heavily used in developing the Army's response to Congress. Table ES-1 summarizes the recommendations and the Army's evaluation of them.

Table ES-1. NRC Recommendations and the U.S. Army's Evaluation

NRC Technology Recommendations	Army Evaluation
The Chemical Stockpile Disposal Program should proceed expeditiously and with technology that will minimize total risk to the public at each site.	The Army agrees and proposes to continue the CSDP in accordance with the Baseline program schedule. The Baseline process has been shown to be both safe and effective in destroying the full range of munitions and agents in the stockpile.
Disposal systems should separately process agent, energetics, metal parts, and dunnage streams.	The Army agrees. The Baseline reverse-assembly process is designed to separately process these streams.
Mechanical methods should continue to be used to access agent and separate material streams. Alternative mechanical systems should be used if simpler, more durable methods, which permit separation of streams, are discovered.	The Army agrees and plans to continue to employ the mechanical reverse-assembly process at all sites. Equipment will be improved as experience and developments dictate.
Research into methods to extract, handle, and process gelled agents should be accelerated. Methods should facilitate the use of alternative technologies.	The Army agrees. In the Baseline, gelled materials are destroyed in the metal parts furnace. The R&D program includes development of methods for handling gels in each alternative technology.
Dispose of energetic materials by incineration.	The Army agrees and plans to continue use of the deactivation furnace.
Decontaminate metal parts in furnace or by other high-temperature treatment.	The Army agrees and plans to continue use of the metal parts furnace.
The CSDP should continue on schedule with the Baseline technology unless alternatives are developed which are safer, less costly, or more rapidly implementable. Baseline improvements should be implemented as identified and successfully demonstrated.	The Army agrees; however, efforts involving low-volume sites were suspended pending completion of the alternative technologies evaluation. The Army proposes to continue the CSDP in accordance with the Baseline schedule. A two-technology R&D program has been recommended.
The application of carbon filters to the discharge from the Baseline system incinerators should be evaluated in detail including site-specific estimates of benefits and risks. If warranted, in terms of site-specific estimates of benefits and risks, such equipment should be installed.	The Army's preliminary assessment indicates that carbon filters integrated into the Baseline pollution abatement system would provide an additional level of safety and environmental protection. The Army recommends an evaluation at Tooele and parallel implementation of a carbon filter modification to the Baseline process.
Neutralization research should be accelerated and expanded to include field grade and gelled material and to consider practical implementation issues. Work should address treatment of empty containers.	The R&D program includes development of methods for handling gels in each alternative technology and treatment of ton containers.
Neutralization research should be accompanied by preliminary analyses of integrated systems capable of reducing agents to materials acceptable for transport or disposal.	The Army agrees; its recommended R&D program is targeted at developing two neutralization-based systems for reducing agents to materials acceptable for disposal.
Research should be conducted in parallel and lead to selection of one system for further development.	The Army agrees; the recommended R&D program performs basic research on the two low-temperature low-pressure technologies in parallel and leads to the selection of one alternative system for pilot testing.
The Army should monitor relevant research development.	The Army agrees.
Neutralization followed by transport for final treatment should be examined as an alternative for low-volume sites. If results are favorable, this option should be considered to replace the LIC at other sites.	Transportation of neutralized agent poses technical and regulatory challenges; the Army will investigate this option.

Table ES-1. NRC Recommendations and the U.S. Army's Evaluation

NRC Technology Recommendations	Army Evaluation
Proven alternative technologies, if available without increasing risk, should be considered for application on the basis of site-specific assessment.	The Army agrees. Alternative technologies will be considered on the basis of site-specific risk assessments.
CAMDS should be maintained at an effective level for the foreseeable future. However, agent should not be retained at Tooele to feed a technology demonstration.	If R&D is directed, CAMDS will remain staffed to test the alternative technology selected in the R&D program.
Application of an alternative technology at any site should be preceded by demonstration of safe, full-scale operation at CAMDS.	Pilot-plant testing at CAMDS is included in the R&D program.
Latent risks from storage, handling, and disposal activities are expected to be low; however, analyses should be conducted that explicitly account for latent health risks from these activities.	The Army agrees. An effort to explicitly include latent risks from storage, handling, and disposal activities will be incorporated into ongoing activities.
Updated risk analyses of the relative risk of storage, handling, and disposal activities should be completed as soon as possible.	The Army agrees. The site-specific risk analysis for Tooele is being updated. Updates of risk assessments at other sites will be performed.
New risk analyses should be site-specific using the latest available information and methods of analysis. Analyses should compare the risks of continued storage with disposal by the Baseline system and identify major contributors to total risk.	The Army agrees. A new site-specific risk analysis is under way for TOCDF within the Army's comprehensive risk management program. The schedule for other sites is being developed.
As site-specific risk analyses are completed, the Army should reconsider the schedule. If indicated, the schedule should be changed to minimize the cumulative total risk. The Army should consider reconfiguring high-risk stockpiles to safer conditions, if this will significantly decrease total risk.	The Army agrees and will reconsider the schedule of construction and operation as site-specific risk analyses become available. The Army will consider reconfiguring high-risk stockpiles to safer conditions, prior to disposal, if this will significantly reduce cumulative total risk.
As research progresses, site-specific risk analyses should be reexamined with the alternative technologies substituted for the Baseline. The program should not be delayed pending completion of the research.	As part of the Army recommended R&D program, the Army will assess alternatives using the factors of safety, environmental protection, and cost-effectiveness on a site-specific basis.
Research into the nature of propellant stabilizer degradation should continue. Stockpile surveillance should be increased, particularly for M55 rockets.	The Army agrees and recommends implementation of an enhanced M55 propellant surveillance program and a random inspection program for mustard ton containers.
The Army should improve communication with the public at the sites and seek out greater community involvement in decisions regarding technology selection, oversight of operations, and decommissioning facilities, and work closely with the Citizens' Advisory Commissions.	The Army recognizes the need to increase its outreach activities with the affected communities. The Army is committed to supporting and meeting with the Citizens' Advisory Commissions and will open public information centers near each site.
The Army should ensure that staff grows with the workload and technical and operational challenges.	The Army agrees additional personnel will be required to implement the R&D program and actions in response to programmatic recommendations.

Carbon Filter Systems

The NRC stated that the Baseline incineration process is an adequate system for destruction of the stockpile and that addition of carbon filter systems to the Baseline incineration process would virtually eliminate the risk of toxic air emissions. It was recommended that addition of carbon filter systems to the Baseline be evaluated in detail.

A detailed assessment of the addition of carbon filters was performed based on a conceptual system design produced for this study. This assessment produced a one-for-one comparison with the Baseline against factors derived directly from criteria specified in PL 102-484. It was found that:

1. Implementation of carbon filters can occur with little impact to the Baseline program schedule and thus meet the Congressionally-mandated deadline of 31 December 2004.

2. Implementation of carbon filters will result in a safer system. A determination as to whether it would be significantly safer must await resolution of several engineering-related uncertainties and the results of demonstration testing.

3. Implementation of carbon filters will result in significantly reduced air emissions for some air pollutants.

4. Implementation of carbon filters will result in an estimated net increase to the program life cycle cost of approximately $260 million.

The Army has experience with activated carbon filter systems because they are used in building atmospheric control systems at JACADS and Chemical Agent Munitions Disposal System (CAMDS). This technology is mature and can be implemented with a high confidence of success. However, an exhaust gas cooling and reheating system must be used to ensure filter performance for possible organic air pollutants of concern.

Risk Management Program

The Army is in agreement with the NRC that minimizing total cumulative risk should be the principal criterion affecting programmatic decisions for the CSDP. The Army has in fact used risk assessments to support siting and scheduling decisions, and will continue to do so. In response to the NRC's recommendations in this area, the Army will develop and implement a comprehensive Risk Management Program that will include an updated risk assessment for each CSDP site.

The risk assessment for TOCDF is already under way. The results of this risk assessment will provide an updated methodology and database that will form the foundation of site-specific assessments for the other CSDP sites. Assessments of storage risk, particularly the M55 rockets, reconfiguration options, and health effects will be performed and updated. The focus of these activities will be to identify specific risk mitigation measures that can be implemented to minimize total cumulative risk.

Finally, the comprehensive Risk Management Program will include interactions with the public. Quarterly briefings to community oversight committees will be provided, and public participation in risk perception studies will be solicited.

Development of an RDT&E Program

The NRC recommended in its 1994 report that research be performed into four neutralization-based alternative technologies for agent destruction. In making this recommendation, the NRC noted that the Congressional criteria for alternative technology use, if taken literally, could not be met. However, the NRC recognized the possibility of program schedule delays due primarily to opposition to the use of incineration. These delays would result in an increase in the cumulative risk to the public from extending stockpile storage. Therefore, consistent with the principle of minimizing total cumulative risk, the NRC recommended that research be performed to develop an alternative technology for agent destruction while continuing with implementation of the baseline program. This approach would minimize total cumulative risk by limiting the chances for delay in the program.

The NRC recommended research and development into the following four alternative technology configurations:

- Neutralization followed by on-site or off-site incineration
- Neutralization followed by wet air oxidation (WAO) followed by biological treatment
- Neutralization followed by supercritical water oxidation (SCWO)
- Neutralization followed by biological treatment (BIO).

Technology assessments were performed on each of these technology configurations to determine the state of the art in the technologies and identify developmental needs. The assessments indicated these technologies are relatively immature *insofar as their application to chemical weapons demilitarization is concerned*. Production scale demilitarization of chemical warfare agents and munitions imposes demanding requirements on the technology configuration. Requirements for extremely high destruction efficiency, thorough decontamination of parts, environmental monitoring, process safety, throughput, and permittable solid waste disposal, plus the need to successfully process five different agent types with varying chemistries and grades of purity, all combine to produce a complex and demanding set of requirements that must be satisfied.

The Army reviewed the four technology configurations recommended by the NRC and concluded that neutralization followed by incineration did not provide sufficient potential advantages over the modified baseline (baseline plus carbon filters). One-step stand-alone neutralization was therefore substituted in the evaluation. In addition, the decision as to what final treatment technology to utilize after neutralization and wet air oxidation was postponed until the products from the process could be better characterized. The key development factors were then used to structure a four-technology RDT&E Program Plan that spans the necessary laboratory, bench, and demonstration phases. The plan also provides discrete Research and Development Tasks, specific research and test objectives, a schedule of RDT&E activities, and estimated costs for implementation.

The four-technology RDT&E program was evaluated against the Congressional criteria as required by PL 102-484. The following conclusions were developed:

1. No alternative technologies are more cost-effective than the Baseline. The cost of program delays dominates all other costs, in particular any possible capital cost savings that might be realized by a different technology than the Baseline.
2. A determination as to whether any of the recommended technology configurations would be safer will have to await the results of research and development.
3. No alternative technology can be implemented in time to meet the 2004 Congressional deadline for destruction of the stockpile.

4. Stand-alone neutralization and neutralization followed by biological treatment can meet the CWC deadline if the five-year extension is obtained for the Aberdeen and Newport sites. The third low-volume site, Blue Grass, could not be projected to meet the extended treaty deadline due to complexities arising from its munitions mix.

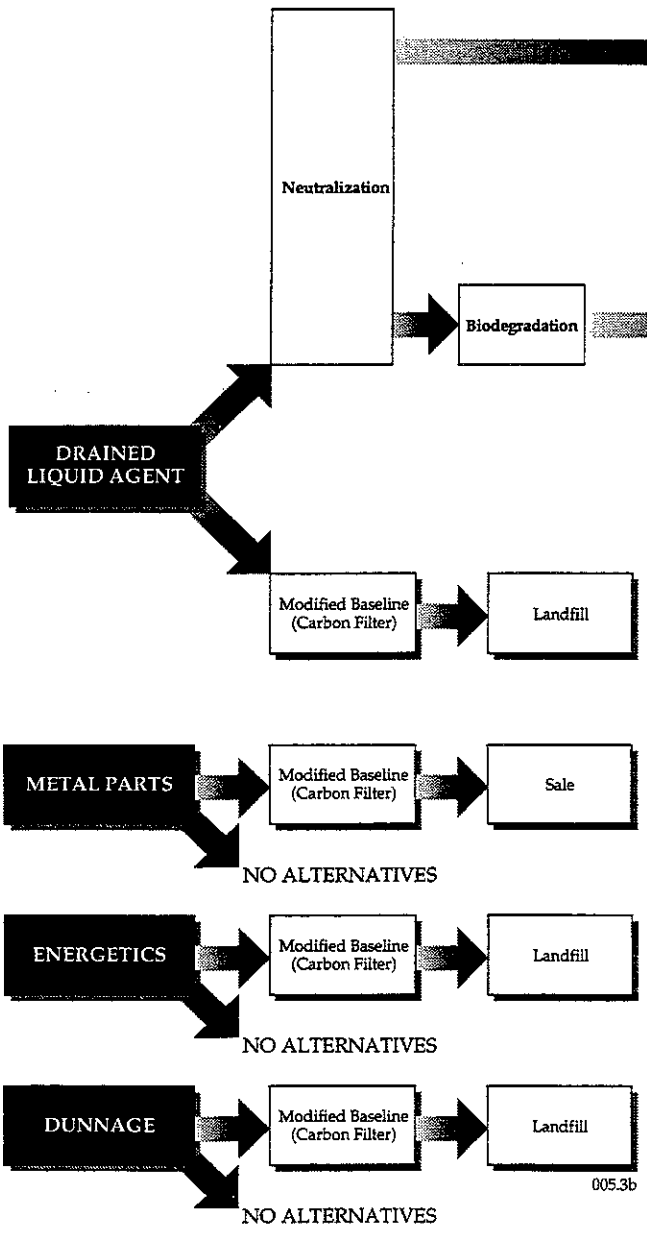


Figure ES-4
Alternative Disposal Technologies Relationships and Modified Baseline

A key feature of the schedule evaluations for these alternative technologies is that the development schedule projections were based on very success-oriented assumptions. This approach gave each alternative the best chance to meet the criteria.

The four-technology RDT&E Program is presented in Appendix F of this report. Based on the Army's analysis and evaluation of the NRC technology recommendations, a two-technology RDT&E Program, to develop stand-alone neutralization and neutralization followed by biological treatment, was developed and is recommended for implementation. These two technologies are fundamentally different from the other recommended alternative technologies and from incineration in that they operate at low temperatures and pressures. They have less challenging operating conditions, simpler process and facility design requirements, and an almost nonexistent possibility of forming certain key contaminants of concern such as dioxins and furans.

A preference for low temperature and pressure systems has been expressed by several of the Citizens' Advisory Commissions. In addition, the two low-temperature and pressure systems can be shown to meet the extended CWC requirements if applied to the two bulk-only sites.

This program, if successful, would provide a backup to the Baseline incineration process should public opposition cause delays in the Baseline program, and would mitigate against any technology-related delays that may occur.

Figure ES-4 illustrates the relationships among the technology areas that were addressed by the NRC and that are included in the two-technology RDT&E program recommended to Congress. It illustrates several important points: (1) the technology configurations to be researched are replacements for

the liquid incinerator and its pollution abatement system only; (2) no alternatives to mechanical separation of process streams or thermal treatment of metal parts, energetics, and dunnage are recommended by either the NRC or the Army; and (3) adequate methods for final treatment and disposal of effluents must be identified and developed for each alternative technology.

The two-technology RDT&E program schedule is illustrated in Figure ES-5. The following key assumptions were used: (1) adequate facility and manpower resources exist to support only one pilot test; (2) cross-cutting technology tasks would make optimal use of resources; and (3) a decision point to select only one technology configuration for demonstration testing must be scheduled at the earliest possible time consistent with other scheduled demilitarization program activities.

This RDT&E Program Plan contains optimized, success-oriented schedules that were used to determine if destruction of munitions could occur with an alternative before the Congressionally-mandated deadline or before the extended treaty deadline. The schedule results for the Aberdeen and Newport sites are summarized in Table ES-2. The earliest that agent and munition destruction can be accomplished at these sites, assuming completely successful development programs, are:

Neutralization	August 2008
Neut/ BIO	April 2009

Scoping cost estimates were also prepared for each of these technologies if applied to the bulk-only sites. The cost estimate can be summarized into three phases consistent with the development schedule which is shown below and on the following page.

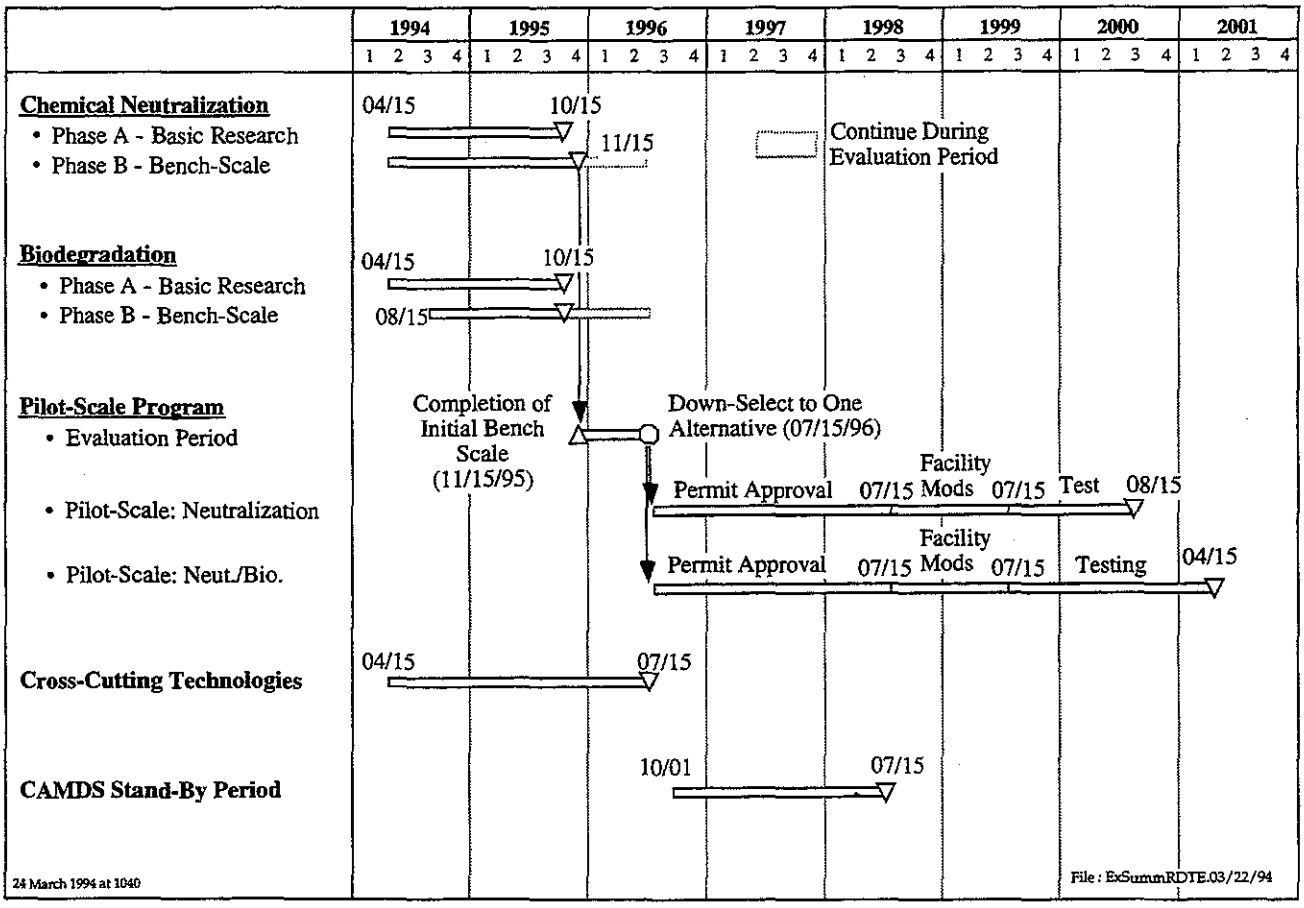


Figure ES-5. RDTE Program Summary Schedule

- Laboratory/Bench-Scale Research: $42M ($45M with inflation)
- Pilot Testing: From $138M - $157M depending on the technology selected for pilot testing ($163M - $186M with inflation)
- Implementation: From $326M - $436M depending on the technology selected for use at the bulk-only sites ($455M - $668M with inflation)

The cost figures presented above are only intended as an order-of-magnitude estimate and represent the projected increases over the current budget for the demilitarization and stockpile storage programs.

The Army recognizes that the concerns expressed regarding incineration are not limited to the two bulk-only sites. Accordingly, the Army will review the results from the laboratory/bench-scale program to determine if the technologies demonstrate the potential for a significant improvement either in safety or environmental performance. It is conceivable that the Army would recommend the expansion of the RDT&E program for possible application to other CSDP sites if the projected improvements are such that they outweigh the increased risk from extended stockpile storage. However, it must be recognized that the NRC has concluded that the likelihood is not high:

...time and money spent in search of a better technology are likely to result in program delays and increases in cumulative total risk, whatever the characteristics of any new technology. Although this conclusion remains to be confirmed with updated risk analyses, the existing evidence is strong enough to recommend that the disposal program proceed in parallel with the analyses and without deliberate delay.

Table ES-2.
Construction Start Dates and Disposal Finish Dates at All Sites Using Baseline Incineration and at Bulk-Only Sites Using an Alternative Technology

Continental United States Site	Baseline Schedule		Alternative Schedule		Alternative
	Begin Construction	Finish Disposal	Begin Construction	Finish Disposal	
Tooele	Finished	JUL 01	–	–	–
Anniston	SEP 94	SEP 02	–	–	–
Umatilla	JULY 95	JAN 03	–	–	–
Pine Bluff	AUG 95	DEC 02	–	–	–
Pueblo	FEB 96	JUNE 02	–	–	–
Blue Grass	JAN 97	MAR 03	–	–	–
Aberdeen	JAN 98	MAY 02	NOV 03 MAR 04	MAR 08 JUL 08	NEUT NEUT/BIO
Newport	JAN 99	APRIL 03	MAY 04 JAN 05	AUG 08 APR 09	NEUT NEUT/BIO

Russian Alternative Technologies

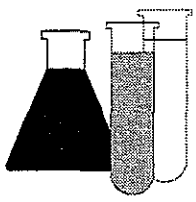
The Army has reviewed and assessed technologies under consideration for use in Russia to destroy the chemical weapons stockpile of the former Soviet Union. No industrial-scale chemical weapons destruction facility has yet operated in the former Soviet Union; but, from 1980 to 1989 the Soviet Army operated a transportable facility for the destruction of leaking organophosphorous chemical munitions, destroying approximately 4,000 munitions containing 280 tons of agent. In 1985, a pilot-scale (300-400 ton/year) facility using similar technology was built, but local opponents (fearful of environmental pollution and of industrial accidents) blocked its operation.

The KUASI process used in these facilities drains agent into a reactor vessel and mixes it with a reactive organic solvent or solution, which has first been used to decontaminate the inside of the drained munition. The liquid reaction mixture incubates for a substantial fraction of an hour at temperatures in excess of 100°C (212°F). The reaction products are cooled and diluted and then transported to a liquid incinerator for final destruction. The Russian agent destruction technology uses a relatively low temperature liquid incinerator compared to the CSDP Baseline and might not ensure destruction of agent to 100 parts per million without a preprocessing step.

The KUASI method burdens the liquid incinerator with more organic material than direct combustion of agent. This means that the incinerator and auxiliary equipment must be larger or operate longer and will generate more air emissions than direct incineration of neat agent. The additional nitrogen found in the organic solvents will elevate concentrations of NO_x in the combustion offgas compared with the Baseline.

The current Russian approach is therefore not seen as presenting any advantage over the U.S. Baseline incineration process with carbon filters. One recent Russian comparative assessment of agent destruction process concludes that "with due regard for the existing doctrine of providing the safest conditions of work and minimizing gas discharges into the air and [other] effluents, the method of direct combustion of toxic agents appears to be the most promising" (Zhdanov et al. 1993).

Russia has made no final selection of technologies for destruction of its chemical weapons stockpile. A number of alternatives to KUASI technology have been proposed. In most cases, it appears that Russian experience with these processes is limited to the laboratory. The U.S. Army intends to continue to follow closely the development of chemical weapon disposal technology in Russia.



Considerations of Public Concern

In response to increased public concerns regarding the selection of incineration as the Baseline disposal technology, the Army approached the NRC in 1991 for support in addressing the topic of alternative technologies. Since October 1992, when PL 102-484 was enacted, the Army has interacted extensively with the public and the state CACs. In the evaluations leading up to development of the conclusions and recommendations presented in this report, the Army has made a concerted effort to give each alternative technology every chance to succeed and meet the legislative criteria. Safety and environmental evaluations were done with as much precision as available data allowed. Schedule and cost projections, especially those done for the RDT&E Program, were done on a success-oriented basis.

Statements received from both the public and the CACs have been carefully considered. In particular, written statements that have been received from the state CACs since publication of the 1994 NRC report were factored into the Army's recommendations. The Army has responded to these statements by proposing a number of initiatives that will contribute to both the need for more public involvement and to the goal of minimizing total cumulative risk.

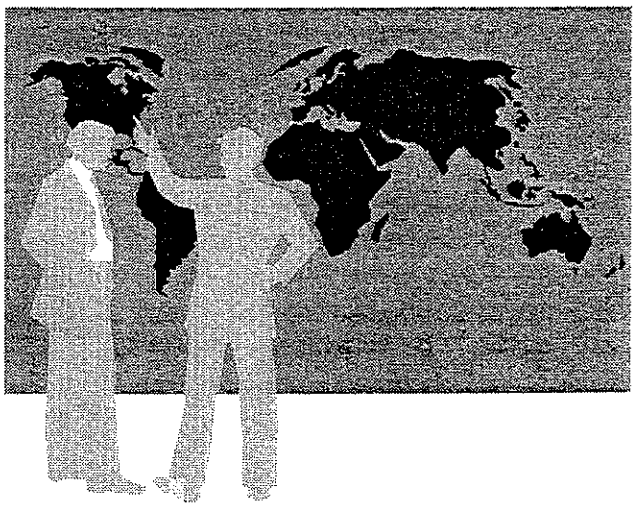
Several Commissions expressed a preference for neutralization-based alternative technologies. The NRC concluded that neutralization-based technologies offer the best chance for developing a viable alternative to the Baseline, and the Army agrees. Most Commissions also expressed the opinion that the Army should initiate an aggressive R&D Program. Although careful analysis has shown that no alternative technology can meet the legislative criteria, the Army has developed an RDT&E Program and is offering it for Congressional consideration.

A significant number of CAC comments focused on actions to make stockpile storage safer. The NRC expressed this same general opinion. The Army is initiating updated risk assessments to identify what actions could reduce the risk of stockpile storage and will implement any actions necessary to reduce total cumulative risk.

Comments were also received that suggested actions to improve the safety of the Baseline technology. The Army has initiated actions to demonstrate the capability of carbon filter systems to make the Baseline even safer and will incorporate carbon filter systems when successfully demonstrated and the funding is approved by Congress.

Also in response to the NRC and public comments, the Army is initiating a comprehensive Risk Management Program, which will include site-specific risk analyses, with the goal of minimizing total cumulative risk.

Finally, the Army is initiating a stronger multi-faceted public outreach program to both communicate better with the public on issues regarding the CSDP and to solicit public involvement. Actions such as local CSDP information centers, regular public meetings, and initiation of a risk perception program are all aimed at improving public involvement.



Conclusions and Recommendations

Based upon careful review of the 1994 NRC Report, the Army provides the following recommendations:

The total cumulative risk will decrease if the Chemical Stockpile Disposal Program is continued without delay. The Army recommends the continuation of the program without deliberate delay and the implementation of a two-technology RDT&E program.

- The Chemical Stockpile Disposal Program should continue without deliberate delay with utilization of the Baseline technology.

  Cost and Schedule Impact: None

- Risk assessments should be updated based upon the most recent methodologies and utilize updated data. Possible recon-figuration programs should be reviewed in terms of their impact on reducing the risk to public health and safety. The program should not be delayed pending completion of these updates.

  Cost Impact: $10.2 million
  Schedule Impact: None

- The evaluation of carbon filtration should continue with demonstration testing on two incinerator systems at Tooele. Efforts for implementation at all other CSDP sites should be initiated.

  Cost Impact: $260 million
  Schedule Impact: Assuming that the State of Alabama will grant a RCRA permit based upon the current application request, no schedule impact to the CSDP schedule is projected.

- The governor of each state with a storage site and various commercial hazardous waste firms should be contacted to determine if a viable receiving site for neutralized products can be identified.

  Cost and Schedule Impact: None

- An enhanced public outreach and involvement program should be implemented to include the formation of site offices at each storage location.

  Cost and Schedule Impact: This program is not directly related to alternative technology. Additional staffing and funding will be required for implementation. Preliminary estimates of impact range from 8-12 additional personnel and an annual cost impact ranging from $2-5 million. The Army is currently preparing a more detailed estimate for consideration.

- An enhanced stockpile surveillance program should be implemented for M55 rockets. In addition, a program to address the possible pressurization of mustard items and munitions should be initiated.

  Cost Impact: Initial assessments are estimated between $5 to $7 million annually.
  Schedule Impact: None

- A research and development program into the two low-temperature and pressure neutralization-based alternatives (stand-alone neutralization and neutralization followed by biodegredation) should be implemented in parallel with the current program activities. This program is targeted at developing a replacement technology as the primary means of agent destruction for potential application at the bulk-only sites.

  Cost Impact: Implementation of this recommendation will require the following funds through the first decision milestone (which technology, if any, to pilot at CAMDS):

Cost of Laboratory/Bench Phase (costs in $M):

	FY-94	FY-95	FY-96	TOTAL
Constant Yr $	4.8	23.8	13.7	42.3
OR IN				
Current Yr $ (includes inflation)	4.9	25.2	15.0	45.1

If a decision is made to pilot an alternative technology at CAMDS, pilot testing costs ranging from $138 million to $157 million (in constant FY94 dollars) are projected.

A decision to delay the activities at the bulk-only sites pending completion of the pilot testing will impact the cost for executing the disposal program at those sites. Projected cost impacts range from $326 million in constant FY94 dollars (if neutralization is selected for piloting but Baseline is eventually selected for use at the bulk-only sites) to $436 million in constant FY94 dollars (if neutralization followed by biodegredation is selected for piloting and eventual use at the bulk-only sites).

Schedule Impact: There is no immediate schedule impact from implementation of this recommendation. If, upon completion of bench-scale testing, a decision is made to proceed with pilot testing at CAMDS and to delay activities for the bulk-only sites, completion of stockpile destruction at the bulk-only sites will be delayed between 50 and 75 months depending on which technology is selected for pilot testing (stand-alone neutralization or neutralization followed by biodegredation) and depending on the technology ultimately selected for use at the bulk-only sites (one of the two neutralization-based alternatives or Baseline).

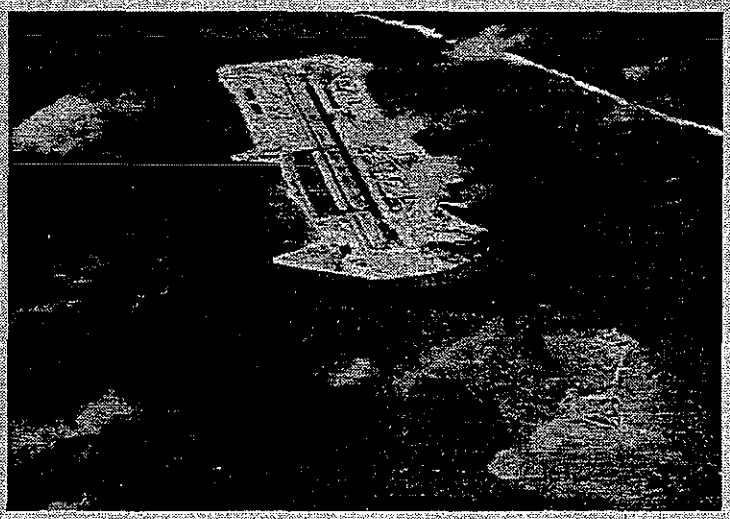
Evaluation of the HD Projectile Test:
Johnston Atoll Chemical Agent Disposal System
Operational Verification Testing

MTR 93W0000060
May 1993

Scott R. Macrae
James F. Klingener
Robert S. Wassmann

Alternative Technologies
for the
Destruction of Chemical Agents and Munitions

NATIONAL RESEARCH COUNCIL



Environmental Report for the Johnston Atoll Chemical Agent Disposal System

Operational Verification Tests 1 & 2
Johnston Island, 1990-1992

★ Chemical Materiel Destruction Agency • United States Army ★

September 3, 1993

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Umatilla Chemical Agent Disposal Facility
Phase 1 Quantitative Risk Assessment

DRAFT

Prepared by:

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Prepared for:

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SUMMARY

Phase 1 of a quantitative risk assessment (QRA) of the Umatilla Chemical Agent Disposal Facility (UMCDF) has been completed. The probabilities and public health consequences of potential accidental releases of chemical agent associated with facility operations have been estimated. In addition, the public risk associated with storage of the chemical munitions at the Umatilla Depot Activity (UMDA) has been assessed.

The intent of the U.S. Army Program Manager for Chemical Demilitarization (PMCD) is to have a comprehensive QRA completed for each chemical agent disposal facility prior to operation. The QRA will support a risk management program designed to help achieve the PMCD's prime objective: disposal of the chemical weapons stockpile while minimizing risks to the public, the workers, and the environment.

Background

The QRAs are being performed in two phases. Phase 1 is limited to an estimate of public health risk and is being done to provide a timely update of the previous risk assessments completed in 1987 in support of the Final Programmatic Environmental Impact Statement (FPEIS). Similar to the FPEIS analyses, the evaluation of the risk of disposal processing is compared to an evaluation of the risk of continued storage. The Phase 1 QRAs update the FPEIS risk analyses based on: 1) current chemical agent disposal facility design and planned operations, 2) relevant data collected since the FPEIS study was performed, 3) improvements in QRA methodology, and 4) declassification of the U.S. chemical weapons stockpile. The Phase 2 QRAs, which will be completed when the plans for the individual sites are finalized, will be a comprehensive assessment of risks, including estimation of worker risks associated with agent operations and explicit evaluation of uncertainty.

The UMCDF Phase 1 QRA draws heavily from the methods and models developed for the Phase 2 assessment of the Tooele Chemical Agent Disposal Facility (TOCDF) QRA. The UMCDF Phase 1 QRA assumed that UMCDF will be nearly identical to the TOCDF and will be operated in the same manner. The UMCDF Phase 2 QRA will update this as necessary based on UMCDF-specific design and operational plans. Although it uses models from the TOCDF study, the UMCDF Phase 1 QRA is based on site-specific evaluations of potential accidents and their consequences so that unique factors associated with the UMDA location, such as weather and seismic activity, are considered.

The scope of the UMCDF Phase 1 QRA is comprehensive in that it is intended to cover all possible causes of accidents that could lead to potential releases of chemical agent. This includes potential accidents initiated by failures of equipment or human error, as well as natural and manmade phenomena such as earthquakes and aircraft crashes. The study does not include intentional acts, such as sabotage, or any nonagent-related health risks.

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Risk Results

Figures S-1 and S-2 summarize the findings of the study concisely. Figure S-1 illustrates the risk of disposal processing at UMCDF, the risk of munition storage at UMDA during the approximate 3-year disposal period, and the risk of continued storage for 20 years (if no processing were undertaken). The risk during the disposal period accounts for the reduction in the inventory of munitions as they are processed at the facility. Figure S-1 illustrates, on the vertical scale, the probability of exceeding the number of fatalities shown on the horizontal scale. For example, the probability of incurring one or more public fatalities is approximately:

1 in 150,000 for disposal processing at UMCDF,
1 in 5,000 for stockpile storage during processing, and
1 in 350 for continued stockpile storage for 20 years with no processing.

The area under each of the curves in figure S-1 is the value most typically referred to as the *risk* (also termed *expected fatalities*). It represents the average risk over all accidents and potential consequences. The results of the Phase 1 QRA indicate that the fatality risk is approximately:

0.000049 for disposal processing at UMCDF,
0.014 for stockpile storage during processing, and
0.22 for continued stockpile storage for 20 years with no processing.

Another way of considering the expected fatalities is by the number of years (of processing or storage) that would be required, on the average, to result in one fatality:

67,000 years of disposal processing at UMCDF, and
90 years of continued stockpile storage at UMDA.

It should be noted that the risk is a summation of the products of accident sequence probabilities and their associated consequences. The risk of an infrequent accident with large consequences can therefore contribute equally with a more frequent accident with smaller consequences. In fact, although the average risk for continued storage is estimated to be approximately about a 20-percent chance of one fatality in 20 years, the risk is dominated by rarer events (such as earthquakes) that would likely involve more than one fatality if they occurred, but which occur much less frequently than once every 20 years.

Figure S-2 displays the risk results as the average risk per year during processing. On figure S-2, the processing risk is illustrated by campaign, each of which involves the disposal of a single munition/agent type. The changeover periods between campaigns are also illustrated. The risk varies among campaigns since munitions have different agents and agent inventories. The storage risk during processing is shown to decline as munitions are removed from the stockpile and is significantly higher than the

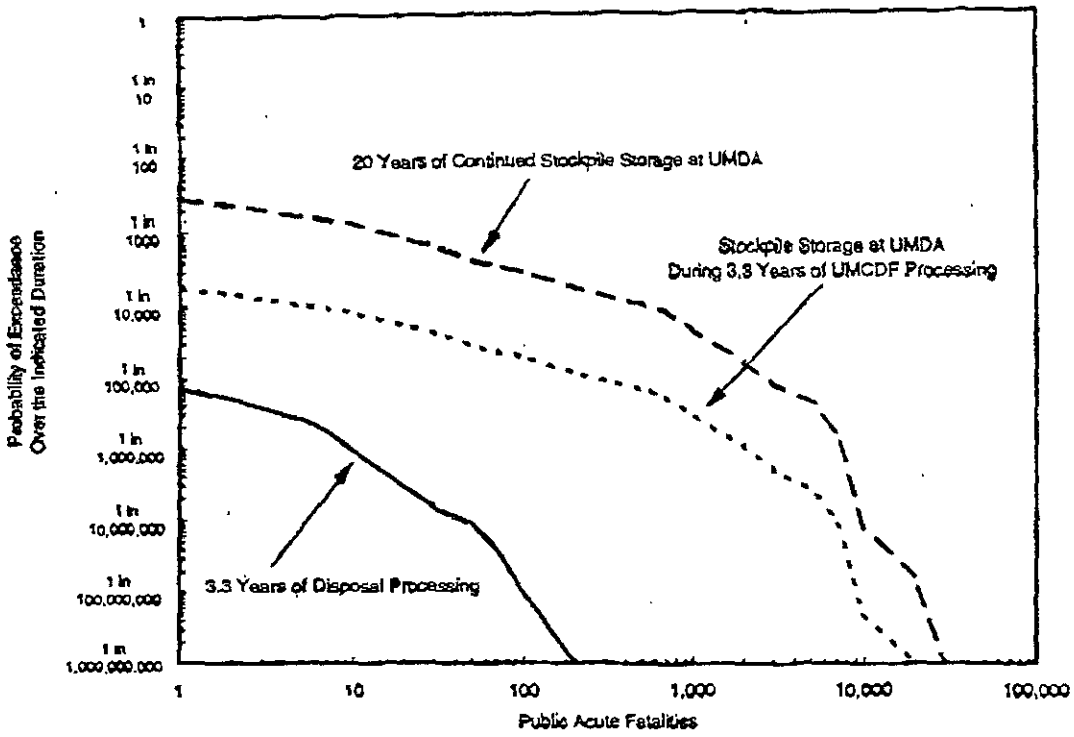

Figure S-1. Summary of Risk Results 1

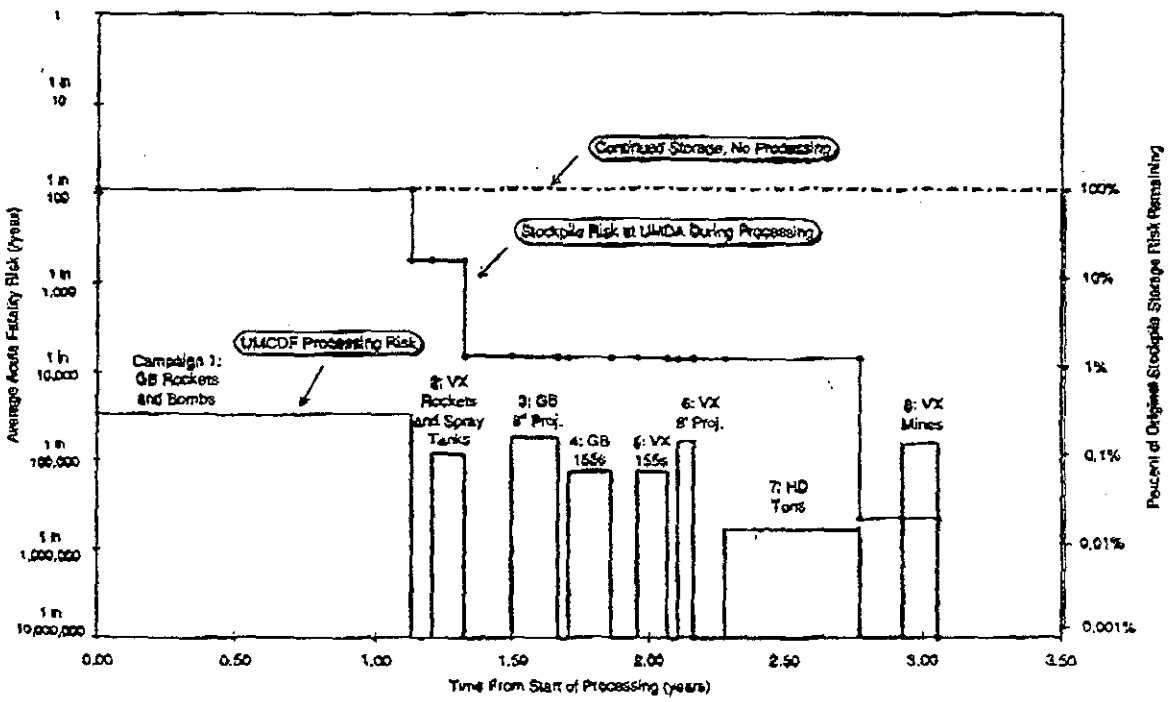

Figure S-2. Comparison of Risks During Processing 2

processing risk except during the last campaign (VX mine processing). The processing risk is slightly higher during this campaign because the mines are somewhat more vulnerable to earthquake-induced damage during processing. The risk of continued storage, assuming no processing takes place, is indicated by a dashed line. In reality, this expression of continued storage risk is incomplete because it does not account for the eventual risk of some type of disposal, and it does not account for any potential accelerated degradation (such as due to increased corrosion) which could be important for extended storage.

All of the risks described previously are acute fatality risks, meaning that they reflect immediate effects of a one-time accidental exposure to agent. The risk of latent cancer, induced by a one-time exposure to mustard agent, was also estimated. The latent cancer risk results indicate that this risk is negligible compared to the immediate effects of nerve agent exposure. In fact, the latent cancer average risk results suggest that there is a less than one in a million chance of a single induced cancer associated with all disposal processing or even 20 years of continued storage.

Risk Contributors and Insights

The results of the study have been examined to determine the accident types that contribute to the public risk. The following conclusions have been developed:

- Risks of processing and storage are dominated by a class of accidents called *external events*, so called because they result from influences external to the process. In particular, the risks of accident sequences initiated by earthquakes dominate the UMCDF processing risk. Earthquakes also dominate the risk of munition storage in the UMDA storage area. Although these are rare events, they would have widespread effects and could possibly result in large agent releases and public consequences.

- The earthquake risk at UMCDF is dominated by the potential for a structural failure of the container handling building unpack area. While the facility is built to appropriate earthquake codes, the second floor area has been analytically determined to be vulnerable to failure for earthquakes larger than those for which the facility was designed. In addition, this area can have a large inventory of munitions outside of their protective containers since this is where munitions are unpacked. It should be noted that because the facility has not yet been built, modifications to the design could significantly increase the capacity.

- Accidents within UMCDF that occur as a direct result of munition processing or agent destruction do not contribute significantly to risk. The low risk of processing activities is due primarily to the process safety and mitigation features and the limited quantities of agent available for release during most processing activities.

This Phase 1 analysis will be expanded in Phase 2 to include an explicit consideration of uncertainty, an evaluation of worker risk, and an assessment of any changes to the actual design and operations to be conducted at UMCDF.

- Activities related to munition storage at UMDA (i.e., normal maintenance activities) account for less than 1 percent of public risk.

- Nerve agents account for nearly all the risk, with the contribution from mustard munitions being small in comparison. Although VX is more toxic than GB, the evaporation rate of GB is so much higher that accidents involving GB have larger releases and correspondingly higher risk.

There are many more insights that have been developed from a detailed evaluation of the results. Sections 13 and 15 include a detailed listing of the potential accidents and the reasons for their importance to the risk profile.

Comparison to the Risk Assessment Supporting the FPEIS

As noted previously, one of the objectives of the UMCDF Phase 1 QRA was to update the risk assessment performed in 1987 in support of the FPEIS. The disposal process and QRA methods have matured since that study, so a one-to-one correspondence is not possible. It is possible to compare the public risk results; however, the results in the FPEIS were reported somewhat less specifically in order to protect the then-classified information concerning the munition inventories. The FPEIS results were given in terms of ranges to facilitate comparisons of risk while eliminating displays of the actual values. A further complication in comparing results is that the FPEIS risk analysis reported results for the process as originally conceived and for various cases including risk reduction, or mitigation, strategies. Since the process has now been fully developed and some of the proposed mitigation concepts have not been implemented (while different ones have been), it is difficult to determine a common baseline for comparison. (Detailed comparisons of all risk measures are provided in section 16.3). The following findings have been developed from a comparison of analyses and results:

- The risk of disposal processing is somewhat less than previously estimated in the FPEIS. For the Phase 1 QRA, compared to the FPEIS unmitigated case, the risk is slightly lower. Compared to the FPEIS mitigated case, the current risk estimate is near the upper end of the range reported for the mitigated case (4.9×10^{-5} compared to $< 1 \times 10^{-4}$).

- The risk of continued storage appears to be higher than previously estimated, but it is difficult to know for sure, because the FPEIS results were just reported as greater than a value (e.g., greater than 1×10^{-2}) rather than within a specific range. While it is judged that the risk of continued storage (as estimated in this Phase 1 update) is higher than previously estimated, it is within the ranges established programmatically in the FPEIS as a summation of risks for all eight sites.

Part of the difference in results is attributable to a change in QRA methods. In particular, the evaluation of potential consequences has changed significantly. The

consequence evaluations in this assessment are based on the same models for atmospheric dispersion and health effects used in the Army's D2PC code. However, the FPEIS used one weather condition for most calculations and another more severe (relative to risk) weather condition for calculating maximum fatalities. The Phase 1 QRA, in keeping with current QRA practices, uses probabilistic weather sampling, which accounts for the variability in site-specific weather that could occur during a postulated release. An average risk is derived by calculating the consequences for many different weather conditions and averaging them. These changes account for the differences in the maximum fatality risk measure. The FPEIS worst-case weather (used in its maximum fatality calculation) does not include some very stable weather conditions (which lead to higher consequences) that are fairly common near UMDA and are sampled in the probabilistic calculation in the Phase 1 QRA. The Phase 1 QRA also accounts for protective action (sheltering and evacuation) while the FPEIS assumed no protective actions.

The estimation of earthquake risk associated with continued storage is higher than previously estimated. The Phase 1 QRA accounts for the potential for munitions falling off stacks simultaneously in many igloos, resulting in possible leaks as munitions impact the floor or each other. Large agent leaks are also predicted to exit the igloo through drains or under the door. In addition, due to the widespread effects of the earthquake, no cleanup or mitigation was modeled for a 24-hour period following an earthquake. The earthquake analysis is more detailed in the Phase 1 QRA than in the FPEIS assessment, and the estimated risk is greater.

The disposal risks are estimated to be lower than previously calculated due to a combination of factors. More is known about the process now, and the models are more detailed. In particular, the models for munitions inadvertently placed in an incinerator now account for greater agent destruction due to the high-temperature environment, thus lowering the risk significance of these events, which were dominant in the FPEIS analysis. Evacuation as a protective action was included in all Phase 1 risk calculations, and it lowers risk by factors of two or more over a nonevacuation case.

Conclusions

It is clear from the Phase 1 QRA results that the risks of disposal processing are less than the risks of continued storage. This is the same conclusion that was reached in the risk analysis supporting the FPEIS. Further, the risk reduction due to munition disposal has been clearly shown. Risks at UMCDF and for munition storage at UMDA are associated with infrequent events having the potential for large consequences.

The risks, as currently estimated in the Phase 1 QRA, are consistent in magnitude with the risks estimated previously in the FPEIS. Although the relative contributors and absolute risk results are different, the UMCDF Phase 1 QRA results lie within the ranges of risk established across all facilities, indicating that there is no major shift in estimated risks.

Summary Evaluation of the Johnston Atoll Chemical Agent Disposal System: Operational Verification Testing

MTR 93W0000036
May 1993

Client Office of the Program Manager for Chemical Demilitarization
Contract No. DAAA15-89-C-0518
Project No. 3201A
Dept. H051

MITRE

McLean, Virginia

MITRE Department
and Project Approval: Douglas M. Medville

Douglas M. Medville

ABSTRACT

As part of its program to destroy its obsolete chemical warfare munitions, the U.S. Army has constructed a prototype demilitarization plant on Johnston Island in the Pacific Ocean. The plant has completed its 32-month operational verification test. During the test, the plant destroyed over 40,000 munitions of three different types, containing three different chemical agents. There were no public or worker injuries or fatalities from agents or munition fire or explosion. The plant emitted no agent, except for one occurrence which posed no significant worker or public health risk. The plant operated within environmental emission and waste disposal requirements, but did not comply with all procedural and administrative regulatory requirements. The plant generally demonstrated the ability to meet throughput goals for short periods of time, but while showing improvement during the test, the plant did not achieve the long-term average throughput rate goals established prior to testing. Based on the test, MITRE concludes that there are no apparent fundamental safety, environmental, or process-related problems in utilizing the technology used on Johnston Island for disposal of chemical munitions in the Continental U.S. sites. However, it is desirable that improvements be made in each of the areas to increase further the assurance of safe, environmentally-sound operation, and to achieve higher throughput rates. This will require particular attention to the operation and management of future plants.

ACKNOWLEDGMENTS

Many persons have contributed to the preparation of this report. MITRE staff Alan Goldfarb, Daisy Ligon, and John Menke conducted the major portions of the analysis and prepared the majority of the report. Also contributing were MITRE staff on Johnston Island conducting the evaluation of the fourth test: Hans Carlson, Michael Hermes, Fred Klingener, Scott Macrae, and Robert Wassmann. Management guidance was provided by Douglas Medville and David Morrison. Special thanks are due to the many members of the MITRE support staff who assisted in production of this document. We wish also to acknowledge the cooperation of the military and civilian staff members of the U.S. Army throughout the course of the OVT.

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EXECUTIVE SUMMARY

Public Law 99-145, as amended, requires that the United States (U.S.) Army destroy (demilitarize) the stockpile of obsolete U.S. chemical warfare munitions and agent. These materials are currently stored in eight different locations in the U.S. and on Johnston Island (JI), which is located about 800 miles southwest of Hawaii in the Pacific Ocean. The Army has constructed a prototype demilitarization facility on JI called Johnston Atoll Chemical Agent Disposal System (JACADS). JACADS was the first full-scale, fully-integrated demilitarization facility to be built and will serve as a prototype for the facilities to be constructed at each of the eight U.S. storage locations. JACADS was designed to destroy chemical munitions stored on JI using a system that separates the different munition components (explosives, agent, and metal munition bodies), and processes each in an incinerator designed for the component. In Public Law 100-456, the Army was required to demonstrate the ability of the JACADS to demilitarize the munitions consistent with the safety and environmental protection goals of the Army's Chemical Stockpile Disposal Program. This demonstration, called the Operational Verification Testing (OVT), consisted of four distinct tests involving different agents and munitions. The testing took place between July 1990 and March 1993.

The Army contracted with The MITRE Corporation to observe and evaluate the results of the tests, and to prepare reports documenting each test and a summary report. This Summary Report provides an overview of the performance of JACADS during the four tests with respect to the overall concerns of safety, environmentally-sound operations, and process performance. In addition, using the JACADS experience as a basis, this report includes projections of the likely system operation for similar munitions at the various U.S. sites.

SAFETY PERFORMANCE

JACADS met the OVT safety performance goals that were established for it. During OVT, there were no injuries or fatalities associated with the handling of agent or munitions, and industrial injuries were within the range typical of industrial chemical facilities. As expected, events did occur that challenged the levels of protection designed into JACADS. The demonstrated safe operating record of JACADS during OVT reinforces the importance of having safety in depth incorporated into the plant design and operating procedures.

Some of the design features of JACADS and planned demilitarization facilities that are especially important include:

- Control of air movement in contaminated areas to prevent migration of agent
- Provision of multiple levels of backup power supply
- Isolation of activities such as explosives removal
- Large margins of safety in the incineration and air exhaust systems
- Separation of people from processes by use of remote and computer control
- Full coverage of the facility using automatic, near real-time agent monitors
- Extensive use of closed-circuit television monitoring
- Extensive use of electronic process monitoring and computer data handling

The JACADS contractor operated an active safety program during OVT. In addition, the Army and other agencies provided extensive oversight and review of the operations.

Challenges to the plant design did demonstrate several notable shortcomings in some of the systems or their operation. In each case, the Army and its contractors have investigated the problems and have installed or plan to install corrections. These areas included:

- Failure of the back-up power and related control system software to operate properly when restarting the plant following loss of power

- Ventilation system failures or inadequacies that on occasion did not fully control agent migration within the facility

- Inadequate control and documentation of software and system design changes

- Control systems that did not maintain accounting of the processing status of each munition

The adequate performance of staff is also essential to the proper operation of the safety systems of the plant. While staff training met minimum mandated requirements, there were instances of performance errors that either led to operating or safety problems, or exacerbated them. The relative effects of other factors (e.g., training, inadequate system designs, faulty or non-existent procedures, or supervisory oversight) in these instances could not be separated in evaluating the causes of these performance errors. The Army's upgraded training program should contribute to improving staff performance at both U.S. plants and at JACADS.

ENVIRONMENTAL PERFORMANCE

The OVT demonstrated that the JACADS process can meet federal regulatory standards and can operate without adverse environmental impact. JACADS operated within applicable environmental regulations with respect to discharge of agent and non-agent air emissions and, with few exceptions, met all operating permit requirements. Waste materials were disposed of in approved locations. Noncompliance with the procedural and administrative requirements in the environmental permits occurred. These included minor non-agent discharges to the ground (without environmental impact), problems in the long-term storage of wastes, and errors in record keeping and inspection. There are no apparent fundamental problems in meeting regulatory standards in future U.S. plants, unless the standards are significantly more restrictive than those in effect for JACADS.

However, there were several areas in which problems have occurred in the past. Programs are underway to address these areas, and will help ensure conformance to the regulations. These areas include the following:

- Emphasize the tracking of the requirements of the applicable permits
- Seek permit conditions that provide for increased flexibility in process operations while protecting environmental quality
- Provide for long-term storage and disposal of agent-contaminated protective equipment
- Achieve reliable operation of the Brine Reduction Area to manage liquid wastes
- Achieve reliable operation of the Dunnage Incinerator to manage solid wastes
- Improve the effectiveness of personnel training concerning environmental regulations

PROCESS PERFORMANCE

During OVT, JACADS demonstrated the ability to demilitarize M55 rockets containing GB or VX, and ton containers and 105 mm M60 projectiles containing HD. During the tests on rockets and ton containers, JACADS generally met its short-term single shift throughput goals, but was unable to meet long-term throughput goals established prior to OVT. Process improvements that have been demonstrated or planned will likely allow similar plants in the U.S. to achieve the JACADS OVT throughput goals, although at least in the near-term still

falling short of the plant design goals established by the Army for the U.S. plants. The projectile test showed that the processes could approach or meet short-term goals. However, projectile operations were not sufficiently reliable or of sufficient duration to draw firm conclusions concerning sustained long-term throughput.

Though the JACADS performance fell short of the desired goals, its efficiency of operation was generally consistent with start-up problems seen in industrial process plants that use similar processes. The experience of such plants typically shows that a two- to five-year period is necessary to identify and correct problems in process design and operation and to achieve the design performance of these plants.

JACADS is a first generation chemical munitions disposal facility, and as such its prototype nature was a major cause of performance shortfalls. In addition, JACADS encountered a variety of munition and agent-specific problems that could not have been foreseen in the tests that were conducted with inert, simulant-filled munitions prior to OVT. These problems are not unusual for a first generation plant processing a unique feedstock, in this case, a substantial variety of obsolete chemical munitions and containers. Operational performance showed that significant engineering development still was needed on several of the systems. While much of the needed engineering has now been conducted, it is possible that additional problems may develop as the JACADS and U.S. plants are run for longer periods and on a more intense, 24-hour per day, schedule. At JACADS, the Army had both successes and failures in diagnosing and correcting system performance problems. However, a program is in place to transfer the lessons learned to the U.S. plants, and additional testing is planned at JACADS to identify solutions for the remaining problems. In addition, to ensure early identification and correction of problems, the Army plans to process those munition types located on Johnston Island before processing similar munition types at U.S. plant locations.

Major process systems that appear to require additional engineering refinement and test to improve system availability include the Deactivation Furnace System, the Liquid Incinerator, and the Multipurpose Demilitarization Machine. Of these, the first two are adapted from systems used in industry, while the third is a special purpose machine. The corrections and improvements needed all appear to be well within the state of the art. Although operating in a support role on JI, the Brine Reduction Area and the Dunnage Incinerator did not achieve full operation. These systems will require additional engineering and testing. Both of these are adaptations of standard industrial systems and were not developed specifically for chemical munition disposal. The backup power systems failed on several occasions during OVT, and require more detailed testing at all sites to ensure reliable operation.

CONCLUSION

The JACADS plant completed its OVT with the destruction of more than 40,000 munitions over a period of 32 months.

There were no public or worker injuries or fatalities from agents or munition fire or explosion, and the plant met the safety goals established for it.

The plant emitted no agent (except for one occurrence that posed no significant worker or public health risk) and operated within permit requirements for other discharges. Although not satisfying all administrative permit requirements, the plant demonstrated its ability to meet federal regulatory standards and to operate without adverse environmental impact.

JACADS demonstrated its ability to destroy rockets, ton containers, and projectiles containing three types of agent. The plant approached or met short-term throughput goals, but did not meet long-term average process rate goals. Although not achieving the throughput goals specified prior to OVT, the performance was within the range of startup performance for similar industrial pioneer processing plants.

The JACADS design has no apparent fundamental problems in achieving safety and environmental goals at planned U.S. plants, although continued improvements in these areas will increase further the assurance of safe, environmentally-sound operation. The implementation of the lessons learned from the OVT combined with additional engineering refinement should enable JACADS and U.S. plant performance to approach or exceed the OVT throughput rate and design goals.

SECTION 1

INTRODUCTION

1.1 BACKGROUND

Public Law 99-145, as amended, requires that the Army destroy (demilitarize) obsolete United States (U.S.) chemical warfare munitions and materials. These materials are currently stored in eight different sites in the Continental U.S. and on Johnston Island (JI) which is located about 800 miles southwest of Hawaii in the Pacific Ocean. Because of concerns for risks in transportation of the materials, the current program calls for the construction and operation of chemical munition disposal facilities at each of the eight locations in the U.S. Figure 1-1 shows the U.S. sites, and identifies the types of munitions* stored at each. The various munitions contain different chemical agents, including nerve agents GB and VX, and blister agent H/HD, also called mustard. Not all munitions are configured for all agents.

As a part of the development of this program, the Army constructed a prototype demilitarization facility on JI called the Johnston Atoll Chemical Agent Disposal System (JACADS). Figure 1-2 shows the location of JI, as well as a drawing of the JACADS facility on the island.

JACADS was designed to destroy chemical munitions stored on JI. The design of JACADS was based on prior testing of prototype and smaller-scale demilitarization facilities. However, JACADS was the first full-scale, fully-integrated demilitarization facility that would serve as a prototype for additional facilities to be constructed in the U.S.

In Public Law 100-456, as a prior condition to proceeding with systemization and operation of demilitarization facilities in the U.S., the Army was required to demonstrate the ability of JACADS to demilitarize the munitions consistent with the safety and environmental protection goals of the Army's Chemical Stockpile Disposal Program. This demonstration was called Operational Verification Testing (OVT).

While not including all munition and agent combinations found in the U.S. locations, the JI inventory is representative of the chemical munitions stored in the U.S. The Army reviewed the various munition and agent combinations, and concluded that tests of three munition types

*The term "munition" technically does not include ton containers or spray tanks; however, for simplicity of terminology, it is used in this report to describe all agent-containing items.

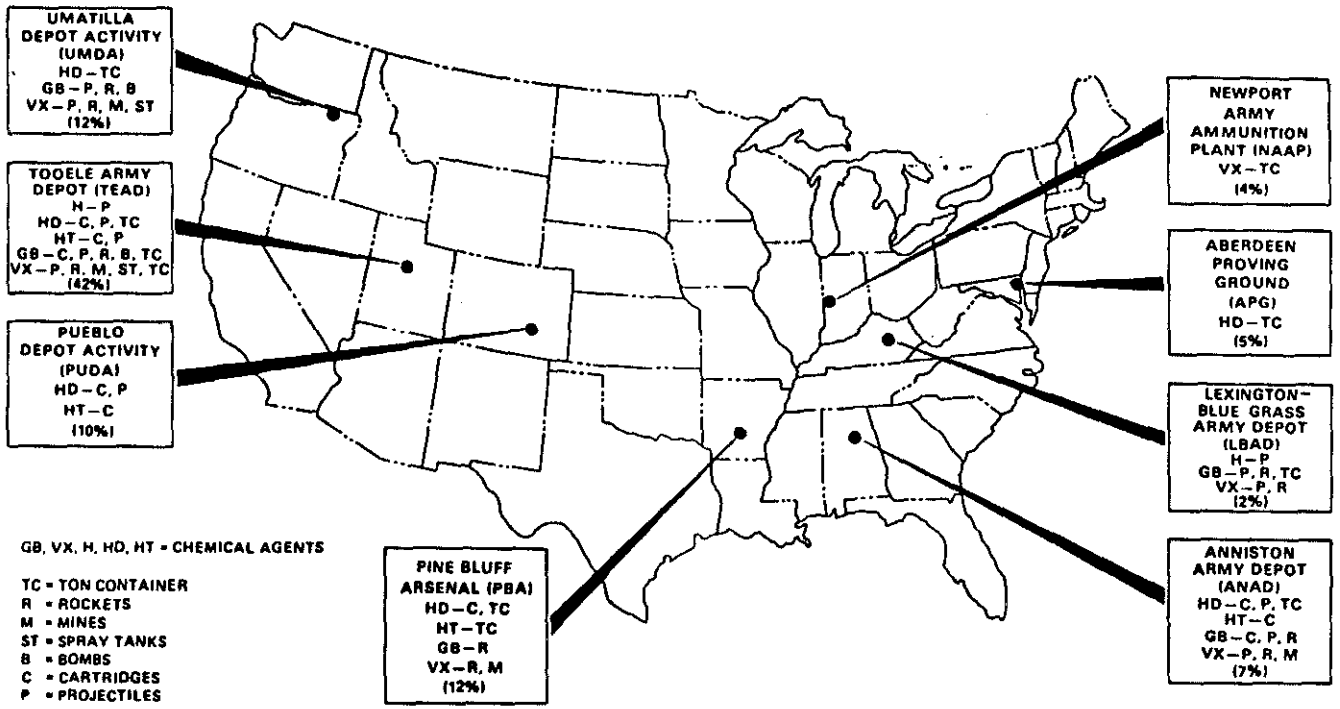


Figure 1-1. U.S. Chemical Munition Storage Sites

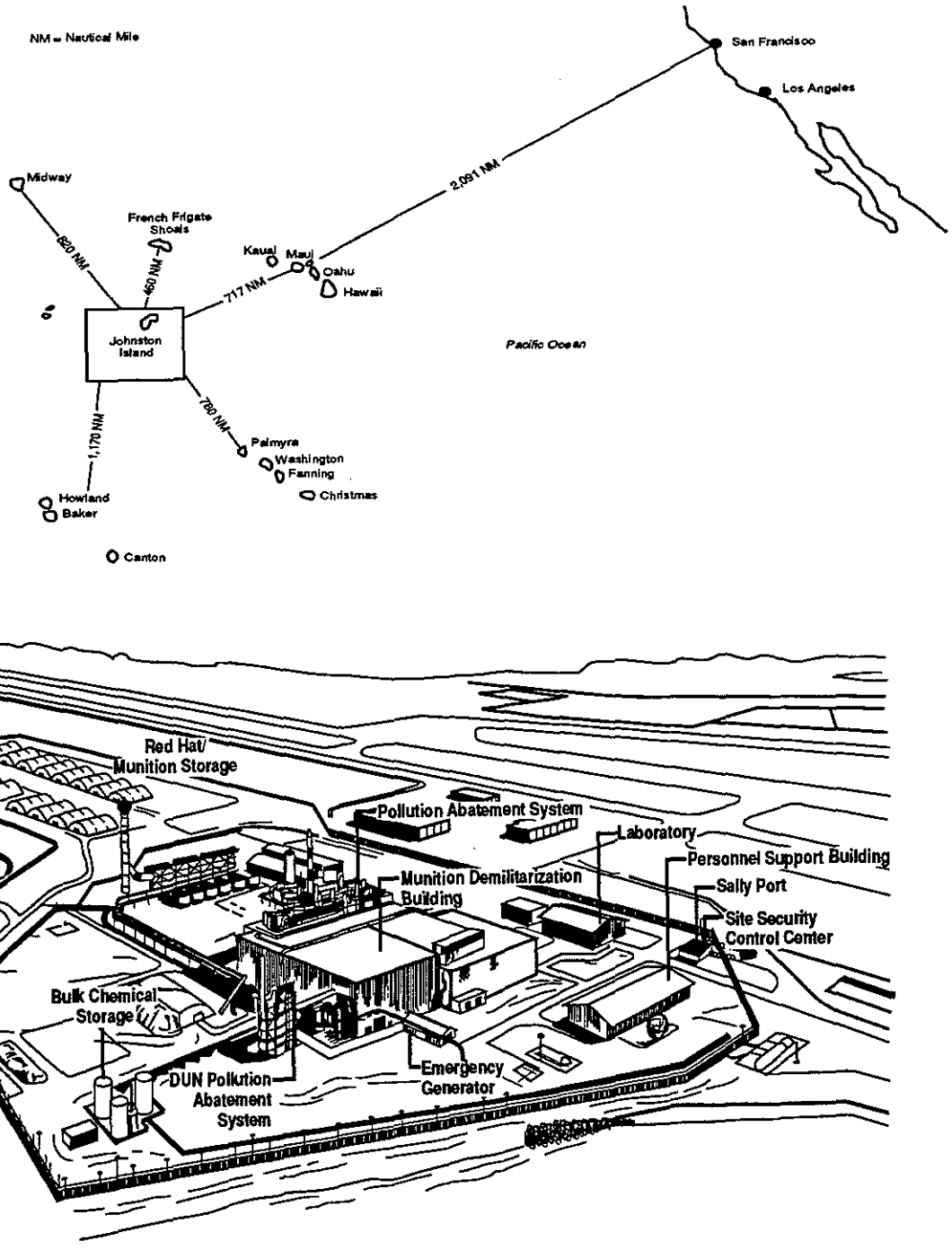


Figure 1-2 Location of Johnston Island and JACADS

containing three different agents would provide the information needed to evaluate the suitability of the JACADS process for the demilitarization of the stockpile munitions. Demilitarization of rockets would test the ability to access and destroy agent and explosive in thin-walled munitions, ton containers of agent would test the ability to destroy materials from large thick-walled containers, while projectiles would test the ability to access and drain agent from thick-walled containers using disassembly procedures. The Army also concluded that testing the destruction of GB, VX, and HD provided a good test of the ability to remove and destroy the types of agents constituting the major portion of the stockpile, while also testing the effectiveness of the necessary agent monitoring systems.

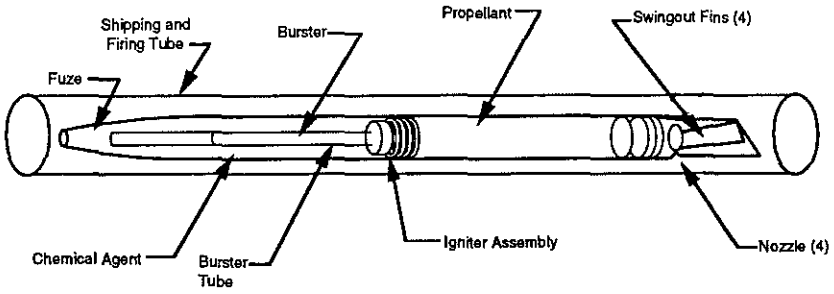
After this review, the Army designed the OVT to include four separate tests:

- OVT1–M55 Rockets containing GB nerve agent
- OVT2–M55 Rockets containing VX nerve agent
- OVT3–Ton (bulk) Containers of HD Mustard blister agent
- OVT4–105mm M60 Projectiles containing HD Mustard blister agent

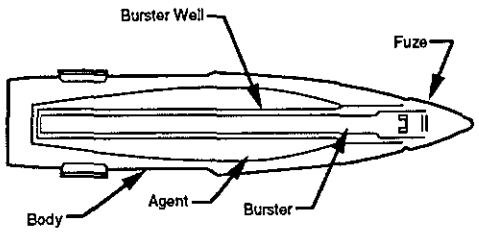
Each test was designed to demonstrate operation of JACADS on a fully-integrated basis. By the end of OVT4, all major process systems would have been operated. Table 1-1 gives a summary of the properties of each of the agents, while figure 1-3 shows diagrams of each of the munitions. The quantities of munitions destroyed were intended to be sufficient to demonstrate the ability to destroy the munitions stored in the U.S. sites.

Table 1-1. Characteristics of Chemical Agents

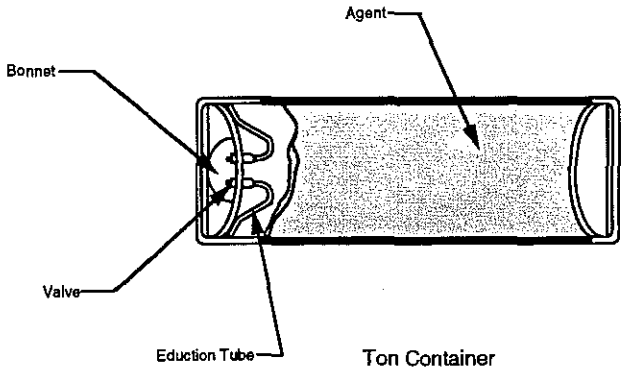
Agent	Common Name	Appearance (25 ° C)	Mode of Action
GB	Sarin	Liquid, clear to amber	Nervous system poison primarily by vapor contact
VX	-	Liquid, clear to straw	Nervous system poison primarily by liquid or droplet contact
HD	Mustard	Liquid, amber to dark brown	Blistering of exposed tissue primarily by liquid or droplet contact



M55 Rocket



105MM Projectile



Ton Container

Munition	Length	Diameter	Weight	Agent
M55 Rocket	78 in.	4.5 in.	57 lbs.	10 lb. GB or VX
Ton Container	82 in.	31 in.	3100 lbs.	1700 lb. HD
105mm M60 Projectile	19.5 in.	4.1 in.	35 lbs.	3 lb. HD

Note: Dimension and weights are approximate

Figure 1-3. Munitions Destroyed During OVT

The Army contracted with The MITRE Corporation to observe and evaluate the operation of JACADS during the OVT. MITRE established an on-site office, and maintained staff on JI throughout the OVT. Prior to the OVT, MITRE prepared an OVT Test Directive that established more than 250 criteria to guide the detailed performance evaluations. MITRE prepared detailed reports evaluating the performance of JACADS during each of the four tests. The titles of these and related reports are listed in appendix E.

This Summary Report provides an overview of the performance of JACADS during the four tests with respect to the overall concerns of safety, environmentally-sound operations, and process performance (including both the throughput rates and the performance of each major system). In addition, using the JACADS experience as a basis, where possible MITRE has made projections of the likely performance to be expected at the U.S. sites for the JACADS technology operating on similar munitions. The individual test reports provide further information on the details of system performance.

1.2 PROCESS DESCRIPTION

The JACADS includes components and processes tailored to the disposal of each munition or agent. Most of the plant is made up of components used for similar material handling or incineration purposes in industry. Some of the equipment used for accessing and removing explosives or agent is unique to chemical munitions demilitarization.

Because only one munition and agent combination is processed at a time, the processing systems are configured to support each test. Some systems, such as the Liquid Incinerator (LIC) that destroys agent, are used in all of the tests, while other systems such as the Rocket Shear Machine (RSM) are used in only one or two tests. A very brief description of the demilitarization process is provided below, while appendix A provides more detail, as well as schematic diagrams of each of the processing configurations.

- For OVT1 and OVT2 (the rocket tests), the demilitarization process involves punching holes through the shipping/firing tube and the rocket, draining the agent, and burning the agent in a LIC. The rocket is then sheared into pieces using an RSM, and burned in the Deactivation Furnace System (DFS).

- For OVT3 (the ton container test), the process involves punching holes in the metal container (holding approximately 1700 pounds of agent) at the Bulk Drain Station (BDS) and withdrawing and burning the agent in the LIC. The container is then decontaminated by heating it in the Metal Parts Furnace (MPF) to destroy residual agent.

- For OVT4 (the projectile test), the process involves removing the explosive components using a Projectile/Mortar Disassembly Machine (PMD), and burning the components in the DFS. The agent is accessed and withdrawn by the Multipurpose Demilitarization Machine (MDM) and burned in the LIC. The empty projectiles are decontaminated by heating them in the MPF.

The disposal of the munitions is carried out within a Munitions Demilitarization Building (MDB). The demilitarization activities involving explosives or agent are carried out remotely, under the control of computer-actuated equipment. Staff in the Control Room monitor operations, and can process munitions either automatically or may use "manual" (remote) control. Additional support systems include Pollution Abatement Systems (PASs), dunnage incinerator (DUN), Brine Reduction Area (BRA), data management, maintenance activities, and safety. A ventilation system maintains negative pressure in the processing areas (to control agent migration), while a charcoal filtering system removes agent from the air before discharge.

A laboratory supports operation of agent monitors at 91 points within the MDB, and at 12 points in the areas outside the plant. Depending on the location, the monitors include an Automatic Continuous Air Monitoring System (ACAMS) that provides a measurement of agent concentration about every five minutes, and/or a Depot Area Air Monitoring System that provides average agent concentration readings over 1 to 12 hours. Monitors are generally operated in pairs, with the furnace Common Stack also containing backup systems.

Maintenance activities in agent-contaminated areas are carried out by workers using personal protective equipment. Work in the most contaminated areas is conducted by personnel wearing the Demilitarization Protective Ensemble (DPE). The DPE provides a sealed garment for the worker, with the provision of external air and communication equipment.

1.3 SIMILARITIES AND DIFFERENCES BETWEEN JACADS AND U.S. FACILITIES

As noted above, this document not only describes the JACADS OVT experience, but draws on this experience to develop projections for operations at the U.S. sites. The OVT was designed to demonstrate that the basic JACADS processes operating in sustained operation could meet expectations for safety, environment, and process performance for similar plants in the U.S. The degree of similarity and difference between JACADS systems and operations and those at U.S. facilities will affect the reliability of the projection.

These factors include the following:

- JACADS was a prototype facility, while the U.S. plants will have the benefit of the lessons learned from operating JACADS.

- JACADS operated 8-12 hours/day, 6 days/week, 2-4 months/test, while U.S. plants will operate 24-hours/day, 5-6 days/week, 2-16 months per munition.

- In many design areas—especially for those machines and systems having direct contact with munitions, agent, or their products—exactly the same design will be used, modified only as experience at JACADS or other requirements dictate. In other areas, especially in the support systems, the design concepts will be the same, but the hardware used may change depending on availability of equipment or technological advances.

- JACADS tested operations with three different munitions and agents. U.S. plants will destroy additional quantities of these munitions, as well as some types not tested during OVT. The Army plans to test the demilitarization for most munition types at JACADS before processing these munition types at U.S. plants.

- JACADS and the U.S. sites will have similar overall management structures, with each facility operated by a private contractor with on-site Army oversight. U.S. facilities may have different contractors at different sites.

- The location of JI in the central Pacific caused significant operating difficulties for the Army and its contractors. These difficulties included the time and logistics of providing supply to the island, especially of replacement or modified devices and materials. Logistics at U.S. plants should simplify and speed up the response to operating problems. As a result, less management attention will be required to provide basic services at U.S. facilities.

- The location and restrictive living conditions (e.g., non-working dependents are not allowed) on JI may have limited the pool of available workers as compared to the U.S.

- Many performance problems were caused or exacerbated by inadequate JI utilities external to JACADS. This situation should improve in the U.S. plants.

- Since JACADS is not in a state, the operation was not subject to state law and regulation as will be the case for facilities in the U.S.

It is important to note that the Army has in place formal "Lessons Learned" programs. These programs are designed to capture the experience at JACADS and ensure its application in the U.S. plant designs and operation. The Design Lessons Learned program tracks equipment and system design changes made (or considered) at JACADS to improve operation, and ensures incorporation of the changes into the U.S. plants. The Programmatic Lessons Learned program captures the changes to operations such as those embodied in changes in the Standing Operating Procedures (SOPs) and other operational guides that were developed at JACADS. The Lessons Learned programs are essential in transferring experience from JACADS to U.S. plants.

The lessons learned are incorporated into the U.S. plants by several means. Design changes derived from JACADS experience and reviewed by the Army will be included in the designs of the new plants. Operational lessons are similarly controlled by Army direction to its contractors, and by Army review.

Improved training is an essential element in maintaining and improving U.S. plant operations. Since OVT began, the Army has developed a much more comprehensive training program than that used at JACADS, and includes the use of simulators and realistic training on actual demilitarization equipment at the Chemical Demilitarization Training Facility (CDTF), in addition to classroom work. The JACADS experience demonstrated the importance of this program.

Although several differences exist between JACADS/OVT and U.S. plants, it is MITRE's conclusion that the OVT experience did provide a sufficient basis to establish that safe operation, environmental compliance, and adequate process performance can be expected at U.S. plants.

SECTION 2

SAFETY PERFORMANCE

JACADS met the OVT safety performance goals that were established for it. As expected, there were no injuries or fatalities arising from the processing of agent or munitions. Industrial injuries were within the range typical of industrial facilities using analogous processes. Events did occur that challenged the levels of protection designed into JACADS. While none of these presented (nor could have presented) significant public risk, some events increased the probability of agent exposure or injury to workers. The lack of agent or munition injury demonstrates the importance of having "safety in depth" incorporated into the facility design and operation.

2.1 BACKGROUND

The safety evaluation included consideration of injury or potential injury to the workers or the public arising from the three distinct sources of risk: exposure to chemical agent, munitions (fire and explosion), and industrial operations.

It is obviously desirable to conduct a process such as JACADS in a totally safe manner all the time; i.e., without injury or possibility of injury to workers or the public. However, since no activity is totally safe (including leaving the munitions in storage), any demilitarization process must be designed to include multiple levels of safeguards, and must be operated with rigorous attention to the requirements of safe operation. While a process such as JACADS does operate safely virtually all of the time, inevitably there are occasions when errors or faults occur that challenge the successive levels of protection. The safety experience of JACADS OVT includes both the record of normal operation, and those occasions when the design safeguards were challenged.

Risk analyses performed as part of the planning for the U.S. plants have shown, on the average, that more than 5,000 years of operation of a JACADS-type facility would likely occur without fatality to a member of the public. Obviously, a test of JACADS for 1–2 years of actual operation, in a location that has a very low population, would not, by itself, prove that the public safety of plant is as good as predicted. The expected risk of injury or fatality from agent- or munitions-related causes for workers as shown by the safety record of the Army chemical demilitarization program was also so low that no worker fatalities or major injuries were likely in a test of this duration.

Thus, evaluating the safety experience also required examining whether events and incidents occurred that did not lead to injury, but might have done so if some condition of the event had been plausibly different. Of course, judgment is required in identifying the relevant events, and in estimating their degree of significance. The Test Directive that established the methods of OVT evaluation labeled these incidents, as well as all agent discharge events, as "critical events". Critical events were to be identified and discussed in the OVT reports as relevant to the safety concerns of the test. Four significant agent-related critical events occurred in 32 months of testing. None of these resulted in injuries. The events are described in appendix B.

Finally, some problems associated with system design or operations created situations that appeared to increase the possibility of injury, even though not necessarily meeting the criteria of agent-related critical events. These are discussed below in section 2.5 as some of the areas of concern.

2.2 JACADS SAFETY CONSIDERATIONS

The JACADS facility is designed to maintain safe engineering control of agent; exposure to or release of agent under normal and emergency conditions is not possible due to any single human failure or single event failure of the plant systems. One of the best examples of the use of multiple levels of protection are the steps taken to keep agent within the MDB and prevent its discharge into the environment. In addition to airtight doors, in all areas where agent might be present, the plant operates at a pressure below atmospheric, so that any air movement is **into** the plant, which means agent cannot leak out. The only places where agent can normally leave the plant are through the ventilating system discharge (which is charcoal filtered and monitored), and the furnace exhaust systems (which are subject to high temperature and are monitored). Even if the ventilating system, furnace systems, power supplies, and backup power supplies should fail, the plant remains tight, allowing sufficient time to reactivate these engineering controls.

Another design feature is that virtually all the processing of the munitions and agent is by mechanical and automated equipment, under computer control, with both software and hardware safety interlocks and with human (operator) oversight. Checks and balances are built into the mechanical and the human operating systems to minimize the effects of human error or equipment failure.

These same techniques minimize danger from the energetic material in the munitions (i.e., explosion or fire from the explosives or rocket propellant present). Operations that involve a potentially significant risk (e.g., shearing rockets into parts) are conducted in an explosion-

proof room, with controlled amounts of munitions present. The incineration of the disassembled and sheared munitions is conducted in a controlled manner, so that quantities of energetic materials burned at any one time are limited. The DFS incinerator that destroys explosives, its enclosure, and associated equipment are designed to contain the effect of an explosion if one should occur.

Additional design and operational safety features include:

- Use of extensive staff training and certification programs, as well as the holding of contingency exercises to test emergency operations and training
- Provision of SOPs and related documents to guide most normal operations
- Establishment of Limiting Conditions of Operations, which is a list of requirements that must be satisfied before starting and while continuing demilitarization operations
- Use of intensive inspection and enforcement activities by the operating contractor, the Army on-site personnel, and visiting inspectors and reviewers
- Conduct of formal investigations of events that had potential safety implications

The operating contractor conducted a safety program throughout the OVT. This program was under the direction of the safety department. Although the staffing level and activities varied through the OVT, the safety staff generally performed the following:

- Conduct walks through the facility during each shift
- Identify, write citations for, and follow up on safety violations
- Identify and improve plant practices that could be performed in a safer manner
- Participate in the evaluation and review of safety events
- Provide safety training
- Assist operations and maintenance staff in developing safe procedures
- Conduct all required safety inspections and activities
- Approve safety-related operation or maintenance activities
- Advise and participate in emergency event mitigation
- Review SOPs

The U.S. plants will embody the same general safety approaches used at JACADS. These include emphasis on engineering safety into the building and process design, extensive training

of staff, and oversight of operations. As discussed in section 1.3, lessons learned from JACADS are to be incorporated into both the U.S. plant designs and plant operations.

2.3 WORKER SAFETY

Prior to the beginning of OVT, the Army decided that the measure of worker safety to be used was the Cases With Days Away (CWDA) or lost workday cases. The goal was decided to be 2.1 CWDA per 200,000 hours worked. The Army had demonstrated this level of worker safety at a similar chemical demilitarization plant, and the value is within the range experienced by chemical industrial plants. Figure 2-1 shows the OVT experience by month. The average value over the OVT period was 0.93, which was better than the goal of 2.1.

Although not established as an OVT goal, a second and more sensitive measure of industrial injury is the "recordable case." This includes all CWDA, as well as additional injury cases that do not cause the loss of one or more full days of work. Recordable cases were tabulated during OVT, and the result is shown in figure 2-1. The average rate of recordable cases during OVT was 5.36, which was better than the industrial average of 5.7 per 200,000 hours worked for hazardous waste storage facilities and 14.9 per 200,000 hours worked for refuse incinerator operations.

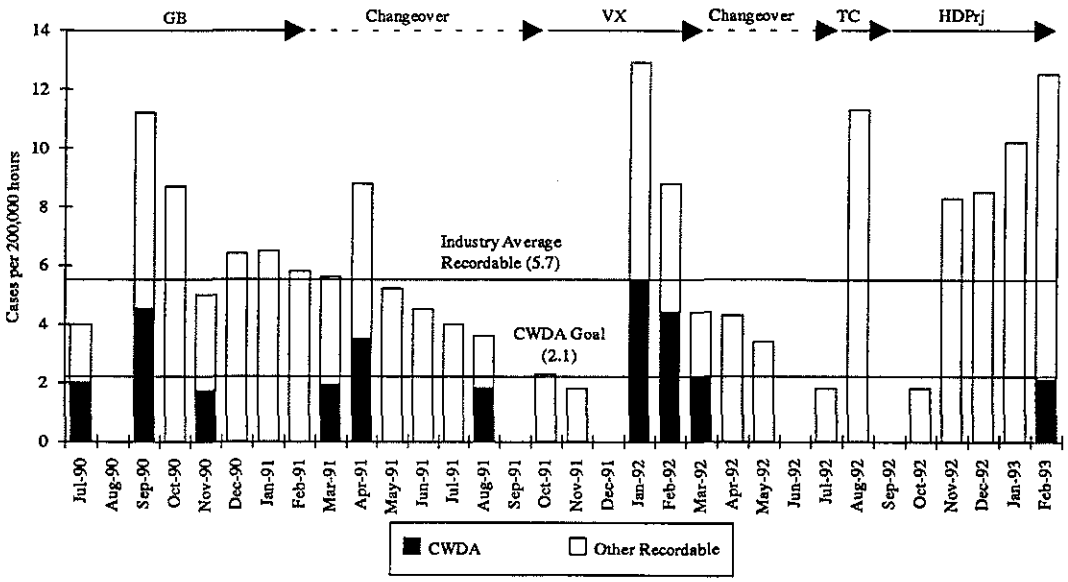


Figure 2-1. JACADS OVT Total Recordable Cases

The recordable case rate was significantly higher in the OVT4 period from November 1992 to February 1993 as compared to the remainder of OVT. The increase resulted primarily from higher rates of injury incurred by maintenance workers in DPE supporting demilitarization operations in the Munitions Processing Bay (MPB). Most of the injuries were related to the manual handling of projectiles which was required as discussed in section 4. Changes in the demilitarization process made in the last week of OVT4 reduced the need for these activities, and will presumably reduce the injury rate in the future. However, the experience demonstrates the importance of monitoring the injury rates of DPE workers operating under physically stressful situations, and the necessity for rapid management response to such experience.

During the OVT period, there were no known cases in which a worker was exposed to agent. Over the course of OVT, approximately 40 clinical lab tests and physical exams were conducted in response to events that made exposure possible, or where the worker expressed concern about a possible exposure. In no case was there evidence of exposure.

There were only two events that MITRE classified as critical events relating to worker safety (appendix B provides additional detail). One event involved mishandling a sample that was erroneously thought to have very low concentrations of agent. In this event, the apparent risk to workers was substantial, although subsequent laboratory and clinical tests showed that no worker had actually been exposed to agent. The second event occurred when an exterior door was kept open into a contaminated area to expedite maintenance activities. Measurements performed after the event showed that the likelihood of agent release to the outside or exposure to workers was very small; however, monitoring outside the door was not performed during the open-door period. In neither case did injury occur, and in both cases procedures were amended to preclude a repetition.

The planned U.S. facilities will embody the same basic process design and safety features as JACADS. Assuming that U.S. plants are at least as aggressive as JACADS in maintaining safe practices, it is likely that the worker safety experience at the U.S. plants will be similar to or better than that of JACADS.

2.4 PUBLIC SAFETY

The major concern of the public is the release of agent to the environment, and subsequent exposure and injury of the public. Because the JACADS facility is located on an edge of JI and downwind from most Island residents, there is little risk to the JI population of about 1000 people even in the event of an agent release. However, for purposes of evaluating the risk to the public at U.S. plants, MITRE has taken this into account by, in effect, assuming

that the public fully surrounds the plant on JI, and by identifying *any* agent discharge as a critical event.

All expected points of possible agent emission from JACADS were continuously monitored. All monitors were checked (by direct challenge with actual agent) every 24 hours, with critical monitors on the common stack checked as often as every 4 hours during operations. Virtually all monitors had backup systems of some type, with the common stack monitors having multiple backups. The monitoring system thus provided a very high degree of assurance that any agent emission would have been detected.

There were no detected releases of agent from any source during normal or transient (e.g., furnace upset) operations of JACADS. One event occurred during cooling of the LIC after a shutdown (this and the event described in the following paragraph are discussed in more detail in appendix B). During OVT1, monitoring evidence during shutdown of the LIC showed that a very small amount of agent was discharged from the common stack for about an hour, with a concentration so small as to be below the reporting requirement. Even though the discharge was insignificant in terms of public (or worker) risk, this event is counted as a critical event, and resulted from inadequate procedures (subsequently modified) during furnace shutdown.

Other than the OVT1 event, there was no measurable discharge of agent from JACADS during OVT. Thus, virtually all normal operation and all transient operations met the Army policy of maintaining zero measurable agent release, rather than just keeping it below permit levels.

The public experienced no injury or fatality relating to munitions or industrial accident events during OVT. In addition, no critical events from these sources were identified.

Transport of rockets from a storage area to a chemical disposal facility's MDB is a particular activity that has raised public safety concerns at U.S. sites. The transport system at JACADS uses trucks to carry the munitions about one-half mile from the storage areas to the MDB. The JACADS OVT munitions transport activity presented no safety events. However, concerns have been raised that the type of transport system used at JACADS may provide insufficient physical protection for the munitions in the event of a transport accident at U.S. locations. Given these transport risk concerns, the Army has decided to use a more robust container for the U.S. sites. With this container system, any risk present in the transport of munitions at JACADS will be greatly reduced in the U.S. plants.

2.5 SYSTEM AND OPERATIONS SAFETY CONCERNS

While the safety record of the OVT was good, there were system or operations inadequacies or failures that, while not causing injury or being identified as critical events for this report, still raised safety concerns. These failures challenged the safety features of the facility and increased the likelihood of critical events. It should be noted that none of these events or activities led to the release of agent or to worker or public injury. In each area, the Army has or is in the process of addressing the concern, both at JACADS and in the U.S. plants.

- **Back-up Power.** Repeatedly, the diesel backup power system did not operate properly, either by failing to start or by failing to connect to the proper loads in a timely fashion. Complete correction of these problems had not been fully demonstrated at the end of OVT. Even more important, early in OVT the Uninterruptible Power Supply, designed to provide very short-term emergency power to vital plant monitoring and control equipment, failed on several occasions due to operator error. This caused plant control and vital data to be lost. This problem was corrected, and the system operated properly during the remainder of OVT.

- **Fire Suppression.** A small fire occurred during OVT4 in the Explosion Containment Room (ECR). Although there was no release of agent or injury to personnel, the fire led to a four-week downtime. After the fire, several design changes were made to reduce the probability of ignition of energetic material, procedural changes were made, and a fire suppression system was added. The Army is continuing to review the possible desirability of additional fire suppression systems.

- **Ventilation System.** On several occasions, generally after power outages and after at least partial loss of plant control, the ventilation system was restarted improperly. This caused damage to internal walls of the MPB on one occasion, and on others, the potential for inappropriate agent movement within the plant. These problems appeared to have been resolved through equipment and procedural changes by the end of OVT.

- **Projectile Processing.** As discussed in section 4.4, during OVT4 the projectile processing system required the continuous presence of workers in DPE. The use of DPE workers on a continuous basis was not a part of the planned operation. In addition to increasing the cumulative hours spent in DPE, the workers were exposed to risk of injury from moving machinery. The projectile processing system requires

additional engineering modifications and testing to reduce the need for DPE worker maintenance and/or to reduce the risk to the workers.

- **Munition Tracking.** As discussed in section 4, the control systems were unable to track each munition item being destroyed, or to maintain an accurate record of what processing steps had been performed on each. While there were occurrences of loss of tracking during each test, the problems were most serious during OVT4 when several projectiles were inadvertently fed to the MPF without having been drained of agent, and one projectile left the ECR with its burster still in place. Although no discharges of agent occurred and the occasions were not critical events, they did indicate a degree of inadequacy of the control and record keeping systems. Designs for the U.S. plants have been modified to correct most of these problems, and some corrections have been installed at JACADS. Additional testing will be required to demonstrate the full effectiveness of these changes.

- **Agent Alarm.** An event of interest also occurred during OVT2 when an agent monitor at the base of the plant's stack alarmed just above the reporting level during one 10-minute cycle. However, due to incomplete data, this event could not be confirmed as an agent discharge. The Army and its operating contractor conducted an investigation and concluded that the agent monitor alarm was due to an interfering chemical.

The adequate performance of staff is essential to plant safety. Failure to operate process or support systems properly can lead to events that challenge the safe design of the plant. While the training of the staff met mandated requirements, there were many instances of performance errors that either led to problems or exacerbated them. This was true for all staff, whether in the laboratory, maintenance, or operations areas. In general, however, MITRE was unable to determine the relative contribution of staff training and plant design errors in any particular event. Experience showed that some of these performance failures arose from missing or inadequate procedures, but most were the result of staff error which is expected to decrease with improved training.

There were several areas which appeared to include both procedural and worker training issues. As OVT progressed, the Army modified its procedures to correct these problems. While conditions improved significantly, full correction has not yet been demonstrated due to the short duration of OVT. These areas included:

- **Housekeeping.** In general, the plant was not maintained at a high level of cleanliness, but rather, was cleaned in an episodic manner. This was a particular problem early in the OVT, when excessive litter was present in many areas, and it

remained a problem later in the OVT, since adequate storage or disposal was not initially provided for used (contaminated) personal protective gear.

- **Design Changes.** Improved control is needed of design changes in the physical plant. There were multiple occasions of the "as built" drawings not conforming to the physical reality of the plant.

- **Jumper Control.** Improved control is needed of the installation of both hardware and software "jumpers". "Jumper" is a term used to describe a temporary bypass or removal of an interlock that controls some particular action (e.g., a high temperature cutoff in a software control program). The use of jumpers during test and operation is appropriate; however, during OVT there were multiple events of jumpers being installed without authorization, inadequate testing, or insufficient documentation. These actions resulted in systems not operating as expected. In addition, on multiple occasions, software changes were made without appropriate authorization, testing, or proper documentation. These problems were cited in several audits during OVT, but were not fully corrected.

Areas in which additional training or emphasis may lead to performance improvements affecting safety include:

- Identification of the precursors to potential contingency (emergency) events, and what should be done in response to them

- Improved understanding of agent, and how it should be handled

- Training in the requirements of environmental regulations as they affect the operation of the incinerators including the reasons for the regulations, and the importance of proactively identifying problem areas

- Additional training in following procedures that require review of all valve positions, cleanup, and other activities at the conclusion of maintenance activities (There were occasions when failure to follow procedures led to operational problems or events that could have caused injury or equipment damage.)

These are all areas that should benefit from the new, more comprehensive training programs and the CDTF. The new program is to emphasize developing worker understanding of why the systems are designed as they are, so that unusual occurrences can be handled more efficiently in the U.S. plants. The Army plans to apply major portions of this program to JACADS workers. As described in section 1.3, the lessons learned programs help

ensure that the problems and solutions identified during OVT will be transferred to the U.S. plants.

SECTION 3

ENVIRONMENTAL PERFORMANCE

The OVT demonstrated that the JACADS process can meet federal regulatory standards and can operate without adverse environmental impact. Emissions of environmental pollutants during the OVT were within regulated limits. The furnace systems used during OVT demonstrated a destruction and removal efficiency (DRE) for each designated principal organic hazardous constituent (POHC) in the environmental permits that met, and in many cases exceeded, federal requirements. Waste materials were disposed of in approved locations. However, as can be expected from a prototype facility, there were noncompliances with the procedural and administrative requirements in the environmental permits. These occurred particularly during the early part of the OVT, and did not result in adverse environmental impact. These included minor discharges of hazardous waste to the ground, storage of hazardous waste beyond 90 days in buildings that were not under the Resource Conservation and Recovery Act (RCRA) permit, errors in record keeping, and not meeting or conducting inspection requirements in accordance with the RCRA permit. These noncompliances suggest the need for increased attention to procedural and administrative environmental requirements as they apply to U.S. plants.

This section provides a general description of JACADS environmental performance during OVT. Additional details are given in appendix C and in the individual OVT test reports listed in appendix E.

3.1 BACKGROUND

Concerns have been raised regarding possible adverse effects of chemical demilitarization activities. These include:

- Release of toxic chemical agent to the environment
- Release of non-agent pollutants such as carbon monoxide (CO), nitrogen oxides (NO_x), and dioxins from the exhaust stacks
- Release of hazardous substances as a result of handling, treatment, and storage of process-and non-process-related liquid and solid wastes
- Release of waste water effluents into bodies of water

These concerns are addressed by regulations that establish limits on emissions, hazardous waste handling, and operating conditions. These include:

- Resource Conservation and Recovery Act (RCRA). A RCRA operating permit imposes regulations on the management of hazardous wastes, and incorporates standards for emissions and for the minimum DRE that must be demonstrated by the facility. Incinerator trial burns are required to verify conformance to permit requirements.*

- Toxic Substances Control Act (TSCA). The shipping and firing tubes of some M55 rockets contain PCBs, which are regulated under TSCA. Trial burns for the DFS are required to verify conformance to TSCA requirements.

- National Pollutant Discharge Elimination System (NPDES). An NPDES permit, under the Clean Water Act, controls the direct discharge of a pollutant water from a point source to navigable waters. For JACADS, limits on temperature, pH, and suspended solid and copper concentrations are imposed on noncontact cooling water discharged to the Pacific Ocean.

- Hazardous Materials Transportation Act (HMTA). Regulations under HMTA, as implemented by the Department of Transportation (DOT), establish the requirements for transport of hazardous materials, such as container specifications, use of shipping manifests, and hazardous materials classification.

- Internal Army Policies. The U.S. Army has also adopted its own performance standards. For example, the Army requires that emptied munition parts be decontaminated in the MPF or DFS to the XXXXX level (i.e., heated to 1000°F for 15 minutes) to ensure complete destruction of agent.

Although the requirements of the Clean Air Act (CAA) did not apply to JACADS, measurements were made of the discharge levels of some of the pollutants for which national ambient air quality standards have been established by U.S. Environmental Protection Agency (EPA). This data will be used to help project facility performance at U.S. sites where the CAA will apply.

The discussion of JACADS environmental performance is organized into the following categories:

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*The term "trial burn" is used in this section to describe any special test or trial burn run to demonstrate that performance meets permit conditions. The various permits and regulations use different terms for this activity.

- Agent air emissions
- Non-agent air emissions
- Liquid and solid wastes
- Environmental procedural requirements

These categories encompass the areas of requirements mandated in the various Federal environmental regulations cited above.

3.2 JACADS ENVIRONMENTAL PERFORMANCE

Among the activities conducted during the OVT were a series of trial burns to demonstrate operational compliance with RCRA and TSCA requirements. The RCRA trial burns were intended to demonstrate compliance with the standards for destruction of chemical agent and other POHCs, hydrochloric acid (HCl) emissions, and particulate matter emissions. For a TSCA authorization, trial burns were conducted to demonstrate the efficiency of the destruction of Polychlorinated biphenyl by the DFS. An extensive set of data were collected before, during, and after the trial burns, which were analyzed to establish furnace performance.

During OVT, JACADS operated within the pollutant discharge limits established by the various permits. Some of the design and operational features that helped achieve this goal include the following:

- Each furnace system includes not only the primary combustion chamber, but also a secondary combustion chamber or afterburner, as well an extensive PAS. The series combination of these components provides a margin for protection for reduction of emissions both during normal and upset operations.

- Extensive instrumentation and computer control of the furnaces and associated equipment contributed to the high level of conformance to environmental requirements.

Although more data were obtained during the trial burns as compared to normal operation, all critical emission parameters such as agent concentrations (if any), CO, and O_2, and most furnace conditions, were continuously monitored and recorded, and it is this entire record that provides the basis for evaluating the environmental performance of JACADS during OVT.

3.2.1 Agent Air Emissions

No agent was detected from the exhaust stacks during the RCRA and TSCA trial burns, and no agent release was detected during either normal or transient conditions (e.g., furnace upset). An occurrence during cooling of the LIC after a shutdown was discussed in section 2.

The RCRA DRE requirement for the incinerators was also met. For agents GB, VX, and HD, DREs greater than 99.9999 percent were achieved for the LIC. The HD DREs for the MPF trial burn were greater than 99.9996 percent. The slightly lower DRE for the MPF was due to the limitation in the agent detection technology and the smaller quantities of agent fed into the MPF as compared to the LIC. In all cases, since no agent was detected in the stack gases during the trial burns, the actual DRE is better (i.e., higher) than the calculated DRE.

The JACADS RCRA permit also imposes requirements that the temperature of each furnace be maintained within prescribed limits during agent operations. That is, if the furnace goes into an upset condition and the temperature decreases below the permit limit, a low temperature interlock shuts off the feed of the agent or munition. On one occasion during OVT3, this stop feed interlock did not shut off the agent feed to the LIC for about five minutes. However, the primary chamber temperature only dropped 5°C below the permitted lower limit of 2550°C. Moreover, the LIC secondary chamber (afterburner) remained on line, and no agent was detected in the exhaust gases.

3.2.2 Non-Agent Air Emissions

Particulate matter, HCl, CO, and O_2 emissions from exhaust stacks were within regulatory limits during the trial burns. Stack emissions during the trial burns were also analyzed for volatile and semi-volatile products of incomplete combustions, as well as for presence of dioxins and furans. Dioxins and furans in the common stack emissions were low, ranging from 0 to 0.16 ng/m^3. None of the dioxins found were the 2, 3, 7, 8 - tetrachlorodibenzo-p-dioxin (2, 3, 7, 8 TCDD) isomer, which is the most toxic form of dioxin. In comparison, municipal incinerators emit dioxins in the 50-7,000 ng/m^3 range. Quantities of substances that are listed as hazardous organic constituents by EPA (e.g., benzene, dimethyl phthalate, and toluene) were also detected at levels well below regulatory concern. These substances were most probably fuel contaminants and not products of agent combustion.

Control of CO emission from a furnace system's secondary chamber is a RCRA permit condition which correlates with complete destruction of hazardous wastes. CO remained within permitted levels during agent operations for all furnaces except for five times while the LIC was processing agent or spent decontamination solution. In compliance with the permit,

in each case agent feed was stopped immediately and no agent was detected. Hence, these were not considered noncompliances.

The O_2 concentration in the furnace secondary chamber is also an indirect measure of the relative efficiency of combustion in the furnace since O_2 is necessary to reduce the formation of CO. Throughout the OVT, there were numerous occasions when O_2 emission alarms occurred in the DFS and LIC because the permit limits were exceeded while hazardous waste was being processed. The majority of the O_2 alarms experienced during OVT were attributed to plugging of the O_2 sensing probes. The Army instituted some modifications, which resulted in a significant reduction in furnace downtime from this cause. In each case, hazardous waste feed was cut off, and such events never resulted in any environmental impact. As per agreement with EPA, exceeding the permit limits was not considered a noncompliance as long as new material feed to the furnace is shut off immediately.

The operation of the MPF (during OVT3) did not result in any O_2 and CO emission limits exceedences.

The DFS trial burn surpassed the 99.99 percent RCRA DRE requirement for nitroglycerin. In three out of four test runs, the DRE for PCBs was better than the required 99.9999 percent TSCA DRE. One of the four burn tests resulted in a DRE of 99.999896 percent. However, the PCB emission rate for this test run was below the corresponding emission rates of three commercially-operated PCB incinerators, and below that of the U.S. Army Chemical Agent Munitions Disposal Facility at Tooele, Utah.

JACADS is exempt from CAA regulations, hence there were no required limits for NO_x and sulfer oxides (SO_x) concentrations. However, control and monitoring of NO_x and SO_x pollutants was an operational goal. The emission levels during the trial burns and normal processing were generally below 500 ppm.

3.2.3 Liquid and Solid Wastes

Both solids and liquids were properly disposed of pursuant to the relevant permits. However, handling, storing, transporting, and disposing of liquids and solids from JACADS presented major difficulties that largely centered on administrative and procedural noncompliances with storage and record keeping requirements (e.g., holding material for more than 90 days). There were minor discharges of RCRA hazardous waste during the OVT. Response to these minor occurrences was prompt. These occurrences did not result in any adverse environmental impact.

The liquid waste of greatest quantity was the brine (solution of salts in water) created by the PASs for the furnaces. The brine sometimes was classified as a hazardous waste, due to the presence of heavy metals (agent was never found in the brine). The brine was planned to be dried in the BRA to produce dry salt for disposal. However, the BRA and BRA PAS did not function properly during OVT1 and OVT2, leading to large quantities of brines to be handled, stored, and disposed of by shipping to the U.S.

Tank and other overflows were experienced on several occasions. For example, during the HD projectile test, 20 gallons of brine containing concentrations of cadmium, chromium, and lead at levels slightly above the hazardous waste limits leaked out of the drum dryer exhaust duct onto the ground. Ground sampling showed that no detectable level of heavy metal contamination remained.

The solid residue handling systems did not function as well as planned. The original system which was to shred the waste for transport in fabric-reinforced plastic bags was not operated. The system was modified to control fugitive dust emission. The design for the residue handling system for U.S. plants is very different from JACADS. The residue handling area (RHA) fill station will be located inside the process utility building. Moreover, the system is capable of processing two different types of waste containers: (1) DFS and DUN wastes collected in a waste bin container, and (2) the brine salts collected in a salt container. A key feature of the system will be a slide gate assembly that is hydraulically retracted onto the bins to provide a seal between the assembly and the bins, thus preventing dust emission.

Solid wastes*, including residue from the furnaces, also needed to be handled, stored, and disposed of (by shipping off Island). Difficulties in waste handling were exacerbated by failure of the DUN to function as planned, requiring handling and offsite disposal of a larger volume of solid waste than originally anticipated. In addition to noncompliance of storage and shipping regulations, some minor discharges of furnace residue took place, including one 17-pound loss of DFS residue to the ground. These discharges were classified as hazardous because they contained concentrations of heavy metals at levels above the RCRA threshold values. Ground sampling showed no detectable level of heavy metal contamination remained.

JACADS was generally in compliance with the NPDES requirements. The only problem was demonstrating that the temperature rise limit for the receiving water was met, because the temperature could not be measured properly. The temperature rise of the receiving water has also been shown to be influenced by solar heating, regardless of JACADS operations. This necessitated application for an NPDES permit modification to raise the temperature limit from

* The term "solid waste" is used throughout this report to refer to waste in solid form and is not intended to have the same meaning as solid waste defined in various EPA regulations.

1°C to 2°C. There has been no apparent adverse environmental effect from the seawater cooling system.

3.2.4 Environmental Procedural Requirements

Throughout the OVT period, RCRA procedural noncompliances neither resulted in any release of chemical agent nor did it lead to a release of other hazardous substances to the environment. Nevertheless, the noncompliances may be indicative of the need for improvements in quality control, standing operating procedures, record keeping, and personnel training. Foremost among these non-compliances were the filling of brine and spent decontamination solution tanks beyond the high-level limit, and the intermittent use of the PAS secondary containment for supplemental brine storage. Moreover, there were occasions during the early part of OVT when waste was either improperly analyzed, shipped out of JI with improper labeling, or disposed of safely but without proper authorization. Such noncompliances with DOT regulations involved less than two percent of the total waste shipped out of JI. The Army and Operations and Maintenance Contractor have initiated corrective actions to ensure that these noncompliances do not occur or, at least, are minimized at JACADS.

The Army has submitted a variety of modifications to the JACADS RCRA permit ranging from Class 1 (minor and generally administrative in nature) to Class 3 (substantial alteration to the facility). Although the majority of these modifications fall under Class 1, there were four Class 2 and three Class 3 modifications. The Army submitted Temporary Authorization Requests to EPA for four Class 2 and 3 modifications to allow continued JACADS operations while EPA was reviewing the modification request. Class 2 and 3 modifications require public comment and a public meeting during the comment period; in addition, EPA must consider and respond to all significant comments received on Class 3 modifications.

Some modifications were required because the conditions established in the permit did not reflect the actual design of the equipment in use. Other permit modifications were needed to handle additional waste material (e.g., clean up debris) not originally planned for incineration in the MPF or DFS. The nature of most of these modifications reflect the restrictive operating limits or conditions the Army has adopted, which in many cases exceed (are more restrictive than) Federal minimum standards. A significant number of these modifications might have been avoided by obtaining more realistic permit conditions while still maintaining safety and environmental protection.

3.3 ENVIRONMENTAL PERFORMANCE: AREAS REQUIRING INCREASED ATTENTION

The following areas deserve continued attention to help ensure future conformance to the regulations:

- **Tracking of Permit Requirements.** It took more than a year after the OVT was initiated before the Army and its contractors fully tabulated the RCRA permit requirements and compared them to actual operations. This process of mapping permit requirements with actual operations, as well as the results of environmental audits, identified permit conditions (such as inspection requirements) that could not be met because either the system design or the equipment in use differed from what was assumed in the permit. Although the Army has recognized this problem and instituted operational permit changes, it had not completely resolved all procedural and administrative noncompliances at JACADS by the time OVT ended. Indeed, the lessons learned from this experience underscore the need for increased attention in tracking environmental requirements early in the environmental program at U.S. plants. The Army has directed its TOCDF contractor to prepare an environmental compliance database that identifies all permit requirements. A program is in place to achieve more comprehensive tracking of requirements, and stronger environmental staffing at U.S. plants (as compared to JACADS startup).

- **Realistic Permit Conditions.** The Army found it necessary to obtain numerous permit modifications. These were needed because the original permit contained conditions that artificially restricted use of the furnaces for designed operations. For example, permits unnecessarily limited the types of waste to be fed to the DFS and MPF, thus requiring permit modifications to accommodate the waste materials to be disposed of. Permits should be sought that allow reasonable response to actual operational needs consistent with environmental protection. It should be noted that this may be difficult to achieve since permit conditions are established by federal and state regulatory bodies.

- **Waste Management Systems.** A number of difficulties were experienced in the overall waste management program. Operation and permit compliance of the DUN and BRA were not demonstrated fully during OVT. As a result of the DUN's unavailability, dunnage was disposed of by open burning at JI—an option not likely to be approved in the U.S. Failure of the BRA to operate properly during OVT1 through OVT3, resulted in a substantial problem in handling and disposing of brines generated in the various PASs. While the basic technology of the BRA appears sound and its capability to dry brines has been demonstrated during OVT4,

compliance of BRA source emissions with RCRA requirements has not been demonstrated. Approximately 3.4 million pounds of brine from OVT1 and OVT2 were shipped offsite. Had the BRA operated efficiently, this quantity of brine could have been reduced to about 509,840 pounds of salt. While U.S. plants may have more options available to them for dealing with similar waste management problems (e.g., availability of commercial hazardous waste sites), more advanced planning for contingencies and backup systems would benefit the waste management program.

- **Control and Monitoring of Operational Parameters.** Some difficulty was encountered in maintaining the proper pH for the brine circulating in the packed bed scrubber of the LIC PAS during destruction of HD agent at high feed rates. Such pH control is required to ensure that acid gases are removed by the caustic brine. JACADS also encountered difficulty in monitoring the temperature of cooling water (sea water) discharge as required in its NPDES permit with very few months of having all required monitoring data collected. The Army has adopted corrective measures to address these problems. U.S. plants would benefit from this experience. While the specific events described here (e.g., sea water temperature monitoring problem is site-specific) may not occur in U.S. plants, consistent control and monitoring of operational parameters is necessary to ensure acceptable environmental performance.

- **Waste Disposal.** The RCRA permit was modified during OVT4 to allow destruction of agent-contaminated miscellaneous (non-DPE) debris in the MPF and DFS. This modification provided a much-needed means of disposing of debris accumulated during maintenance activities; some of which was previously shipped offsite for disposal in a hazardous landfill. Used DPE suits were originally intended to be burned in the DUN. However, although the Army decided to dispose of decontaminated DPEs in landfills, at the end of OVT, agent-contaminated DPEs remained in storage at JI. Final disposal has not been resolved. Contaminated DPEs make up the majority of approximately 125,000 pounds of waste contaminated with agent that is stored at JI. Large quantities of DPEs are expected to be used at U.S. plants. The Army is conducting a DPE study at the Chemical Agent Munitions Disposal System (CAMDS) facility in Tooele, Utah to evaluate various decontamination methods and decontamination solutions to achieve a XXX decontamination level. The JACADS experience and future U.S. plant operations underscore the need for increased attention to this issue.

- **Personnel Training.** The presence of agent and the Army regulations governing its handling made the management of waste streams even more complex than in a typical chemical process facility. Such complexity contributed to the difficulty of

ensuring effective operator training, particularly regarding compliance with environmental regulations. The Army and its contractors have not only increased the number of environmental compliance staff, but have also taken concrete measures to improve personnel training on environmental issues. An important aspect of the new training philosophy is the establishment of the CDTF in Edgewood, Maryland. JACADS and U.S. plant personnel will undergo extensive training at the CDTF not only to understand how systems and equipment are operated, but also why they are operated as designed. It is expected that training on environmental standards will be an important aspect of the overall training program.

3.4 POTENTIAL ENVIRONMENTAL ISSUES AT U.S. SITES

The JACADS experience provides extensive data to help address many of the state regulatory concerns for the environmental safety of U.S. plants. For example, the State of Utah has required the development of extensive additional information to ensure that breakthrough of agent from the ventilation system's carbon filters will not occur. JACADS data demonstrated a very large safety margin in the filter design. The Army is currently conducting a study, using JACADS and other test data, to provide the basis for requesting Utah to rescind this requirement.

Another example relates to Indiana and Kentucky regulations requiring monitoring data from a comparable facility to show that there are no emissions from stacks or fugitive sources that present a risk of an acute or chronic health effect on humans. The JACADS experience showed only one occasion when agent was released to the environment, and even then the amount released was insignificant in terms of adverse health effects. The toxic effects of chemical agents are well understood, and standards for the protection of both workers and the public have been developed under the guidance of the U.S. Department of Health and Human Services (DHHS). In addition, using data obtained from the DFS and LIC trial burns, an Army study (reference listed in appendix E) showed that the carcinogenic and noncarcinogenic risks from operating these furnaces are negligible and substantially below the levels of concern set by DHHS and EPA. Although the Army's experience to date strongly supports the contention of no significant risk to human health, additional data may be needed depending on how state regulators interpret and implement these regulations.

There are other areas, however, where JACADS experience alone does not provide sufficient data to demonstrate that state environmental concerns can be addressed fully. Additional information would be needed to address the following state requirements:

- Indiana and Kentucky require more stringent agent DREs (99.9999 percent) for all furnaces as compared to the Federal RCRA requirement (99.99 percent). Utah also requires a 99.9999 percent DRE for the LIC, but only 99.99 percent for the other furnaces. The DFS and LIC at JACADS have been demonstrated to meet these more stringent DRE requirements. The MPF has not demonstrated a 99.9999 percent DRE, but this was largely due to limitations in agent detection technology and not in the ability of the furnace to completely destroy the agent. The State of Utah also requires trial burns to demonstrate a 99.9999 percent DRE for all furnaces using surrogate agents. Additional attention will be needed to address this requirement.

- Chemical agent is a listed hazardous waste under Indiana, Kentucky, Maryland, and Utah regulations. The Army may need to petition for delisting residues from demilitarization, treatment, and testing of chemical agents. These residues include all solid and liquid generated from agent-contaminated furnace fuels, including decontaminated projectile bodies and other materials suitable for recycling. The State of Maryland has delisted liquids and residues from chemical decontamination of chemical agents, but it does not appear that residue resulting from thermal decontamination is part of Maryland's delisting. The Army currently has a program in place to identify test methods and procedures necessary to delist selected waste streams. This program specifically addresses Utah regulations. The Utah Department of Environmental Quality is currently reviewing the Army's delisting plan as it applies to materials stored at Dugway Proving Ground and the Tooele Army Depot.

- Maryland's Toxic Best Available Control Technology (T-BACT) rule requires the installation and operation of a T-BACT and an analysis showing that emissions of toxic air pollutants will not seriously endanger human health (mustard is classified as a carcinogen). Since JACADS operations did not lead to any release of mustard agent to the environment, meeting the substantive portions of these requirements should not be a problem. However, the Army's ability to satisfy the regulation may depend on the detailed interpretation of the regulation.

SECTION 4

PROCESS PERFORMANCE

During OVT, JACADS demonstrated the ability to demilitarize M55 rockets containing GB and VX, and ton containers and 105mm M60 projectiles containing HD. During the tests JACADS generally met or came close to meeting its short-term (one shift) throughput goals, but did not meet the long-term average throughput goals established prior to testing. Process improvements that have been demonstrated or planned will likely allow similar plants in the U.S. to achieve improved results substantially closer to the JACADS throughput goals, although still falling short of the original process design goals at least in the near term.

4.1 BACKGROUND

Process performance describes how efficiently the demilitarization plant accomplishes its purpose. This includes considerations of how well the various systems operate, how well the staff runs the plant, the pattern of operation, and the bottom line: the rate at which munitions are destroyed, as averaged over hours, days, or even months of operations. The cost and schedule projections for the disposal of the U.S. munitions are based in part on achieving system design throughput rates, as adjusted by the Army for life cycle costing. The cost and schedule also depend on achieving the planned operating schedule, i.e., the number of shifts and operating days per week (taking into account expected equipment failure rates and repair times). The calculation of the actual effects of the projections presented in this report on the programmatic life cycle cost and schedule is outside the scope of this report.

In this section, the demilitarization rates demonstrated at JACADS will be discussed and the likely rates in U.S. facilities will be projected. System performance and the major factors that affect throughputs are also described.

Throughput

The performance of a demilitarization plant is measured by the rate at which the plant destroys munitions over some specified averaging time, i.e., the throughput. For example, during the VX rocket test (OVT2), JACADS destroyed the following:

- 32 rockets per hour (R/hr) average during the best 10-hour day (shift)
- 6436 rockets during the last 40 calendar days of the test

Since JACADS operated only during one or two shifts and U.S. facilities will operate 24 hours/day, the JACADS data must be adjusted onto a **24-hour basis** to reflect the best estimate of what the throughput would have been if the plant had been operated for 24 hours. Using the data for the last 40 calendar days of OVT2, we estimate that if JACADS had operated 24 hours/day as well as it actually did during OVT2, it would have processed 14.4 R/hr. Appendix D provides a more detailed description of the 24-hour basis calculation.

Different throughput calculations are useful for different purposes. If one is interested in the fastest demonstrated operation of the plant (to compare to peak design rates), then one might use the throughput from the best hour as the reference. However, if one is interested in the demonstrated ability to operate over the long term (taking downtime into account), one might use the 24-hour basis adjusted data.

The Army and its contractors established design average throughput rates for each of the demilitarization processes at JACADS. To do this they used the best available estimates of the performance characteristics including design peak rates, probable failure rates, and repair times of the individual hardware items in the system. Taking into account the likely startup problems for JACADS, its prototypical status, and the likelihood that the relatively-limited test duration would not be sufficient to reach the ultimate design rates, two OVT goals were established for each test:

- The first goal was to demonstrate that the process designer's **average** throughput rate could be achieved during at least one operating shift (about 8 hours) during the test.

- The second goal was to demonstrate a reasonable average throughput rate over a planned extended period of operation in the last portion of each test (the "full-rate" phase). This goal was about 2/3 of the designer's average rate to allow for the fact that JACADS is a first generation plant undergoing startup operations. This rate is computed on a 24-hour basis as discussed above.

Since each OVT test would require operation with a new munition or agent, each test (except for OVT3 which was too short to allow full phasing of operations) was further divided into three phases to allow for identifying and correcting initial problems. The first phase would have a duration of about eight weeks, with a planned attempted throughput rate of 1/3 the full-rate goal, the second phase of four weeks at 1/2 the full-rate goal, and the final four weeks at the full-rate goal. In practice, the plant was operated to maximize the throughput during each phase and the reduced rates were used as subsidiary goals for the phases. As expected, none of the tests followed the precise plan; however, in each case

MITRE has identified an appropriate period corresponding to the "full rate" period originally planned.

The U.S. plants will be of somewhat different configuration from JACADS, will operate under different conditions, and will have the benefit of lessons learned. Therefore, projected rates for the U.S. plants, while derived from the 24-hour basis throughput demonstrated at JACADS, will be somewhat different. The U.S. plant projections presented here exclude time spent in startup activities, including "debugging" systems and equipment, and also exclude time spent changing the systems from one munition or agent to another. The projections include consideration of the major physical and operational characteristics of the U.S. plants and the lessons learned from the OVT. Of course, as the detailed planning for each site develops, and as additional operating experience is gained, additional modifications can be made to the projections.

4.2 OVT1 AND OVT2 ROCKET TESTS

The first test during OVT was the planned destruction of M55 rockets containing GB nerve agent; the second test was the planned destruction of identical rockets containing VX nerve agent. Both nerve agents are liquid at normal temperatures. Since the two tests involve virtually identical processes, this report treats them together in this section.

Although the demilitarization techniques for the two munitions are virtually identical, the monitoring system must be aligned and calibrated for the agent being handled. This was done during a changeover period between OVT1 and OVT2. This period, originally scheduled to last for 1–2 months, also included performance of substantial repairs and upgrading of plant systems, as described below. The changeover period was extended to 8 months to allow for x-ray and other testing of several of the piping systems in the plant.

Table 4-1 summarizes the overall results of OVT1 and OVT2, while figure 4-1 shows the number of rockets destroyed on each day. As can be seen, the number of rockets destroyed per day was substantially higher in OVT2 as compared to OVT1. This increase was due to improved process operation (i.e., higher throughputs during operating hours), and to operation for more hours per day. Figure 4-2 shows the number of hours operated at each throughput rate for both tests. This figure shows that even with a shorter OVT2 test period, there were more operating hours accumulated (i.e., hours with at least one rocket destroyed), as well as a higher rate achieved during the operating hours. The increase in hours operated per day was achieved primarily through a greater number of scheduled hours per day, made feasible in part by improved operations.

As can be seen in figure 4-1, operations during the last ten days appeared to improve further with all days showing processing. This period occurred after modifications of the DFS including changes to the air handling in the DFS room that lowered the room temperature and may have reduced failures of the heated discharge conveyor, and improved cooling to the thrust bearing. Although the duration of this period was too short to verify the long-term ability to operate at higher rates, the period does demonstrate that the JACADS system, even without the planned major modifications, has the potential for further rate improvements.

Table 4-1. Summary of Rocket Tests

Item	Planned	Performance
OVT1		
Duration	16 weeks	32 weeks
# Rockets	9,984	7,449
Best Shift	32 R/hr (goal)	27 R/hr
Full Rate (24 hr basis)	24 R/hr (goal)(note 1)	15.3 R/hr (note 2,3)
OVT2		
Duration	17 weeks	19 weeks
# Rockets	13,889	13,889
Best Shift	32 R/hr (goal)	32 R/hr
Full Rate (24-hr basis)	24 R/hr (goal)(note 1)	20.6 R/hr (note 2,4)

Notes: 1. 24-hour basis
2. Modified operating window data from OVT2 report
3. Excludes modification shutdown period.
4. Excludes downtime due to kiln detonation.

Both tests produced throughput results that were substantially less than the original goals, especially when averaged over weeks of operation. This shortfall arose from lower than expected peak (hourly) rates, and undocumented as well as documented downtimes.

The average 24-hour basis throughputs over OVT1 and OVT2 were 6.9 and 11.1 R/hr, respectively, and the last five weeks of OVT2 (the full-rate part of the test) showed a 24-hour basis rate of 14.4 R/hr. In contrast, the expected average throughput rate goal for

Figure 4-1. Number of Rockets Processed Each Day

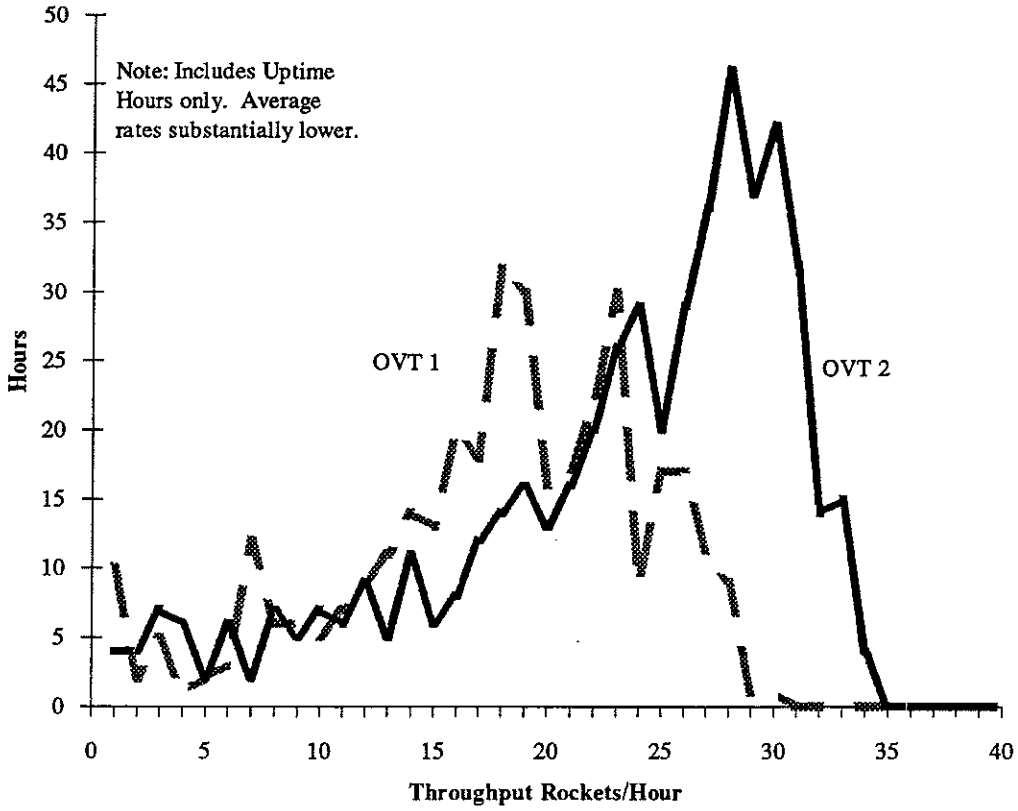

Figure 4-2. Rocket Tests: Number of Hours at Throughput

the full-rate portion (final phase) of each test was 24 R/hr. As discussed in more detail below, the reasons for the shortfall included:

- The inability (primarily caused by the DFS) to operate at its design peak rate (44.3 R/hr)
- The effects of undocumented downtime (outages or interruptions of fewer than 15 minutes)
- The effects of documented downtime (outages of more than 15 minutes)

The average throughput goal of 24 R/hr for JACADS was based on using automated operations to achieve a **peak** design throughput rate of 44.3 R/hr, a limitation set by furnace capacity. For several reasons enumerated in the OVT1 report (see appendix E for listing), the furnace capacity limited the peak throughput to about 30–34 R/hr (in contrast to the 44.3 R/hr assumed when the goal was set). Using this peak processing rate, and other factors remaining equal, the expected average throughput rate would have been about 18 R/hr (vs. the 24 R/hr goal). Since the average throughput achieved during the last portion of OVT2 was only 14.4 R/hr, it is clear that the failure to achieve the expected **peak** rate was one of the major contributors to the low **average** throughput during OVT1 and OVT2.

During both OVT1 and OVT2, there were many short downtimes or slowdowns in operations. Lasting from a few seconds to 10–15 minutes, in this report these are referred to as undocumented downtimes because they were not individually catalogued. However, analysis of the data showed that they were a significant cause of reduced throughput for operating hours with fewer than 32 rockets per hour, but which had no documented downtime. The main causes of undocumented downtimes were handling minor operating problems in the RSM (e.g., shifting from computer to manual control to reposition a rocket) and responding to equipment alarms (e.g., low water flow) elsewhere in the plant. The amount of undocumented downtime was significantly reduced in OVT2.

There were many contributors to documented downtime. Although there were many short downtimes of 15–30 minutes, the majority of documented downtime ranged from many hours to many days. As JACADS operated through OVT1 and OVT2, causes of downtime were identified, and corrections designed and implemented. Most, but not all, of these were successful.

Several problems accounted for a large portion of the documented downtime. These included:

- **Kiln Bolts**. DFS kiln flange bolts failed due to the use of inadequate materials of construction. This was corrected by redesign and replacement of the bolts during the December 1990 shutdown in OVT1.

- **HDC Slag**. Melted aluminum from the rocket warheads was discharged from the kiln onto the Heated Discharge Conveyor (HDC), which was constructed of stainless steel mesh. The slag built up on and dripped through the mesh, causing damage to the heating elements, conveyor drive system, and HDC discharge gates. During the OVT1, various corrections were attempted, but with only partial success. During the OVT1-OVT2 changeover, the mesh conveyor belt in the HDC was replaced by a bucket conveyor system to contain the molten slag and prevent it from damaging the system. An explosion-proof enclosure was constructed around the HDC residue bin to allow the HDC discharge gates to remain open during operation. These corrections effectively solved these problems.

- **RCRA Permit**. The RCRA permit for JACADS imposed specific discharge (emission) limits, various operating requirements such as furnace temperatures and oxygen levels, and also data recording and record keeping and other administrative requirements. During the OVT1, it was found that not all the operating data were being recorded on the time scale required by the permit, and that certain other inspection and record keeping requirements were not being met. Although the data records were sufficient to demonstrate that the plant had, in fact, operated within the emission and operating limits of the permit, the plant was shut down for ten days while the computer programs for the data recording were corrected.

- **Kiln Detonation**. During OVT2, a detonation in the kiln occurred that created a hole in the kiln wall of about 2xß inches. The explosion was presumably caused by a burster or other energetic material in the kiln. The explosion caused no other damage and no agent release, thus verifying the protective design of the DFS, including the new receiving bin structure. The kiln was repaired and operations restarted. The CONUS plants will have a much thicker kiln wall, further reducing damage from such an event. JACADS is also to be retrofitted with a kiln having thicker (2 inches vs. 0.5 inch) walls.

- **Thrust Bearings.** During OVT2, the thrust bearings that hold the kiln in place overheated and failed. This had been a problem during OVT1 as well. Although cooling was applied to the bearings and to the DFS room, the resolution of the problem has not been fully demonstrated. The Army plans to remove the bearings from inside the kiln shroud to reduce the heating load placed on them.

- **Fuze Segregation Conveyor.** As part of the RSM design, the first shear of the rocket removed the fuze from the rocket. This was placed on a separate fuze segregator conveyor, while the remainder of the rocket (including rocket propellant) was sent to the kiln. After an appropriate number of fuzes were accumulated, they were sent separately to the kiln. This was designed to reduce the risk of explosion by separating the fuzes from the rocket burster. Part way through OVT2, the fuze segregator conveyor had accumulated sufficient operating problems that the decision was made to abandon its use, and to separate the fuzes and rocket burster by operational means. This solution proved to be effective.

Although there had been some expectation that the RSM reliability might be a major factor in limiting the throughput during OVT1, the RSM actually demonstrated a relatively high availability of 87 percent. On the other hand, in addition to limiting the peak rate, the DFS had an availability of 44 percent; lower than the design rate of 89 percent. The DFS was the largest source of documented downtime.

The planned durations of OVT1 and OVT2 assumed that there would be a period of about three months at the beginning of each test when the performance would be below the OVT goals. That is, all the major performance problems would have been corrected by three months into each test, allowing the "full rate" goal to be achieved. In retrospect, it is clear that this was optimistic, and that the time required to achieve close to full performance (as shown by similar industrial plants) is closer to two years.

It is important to note that the portions of the plant that are most innovative with respect to demilitarization, such as the rocket shear machine and the agent monitoring system, were not the major causes of downtime during OVT1 and OVT2. Rather, the more conventional portions of the plant dominated both downtime (e.g., the DFS) and the failure of systems to achieve effective operation (e.g., DUN and BRA). An important implication of this observation is that corrections that are required to achieve improved performance do not appear to require new, state-of-the-art advances in demilitarization processes, but rather, a more effective diagnosis of problems and corrective application of known engineering solutions.

Projection of Rocket Performance Rates at U.S. Sites

U.S. plants will be operated differently from JACADS. OVT1 and OVT2 were operated on a one or two shift basis, while the U.S. plants are to operate on a 24-hour basis. Thus, process performance data from the OVT must be adjusted to a 24-hour basis. A major consideration is the choice of the appropriate baseline period from the OVT. Review of OVT1 and OVT2 data showed that the performance of JACADS during the last five-week

period (actually 40 calendar days) of OVT2 was much more uniform than the remainder of the tests, while being of sufficient duration to be representative of long-term operation. This five-week period was chosen as the baseline period.

The data from the baseline period were first converted to the 24-hour basis as discussed in appendix D.

Each downtime was then evaluated to determine whether the cause of the downtime was planned for correction in the lessons learned program. If so, the downtime was removed and downtime from that cause was assumed not to occur in the U.S. plants. If the downtime cause was assumed not to be corrected, the projection contained the effects of the downtime. Downtime that began when not attempting to operate (i.e., at night) was assumed to be caused by the passage of time, and not from rocket processing (the contrary assumption would have reduced the projected throughputs by 10 percent).

Other differences between JACADS and U.S. plants, beyond the incorporation of lessons learned are discussed below.

A major configuration difference between JACADS and U.S. plants is that the U.S. plants are planned to operate two ECRs simultaneously. Although JACADS has two ECRs, it was decided to operate only one during OVT. Two ECRs (each with its own RSM) allow a slightly higher rate of operation since one ECR can continue to operate while the second is in a maintenance or repair condition (especially important for 24-hour operation).

The second difference is that the U.S. plants will incorporate changes to increase the peak rate at which the DFS can process. As noted above, the reduced peak rate imposed by the DFS during OVT was a major factor in reducing the average throughput. Provision of thicker kiln walls and other changes will allow higher DFS processing rates, projected by the Army to be at least 38.8 R/hr.

While there are no apparent fundamental obstacles in achieving these two changes from JACADS, neither has actually been demonstrated in OVT. Therefore, the projections for the U.S. plants have been prepared both with and without these changes. The results of the projections are shown in table 4-2.

Table 4-2 shows the OVT2 entire test average, and the baseline period average for comparison. Future Intermediate Estimate 1 assumes only one ECR and a peak rate of 32 R/hr, i.e., the same conditions as during OVT. However, Estimate 1 includes the effects of correcting those problems seen during the baseline period for which corrections are identified and planned in the lessons learned programs. These have the effect of increasing the expected

24-hour rate from 14.4 (JACADS) to 18.9 R/hr (U.S. plants). Future Intermediate Estimate 2 assumes the same conditions, except that a second ECR is in use. The second ECR increases the throughput from 18.9 to 22.0 R/hr.

Future Intermediate Estimate 3 projects the performance for one ECR, but assuming the planned higher peak throughput of 38.8 R/hr. The single ECR rate of 23.5 R/hr should be compared to the OVT goal of 24 R/hr and the design goal of 32 R/hr.

The U.S. plant estimate assumes the planned U.S. plant operation of two ECRs and the higher peak rate of 38.8R/hr. This compares to an original two ECR OVT throughput rate of 29 R/hr and a two ECR design rate of 39 R/hr.

Table 4-2. U.S. Rocket Throughput Projections

Item	Average Rate 24-hour basis R/hr	Lessons Learned Applied	Number ECRs	Peak Rate R/hr
OVT2 Test Average	11.1	No	1	32
OVT2 Baseline Period	14.4	No	1	32
Future–Intermediate Estimate 1	18.9	Yes	1	32
–Intermediate Estimate 2	22.0	Yes	2	32
–Intermediate Estimate 3	23.5	Yes	1	38.8
–U.S. Plant Estimate	28.3	Yes	2	38.8

It is difficult to assess the reliability of these estimates. Certainly, the projections must be compared to the actual performance during OVT, both as averaged across each test, and as shown during the baseline period in table 4-2.

The assumption that the lessons learned modifications will be fully effective is optimistic. To put this issue in perspective, the downtime causes during the baseline that were assumed to be fully corrected include problems related to the DFS thrust bearings, rocket system hydraulics and photo sensors, DFS home switch, discharge gates, and other mechanical and operating problems that had occurred repeatedly during the tests, and that did not have demonstrated correction before the baseline period. However, in each case the Army has concluded, and MITRE has accepted as reasonable, that the solutions will be effective and applied to the U.S. facilities. On the other hand, if none of these corrections are effective, the

throughputs are reduced by approximately 20 percent. The computations also assume that no new problems imposing substantial downtime will develop.

On the other hand, as shown by the improvement between OVT1 and OVT2, improvements can also be expected on a wide variety of problems as the plants continue to operate. None of the problems noted appear to be fundamental design problems, and all should be feasible to correct with reasonable engineering and testing efforts. Overall, the estimates above appear to be reasonable, with the assumptions that engineering and development work will continue as the plants are brought on line and operated, and that the projected rates should not be expected to be achieved early in U.S. operation.

There continues to be significant uncertainty in the future estimates with regard to the availability of the LIC. Since agent storage capacity was available, the rocket demilitarization process line could continue until the two agent holding tanks were full, even if the LIC was unavailable. The capacity was equivalent to agent from about 1100 rockets. In practice, because of the low rocket throughput rates, the LIC (even with downtime) was not a major factor limiting rocket processing during OVT. However, for 24-hour U.S. operation at the higher rates projected, the LIC may become the limiting system, especially with the smaller agent storage tank capacity planned for U.S. plants. Detailed evaluation of this issue could not be performed with the available data.

In summary, the rocket demilitarization process demonstrated that it can operate effectively and safely, though at less-than-anticipated throughput rates. The shortfall in performance was not caused by the demilitarization technology (e.g., RSM), but rather by the adapted commercial systems (e.g., DFS) in JACADS. As such, it is reasonable to conclude that the process is fundamentally sound, and that significant improvements in throughput can be achieved by a more effective application of known engineering solutions to the demonstrated problems.

4.3 OVT3—TON (BULK) CONTAINER TEST

The HD Ton Container test (OVT3) was conducted over a four-week period as scheduled. There were a total of 67 HD ton containers in the JI stockpile, and all were emptied and decontaminated during OVT, and all the HD removed from the containers was incinerated in the LIC.

The production goals for the ton container process were established in a similar manner as for rocket processing. Complicating the analysis of OVT3 were the effects of the limited duration of the test, the small number of containers, and the need to accumulate inventories of

containers to satisfy the requirements for the trial burns conducted during OVT3. The throughput goals and the actual results are shown in table 4-3.

The design performance for the HD ton container demilitarization system is limited by the maximum capacity of the LIC to burn agent. The design capacity of the LIC for mustard is 1,330 lb/hr, which is equivalent to about 0.78 ton containers per hour based on a nominal 1,700 pounds of mustard per container. The design capacity of the BDS and MPF to drain and decontaminate the ton containers is about 1.71 containers per hour. Thus, the capacity of the LIC is well below the capacity of the BDS and MPF for draining and decontaminating the ton containers. There is also buffer capacity for agent in the agent storage tanks, and for the drained ton containers in the buffer storage area. Thus, it is not necessary for the BDS and MPF to operate continuously in an integrated manner at their respective design rates to meet overall demilitarization goals.

Demonstrating the capability of the JACADS system to drain and destroy agent from ton containers was made very difficult because of the small number (67) of ton containers available on JI. This number limited the duration of the test, and reduced the time available to investigate and correct operational problems that occurred. The test was made even more difficult because of the requirement to conduct RCRA trial burns with the LIC and the MPF to verify that incineration permit requirements could be met. This required that agent and drained ton containers be stored, so that adequate supplies of each were available for the trial burns. Combined with the operating problems that were encountered, these constraints resulted in intermittent operation of the system except for two reasonably steady days of operation during the trial burns.

On one of the four trial burn days, six ton containers were drained while six were detoxified in the MPF. Because of the staging problems noted above, in actual fact the ton containers processed were those stored from earlier operations; however, in effect, continuous processing by the BDS and MPF was demonstrated.

Although the operations were very limited, the simplicity of the process, plus the previous and subsequent operations of the LIC and MPF, allow a reasonably realistic qualitative assessment of the operation at JACADS. However, because the operation was so limited, it is not possible to develop an accurate projection for the capacity of the BDS. This is not critical for U.S. facilities, however, because the LIC will be the limiting factor in ton container processing, even for those U.S. facilities planned to have two LICs.

JACADS Ton Container Performance

The BDS and MPF operated at about 2/3 of the design rate during the trial burn days, which was still above the LIC design rate. Even during that time, the actual LIC operation would have limited the throughput to about 0.70 per hour.

The major limitation on throughput arose from limited availability and throughput capacity of the LIC. However, there were some processing problems with the BDS and associated systems. These included:

- The Air Quantification System (AQS) contains a pump which is designed to withdraw the agent from the ton container. The pumping process presented numerous difficulties including loss of prime and clogging. These problems were only partially resolved during the test.

- The weight of the agent removed was to be determined by an electronic load cell which was to measure the weight of the agent removed. However, accurate tare (empty) weights for the containers were not available. This required that draining be verified by workers wearing DPEs manually measuring the remaining contents to provide the data for the trial burns and DRE calculations .

Neither of these problems appear to present serious, long-term difficulties, but they could not be resolved within the short duration of OVT3.

Table 4-3. Summary of Ton Container Tests

Item	OVT Goal	OVT Performance
OVT3		
Duration	4 weeks	4 weeks
# Containers	67	67 (Note 1)
Rate BDS, MPF, LIC (8 hrs)	0.70 per hour	0.70 (Note 2)

Note: 1. Plus one additional after the close of OVT
2. Limited by LIC rate; based on trial burn data only

U.S. Ton Container Throughput Rate

The demilitarization rate and schedule for ton containers is directly dependent on the performance of the LIC. During OVT2 and OVT3, the availability of the LIC was about 55 percent (excluding salt removal time). With incorporation of lessons learned, the availability of the LIC in the future is calculated to be about 71 percent, still below the design basis availability of 90 percent. Assuming the LIC operates consistently at design capacity when burning agent and an average 71.4 percent availability, the JACADS throughput rate for HD ton containers will be about 0.56 ton containers per hour, which is about 80 percent of the design throughput rate. The throughput rate at plants with two LICs would be 1.11 HD ton containers per hour, except at Tooele Army Depot where, due to its elevation above sea level, the rate would be 0.86 ton containers per hour. This is about 70 percent of the design rate for the Tooele chemical demilitarization facility. The requirement to periodically remove accumulated salt from the LIC might further reduce the overall demilitarization rate and thus increase the schedule for demilitarization of HD ton containers.

Although MITRE could not compute a 24-hour availability for the BDS or the overall processing system, it remains clear that the LIC will likely be the throughput limiting system in the U.S. sites.

4.4 OVT4—PROJECTILE TEST

Background

The 105mm M60 projectile includes a fuze, fuze well cup, a burster inserted in a burster well in the agent cavity, and the agent within the agent cavity. The projectile weighs about 35 pounds, and contains about 3 pounds of HD (mustard) chemical agent. The projectile was designed to permit mechanical removal of the fuze and burster, but was not originally designed to permit agent removal. However, the design of the projectile permitted development of a machine that can disassemble the projectile to gain access to the agent cavity. The discussion below assumes familiarity with the projectile demilitarization process as described in section 1, and in appendix A.

An important aspect of the projectile demilitarization process is that it includes several activities that can be conducted independently. For example, as with other munitions, agent removed from the projectile can be stored and incinerated at a later time in the LIC. More importantly, there are relatively large buffer storage areas between the major steps in demilitarization. For example, there is storage capacity for eight trays of projectiles (each designed to hold 96 projectiles) between the PMD (which removes the fuze and burster), and the MDMs (which remove the burster well and drain the agent). Similarly, there is capacity

for eight trays between the MDMs and the MPF (which detoxifies the projectile bodies). Therefore, if the operating patterns of the PMD and the MDMs are highly variable, causing the storage areas to fill and empty, it is difficult to analyze the JACADS data to estimate 24-hour-per-day operation.

The throughput goals for OVT4 were established in a manner similar to that used for OVT1 and OVT2. Specifically, design-based reliability and maintainability data were used in computer models to determine expected peak and average throughputs to be expected in a full performance, 24-hour operation. This design assumed one PMD, and three MDMs to be available (with two actually operating at any time), and that the projectiles would be processed in trays holding 96 projectiles each. The computer models predicted that the PMD would be the limiting factor in the overall process throughput rate.

These design throughput estimates were then reduced to take the prototype nature of JACADS into account, thus producing the OVT4 goals. However, the original goals were based on the Army's plan to use 155mm projectiles for the test. Prior to OVT4, the Army concluded that with the greater supply of 105mm M60 projectiles on JI, full-rate destruction could be demonstrated for a longer time period than with the 155mm projectiles. As a result, goals were adjusted to reflect the throughput expected with the 105mm projectiles. The goals and other relevant estimates are shown in table 4-4.

For the purposes of comparing performance to goals during OVT4, the Army and MITRE agreed that a ten-hour window would be designated during each operating day. Data for processing and downtime from the ten-hour window would be used in computing the performance and for comparison to the values of the original goals. Operations (both production and downtime) outside the window would generally be recorded, but not counted in the ten-hour window throughput calculation.

Using operating data to compute the 24-hour basis throughput requires that a number of factors be considered. For example, the downtime spent in repairing and maintaining the equipment outside the window must be accounted for, and allowances made for the faster repairs expected in 24-hour operation. When calculating either the operation of particular machines, or the whole system, one must consider that failure of a downstream machine, such as the MDM, or filling of the buffer storage (exacerbated by space taken by empty trays), may artificially reduce the throughput of the upstream PMD. Similarly, the PMD on occasion did fail to keep up with the MDMs (even though the PMD was often run outside the 10-hour window to build an inventory for the MDMs). Finally, the variability of operation, and the constraints on throughput imposed by the RCRA permit (discussed below), increase the uncertainties in the calculations.

Table 4-4. OVT4 Operating Window Goals and Performance Results

Component	Goal	Performance (Note 1)
Best 10 hour shift		
PMD	82.7 P/hr	74.2 P/hr
MDMs	N/A	71.9 P/hr
Full Rate Period		
PMD	56 P/hr	35.0 P/hr
MDMs	N/A	31.4 P/hr
Total Projectiles		
Within Window	N/A	18,949 (Note 2)
Total Time	N/A	23,978 (Note 3)

N/A = Not Applicable

Notes: 1. See next subsection for discussion of performance constraints
2. Drained and thermally decontaminated during scheduled processing window
3. Total thermally decontaminated through MPF by the end of OVT

Consistent with the Test Directive, in December 1992, the Army designated the final four weeks of OVT4 (later extended by one week) as the baseline or full-rate portion of the test providing the definitive data for throughput calculations. As can be seen in figures 4-3 to 4-5, the last two weeks of that period (including the week extension) did produce significantly improved operations.

To summarize, the OVT4 goals were used, but applied only to performance within the 10-hour operating window of the full-rate period. The resulting full-rate period average throughput is not on a 24-hour basis. While the data did not allow a 24-hour basis calculation for the whole projectile demilitarization system, a series of assumptions did allow calculation of the 24-hour basis throughput rates for the individual PMD and MDMs.

OVT4-Projectile Throughput Results

Figure 4-3 shows the number of projectiles detoxified each day during OVT4 by the MPF, while figures 4-4 and 4-5 show the number of projectiles demilitarized by the PMD and MDMs.

The performance of the MDMs was generally the limiting factor on daily operations, although other equipment also contributed to reducing throughput, as described in the following subsection. These figures show that the operations were highly variable, especially early in OVT4. Early in the test, it was very difficult for the PMD or the MDMs to demonstrate a several-hour operation even at reduced rates. That is, the machines might operate for a short time, but then break down and require maintenance before resuming operation. During the last several weeks of the test, operations became more stable, although still substantially below the OVT goals. Since the components did not operate in a sufficiently reliable manner to achieve steady state operation, it was not possible to estimate a valid, long-term 24-hour throughput for the overall system.

As table 4-4 demonstrates, the best shift throughput rates, as calculated using only data from within the operating windows, came relatively close to meeting the throughput goals. The PMD has a design peak rate of 126 P/hr (Projectiles per hour) and a design average rate of 82.7 P/hr. The best shift goal was set at 82.7 P/hr and the PMD demonstrated a best shift of 74.2 P/hr. It should be noted that the 24-projectile-per-tray limitation artificially constrained PMD operation and prevented attainment of this goal. The MDMs each have a design peak rate of 75 P/hr and a design average rate of 59 P/hr. Although individual goals were not set for the MDMs, it was expected that two MDMs should be able to more than match the PMD. The best shift for each of the MDMs were 38.4 and 33.6 P/hr, approaching but not quite reaching the PMD rate.

The goal for the full-rate portion for the PMD was 56 P/hr, and the performance demonstrated was 35 P/hr. However, although there were operating periods when the PMD could not supply projectiles to the MDMs, it was more frequently the case that the PMD was artificially constrained by the limited amount of storage area for trays and the lower performance of the MDMs. During the full-rate portion of the test the MDMs operated with throughputs of 16.4 P/hr and 14.6 P/hr.

Since the PMD and MDMs demonstrated the ability to operate at rates approaching the single-shift rate goal, the failure to achieve the longer term throughput was clearly due to the effect of downtimes, and not to a failure to achieve peak design rates.

Figure 4-3. Daily MPF Projectile Demilitarization

Figure 4-4. Daily PMD Operation

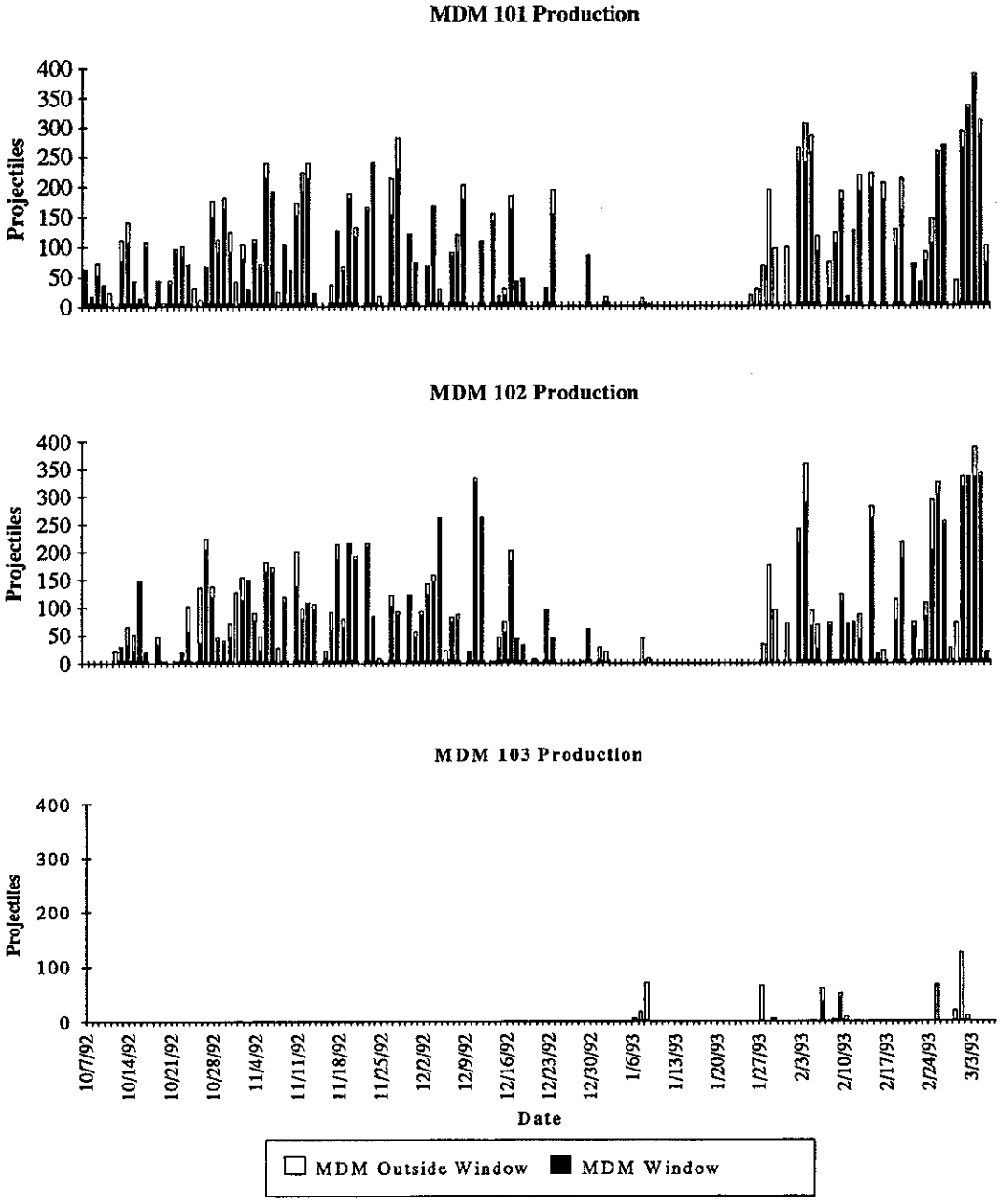

Figure 4-5. Daily MDM Operation

As discussed below, the variability of the operation, the limitations of the tray capacity caused by the drainage problems, and the consequent difficulty of accounting for the effects of the storage, make preparing an overall 24-hour basis throughput problematic. Since the U.S. plants are planned to operate on a 24-hour basis, MITRE has analyzed the data from OVT4 to estimate the 24-hour basis equivalent throughput rates for each machine. The method used is the same as that used for OVT1 and OVT2, and is described in appendix D. Because the operating records do not always allow precise identification of the status and timing of maintenance activities, the analysis is based on data from those days of the full-rate period which have the most complete data. It was assumed that the recorded preventive maintenance durations would have been unchanged with actual 24-hour operation. If a machine operation stopped because buffers were full or munitions were unavailable, the time was treated as potentially available for processing. For this calculation, processing that occurred outside the window was treated the same as processing inside the window. During the full-rate period, about 20 percent of the projectiles were processed outside the window.

The resulting 24-hour throughput estimates are shown in table 4-5, along with the throughputs computed from the operating window data only. As can be seen, the results show the relatively small differences between the two methods of computing throughputs. Note that the window performance data for each machine includes the adverse effect of operational problems in other parts of the demilitarization system. Removing these effects gives PMD and MDM throughputs, during the window, of 47.6 and 35.0 P/hr, respectively.

Table 4-5. Full-Rate Period 24-Hour Basis Projectile Throughput

Component	Window Performance	24-hour basis
PMD	35.0 P/hr	39.7 P/hr
MDMs	31.4 P/hr	30.0 P/hr

During the last week of OVT4, performance improved after changes to process methods were made. These changes included improvements in the agent draining and burster well removal operations. Although the data for the PMD for several of the days were not sufficiently detailed to support analysis, 24-hour basis throughputs were computed for those days for which data were sufficient. Positive adjustments included allowances for the

continuing adverse effects of the 24-projectile-per-tray limitation and burster well handling. Corrections were not included for possible adverse effects of DPE preparation time (since DPE workers would not normally be present) and burster well processing time. The resulting 24-hour basis estimate reflects what the rate would be on a 24-hour basis when the performance problems described below are fully resolved.

The window throughputs of the PMD and MDMs were 61.3 and 61.1 P/hr, respectively, for the last week. The adjusted 24-hour basis calculations for the last week of operation showed a PMD rate of 58.2 P/hr, and MDM rates of 35.6 and 35.3 P/hr. Comparing these rates to those shown in table 4-5 illustrates what appears to be a very significant improvement in processing rates as a result of the improved availability during the operating window. While the data are from a very limited time period, the results tend to indicate that the projectile demilitarization system has the capability of operating at rates close to the OVT goals.

Although the projectile demilitarization system did not operate in a sustained, full-production mode for a sufficient period to evaluate its long-term ability to process projectiles, by the end of OVT4 each major component of the system did demonstrate that it was capable of meeting a substantial portion of at least short-term OVT goals. The performance shows that this technology is capable of successfully demilitarizing this munition. Indeed, as discussed below, there are no apparent fundamental obstacles to approaching the design performance goals. It is clear, however, that additional engineering, testing, and demonstration work remain to be done before reliable operation can take place at design throughput rates for this munition. It must be emphasized that the M60s with HD create unusually difficult disassembly and drainage problems that are not necessarily typical of other projectile types.

Factors Affecting Performance During OVT4

The early portion of OVT4 showed a wide variety of design and operating problems. These problems were not unexpected, given that OVT4 was the first fully-integrated test of all of the projectile disassembly and draining equipment using live stockpile munitions. Examples of some startup problems include an undrained projectile entering the MPF on 7 October. The burster well tube had not been pulled and the agent had not been drained at the MDM. This tube was ejected from the projectile body in the MPF, causing some damage to the refractory on the ceiling of the MPF. This occurred again on 29 November and twice on 1 December. Also, minor problems occurred involving PMD chuck jaws being out of tolerance, dropped bursters, MDM hydraulic leaks, plugged drain tubes, and sensor failure. These were corrected early in the test.

By December 1992, operations were showing signs of improvement. However, on 2 January 1993, a fire occurred in the ECR. The fire was fully contained by the ECR, and posed no worker or public risk. The investigative team identified the probable cause as friction from a booster cup wedged in the conveyor igniting debris from punched booster cups and other material that had not been cleaned up by maintenance workers. Although the initial fire intensity decreased after several minutes, it ignited a conveyor belt which then burned slowly for two hours. After television monitoring showed that it was safe to enter, the fire was extinguished by workers. The fire destroyed a conveyor and other equipment related to the PMD. During January, demilitarization was shut down while the incident was investigated, equipment repaired, and a fire suppression system installed. Maintenance and inspection procedures were also modified.

Other factors affecting OVT4 performance include the following:

- AQS reliability and limit on MPF feed rate
- Collet problems
- Use of DPE workers in continuing maintenance
- Munition tracking

AQS Reliability. The AQS operates to pump the agent out of the agent cavity in the projectile (after the MDM removes the burster well), and it measures the amount of agent removed. Knowing the amount removed allows approximate calculation of the amount of agent remaining in the cavity. This is important because the RCRA permit for the MPF for OVT4 included a limit of 52.8 lbs/hr of HD agent into the furnace. Experience showed that many projectiles contained sludge or solids which interfered with operation of the agent drain system so that agent removal was not ensured. In addition, undrained agent combined with the solids resulted in as much as one pound of material remaining in the projectile. Uncertainties in the original tare (empty) weights of the projectiles contributed to the difficulty of determining the precise amount of material in the projectiles. The design of the projectile demilitarization system provided for the processing of trays containing 96 projectiles. With the theoretical possibility of up to one pound of material remaining in each projectile, and with two trays present at once in the MPF, the decision was made to limit each tray to 24 projectiles to ensure that the RCRA limit would not be exceeded.

These problems, and the consequent tray limits, had several adverse effects on operations. Because of the uncertainty in draining projectiles, DPE workers were required to inspect projectiles for proper agent drainage. This was one of the major reasons for the requirement (discussed below) that DPE workers be present in the MPB during processing. The tray limits caused reduced throughput because more trays were handled at a given processing rate, thus greatly increasing the fraction of time devoted to tray processing. This constraint alone

appears to have caused as much as a 10-20 percent reduction in time available for processing in the operating window. In addition, the buffer storage available between machines was, in effect, reduced by 75 percent, increasing the sensitivity of machine throughput to upstream and downstream failures.

In the last two weeks of OVT4, modifications to the AQS appeared to improve the operation of the drainage system thus reducing but not eliminating the uncertainties in the material remaining in the projectiles. Further work is continuing to ensure more effective drainage of projectiles. The Army is working with EPA to relax the restriction of 24 projectiles per tray, based on the increased assurance of effective drainage, and on the fact that the MPF has shown the ability during OVT3 to process over 140 lb/hr of agent, in contrast to the lower limit adopted for OVT4 of 52.8 lb/hr.

Collet Problems. A collet is a device used by the MDM to grasp and remove the burster well, and then to re-insert the burster well after removal of the agent from the agent cavity. Originally expected not to be a maintenance problem, collets demonstrated the ability to handle only a limited number of burster wells before failing. Collet life was highly variable. In the last few weeks of OVT4, a decision was made to modify the process to remove but not re-insert the burster wells (the burster wells were collected, and fed to the MPF separate from the tray of projectiles). During the final days of OVT4, collet life appeared to improve; however, the test ended before definitive results were obtained. Over the course of OVT4, the collet problems were one of the main contributors to lower-than-expected performance.

DPE Workers. As noted above, MDMs showed serious operating problems through most of OVT4. Since the MDMs operate in a contaminated area, maintenance requires use of workers in DPE. DPE operations require workers to operate in pairs (for safety), with backup and control staff to ensure safe operation. Depending on the advance notice, a DPE entry may take 30–60 minutes after the beginning of preparation before the worker begins the planned maintenance operation. Since this lead time reduced the available time for operation, the Army decided early in OVT4 to maintain DPE workers in the MPB on a virtually continuous basis during operations.

The DPE workers engaged in a variety of activities to help maintain the throughput of the MDMs. In response to the agent drain problems, the workers used dipsticks and visual inspection to ensure that projectiles had been properly drained of agent. The problems with collets discussed above, as well as other malfunctions of the MDMs and other machines in the MPB, required that the workers repair the equipment, as well as move projectiles off of and onto the processing lines. The workers were actively involved in identifying problems, and devising and installing corrections to improve operations. Finally, the workers conducted preventive maintenance as required.

These activities were physically demanding and were conducted on a greater scale than had been anticipated. The result was increased risk of injury due to a larger number of hours of activity, but also a higher rate of injury compared to DPE work earlier in OVT when no DPE injuries were experienced. Most of the six injuries that occurred during OVT4 were related to the need to handle projectiles.

The equipment in the MPB was not designed and configured for this type of on-line, continuing maintenance. Although efforts were made to ensure safe operations, heavy reliance was placed on administrative controls, as opposed to designed-in safety measures. The most significant injury to a DPE worker during OVT occurred when the tip of one finger was severed by a machine in the MPB. The worker was not exposed to agent. It is clear that if this degree of on-line DPE maintenance is to be used in the future, additional engineering will be required to improve maintenance efficiency and to ensure worker safety.

As discussed earlier, in the last 7 to 10 days of OVT4, both the agent drain and collet problems decreased, reducing the demands on the DPE workers. The Army is planning to continue identifying more effective solutions to the operating problems seen during OVT4, and, if successful, these should largely eliminate the need for continuous DPE workers in the future. However, it should be noted that changing the processing to different projectile types or to different production runs (lots) within the same projectile type, may create substantial operating problems requiring extensive DPE work to resolve. Thus, care will be required to prevent a recurrence of the injury rates seen in OVT4.

Munition Tracking. The final issue of concern relates to the problem of munition tracking. Munition tracking is the ability of the control software to "know" where every projectile is, and what processing has been done to it. During rocket and ton container processing, there were occasions when the control software lost track of munitions. However, because there was little buffer storage in the rocket system and only a limited number of ton containers, the consequences of error were relatively minor. However, on at least eight different occasions during projectile processing, projectiles were sent to the MPF without having been drained of agent at all. The result in each case was violent expulsion of the burster well into the ceiling of the MPF, and a pressure transient in the furnace as the agent ignited. In each case, the MPF and its afterburner successfully destroyed the agent, and none was detected in the common stack.

In a more serious case, a projectile with its burster intact left the ECR and reached the MDM. After two collets were damaged in an attempt to remove the burster well, examination showed that the burster had not been removed by the PMD. It appears that the risk of explosion or fire was extremely low; however, the presence of this explosive in the

MPB, with DPE workers present, in violation of the design concept, raises safety questions. It is theoretically possible that the burstered projectile could have bypassed the MDM, as did at least some of the projectiles discussed above. The consequences of such a projectile in the MPF has not been evaluated; however, the MPF and its enclosure is not designed to handle explosives.

The lack of munition tracking data prevented identification of exactly when the projectile was on the PMD, and what actions took place there. It appears, however, that an interlock sensor in the downstream robot projectile handler that should have detected the presence of the burster had been disabled, with no record made of why or by whom. After the event, the interlock was reinstalled, and administrative modifications were made to test the interlocks.

The Army is continuing to evaluate and correct the inadequacies of tracking the location and the processing done to each munition item. Work performed at the Army's training and simulation facility has confirmed that many of the shortcomings of the tracking system observed during OVT were caused by control software not keeping track of munitions as control was switched between automatic and manual operating modes. Corrections are being installed at JACADS and in the U.S. plants.

4.5 OVT1–4 PROCESS PERFORMANCE SUMMARY

The previous sections have separately discussed each of the four OVT subtests. This section provides a summary reference for each of the major operating systems, with emphasis on noting the problem areas that have been identified but not fully resolved by the end of OVT. All the problem areas identified are in active stages of investigation and/or correction. As already mentioned—with the exception of the actual demilitarization machinery used for the rockets, ton containers, and projectiles—the majority of the plant uses commercial/industrial equipment as adapted for this application. Thus, corrections to operating problems while perhaps difficult, should be well within the state of the art. Correcting problems of the demilitarization machinery may require a somewhat higher degree of innovation.

- The DFS appears to operate relatively well although there remain problems with bearings, home switch, feed chute, and related components. During OVT, the Army achieved major improvements in the HDC, as well as in other parts of the DFS. The thicker DFS kiln wall planned for U.S. plants (and for retrofit at JACADS) will help achieve a more robust design. The demonstrated availability for rocket processing was significantly less than the 85 percent planned.

- The RSM appears to operate well, except for possible problems relating to corrosion by some of the decontamination liquids used.

- The BDS appears to operate well, except for continuing problems with the associated AQS (load cell) for the ton containers.

- Portions of the projectile demilitarization system appear to operate well. The PMD and the robotic equipment for handling projectiles came reasonably close to meeting performance goals. However, even with virtually continuous tending by maintenance staff in DPE suits during most of OVT4, the MDMs did not demonstrate sustained, consistent operation. During the final week of OVT4, the MDMs operated more reliably, but the test concluded before definitive results were obtained. The MDM clearly requires substantial additional experience and refinement to meet throughput goals. A major concern, not fully resolved during OVT, was that the process control logic did not maintain control of munition accountability. Although corrections have been identified and are being installed in the first U.S. plant, operation has not yet been fully demonstrated at JACADS.

- The MPF operated well, although the automatic control of the furnace temperature was slow to respond to changes in the chamber temperature.

- The AQS appears to have operated reasonably well for rockets, but not for ton containers or projectiles. The major problems appear to be both agent removal (draining) problems and measurement of agent quantities. Difficulties in draining HD due to the presence of sludge apparently contributed to the agent draining problem.

- The LIC operated effectively in disposing of agent; however, if not improved, its relatively limited availability will significantly restrict processing of munitions that generate large amounts of agent. One unresolved problem that limits availability continues to be the removal of the salt that accumulates in the LIC secondary chamber, although methods to reduce this problem are under evaluation by the Army. The smaller planned agent storage capacity at the U.S. sites (compared with JACADS) increases the probability that any failure of the LIC will have an adverse effect on processing both rockets (as higher daily processing totals are achieved), and bulk containers. This increases the importance of achieving a high LIC availability, or of reconsidering the agent storage capacity.

- The DUN did not operate satisfactorily during OVT. The DUN requires additional engineering work, as well as extensive operation to demonstrate that problems have been resolved. A trial burn must also be performed to demonstrate compliance with RCRA permit requirements.

- During most of OVT, the BRA did not operate satisfactorily. However, after modifications, the BRA did process the brines generated during OVT3 and OVT4, although some operating problems remain and the required BRA PAS compliance test has not yet been performed.

- The munitions transport system operated without any significant problems or safety events.

- The unpack area operated without any significant problems or safety events.

- The DPE system of personal protective equipment functioned well, with excellent protection against agent exposure and no worker agent injury. This performance was achieved even though workers were called upon continuously to support active operations during OVT4. The DPE system requires continuing attention to ensure safety for the workers. Responding to the problems generated by the high-level DPE work in OVT4, the Army instituted a health monitoring program and began procurement of a cooling system for DPE air.

SECTION 5

CONCLUSIONS

5.1 JACADS PERSPECTIVE

The JACADS facility, as well as the process it represents, is the world's first and only fully-operational facility for the destruction of chemical nerve and blister agents, and for the demilitarization of chemical munitions. Prior to the construction and operation of JACADS, the Army had conducted tests of individual plant components with inert, simulant-filled munitions and with rockets at its test facility in Utah (CAMDS). The army had destroyed several thousand M55 rockets at CAMDS using the Rocket Line System at that location and, in the 1970s, destroyed over six million pounds of GB and mustard in bulk containers at Rocky Mountain Arsenal in Colorado.

Prior to OVT at JACADS, no pilot plant or demonstration plant existed in which the fully-integrated JACADS process, including demilitarization machines, incinerators, pollution abatement equipment, agent monitors, conveyors, robots, and all support systems, could be tested. Thus at JACADS, the processing of live munitions containing lethal chemical agent represents a quantum increase in process complexity with respect to previous component testing with inert, simulant-filled munitions.

Before OVT began, the Army anticipated that a variety of processing problems would occur that could not have been predicted or identified in the component tests. To account for this, rampup periods were incorporated into the OVT campaign schedules with full processing rates only planned to occur during the last two to four weeks of each test, depending on the test duration. The relatively short time duration of each test—one to four months—combined with the rampup periods, placed an upper limit on the time period allowed for demonstration of full-rate processing and did not provide sufficient time for all processing problems to be addressed prior to the end of each test. In hindsight, the test periods were probably too short to permit JACADS to demonstrate its full-rate throughput goals, although substantial performance improvements within each test period were observed.

5.2 SAFETY PERFORMANCE

JACADS met the OVT safety performance goals that were established for it. During OVT, there were no injuries or fatalities associated with the handling of agent or munitions, and industrial injuries were within the range typical of industrial chemical facilities. As

expected, events did occur that challenged the levels of protection designed into JACADS. The demonstrated safe operating record of JACADS during OVT reinforces the importance of having safety in depth incorporated into the plant design and operating procedures.

Some of the design features of JACADS and planned demilitarization facilities that are especially important include:

- Control of air movement in contaminated areas to prevent migration of agent
- Provision of multiple levels of backup power supply
- Isolation of activities such as explosives removal
- Large margins of safety in the incineration and air exhaust systems
- Separation of people from processes by use of remote and computer control
- Full coverage of the facility using automatic, near-real-time agent monitors
- Extensive use of closed circuit television monitoring
- Extensive use of electronic process monitoring and computer data handling

The JACADS contractor operated an active safety program during OVT. In addition, the Army and other agencies provided extensive oversight and review of the operations.

Challenges to the plant design did demonstrate several notable shortcomings in some of the systems or their operation. In each case, the Army and its contractors have investigated the problems and have installed or plan to install corrections. These areas included:

- Failure of the back-up power and related control system software to operate properly when restarting the plant following loss of power

- Ventilation system failures or inadequacies that on occasion did not fully control agent migration within the facility

- Inadequate control and documentation of software and system design changes

- Control systems that did not maintain accounting of the processing status of each munition

The adequate performance of staff is also essential to the proper operation of the safety systems of the plant. While staff training met minimum mandated requirements, there were instances of performance errors that either led to operating or safety problems, or exacerbated them. The relative effects of other factors (e.g., training, inadequate system designs, faulty or non-existent procedures, or supervisory oversight) in these instances could not be separated in evaluating the causes of these performance errors. The Army's upgraded

training program should contribute to improving staff performance both at U.S. plants and at JACADS.

5.3 ENVIRONMENTAL PERFORMANCE

The OVT demonstrated that the JACADS process can meet federal regulatory standards and can operate without adverse environmental impact. JACADS operated within applicable environmental regulations with respect to discharge of agent and non-agent air emissions and, with few exceptions, met all operating permit requirements. Waste materials were disposed of in approved locations. Noncompliance with the procedural and administrative requirements in the environmental permits occurred. These included minor non-agent discharges to the ground (without environmental impact), problems in the long-term storage of wastes, and errors in record keeping and inspection. There are no apparent fundamental problems in meeting regulatory standards in future U.S. plants, unless the standards are significantly more restrictive than those in effect for JACADS.

However, there were several areas in which problems have occurred in the past. Programs are underway to address these areas, and will help ensure conformance to the regulations. These areas include the following:

- Emphasize the tracking of the requirements of the applicable permits
- Seek permit conditions that provide for increased flexibility in process operations while protecting environmental quality
- Provide for long-term storage and disposal of agent-contaminated protective equipment
- Achieve reliable operation of the Brine Reduction Area to manage liquid wastes
- Achieve reliable operation of the Dunnage Incinerator to manage solid wastes
- Improve the effectiveness of personnel training concerning environmental regulations

5.4 PROCESS PERFORMANCE

During OVT, JACADS demonstrated the ability to demilitarize M55 rockets containing GB or VX, and ton containers and 105mm M60 projectiles containing HD. During the tests on rockets and ton containers, JACADS generally met its short-term single-shift throughput goals, but was unable to meet long-term throughput goals established prior to OVT. Process improvements that have been demonstrated, or have a high probability of success, will likely allow similar plants in the U.S. to achieve the JACADS OVT throughput goals, although at least in the near term still falling short of the plant design goals established by the Army for the U.S. plants.

The projectile test showed that the processes could approach or meet short-term goals. However projectile operations were not sufficiently reliable or of sufficient duration to draw firm conclusions concerning sustained long-term throughput.

It should be pointed out that a significant improvement in JACADS performance was achieved over the period of performance of two sequential tests, both with the same munition (M55 rockets) and with only the agent in the rockets differing. This permitted the learning experience from the first rocket test to be applied to the second test and, in effect, provided for a longer and more realistic test of JACADS' ability to process rockets than was the case for the other items processed during OVT. In the first rocket test JACADS achieved a 24-hour average destruction rate of 6.9/hr, and in the second test achieved 11.1 R/hr for a 61 percent improvement. The availability of JACADS to process rockets also increased from 33 percent in the first test to 47 percent in the second test.

In contrast, there was only one OVT campaign that demonstrated JACADS' ability to process projectiles, the most complex item in the chemical munitions stockpile. The Army deliberately selected the M60 projectile for this test. The M60 projectile contains the blister agent mustard, known to be more heterogeneous in composition and thus more difficult to drain than the nerve agents. The M60 also contains a variety of internal components, some of which are explosive, and has fairly tight tolerances, making disassembly and partial reassembly more difficult than for other projectiles. In spite of a substantial number of processing problems resulting from the internal configuration of this projectile, over 20,000 M60s were disposed of during 17 weeks of processing. The average throughput rate achieved when full-rate production was attempted was 30.9 projectiles per scheduled hour of operation. While lower than the desired process test goal of 56 projectiles per hour, this throughput rate is still within reasonable expectations, given the five-week time period available for demonstrating this rate.

JACADS is a first generation chemical munitions disposal facility, and as such its prototype nature was a major cause of performance shortfalls. In addition, JACADS

encountered a variety of munition and agent-specific problems that could not have been foreseen in the tests that were conducted with inert, simulant-filled munitions prior to OVT. These problems are not unusual for a first generation plant processing a unique feedstock, in this case, a substantial variety of obsolete chemical munitions and containers. Operational performance showed that significant engineering development was still needed on several of the systems. While much of the needed engineering has now been conducted, it is possible that additional problems may develop as the JACADS and U.S. plants are run for longer periods and on a more intense, 24-hour-per-day schedule. At JACADS, the Army had both successes and failures in diagnosing and correcting system performance problems. However, a program is in place to transfer the lessons learned to the U.S. plants, and additional testing is planned at JACADS to identify solutions for the remaining problems. In addition, to ensure early identification and correction of problems, the Army plans to process these munition types located on Johnston Island before processing similar munition types at U.S. plant locations.

JACADS can be considered to be a "pioneer process plant" in that it is the first full-size facility to process and destroy chemical munitions and agent, it uses a number of unique processing steps, and it has only been operated in a startup mode during OVT. The only evaluation of the initial operating experience of comparable facilities was carried out in a series of reports by the RAND Corporation in the early 1980s (reference listed in appendix E.). The evaluations covered over 40 such plants. For those plants processing solid materials, similar to JACADS, it took 6 months to achieve a mean processing rate of 59 percent of design capacity.

There are several difficulties in comparing JACADS OVT performance with the results of the RAND studies. For example, the RAND reports do not specify the number of hours per day during which operations were attempted for the pioneer processing plants and thus, it is not possible to state whether performance was predicted on an operating hour basis or a 24-hour per day basis, as given in this report. Also, the RAND reports do not state whether different kinds of operations with varying feedstocks were attempted during startup operations as was the case with JACADS during OVT. Keeping these limitations in mind, a rough comparison of JACADS performance, as measured by munition throughput, can be made with the facilities in the RAND study.

The two OVT rocket tests taken together lasted for 44 weeks (10.2 months) during which time processing occurred or could have occurred. This does not include planned shutdown periods and closures due to factors beyond the Army's control (e.g., weather). For the last 5.5 weeks of the second (VX) rocket test full rate operation was attempted. During this time, 6,436 rockets were processed in 406 scheduled hours corresponding to a throughput on a 24-hour basis of 14.4 RPH. This was 45 percent of the design goal, and is in the middle of

the performance range of the plants studied in the RAND report having a similar duration of experience. The experience of the projectile test showed a similar trend in performance growth.

Taking the above caveats into account and recognizing data limitations, we conclude that while the JACADS processing performance to date did not reach the throughput goals established prior to OVT, this performance was well within the range of the startup performance experience of roughly similar pioneer processing plants that had been evaluated in the past. We also conclude that substantial learning experience was obtained during each test and that further performance improvements are likely to occur.

Major process systems that appear to require additional engineering refinement and testing to improve system availability include the Deactivation Furnace System, the Liquid Incinerator, and the Multipurpose Demilitarization Machine. Of these, the first two are adapted from systems used in industry, while the third is a special purpose machine. The corrections and improvements needed all appear to be well within the state of the art. Although operating in a support role on Johnston Island, the Brine Reduction Area and the Dunnage Incinerator did not achieve full operation. These systems will require additional engineering and testing. Both of these are adaptations of standard industrial systems and were not developed specifically for chemical munition disposal. The backup power systems failed on several occasions during OVT, and require more detailed testing at all sites to ensure reliable operation.

5.5 CONCLUSION

The JACADS plant completed its OVT with the destruction of more than 40,000 munitions over a period of 32 months.

There were no public or worker injuries or fatalities from agents or munition fire or explosion, and the plant met the safety goals established for it.

The plant emitted no agent (except for one occurrence that posed no significant worker or public health risk) and operated within permit requirements for other discharges. Although not satisfying all administrative permit requirements, the plant demonstrated its ability to meet federal regulatory standards and to operate without adverse environmental impact.

JACADS demonstrated its ability to destroy rockets, ton containers, and projectiles containing three types of agent. The plant approached or met short-term throughput goals, but did not meet long-term average process rate goals. Although not achieving the

throughput goals specified prior to OVT, the performance was within the range of startup performance for similar industrial pioneer processing plants.

The JACADS design has no apparent fundamental problems in achieving safety and environmental goals of planned U.S. plants, although continued improvements in these areas will increase further the assurance of safe, environmentally-sound operation. The implementation of the lessons learned from the OVT combined with additional engineering refinement should enable JACADS and U.S. plant performance to approach or exceed the OVT throughput rate and design goals.

APPENDIX A

JACADS PROCESS DESCRIPTION

The chemical munitions on Johnston Island are in munition storage buildings located in an area about one-half mile from the Johnston Atoll Chemical Agent Disposal System (JACADS) complex and linked to it by paved roads. The major structure at JACADS is the Munitions Demilitarization Building (MDB), a 73,000 square foot, two-story building containing disassembly machinery, incinerators, and supporting equipment. Four pollution abatement systems, an air purification (filter) system, a laboratory, and a personnel support facility are adjacent to the MDB. Together, these and other supporting facilities constitute JACADS.

Pallets of M55 rockets are sealed in a Single Pallet Only Rocket Transport container and transported by truck to the MDB. Projectiles and ton containers are transported by truck from storage to the MDB. At the MDB, in an automated process, special machines disassemble the munitions, and access and drain the agent from the munitions. Four specialized incinerators, each with its own pollution abatement system (PAS), incinerate the munition pieces, explosives, packing materials, and drained agent.

JACADS contains four incinerators designed to destroy material from different parts of the demilitarization process. Each incinerator has a primary chamber which provides the temperature, oxidizing conditions, and residence time to provide the desired destruction, and a secondary chamber to provide additional assurance that any agent vapors remaining will be fully destroyed. Each incinerator has a PAS that reduces the pollutants in the exhaust gas to below the levels established in the environmental permits.

The Liquid Incinerator (LIC) is designed to incinerate liquid agent. Agent is injected into the primary chamber which operates at a nominal 2700°F. The exhaust gases pass to the secondary chamber operating at 2000°F, and are then treated in a PAS (including acid gas scrubbing), before being released from the common stack. Decontamination solutions from the demilitarization operations are collected and injected into the LIC secondary chamber to ensure destruction of any residual agent or organic byproducts of agent neutralization.

The Deactivation Furnace (DFS) primary chamber is a rotary kiln designed to incinerate solid materials including rocket propellant and explosives, as well as agent-contaminated materials. Solids remain in the kiln for about 12 minutes, then the incinerated residue passes through a heated discharge conveyor for at least 15 minutes at 1000°F to ensure thorough decontamination before discharge to a residue bin. The gases from the kiln pass through an afterburner operating at 2000°F, and are then treated in the DFS PAS before discharge from the common stack.

The Metal Parts Furnace (MPF) is a refractory-lined furnace designed to thermally decontaminate drained metal parts (ton containers, bombs, or trays of projectile bodies). Trays of drained metal parts are conveyed through the furnace during which time any residual agent is destroyed by incineration. The metal parts are heated to at least 1000°F for 15 minutes to ensure decontamination, then they are removed and cooled before disposal. The exhaust gases pass through the afterburner at 2000°F, are treated in the MPF PAS, and are then discharged from the common stack.

The Dunnage incinerator (DUN) contains a refractory-lined furnace designed to incinerate packing materials (dunnage) and other miscellaneous solid wastes that may be agent contaminated. The DUN operates at 1400°F, the exhaust gases pass through an afterburner at 2000°F, are treated in the DUN PAS, and are discharged from the DUN stack. The solid residue (ash) is cooled and removed for disposal.

Rockets, ton containers, and projectiles were demilitarized during Operational Verification Testing (OVT). Only one type of munition and agent was demilitarized at a time. The sequence of operation for demilitarization of each item is briefly described below. Figures A-2, A-3, and A-4 show diagrams of the JACADS process configuration for each of the munitions demilitarized during OVT.

Rockets (Figure A-1)

- The rocket shear machine (RSM) is used to drain agent from the rockets by punching precisely-located holes through the exterior of the rocket and its shipping/firing tube. The agent is then pumped from the rocket to an agent storage tank.

- The RSM then shears the rocket into pieces that drop into the rotary kiln of the DFS.

- The DFS incinerates the residual agent, explosives, and propellant; a heated discharge conveyor ensures thermal decontamination of the rocket pieces.

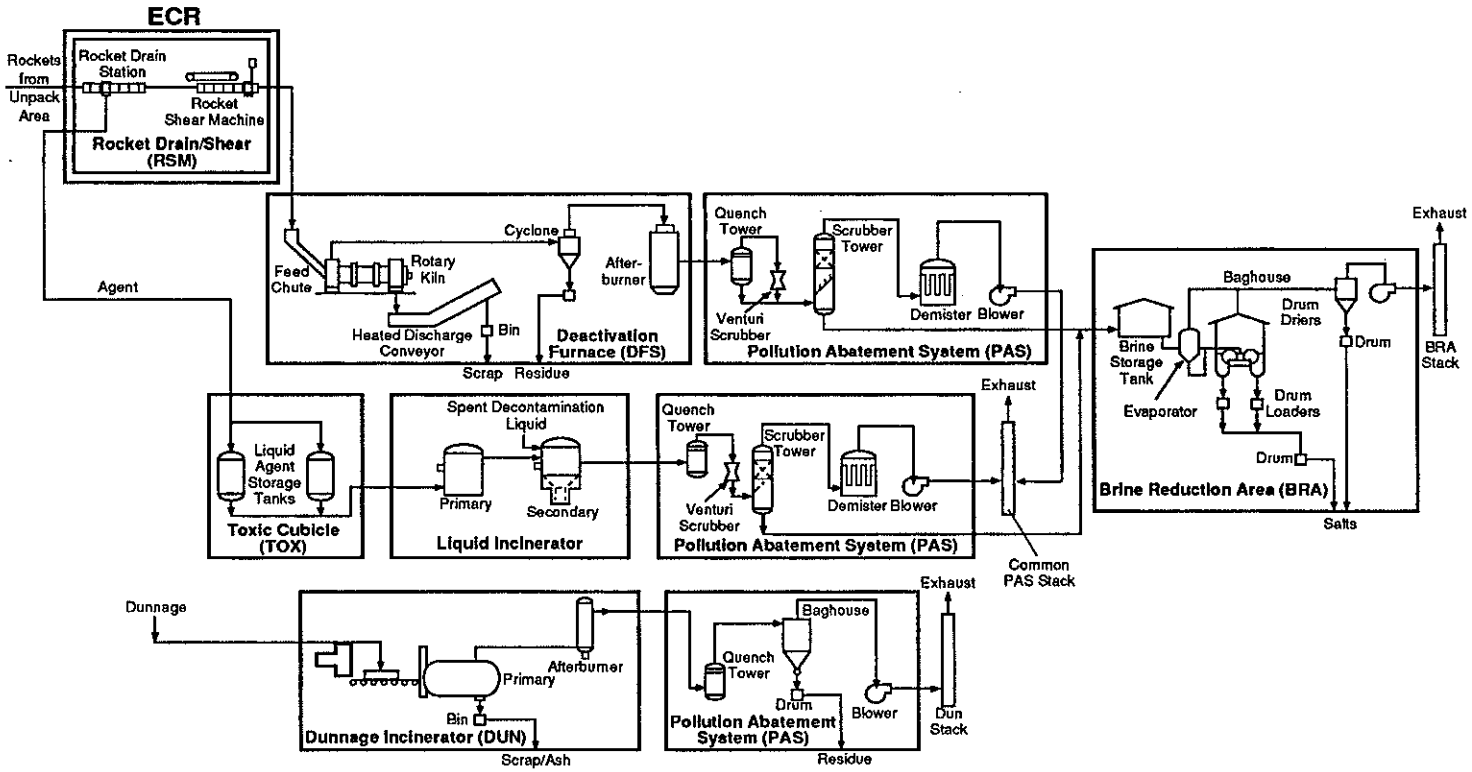

Figure A-1. Rocket Demilitarization Process Flow

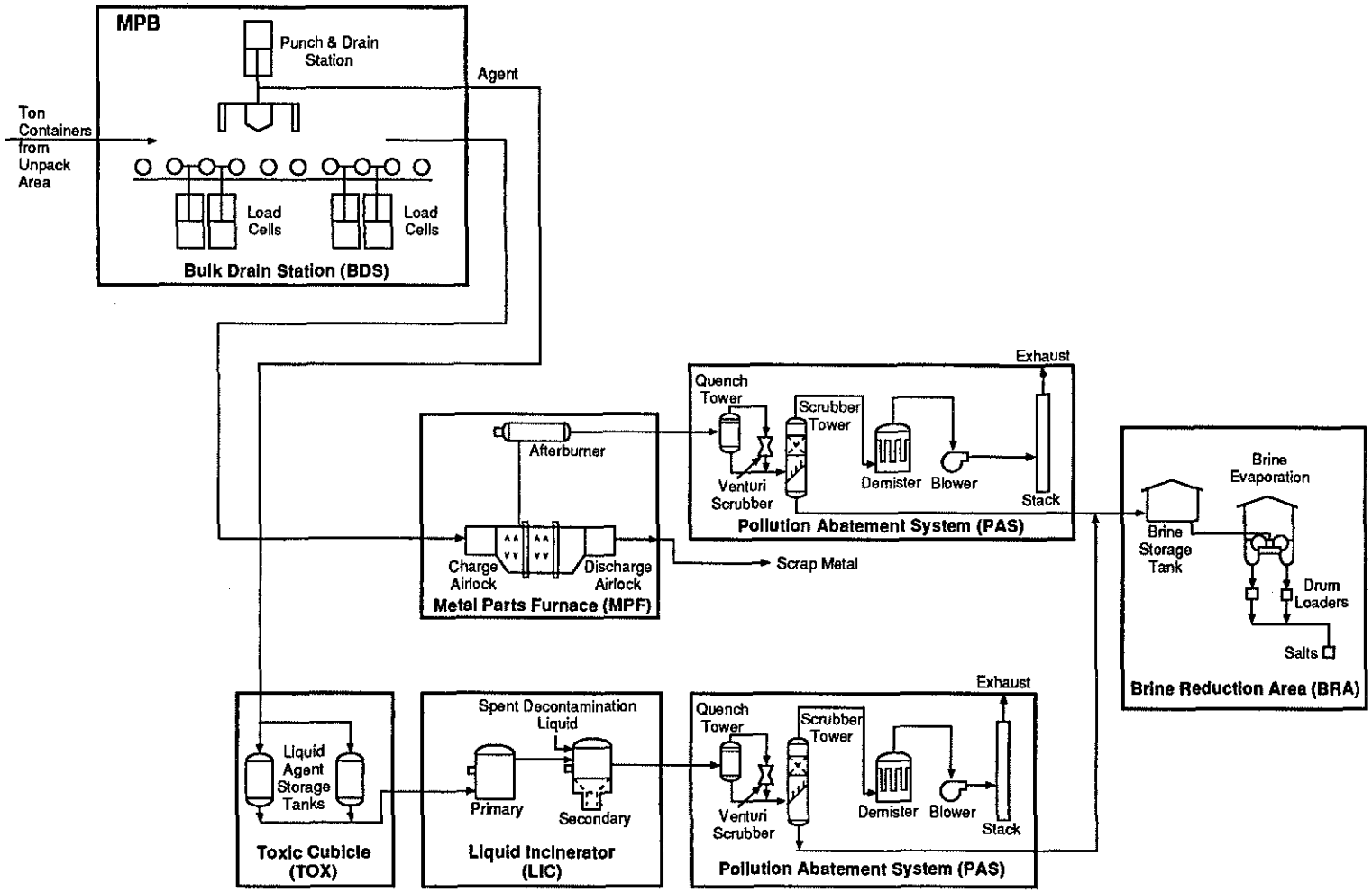

Figure A-2. Ton Container Demilitarization Process Flow

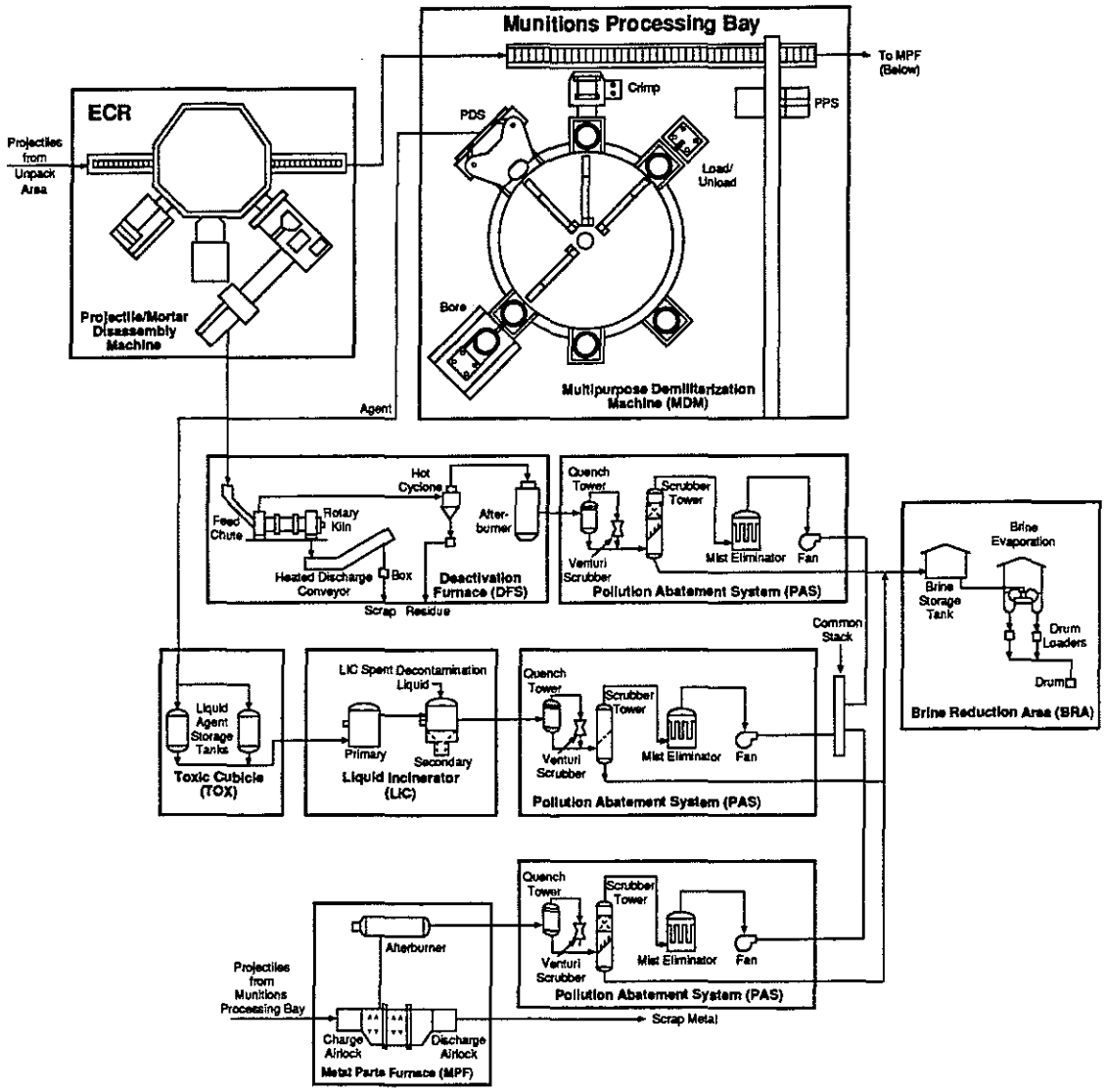

Figure A-3. Projectile Process Flow

- The agent is burned in the LIC.
- The wooden pallets are burned in the DUN.

Ton Containers (Figure A-2)

- The bulk drain machine is used to pierce access holes in the ton container and pump agent from the container.
- The agent is burned in the LIC.
- The residual agent in the ton container is destroyed by heating in the MPF.
- The ton container is decontaminated by continued heating in the MPF.
- The detoxified container is disposed of as scrap.

Projectiles (Figure A-3)

- The projectile/mortar disassembly machine (PMD) located in the Explosion Containment Room (ECR) is used to remove explosive components from the projectile.
- The explosives are incinerated in the DFS.
- The multipurpose demilitarization machine (MDM) in the Munitions Processing Bay (MPB) is used to pump the agent from the projectile when the burster well in the projectile is removed.
- The drained agent is incinerated in the LIC.
- The residual agent in the projectile body is destroyed by heating the projectile body in the MPF and incinerating the vaporized agent.
- The projectile body is decontaminated by continued heating in the MPF.
- The wooden pallets and strapping are burned in the dunnage incinerator.

The MDB houses the demilitarization system on two floors. Munitions enter the system on the upper floor where they are disassembled and drained of agent. The incinerators are located on the first floor. The second floor consists of an unpack area, an explosion containment room vestibule (ECV), two ECRs, a munitions corridor, an MPB, and some supporting services areas.

In the unpack area, munitions are received, manually separated from packaging materials, and placed on conveyors that transport the munitions to the processing areas. The ECV is isolated from the unpack area by a wall and airlocks. In the ECV, operators wearing demilitarization protective ensembles (DPE) suits can unpack leaking munitions for subsequent processing.

The ECRs are separated from the ECV by blast doors. The ECRs are reinforced concrete enclosures designed to totally contain the effects of an accidental explosion, as well as the associated agent during the processing of rockets, projectiles, and mortar cartridges, all of which contain explosives. Explosive components and rocket propellant sections that are sheared or removed from the munitions in the ECR drop through blast gates in the floor in the ECR into a deactivation furnace located on the first floor of the MDB. Machines located inside the ECR include the RSM and the PMD. Mine machines, where used, will also be installed in the ECRs.

The munitions corridor is separated from the ECRs by blast gates. Trays containing projectiles and mortar shells that have had their explosives removed in the ECR and trays containing bulk items, which have no explosives, are stored on conveyors in the corridor until they can be moved into the MPB. The MPB contains two parallel conveyor lines which receive the trays containing the munitions or bulk items. In the MPB, agent is drained from the bulk items and projectiles and pumped to an agent storage tank located in the toxic cubicle on the first floor of the MDB. Machines located inside the MPB include two bulk drain stations for the bulk items, and three MDMs for the projectiles. Projectiles are transferred between the trays and the MDMs by pick and place robots associated with each MDM.

The first floor of the MDB contains a buffer storage area (BSA), a toxic cubicle, the control room, a DFS, a LIC, an MPF, a DUN, and various supporting services areas. The BSA stores trays with drained munitions and bulk items until they can be transferred into the MPF where residual agent in the munitions and bulk items is thermally destroyed. The toxic cubicle contains two agent storage tanks from which agent is pumped to the LIC where it is thermally destroyed. The toxic cubicle also contains storage tanks for spent decontamination solution generated by the washing of agent-contaminated surfaces and cleanup of agent spills in the MDB. The spent decontamination solution is pumped to the secondary chamber of the LIC. The DUN is used to burn solid waste resulting from the unpacking operations as well as

laboratory waste, spent carbon, and used DPE suits. Each incinerator has its own PAS located outside the MDB.

From the time the rockets and projectiles are fed into the ECR until waste is collected from the incinerator discharges, the process is largely automated to minimize both the exposure of operating personnel to agent and explosion hazards, and the possibility of human error in the performance of the required tasks. A variety of support systems and equipment are also provided to maintain continuous and safe operation of the plant. These include the following:

- Ventilation systems to remove and clean contaminated air, and to protect equipment and personnel
- A decontamination system to treat agent spills or to clean agent-contaminated munitions or equipment surfaces as required for safe operation or maintenance
- A control room to safely and productively control the process
- A mechanical equipment room with a variety of process support equipment
- A personnel area used for the donning of protective clothing and to protect workers in contaminated areas
- A communications system

Ventilation is provided to areas within the MDB in accordance with expected agent contamination in those areas. Toxic areas including the ECV, the ECR, and the MPB, and intervening corridors are provided with a cascading ventilation system of negative pressure to prevent migration of agent vapors to areas where there may be unprotected workers. Areas with the highest potential for being contaminated are at the greatest negative air pressure so that MDB air always flows from cleaner areas to the more toxic areas. Air collected from the toxic areas is passed through a carbon filter system before being exhausted to the atmosphere. The control room is provided with its own filtered clean air supply and is under positive pressure with respect to the other areas of the MDB and outside ambient air.

Support activities for the JACADS operation are housed in additional buildings in the JACADS complex. These include a site security control center, a laboratory, personnel support complex, a boiler house/brine reduction area (BRA), and a mechanical maintenance building. Various fuel tanks, a bulk chemical storage area, a residue handling area, and an emergency generator shed are also found within the JACADS security perimeter.

APPENDIX B

REFERENCE SAFETY EVENTS

Note: These events are synopses of those agent-related events that have raised safety concerns or issues. In each case, additional information is available in the particular OVT report. It must be emphasized that none of the events presented significant risks to the public since built-in controls and protections prevented public injury or potential injury in each case.

Event #1 Common Stack Agent Discharge

Event #1 occurred on 8 December 1990 during OVT1 when the LIC was in the process of cooling after a shutdown. During approximately one hour, residual agent evaporated from the LIC injector and passed through the cooling furnace system to the common stack where it discharged. The discharge lasted for about an hour, and reached a peak of about 0.22 Allowable Stack Concentration (ASC), which is less than a reportable discharge. As expected, agent was not detected in the off-site monitors around the plant since the quantity was far too small to measure. There was no significant public health risk. However, the event is listed here because the discharge itself was verified, and it was unexpected. As a result of the incident, the LIC shutdown procedure was modified, and there were no additional outside discharges from this cause.

Event #2 Common Stack Agent Alarm

Event #2 occurred on 17 February 1992 during OVT2 and involved an Automatic Continuous Air Monitoring System (ACAMS) monitoring the PAS common stack that alarmed at a reading of 1.19 ASC during one ten-minute cycle of the monitor. This event is not considered a critical event. Investigation of this incident showed that the Depot Area Air Monitoring System (DAAMS) tubes that normally monitor the PAS common stack had been removed for routine exchange when the ACAMS alarm occurred. Thus, (DAAMS) analysis could not be used to confirm whether the VX agent actually caused the alarm. As a result of this occurrence, the DAAMS sampling apparatus was modified so that DAAMS tubes are always sampling the stack gases even while changing tubes. Additional analysis of the evidence led the Army and operating contractor to conclude that agent had not been discharged, and that the monitor had responded to an interfering chemical in the furnace gases. Off-site agent measurements were negative, and even if agent was present, there was no significant public health risk. Monitor operations were changed to improve the ability to resolve events such as this.

Event #3 Deactivation Furnace Room Doors

Event #3 occurred during OVT2. During repair work on the DFS, the outside doors to the DFS room were blocked open, allowing large amounts of ventilation air to be drawn into the DFS room. Air drawn into the room was passed through the ventilation system charcoal filters before being exhausted to the outside, and there was no agent discharge from this source. While smoke tests subsequently showed that air containing agent would not have left the room, unusual wind or traffic conditions, or a failure of the ventilation system while the doors were open could have affected the air flow at the open doors. There were no measurements to show that agent did not leave the doorway when workers disturbed the airflow as they moved in and out of the room. The likelihood is that no discharge occurred; however, the open doors did represent possible discharge point and source of potential exposure to nearby workers. The Army has recognized that this situation was inappropriate and has implemented policies to prevent a recurrence.

Event #4 Agent Sample Mishandling

Event #4 occurred on 12 April 1992, during the changeover between OVT2 and OVT3. The event involved the unknowing and only partially-protected movement of two samples (about 500 ml each) of agent solution outside of the MDB and potential exposure of lab personnel. No one was injured, but the event demonstrated a series of failures to follow procedures and good practice.

The event began when the operations staff began decontamination of the VX agent storage tank as part of the preparations for changeover to OVT3. An error was made in a valve setting, and decontamination solution that was to have circulated in the tank did not circulate, thus preventing neutralization of the agent in the tank to what was predicted to meet "drinking water" agent levels. The first plastic sample bottle was taken of the supposed decontaminated material, but a sampling of the outside of the bottle showed high agent levels. Glass bottles were then used, and the outside decontaminated. The bottles, thought to contain nearly agent-free decontamination solution, in fact contained 9 percent and 16 percent VX in water. The bottles were put into plastic bags (without "overpack" rigid protection) and carried outside the MDB to the lab. The bottles were placed on a work bench (not in a hood) and sampled. The initial and subsequent samples overloaded the detectors. Nearly 24 hours of testing involving seven workers were done before a staff member recognized that the "problem" was not with the detectors, but that the samples contained VX concentrations beyond the capability of the detectors, and that the samples should be handled and tested accordingly. Although there was little protection against contact with the agent, there was no injury to the lab workers.

There was no release of agent to the environment. Dropping and breaking the sample bottles during the sample transfer could have resulted in agent on the ground if the plastic bags failed. This could have potentially exposed workers to agent, but would not have caused significant off-site risks to the public unless contaminated shoes or other materials had been taken off the site. At JACADS, the lab is within the facility complex (one U.S. site will have a lab outside the plant boundary).

Corrections were made to lab procedures to prevent potential worker exposure from a similar event in the future.

APPENDIX C

ENVIRONMENTAL PERFORMANCE

This appendix supplements the environmental performance discussion presented in section 3.

C.1 OVERVIEW OF ENVIRONMENTAL REGULATIONS

Table C-1 lists the environmental requirements that apply to chemical demilitarization facilities. Most environmental regulations require issuance of operating permits before a facility can be operated to ensure compliance with environmental standards.

The environmental regulations cited in table C-1 apply to JACADS, although JACADS is exempted from the requirements of the CAA. Nevertheless, a monitoring program for some air pollutants regulated by the CAA, such as NO_x and SO_x, has been conducted to gather data to demonstrate that U.S. facilities can meet air quality standards imposed by specific states.

Table C-2 provides an overview of JACADS environmental performance during the OVT period as measured against certain regulated parameters. Details of JACADS experience are discussed further in sections C.2 through C.6.

C.2 AGENT AIR EMISSIONS

In this and following sections, a more detailed discussion will be presented of the major waste streams and areas where increased attention is needed.

The analytical method used for the detection of chemical agent must be able to discriminate the presence of chemical agent from other chemicals present in the sample, and be able to quantitatively measure the concentration of the chemical agent. The probability of detection is increased with the simultaneous use of two different analytical techniques-the Automatic Continuous Air Monitoring System (ACAMS) and the Depot Area Air Monitoring System (DAAMS).

The ACAMS instruments monitoring the stacks and the Heating, Ventilation and Cooling (HVC) filters collect samples from the gases exiting the stacks and filters. The ACAMS is a near-real-time monitor (with cycle time of about 3 to 10 minutes), whereby a detection level equivalent to the lower limit of quantification (LOQ) triggers an LOQ alarm.

Table C-1. Environmental Requirements for Chemical Demilitarization Facilities

Regulated Emissions/Wastes	RCRA	TSCA	CAA*	CWA	DOT
Agent Air Emissions:					
Agent release outside MDB	X				
Agent (DRE for LIC and MPF)	X				
Non-Agent Air Emissions:					
Particulate matter	X	X	X		
HCl	X	X			
CO	X	X	X		
O_2	X	X			
NO_x			X		
SO_x			X		
Pb			X		
CO_2		X			
Opacity			X		
Fugitive dust containing heavy metals (e.g., Cd, Cr, and Pb)	X				
Nitroglycerin (DRE for DFS)	X				
PCB (DRE for DFS)		X			
Hazardous Wastes					
Liquid (containing hazardous constituents)	X				X (if shipped offsite)
Solid (e.g., HDC and BRA residues; contaminated DPE suits)	X				X (if shipped offsite)
Water Quality:					
Discharged cooling water				X	

*JACADS is not covered by the CAA requirements.

Table C-2. Summary of JACADS Environmental Performance

Requirements	JACADS Experience[1]
Agent Air Emissions:	
Agent from stacks: Release >1.0 ASC is reportable to EPA	0.22 ASC for less than 1 hr (GB rocket test): confirmed GB agent
Agent DRE	
LIC: 99.99% (GB, VX, & HD)	Met requirement
MPF: 99.99% (HD)	Met requirement
Non-Agent Air Emissions:	
Particulates	
Furnace PAS: 180 mg/dscm, corrected to 7% O_2	DFS, LIC, & MPF: met requirement
BRA: 30 mg/dscm	BRA: Compliance test not successfully performed during OVT
Analysis of exhaust gas for PICs and metals (trial burns only)	Very low levels of hazardous constituents found in volatile and semi-volatile PICs (most likely from the furnace fuel)
Dioxins and furans (trial burns only)	Very low levels (0 to 23.64 µg/hour during trial burns)
HCl: 4 lb./hr	DFS, LIC & MPF: met requirement DUN: no trial burn performed during OVT
CO: 100 ppm over 1-hr rolling ave.	DFS, LIC & MPF: within permitted limits DUN: no trial burn performed during OVT
O_2	
DFS AFB[3]: 6-14%	Within permitted limits
LIC sec. chamber: 5-10%	Within permitted limits
DUN AFB: 8-14%	Not operational during OVT

Table C-2. (Concluded)

Requirements	JACADS Experience[1]
MPF AFB: 2.5 - 11.5%	Within permitted limits
NOx (concentration monitored as an Army goal only)	Below 500 ppm except on one occasion during OVT2
SOx (concentration monitored as an Army goal only)	Same as NOx
Nitroglycerin DRE (99.99%)	DFS: Met requirement
PCB DRE (99.9999%)	DFS: R&D burn--requirement met, demonstration burn--requirement met in 3 of 4 trials
Hazardous Waste Management:	
Brine spills/storage	PAS secondary containment intermittently used as supplemental storage for brine; brine tank high-high alarm overridden in control room–overflow occurred but contained in secondary containment; large amounts of brine residue accumulated in the brine exhaust duct; no release to the environment
Fugitive dust (containing metals such as Pb, Cd, and Cr)	Several instances of release in reportable amounts not reported to National Response Center in a timely manner
Internal inspections and record keeping	Several cases of noncompliance
DOT packaging	HDC residues shipped in FIBCs before DOT certification obtained
90-day storage	Numerous instances of noncompliance
NPDES Effluent:	
Heated water discharge	Receiving water temperature exceeded permit requirement–permit modification pending

[1]JACADS is not covered by CAA regulations, but monitoring of NOx and SOx pollutants is an operational goal.
[2]Trial burn test results are still undergoing EPA review.
[3]AFB = Afterburner .

For the stack and blower ACAMS instruments, the LOQ alarm is normally set at 0.2 ASC, while the "action" alarm is set at 0.8 ASC (0.7 ASC for VX and HD), to allow for instrument variation. The DAAMS system is not a real time monitor; contaminants in the sampled air are concentrated for 1 to 12 hours, and then brought to the laboratory for analysis. However, the DAAMS is more discriminating against non-agent chemicals than the ACAMS, and can more accurately measure low-level agent concentrations.

The agent monitoring system is composed of 91 sampling stations within the JACADS facility and 12 perimeter sampling stations outside the boundaries of the facility. An ACAMS instrument or DAAMS or both are present at each of these sampling stations. There are five exhaust pathways that are monitored continuously for chemical agent—common PAS exhaust stack, DUN exhaust stack, BRA exhaust stack, MDB HVC exhaust stack, and operational laboratory HVC filter stack. Table C-3 presents a summary of the agent air emissions experienced at JACADS during the OVT.

Table C-3. Agent Air Emissions Experienced During the OVT

Test	Agent Processed* (Lbs)	Test Duration (Weeks)	Total ACAMS Analyses	Stack ACAMS Alarms	Confirmed Agent Release
OVT1(GB)	75,000	32	N/A	62	1
OVT2(VX)	134,961	19	327,120	21	0
OVT3(HD)	112,951	4	33,940	5	0
OVT4(HD)	35,485	17	347,900	55	0

*Agent destroyed in the LIC.
N/A = Not Available

The JACADS Resource Conservation and Recovery Act (RCRA) permit requires that an agent release exceeding 1.0 ASC from any of the stacks or to the atmosphere outside of the MDB must be reported to the U.S. Environmental Protection Agency (EPA). Although there were several occasions where the ACAMS instrument alarmed, there was no confirmed chemical agent emissions above the RCRA regulatory limit. Most of the alarms experienced were determined to be false positives and caused by operator error, by system malfunction, or by an interfering chemical. The difficulty of identifying the specific compounds causing the

false positive alarms (arising from interfering chemical species detected by the ACAMS) was never satisfactorily resolved during OVT, although the Army is working actively to resolve this problem.

As described in section 2 of the main report, during OVT1, there was a confirmed emission of agent release that occurred as a result of agent entering the LIC. The emission level was less than 0.22 ASC for less than one hour and had no adverse impact on public health or the environment. On another occasion, during OVT2 (startup of DFS furnace), the ACAMS alarmed at 1.19 ASC during one 10-minute cycle of the ACAMS monitor, but the substance causing the alarm could not be conclusively identified. The release was of short duration, and even if actually agent, would have had no adverse effect on public health or the environment.

The effectiveness of a furnace in destroying agent is measured by the Destruction Removal Efficiency (DRE). The DRE for a particular agent and furnace is measured by comparing the amount of agent entering the furnace with the agent concentration in the exhaust gases. For example, the permitted agent limit for the LIC ranges from 700 (VX) to 1330 (HD) lb/hour, while that for the MPF ranges from about 53 (HD projectiles) to 146 lb/hour (for HD ton containers). Since no agent was measurable in the exhaust of the furnaces, the actual DRE is higher (better) than what could be computed theoretically based on the level of quantification of the ACAMS instrument; the measurement for the MPF was less sensitive than for the LIC because of the small amount of agent fed.

Table C-4 summarizes the agent DREs demonstrated during the trial and demonstration burns for the furnaces. DREs much greater than the RCRA-required 99.99 percent were achieved during the LIC GB and VX trial burns, as well as during the LIC HD demonstration burn. For the MPF trial burn, the DRE for HD was greater than 99.9996 percent. The smaller DRE for the MPF was due to the much smaller amount of agent fed into the MPF as compared to the LIC.

Although not a RCRA requirement, an Army goal is to measure any breakthrough of agent from the charcoal beds for the MDB filters so as to help evaluate the useful life of the charcoal. Breakthrough of agent in a filter bed is determined when the agent is detected downstream of a charcoal bed. Throughout the OVT, agent was never detected after the first of the six charcoal beds in the MDB filter. Analysis of the OVT1 ACAMS data from the MDB exhaust air, furnace room exhaust air, and the first stages of the air filters showed that the GB concentration in each of the six beds was reduced by more than 400,000 times, much better than the design reduction minimum of 10,000 times reduction (or 99.99 percent removal).

Table C-4. Agent Destruction Removal Efficiencies Achieved During Trial Burns at JACADS

Furnace*	Agent	DRE (%)
LIC	GB (rockets)	>99.9999995
	VX (rockets)	>99.9999997
	HD (ton containers)	>99.99995
MPF	HD (ton containers)	>99.9996

*No DUN trial burn was performed during the OVT.

In addition to the regulatory limits on the amount of agent released from exhaust stacks, the Army and Department of Health and Human Services (DHHS) require detection of agent emissions at selected locations around Johnston Island (JI). There are 12 perimeter monitor stations, with each taking two 12 hour sample measurements per day. The amount of agent detected at the perimeter stations should not exceed 1 general population level (GPL). For VX or GB, one (1.0) GPL is a 72-hour time weighted average concentration of 3.0×10^{-6} mg/m^3; for mustard, it is equivalent to 1×10^{-4} mg/m^3. Although there were several occasions where positive readings were obtained from the perimeter monitoring stations, there were no instances where chemical agent was confirmed to be present. Examination of plant operations data such as whether or not agent operations were underway, furnace temperatures and pressures, and other monitor data at the time of the perimeter monitor readings supported the conclusion that the monitors did not detect agent.

With the exception of Indiana, Kentucky, and Utah, the agent DRE established by the five states is 99.99 percent, which is the same as the federal standards. Indiana and Kentucky require a 99.9999 percent DRE for all chemical agents for all furnaces, while Utah requires a 99.9999 percent DRE for the LIC and 99.99 percent for the other furnaces. In addition to trial burns using actual chemical agents, states may require trial burns using surrogate agents. For example, Utah requires trial burns to demonstrate a 99.9999 percent DRE for surrogate agents prior to an actual agent trial burn.

As noted above, the less than 99.9999 percent DRE demonstrated during the JACADS HD trial burn tests for the MPF was limited by the agent detection technology and the small amount of agent fed. The Army is already looking into ways of further improving the sensitivity of the agent monitors.

C.3 NON-AGENT AIR EMISSIONS

At JACADS, the PAS common exhaust stack and all furnace exhaust ducts are required to be continuously monitored using on-line continuous emission monitors (CEMs) for certain parameters, such as CO and O_2 concentrations. In addition, to ensure that the combustion efficiency of each furnace is maintained during the processing of hazardous waste, other furnace operating data such as furnace temperature and pressure are monitored. As noted earlier, the Toxic Substances Control Act (TSCA) DRE requirement for Polychlorinated biphenyl (PCB) must be demonstrated during the performance burns, but continuous monitoring of PCB concentration during furnace operation is not required since the operation at proper furnace conditions ensure the destruction of the PCBs.

As summarized below, non-agent air emissions from JACADS were maintained within the permitted limits:

- Particulate emissions from the DFS, LIC, and MPF were below the limit of 180 mg/dscm (0.08 gr/dscf). Preliminary BRA source emission tests indicated that particulate emissions from the BRA PAS were less than 33 percent of the 30 mg/dscm RCRA limit (see table C-5).

- The Hydrochloric Acid (HCl) emissions from the LIC HD demonstration burn and MPF HD trial burns were well below the allowable limit of 4 lb/hr. HCl is not produced during combustion of GB or VX.

- CO and O_2 concentrations of emissions from the DFS, LIC, and MPF did not violate permit requirements.

- The DFS trial burn surpassed the 99.99 percent RCRA DRE requirement for nitroglycerin.

- In three out of four performance burn runs, the DRE for PCBs was better than the required 99.9999 percent TSCA DRE. One of four burn tests resulted in a PCB DRE of slightly less than 99.9999 percent. However, the emission rate from this run was below the emission rates of three commercially-operated PCB incinerators and also below that of the U.S. Army Chemical Agent Munitions Disposal Facility (CAMDS) at Tooele, Utah.

- Stack emissions during the performance burns were analyzed for volatile and semi-volatile products of incomplete combustion (PICs), as well as for presence of dioxins and furans. There were small quantities of substances emitted that are listed

as hazardous constituents by EPA (e.g., benzene, dimethyl phthalate, toluene, and vinyl chloride). However, there are no regulatory limits with which to compare the results of the PICs analysis. The levels of dioxin and furan emissions ranged from 0 to 23.64 micrograms/hour, well under the calculated threshold of 350 micrograms/hour for no adverse effect for aquatic life. None of the dioxins found were the 2, 3, 7, 8-tetrachlorodibenzo-p- dioxin (2, 3, 7, 8 TCDD) isomer, which is regarded as the most toxic form of dioxin. The detected PICs were most likely from the fuel used for the furnaces rather than from the waste constituents.

Table C-5. Particulate Emissions

Furnace[1]	Performance Burn	Particulate Matter (mg/dscm)[2]
DFS	TSCA R&D test	12-23.9
	RCRA trial and TSCA demonstration burns	1.10-4.55
LIC	GB rocket trial burn	<4.23
	VX rocket trial burn	2.69-10.4
	HD TC demonstration burn	0.54-5.06
MPF	HD TC trial burn	0.89-10.9
BRA	Capacity testing	7.1-13.8

[1]No trial burns performed for the DUN during the OVT.
[2]Corrected to 7 percent O_2 concentration.

Regarding the CO and O_2 concentration limits, it is important to understand the basis of EPA's permitted levels. The EPA has determined that the RCRA permit conditions apply to JACADS only when hazardous materials are being fed to the furnace; and not when the furnace is on standby, or in startup or shutdown mode. The limits also do not apply if a furnace upset occurs when the hazardous material is in the furnace as long as new material feed is immediately stopped.

The JACADS RCRA permit requires that the furnace exhaust CO concentration must be kept to less than 100 ppm over a one hour average during hazardous waste operations. O_2 concentration limits vary according to furnace type. For example, the DFS afterburner outlet O_2 concentration must be kept within 6 to 14 percent while the limit from the LIC secondary

chamber outlet is 5 to 10 percent. Exceedences of the O_2 concentration limit occurred primarily from the DFS afterburner and LIC secondary chamber. Examination of the circumstances of the CO concentration exceedences that occurred during OVT indicated that most were associated with the startup and shutdown of the furnace. Although there were times when the CO concentration in the LIC exhaust gas exceeded the limit while hazardous waste was being processed, the feed was immediately stopped as required.

The majority of O_2 alarms that occurred during OVT were attributed to the plugging of O_2 sensing probes in the exhaust duct from the LIC secondary chamber. During OVT3, the primary and secondary LIC exhaust gas samples to the CEMS were scrubbed with caustic solution before entering the O_2 monitor. This modification improved the O_2 detector response and eliminated poisoning of the detector cell which may have caused the downward drift of O_2 concentrations during OVT2. The contribution of O_2 alarms to LIC downtime significantly decreased after the implementation of the caustic wash.

Although monitoring NO_x and SO_x emissions during routine operations is not required for JACADS, the Army has set a goal of acquiring such emission data to support the CAA permitting process for the U.S. facilities. Both NO_x and SO_x concentrations are monitored from the PAS common and DUN exhaust stack. There are no separate monitors in the LIC, DFS, and MPF exhaust ducts. Limited NO_x and SO_x data were collected during the OVT. The LIC exhaust gas NO_x and SO_x concentrations were not measured during OVT1. Although the RCRA trial burn for the LIC was performed during OVT1, RCRA trial burn protocol did not specify the measurement of NO_x and SO_x concentrations. However, the DFS afterburner exhaust was monitored for both NO_x and SO_x during OVT1. NO_x concentration averaged between 5 and 30 ppm, while SO_x concentration averaged between 50 and 150 ppm.

There was only one occasion (during OVT2 on 1/22/92) when the SO_x concentration detected from the LIC exceeded the maximum Process Data Acquisition and Reporting System reading of 500 ppm. On this same day, the NOx concentration in the PAS common stack due to LIC operation was between 300 and 500 ppm. This was higher than the NO_x concentration of 200–300 ppm during the performance burns for the DFS. High concentrations of NO_x continued to be produced during agent processing throughout the rest of OVT2 (above 450 ppm during maximum VX feed rates). A possible, although unconfirmed, reason for the high concentrations of SO_x and NO_x was channeling through the small metal cylinders (pall rings) in the packed bed scrubber; these cylinders are designed to increase the available surface area for contact between the circulating caustic and gas streams to achieve acid gas removal.

During OVT2, the LIC outlet SO_x concentration was not monitored during the period of highest rate of rocket processing and agent burning (March 1992). Moreover, the SO_x analyzer was not operating during the DFS performance burns that were performed during OVT2.

During OVT3, the LIC outlet NO_x concentration was on the average less than 100 ppm, while SO_x concentration was normally under 10 ppm. During OVT4, the NO_x concentration averaged between 50 and 75 ppm when both the DFS and MPF were operating, while the SO_x averaged between 2 and 20 ppm.

Table C-6 summarizes the state-imposed air permit standards for the different air pollutants. The National Ambient Air Quality Standards determine how air pollution is to be controlled at new or existing sources. An important consideration in the enforcement of emission limitations and other controls is the location of new or modified sources of pollutants. A Prevention of Significant Deterioration (PSD) permit is needed for a new or modified source located in a PSD region, which is defined by EPA as a region where the air quality exceeds the federal ambient air standards and significant deterioration of air quality must be avoided. To obtain a PSD permit, the new source must demonstrate that it will use the best available control technology to control emissions within the allowable air quality increment levels.

All eight states where the U.S. plants will be located require permits to regulate air emissions in accordance with the CAA. Two sites—Anniston Army Depot (ANAD) in Alabama and Pine Bluff Arsenal (PBA) in Arkansas—will require a PSD permit. Non-demil operations at ANAD currently emit more than 250 tons/year of air pollutants (e.g., NO_x and particulate matter). Due to manufacturing of ordnance, PBA is currently categorized by the State of Arkansas as a "Chemical Process Plant." Thus, being a named PSD source, the emission units of the chemical demilitarization facility at PBA will emit one or both of the following PSD-regulated pollutants: NO_x and particulate matter. Two other sites—Pueblo Depot Activity (PUDA) in Colorado and Umatilla Depot Activity (UMDA) in Oregon—may also require a PSD permit. The PSD status for each of these sites has not yet been finalized. The small amounts of NO_x and SO_x emitted during the operations at JACADS should enhance the Army's ability to meet the states' emission standards.

One important limitation of the JACADS data relates to the characterization of the particulates emitted from the BRA PAS. Analysis of BRA particulates for heavy metals has been performed during the BRA capacity testing, but the results of the BRA test will be superseded by the results from the compliance test scheduled for some time in 1993.

Table C-6. State Air Emission Standards

Facility/ State	PM	Pb	NO_x	SO_x	VOCs	CO	Opacity
ANAD/AL[a]	Best Available Control Technology (BACT)	--[b]	BACT	--	--		20%
PBA/AR[a]	BACT	--	BACT	--	--		20%
PUDA/CO	0.10 gr/dscf, corrected to 12% CO_2	--	--	--	--		20%
NAAP/IN	0.5 lbs/1,000 lbs dry exhaust gas, corrected to 50% excess air	--	--	--	--		40%
LBAD/KY[c]	0.08 gr/dscf, corrected to 12% CO_2	--	--	--	--		20%
APG/MD[d]	0.03 gr/dscf, corrected to 12% CO_2	--	--	--	--	If CO >500 lbs/day and at concentration >12% volume, direct flame afterburner for >= 0.3 sec. at >= 1300°F	No visible emissions
UMDA/OR	0.10 gr/dscf, corrected to 7% O_2 (Refuse burning)??	--	--	--	--		20%
TEAD/UT	0.02 gr/dscf, corrected to 7% O_2	--	--	--	--		10% (incinerators) 0% for BRA stacks
Federal standards (for incinerators)	0.08 gr/dscf, corrected to 12% CO_2	--	--	--	--		--
JACADS	0.0002 TO 0.04 gr/dscf, corrected to 7% o2		<500ppm	<500p	--	<100 ppm@ 1hr average	not measured

(a) Major sources are currently emitting >250 tons per year of at least one criteria pollutant.

(b) (--) Emission levels are emission system-specific and specified in the permit in order to meet ambient air quality standards.

(c) Toxic air pollutant standards are risk-based.

(d) Air toxics program requires that sources quantify all toxic air pollutants and use TOXIC-BACT as determined by the State.

VOSs = Volatile Organic Compounds

DPE suits were originally planned to be destroyed in the DUN. Since this would produce HCl in the exhaust gas, controls and permit limits were applied. However, since the Army has decided not to burn DPEs in the DUN at JACADS, there is no data to indicate whether HCl emission limits will be achieved. If the Army decides to process DPEs in the DUN for the U.S. facilities, it may have to control the feed rate for DPEs so the allowable emission standard for HCl is not exceeded.

The DFS trial burns demonstrated conformance to TSCA requirements for PCB destruction in three of four test runs. Hence, there are no apparent problems that would be of concern for the U.S. plants. Moreover, the U.S. plant design for the DFS afterburner provides for a longer residence time (2 seconds as compared to 1 second for JACADS) at a higher temperature (2200°F as compared to 2000°F for JACADS).

C.4 LIQUID AND SOLID WASTES

RCRA requirements also apply to process- and nonprocess-generated liquid and solid hazardous wastes. Process-generated liquid wastes include the agent decontamination solutions and the brine solution generated in the PASs. Spent decontamination solutions are stored in tanks and eventually fed to the LIC for incineration. PAS brine is also stored in tanks and then converted to dry salt in the BRA.

Sources of hazardous solid waste* include the furnace residues and dried salt from the BRA. Bulk solid wastes are generally collected in bins at the point of generation (e.g., the Heated Discharge Conveyor (HDC) carrying the ash and solid debris from the DFS) and then packaged for offsite shipment per Department of Transportation (DOT) specification. Hazardous waste disposed of offsite is packaged in DOT-approved containers.

Hazardous waste material either processed or generated during OVT included chemical agent, M55 rockets, shipping and firing tubes, propellant, projectiles' explosives, fuzes, spent decon, scrubber brine, dried salt, and incinerator ash.

Approximately 5.9 million pounds of waste was shipped from JI for disposal during OVT. The total quantity of waste shipped during each of the four tests is shown in table C-7. Note that these are the quantities shipped, and are not necessarily those wastes generated during each test period. Additionally, approximately 125,000 pounds of waste is contaminated with agent and is being held in storage for processing at JACADS after all of the munitions and

* The term "solid waste" is used to refer to waste in solid form and is not intended to have the same meaning as solid waste defined in various EPA regulations.

bulk containers are processed. The majority of this waste is used DPE suits that are being stored for future disposal. Approximately 3.4 million pounds of brine was shipped for disposal in deep wells at an approved hazardous waste disposal site in Corpus Christi, Texas. Had the BRA operated as designed, this quantity of brine could have been reduced to 509,843 pounds of salt, thereby reducing both transportation and disposal costs.

Table C-7. Wastes Shipped During Each OVT Test Period

Test	Agent-Contaminated Waste* (lb)	DFS Residue (lb)	Brine (lb)	DPE Suits (lb)	Other Waste (lb)	Total Waste (lb)
OVT1	0	330,966	883,627	0	222,550	1,437,143
OVT2	6,677	408,331	2,024,999	26,643	422,382	2,889,032
OVT3	29,337	212,910	486,716	13,551	258,979	1,001,493
OVT4	36,187	0	3,608	10,587	515,539	565,921
Total	72,201	952,207	3,398,950	50,781	1,419,450	5,893,589

*Wastes contaminated with agent that have been decontaminated (XXX level).

Approximately 16.4 pounds of waste was produced per pound of agent destroyed. If all brine that was shipped for disposal had been dried to salt, the weight of waste generated would have been 8.3 pounds per pound of agent destroyed.

Liquid Waste

During OVT2, events involving the BRA, agent tanks, and spent decon tanks indicated that the standards to prevent spills and tank overflows were not met. For example, although brine tanks are equipped with high and high-high level alarms to ensure that they were not overfilled, tank overflow occurred on two occasions because the high-high level alarms were overridden in the control room several weeks prior to the overflow events. The high-high level alarm and interlock controls to the agent holding tank were also disabled several times in November and December 1991 to allow for additional storage capacity. However, none of the incidents involving the agent holding tank resulted in agent release to the environment. As

a corrective action, the Army has discontinued the practice of disabling hazardous waste storage tank high-high alarms during normal operations.

Numerous brine management problems also occurred during OVT3. The large amounts of acid gas generated from the incineration of the agent HD in the LIC generated large amounts of brine during the neutralization of the acid gases in the main PAS. This, combined with the high processing rates of the LIC and unavailability of the BRA during the first two weeks of the test, led to the accumulation of large quantities of brine. The brine was stored in two 26,000 gallon BRA surge tanks and fifteen 5,000 gallon portable stainless steel intermodal tanks. The main PAS secondary containment was intermittently used to store brine during OVT3. This violated 40 CFR 264.194, which requires that appropriate controls and practices be used to prevent any spills or overflows from tank or containment systems.

On another occasion, the liquid (mostly accumulated rain water) in the BRA baghouse secondary containment area was pumped to the ground instead of being transferred to one of the BRA storage tanks for processing as required by the operating permit. During OVT4, 20 gallons of liquid brine containing barely hazardous concentrations of cadmium (Cd), chromium (Cr), and lead (Pb) leaked out of the drum dryer exhaust duct onto the ground; however, no environmental damage was found.

The BRA PAS is designed to remove particulates from the BRA exhaust. However, the operation of the BRA and BRA PAS was erratic. For example, brine residue (i.e., salt) was found to accumulate in the exhaust duct before reaching the PAS baghouse. During one cleanup operation, over 8,000 pounds of salt was recovered. Although not functioning correctly, the BRA and BRA PAS did not release brine residue to the environment.

Wastewater Discharge

The JACADS National Pollutant Discharge Elimination System (NPDES) permit specified limits on the flow and discharge temperature of the cooling water used by the plant, and on the temperature rise permitted in the receiving water. The NPDES permit limits are as follows: (1) 2.6 million gallons per day of wastewater discharged; (2) temperature rise of seawater used for cooling shall not be more than 15°C; (3) the temperature rise in the receiving water should be less than 1°C; and (4) effluent pH shall not be less than 6, but not more than 9.

The wastewater discharge quantity requirement was met, as was the requirement to control temperature rise below 15°C. However, the receiving water temperature rise limit of 1°C was not met during the OVT. In addition, the Army encountered problems with the collection of temperature monitoring data, which persisted until OVT ended. The receiving

water temperature rise has been shown to fluctuate more than 1°C as a result of direct sunlight, ambient air temperature, and relatively stagnant water. This necessitated an Army request to EPA for an NPDES permit modification to raise the allowable receiving water temperature limit.

Wastewater pH was measured once a week and normally was within permitted limits. However, during OVT2 a pH of 9.08 was recorded, and during OVT3 a pH of 9.36 was recorded. Both events were attributed to an out-of-calibration pH meter.

Solid Waste

Solid process wastes include the dunnage and other materials associated with the packaging of rockets, munition metal parts, the residue from each furnace, and the dried salt resulting from evaporated brine used in the PAS of each furnace. Nonprocess solid waste include rags, papers, and used DPE suits.

A major consideration in solid waste management at JACADS is the proper segregation of waste. Material that may have been contaminated with agent can either be surface-decontaminated and designated as XXX material, or can undergo thermal treatment (1000°F for 15 minutes) and be designated as XXXXX material. The XXX items are not allowed to leave government control without written authorization. The XXXXX classification indicates that any agent present has been destroyed by the thermal treatment (1000°F for 15 minutes).

The DFS HDC residue is considered XXXXX material, while the DFS cyclone residue waste stream is considered XXX. Although the Army considers the XXXXX treatment as ensuring that the material will be agent-free, the RCRA permit requires that the residue be analyzed for agent when the DFS feed changes or annually, whichever is more frequent. Laboratory testing of the HDC residue indicated no agent was present above the level of quantification. Since the cyclone residue is not subject to the minimum 1000°F for 15 minutes treatment, it is subject to chemical analysis to demonstrate that the concentration of VX or GB present is below 20 ppb, and the concentration of HD is below 200 ppb, or it will remain classified as XXX material. The JACADS RCRA permit requires that the cyclone residue be analyzed for agent when the DFS feed changes or annually, whichever is more frequent. Analysis of cyclone ash during OVT1 and OVT2 showed that no agent was present.

A number of procedural violations related to solid waste handling occurred during the OVT. The DFS cyclone residue, classified as XXX material, was shipped to a U.S. Treatment, Storage and Disposal (TSD) facility, although the Program Manager for Chemical Demilitarization (PM Cml Demil) was not authorized to dispose of XXX material, except DPE suits, in this manner. Moreover, all 11 drums of cyclone residue were shipped as

nonregulated material under RCRA even though analysis of 3 of the 11 drums indicated presence of up to 12.5 ppm leachable Cr. However, this error was identified while the drums were in transit and the necessary changes were made to the shipping manifest prior to the final disposal of the material. No hazardous material was released to the environment.

The DFS HDC residues also contain hazardous levels of Cd and Pb. The residue bins are stored on a concrete pad and, while being cooled, emissions of fugitive dust routinely occur. Runoff of hazardous material from the pad can occur during a rain storm since there are no structures in the pad to prevent such event. As a corrective measure, the Army planned to construct a roof and berm at the pad. Quantities of Cd and Pb that may be present are quite small (0.0375 to 0.0625 pounds per bin). Their release to the environment would result in minimal impact.

A release to the environment of a hazardous substance that has been designated as a reportable hazardous substance under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) must be reported to the National Response Center. CERCLA-defined hazardous substances include hazardous substances listed under the Clean Water Act, RCRA hazardous wastes, hazardous air pollutants under the CAA, and chemicals listed under Section 7 of TSCA. The hazardous substances and reportable quantities (RQs) are listed in 40 CFR 302.4. For JACADS, the RQ requirement is one pound for each of the following JACADS process wastes: (1) DFS HDC residue, (2) DFS cyclone residue, (3) dried salt, and (4) brine. The RQ applies to any consecutive 24-hour period.

During the period between 20 July 1990 and 2 August 1991, there were at least 29 reportable releases of hazardous fugitive emissions from the handling of rocket waste residues (JACADS 1991 RCRA report). None of these releases led to soil contamination.

On 7 August 1991, about 17 pounds of particulate resulting from the incineration of GB-filled rockets was released to the atmosphere. The particulate originated from the incineration ash packaging operation in the residue handling area. Although no chemical agent was released, previous analysis of the material samples indicated that they contained up to 60 ppm Cd and 62 ppm Pb (note that the RCRA threshold values are 1 ppm for Cd and 5 ppm for Pb). This release was above the CERCLA reportable quantity for hazardous wastes containing Pb. The prevailing winds dispersed the particulate toward the Red Hat area, which is a restricted access, hazardous waste storage area. The release did not lead to public exposure or measurable ground contamination.

Corrective actions taken by the Army to prevent release of hazardous fugitive emissions have been effective. For example, during OVT3, 3.5 million pounds of hazardous wastes was handled without any reportable CERCLA release.

Hazardous waste may accumulate and be stored on site for 90 days without a RCRA permit. Violations of this RCRA 90-day storage limit occurred on several occasions. For example in 1991, 51 containers of hazardous waste were accumulated and stored beyond the 90-day period. The hazardous waste included an isotainer filled with spent decontamination solution and three flexible intermediate bulk containers (FIBCs) of ash and residues from the DFS. Corrective actions instituted by the Army, such as improvements to the Waste Inventory Database and Tracking System, significantly reduced the 90-day noncompliances.

Provisions have not been made on the final disposal of empty ton containers and projectiles. At the end of OVT, they were still being stored at JI and no decision had been made on whether the projectile bodies would have to be crushed prior to disposal.

In addition to the incidents cited above, problems were also encountered with regard to use of FIBCs for HDC residue. The FIBCs had not been tested and were not DOT-authorized packaging for shipment of HDC residue. When this problem was identified, the Army stopped shipments. To be certified by DOT, the FIBCs were modified to have cardboard liners to prevent the metal rocket parts from puncturing them. Shipments were resumed upon successful DOT certification.

Most of the non-compliance at JACADS affecting the handling of liquid and solid wastes could be avoided at the planned U.S. facilities. Meeting the 90-day storage requirement should be easier because of closer proximity of hazardous waste disposal and treatment sites to the U.S. facilities, as compared to the situation at JACADS. Incidents at JACADS, occurring as a result of the inadequate operator training with regard to permit requirements, can be reduced with improved training.

C.5 OTHER ENVIRONMENTAL REQUIREMENTS

The RCRA also imposes limits on operational parameters such as furnace temperatures, as well as procedural or administrative requirements to ensure that hazardous wastes are not released to the environment. This section discusses JACADS experience in meeting these requirements and the implications it may have for the planned U.S. facilities. Another important element of a RCRA permit concerns emergency planning requirements. Sections 264.50 through 264.55 of 40 CFR 264 establish the requirements for the development of a contingency plan and emergency procedures to ensure that hazards to human health or the environment are minimized should unplanned events such as fires and explosions occur at a TSD facility.

Noncompliance with RCRA requirements did not lead to exposure of worker and the public to chemical agent and other hazardous material. The problems experienced during the OVT as they relate to other RCRA requirements not addressed in previous sections include the following:

Inspection Requirements. An audit conducted on 27 October 1991 indicated that the facility was not being maintained in accordance with regulatory requirements. Many of the inspection requirements in the permit were based on inaccurate description of the plant process equipment. Thus, RCRA permit modifications were made to establish revised inspection schedules that are more in line with the plant equipment configuration.

Record Keeping and Reporting. Copies of waste analyses, test results, and other records used in determining hazardous waste classifications were not filed in a central location. Process and non-process wastes were not tracked in the same level of detail as the chemical agent inventory. The inadequate number of flow meters in the PASs and the BRA contributed to inaccurate records of material stored and processed in the BRA. Transfers between brine storage containers and temporary portable containers were also poorly recorded.

Personnel Training. Although the Operations and Maintenance Contractor (OMC) has full-time training staff on JI, compliance with the administrative portion of RCRA training requirements—such as maintaining job titles and duties, and detailed descriptions of individual courses—was not fully accomplished during the early part of the OVT. Record keeping problems experienced in the BRA could also be attributed to the fact that the BRA training program insufficiently prepared the operators for tracking hazardous waste properly and uniformly. The Army has revised its training requirements, which EPA approved on 14 October 1992.

Stopping Agent Feed. During the HD TC test, in one isolated instance, the agent feed to the LIC was not stopped, either manually or with the required feed interlock, when the temperature of the LIC primary chamber dropped 5°C below the permitted low temperature limit. The secondary chamber remained at the required temperature (2000°F) during this period. The problem arose from an inadvertent removal of the interlock. Data showed that no agent was emitted. On another occasion, during the HD TC test, agent feed to the LIC was not stopped after an alarm was received indicating that the Process Data Acquisition and Recording System was no longer collecting data. While the parameters were still being monitored for alarm conditions, some of the data were not recorded for about 30 minutes.

Based on the JACADS experience, the procedural and administrative noncompliances were more prevalent during the early part of the OVT. The corrective actions taken by the Army in response to the RCRA noncompliances cited above have led to a significant

reduction of these noncompliances. Thus, there is sufficient basis to believe that the U.S. facilities would not have serious difficulty in addressing similar problems.

No problems were encountered at JACADS that could raise significant question concerning any aspects of the facility's emergency response plan. However, this issue is difficult to assess since states' approaches for implementing this requirement vary. The types of munitions handled, the logistics of moving munitions from storage to the MDB, and the different organizations (including state agencies) involved in an emergency are but a few of the factors that will have to be considered in the development of emergency response and emergency control programs for each U.S. site.

C.6 EPA AUDITS

Compliance with the environmental regulations has been a top priority for the Chemical Stockpile Disposal Program. The administrative requirements for a TSD are extensive. Compliance with these requirements has improved steadily throughout OVT. There have been only two Notices of Violation (NOVs) issued to the office of the PM Cml Demil following audits by the EPA.

An NOV was received following the 1990 EPA audit that cited three deficiencies, which included storing non-permitted waste in the spent decontamination solution tanks, storing a drum of waste for more than 90 days, and failing to complete inspections specified in Attachment F of the RCRA operating permit. The first two deficiencies were easily corrected, but some of the Attachment F inspections are still not being performed.

On 21 December 1992, the Army received an NOV from the EPA that cited JACADS for accumulating waste beyond 90 days at some of the satellite accumulation areas. The Army and the EPA inspector interpreted the regulations differently and the Army has submitted justification to the EPA for its interpretation. The EPA concurred with the Army's position (EPA letter to PM Cml Demil, 22 March 1993).

APPENDIX D

THROUGHPUT CALCULATION

Different performance measures show different aspects of operation. These are derived by computing production over different time periods. The plant is in different states at different times:

- Available—The plant is available for immediate operation. Available time may be during scheduled operation or at night during standby.

- Down—The plant is not operable because of some problem. During OVT, downtimes of longer than 15 minutes were identified as documented downtimes. Shorter downtimes were not individually counted, but were shown as slowdowns during operations, and are referred to in this report as "undocumented downtimes".

- Operating—The plant was demilitarizing munitions. In general, an hour with at least one rocket destroyed was considered an operating hour.

Process data were adjusted to a 24-hour basis by assessing the operating and downtime performance for each day. The ratio of downtime associated with each hour of operating time (i.e., hours without documented downtime) was computed. The remaining hours of the 24-hour day, when the plant was available for operation (i.e., not actually operating or under repair or maintenance) were then allocated to operating and downtime with the same ratio, and a theoretical 24-hour production was computed.

A problem in this process is how to count downtimes that occur outside the scheduled hours of operation. If such a downtime is caused by munition processing, it should be counted as a downtime and will directly reduce the day's throughput. However, if it simply occurs as the result of the passage of time, it should not be counted as a downtime. In both cases, it will have the effect of removing time the plant is available for operation. Since it is often very difficult to distinguish the precise cause of a downtime, the 24-hour basis was computed assuming that the downtime outside of scheduled hours of operation was caused by the passage of time only. If the contrary assumption is made, the projected throughput will be smaller.

As with any projection technique, there are a variety of factors that affect the results, in addition to those explicitly stated. Some of these make the projection optimistic (i.e., high), while others likely make the projection pessimistic (i.e., low). These factors and assumptions include the following:

- An assumption inherent in the calculation of the 24-hour basis is that the proportion of time in operation and downtime will remain the same, even as the hours per day of operation are extended. This may be pessimistic, since a real attempt to operate on a 24-hour basis will reduce downtime associated with turning equipment on and off. In addition, the proportion of downtime associated with failures resulting from the sheer passage of time (in contrast to destroying munitions) will be reduced. On the other hand, an increased amount of operation may generate new failure modes not so far seen. More intense operation may also increase the relative rates of certain failures.

- A second set of assumptions in the 24-hour basis calculation involves how maintenance to the demilitarization equipment is performed. During OVT, preventive maintenance was performed during the night (off shift), or in some cases, in association with corrective maintenance. However, in full 24-hour U.S. plant operation, there would not be scheduled routine maintenance except for weekends. While preventive maintenance could be conducted in connection with corrective maintenance, the degree to which this will be possible is not clear. The projections performed here assumed that the time now spent in preventive maintenance will continue (and will thereby contribute to downtime).

- Some outages or downtime occurred at the end of the day's operation, or at night while no operation was being attempted. While MITRE recorded the time of the outage and its correction, it is likely that on some occasions the maintenance staff did not move as quickly as they might have to correct the problem (since processing was not being adversely affected). A review of the data indicated that this appears to have a relatively small effect, but it would make the projection pessimistic.

- Another assumption is that the selected baseline was fully representative of long-term operation. While five weeks is a substantial period and includes a variety of problems, it is likely that a longer operation would have demonstrated other problems. On the other hand, some of the problems seen would likely be corrected (lessons learned).

Beyond the specific implicit assumptions in the projections, is the basic assumption that the overall OVT period was long enough to bring forth all the operating problems and the best solutions for them. In fact, although the calendar period of OVT1 and OVT2 extended over about 84 weeks, in only about 26 weeks did actual operations take place (i.e., about six months). A substantial body of experience in industry (including the closely-related chemical

industry), shows that most prototype plants do not achieve their design goals until two to five years of operation have passed.

APPENDIX E

LIST OF REFERENCES

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GLOSSARY

ACAMS	Automatic Continuous Air Monitoring System
AQS	Agent Quantification System
ASC	Allowable Stack Concentration
ANAD	Anniston Army Depot
BDS	Bulk Drain Station
BRA	Brine Reduction Area
CAA	Clean Air Act
CAMDS	Chemical Agent Munitions Disposal System
CDTF	Chemical Demilitarization Training Facility
CEM	Continuous Emissions Monitor
CO	Carbon Monoxide
CWA	Clean Water Act
CWDA	Cases With Days Away
DAAMS	Depot Area Air Monitoring System
DFS	Deactivation Furnace System
DHHS	Department of Health and Human Services
DOT	Department of Transportation
DPE	Demilitarization Protective Ensemble
DRE	Destruction and Removal Efficiency
DUN	Dunnage Incinerator
ECR	Explosion Containment Room
ECV	Explosion Containment Vestibule
EPA	U.S. Environmental Protection Agency
FIBC	Flexible Intermediate Bulk Container
GB	Nerve Agent
GPL	General Population Limit
gr/dscf	Grains per dry standard cubic feet
H/HD	Blister Agents
HCl	Hydrochloric Acid
HDC	Heated Discharge Conveyor

HMTA	Hazardous Materials Transportation Act
HVC	Heating, Ventilation, and Cooling
JACADS	Johnston Atoll Chemical Agent Disposal System
JI	Johnston Island
LIC	Liquid Incinerator
LOQ	Limit of Quantification
MDB	Munitions Demilitarization Building
MDM	Multipurpose Demilitarization Machine
mg/dscm	milligrams per dry normal cubic meter
MPB	Munitions Processing Bay
MPF	Metal Parts Furnace
ng/m^3	nanograms per cubic meter
NPDES	National Pollutant Discharge Elimination System
NOV	Notice of Violation
NO_x	Nitrogen Oxides
OVT	Operational Verification Testing
P/hr	Projectiles per hour
PAS	Pollution Abatement System
PBA	Pine Bluff Arsenal
PCB	Polychlorinated Biphenyl
PM Cml Demil	Program Manager for Chemical Demilitarization
PMD	Projectile/Mortar Disassembly Machine
POHC	Principal Organic Hazardous Constituent
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
PUDA	Pueblo Depot Activity
R/hr	Rockets per hour
RCRA	Resource Conservation and Recovery Act
RHA	Residue Handling Area
RQ	Reportable Quantity
RSM	Rocket Shear Machine

SOP	Standing Operating Procedure
SO_x	Sulfur Oxides
TAR	Temporary Authorization Request
T-BACT	Toxic Best Available Control Technology
TOCDF	Tooele Chemical Demilitarization Facility
TSCA	Toxic Substances Control Act
TSD	Treatment, Storage, or Disposal
UMDA	Umatilla Depot Activity
VX	Nerve Agent

EQC Work Session
7/11-96
#2

Oregon Environmental Quality Commission Worksession

DEQ and Ecology & Environment
Response to Risk Assessment Issues
July 11, 1996

Panelists:

Regina Skarzinskas	DEQ Toxicologist, Headquarters
Julie Wroble	Ecology and Environment, Toxicologist
Fredrick Moore	DEQ Permit Writer, Eastern Region, Bend
Steve Whittaker	Ecology and Environment, Toxicologist

Regina Skarzinskas

Julie Wroble

Fredrick Moore

Overheads

Testimony of Regina Skarzinskas

Good afternoon, I am Regina Skarzinskas, the DEQ toxicologist working on the Umatilla chem demil project. To my right, are Julie Wroble and Steve Whittaker, representing Ecology and Environment, who prepared the Draft Proposed Umatilla Demilitarization Pre-Trial Burn Risk Assessment. At the end of the table is Fredrick Moore, permit writer for the Eastern Region Hazardous Waste program.

Introduction

Over the last few months you have heard a considerable number of issues and concerns raised not only about the risk assessment which we will be discussing this afternoon, but also about the entire demil program. One comment I have heard repeatedly during public testimony is the genuine frustration of "whom to believe". There seem to be so many contradictory "facts". While it is true that there are many facts, a fact is simply an objective statement. The interpretation of these facts is provided by an author or speaker who takes them and puts them into some sort of context. Therefore, just as it is important to verify the facts, it is also important to verify the context. In the testimony you have heard and read to date, you have heard many facts. Most of them accurate in terms of information but very different in terms of context from what you will hear today.

What you have heard from speakers such as Mr. Mick Harrison of Greenlaw is called advocacy science - facts placed into a context that supports a particular position[1]. In her 1994 report on the US Chemical Weapons Destruction Program, Amy Smithson writes, "The opposition (to incineration) has probed virtually every aspect of the baseline program, but the technical underpinnings of its accusations have not received the same degree of examination. Recent peer reviews of the science contained in some of the opposition's reports reveal it to be poor, biased, and lacking in the standards that normally discipline scientific research."[2] Before we begin, I would like to point out that we have provided each of you with a copy of the peer-reviewed report prepared by Amy Smithson for the Henry L. Stimson Center. This report was funded by the Carnegie Foundation. We believe this report provides a balanced view of the issues. And, more importantly, it is replete with references, reviews and direct statements from credible representatives of both sides of the issues.

Comparative Risk Assessment Issues

Today's discussion will focus primarily on responding to the testimony of Mr. Mick Harrison representing Greenlaw, Dr. Mary O'Brien, and Mr. J.R. Wilkinson representing the Confederated Tribes of the Umatilla Indian Reservation. Before we discuss the specific issues raised, let me at the outset state for the record that as we heard the testimony, and reviewed the audio transcript, nothing that was said indicated to DEQ that the Pre-Trial Burn

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[1] Amy E. Smithson, The U.S. Chemical Weapons Destruction Program: Views, Analysis, and Recommendations, The Henry L. Stimson Center, September 1994, pgs. 47-53.

[2] Ibid., pg iii.

Risk Assessment is flawed or unacceptable science. The issues raised during testimony at the May 17 EQC meeting ranged from either a misinterpretation or misunderstanding of what the risk assessment is and how it is to be used, which led to misinterpretation of the data presented and to some erroneous statements of fact. Other issues and concerns questioned our risk assessment process. We shall answer to these today.

The testimony at the May EQC Meeting included the following criticisms: First, the risk assessment should have been comparative in nature and should have included an evaluation of the risks of alternative technologies. Second, we did not evaluate the noncancer health effects of dioxins. Third, we did not address concerns of the Confederated Tribes of the Umatilla Indian Reservation. I will address the issues of the comparative risk assessment, the selection of a regulatory benchmark for potential excess cancer risk, and the tribal concerns; Julie Wroble will address the issues of pathways, products of incomplete combustion, halogenated congeners and noncancer health effects related to dioxins, how missing data were handled in the risk assessment report and specifically the toxicity of cadmium; and Fredrick Moore will address regulatory and technical issues.

The first major concern Mr. Mick Harrison raised is that the Commission will be making a decision about the best available technology without comparing the risks of these technologies. That is, the risk assessment conducted by the Department and its contractors is not a comparative risk assessment. Mr. Harrison is correct; the Pre-Trial Burn Risk Assessment is not a comparative

risk assessment. It is an assessment of the potential risks to human health and the environment from operation of the proposed facility. This risk assessment is a distinct requirement of the hazardous waste permitting process.[1] Its primary purpose is to assist in the review of the hazardous waste and air permit applications and to provide data to the permit writers for setting acceptable emissions limits and establishing permit conditions. This risk assessment was never intended as the review of "best available technology" as called for in ORS 466.055 nor as the comparative risk assessment requested by incineration opponents.

The Pre-Trial Burn Risk Assessment provides information for DEQ to ensure that a pre-established regulatory benchmark is not exceeded for carcinogens and noncarcinogens, both of which support the issuance of a draft permit for public comment. To select the benchmark for excess cancer risk, we also looked to programs and guidance which regulate air emissions. EPA's Implementation Guidance Document, which was used as the primary guidance document for our risk assessment, set the benchmark at 1E-5 excess cancer risk from inhalation exposure only. To maintain consistency with other Oregon programs, we examined the state's Air Quality Program, which also sets 1E-5 as the benchmark for excess cancer risk in the permitting process. Therefore, DEQ selected this as the regulatory benchmark for the Pre-Trial Burn Risk Assessment. As far as noncancer risks are concerned, standard practice in the clean-up program is to set the Hazard Index at 1.0 for noncancer risk. However, since the Pre-Trial Burn Risk Assessment was

[1] USEPA, Environmental Fact Sheet: Source Reduction and Combustion of Hazardous Waste, EPA530-F-93-010, pg. 4

designed to be a conservative screening exercise we set the Hazard Index for noncancer health effects at 0.25 in accordance with the EPA Implementation Guidance. This allows a buffer for any potential noncancer effects from possible background levels of contaminants. Additionally, since the facility has not yet been built, DEQ also requires that a second risk assessment be done using facility specific data once that is available and will require notification and possible shutdown of the operating facility should emissions in excess of those used in the risk assessment be found.

What then is a comparative risk assessment and how does it differ from the Pre-Trial Burn Risk Assessment required by the permitting process? The most obvious difference is that a comparative risk assessment compares and contrasts two or more "things"; in this instance, two or more technologies. Where the Pre-Trial Burn Risk Assessment provides a piece of information regarding the potential risk of only one technology, a comparative risk assessment provides a relative ranking of a number of technologies on the basis of preselected criteria. Let me clarify this one step further. Where the Pre-Trial Burn Risk Assessment has a prescribed "formula", there is no set format for a comparative risk assessment. One can select as many criteria upon which to base a decision as is desired. For instance, if the Commission wanted the Department to look at the cost for construction and at the cost of operation of a facility, you can compare only these two parameters and rank the technologies in terms of these costs. While it is possible to factor in such parameters as community acceptance, time to permit, mobility and all of those myriad

parameters listed by Dr. O'Brien, there are no standard scales for measurement and a comparative risk assessment of this nature can be riddled with subjectivity and imprecision. While this type of analysis may be quite valid in assisting the Commission with its findings, I would argue that it is not a "risk assessment" in the true sense of the word. This approach will be explored further with the EQC during the August EQC discussion of criteria for selecting best available technology.

Another approach for comparing technologies is to pose the question for each potential technology: "What is the risk to human health and the environment from exposures due to operation of the proposed facility?" This is essentially the question addressed by the Pre-Trial Burn Risk Assessment for the proposed incinerator. The reality of conducting such an analysis is this: The Pre-Trial Burn Risk Assessment is a regulatory requirement of the permitting process. There is no regulatory requirement for a risk assessment of alternative technologies. Within the scope of its findings, however, the Commission could direct that such a risk assessment be done on all or some of the alternative technologies. Should the EQC direct that such a risk assessment be done, these are the limiting factors: We estimate it would take seven years to complete;[1] it would cost approximately $500,000 per risk assessment to conduct the same kind of analysis as was done for incineration;[2] there are real questions about whether or not data exist to

[1] National Research Council, Recommendations for the Disposal of Chemical Agents and Munitions, Washington D.C. 1994, p. 119. The NRC estimate it would take 5-7 years to develop and demonstrate alternative technologies. DEQ assumes six years as an average and adds a year to conduct a risk assessment.

[2] Based on the approximate cost of $500,000 for The Pre-Trial Burn Risk Assessment.

analyze emissions from these proposed facilities. A report in 1994 by the National Research Council states that "... for many of the potential alternative technologies, fully (operating) systems have not been designed, risks are not fully identified, and indeed, technical feasibility is yet to be proven. Obviously, comparable quantitative risk assessments cannot be completed at this time"[1] The National Research Council will be providing an evaluation of alternative technology in late summer, but it will not be a comparison of risk.

We believe that a comparative risk assessment of all proposed alternative technologies is neither feasible or cost effective; however, some kind of comparative analysis is clearly necessary in order for the Commission to make a reasonable decision about best available technology. We believe that analysis should be more along the lines of comparing a variety of factors.

We believe that the factors considered in best available technology definitions under the Clean Water Act, the Clean Air Act, and the Resource, Conservation and Recovery Act will provide the Commission with framework for an appropriate and sufficient comparative analysis. We also intend the staff report which you will receive in November to address the comparative risk analysis issue by synthesizing three documents. (1) The NRC report which will evaluate alternatives based on technical feasibility such as safety, cost, maturity of technology; (2) the Pre-Trial Burn Risk

[1] National Research Council, Recommendations for the Disposal of Chemical Agents and Munitions, p. 80.

Assessment on the incinerator alternative, and,(3) The quantitative risk assessment being conducted by the Army which addresses the risks from continued storage of chemical agent. We believe that an evaluation of this information plus information provided by the alternative technology vendors provides a sound basis for comparing the technologies and will allow for a comparison of continued storage versus incineration versus alternatives. We believe that this will satisfy the legal requirement for consideration of "best available technology."

Tribal Issues

Moving on to the issue of tribal concerns I would like to address Mr. J.R. Wilkinson's comments at the May 17th meeting that the risk assessment "did not take into account" tribal issues as they relate to the Confederated Tribes of the Umatilla Indian Reservation. This statement leaves the impression that the risk assessment, or more specifically that staff at DEQ, ignored tribal issues. We do not agree.

While developing the workplan for the risk assessment, DEQ staff, along with staff from EPA Region 10, met several times with technical staff of the Confederated Tribes. We were directed to the Hanford Scoping Report which discusses general tribal concerns and opinions regarding risk assessments but did not provide specific information which we could incorporate into our analysis. DEQ staff reviewed the "Scoping Report," and met again with Tribal technical staff on November 2, 1995. Specific information regarding cultural and tribal concerns were not yet available to us at this time. In our continuing efforts to gain an

understanding of tribal issues and concerns and how they might be incorporated into a risk assessment framework, Steve Whittaker and I attended the First State and Tribal Conference on Risk Assessment held in St. Louis, Missouri. What we learned from that conference is that incorporation of tribal concerns involves a much different, more holistic approach to risk assessment than is currently being done. One of the work sessions at that conference specifically addressed the mechanics of such a holistic risk assessment process, since one does not currently exist. We have acknowledged this limitation in the report. However, to say that we "ignored" tribal concerns is misleading and inaccurate. As the workplan progressed we did deliberate on what to do about possible tribal lifestyles that don't fit well into the typical lifestyle of the subsistence farmer, resident adult or child. Data for such unique tribal exposures were not available to us and could not be directly factored in. However, we surmised that by placing a fictional subsistence farmer and an adult and child resident on the fenceline where there was a high probability of exposure, we would provide a far more conservative exposure scenario than a unique tribal lifestyle 35 miles away from the proposed demilitarization facility. Furthermore, discussions with technical staff from the Confederated Tribes and EPA have led us to believe that we might, at some future time, receive unique lifestyle data. At that time, we can review these issues with better data. In fact, it has always been our intention to address tribal concerns. We used the best available data in this report; we will use the best available information in the Post-Trial Burn Risk Assessment.

A second tribal issue raised by Mr. J.R. Wilkinson in his presentation, is that of regional air flow patterns and the potential effects of the Blue Mountains. This discussion began with the statement that the reservation is 30 miles downwind of the proposed facility. To be exact, the closest reservation boundary from the proposed facility is approximately 35 miles away. As shown by this overhead[1] the downwind plume where the fenceline risk is located ranges from 50° to 90° East from North. The direction to the nearest point on the Confederated Tribes border is approximately 110° East from North. With this data based on one year's worth of meteorological data, DEQ cannot agree that the reservation is downwind. However, the Post-Trial Burn Risk Assessment will use at least four years of meteorological data, which will be more representative.

What this diagram also shows is that at the 31 mile modeling radius the more impacted area would be from Kennewick, Washington, to somewhere out by Holdman. It is our professional judgment that for a unique tribal exposure to be significantly affected one would have to have an intake of contaminants at a level more than 10,000 times greater than the level that was calculated for the subsistence farmer. The risks calculated for this receptor did not exceed regulatory benchmarks.

At this time, I will present to you again, Julie Wroble, representing Ecology and Environment who will discuss technical issues related to the risk assessment.

[1] Figure 3-13, Draft Pre-Trial Burn Risk Assessment Proposed Umatilla Chemical Demilitarization Facility Vol. 1, April, 1996.

Testimony of Julie Wroble

For the record, my name is Julie Wroble. I am a toxicologist with Ecology and Environment, Inc. DEQ contracted E & E to perform the pre-trial burn risk assessment for the proposed Umatilla Chemical Demilitarization Facility. Today I will discuss some specific technical issues raised during the last EQC meeting on May 16 and 17, 1996. The issues will be discussed as follows: (1) toxicology and risk assessment related to dioxin; (2) the toxicity of cadmium; (3) potential risks associated with unknown products of incomplete combustion (PIC's); (4) exclusion of several exposure pathways, including breast milk, the pica child, and ingestion of wild game; and (5) clarifications and rebuttals to statements made during the May 17 EQC meeting by Dr. Mary O'Brien and Mr. Mick Harrison.

Throughout my talk, I will refer to several guidance documents and reports. These are:

- The Draft Health Assessment Document for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and Related Compounds[1], which I will refer to as the Health Assessment for dioxin;
- The Exposure Factors Handbook[2];
- Exposure Assessment Guidance for RCRA Hazardous Waste Combustion Facilities[3] and subsequent modifications, which I will refer to as the Implementation Guidance; and

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[1] United States Environmental Protection Agency, August 1994b, Health Assessment Document for 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) and Related Compounds, External Review Draft, Office of Research and Development, EPA/600/BP-92/001a,b,c, Washington D.C.

[2] USEPA, Exposure Factors Handbook, Office of Research and Development, EPA/600/P-95/002A, Washington D.C., June 1995.

[3] USEPA, Exposure Assessment Guidance for RCRA Hazardous Waste Combustion Facilities, Draft, Waste Management Branch, Office of Solid Waste and Emergency Response, Washington D.C., April 1994

- The US Chemical Weapons Destruction Program: Views, Analysis, and Recommendations[1], which I will refer to as the Stimson Report.

Dioxin Issues

Mr. Harrison discussed several possible toxicity values that could be used to assess dioxin's noncancer health effects. In standard risk assessments, chemical toxicity values are generally taken from one of two EPA databases: the Integrated Risk Information System, also referred to as IRIS, and the Health Effects Assessment Summary Table, also referred to as HEAST. IRIS and HEAST are the primary sources of EPA-recommended, peer-reviewed toxicity values. While other sources of toxicity data may be available, usually this data has not received the same level of scientific scrutiny as the values in IRIS and HEAST. Use of non-peer reviewed toxicity values may reduce the degree of confidence and scientific credibility of the risk assessment. Therefore, DEQ decided to only use peer-reviewed, EPA validated toxicity values in the Pre-Trial Burn Risk Assessment. The only exceptions are the nerve and mustard agents. Because these chemicals are unique, EPA has not derived toxicity values for them. Toxicity values were derived from inhalation control limits recommended by the US Surgeon General and Oak Ridge National Laboratory (ORNL) control limits for indirect exposures.

[1] Amy E. Smithson, The US Chemical Weapons Destruction Program: Views, Analysis, and Recommendations, Henry L. Stimson Center.

First, let me clarify the term "dioxin" is commonly used two ways: (1) to describe 2,3,7,8-tetrachlorodibenzo-p-dioxin, or 2,3,7,8-TCDD, and (2) to refer to the group of chlorinated dioxin and furan congeners that are considered to be toxic. In risk assessment, the concentrations of the various toxic congeners are assigned a weighting factor based on each congener's relative toxicity to 2,3,7,8-TCDD. These weighted concentrations are then summed and the result is referred to as 2,3,7,8-TCDD equivalents, or TEQ. I will use dioxin to refer to the chlorinated toxic congeners that contribute to the TEQ.

Mr. Harrison suggested that the Pre-Trial Burn Risk Assessment was incomplete because it did not address the assessment of potential noncarcinogenic effects associated with exposures to dioxin. The health assessment for dioxin reports that relatively few chronic effects have been observed in humans. Potential noncarcinogenic impacts reported in animals include effects on reproduction, development, skin, the immune system, and the nervous system. In spite of these potential effects, the health assessment for dioxin[1] does not provide a reference dose, which is the toxicity value that relates exposure to potential noncancer health effects. One of the reasons that an EPA-accepted reference dose has not been established is because a dose-response relationship has not been proven. Dose-response is a fundamental principle of toxicology that expresses the proportional relationship between increased dose, or exposure level, and response, or adverse health effect.

[1] USEPA, EPA/600/BP-92/001a, b, c, Washington D.C.

You may have heard about the controversy surrounding the health assessment for dioxin. The science advisory board recently questioned the risk characterization of dioxin in the Health Assessment of Dioxins report, in particular, its discussion of cancer and noncancer health effects. Panel members reviewing health effects questioned whether the data supported the conclusions drawn in the assessment and risk characterization.[1]

Because they realize that potential noncancer effects may be important, EPA is currently developing an approach to assess the potential noncancer impacts associated with exposures to dioxin. This is the "margin of exposure" approach. Briefly, this approach involves comparing exposures associated with emissions from a particular facility (for example, the UMCDF) to background exposure levels (i.e., 1-3 pg/kg-day). If facility-specific exposures comprise a small fraction of background exposures--defined as 1-3% of background, the facility is assumed to pose insignificant incremental risk. Using this approach, we looked at a daily dose for the subsistence farmer at the fenceline, this exposure results in a dose of 0.03 pg/kg-day which is within the 1-3% range. Therefore, noncancer effects from potential dioxin emissions do not exceed EPA's benchmark based on this "margin of exposure" approach.

Mr. Harrison also noted that dioxin-like compounds were omitted from consideration in the Pre-Trial Burn Risk Assessment. Dioxin-like PCBs were considered in the Pre-Trial Burn Risk Assessment.

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[1] Environmental Science and Technology (ES&T), SAB Advisory Panel Rejects Dioxin Risk Characterization, 1995.

However, brominated, fluorinated, and sulfur-containing analogs of dioxin and furan were not quantitatively assessed. This is consistent with the implementation guidance[1] which does not specifically recommend consideration of these dioxin-like compounds. Additionally, validated stack sampling methods to detect these compounds and weighting factors to compare their toxicity to 2,3,7,8-TCDD are not currently available.

Brominated and chlorobrominated analogs of dioxin may be as toxic as the polychlorinated dioxin and furan congeners. However, because the amount of bromine in the waste feed is negligible, the amount expected to be emitted is also negligible.

Fluorinated compounds would be less stable than the chlorinated compounds and would not persist in the environment.

Sulfur analogs of furan have been associated with incinerator emissions but sulfur analogs of dioxin have not been specifically observed. The impact of excluding these dioxin-like compounds to the bottom line of the risk assessment is insignificant.

Finally, a large percentage of the dioxin risk at the UMCDF is attributable to nondetected results from the JACADS trial burns. Although dioxin and furan congeners may not be present at all, for conservatism, we assumed that 2,3,7,8-TCDD and the other toxic chlorinated dioxin and furan congeners were present at the

[1] USEPA, Exposure Assessment Guidance for RCRA Hazardous Waste Combustion Facilities, April, 1994, page A1,C-2-1.

detection limit. (See overhead.) Detection limits are used where results were "nondetect". An upset factor of 2.8 was applied to account for the assumption that 20% of the time, organic emissions were assumed to be 10 times higher. At JACADS, the facility operated in upset only 2% of the time as reported by the Army.[1] Either the maximum detected values or detection limits were used as the "emitted concentrations" for the pre-trial burn risk assessment. These steps ensure that potential dioxin emissions are not underestimated.

To address the question of how UMCDF dioxin emissions compare with other sources, I refer you to page 54 of the Stimson report[2] to illustrate just how ubiquitous dioxin is in the environment. In the Stimson report,[3] Amy Smithson cites studies which describe common sources of 2,3,7,8-TCDD. For example:

- "A diesel truck traveling at an average speed of 40 miles per hour with an equal amount of uphill and downhill travel would emit about 4 times as much dioxin" as the deactivation furnace at Johnston Atoll.[4]
- The comparison to cigarettes showed that if an adult were at the location of maximum dioxin concentration from the deactivation furnace and breathed in 23 cubic meters of that air each day for an entire year (which is roughly the adult average inhalation

[1] Raytheon, Draft Johnston Atoll Chemical Agent Disposal System Human Health and Ecological Risk Assessment, May 28, 1996, pg. 2-9
[2] Amy E. Smithson, The US Chemical Weapons Destruction Program: Views, Analysis, and Recommendations, 1994, pg 54.
[3] Ibid.
[4] Ibid.

rate), it would be equal dioxin exposure to smoking between 1.7 cigarettes per year to one cigarette every three weeks.[1]

In other words, citizens living near the eight continental U.S. stockpile sites may already be routinely exposed to levels of pollutants that exceed by a significant margin the expected emissions from a baseline incinerator.[2]

Another comparison is shown in this overhead.

Toxicity of Cadmium

During his testimony on May 17, Mr. Harrison referred to Appendix P of the Pre-Trial Burn Risk Assessment. He pointed out that some toxicity data were missing for cadmium. This is true. However, it is not true that exposures to cadmium were not evaluated. In actual fact we evaluated potential toxicity from exposures to cadmium for both carcinogenic and noncarcinogenic endpoint using two different critical pathways. The carcinogenic potential of cadmium was assessed by evaluating inhalation, or direct, exposure to cadmium. The noncarcinogenic potential of cadmium was assessed by evaluating oral, or indirect, exposures to cadmium. In other words, when exposure to cadmium occurs via inhalation, cancer is the potential health effect. When exposure occurs via ingestion, then noncancer effects may occur.

Lack of toxicity data for a specific exposure pathway does not necessarily mean that adverse health effects from that chemical were not quantitatively evaluated. Rather, the toxicity data may

[1] Ibid.
[2] Ibid.

not support quantitative evaluation for every exposure route or every health effect considered.

In Appendix P of the Pre-Trial Burn Risk Assessment, the words "Error: Missing ToxData" were used to show what toxicity data were unavailable throughout this appendix. This may have been a poor choice of words. This phrase simply means that peer-reviewed toxicity values needed to perform the calculation in question were not available. In the event that these toxicity data become available at a later date, they will be incorporated into future versions of the human health risk assessment.

Products of Incomplete Combustion(PICs)

When the JACADS data were collected, limited analyses were performed resulting in a large percentage of PICs that could not be identified. Consequently, for this risk assessment, the unknown fraction was assumed to have the same toxicity as the identified semi-volatile compounds. Note that the unknown fraction may account for compounds that are not necessarily toxic. This method is designed to be protective of human health and should not underestimate the emissions of PICs.

"Excess Cancer Deaths"

Dr. O'Brien stated that $1x10^{-5}$ "excess cancer deaths" was the criteria used to assess the potential for carcinogenic risks associated with the UMCDF. In risk assessment, the probability of an individual developing cancer is quantified, as opposed to death from site-related cancer. Therefore, an excess lifetime cancer risk of $1x10^{-5}$ means that an individual who is subjected to those

types and magnitude of exposures described in the exposure assessment possess no greater than one chance in 100,000 of contracting cancer from site related impacts. The Pre-Trial Burn Risk Assessment estimates were based on conservative assumptions that are designed to demonstrate protectiveness, and likely overestimate actual risk. An excess lifetime cancer risk of $1x10^{-5}$ does not mean that 1 in 100,000 people will die of cancer.

Hazard Index of 1

Mr. Harrison stated that a hazard index of 1 was used to evaluate potential noncarcinogenic effects for human health in the pre-trial burn risk assessment. Actually, noncancer hazard indices were compared with the more conservative benchmark of 0.25, the value specified in the Implementation Guidance, to account for background exposures from other sources. This value is four times more conservative than a value of 1.0.

Additional Exposure Pathways

Mr. Harrison commented that the pre-trial burn risk assessment was incomplete because certain exposure pathways were ignored, including: (1) exposures to infants via breast milk; (2) exposures to children with pica for soil; (i.e. eat dirt) and (3) ingestion of wild game.

The breast milk exposure pathway has not been clearly delineated by EPA in any available guidance document. Consequently, this exposure route could not be quantitatively evaluated. If an EPA

method is established prior to performance of the post-trial burn risk assessment, then this exposure pathway will be included at that time.

Pica describes the tendency for an individual to ingest non-food substances. EPA does not currently recommend evaluating exposures specifically for children with pica because it is a relatively rare occurrence in a population. Consequently, the "pica child" scenario was not quantitatively evaluated in the pre-trial burn risk assessment.

Ingestion of wild game was not specifically evaluated in the pre-trial burn risk assessment. However, evaluation of the beef ingestion pathway for the farmer scenarios is protective of wild game ingestion. In fact, ingestion of wild game would be associated with lower risks than ingestion of beef by farmers because wild animals are not confined. Therefore, their forage areas are likely to encompass a broad area, some of which may be impacted by Umatilla emissions and some of which are not. The cattle evaluated for the farmer scenario were assumed to forage at the areas of maximum impact at the high-impact location and the fenceline. Consequently, the concentrations in meat from cattle would be much higher than expected in meat of wild game.

Testimony of Fredrick Moore, Permit Writer, DEQ

Thank you, as introduced earlier, and for the record, my name is Fredrick Moore and I am a hazardous waste permit writer and the DEQ project manager for the Umatilla Army Depot hazardous waste permit. In addition to the issues of risk assessment methodology

that certain speakers brought out at the May Commission meeting, they brought up regulatory and technical issues that relate to both the Pre-Trial Burn Risk Assessment and the draft hazardous waste permit.

Regulatory Issues

As you may remember, Mr. Mick Harrison, a lawyer from Greenlaw, took exception with what was stated on page 2-2 in the Pre-Trial Burn Risk Assessment, and what is stated is, and I quote, "If the risk estimates indicate unacceptable risks to human health or the environment, ODEQ would reevaluate the emission rates and impose lower emission limits in the permits."[1] As permit writers, we are trained and have the regulatory obligation to write permits that incorporate conditions that are protective of human health and the environment and are in compliance with state regulations. When it is determined that the proposed facility is in compliance with the regulations, then a permit can be issued.[2] This means that only if a proposed facility **cannot** be in compliance with the regulations and be protective of human health and the environment can the Department recommend denial of a permit.[3] In the case of the proposed Umatilla Chemical Demilitarization Facility, the permit application and additional submittals of information by the Army, as well as the Pre-Trial Burn Risk Assessment indicate that the

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[1] Ecology and Environment, Draft Pre-Trial Burn Risk Assessment Proposed Umatilla Chemical Demilitarization Facility Hermiston, Oregon Volume 1, April, 1996, page 2-2.

[2] See Resource, Conservation, and Recovery Act Section 3005(c). "Upon a determination by the ... State, of compliance by a facility for which a permit is applied for under this section, the State shall issue a permit for such facilities."

[3] See documents Nos. 9523.1991(01), 9524.1984(01) and Nos. 9524.1984(02), RCRA Permit Policy Compendium Vol. 10, EPA/530-SW-91-0625, August 1991.

facility would operate in compliance with the regulations and would be protective of human health and the environment.

Mr. Harrison took further exception with the statement on page 2-2, and I quote, "[Page 2-2] shows a bias toward permitting this facility" and "has no place in what should be a scientific document." He's very wrong in both instances. The State of Oregon Department of Environmental Quality does not have a history permitting hazardous waste incinerators, therefore we have not inherited a predilection, one way or the other. And DEQ does believe it is appropriate to discuss how the results of the risk assessment will be used.

In response to Mr. Harrison's criticism of the permitting scenario contemplated on page 2-2, let me first point out that this discussion is moot because no emission rates were lowered as a result of the risk assessment which used conservative, worst-case scenarios; however, Mr. Harrison brings out a larger permitting issue when he states, and I quote, "[DEQ] is talking about changing numbers on a piece of paper called a permit as if that's going to protect you from emissions from the facility." As a matter of fact, I agree with Mr. Harrison, in this instance. A permit does <u>not</u> guarantee that the facility will be operated safely and within the regulations, much like, a written contract cannot guarantee that the parties to the contract will abide by the agreements. A contract is the means to address nonperformance and entitle the wronged with redress – and the permit **is** the legal means that the DEQ uses to regulate a facility in noncompliance to

change the operation, and if perpetual noncompliance is determined, then the permit may be revoked and operations stopped.

Technical Issues

I would like to now address the more technical risk assessment issues that have been raised. Probably foremost is the issue of the contaminants that are emitted from the incineration process, commonly referred to as either "products of incomplete combustion," often called PICs, or called combustion byproducts. In Mr. Harrison's testimony, he referred to them as "poisons."

Combustion byproducts are not unique to hazardous waste incineration, they are a common phenomena of all combustion activity. EPA points out the complex nature of combustion, any combustion, by stating that "Ideally, the primary products from combustion are carbon dioxide, water vapor and inert ash. In reality, what appears outwardly to be a straight-forward, simple process, is actually an extremely complex one involving thousands of physical interactions and chemical reactions, reaction kinetics, catalysis, combustion aerodynamics and heat transfer. This is further complicated by the complex and fluctuating nature of the waste feed to the process."[1] What I want to emphasize is that combustion is a common process all around us, and that these common processes result in products of incomplete combustion. From an EPA article, two charts are presented that I would like to show you. The first[2] slide shows many sources that contribute to

[1] Clyde R. Dempsey and E. Timothy Oppelt, Incineration of Hazardous Waste: A Critical Review Update, Air and Waste Journal, Vol. 43, January, 1993, p. 43.
[2] Ibid., pg. 60

pollutants in the air, and I have shown you which of these sources are combustion. The EPA chart shows modeled data and ranks these sources. As you can see, hazardous waste combustors are ranked fairly low when assessing modeled emissions.

The second slide, shows a review of incinerator emission data assessing what makes up the total organic carbon emissions. The Army estimates that when evaluating total mass emissions from the common stack during M-55 rocket processing, approximately 94% will be nitrogen, water, and oxygen, and that 0.0007% will be hydrocarbons[1], which can also be referred to as organic mass or total organic carbons. So what this chart shows is an approximation of the chemical makeup of the 0.0007%. It is the volatile emissions that make up most of the organic compound mass[2], and, "strictly speaking, PICs are organic compounds which are present in the emissions from the incineration process."[3] This chart shows reasonable worst case emissions of specific organics and "supports the belief that a large percentage of the organic emissions are the non-chlorinated, low molecular weight hydrocarbons"[4] such as methane and ethylene.

That said, Mr. Harrison's inference that DEQ neglected some PICs in the permitting process and risk assessment is not correct. We predict that many products of incomplete combustion will occur at

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[1] Army information provided by undated public affair material from the Program Manger for Chemical Destruction.
[2] Ibid., pg. 47, quoting the source A.R. Trenholm, *et al.*, "Organic Products of Incomplete combustion from Hazardous Waste combustion," presented at the *AWMA 85th Annual Meeting & Exhibition,* Kansas City, Missouri, June 21-26, 1992.
[3] Ibid., pg. 47.
[4] Ibid., pg. 48.

low concentrations. It is important to remember that for the Pre-Trial Burn Risk Assessment, DEQ and Ecology and Environment used the best data currently available, which is from the Johnston Atoll facility. Data collected at JACADS were used to assess destruction removal efficiencies, not for risk assessment; however, we believe these data provide an adequate basis for assessing risk from the PICs. Because the permit requires a **Post**-Trial Burn Risk Assessment, we expect to obtain better and more data on PICs. If that risk assessment shows an unacceptable risk, then a combination of design changes, with or without operational changes, such as feed rate or different pollution control, will be instituted per the permit authority invested in DEQ. If it is determined that no design or operational change will result in adequate protection of human health and the environment, then the DEQ would initiate a permit revocation.

Establishing acceptable emission rates for combustion byproducts is not all that the draft permit does. The permit also addresses formation of combustion byproducts through design and operating requirements.

The three (3) second residence time at higher-than-normal temperatures in the Liquid Incinerators, the design of the Quench tower to rapidly drop the exhaust gas temperature to minimize dioxin formation, and placing a carbon unit in-between the pollution abatement system and the common stack, are all examples of designs developed to minimize and control combustion byproduct formation.

But design is only part of controlling emissions. Maintaining proper operating conditions is also critical to minimizing combustion byproducts.[1] For example, this table from the draft hazardous waste permit shows some of the automatic waste feed cut-offs for the deactivation furnace. All of the furnaces at the facility would have similar requirements. Other examples of operating conditions are: Temperature requirements, maintaining adequate negative pressures throughout the system, and the carbon monoxide level which is continuously monitored and is one of the standard indicators of good combustion. All of these are permit requirements to keep the incinerators within the nominal operating conditions to minimize combustion byproducts. When conditions do not match the proper operating parameters, feed is stopped until the proper operating conditions are reached again.

In addition to the automatic waste feed cut-off requirements in the draft permit, the permit also requires the Permittee to notify DEQ when certain constituents exceed emission limits.[2] DEQ may or may not require that waste feed be stopped. This notification requirement is for constituents, like nickel or methylene chloride, which may or may not require a shut-down because these emission constituents are not the "risk drivers." Exceedances that initiate automatic waste feed cut-offs, such as agent emissions above the allowable stack concentration, require shutdown with no time lag to notify DEQ.

[1] Ibid., pg. 46.
[2] See draft hazardous waste permit condition VI.A.5.vii.

I would now like to respond to Mr. Harrison's testimony that the Pre-Trial Burn Risk Assessment did not use conservative assumptions. For example, he stated that upset conditions and fugitive emissions were not included. If you refer to page 2-11 of the Pre-Trial Burn Risk Assessment, you will see that we did, in fact, take these conditions into account. Section 2.3.2 is entitled "Evaluation of Upset Conditions" and Section 2.3.1.4 is entitled "Heating, Venting, and Air Conditioning Emissions" and contains the description of fugitive emissions which are accounted for.

Some other examples of conservative assumptions in the Pre-Trial Burn Risk Assessment are:

- We assumed that the incinerators would be operating every minute of every day for 3.2 years which equates to burning for 8,760 hours per year for a total operation time of 28,032 hours. This is in contrast to the approximate total time of 8400 hours the incinerators will actually be burning and the permit's limitation of operating only 6,000 hours per year.[1]

- For those 8,760 hours of operation per year, we assumed all incinerators were in operation. In reality, some munitions, for example the rockets and mustard ton containers, will only use three of the four common stack furnaces. The dunnage furnace will operate on an sporadic basis, burning only when enough

[1] See draft hazardous waste permit condition I.G.

packing material and carbon change-out is accumulated.

- And again, for the 8,760 hours of continual operation we assumed that the 45 organics, 20 metals, and all three agents were processed at the same time, even though we know the proposed facility can only process one agent at a time.[1]

- We evaluated at a "high-end" emission rate, when in actual operation we would expect a more normal bell-shaped emission rate.[2] Of special note is that we assumed worse-case emissions of chemical agent at the U.S. Surgeon General limit, which is a health-based limit and 5 times greater than the detection limit.

- We did not include a degradation half-life factor for any constituents, including dioxins, in soil, even though such data does exist. This is a conservative approach because concentrations were assumed to be constant throughout the exposure duration. In actuality they would be expected to diminish throughout time.

- Carbon filters were not credited with any emission reductions at the common stack even though we predict further removal of emissions including dioxins and other organics from the exhaust gasses.

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[1] See draft hazardous waste permit condition VII.A.2.

[2] "High-end," in this case, means that worst-case emissions from JACADS were used, or that detection and half-detection limits for constituents not detected in certain JACADS sampling. The "risk drivers" of TEQ dioxin, manganese, mustard, and thallium were modeled at either at the detection limit, or in the case of mustard, at the Surgeon General allowable stack concentration.

In addition to these conservative assumptions related to facility operations, the EPA Implementation Guidance itself incorporates a number of conservative assumptions in the equations used to determine exposure levels.

I would like now to respond to testimony about the general fallibility of hazardous waste incinerators.

You heard testimony that one incinerator failed, causing a by-pass stack to function incorrectly and allowing excess dioxin emissions into the atmosphere. Even though by-pass stacks are appropriate for some incinerators, it has been determined that given the lethal nature of chemical agent, the main process incinerators at Umatilla that feed into the common stack **do not** have a by-pass stack.

It has been correctly stated that upsets are part of incineration processes. Upsets in the Pre-Trial Burn Risk Assessment were taken into account by increasing emissions for organic constituents by 280%, and increasing emissions for metals by 146%. However, the draft permit differs from the risk assessment in that it does not allow for increased emissions due to upsets. Upsets that do occur, are controlled by automatic waste feed cut-offs and will be handled by DEQ in an enforcement mode.

The possibility of restricting facility operations in certain weather conditions, such as times of inversion, was raised by the Commission and during public meetings. At this time, DEQ's position is that the middle-Columbia basin is not prone to severe

air inversions, such as they occur in the Klamath Falls area of the state. We note that the middle-Columbia basin is in attainment with the air quality standards for criteria pollutants, NO_x, SO_x, CO, particulates, volatile organics, which suggest that the area has sufficient dispersive characteristics. Shutting down the proposed facility during poor air-quality conditions, when the proposed facility, is a very small contributor of these pollutants would not be reasonable.

It has also been stated that the air monitoring system will not protect the surrounding environment. The National Research Council has looked at the issue and concluded "The agent monitoring systems underwent extensive operational testing at JACADS. While the ACAMS and DAAMS[1] demonstrated that they are sensitive enough to detect agent at the required levels, the response time and incidence of false positives require improvements."[2] This report did recommend many improvements, but still concluded the monitoring system "has the capability to ensure safe disposal operations."[3] To address the response time, the draft hazardous waste permit[4] requires staggered agent monitors which will effectively cut in half the time it takes to sample and report potential emissions. What is also important to note is that there are other air monitors, namely the carbon monoxide and oxygen monitors; these provide data indicating whether good

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[1] ACAMS and DAAMS are the monitors used to detect agent. The acronyms stand for Automatic Chemical Agent Monitoring System and Depot Area Air Monitoring System.
[2] National Research Council, Review of Monitoring Activities Within the Army Chemical Stockpile Disposal Program, 1994, pg. 2.
[3] Ibid., pg. 34.
[4] See draft hazardous waste permit condition VI.F.5.

combustion is being maintained, therefore indicating that agent is being thoroughly treated. So in essence there is a redundant air monitoring system to monitor for proper treatment.

Mr. J.R. Wilkinson indicated in his testimony that he believes an air and health monitoring system should be installed. The permit does contain a condition for monitoring at the fenceline; however, if Mr. Wilkinson is contemplating a regional health and air monitoring program, this is beyond the scope of what is planned for Umatilla. Given that this proposed facility is designed to operate only for 3.2 years, under strict environmental and regulatory controls, we believe the monitoring currently required will be protective of human health and the environment.

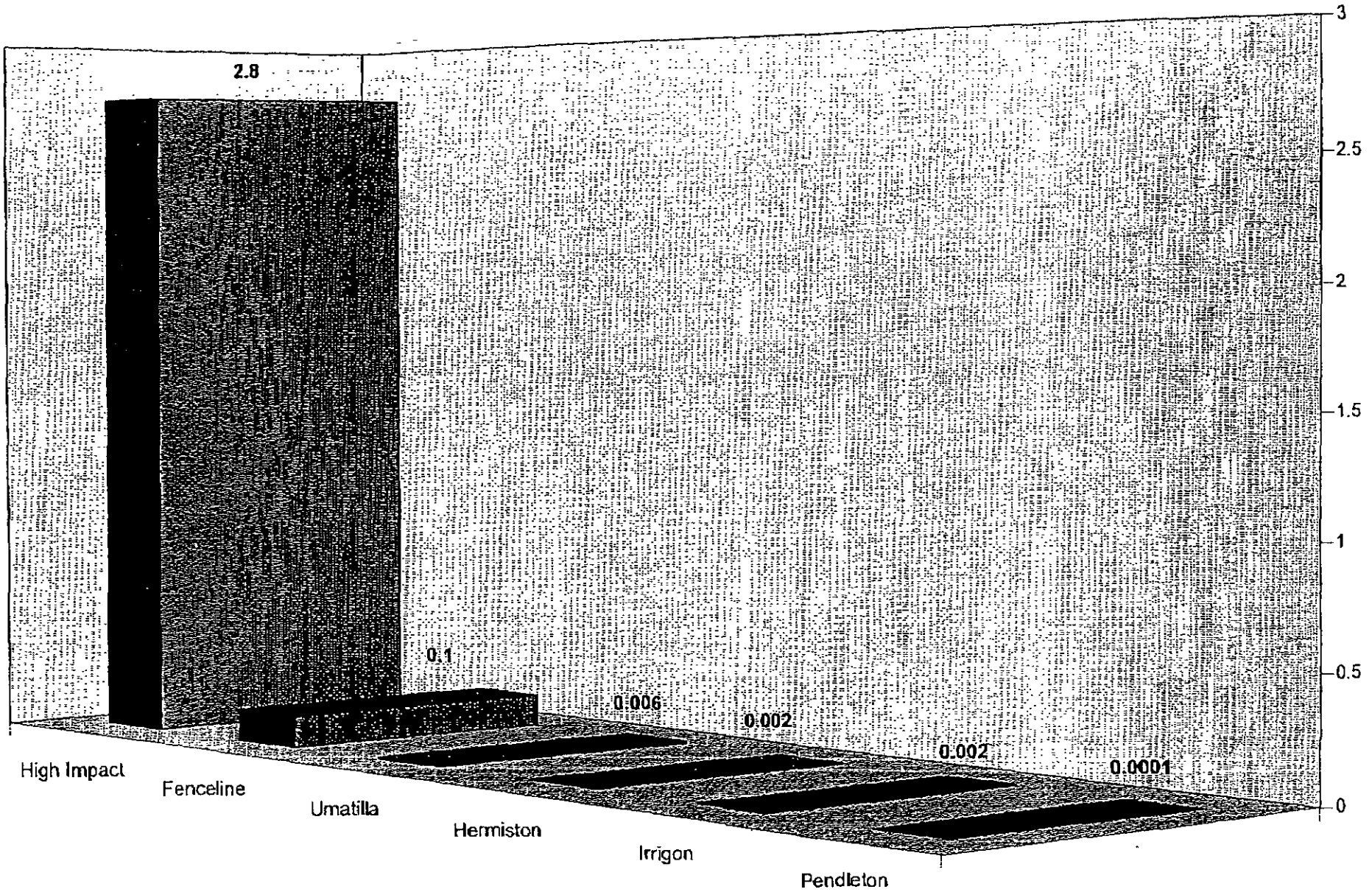
The last issue I want to address is the criticism that we used 'modeled' rather than empirical data. The fact is, we used both. We used actual representative site meteorological data and actual JACADS data which represents an operational unit that closely matches the proposed Umatilla facility. What is 'modeled' is using the data in an EPA approved air dispersion and deposition computer program to determine what the air and soil contaminant concentrations will be from Umatilla. This methodology is in accordance with the EPA Implementation Guidance, and DEQ believes that this type of evaluation, with the best data available, **is good science**, and therefore credible and defensible.

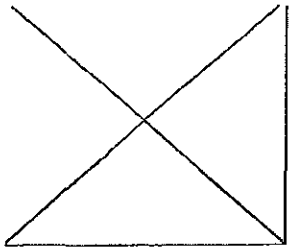
This concludes my remarks, and I, along with Regina, Julie, and Steve, would be happy to answer any of your questions.

OVERHEADS


N
35°
IRRIGON
HOLDMAN
COMMON
STACK
HERMISTON
RISK ASSESSMENT
SUBSISTANCE FARMER
STANFIELD
ECHO
35 MILES
CLOSEST TRIBAL
BOUNDARY

Unitized Total Deposition Rates by Location

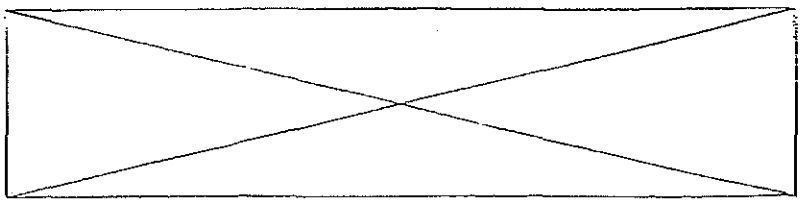




Pre-Trial Burn Risk Assessment

Technical Issues

- Dioxin Issues
- Toxicity of Cadmium
- Products of Incomplete Combustion
- Additional Exposure Pathways
- Items of Clarification



Pre-Trial Burn Risk Assessment

Relevant References

- Health Assessment for Dioxin
- Exposure Factors Handbook
- Implementation Guidance
- Stimson Report

SUMMARY OF DIOXIN RESULTS
JACADS OPERATIONAL VERIFICATION TEST RESULTS
LIQUID INCINERATOR

Congener	Detection Limit	HD				VX				GB		
		Run 1	Run 2	Run 3	Run 4	Run 1	Run 2	Run 3	Run 4	Run 1	Run 2	Run 3
Tetra CDD	4.00E-02	-	-	-	-	-	-	-	-	3.20E-01	8.70E-02	1.01E-01
Penta CDD	2.00E-01	-	-	-	-	-	-	-	-	-	-	-
Hexa CDD	2.00E-01	-	-	-	-	-	-	-	-	-	-	-
Hepta CDD	2.00E-01	-	-	-	-	-	-	-	-	-	-	-
Octa CDD	4.00E-01	-	-	-	4.28E-01	-	-	-	-	4.70E-01	-	5.80E-01
Tetra CDF	4.00E-02	6.10E-02	-	-	-	-	-	-	-	-	-	-
Penta CDF	2.00E-01	2.14E-01	2.06E-01	-	-	-	-	-	-	-	-	-
Hexa CDF	2.00E-01	2.37E-01	-	-	4.39E-01	-	-	-	-	-	-	-
Hepta CDF	2.00E-01	-	-	4.00E-01	6.62E-01	2.60E-01	-	-	-	-	-	-
Octa CDF	4.00E-01	-	-	-	-	-	-	-	-	-	-	-

Comparative TEQ Dioxin Air Emission

10 July, 1996

Facility Name:	***Permitted TEQ Dioxin Emission Limits:***	***Actual TEQ Dioxin Emission Measured:***
Umatilla Army Depot, Umatilla		
2 Liquid Incinerators	1.95E-09 g/s	NA
Metal Parts Furnace	9.08E-10 g/s	NA
Deactivation Furnace	6.69E-10 g/s	NA
Dunnage Incinerator	3.54E-10 g/s	NA
Total Emissions from proposed Chemical Demilitariztion Facility	3.88E-09 g/s	NA
Ogden Martin, Brooks		
Unit 1	NA	7.74E-10 g/s
Unit 2	NA	3.49E-09 g/s
Total Emissions from Municipal Waste Combustors Facility	5.04E-08 g/s	4.26E-09 g/s

Pre-Trial Burn Risk Assessment

Additional Pathways

- Ingestion of Breast Milk
- "Pica Child" Scenario
- Ingestion of Wild Game

Table XXVII. Summary of estimated incremental annual cancer cases based on modeled ambient concentration by source category.[a]

Source Category[b]	Annual[c] Cancer Cases	Percent	Principal Pollutants[d]
1. Motor Vehicles	1115.00	56.13	PIC, 1,3-Butadiene
2. Secondary Formaldehyde	130.00	6.54	Formaldehyde
3. Electroplating	120.00	6.04	Hexavalent Chromium
4. TSDFs	94.50	4.76	Dioxin
5. Woodsmoke	89.00	4.48	PIC
6. Asbestos, Demolition	81.00	4.08	Asbestos
7. Unspecified (Point)	59.50	3.00	Arsenic, Formaldehyde
8. Cooling Towers	55.50	2.79	Hexavalent Chromium
9. Gasoline Marketing	49.50	2.49	Gasoline Vapors, Benzene
10. Solvent Use/Degreasing	29.00	1.46	Perchloroethylene, Methylene Chlo
11. Unspecified (Area)	21.00	1.06	Carbon Tetrachloride
12. PVC/EDC/Vinyl Chloride	19.00	0.96	Vinyl Chloride
13. Iron & Steel	17.50	0.88	Coke Over Emissions, Benzene, P
14. Sewage Sludge Incinerators	13.00	0.65	Cadmium, Vinyl Chloride
15. Municipal Waste Combustors	12.00	0.60	Dioxin
16. Petroleum Refineries	11.00	0.55	Gasoline Vapors, Formaldehyde
17. 1,3-Butadiene Production	10.00	0.50	1,3-Butadiene
18. Styrene-Butadiene Rubber Production	10.00	0.50	1,3-Butadiene
19. Coal & Oil Combustion	9.00	0.45	Arsenic
20. POTWs	6.00	0.30	Vinyl Chloride
21. Smelters	3.50	0.18	Formaldehyde
22. Commercial Sterilization/Hospitals	3.50	0.18	Ethylene Oxide
23. Pesticide Production/Usage	3.50	0.18	Benzene
24. Drycleaning	3.00	0.15	Perchloroethylene
25. Pulp & Paper Manufacturing	2.10	0.11	Chloroform
26. Chlorinated Drinking Water	1.70	0.09	Chloroform
27. Ethylene Dibromide Production	1.50	0.08	Ethylene Dibromide
28. Polybutadiene Production	1.20	0.06	1,3-Butadiene
29. Ethylene Oxide Production	1.20	0.06	Ethylene Oxide
30. Ethylene Dichloride Production	0.80	0.04	Ethylene Dichloride
31. Waste Oil Burning	0.60	0.03	Arsenic
32. Asbestos Manufacturing	0.50	0.03	Asbestos
33. Asbestos Renovation	0.40	0.02	Asbestos
34. Glass Manufacturing	0.40	0.02	Arsenic
35. Hazardous Waste Combustors	0.30	0.02	Hexavalent Chromium
36. Paint Stripping	0.22	0.02	Methylene Chloride
37. Pharmaceutical Manufacturing	0.30	0.02	Chloroform
38. Benzene Fugitives	0.20	0.01	Benzene
39. Nitrile Elastomer Production	0.16	0.01	Acrylonitrile
40. ABS/SAN Production	0.13	0.01	Acrylonitrile
41. Asbestos Fabrication	0.13	0.01	Asbestos
42. Benzene Storage	0.10	0.01	Benzene
43. Other	9.50	0.48	Hexavalent Chromium, Radon
Totals	1986.44	100.00	

[a] Values in this table are not absolute predictions of cancer occurrence and are intended to be used in a relative sense only.

[b] TSDF denotes Treatment, Storage, and Disposal Facilities for Hazardous Waste; PVC denotes Polyvinyl Chloride; EDC denotes Ethy Dichloride; POTW denotes Publicly Owned Treatment Works; ABS denotes Acrylonitrile Butadiene Styrene; SAN denotes Sty Acrylonitrile.

[c] Where a range was estimated, the midpoint is given in this table.

[d] PIC denotes Product of Incomplete Combustion.

Table XX. Reasonable worst case emissions of specific organics from incinerators, boilers and industrial furnaces burning hazardous wastes.[77]

	Carcinogenic (Y/N)	Emission[c] (ng/L)	Percent of Total (%)
C2 Hydrocarbons	N	17000	43.3
C1 Hydrocarbons	N	9600	24.5
Benzene	Y	4928	12.6
Methylene Chloride[a]	Y	1755	4.5
Chloroform	Y	1407	3.6
Formaldehyde	Y	892	2.3
Chloromethane	Y	807	2.1
1,2-Dichloroethane	Y	714	1.8
Toluene	N	551	1.4
Tetrachloroethylene	Y	297	0.76
Chlorobenzene[b]	N	195	0.50
2,4,5-Trichlorophenol	N	144	0.37
Naphthalene[b]	N	130	0.33
Carbon Tetrachloride	Y	99.5	0.25
o-Dichlorobenzene	N	95	0.24
p-Dichlorobenzene	N	86	0.22
Trichloroethylene	Y	81.8	0.21
bis(2-Ethylhexyl) Phthalate	Y	77.7	0.20
1,2,4-Trichlorobenzene	N	77	0.20
1,1,1-Trichloroethane[b]	N	64	0.16
1,1,2-Trichloroethane	Y	36.7	0.094
Methyl Ethyl Ketone	N	33.2	0.085
Phenol	N	33.1	0.084
1,1-Dichloroethylene	Y	31.6	0.081
Diethyl Phthalate	N	31	0.079
1,1,2,2-Tetrachloroethane	Y	17	0.043
Vinyl Chloride	Y	14	0.036
Pentachlorophenol	N	9.3	0.024
Hexachlorobenzene	Y	8.95	0.023
Dibutyl Phthalate[b]	N	3.6	0.0092
1,1-Dichloroethane	Y	3.37	0.0086
Butylbenzyl Phthalate[b]	N	3	0.0076
Bromomethane	N	2.13	0.0054
Dichlorodifluoromethane	N	1.22	0.0031
Benzo(a)Anthracene	Y	1.10	0.0028
2,4-Dichlorophenol	N	0.50	0.0013
Acetonitrile	N	0.26	0.00066
TCDF	Y	0.00141	0.0000036
PCDD	Y	0.10246	0.00026
Other Carcinogens	Y	4.6	0.0117
Other Noncarcinogens	N	2.8	0.007
Totals		39240	

[a] May be due to laboratory contamination.
[b] Values estimated from Reference 126.
[c] 95th percentile concentration levels.

Item Number	Tag Number	Process Data Description	Setpoints During Shakedown and Post Trial-Burn	Setpoints During Trial Burn
DFS-10	SAL-57	No motion on heated discharge conveyor	No motion	No motion
DFS-11	PDAH-813	Afterburner exhaust flow rate high	0.9 inch w.c.	1.0 in. w.c.
DFS-12	TALL-182	Rotary retort temperature low-low (flue gas temp before spray)	1,050°F except during start-up feed is allowed at 910°F up to 12 min. to achieve 1,050°F	1,000°F except during start-up feed is allowed at 900°F up to 5 min. to achieve 1,000°F
DFS-13	TAL-197	Afterburner temperature low-low	2,050°F for rockets; 1,850°F for other munitions	1,950°F for rockets 1,750°F for other munitions
DFS-14	TAHH-197	Afterburner temperature high-high	2,350°F for rockets; 2,150°F for other munitions	2,500°F for rockets 2,250°F for other munitions
DFS-15	PDAL-08	Venturi scrubber pressure low-low	20 inch w.c.	18 inch w.c.

96-WP98.04

How Strong is the Relationship Between Dioxins and Chlorine in Hazardous Waste Incinerator Stack Emissions?

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INTRODUCTION

More than 1,900 PCDD/F runs at different types of waste combustors were assembled and analyzed. A series of increasingly sophisticated statistical techniques found that for the vast majority of the data sets, the effect of feed chlorine content on PCDD/F emissions cannot be distinguished from normal variability. The small number of data sets that showed an effect displayed conflicting results with the quantity of PCDD/F increasing in some cases and decreasing in others. Whatever effect chlorine feed rate has on PCDD/F in the products of combustion, it is not discernible against the background of all other causative factors. Consequently, mandatory chlorine reduction programs are unlikely to produce any measurable reduction in the quality or quantity of PCDD/F emissions from commercial scale hazardous waste combustors.

Since polychlorinated dibenzo-p-dioxins and dibenzo furans [PCDD/F] are organochlorides, they clearly cannot be found in the products of combustion unless there is chlorine in the system. On the other hand, atmospheric measurements demonstrate that air contains enough chlorine to produce about 2,500 ng/dsm^3 of 2,3,7,8 TCDD. Laboratory experience indicates that intrinsic PCDD/F might pass through the flame zone under poor combustion conditions or be formed throughout the combustion system via a complex series of interacting gas phase, surface catalyzed and solid phase reactions. Laboratory work also shows that PCDD/F formation is strongly influenced by combustor and air pollution control system [APCS] design and operating conditions. This leads to the question, is chlorine content a major factor of PCDD/F emissions at commercial scale facilities?

FOCUS & LIMITATIONS

This paper summarizes some of the key findings of the effort directed by the Subcommittee on The Relationship between Chlorine in Waste Streams and Dioxin Emissions from Combustors of the ASME Research Committee on Industrial and Municipal Waste which examined the impact of waste feed chlorine content on PCDD/F emissions from waste combustion systems.[1] The effort focused primarily on emissions data from the municipal, medical, hazardous and agricultural (biomass) commercial waste management segments. But seminal data from laboratory, pilot and small-scale test facilities were used to provide understanding of mechanisms and a framework for examining full-scale facility performance.

The full report provides an analysis of the data, a discussion of the statistical techniques employed, and a standardized listing of the pertinent data so that others may perform independent analyses. There is a wealth of information in the full report that can be used to address other PCDD/F formation questions and APCS performance. Others are encouraged to use this reference work as a starting point to verify the following conclusions and observations and to extend the assessment to address other questions.

Neither this paper nor the underlying study, however, address changes in the PCDD/F characteristics of residues and liquid effluents leaving commercial scale waste combustion facilities. This limitation does not seriously reduce the utility of the effort since multipathway health risk assessments find stack emissions predominating the PCDD/F risk contribution; the other effluents have a negligible effect. This is not surprising since testing at Stapelfeld[2] and Montgomery County, Ohio[3] found little PCDD/F in scrubber effluents and routine TCLP testing shows that whatever amount of PCDD/F is in combustor residue is not leached. This study emphasized the area where an environmentally significant relationship is most likely to be found.

APPROACH

Data Acquisition

Information in Rigo & Rigo Associates, Inc.'s proprietary emissions database and the emissions database assembled by Energy & Environmental Research Corp. [EER] in support of the Combustion Emissions Technology Resource Document[4] was augmented by data gleaned primarily from complete emissions test reports and occasionally from summary reports obtained from plant owners, researchers and regulators predominantly in the United States, Canada and Europe. Previously unpublished results were provided and utilized. In total, more than 1,900 PCDD/F measurements taken along waste combustion system gas paths were databased and utilized. The data were assembled along with facility characteristics, test methods, plant operating data and an indication of chlorine feed rate (e.g., uncontrolled HCl measurements in the flue gas or an indication of waste composition).

Standard USEPA regulatory units--PPMdv for gases, such as HCl; mg/dsm^3 for particulates; and ng/dsm^3 for PCDD/F congeners and homologues--were used. The data were standardized to 20°C, 762 mm Hg, dry and 7% O_2 conditions. Standardized dioxin and furan concentrations were also expressed as molar concentrations to facilitate application of chemical thermodynamic and kinetic formulations to this complex mixture.

Data quality was assessed for each data set (i.e., test report or publication). In addition to verifying that the tests used standard test procedures and adhered to an established QA/QC protocol, the data were reviewed to identify data that did not meet QA requirements and outliers. Apparent outliers were traced back and, where errors were found, the appropriate corrections were made. Remaining outliers were flagged so that the effect of possibly aberrant data could be considered during interpretation.

Data Analysis

The overall question of whether chlorine affects PCDD/F stack emissions was broken down into a pair of testable questions so that the same objective statistical methods could be used to determine if there is a discernible effect of waste feed chlorine content on PCDD/F emissions at commercial waste combustion facilities. Two questions were designed to ascertain the effect changes in chlorine feed rate have on:

1) PCDD/F composition, and
2) the quantity of PCDD/F emissions.

The composition question was addressed by determining if the PCDD/F profile differs by more than experimental variability could explain. The quantity question was addressed using a number of correlation based tools and Analysis of Variance [ANOVA] techniques. If no relationship was found between chlorine and either composition or quantity of PCDD/Fs in the gaseous products of combustion, then there was no overall effect.

Many ways of characterizing PCDD/F profiles have been proposed and utilized. This effort used as many of the following three descriptor sets to describe individual run signatures as could be computed from the available information:

- the fraction congener, defined as the ratio of the 2,3,7,8 Substituted Congeners grouped by equal International Toxicity Equivalence Factor [ITEF] within a homologue to the sum of all 2,3,7,8 Substituted Congeners (A-J, Figure 1);

- the fraction homologue, defined as the ratio of each homologue total to the Total PCDD/F (K, Figure 1); and

- the 2,3,7,8 Ratio, defined as the sum of all 2,3,7,8 Substituted Congeners to the Total PCDD/F (L-U, Figure 1).

Each of the above was calculated on a molar rather than on a mass basis to avoid camouflaging changes induced by substituting a few molecules of heavier congeners for more molecules of lighter, more toxic congeners. Figure 1 displays the signatures developed for several types of waste combustors using complete data sets (e.g., sets that did not include below detection limits [BDL] data points).

First, for individual facilities and subsequently facility averages, cluster analysis, a technique that compares entire patterns, was used to compare the relative congener and homologue signatures. The Squared Euclidean Distance, the sum of the squares of the differences between each signature component (shown graphically in Figure 2), was used to make this comparison.

Other clustering techniques could have been chosen, but method imprecision would not have been as cleanly addressed. A Criterion to distinguish Squared Euclidean Distances that exceed PCDD/F measurement method imprecision from normal data variability was developed by combining the expected signatures in Figure 1 with estimated method imprecision estimates for individual isomers[5] in a Monte Carlo simulation. If the Squared Euclidean Distance is less then the Criterion, then the individual signatures are the same and changes in chlorine feed rate could not have had a measurable effect. Also, if the signatures are the same, then a summary quantity measure like total PCDD/F concentration can be used to assess quantity changes since changes in the summary statistic and each individual component are related with observed differences being less than method variability. Hence, these differences and are attributable to chance.

The database includes 87 variables for each of the more than 1,900 PCDD/F runs recorded. It is difficult to meaningfully inspect such extensive data and identify and separate systematic variations from data noise. A statistically significant difference at the 95 percent confidence level is likely to be found 5 percent of the time when the comparisons are made due to data noise alone. Since this effort involves analyzing more than 1,900 sets of PCDD/F results, the number of false conclusions likely to be found by not starting with method imprecision is in excess of 2 million due to chance. The number of false positives was minimized in this effort by using multiple means comparison techniques such as using the Studentized Maxim Modulus statistic instead of the t-statistic when developing critical values for differences*.

Correlation methods, including principal component analysis [PCA], canonical correlation and scatter plots of one variable against another with linear regression line overlays provide a quick way to identify potentially meaningful relationships, but cannot account for collinear and confounding factors. Designed experiments that purposely varied operating parameters (parametric tests), collinearity (variables responding together like a scrubber lowering the flue gas temperature) and confounding factors (different sam-

* Another technique is to simply use the Bonifornini approximation and do all comparisons at the α/k statistical significance level instead of the α level when k comparisons are being made. For example, when 4 averages are compared, six unique paired comparisons will be made (k). So, if the 95 percent statistical confidence level is desired, tabulated values for 1-.05/6 or 99.2 (say 99) percent confidence level should be used. Obviously, larger differences are needed to identify significant differences, but this is a natural consequence of using a data set to do more than one comparison.

pling locations or combining data from different units or time frames) however, are readily handled using regression based ANOVA techniques. Continuous variables, like flue gas temperature and oxygen content, can be combined with discrete blocking variables, which take on a value of 1 when a condition is true (a spike, for example) and a value of 0 when it is false (normal waste feed being burned) in an ordinary least squares or robust least median square regression. Statistically significant regression coefficients indicate that the continuous variable or the condition represented by the blocking variable has an effect; otherwise, it does not. ANOVA enables identification of significant discrete effects and the sorting out of complex industrial experiments where several things are changed simultaneously.

A combination of all these techniques, applied in a consistent manner to all the available data, is required to identify meaningful differences. Further statistical and technical data analysis is then used to determine whether changes in feed chlorine affected the composition of the emitted PCDD/Fs (i.e., did the changes induce shifts in the congener and homologue distributions?) or the amount of PCDD/F emitted. If the answer to both of these questions is no--chlorine changed neither the character nor the amount of the PCDD/F emissions--it is concluded that there is no effect of changes in chlorine feed rate on PCDD/F emissions. If a change is noted, it is compared to other experiments and tests with similar results. The same effect must be found in the majority of similar experiments to assign causality because even with the application of techniques designed to minimize the number of chance findings in multiple comparisons, happenstance can still produce a few significant results when there is really nothing there.

HAZARDOUS WASTE INCINERATION [HWI] TESTS AND STUDIES

Several types of systems are used to incinerate hazardous waste. These systems include incinerators specifically designed and operated for the disposal of hazardous waste, industrial boilers co-firing compatible waste streams and cement and light weight aggregate kilns that use combustible waste streams in lieu of fossil fuel. There are also highly specialized incinerators, referred to as halogen acid furnaces, that recover energy and chlorine from highly chlorinated waste streams.

Over the past decade, an extensive body of emissions data has been developed from hazardous waste combustion facilities. Trial burn and Certification of Compliance [CoC] test reports describe the waste material burned, facility design and operating conditions, and emissions data. These tests provide a wealth of pertinent information even though the combustion systems are intentionally stressed during testing to maximize permitted emissions.

One of the frequently reported feed parameters to hazardous waste combustors is the amount of chlorine fed to the combustor. While HCl concentrations are generally available at the stack, there are few, if any, uncontrolled HCl (before APCS) measurements because permits generally do not require testing at this location. Thus, while directly measured gas phase chlorine concentrations prior to the APCS are not generally available, the amount of chlorine introduced into the system and available to react is usually known. Furthermore, the temperature of the gas stream before the APCS makes measurement difficult and perhaps meaningless for trace organics which can be catalytically formed and decomposed on a high temperature sampling probe tip.

Most of the PCDD/F concentration data from HWIs are stack emission measurements. That is, the data characterize the gases after passing through the APCS. The APCS can have a significant impact on overall PCDD/F concentrations if designed to interfere with PCDD/F formation or to control PCDD/F emissions. Conversely, under the wrong conditions, such as those that characterize high temperature

particulate control devices, APCS can become PCDD/F generators. Hence, each facility or group of like facilities must be separately analyzed and overall trends identified. Broad aggregation across the various types of systems without accounting for these phenomena is meaningless.

HAZARDOUS WASTE CHARACTERISTICS

Combustible hazardous waste is generated by a wide range of commercial processes and consists of a broad array of chemical species. The waste may be either organic or inorganic. Further, hazardous "solid" wastes, as defined in RCRA regulations, may be in a solid, liquid, or containerized gaseous physical state. The higher heating value can range from negative (for endothermic materials like wastewater with a trace of combustible organics) up to approximately 20,000 Btu/lb. The chlorine content can vary from trace levels to as much as 80% chlorine with 1 to 40% being most typical for wastes burned in incinerators. The chlorine content is frequently less than 0.1% for wastes burned in industrial boilers. The physical and chemical characteristics of the waste generally influence the type of incineration equipment used to treat the waste.

FINDING DIFFERENCES IN DIOXIN QUALITY—SIGNATURE ANALYSIS

All the data sets with PCDD/F congener or homologue data for six or more runs were analyzed using cluster analysis to find any substantial differences in the PCDD/F signatures for the various tests. Differences were investigated to see if they could be related to chlorine feed characteristics.

The uncertainty in total congener and homologue measurements of 10 to 30 ng/dsm^3 @ 7% O_2 concentration produces a Squared Euclidian Distance coefficient of approximately 0.34 for the full signature. The Squared Euclidian Distance coefficient must be larger than 0.05 for homologue, or 0.25 for congener profile signatures to be different. Squared Euclidian Distance coefficients smaller than these coefficients are within the accuracy of the sampling and analytical methods and characterize data noise so any interpretation beyond random noise is meaningless. Each analyzed facility is considered in turn in this section.

3M, Cottage Grove, MN - Eight runs were conducted under two distinct operating conditions. The largest difference coefficient is less than the criterion which implies that all the signatures are the same for this plant. The first and second test series cluster together. While the coefficient is not sufficiently different to indicate a real change, the first test series has many more BDL results. Also, the first test series burned 1% chlorine hazardous waste and the second burned 4% chlorine material. Whatever effect chlorine has on the PCDD/F quality at this plant, it is not distinguishable from method variability.

Aptus, Coffeyville, KS - Of the 14 runs with complete homologue data, 11 are for four test conditions conducted after the venturi scrubber based APCS was replaced by a high temperature baghouse to improve particulate removal; 3 are before replacement. All tests produced similar homologue profiles. The largest coefficient is less than the criterion needed to have a profile separation greater than analytic precision. The test condition and APCS configuration signatures are interleaved indicating that these changes did not affect dioxin distribution at this plant. Chlorine ranged from 13 to 30% of feed during testing. There is no pattern relating chlorine concentration to cluster arrangement. This indicates that this homologue profile is not affected by chlorine content over the almost 2:1 test range.

Aptus, Aragonite, UT - The nine runs at this facility are characterized by a maximum difference coefficient for the full signature metric less than the criterion. The tests cluster in three groups matching the run condition. However, given the low coefficient, all can be judged to have the same signature. Chlorine feed percent ranged from 9 to 20% and does not explain grouping. Each cluster group contains runs from a wide range of percent chlorine feed values.

Chevron, Richmond, CA - Six runs are included in the database. Signatures were not analyzed because only 6 of the 150 congener and homologue results were above detection limits. The profiles, therefore, represent method detection limits and not PCDD/F profiles.

* *Tooele Army Depot* - A total of 10 runs covering 4 test conditions are available. The maximum difference coefficient is less than the full signature criterion. Much of the reported congener and homologue data are BDL. The data cluster by test condition. Chlorine feed rates were not obtained and potential effects of chlorine feed concentration and changes in PCDD/F characteristics cannot be evaluated.

DOW, Midland, MI - Three runs are reported for each of the two rotary kiln incinerators at the facility. The maximum difference coefficient for the congeners is less than the criterion. There is no difference between signatures greater than total method error. The signatures cluster by unit; one unit was firing nominal 28% chlorine waste and the other 11% chlorine waste. Within the unit sub-clusters, the runs are not arranged by feed chlorine content indicating that the difference is likely due to combustor type rather than chlorine content.

Eastman Kodak, Rochester, NY - The six runs with congener data are closely grouped with a maximum difference coefficient less than the full signature coefficient. The data group by test series, but the chlorine feed rate is between 6 and 7% for all runs. No relationship between dioxin signature and chlorine content can, therefore, be discerned.

GE, Waterford, NY - A total of nine runs were conducted on two incinerators sharing a pair of ionizing wet scrubbers [IWS] which can be aligned to treat either the flue gas from each incinerator individually or the combined flow. Chlorine feed concentration is not available. One run in each triplicate is separated from the balance of the runs by more than the total method error. This indicates a sampling or analytic problem since these runs are also individually separated from each other by more than normal total method error explains.

OxyChem, Niagara Falls, NY - A total of 10 runs are included in this set. Chlorine feed concentrations ranged between 26 and 63%. Each test series forms its own sub-cluster and the low chlorine runs are separated by more than the distance criterion from the balance. These signatures are all predominated by BDL results. Test method limitations rather than a chlorine effect is a more plausible explanation since no meaningful distribution information is provided by a detection limit predominated profile. It is also important to note that these runs were characterized by much higher particulate loadings than found in prior testing. This indicates a difference in APCS performance or waste chemistry. The results are confounded and cause cannot be assigned.

Rollins, Bridgeport, NJ - The six runs with homologues group by test series and display a maximum Squared Euclidian Distance of 0.27. Since there are only two detected homologues

among all 60 results used to compute these homologue profiles, this profile really reflects differences in the analytic detection limit profile with the major difference due to the detection of two homologues in one run.

Waste Technology Industries [WTI], East Liverpool, OH - Twenty-seven runs are included in this set. The maximum difference coefficient is 0.19, below the 0.25 method precision metric. The runs cover several test series. Some of the trial runs during activated carbon system tuning cluster apart from the main data body. This indicates that distribution uniformity for carbon addition may be important or it may simply reflect normal differences between test campaigns. The chlorine feed rate ranges from 10 to 28% and the runs spanning the range cluster throughout the subgroups. This indicates that there is no observed effect of chlorine on the profile.

Chemical Waste Management, Port Arthur, TX - Seventeen runs with completed PCDD/F signatures are included in the database. More than 50% of the congener and homologue results are BDL. Signatures were predominated by methodological limitations rather than PCDD/F characteristics as evidenced by test series grouping.

All the statistically significant differences found by the cluster analyses were related to sampling and analytical chemistry limitations. So, no discernible differences in PCDD/F signatures were found within any of these facilities. Although lower than critical values, two incinerators (3M and OxyChem) showed sub-clustering with chlorine content; the balance did not. Those that showed sub-clustering may be reflecting laboratory differences since the BDL patterns and detection limits change. OxyChem also displayed different particulate emissions indicating more changed than just the waste feed chlorine content.

Furthermore, a number of the facilities have total PCDD/F concentration levels well below the 10-30 ng/dsm^3 @ 7% O_2 implicit in the critical separation criterion used for screening. Indeed, some runs are as low as 0.1 ng/dsm^3 @ 7% O_2 total PCDD/F. At a level of 1.0 ng/dsm^3 @ 7% O_2 total PCDD/F, the nominal sampling error per congener and homologue rises to 100% and the full signature criterion becomes 0.94.

Cluster analysis was also used to compare the average signatures of each of the 26 facilities with full distribution descriptions. This analysis, shown in Figure 3, illustrates that three major groups exist. The furthest removed group (Chevron (3) through OxyChem (13)) is predominated by BDL results. Similar explanations apply to the sub-groupings demarked by Aptus, UT (2) through Vulcan (20); Ciba-Geigy (4) through GE Waterford (11) and Pfizer (14) through Rollins, TX (17). There is no orderly pattern of chlorine feed rate or incinerator type to characterize the groups. This indicates that chlorine feed rate, incinerator and APCS type are not significant determinants of PCDD/F quality as indicated by the signature. BDL's predominate, implying that much of the clustering reflects PCDD/F method limitations rather than meaningful differences.

FINDING DIFFERENCES IN DIOXIN QUANTITY

The differences in plant design and the unbalanced nature of the available test data make it imprudent to simply combine all the data into a global ANOVA. The individual plant data show different within-plant PCDD/F concentration trends as a function of waste feed chlorine concentrations. Two blocking variables would be needed to absorb gross offsets as well as more subtle rate (slope) effects at each plant in a

global ANOVA. Consequently, meaningful analysis must proceed on a facility-by-facility basis or at least in a manner that enables individual plant trends to be identified.

Scatter plots relating the logarithm of the total moles of PCDD/F concentrations to reciprocal absolute temperature (e.g., TINV=1800/°R=1000/°K) and percent chlorine in the feed are provided in Figure 4. Different plotting symbols identify each plant, but multiple units at a single plant are not distinguished.

The reciprocal inverse temperature plot shows a wide variation in $\log_{10}$ (totmole) (PCDD/F @ 7% O_2) at each temperature. As temperature decreases, TINV increases. Within individual facilities where an observable range of temperatures is tested (see the points for Rollins, Bridgeport, NJ, for example), concentrations decrease with temperature. Other facilities, like DOD's Johnson Atoll facility, exhibit no trend with temperature. Since the available temperature information characterizes the stack and not the average or peak APCS temperature, and since these data provide conflicting trend information, firm conclusions cannot be drawn concerning the effect of temperature reduction on PCDD/F concentrations from HWIs. Temperature, however, is clearly a confounding parameter that could be the underlying cause of any other observed effects.

Individual plots relating PCDD/F and chlorine feed rate for each facility with a linear regression line overlay were calculated for each data set and the statistical significance of each slope determined. A more detailed analysis using ANOVA techniques and accounting for variations in APCS temperature and other engineering parameters was not attempted since the majority of these data were taken after wet APCS and exhibit little temperature variability. Further analysis to isolate differences between various APCS configurations might prove interesting as long as the information needed to characterize differences in feed streams and operational set points that are not immediately obvious from the trial burn and CoC reports can be obtained.

Examination of the scatter plot relating molar concentration of PCDD/F to percent chlorine in the feed again reveals no relationship. Some, like Aptus, Coffeyville, KS; OxyChem, Niagara Falls, NY; and Chemical Waste Management, Port Arthur, TX, reveal reduced PCDD/F concentrations with increasing chlorine feed concentration. Others, like Aptus, Aragonite, UT and Eastman Kodak, Rochester, NY, show an increase in PCDD/F concentrations with increasing chlorine feed. The majority, however, behave like BROS Lagoon and Clean-Up Site and show no change in PCDD/F concentrations when chlorine feed concentration increases from 35 to 60%. 3M, Cottage Grove, MN has near zero chlorine, but the PCDD/F concentrations are virtually identical to those at BROS Lagoon and Vulcan, Wichita, KS with much higher chlorine feed concentrations. The WTI data came from one plant before and after tuning of the activated carbon system. A recent analysis of this data by Liberson[6] found no relationship between chlorine feed rate and PCDD/F concentrations, but test company differences were noted.

There is a factor of 8000 variation in total molar concentration of PCDD/F emitted for apparently similar chlorine feed rates. Hence, PCDD/F concentrations are much more likely to be the result of facility design and operating conditions than chlorine feed variations. The available data indicate that, depending on the plant, changing chlorine concentration can have no observable effect (20 facilities); increase PCDD/F concentrations (4 facilities); or decrease PCDD/F concentrations (4 facilities).

CONCLUSIONS

The PCDD/F signatures that are not predominated by BDL's and different detection limits are the same for all HWI's regardless of incinerator type or chlorine feed rate.

Scatter plots of pM/dsm^3 PCDD/F versus percent chlorine in the feed find no dependence of PCDD/F on chlorine from virtually zero to the upper limit tested, around 80% (by comparison, pure carbon tetrachloride is 92% chlorine). Similar stack PCDD/F concentrations were observed for facilities with very low chlorine feed rates and facilities with high chlorine feed rates. On the other hand, at the same chlorine feed rate, three to four orders of magnitude differences in PCDD/F concentrations were observed across different facilities. Even within individual plants, factor of 50 variations are observed at the same chlorine feed rate. When individual plant PCDD/F concentration performance is studied, some facilities display an increase, some a decrease, and the majority display no relationship with percent chlorine in the waste feed. Based upon this analysis, reducing chlorine content in waste feed is not generally expected to have an effect on stack gas PCDD/F concentrations.

The hazardous waste incinerator data set produces results that are consistent with those found for other waste combustion sources.[7] While dioxins, a chlorinated chemical, clearly cannot exist absent any chlorine, full scale tests make it clear that dioxin formation is a complex problem and simplistically expecting a solution by reducing waste feed chlorine, even substantially, is wistful thinking. Other phenomena like furnace design and operating characteristics, APCS design and operating temperature, particulate morphology and composition, flow stratification and gas pocket temperature history, all play predominant roles in full scale systems. This is not surprising given current theory. If dioxin formation is a catalytic phenomenon, once the sites are all active, increasing the chlorine content cannot increase the yield. Similarly, if it is an equilibrium type phenomenon, once a constituent is overwhelmingly available, it no longer substantially affects final product concentrations. Reducing chlorine content to the point where it affects final concentrations is probably not practical given the amount of chlorine in ambient air (enough to form 2,500 ng/dsm^3 of 2,3,7,8 TCDD) and the ubiquitous nature of chlorine in all living things.

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7. Rigo, et al., ibid.

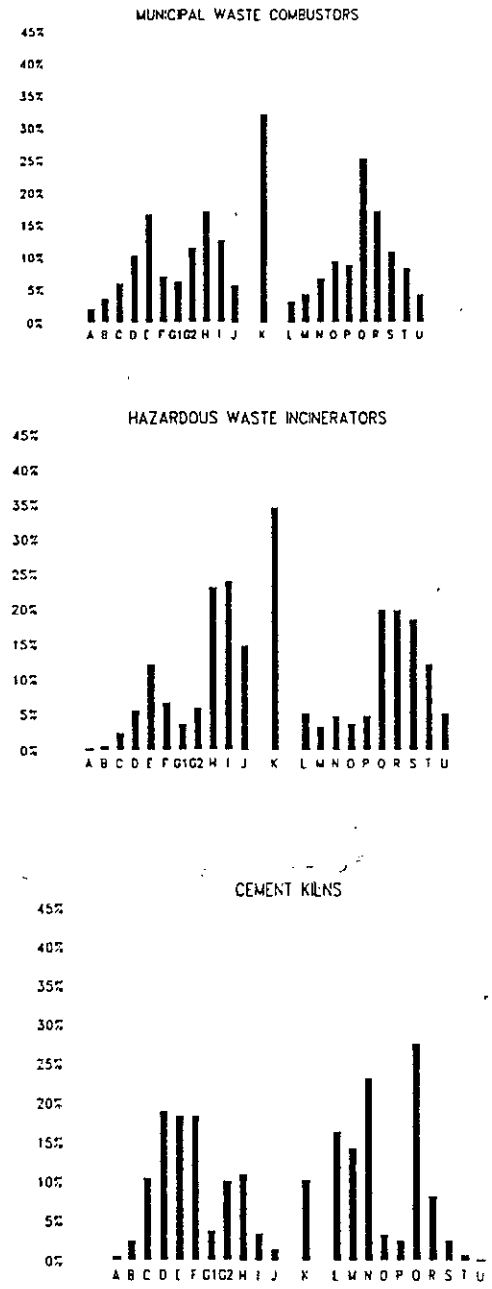


Figure 1. PCDD/F profiles for several commercial waste combustion systems.

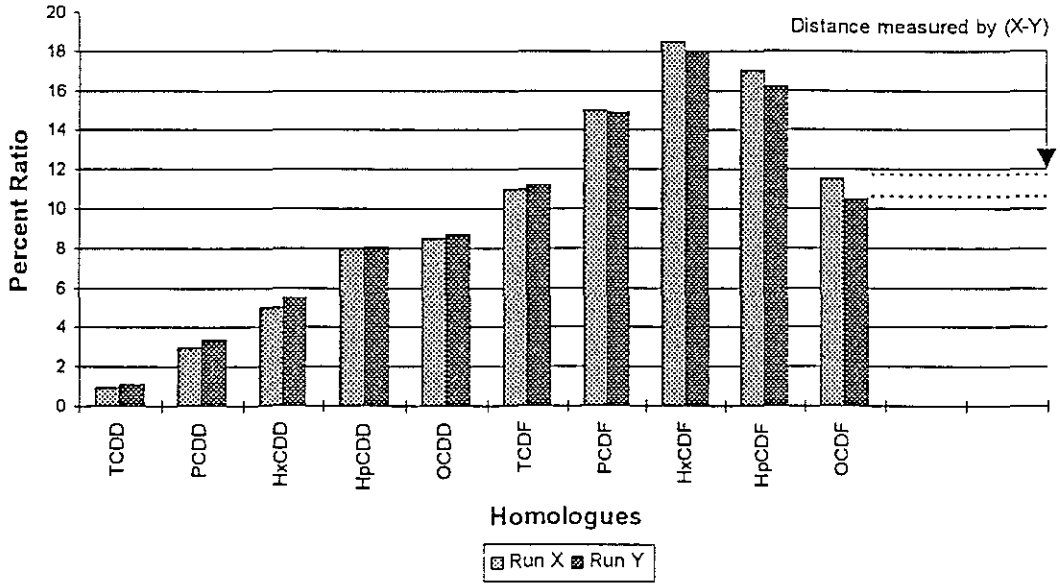
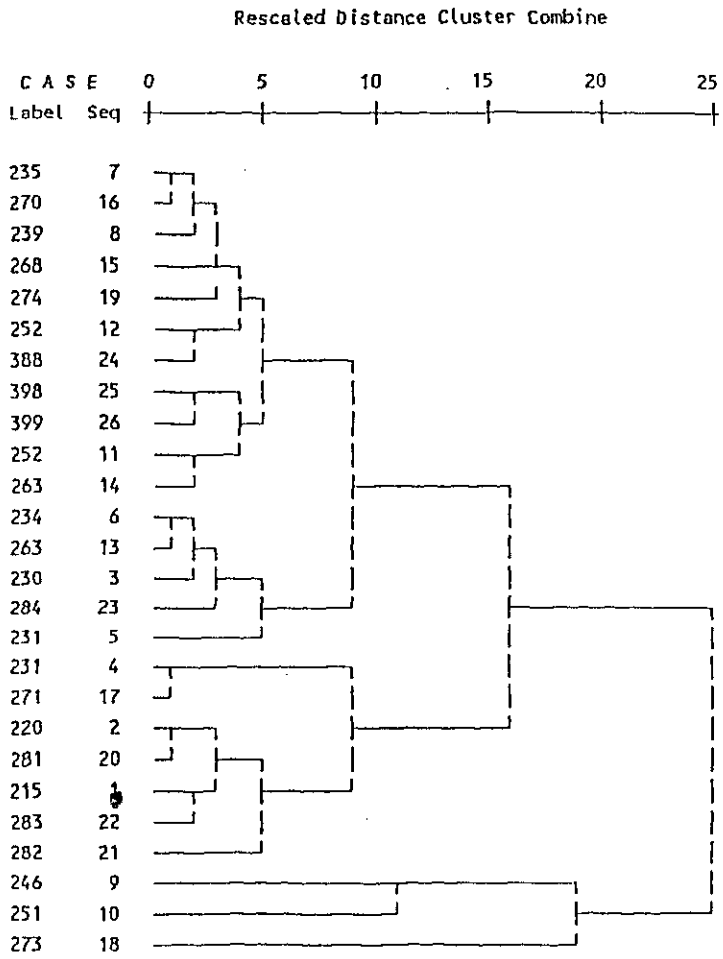


Figure 2. Differences between signature components used to estimate the squared Euclidian distance.

Dendrogram using Average Linkage (Between Groups)



* H I E R A R C H I C A L C L U S T E R

WARNING 14269
Due to missing data, some cases have been excluded from computations.

Agglomeration Schedule using Average Linkage (Between Groups)

Stage	Clusters Combined Cluster 1	Cluster 2	Coefficient	Stage Cluster 1st Appears Cluster 1	Cluster 2	Next Stage
1	7	16	.007729	0	0	9
2	6	13	.010864	0	0	6
3	4	17	.011425	0	0	20
4	2	20	.018676	0	0	11
5	1	22	.019103	0	0	11
6	3	6	.019155	0	2	13
7	25	26	.019800	0	0	15
8	11	14	.021235	0	0	15
9	7	8	.021436	1	0	12
10	12	24	.025093	0	0	16
11	1	2	.032137	5	4	18
12	7	15	.033344	9	0	14
13	3	23	.034774	6	0	17
14	7	19	.036613	12	0	16
15	11	25	.041774	8	7	19
16	7	12	.041870	14	10	19
17	3	5	.054730	13	0	21
18	1	21	.055112	11	0	20
19	7	11	.061234	16	15	21
20	1	4	.102387	18	3	23
21	3	7	.105276	17	19	23
22	9	10	.126350	0	0	24
23	1	3	.181595	20	21	25
24	9	18	.212712	22	0	25
25	1	9	.285878	23	24	0

Figure 3: Cluster analysis for complete HWI PCDD/F signatures.

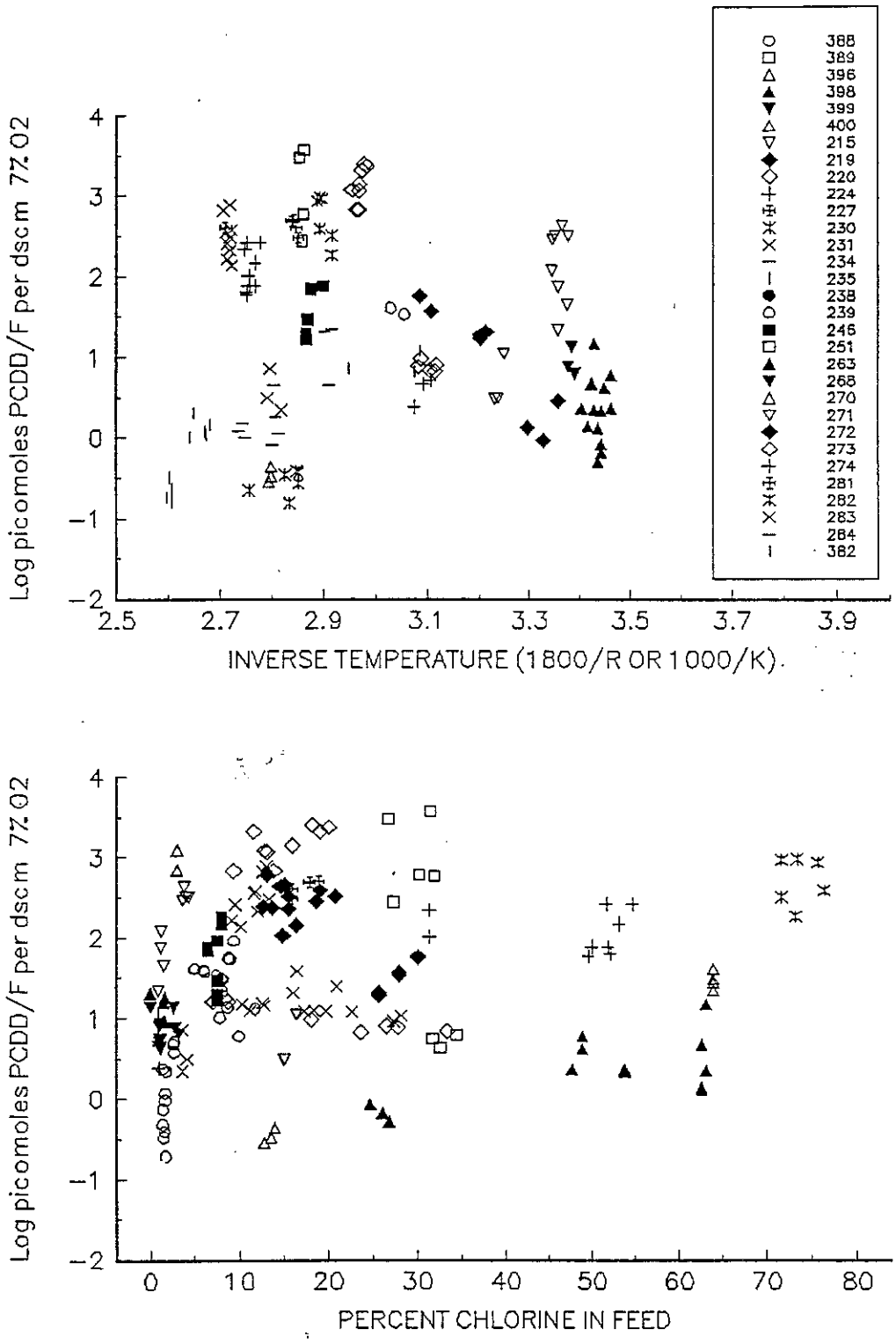


Figure 4: Scatter plot showing the lack of relationship between moles of PCDD/F and either temperature or percent chlorine feed of HWI.

R-2569-DOE

Understanding Cost Growth and Performance Shortfalls in Pioneer Process Plants

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September 1981

Prepared for the U.S. Department of Energy

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PREFACE

This is the second report from Rand's Pioneer Plants Study, which began in 1978. The study seeks a better understanding of the reasons for inaccurate estimates of capital costs and performance difficulties for first-of-a-kind process plants, especially energy process plants. Armed with a better understanding of the problems, the goal is to provide government and industry with tools to improve assessment of the commercial prospects of developing technologies.

The first report, R-2481-DOE, *A Review of Cost Estimation in New Technologies: Implications for Energy Process Plants*, by E. W. Merrow, S. W. Chapel, and J. C. Worthing, July 1979, documented the problems routinely encountered in projecting realistic costs for advanced technologies. This report presents an analysis of cost estimation and system performance for 44 pioneer process plants built by the private sector in North America over the past fifteen years.

Forthcoming reports will present the results of an effort to develop a simple and useable scale for measuring technical advance in process plants, an application of the study results to selected synthetic fuels projects, and an executive summary.

This study is being conducted for the U.S. Department of Energy under contract DE-AC01-79PE70078 as part of Rand's program of policy research and analysis for DOE. DOE offices supporting the research are Policy and Evaluation, Nuclear Energy, Resource Applications, and Energy Research.

SUMMARY

Misestimation of the capital costs and performance of innovative energy process plants and other chemical process facilities creates fundamental problems for government and industry in planning the development and commercialization of such plants. Misestimation erodes the rationality of R&D allocations, capital expenditure assessments, and comparisons between competing systems. The past decade has witnessed continual upward revisions in the estimated costs of synthetic fuels and other energy process plants—increases far beyond the effects of inflation. Among the few plants that have been completed here and elsewhere, most have experienced reliability problems that have adversely affected their economic viability.

The occurrence of cost misestimation and performance shortfalls does not surprise the few people who have experience with first-of-a-kind technologies. Unlike prior anecdotal accounts of the problems afflicting innovative process plants, however, this report presents an empirical and quantitative analysis of the following questions:

- What factors are responsible for inaccurate cost estimates for process plants?
- How well do pioneer plants perform and what factors are responsible for poor plant performance?
- What are the implications of the answers to the above questions for planning by the process industries and the Department of Energy?

For this study, 34 firms in the process industries provided data to support a statistical analysis of cost estimation error and performance shortfalls in pioneer plants. Detailed proprietary information on 44 process plants sustained the analysis.

The principal conclusions of the analysis are:

- Both performance problems and cost-estimation error, measured as the ratio of the estimated costs at various points in a project's development to the actual cost, were common among the plants examined. Both experiences, however, are associated with characteristics of the project or technology—characteristics that are knowable early in project development.
- Despite widespread belief to the contrary, unanticipated inflation, unanticipated regulatory changes, scope changes, and

other external factors such as bad weather and strikes, are *not* the principal causes of cost underestimation.

- Most of the variation found in cost-estimation error can be explained by (1) the extent to which the plant's technology departs from that of prior plants, (2) the degree of definition of the project's site and related characteristics, and (3) the complexity of the plant.
- Most of the variation in plant performance is explained by the measures of new technology and whether or not a plant processes solid materials.
- The statistical analysis of cost-estimation error—cost growth—enables both government and industry planners to gauge the reliability of a given estimate, and to assess probable ultimate costs of process facilities.
- The performance analysis suggests that the routinely high performance assumed for pioneer process plants when financial analyses are done is unrealistic. Over 50 percent of the plants in our sample failed to achieve their production goals in the second six months after start-up.

The analytic method presented in this study can be useful to industry and the Department of Energy in making decisions about R&D allocations where, otherwise, conventional estimating techniques will routinely overstate any advantages of advanced technology; in making decisions about commercialization; and in making decisions about required subsidies and risks for synthetic fuels and other energy process plants.

PL Technical Bulletin
Programmatic Lessons Learned

Aug & Sept 1995
Issue 1

JACADS Rocket Campaign Concludes

by RE&C

Operational Verification Testing for demilitarization of M55 GB-filled rockets was completed by the Johnston Atoll Chemical Agent Disposal System (JACADS) in February 1991; however the majority of the GB filled rockets were destroyed in the campaign which began on 19 Jan 94 and lasted through 30 Jun 95 when only 36 "leaker" rockets, a long rocket, and 57 rocket warheads remained. These were destroyed during a subsequent "leaker campaign," (13-17 July) which included sampling of rocket propellant. All totaled, JACADS destroyed 50,788 GB rockets, 57 GB warheads, and 515,600 pounds of GB during the 1994-95 GB Rocket Campaign.

Process Performance

The GB rocket campaign began on 19 January 1994. The campaign was interrupted during the first year for the following reasons: agent release in common stack and subsequent plant modification, 15 weeks; Hurricane John, 9 weeks; ECR-B rocket detonation repair, 16 day investigation; Exhaust duct refractory replacement, 25 days.

The rate of demilitarization averaged 850 rockets per week prior to Jan 95. After the March 1994 stack release, a joint government/contractor management review team (Red Team) was formed and the entire JACADS project was thoroughly evaluated. Recommendations were made to address potential areas for improvement. There were over 100 separate recommendations made for improving project performance.

From May 1994 through June 1995, all of the Red Team recommendations were addressed. Consequently, the overall JACADS production has continued to improve during this same time period.

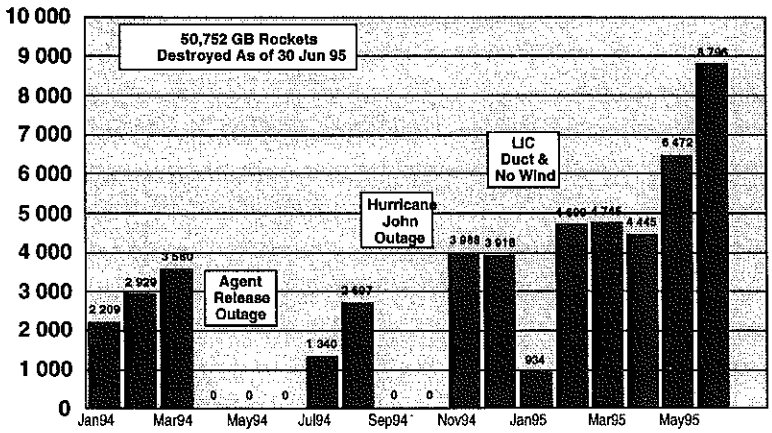
February, March, and April 1995 processing was delayed by no rocket deliveries which reduced processing on 22 days during these months. The average number of rockets processed increased to 4,630 per month (1,111 per week) during this 3-month period.

Rocket processing was interrupted in late March and early April by a 25-day shutdown for refractory replacement of the LIC secondary chamber. At this point, JACADS productivity improved again, increasing to 6472 rockets during May (which was 36 percent above the previous high month of March) and to 8,795 rockets during June (which was 36 percent above May). During June 1995, the last month of the regular campaign, the JACADS plant not only set the new record for monthly demilitarization of rockets, it also established significant new daily and weekly records: 701 rockets per day and 2,978 per week.

The increased productivity was due largely to the following:

During February 1995, the JACADS rocket line averaged 21.5 rockets per up-hour. This rate was increased to 26.3 during March, and to approximately 30 rockets per up-hour during April, May, and June. The following factors contributed to the improved hourly rates:

~ The temperature in the HDC was increased from 1,050 to 1,120 degrees in late 1994 to reduce aluminum solidification on conveyor buckets, with the aim of reducing HDC jams. Though this change reduced HDC jams, it resulted in increased



Continued on pg. 8

Revitalized PLL Program

Review of Our First Year

by Mr. Mark Evans, PMCSD

As systemization progressed at the Tooele Chemical Agent Disposal Facility (TOCDF) and as operations continued at the Johnston Atoll Chemical Agent Disposal System (JACADS), it became apparent that the existing Programmatic Lessons-Learned (PLL) Program just wasn't answering the mail. The old PLL Board had never met, and while a database listing lessons-learned was in existence, it certainly was not being utilized as a vital element in decision-making.

One of the first decisions made by Mr. Misiewicz when he became the Acting Project Manager for Chemical Stockpile Disposal, was that the PLL Program was a critical program element that must function well if we are to learn from our experiences. This is essential in demonstrating what is termed a programmatic learning curve, which should result in reduced costs (both in terms of cost savings and in terms of avoiding future cost growth) and greater degrees of schedule attainment. Therefore, Mr. Misiewicz moved the PLL task into his office with one clear charter - make it work!

The first step in revitalizing the PLL was to review each step in the PLL process to ensure that it had an efficient and effective system for identification and capture of lessons. The old system of input (individual interviews) was replaced with a system of facilitated workshops and document reviews. Site managers were empowered to approve what issues came into the PLL process prior to expenditure of efforts, creating the PLL concept of site issues as opposed to PMCSD, Systems Contractor, or PAISC issues. The old system of approving and directing PLL

Continued on pg. 3

Project Manager's Corner

by Mr.Richard W. Misiewicz, PM

I hope you are enjoying the first of the PLL Technical Bulletins. This bulletin is intended to allow for the sites and the corporate office to exchange technical information routinely in a format that is easy to use. I will be providing a summary of program activities of interest in each PLL Bulletin so that the entire demilitarization community can remain aware of program developments.

As most of you know, the demilitarization program has seen major cost growth and schedule extensions over the last several years. This trend must be stopped and a trend toward schedule attainment and cost reductions must be started. The JACADS team has gotten us off to a good start by starting the MC-1 bomb campaign slightly ahead of schedule - the second consecutive major project milestone attained by JACADS. Now it is time for us to examine the basics of demilitarization to determine if there are other programmatic things that can be done to reduce costs while still maintaining a maximum protection posture. To that end, a two-day brainstorming workshop will be held in September. I have called together a group of diverse thinkers and provided the following guidance - everything allowable by law is on the table. The team is chartered to develop programmatic recommendations targeted at achieving meaningful cost reductions while not compromising on safety or environmental protection. I will share the results of this effort with you when it has been completed.

We have also committed to a review of the JACADS process to look for cost-effective ways to optimize the system. A multi-disciplinary team comprised of industrial experts is scheduled to travel to JACADS to perform that assessment. Depending of the procurement process schedule, this team could be on JI as early as mid-October. A final report and implementation plan is expected eight months from task award. We will be looking at the results for application to JACADS, TOCDF, and for future sites as well.

Also, as many of you know, we have put construction of our PAS carbon filter demonstration test unit at Tooele on hold. The projected cost of the filtration program was climbing rapidly, and the State of Utah was asking some questions that required data that we had hoped to gain during the demonstration test. Therefore, we have initiated a modeling and simulation program to develop a model to predict the performance of the filters under both normal and upset conditions. The results from the modeling will be used with the Quantitative and Health Risk Assessments to determine if the PAS filters will deliver value in terms of added protection to workers, the public, and the environment. If so, we will move forward to implement filtration of the PAS exhaust. If not, the PAS filters will not be used.

Our efforts towards disposal of the stockpile at Anniston continue to move forward. We held our first construction lessons-learned workshop in August, and a call for best and final offers has been made, with a goal of awarding the Systems Contract (SC) for the Anniston facility during the second quarter of fiscal year 1996. A limited notice to proceed will be granted to allow the SC to assist the Government staff in processing all of the necessary environmental permits and modifications and to initiate planning activities and long-lead time procurements. Actual construction activities will not be initiated until the environmental permits are secured for the facility. This is projected to occur during the third quarter of fiscal year 1996. This approach is totally consistent with our program mandate to continue expeditiously with the demil program to eliminate the risk posed by these weapons, and it should result in saving time and money by allowing time for a thorough design review and preparation of plans and schedules which should allow construction to start immediately upon receipt of the environmental permits.

I will close by thanking all of our project sites and corporate partners for their continued support to the PLL Program. This support should allow us to profit from our experiences and therefore continue to deliver the best value possible to the taxpayer. ■

Revitalized PLL Program

Continued from Pg. 2

implementation was jump-started by the creation and approval of a PLL Board Charter and the conduct of the first-ever PLL Board Meeting. And, a system for following through on lessons-learned to ensure that they were in fact captured and implemented was put into being.

In addition to the systemic or structural changes discussed above, four specific goals for the PLL team were set for Fiscal Year 1995. These four goals were intended to ensure that we were in the best posture possible when the demil program moved into a new phase-one of having not one, but two full-scale destruction facilities in operation at the same time. The four goals for fiscal year 1995 were:

(1) Creation of a system to share critical safety and environmental performance related information in a rapid fashion.

(2) Creation of a system to share more routine information (such as procedural modifications or changes in maintenance frequencies) between sites.

(3) A review of critical documentation from JACADS prior to the start-up at Tooele to ensure that critical lessons-learned are captured, and

(4) Completion of the first round of facilitated workshops.

As the first year of the revised PLL Program draws to a close, I am pleased to report that we are on track to meet all of our objectives. The new "quick react" system was approved by the PLL Board and a dry-run was held in August. We have some bugs to work out, and site-specific implementing procedures are required, but we should be able to have those issues resolved prior to TOCDF start-up. This document is the first of our new Technical Bulletins, and as such serves as the mechanism for exchanging more routine technical information between sites. Eighteen critical documents have been reviewed and actions assigned. And, all system and operational-related workshops have been held at least once. We even held the first phase-based workshop (construction)!

However, this is no time for us to sit back and admire our work. We still have a long way to go. From a corporate perspective, we now need to move into Phase II of our revitalization program. Phase II involves additional structural modifications and also four new objectives. From a structural perspective, policy statements and procedures (both at the corporate office and at each site) need to be created and implemented so that the PLL Program becomes institutionalized and not just a demonstration of our personal commitment to the process. Standardized report formats are necessary so that information is provided in a consistent and easy-to-use format. From a specific perspective, our theme statement for FY 1996 is "Keeping Our Commitments" - we need to follow through on what we've started in FY 1995. Our four specific objectives are:

(1) Putting the PLL Database on-line so that sites and corporate users can access it in a convenient manner.

(2) Incorporating the Alternative Technology Program into the PLL Program so they can input their lessons and so that they too can share from the demilitarization experience (remember - we're demil people, not incinerator people or neutralization people; we share a common goal of destroying the stockpile while providing maximum protection to the workers, the general public, and the environment).

(3) Keeping to our schedule for PLL Board Meetings, Publication of Technical Bulletins, and maintenance of the Quick React System.

(4) Integration of the Programmatic Lessons-Learned Program with new efforts into modeling and assessment.

In closing, I would like to share with you my favorite comment from one our of survey sheets. As most of you know, survey sheets are distributed with each read-ahead to allow for your comments to the PLL process. One commentator wrote "Mark Evans is an idealist if he thinks that because we talk about it at a workshop, something will happen," or something to that extent. And, I agree with the commentator in that the commitment of one individual will NOT result in any meaningful change to the program. What I think the commentator missed was the commitment on the part of all of our sites and of our corporate office to meeting Mr. Misiewicz's charge to us - make it work. I believe that meaningful change can already be seen after the first year, and that more is to come. The credit for that change goes to you. And, I look forward to working with all of you again this fiscal year in meeting our commitments - our commitments to each other as teammates in demilitarization and our commitment to the taxpayer to dispose of the stockpile while providing both maximum protection and reasonable cost. ■

From a specific perspective, our theme statement for FY 1996 is "Keeping Our Commitments"

JACADS Update

August - September

- Preparations expedited so that the MC-1 Bomb Campaign started on 1 September 1995, three weeks ahead of initial schedule. Extra effort, detailed scheduling, and teamwork were required to accomplish this goal.
- The LIC is successfully processing over 1,000 pounds of GB agent per hour. Limitations of 450 pounds per hour were imposed in the previous rocket campaign because of concern about pressure control; however, since the 20 inch valve was installed, pressure control has not been a problem.

October - November

- Slag removal and first rebricking of the LIC secondary chamber for the MC-1 Bomb Campaign are scheduled to start in mid-November. These activities are required because of the refactory deterioration from processing SDS and agent.
- Efforts are underway to modify the RCRA permit to allow off-island shipment/disposal of SDS so that testing of the LIC (with agent only) can be performed to determine if slag build-up/refractory deterioration is minimized when SDS is not processed in the LIC.

TOCDF Update

August - September

- Pre-op Survey completed in mid August 1995.
- DFS Hazardous Dry Run (HDR) start in late September 1995.

October - November

- TSCA R&D Burn scheduled mid October 1995.
- LIC 2 HDR scheduled for early November 1995.

PLL Technical Bulletin Background & Scope

by Mr. Martin Teomajian, PLL Task Manager

The Programmatic Lessons Learned (PLL) Program has undergone many changes during the last year to become more proactive and results driven. As part of the renewed commitment to capturing lessons learned, a Technical Bulletin was authorized by Project Manager for Chemical Stockpile Disposal (PMCSD) to pass routine changes to common procedures, improved operations or maintenance techniques, and other programmatic items of interest to the Chemical Stockpile Demilitarization Program (CSDP) sites. The Technical Bulletin was developed to fill a void in the new PLL Program.

The new PLL process captures lessons learned through a series of facilitated workshops and critical document reviews. The facilitated workshops cover 16 different subject areas, such as the incinerators, support systems, training, laboratory and monitoring. A series of workshops is held each month to cover several of these subject areas. Unfortunately, due to the number of subject areas, each is only covered in a facilitated workshop every six months. During the time span between workshops, many routine changes to common procedures occur at different CSDP sites.

Since one of the fundamental concepts of the Demilitarization Program was to build on the experience of earlier sites, many of the procedures developed at the Johnston Atoll Chemical Agent Disposal System (JACADS) have been passed to the Tooele Chemical Agent Disposal Facility (TOCDF) to be used as a basis for developing their site specific procedures, and the TOCDF procedures will be passed to Anniston Chemical Agent Disposal Facility (ANCDF). Since many of these procedures continue to be updated, the Technical Bulletin is meant to provide a means to notify all of the CSDP sites of any changes made at another site. This notification must include both a description of what was changed and why it was changed so other sites can determine if it applies to them. For example, if the TOCDF changes an SOP on operating the Deactivation Furnace System (DFS) to improve the disposal of rockets, JACADS would not necessarily need to make the same SOP changes since they are finished with their rocket campaign. JACADS personnel would, however, need to review the changes to ensure that they would not also affect the use of the DFS for destroying projectile bursters or mines.

In addition to changes to common procedures, many program employees develop better ways to operate, repair, or maintain the CSDP facilities and the timely passage of this information would benefit the Demilitarization Program. Another use of the Technical Bulletin is to pass these new methods of operating and maintaining equipment to other CSDP sites. A good example of these types of issues is the article in this edition on operating and maintaining the Heated Discharge Conveyor (HDC) at JACADS. JACADS

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Background & Scope

Continued from Pg. 4

personnel learned that they could monitor several operational indicators to determine when the HDC would need maintenance. By scheduling these maintenance periods during other scheduled down times, JACADS personnel were able to mitigate the impact HDC operations had on the overall processing schedule. JACADS personnel also learned how to maintain key items on the HDC to further reduce unscheduled outages. By passing these lessons to TOCDF, the CSDP program will benefit by having fewer schedule delays due to the HDC being out of operation.

Another use of the Technical Bulletin is to identify excess or obsolete equipment at a particular CSDP site that may be useful at other sites. Whether the equipment becomes excess through a change in the Max/Min level or obsolete because the site no longer needs a particular piece of equipment or component of a larger system, the parts may still be useful elsewhere. For example, JACADS has completed their rocket campaign and no longer needs the parts of the Rocket Shear Machines (RSM) which are used solely to process rockets. These parts may be turned over to the TOCDF, or any other CSDP site that needs them, to reduce the overall program costs and free valuable warehouse space at JACADS. This equipment may be publicized as available for transfer in the Technical Bulletin to ensure the CSDP has a chance to claim the equipment before it is turned in to the Defense Resource Management Organization (DRMO) for disposal.

In general, any issue which is covered by the PLL program may be submitted for inclusion in the Technical Bulletin. The PLL Program was developed to aid the existing design lessons-learned program by capturing operational and maintenance lessons for future CSDP sites. The design lessons-learned program, commonly referred to as the Field Lessons-Learned Review Team (FLLRT) only captures design related issues that resulted in an approved Engineering Change Proposal (ECP). The PLL Program was developed to capture operations and maintenance issues which are loosely defined as any issues not solved through an ECP. Furthermore, since the PLL Program is chartered to capture programmatic changes, issues which are site specific due to differences in design, location, etc., are not covered within the scope of the PLL Program.

The Technical Bulletin will be published every two months by the PLL team and will be distributed to PMCD Corporate offices and the CSDP field sites. Anyone working within the CSDP, whether they are a contractor or government employee, may submit articles to the Technical Bulletin. As always with the PLL program, individuals are representing their site or office so all articles must be approved by their site Project Manager or PMCD Division or Branch Chief prior to submitting them for publication. For further information on submitting items for the Bulletin, contact your manager or the PLL team directly at 410-671-6735. ■

JACADS Update

August - September

- VX/Water - 10 percent water by weight was added to a ton container, then the container was allowed to stand for 720 hours. The initial agent concentration was 85 percent. The final analysis by ERDEC showed no detectable agent (at 5 to 250 ppm level).
- GB Performance Standard Demonstration Test for ton container heels was completed using an 8 percent heel.

October - November

- 8 inch GB filled projectiles will be processed on the PMD and MDM machines. The projectile bodies will be 5Xed in the MPF.
- 5X coupon testing is underway with GB coupons currently being processed.

ALT TECH Update

August - September

- First bench scale reactor (30 gal) brought on-line to study hydrolysis of agent. This reactor is currently being used to develop design data for HD destruction.
- Continuing to study the kinetics and thermodynamics of VX hydrolysis using a Mettler reaction calorimeter. This computer driven calorimeter determines the instantaneous heat flux of the reaction mixture.

October - November

- Approve final site location for the alternative technology pilot plant.
- Continue to research methods of stabilizing the products of agent hydrolysis. Currently studying immobilizing wastes in cement.

Computer Support: Obsolete or still effective?

by Mr.Rick Holmes, PMCSD

There has been much discussion lately about the capabilities of the central control system and the capabilities of a similar system to control the demilitarization processes in future plants. Some believe the existing system represents yesterday's technology, others believe that use of a proven technology is the only possible approach. The existing control system design in many ways represents the state of the art in the control of an industrial facility with the complexity and integration of a demilitarization facility; however, in some areas, the capabilities of control systems today represent levels of improvement. As with most complicated questions, the best approach is not always clear, nor easily developed, and most likely lies between the two extremes - total replacement, or total duplication.

The control system in a demilitarization facility the size of the TOCDF is one of the largest and most sophisticated Programmable Logic Controller (PLC) based process control systems in the US. The system utilizes 11 networks for communications, 73 PLCs for distributed process and machine control, more than 13,500 input/output points, 29 personal computer (PC) based operator workstations, clustered minicomputers for data acquisition and recording and more than 1.2 million lines of software. (For a full description of the TOCDF central control system see Process Control System Overview For the Chemical Stockpile Disposal Program, Gary L. Ferentchak, Proceedings of the 1995 International Incineration Conference, May 8-12, 1995). This system represents the third generation of demilitarization facility control systems, with the first two utilized at CAMDS and JACADS. The selection of a PLC based control system was made after an evaluation of three general categories of control systems: a Distributed Control System (DCS), a PLC system, and a hybrid system consisting of a combination of both a DCS and PLCs. The PLC system proved to be the most cost effective due to the high number of digitally controlled machines, advancements in PLC based analog control, the availability of redundant processors, and relatively inexpensive PC based operator workstations. The system required 23 man-years of work to design and fabricate, and 47 man-years for software development.

> The system required 23 man-years of work to design and fabricate, and 47 man-years for software development

Despite the level of sophistication included in the current design, it must be recognized that the process control industry has made significant improvements in capability. As those responsible for the operations and management of the demil program, we must integrate those improvements which truly enhance the capabilities of the process control system to ensure maximum protection of the facility workers, the public and the environment while delivering the most value for the investment. For the purposes of discussion, the control system can be divided into four categories: process controllers, communication networks, operator workstations, and PDAR.

Process Controllers - The control system configuration of today utilizes Allen Bradley PLC-3 and PLC-5 processors. At the time the system was selected, the number of information pathways on which each processor would have to communicate was a significant selection criteria. Additionally, the requirement for selected controllers to incorporate redundant processors to ensure high reliability served to define the final processor selection. The PLC-5 processor could not meet either of these criteria, nor can they meet them today. This does not mean that the PLC-3 processors that will be used tomorrow will be identical to the original processors. A PLC can be thought of exactly as a industrial computer. As advances occur in the computing speed in processors, increased memory capability and improved communications technology, these are utilized in the control system replacement parts and new systems. This means that a PLC processor purchased today has improvements already built in over the system purchased yesterday.

In the future, it may be possible to replace the PLC-3 system with a PLC-5 based system. Allen Bradley projects that within the next couple of years, the PLC-5 processors will include the redundant processor capability that exists in the PLC-3 systems of today. Additional advancements exist in the communications capability of the PLC-5s that may (if linked with a communications network change - see below) provide cost savings for future systems. This evaluation will have to occur sometime in the near future (retain the existing PLC-3 and PLC-5 processors or replace the PLC-3s with PLC-5s) as Allen Bradley may no longer support the PLC-3 systems once the PLC-5s communications improvements and redundant PLC-5 capability is implemented.

Communications - The TOCDF control system includes 11 networks for communications, most of which utilize Data Highway II

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Computer Support:

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(an Allen Bradley product). This system is currently operating at approximately 1/3 of its total capacity. This means that the data required to be transferred between the controllers and the operators can grow by 300 percent before the capacity of the communications network is reached. It has been suggested that the networks be changed to an Ethernet type system. This is not possible. The control system networks need to be deterministic. That is, they must have predictable and repeatable response times. Ethernet is a suitable network for small control systems where the communications traffic is very small compared to the system capacity (not the case with the TOCDF system).

Allen Bradley is developing a new communications network that may be an acceptable, cost effective replacement for the Data Highway II. The first version of this product was released this summer. This version did not contain the full functionality of the existing Data Highway II. However, the vendor is projecting a second version to be released in mid 1996. This system is currently being developed for the PLC-5 controllers, and evaluation of a change in the communications networks would have to be completed concurrent with the potential change in the process controllers. In the interim, Allen Bradley has already fabricated sufficient communications network materials for the next four demilitarization facilities. This should ensure the existing system will be available during the development of a potential replacement.

Operator Workstations - This is the area of the control system that is the most visible and thus is where the most attention is placed on potential improvements. The size of the TOCDF control system played an important part in the selection of the operator interface system. The TOCDF system includes over 500 operator screens and 9,000 alarms. These levels are more than any current operator workstation can handle. The number of system alarms led to the development of the Alarm Concentrator (used to manage the system alarms). Additionally, a custom keyboard was developed to provide operators with a single keystroke to actuate devices in the process.

The TOCDF system includes over 500 operator screens and 9000 alarms

Allen Bradley is developing a product to replace the existing operator workstation system. This system has been released, however, it cannot yet handle the number of system alarms. The next version is expected to be released in 1996 and is advertised to be capable of managing more alarms than in the TOCDF. Once this system is developed and released, it can be evaluated for integration with the existing and future systems.

In the interim, improvements in capability will be realized with the improvements in personal computer speed and capacity. The TOCDF operator workstation system is software based with a mouse/trackball to select devices and runs on a 386 computer. It is likely that future systems will use the current 586 (and maybe 686) level computers. These advancements alone will further improve the speed at which operator commands are transmitted to the process controllers, and instrument information is displayed to the operator.

PDAR - The Process Data Acquisition and Recording System (PDAR) has experienced the most change since the inception of the control system design. The original system purchased for JACADS had about the capability of a high end personal computer purchased today. This system has been replaced with a system that includes redundant processors for high reliability and CD disks for the large volume of data recorded. The system originally installed at the TOCDF is also being replaced with the same level of sophistication as the new JACADS system. These changes have resulted not only from the improvements in the minicomputer industry, but from the increased demands on the reliability and the quantity of data recorded from the facility. During a typical day, approximately 5 million data points are collected by the PDAR - this is more than a large bank collecting credit card transactions.

The minicomputer industry is continuing to improve the cost and capabilities of the products available. For this reason, the PDAR for future sites will be purchased as late as possible to ensure the best equipment available is provided. The decision on the hardware selection will also be intimately linked to the type of process controller and communications network to be utilized in the facility.

Summary - Changes in the control system are inevitable and should be expected. However, these changes can only be implemented once the process control industry incorporates the capabilities that exist in the current system into the future products. As these changes become available, an evaluation of costs and benefits should be completed as part of the decision making process. In the interim, the system that is installed at the CDTF and TOCDF, and is planned for ANCDF does provide the capabilities required to meet the program's maximum protection mandate. Product improvements will be continuously implemented as technology improves. ■

Rocket Campaign Concludes

Continued from Pg. 1

jams being experienced at the HDC discharge chutes. During late February 1995, clean-out ports were added to the HDC discharge chute to allow more rapid clearing of jams. This change improved hourly rocket rates and reduced the amount of downtime for the DFS.

~ During February, improvements were made to the agent quantification systems located in the Explosive Containment Rooms. Upgrades included the installation of improved vents, new AQS pumps, ACS transfer pump speed controls, and double capillary level transmitters. As a result of these improvements, repeat draining of rockets virtually ceased and rocket processing no longer had to be frequently interrupted while operations re-zeroed agent quantification instruments.

~ On 2 March, RSM-102 was put back into operation, after having been out of service since the late-November detonation in ECR-B. The redundancy provided by having this machine back on-line helped improve the hourly rate; more importantly, it allowed rocket processing to continue operation whenever there was a problem in an ECR. During January and February, while RSM-101 had to carry the burden alone, rocket rates were generally lower and they varied widely from 14 to 32 rockets per up-hour. However, after RSM-102 came back into service during the first week of March, the range of performance was significantly narrowed, and the level of performance increased with RSM-102 back in service. Daily rocket rates rarely dipped below 25 rockets per hour and on several days the rocket lines achieved almost 35 rockets per hour over extended runs. Only after RSM-102 was back in operations was the plant able to exceed 600 rockets per day, which it did a dozen times between 9 March and 24 June. All of this constituted strong endorsement for the concept of maintaining two processing lines.

During early 1995, the JACADS team was gradually able to decrease the number of rocket line down days. The following factors accounted for reduced down time toward the end of the campaign:

~ During late January rockets were not delivered to the plant for four straight days due to adverse wind conditions. During six more days in February and three more days in early March, the plant lost rocket processing time due to the fact that rocket deliveries were not made during light wind conditions. Wind was not a factor, however, in preventing rocket deliveries during late-March, April, May, or June. Similarly, over 20 hours of processing time was lost during February, and then again in March, due to the lack of nighttime rocket deliveries from Red Hat; however this reason for non-processing dropped to less than seven hours in April, less than three hours in May, and less than one hour in June. The storage capacity of the UPA was increased to alleviate the problem of running out of rockets at night. From April until the end of the campaign, the problem was virtually eliminated by the increased storage capacity.

~ By maximizing the differential pressure across the DFS venturi, by initiating continuous use of the water wash system on the DFS candles, and by adjusting automatic control loops, JACADS personnel increased the life of the DFS candles. DFS demister candles, which previously had to be changed out after processing of about 4,000 rockets, could then be used to process more than 6,000 rockets before a 2-day shutdown was required for candle change-out. Thus, several days of down-time were saved.

~ By modifying the software control program and installing a new low-level switch for atomizing air pressure, JACADS engineers were able to reduce ramp-up problems on the DFS afterburner. This significantly reduced DFS down-time after the changes were made in late March and early April 1995. What accounted for the fact that the May processing total significantly exceeded (by 36%) that of April? The rocket processing rate remained stable at about 30 rockets per hour, but the number of rocket line processing hours increased from 154 during April to 214 during May. This improvement was largely attributable to increased availability of the Liquid Incinerator during May. The LIC secondary chamber had to be completely re-bricked during early April, but during May the LIC only had to be shut down for a few days to allow slag removal.

What made the June figures surpass those of May by another 36 percent? Each of these two months averaged slightly over 30 rockets processed per up-hour on the rocket line, but the plant was shut down for six days in May for cleaning slag from the LIC secondary chamber, whereas there was no comparable LIC outage required during June. Partially offsetting this advantage for June, however, was the fact that the plant did not receive rockets for three

JACADS plant established new daily and weekly records: 701 rockets per day and 2978 per week

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Rocket Campaign Concludes

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days during early June while USACAP was preparing for a Chemical Surety Inspection. While improved rocket rates help explain improved productivity between February and April, it is the number of hours of rocket processing, not the number of rockets per hour, that explains improved productivity between April and June.

Conclusions

The JACADS project team set 23 June 95 as the goal for completing the main portion of the GB Rocket Campaign. In fact, this was achieved a week later, on 30 June, and all remaining leakers and warheads were completed by 17 July. Although our project team goal was missed by a week, we still beat the government's programmatic schedule of completion of all rockets by the end of August 1995. ■

Changes to JACADS Documentation

JACADS developed a new PME to perform daily maintenance after draining bombs. The following topics are covered in the **Bulk Drain Station (101, 102) PME-410D:**

-Wipe down and decontaminate components
-Inspect drain tube and replace if required
-Inspect punch and replace if required
-Observe cycling of components, clamps, punch, drain tube, etc.
-Decontaminate floor area under machines and conveyor rollers
-Rezero load cell transmitters

PP-47, Limiting Conditions of Operation - Position requirements for MC-1 Bomb campaign should be changed per the following:

-Processing single line and receiving MC-1 bombs: Two certified, two qualified and one door guard.
-Processing single line only: One certified, one qualified and one door guard.
-Processing two lines and receiving MC-1 bombs: Three certified, three qualified and one door guard.
-Processing two lines only: Two certified, two qualified and one door guard.
-Receiving MC-1 bombs only: One certified, one qualified and one door guard.

EC-10, Storm Water Sampling - Changes were required to simplify the procedure and to bring the sampling into compliance with Federal Regulations on storm water discharge associated with industrial activity.

PL-24, Storm Water Pollution Prevention Plan - Revision necessary based on results of NPDES storm water pollution prevention annual site compliance evaluation and in accordance with storm water permit Section IV.D.4.b.

SOP-001, 103, UPA System

- Change load capacity, new lifting equipment and operators procedures due to bomb campaign.

SOP-037, 038, MMS System

- Changed program due to the bomb campaign.

SOP-067, 068, 106, MPF System

- I.D. fan and flue gas modification per EPA mandate, pH modification recommendation by SAIC, lifting equipment and operator procedures for the bomb campaign.

SOP-020, DFS System

- PAS pH modification per SAIC recommendation, EPA approval to use acid for brine piping cleaning requested by operations.

SOP-021, 008, 009 - LIC System

- PAS pH modification recommended by SAIC, EPA approval to use acid for brine piping cleaning requested by operations.

SOP-009

- Program changes for bulk processing for the bomb campaign, combustion air blower relocation mandated by EPA, secondary chamber rebrick and restart.

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Heated Discharge Conveyor
Improving Reliability

by Mr. George Nelson, RE&C

Several corrective and preventive measures were taken to improve the reliability of the Heated Discharge Conveyor (HDC) at JACADS. The following items all contributed to developing a reliable "operating philosophy".

1. The operating temperature of the HDC was raised from 1,050 F to 1,120 F to keep molten aluminum from solidifying on the conveyor buckets. This greatly reduced the amount of debris collected in the HDC and extended the time between required clean-outs. The set point was limited +1,120°F based upon parameters previously established during TSCA trial burns. Higher temperatures based upon HDC system capabilities could potentially provide even more benefits.

2. During any DFS furnace outage, the furnace room was cooled, the HDC was opened up, and all debris was removed. While the HDC was being reheated, mold release was applied to the conveyor and discharge chute when the HDC reached approximately 250° F - 300° F. Thorough cleaning at every opportunity was the most important factor in reducing unscheduled down-time.

3. As a result of raising the HDC operating temperature, however, the aluminum buildup now tended to occur (cooler temperature than HDC - no heaters on chutes) in the discharge chute, which caused jams. Clean-out ports were then installed, one located just above each of the discharge gates, to allow rodding-out of these jams. A lock-out/tag-out routine was established so this could be performed as expeditiously as possible. Jams between the gates were cleared in about 30 minutes with no loss of HDC temperature if the upper gate remained closed. Nonetheless, for jams above the upper gate, recovery was delayed up to several hours due to loss of temperature in the HDC. This was significantly better than the one to two day shutdown associated with previous internal HDC jams.

4. Two CCTV cameras were installed to monitor inside the HDC in an effort to identify potential problems before they caused shutdowns. Tapes from these cameras were reviewed to analyze operation of the HDC and to determine the cause of HDC shutdowns. The feed-end camera worked well and was used to pick up potential jams. The discharge-end camera could not be positioned to view the discharge chute. Instead, this camera was positioned above the conveyor buckets to determine the molten state of the aluminum dropping into the discharge chute.

5. Engineering and Maintenance personnel periodically checked the HDC for any air leakage that might contribute to cool air causing aluminum to solidify. All air leaks were then sealed. Several major leaks were initially identified and, once these were fixed, no other major leaks were discovered. This sealing of the HDC helped the system better maintain the temperatures needed to keep the aluminum molten. ■

Programmatic Lessons-Learned Wrap Up
Miscellaneous Information

JACADS Spare Equipment

The JACADS OMC Engineering Department is in the process of identifying spare parts and materials that are excess and are available for transfer to the other CSDP sites for their use. Since the recent completion of the Rocket Campaign, the two Rocket Handling System (RHS) metering devices have been removed and crated for shipment to TOCDF for storage until needed at the Umatilla Demil Facility ■

TOCDF Rocket Shear Machine

Rocket Shear Machine Shear Spray Flow Sensors were oversized and were in constant low flow alarm.

The flow sensor for the Rocket Shear Machine shear blade spray was oversized for the application. The specification was for an average flow of 5 GPM and the actual flow is always in alarm even though the flow was as high as it should be. An ECP was approved to have the vendor modify the sensors to a lower flow range.

By converting the flow sensors to a lower range, the low flow alarm will alarm only when the actual flow drops to below 3 GPM. ■

TOCDF Spare Parts Review

TOCDF is expected to be operational early in 1996 and will start with the M55 Rocket Campaign. The spares system is presently being reviewed to ensure parts are available to keep equipment operational and systems functioning. The Systems Engineers are tasked with reviewing the spare parts lists to assure the proper parts are being stocked and the stock levels are adequate. The spares list is also being scrutinized for obsolete parts, repetitive parts and parts description. The spares systems study includes review of original purchase requisitions, updated vendor contact information, min/max levels parts description and vendor cut sheets submittal.

Excess Parts: Identified excess materials are two liter sample/test bottles, and a fuse conveying system.

Maintenance Problems: Maintenance projects of a recurring nature include the DFS Brine Pump 106 and 107. They have been repaired several times and the cause of the failures has not been identified by the maintenance section or the pump vendor.

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Programmatic Lessons-Learned Wrap Up

Miscellaneous Information

Continued from Pg. 10

Changes to Documents:
No recent changes to SOPs or PMs have been made and there are no anticipated changes in the mill.

Editor's Note:

Any CSDP facility in need of the identified excess parts or equipment or, having a solution to the recurring pump failure problem, should contact Mr. Neil Palke of the TOCDF Site Project Team at (801) 933-7481. ■

HDC Bin Change-Out Problems at TOCDF

The HDC Blast Enclosure is designed to provide blast protection while operating with both HDC discharge gates open, and includes the material handling equipment necessary to perform bin change-out. Although the outside operators are able to maintain the required four-minute change-out cycle, several problems in bin handling have been encountered.

1. The bin sits too high on the shuttle platform and dolly for easy lid removal. The handles are too high to be used from the ground and there is no place to safely step/stand to remove the lid.

2. The door should have a positive stop to prevent its closing while changing bins. The electric eye/track interlock is not fail-safe.

3. The winch controller freezes during cold weather.

4. The shuttle requires three operators to move it. The operators must bend low to move the shuttle which invites back injuries. The shuttle locking pin pedal tends to throw the operator toward the shuttle.

5. Winter or foul weather causes surfaces to become slippery. Ice readily forms on the tracks and surrounding surfaces. This increases the difficulty in moving the shuttle and the probability of injury.

This situation was discussed at the Programmatic Lessons Learned (PLL) Workshops in February and July 1995. The off site PLL Team is following up under Action #95-132A.

Editor's Note :

A Process Action Team (PAT) was approved by the PLL Board (PLL #26) to provide solutions to these problems. The study is on-going. ■

TOCDF Training:

Draft training materials for Site Danger Tagging and Lockout Training (SDLT) was provided for Government review.
Received Inter-active Video Disc equipment. The disc on Hydraulics Fundamentals was installed and will be used to train mechanics. The training path for Training Group J-4 (Control Room Operators) was completed. They began field training and certification. Continued Training Group N-1 on schedule, with several employees testing out of the training. Continued Certification efforts with several completions. Overall status has dropped to 80 percent due to new starts on certification from the J, L, and N training groups and cross-training efforts.
Contingency Certification continues in the 90 percent range. Completed near 100 percent training for the LIC-1, LIC-2, and DFS STBs, with only requirements to read and sign SOPs 86 and 87 remaining to be completed. Completed a corrective action plan to improve the Emergency Response Forces, as noted in ORE and Pre-op Survey findings. Submitted the TOCDF FCCB and approved an ECP for Operations and Maintenance staff ramp-up to meet LCOs and accompanying training. Training is being coordinated with PMCD.
The major issue in training is the expeditious training of the workforce prior to toxic operations.

Current document development and in progress training is on schedule. Training to support ECP 1908 (Staff Ramp-up) has not yet been scheduled. Scheduling delay is a result of ECP approval (August 24, 1995) and subsequent hiring to support the ramp-up. ■

Changes to JACADS Documentation

Continued from Pg. 9

An electronic copy of the procedures can be obtained by contacting the PLL team. (410) 671-6735

SOP-003, 005, DUN System
- I.D. fan and flue gas modifications mandated by EPA.

SOP-053, 057, 059,
-HVC System Agent break through due to gasket failure, change to different pre-filters, upgrade system.

SOP-48, PRW
- Change sign control variables, stabilize pressure fluctuations.

SOP-042, 044, 031, PWR
- Slight reading changes, balance UPS power loading, changes in critical loading, changes in readings, alarms, System modification and upgrade.

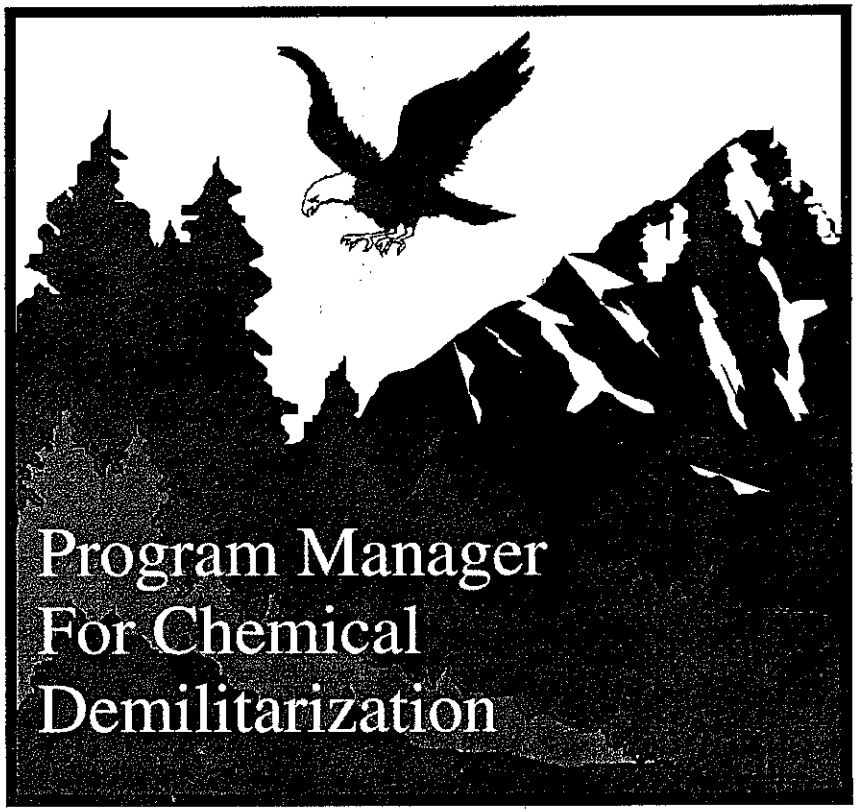
SOP-002, 082, 078, 098, DSA
- Changes in requirement and limits, SOPs updated to meet AR385-64, DA PAM 385-64 and AR 385-61 standards.

SOP-602, 604, 605, 606, 607, 608, CSF
- changes in fitting assembly, disassembly, PPE requirements, testing and issuing, initiated by change in Army TM 10-277, AR 385-61, DA PAM 385-64, DA PAM 385-64 and change to M40A1 as the primary mask. ■

CHEMICAL DEMILITARIZATION PROGRAM

11 July 1996

Oregon Environmental Quality Commission

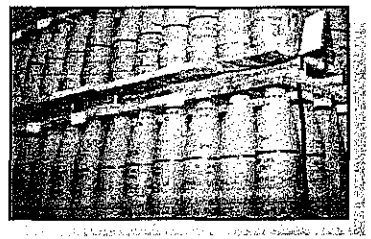


Presented By:
MG Robert D. Orton
Program Manager for
Chemical Demilitarization

P324-1-7/9/96

Program Manager
For Chemical
Demilitarization

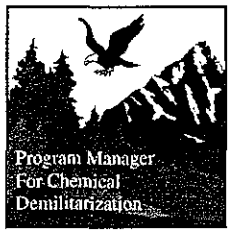
TASKS



Destroy All U.S. Chemical Warfare Related Materiel While Ensuring Maximum Protection of the Public, Personnel Involved in the Destruction Effort, and the Environment

Support U.S. Government Programs to Assist Other Nations in Eliminating Their Chemical Warfare Related Materiel

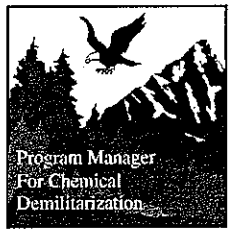
Committed to Eliminating the World-Wide Risk of Chemical Warfare Materiel Using Clean, Safe, and Effective Destruction Methods



SOLVING THE PROBLEM

- **This Program Is Focused on Safe Solutions**
  - ► **Based On**
    - **20 Years of Experience**
    - **Regulatory Oversight of EPA**
    - **Technical Oversight of NRC**
    - **Health and Worker Protection Oversight of DHHS**
    - **Emergency Preparedness Team Effort With FEMA**
    - **Complete Review and Operational Oversight by State DEQ**

PARTNERSHIP of Experts for Engineering Solutions With Maximum Emphasis on Safety for Workers, for Your Community, and for Your Environment



WE ARE SUCCEEDING

Munition	Safely Destroyed at JACADS	Umatilla Stockpile
GB/VX M-55 Rocket	72,000	105,961
GB 500 lb/750 lb Bombs	6,617	2,445
GB/VX 155mm Projectiles	15,254	79,719
HD Ton Containers	68	2,635
GB/VX 8 Inch Projectiles	Begin Dec 96	17,998
VX Land Mines	Begin Jan 99	11,685
VX Spray Tanks	Begin Mar 97 (At TOCDF)	156

A Proven Process

P324-4-7/9/96

PROTECTING THE WORKER

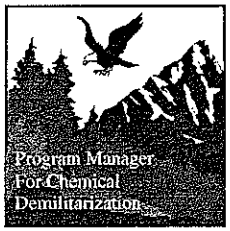
- Dept of Health & Human Services, Centers for Disease Control
  - ► Provides Agent Monitoring Assistance
  - ► Sets Safe Limits for Workers
  - ► Trains Health Care Providers
  - ► Provides Quality Assurance for All Health Concerns
- The Value of DHHS Involvement Is Validated Daily by Army

Safety Is Our Primary Concern

PROTECTING THE ENVIRONMENT

- Johnston Atoll Has Been a National Wildlife Refuge Since 1923
- The U.S. Fish and Wildlife Service Maintains Biologists on the Atoll to Advise and Monitor the Wildlife and Human Activities
  - ► A Dozen Different Resident Birds
  - ► Another Dozen Different Migratory Birds
  - ► Two Unique Endangered Marine Life Species
    - – Green Sea Turtle
    - – Hawaiian Monk Seal
  - ► 300 Fish Species Reside in Reefs and Inshore Waters
  - ► 32 Coral Species

No Adverse Impact



THE BOTTOM LINE

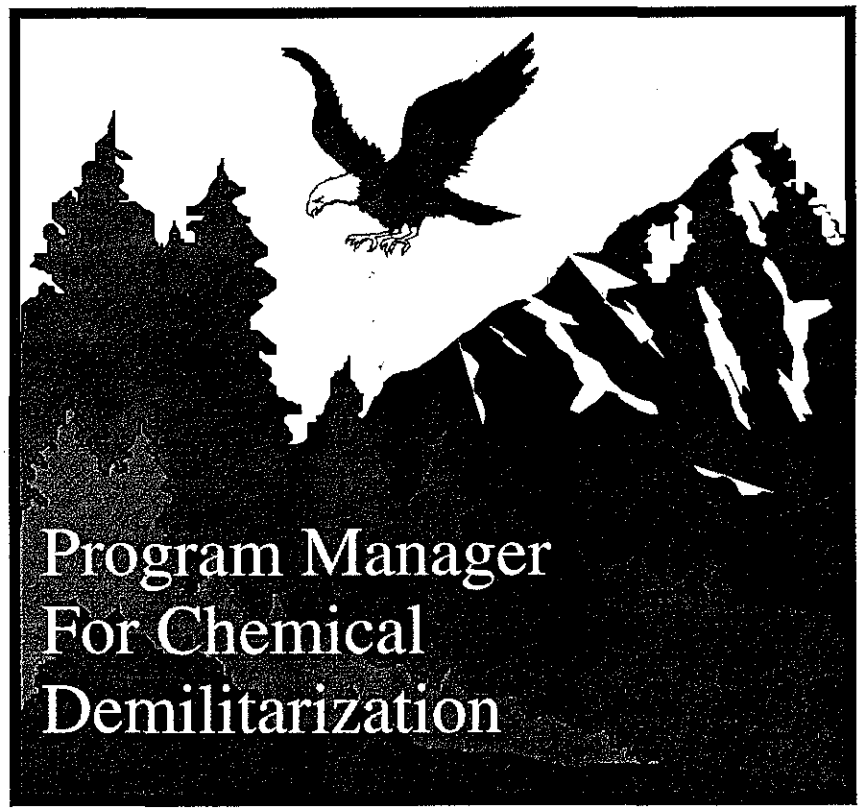
- Johnston Island Is a Success Story
  - ► For Safe Destruction of Chemical Weapons
  - ► For Protecting Human Health
  - ► For Protecting the Environment

We Will Bring the Experience to Umatilla

CHEMICAL DEMILITARIZATION PROGRAM

11 July 1996

Oregon Environmental Quality Commission

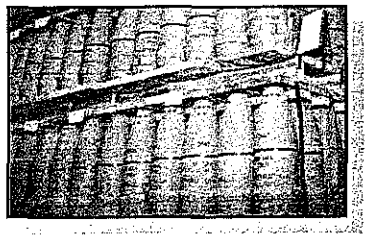


Presented By:
MG Robert D. Orton
Program Manager for
Chemical Demilitarization

P324-1-7/9/96

Program Manager For Chemical Demilitarization

TASKS



Destroy All U.S. Chemical Warfare Related Materiel While Ensuring Maximum Protection of the Public, Personnel Involved in the Destruction Effort, and the Environment

Support U.S. Government Programs to Assist Other Nations in Eliminating Their Chemical Warfare Related Materiel

Committed to Eliminating the World-Wide Risk of Chemical Warfare Materiel Using Clean, Safe, and Effective Destruction Methods

SOLVING THE PROBLEM

- **This Program Is Focused on Safe Solutions**
  - ► **Based On**
    - **20 Years of Experience**
    - **Regulatory Oversight of EPA**
    - **Technical Oversight of NRC**
    - **Health and Worker Protection Oversight of DHHS**
    - **Emergency Preparedness Team Effort With FEMA**
    - **Complete Review and Operational Oversight by State DEQ**

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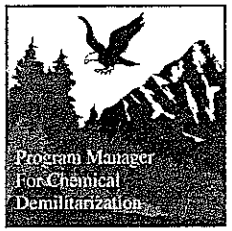

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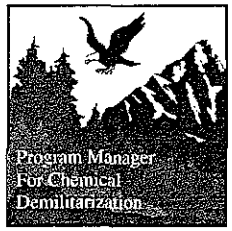

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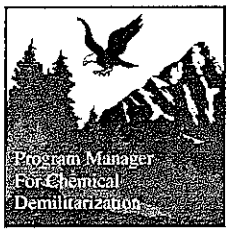

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EQC 7/11/96 #3

CHEMICAL DEMILITARIZATION PROGRAM

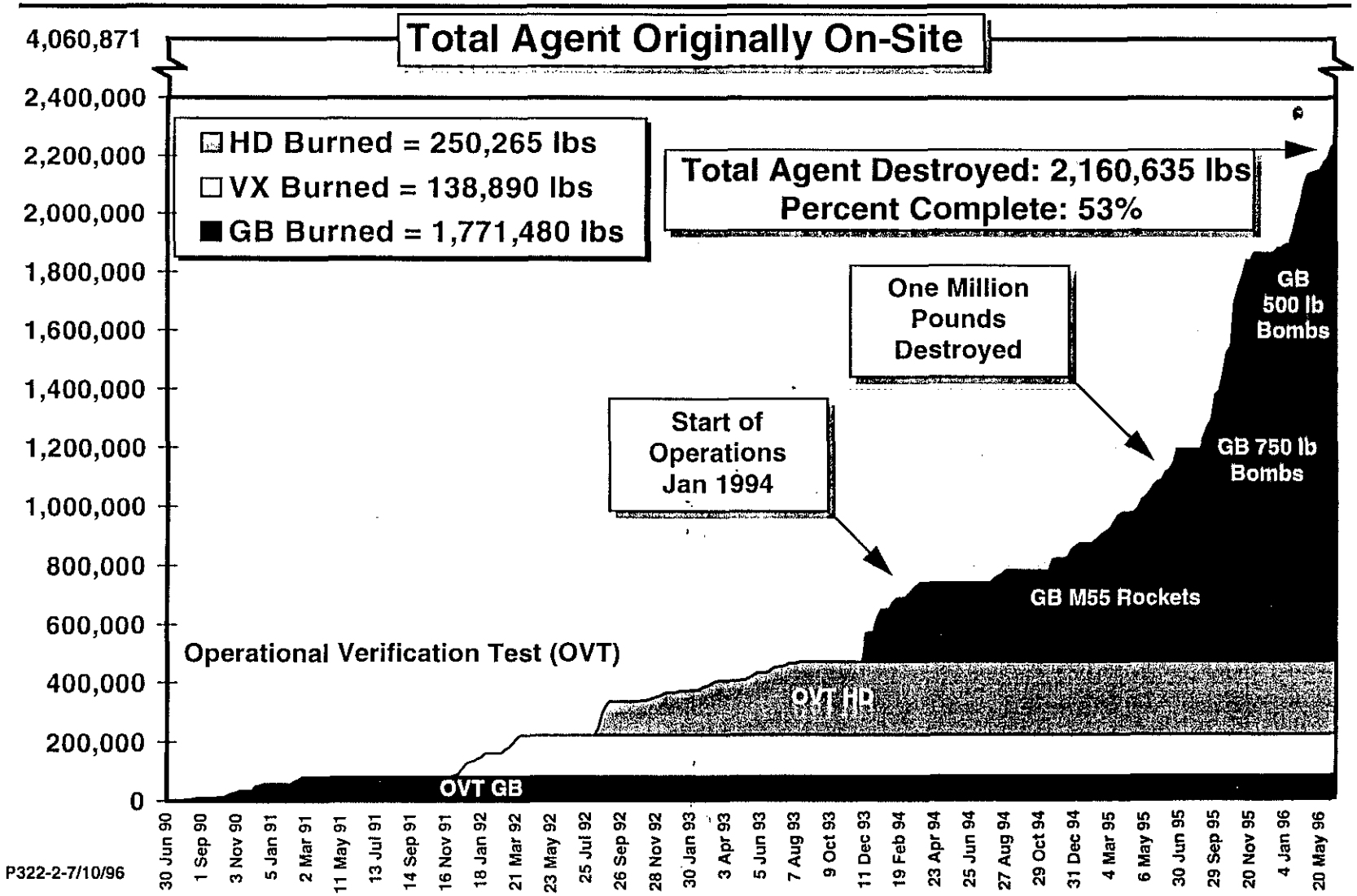
11 July 1996

Oregon Environmental Quality Commission

Presented By:
LTC John Ontiveros
Deputy, Operations Division
Project Manager for
Chemical Stockpile Disposal

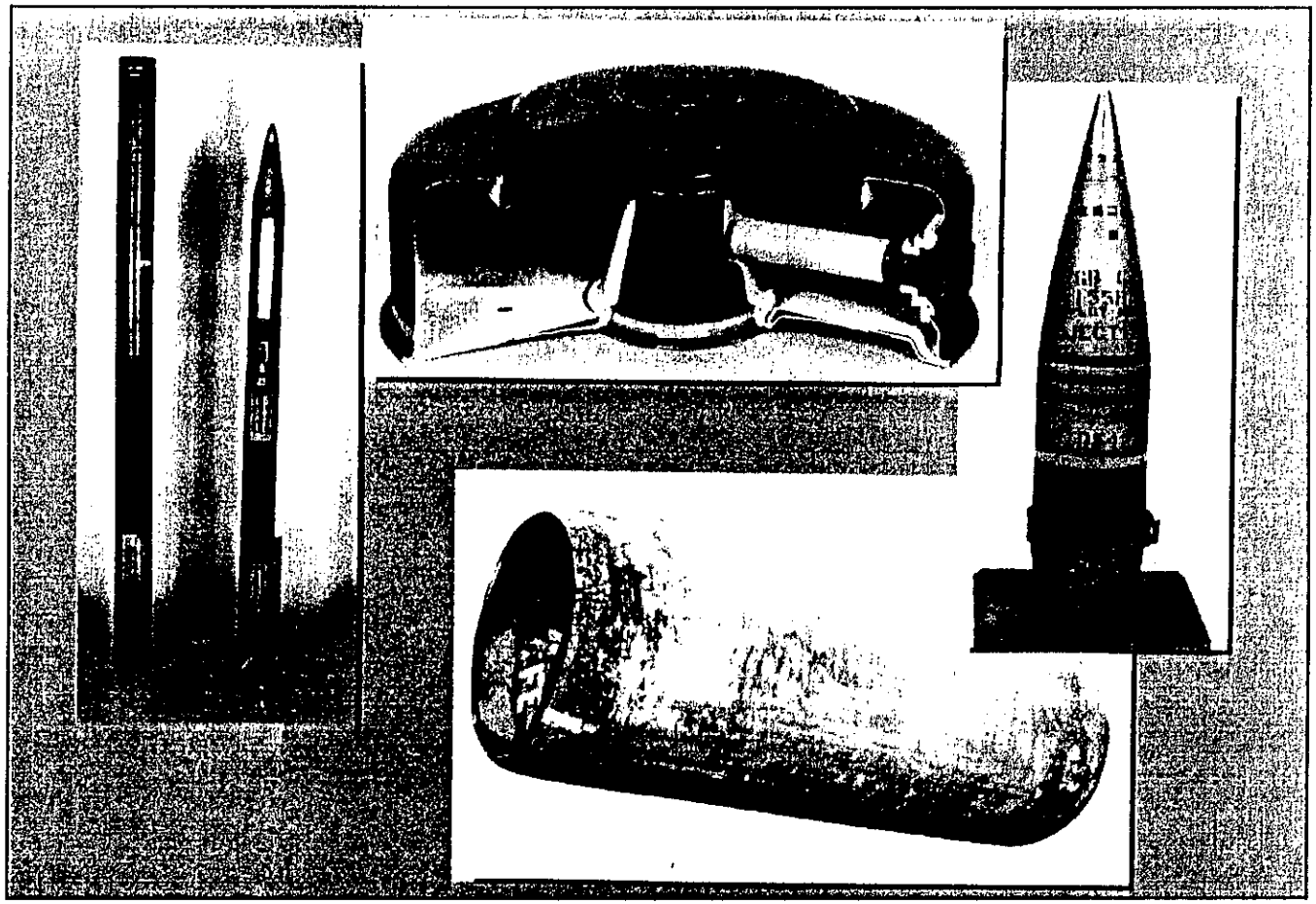
CUMULATIVE POUNDS OF CHEMICAL AGENT DESTROYED AT JACADS

As of: 1 Jul 1996



P322-2-7/10/96

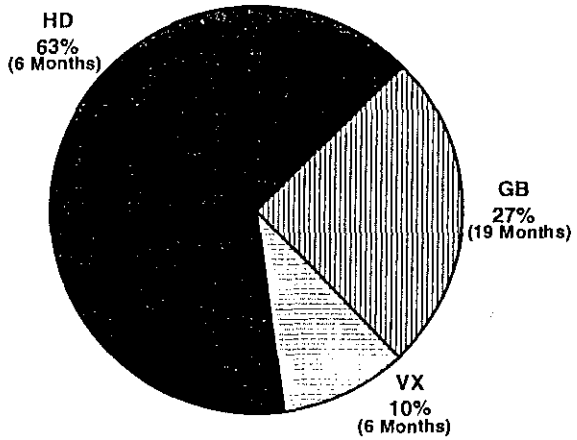
CHEMICAL AGENT STORAGE CONFIGURATIONS



UMATILLA STOCKPILE

Program Manager For Chemical Demilitarization

Umatilla Agent Tonnage Distribution



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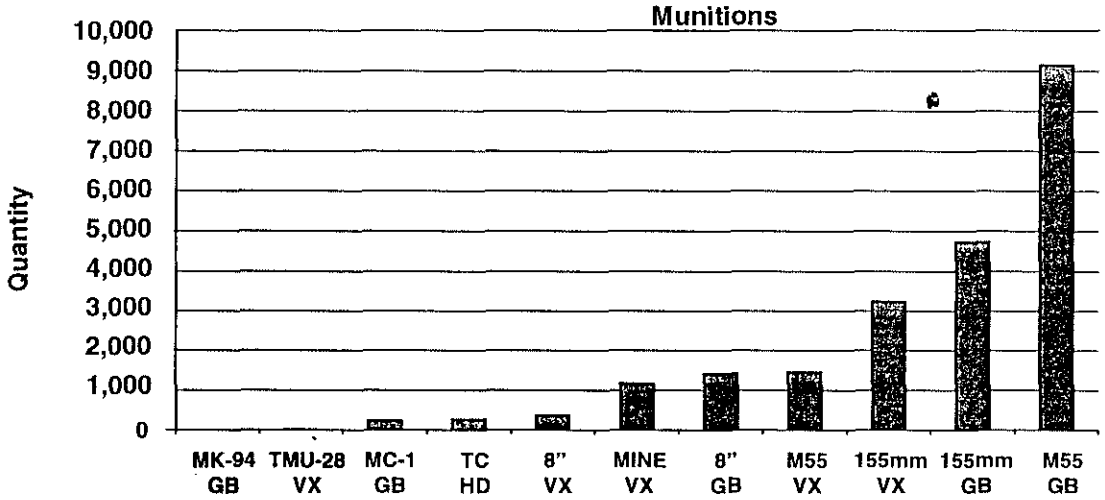
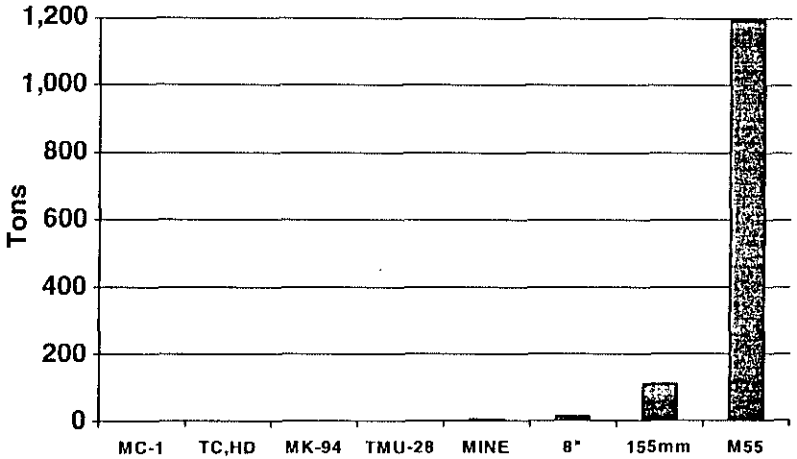
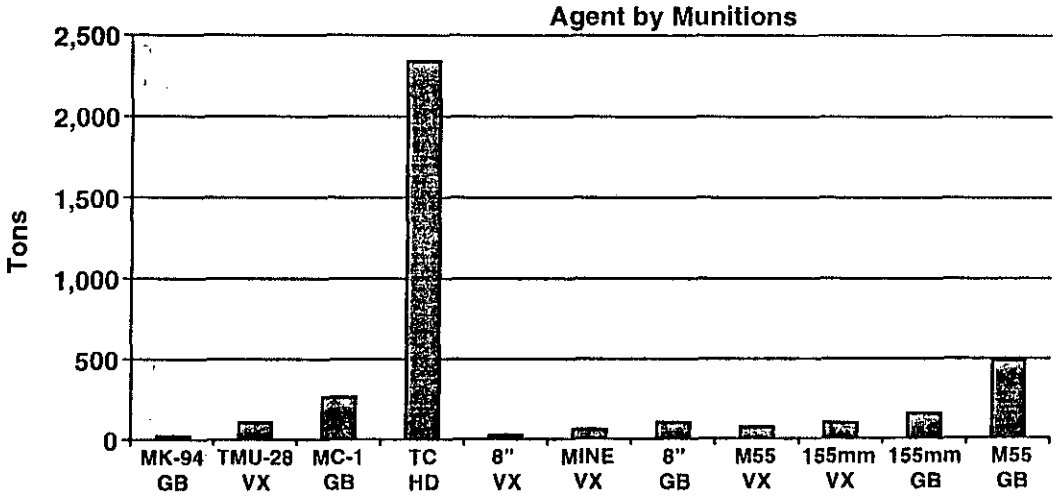


Explosives



P322-04-7/10/96

Agent by Munitions



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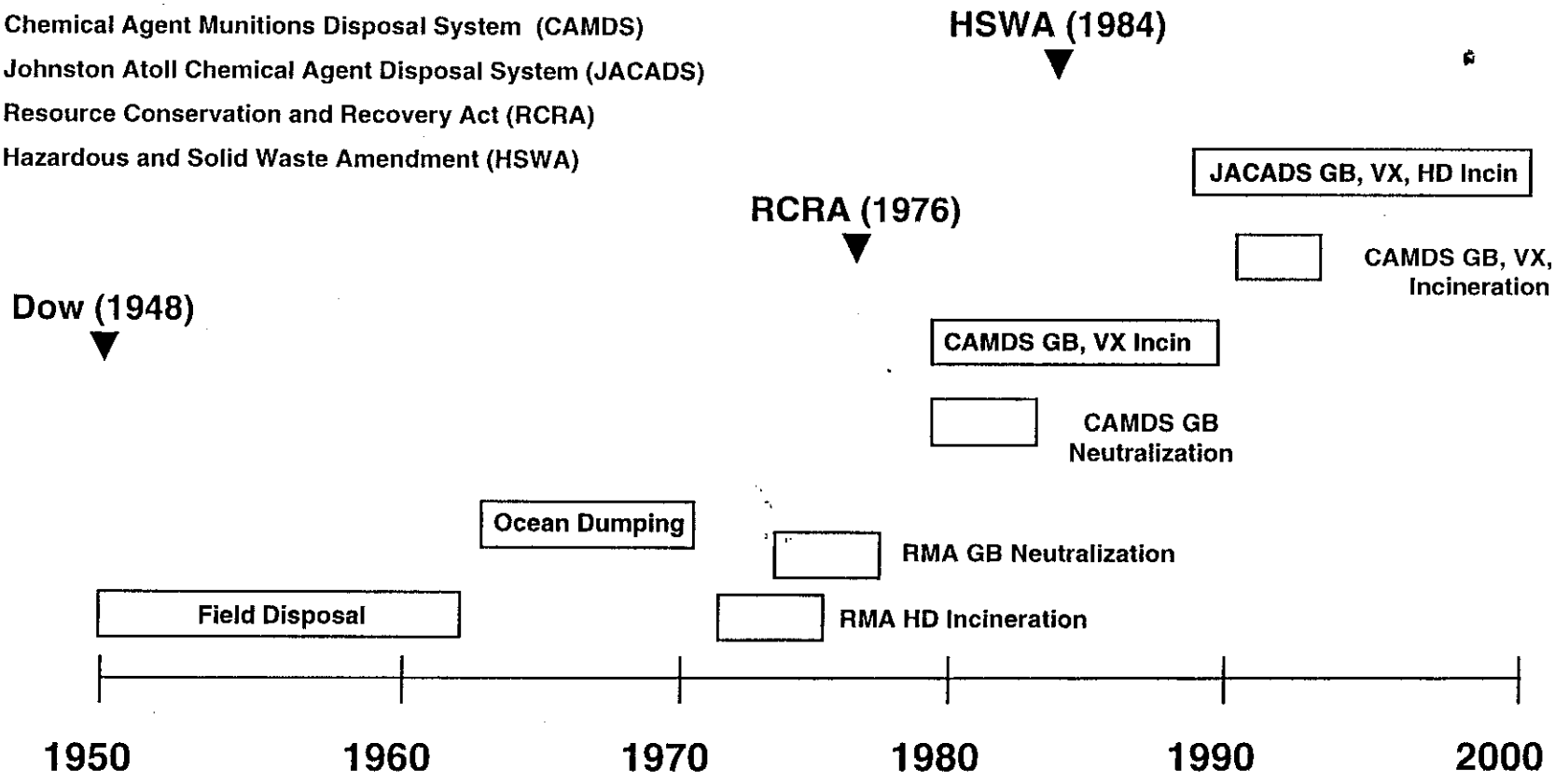
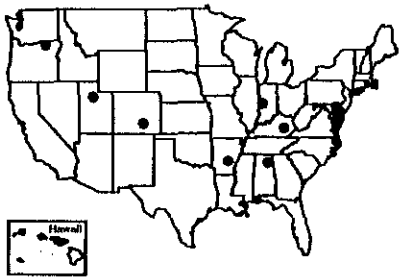
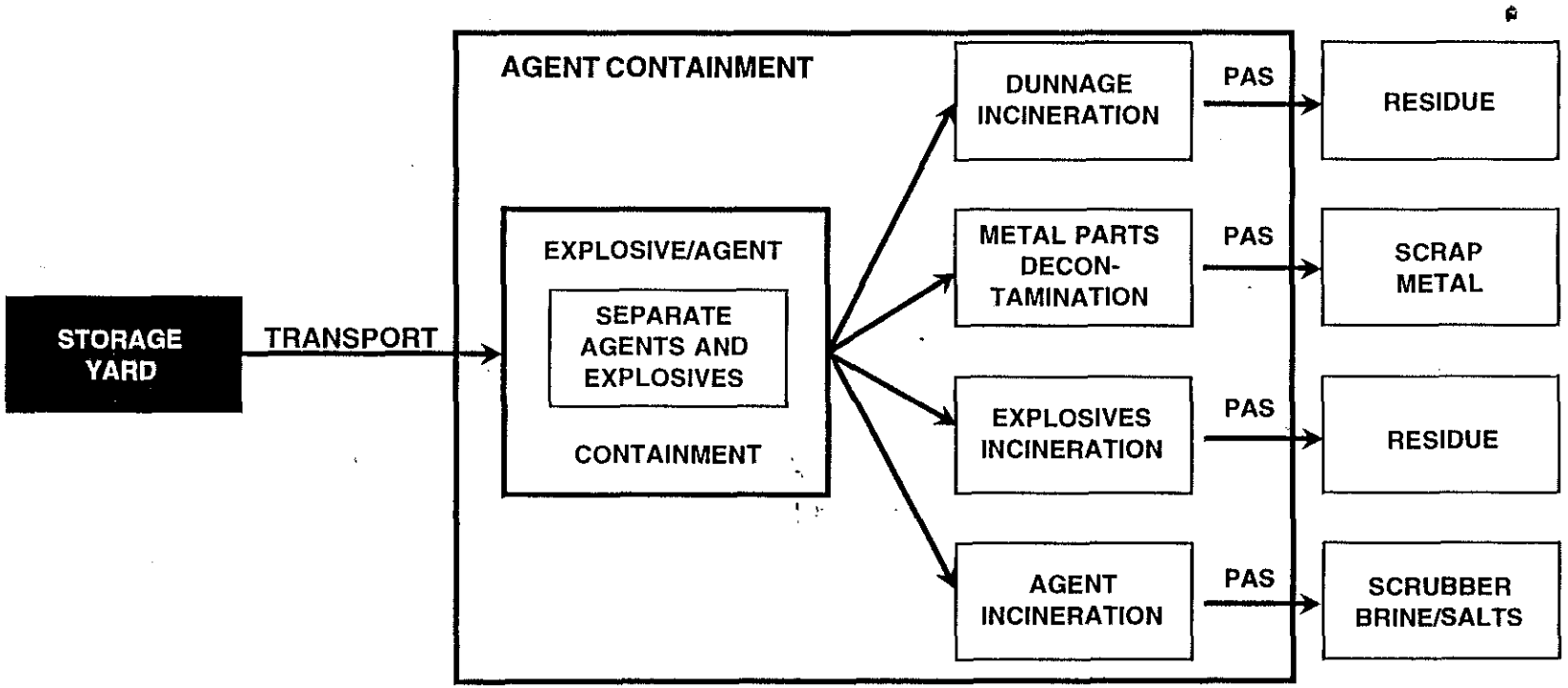


To Know Where We're Going, It Is Important to Know Where We've Been.

P322-5-7/10/96

CHEMICAL MUNITIONS DISPOSAL PROCESS

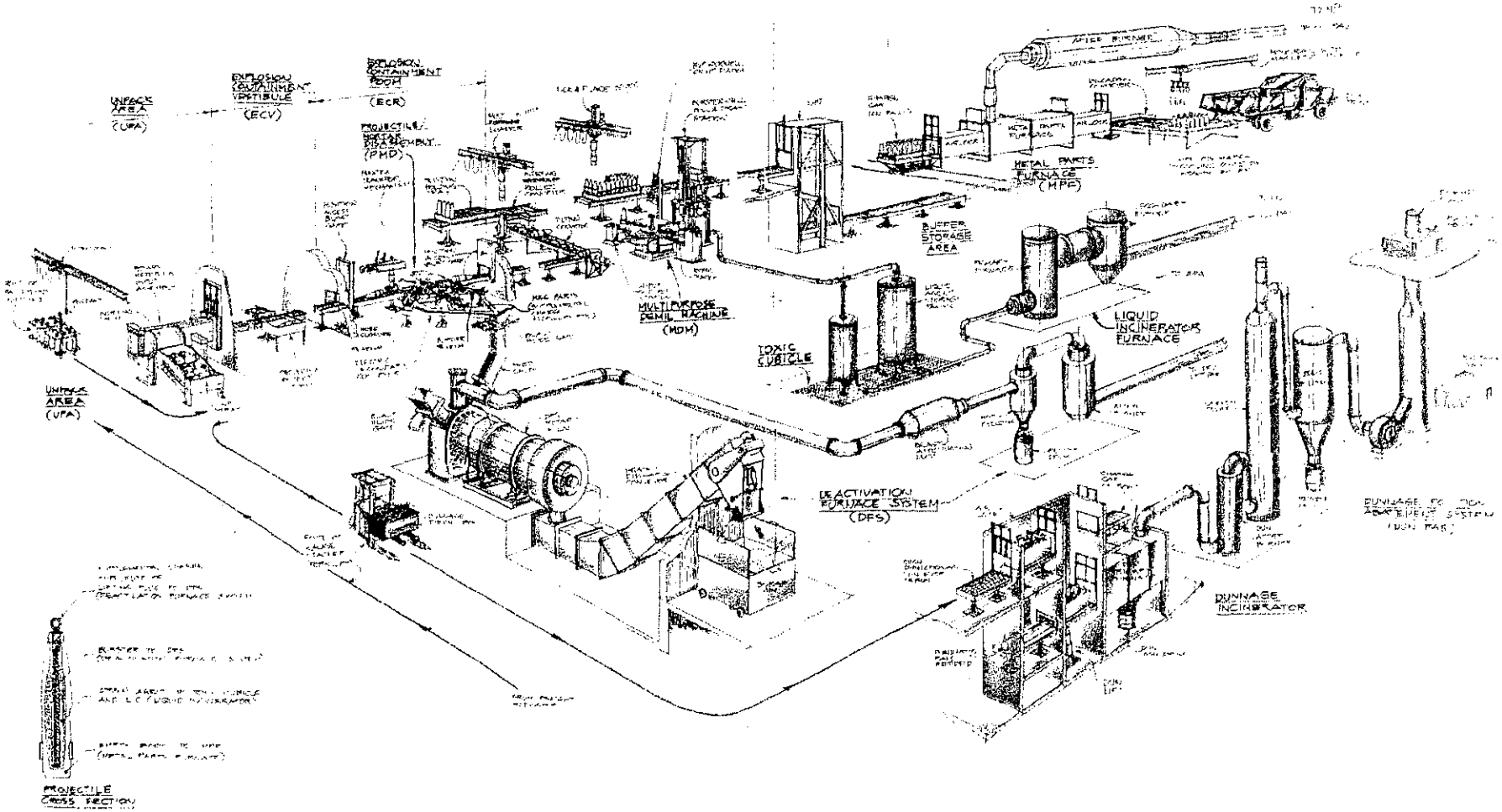




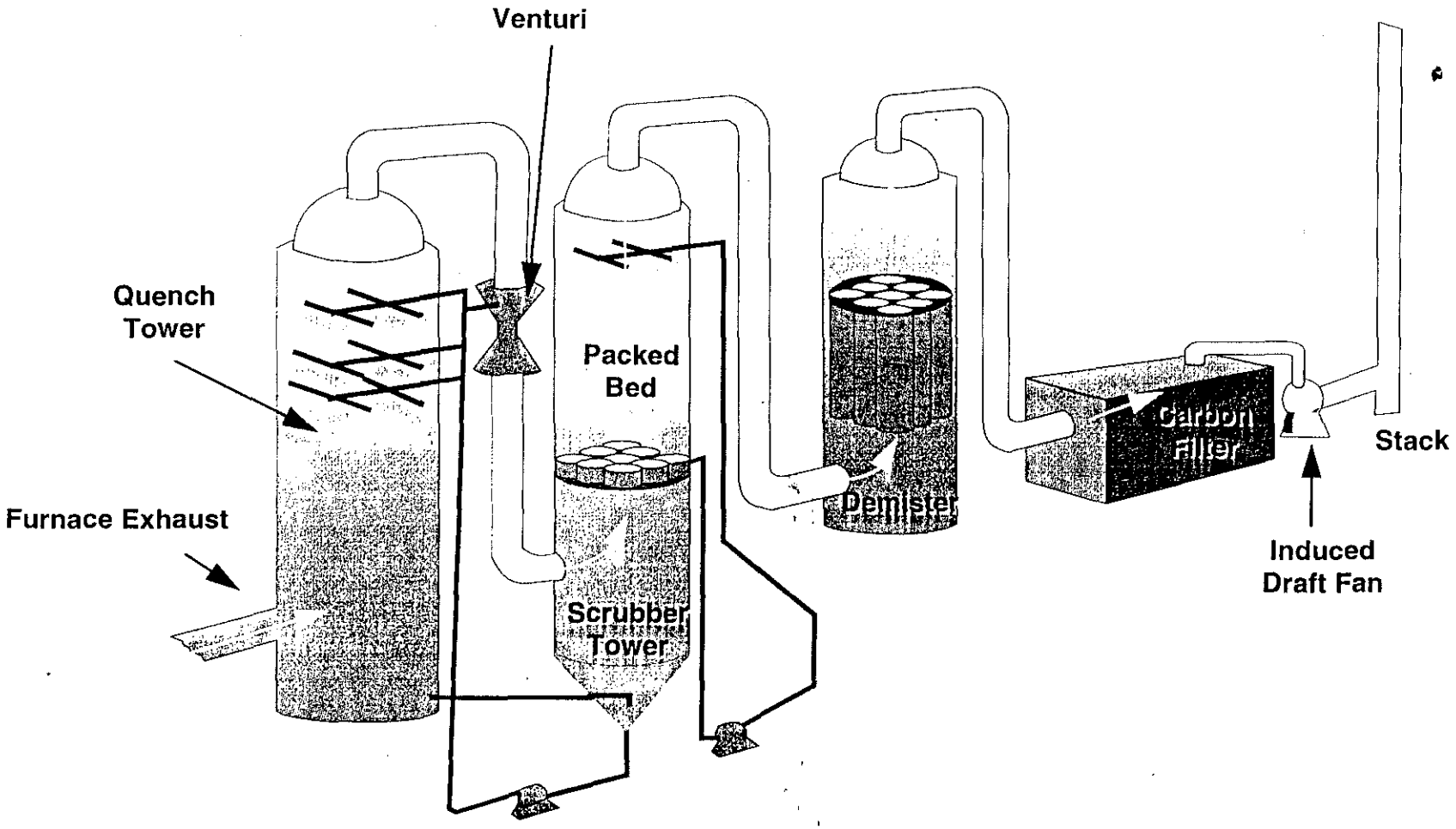
PAS - Pollution Abatement System

Program Manager For Chemical Demilitarization

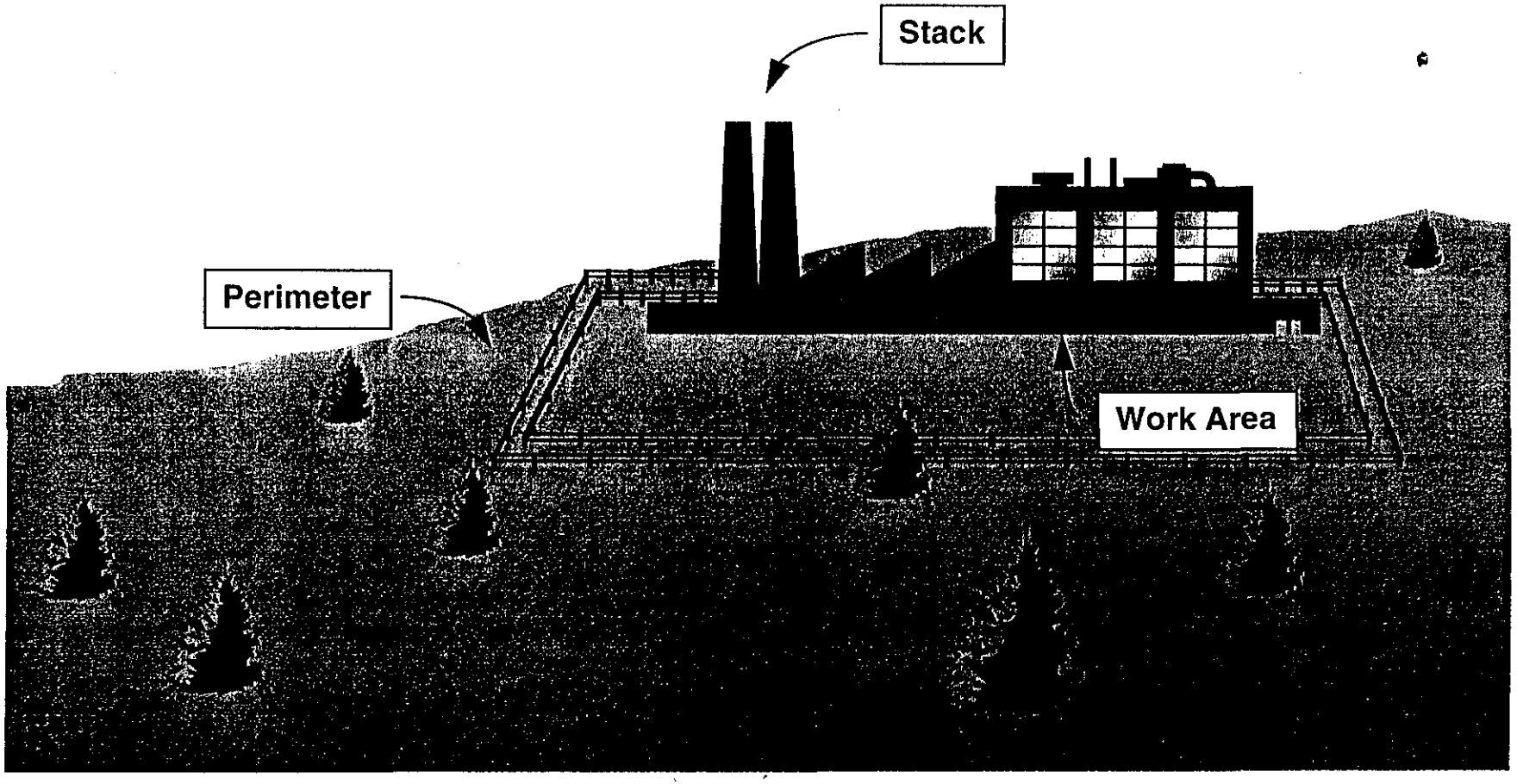
PROJECTILE/MORTAR PROCESSING



POLLUTION ABATEMENT SYSTEM



CHEMICAL AGENT MONITORING LOCATIONS



P322-10-7/10/96

PLANT DESIGN FEATURES

- Agent Containment
  - ► Negative Pressure
  - ► Cascaded Ventilation System
  - ► Redundant Filter Systems
- Extensive Use of Robotics
- Interlocks, Pre-Alarms, Waste Feed Cut-Offs
- Redundancy
  - ► After Burner
  - ► Data Links and Interlocks
  - ► Agent Monitors
- Continuous Improvements

Lessons Learned Applied

STACK EMISSIONS
HD - LIQUID INCINERATOR

Water	46.66%
Nitrogen	42.07%
Carbon Dioxide	5.39%
Oxygen	5.81%
Sulfur Dioxide	0.04%
Nitrogen Dioxide	0.02%
Carbon Monoxide	0.0053%
Hydrogen Chloride	0.0011%
Hydrocarbons	0.000449%
Dioxins/Furans	0.000000000082%

Dioxins/Furans Equivalent to
1 Second in Over 38,000 Years

DIOXIN FORMATION

- Chlorine
- Particulate Surfaces
- Organic Compounds
- Temperature (400°F - 750°F)

DIOXIN CONTROL

- **Efficient Combustion Practices**
  - ► **Time/Temperature/Turbulence**
  - ► **Carbon Monoxide Levels**
  - ► **Oxygen Levels**
- **Rapid Quench (<350°F)**
- **Fine Particulate Control**

What Do Actual Dioxin Emissions Show?

JACADS DIOXIN RESULTS

Mustard Processing	Maximum Dioxin *TEQ (ng/m^3)
Liquid Incinerator	0.0023
Metal Parts Furnace	0.1077
Non-Mustard Processing	**TEQ (ng/m^3)**
Liquid Incinerator	0.0034
Deactivation Furnace System	0.0396

Proposed EPA Standard- 0.2 ng/m^3 TEQ

*TEQ - 2,3,7,8 Dioxin Toxicity Equivalent

Efficient Combustion Practices and Engineering Design Control Dioxin Emissions Regardless of Agent Type

PRE-TRIAL BURN HEALTH RISK ASSESSMENT SCREENING PROTOCOL

- Quantifies Human Health Risk and Environmental Impact
- Extremely Conservative Approach
  - ► Addresses Multiple Exposure Routes and Receptors
  - ► Addresses Environmental Impact
- Used Actual JACADS Emissions Data
  - ► Composite Worst Case
- Non-Detected Compounds of Potential Concern Were Evaluated
- All Furnaces Operate Simultaneously, Continuously for Over 3 Years (Varies)
- All Three Agents Emit Simultaneously, Continuously (Stop Feed)
- Exposure Duration
  - ► 70 Years for Carcinogens
  - ► 30 Years for Noncarcinogens

Conclusion: No Adverse Impacts to Human Health or Environment

P322-15-7/10/96

QUANTITATIVE RISK ASSESSMENT (QRA)

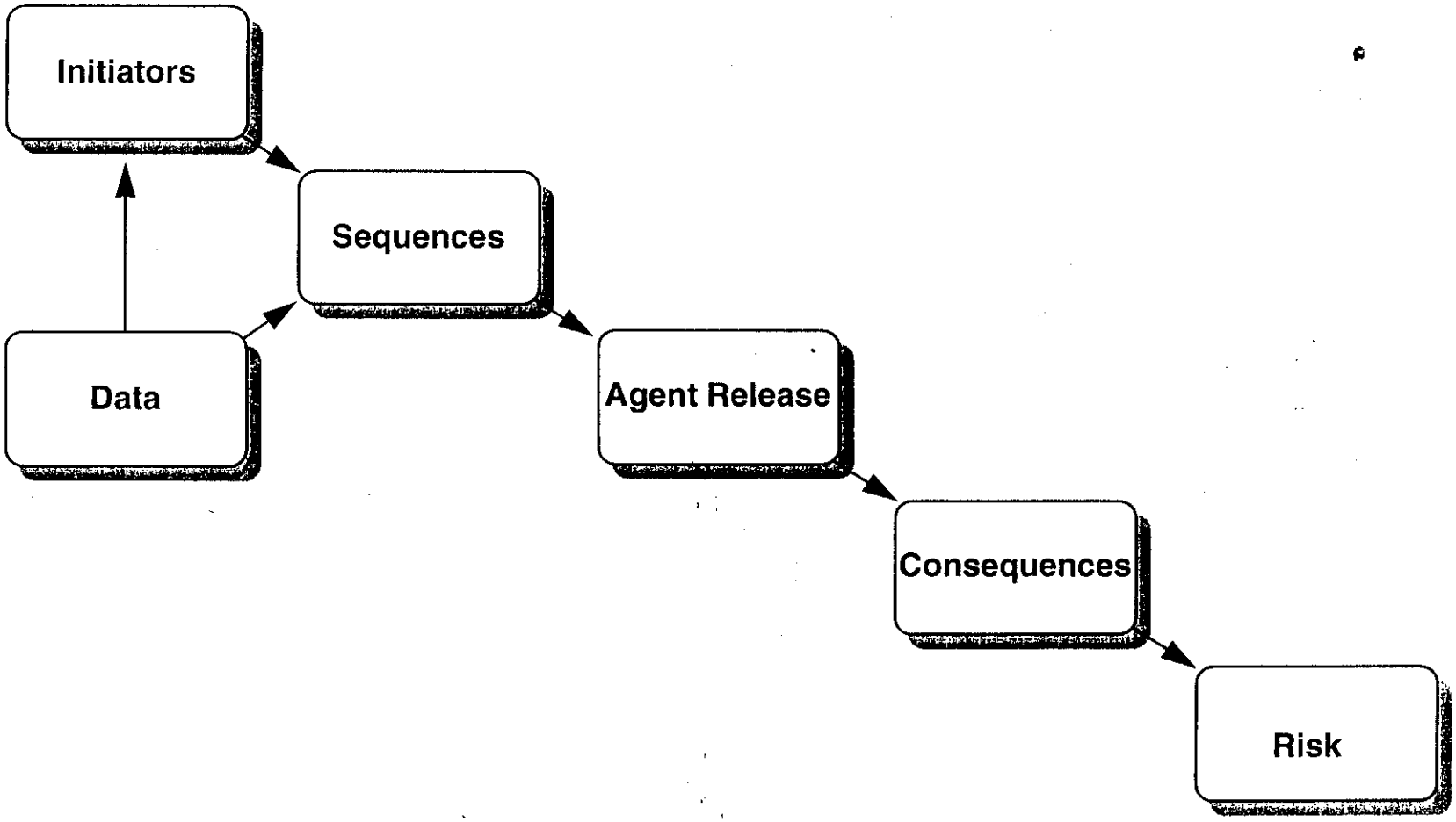
- A Systematic Process for Identifying Potential Accidents Associated With a Particular Process or Activity and Estimating, Quantitatively, the Risk Associated With These Accident Scenarios

- Three Main Parts
  - ► Identify Accident Sequences
  - ► Estimate Frequencies (e.g., Occurrences Per Year)
  - ► Estimate Consequences (e.g., Fatalities)

- Risk = Frequency X Consequence

Assess How Often and How Bad

OVERVIEW OF QRA PROCESS



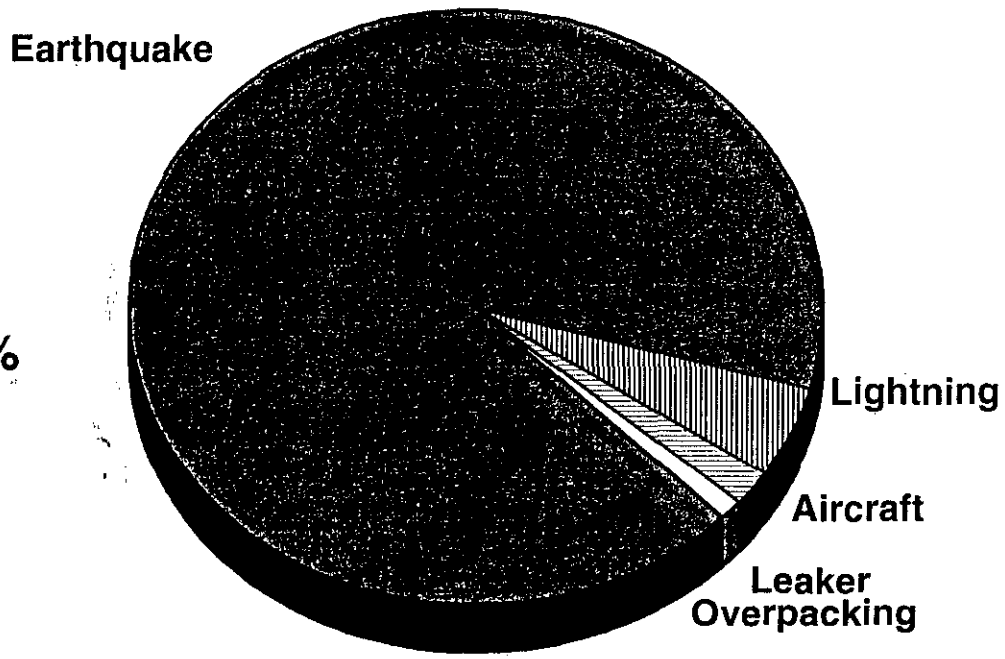
STORAGE RISK CONTRIBUTORS

Earthquake - 93%

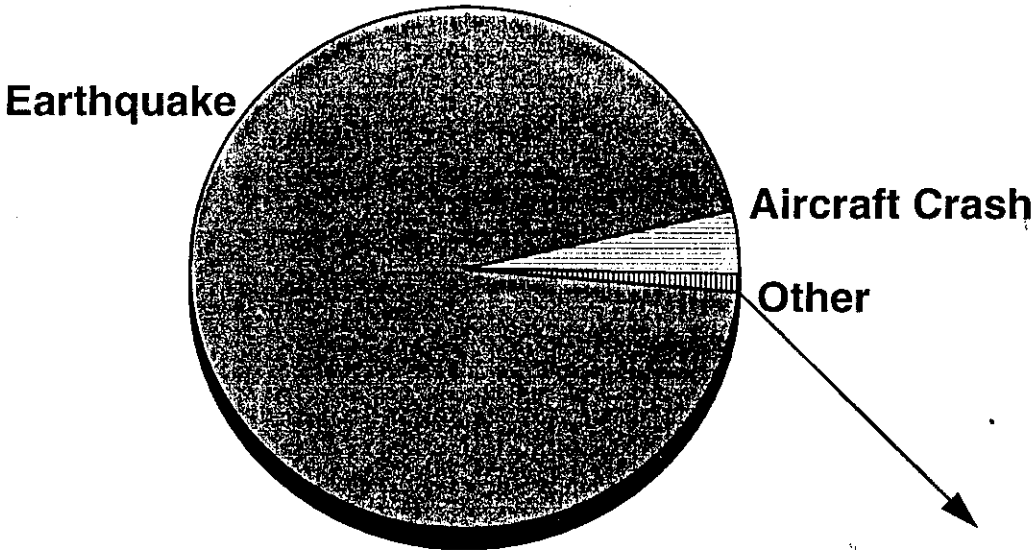
Lightning - 5%

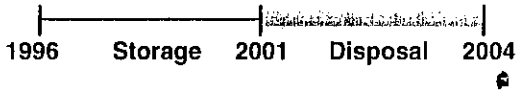
Aircraft - ~2%

Leaker Overpacking- <1%



DISPOSAL PROCESSING RISK CONTRIBUTORS

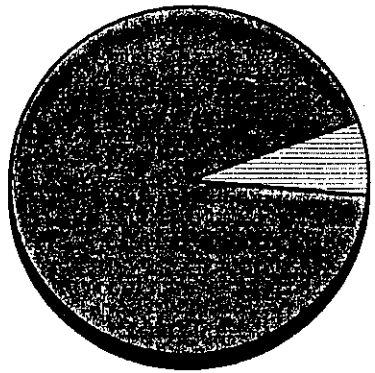




Earthquake - 95%

Aircraft - ~5%

Other - <1%



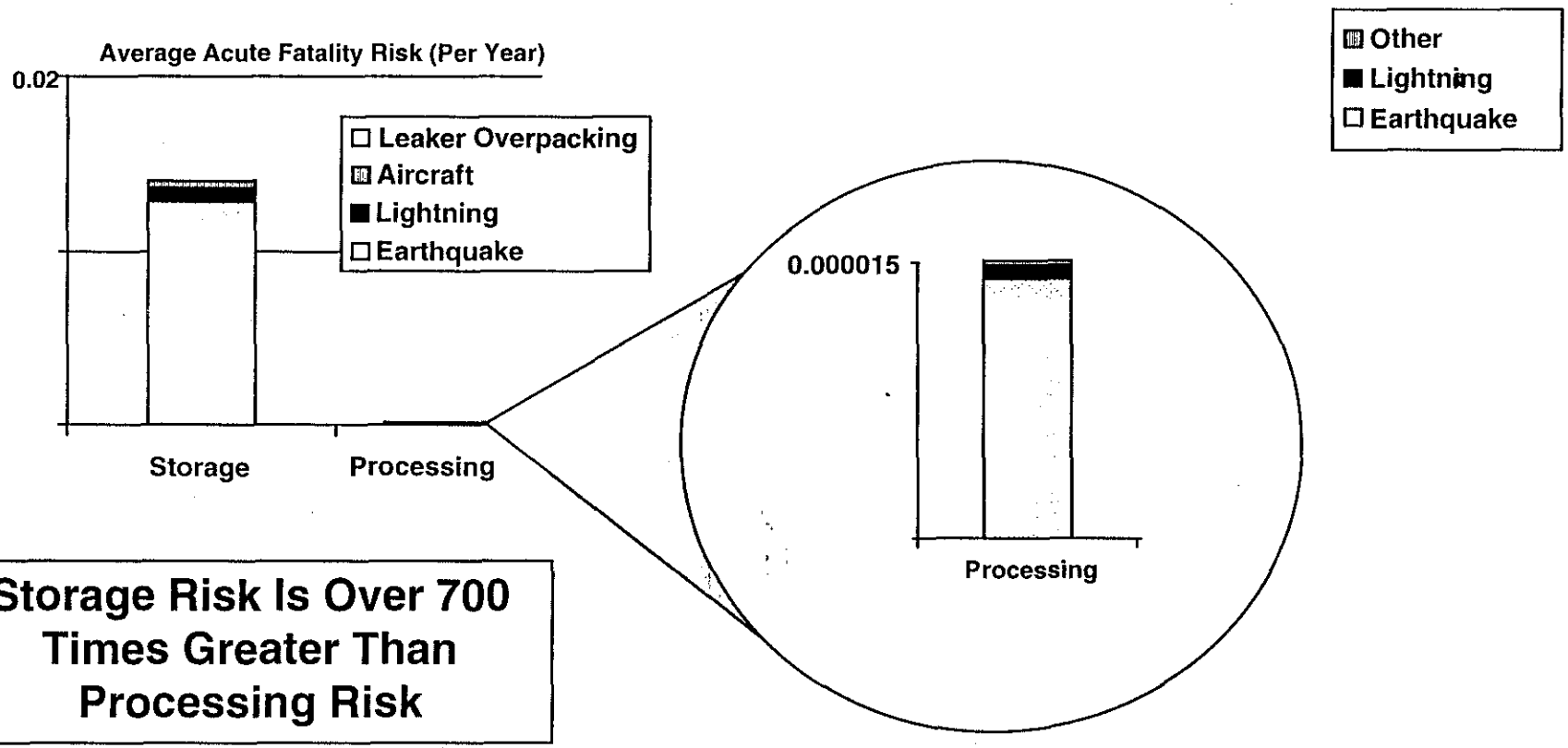
ONC Loading at Igloo

0.93%

Natural Gas Event

0.07%

UMATILLA RISK PROFILE



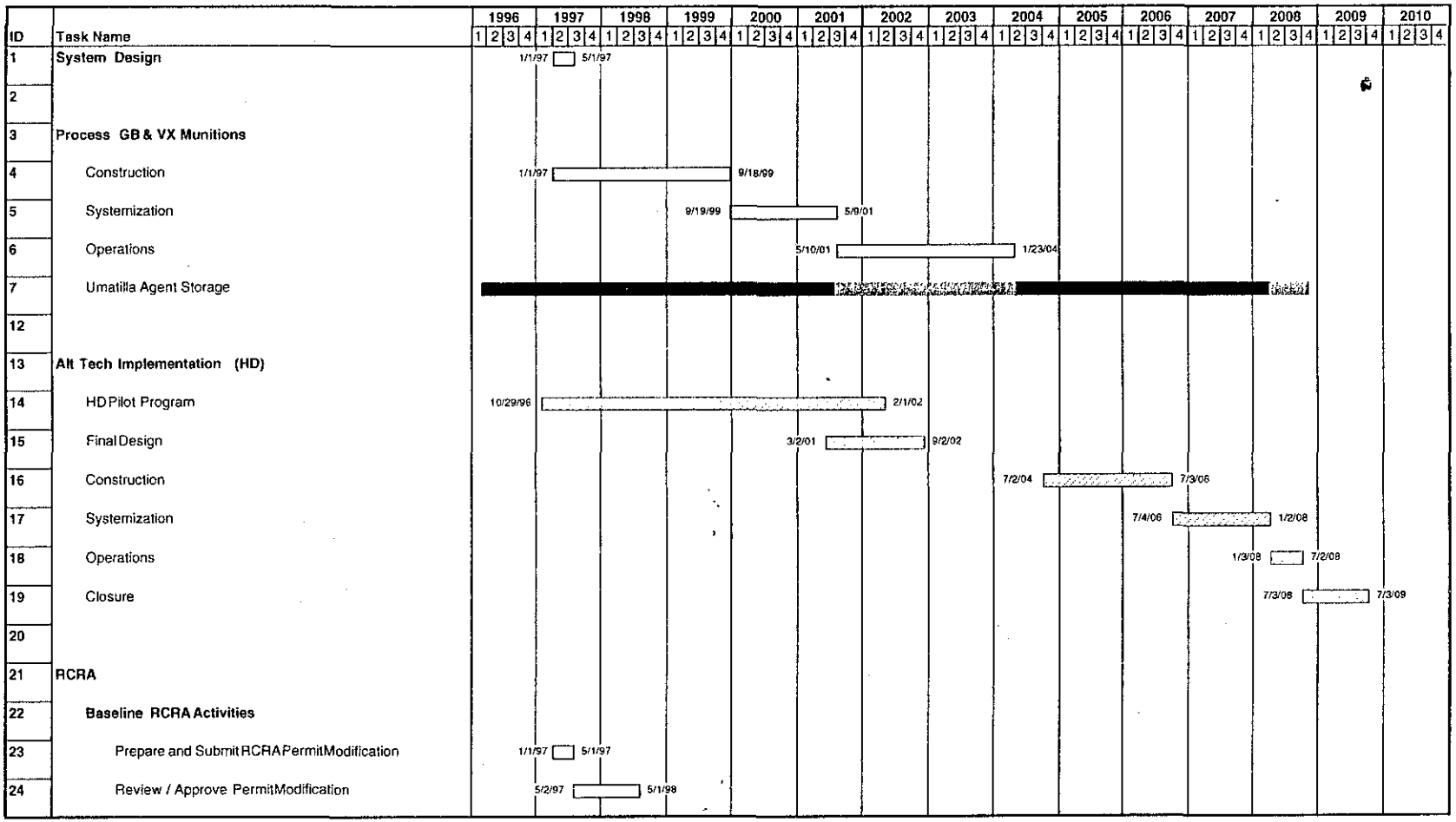
Storage Risk Is Over 700 Times Greater Than Processing Risk

2 Days of Storage Risk Is Equivalent to 3.3 Years of Processing Risk

P322-20-7/10/96

UMATILLA IMPLEMENTATION SCHEDULE

SCENARIO-4 DFS, MPF, 1 LIC; Alt Tech (HD)



Normal Task **Critical Path** **Milestone**

P322-23-7/10/96

ALTERNATIVE PROCESSING SCENARIOS

Scenario*	Public Risk	Approximate Time Ext.	Approximate Cost Increase
1) Drain and Store	Increases	6yrs	$350M
2) DFS Only	Increases	6yrs	$330M
3) MPF,DFS Only	Increases	6yrs	$350M
4) MPF, DFS, 1 LIC (GB, VX Only)	Increases	4yrs	$310M
5) No DUN	Equivalent	-	-
6) MPF, DFS, 2 LICs (GB, VX Only)	Increases	4yrs	$340M

* Compared to Proposed Disposal Facility
Generic Alternative Technology Used for Agent Destruction

Liquid Incinerator (LIC)
Deactivation Furnace system (DFS)
Metal Parts Furnace (MPF)
Dunnage Incinerator (DUN)

Alternate Processing Scenarios Increase Public Risk, Cannot Meet 2004 Date and Treaty, and Increase Cost

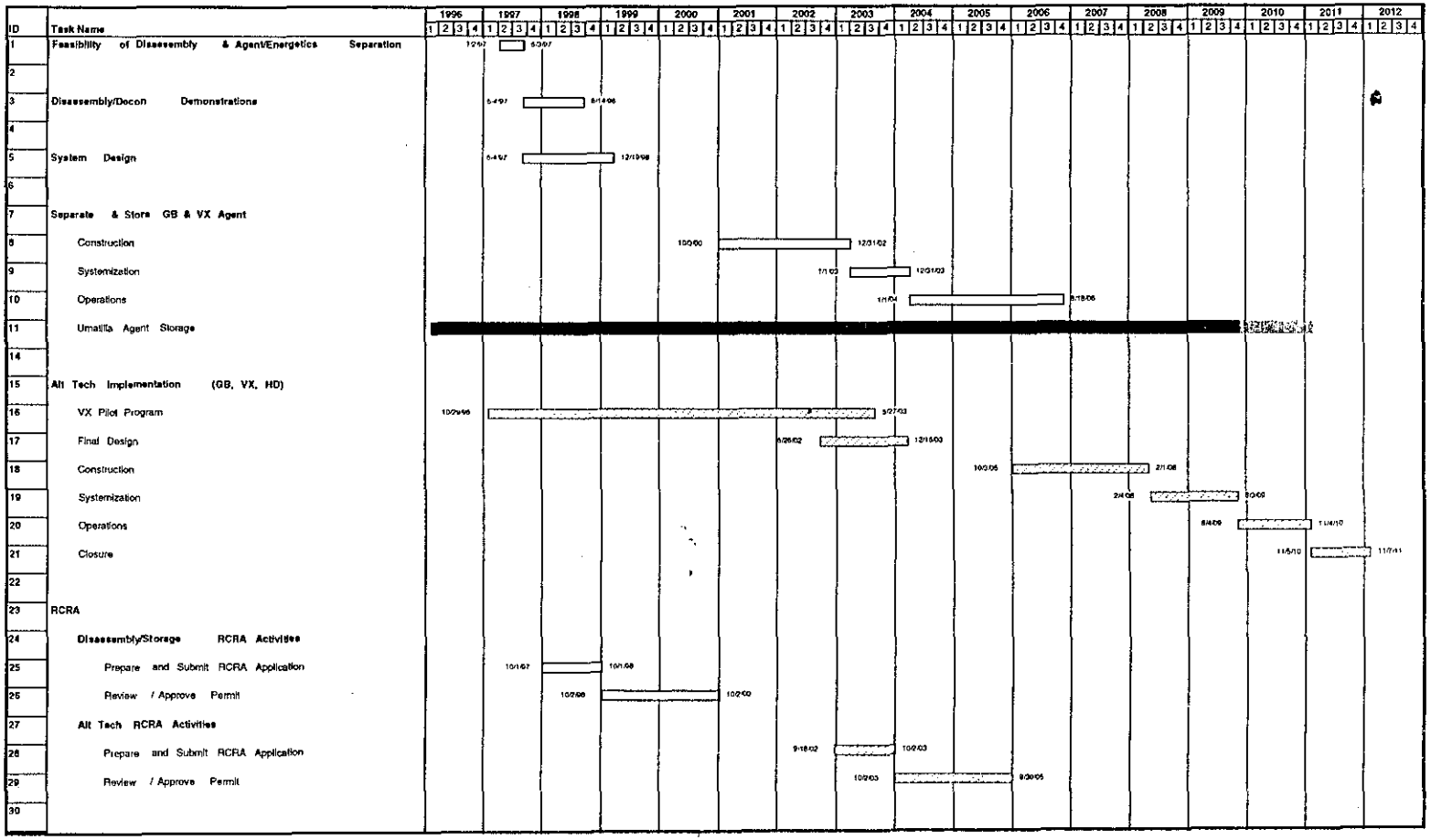
P322-24-7/10/96

SUMMARY

- Any Delay Increases Public Risk
- Mature Proven Technology; Demonstrated Performance - Safe & Effective
- HRA Indicates No Adverse Environmental Impacts
- Active Lessons Learned Program
- Deliberate, Methodical Approach to Chemical Weapon Disposal
- 3rd Generation Versus Emerging Technology
- Evolutionary Versus Revolutionary

Make Decisions Based on Science and Demonstrated Performance

UMATILLA IMPLEMENTATION SCHEDULE
SCENARIO-1 DRAIN & STORE; ALT TECH (GB, VX, HD)



P322-22-7/10/96

SCENARIO CONSIDERATIONS

- Must Wait for VX, HD Pilot Tests; GB Bench Test
- Must Develop Rocket/Mine Agent/Explosive Separation Technology
- Must Develop Rocket/Mine/Projectile Decontamination Technology
- Increases Number of Munition Movements
- Construction of Alternative Agent Destruction Facility Concurrent With Munitions Processing Operations (Separate Facilities)
- Two Step Process; Agent Is Not Destroyed in First Step
- Modified Proposed Umatilla Facility; Modified Aberdeen Alternative Facility
- Assumed Two Liquid Incinerator Capacity

Immature or Non-Existent Technology; Information Needed for Permit Preparation and Review

CHEMICAL DEMILITARIZATION PROGRAM

11 July 1996

Oregon Environmental
Quality Commission

Presented By:
LTC John Ontiveros
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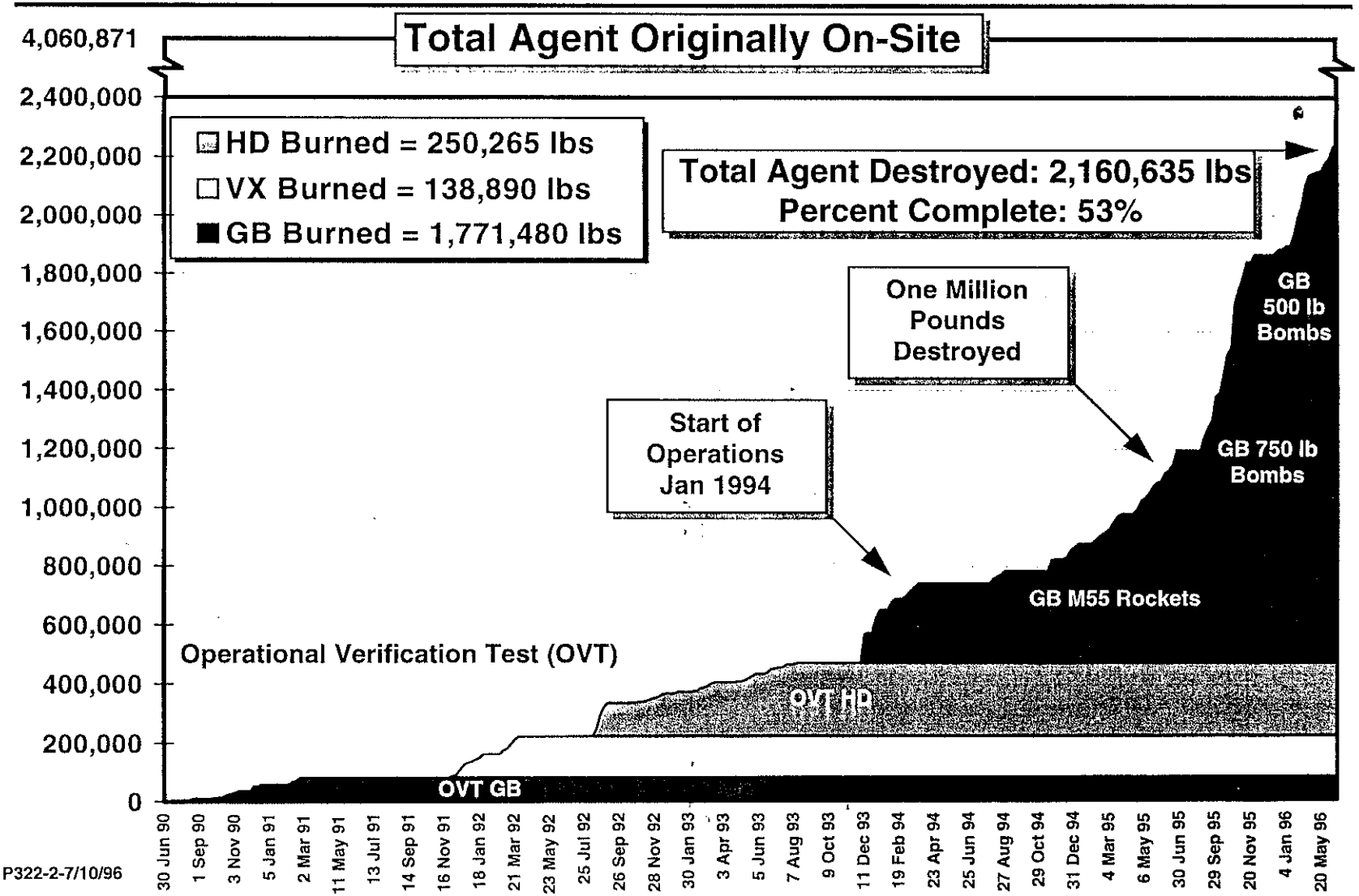
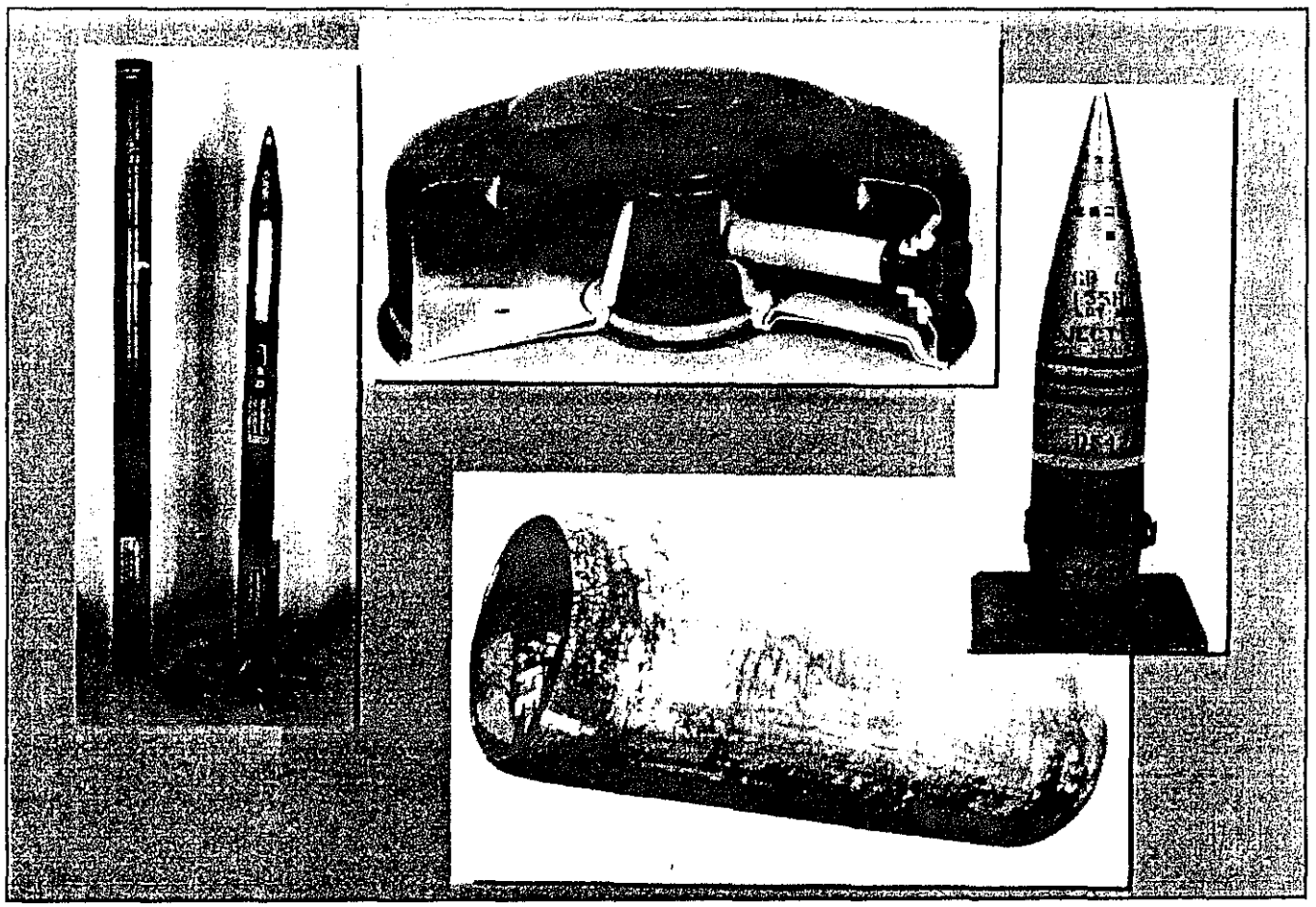


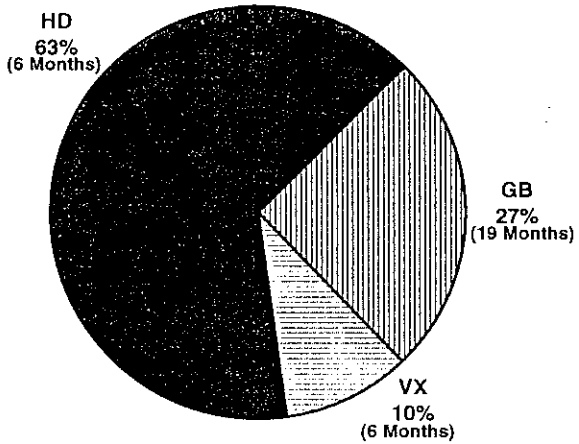
P322-2-7/10/96

CHEMICAL AGENT STORAGE CONFIGURATIONS



UMATILLA STOCKPILE

Umatilla Agent Tonnage Distribution



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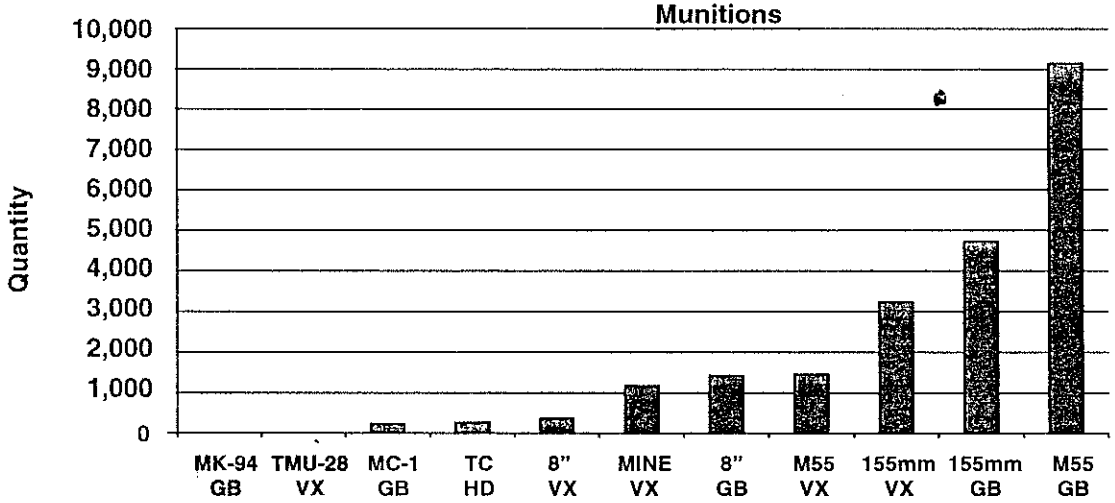

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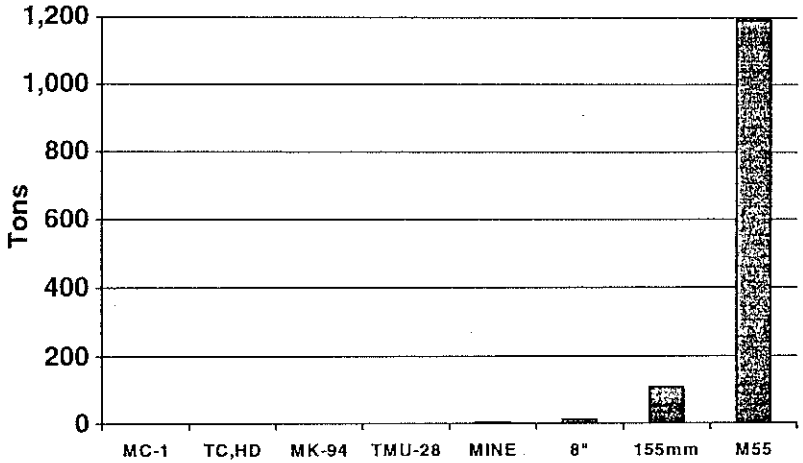

P322-04-7/10/96

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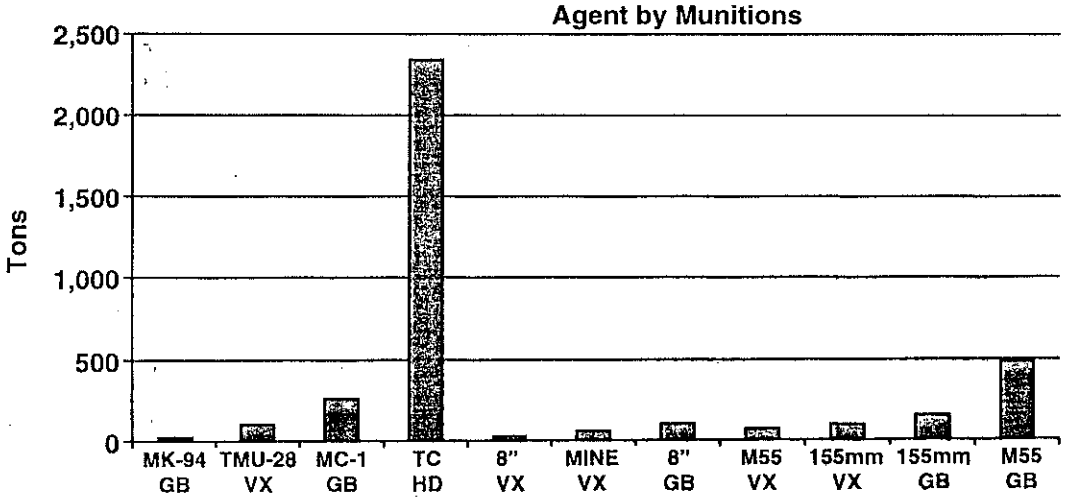

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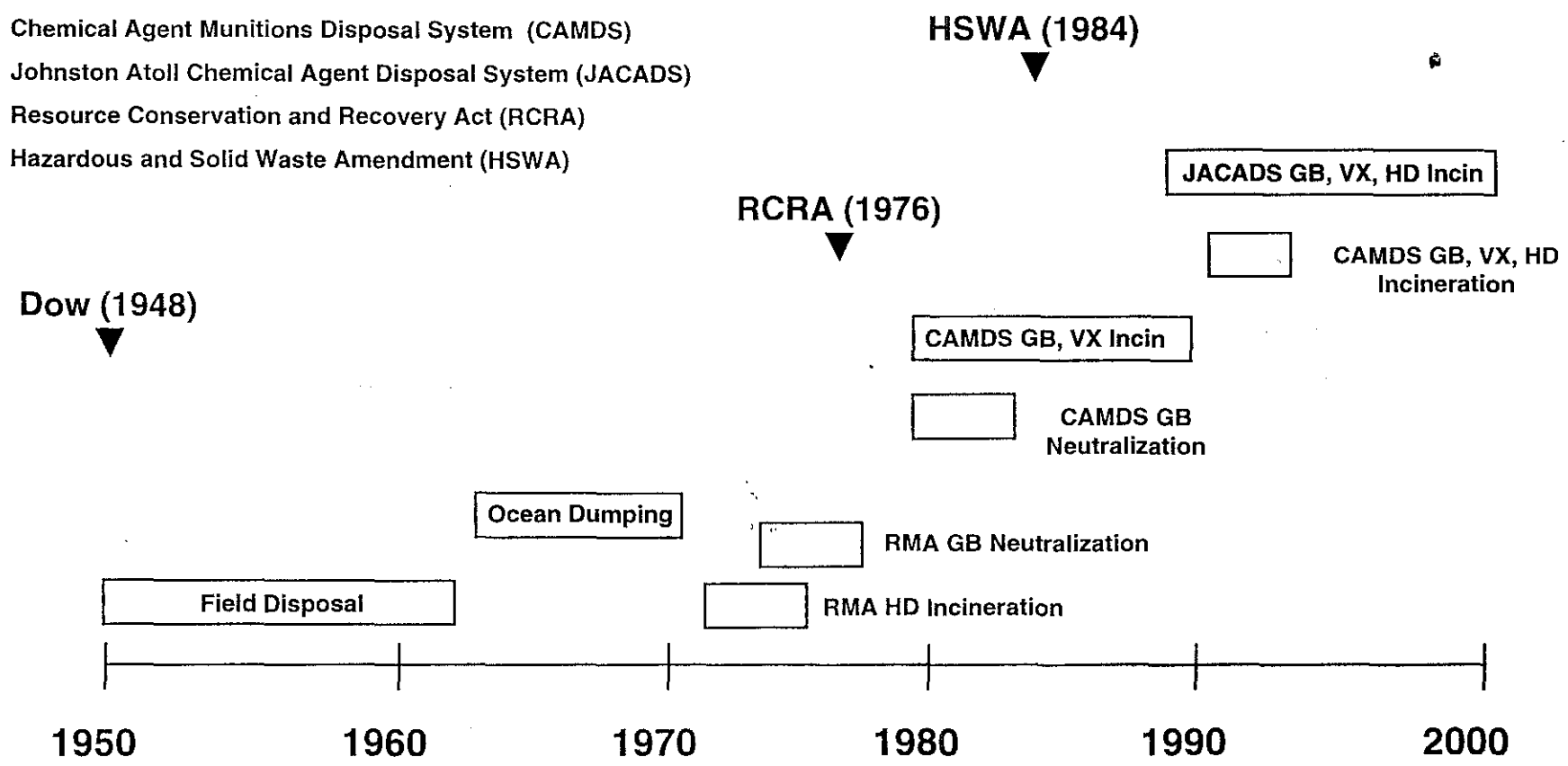

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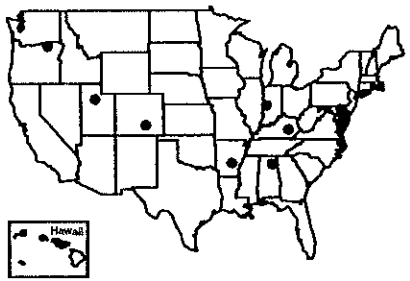
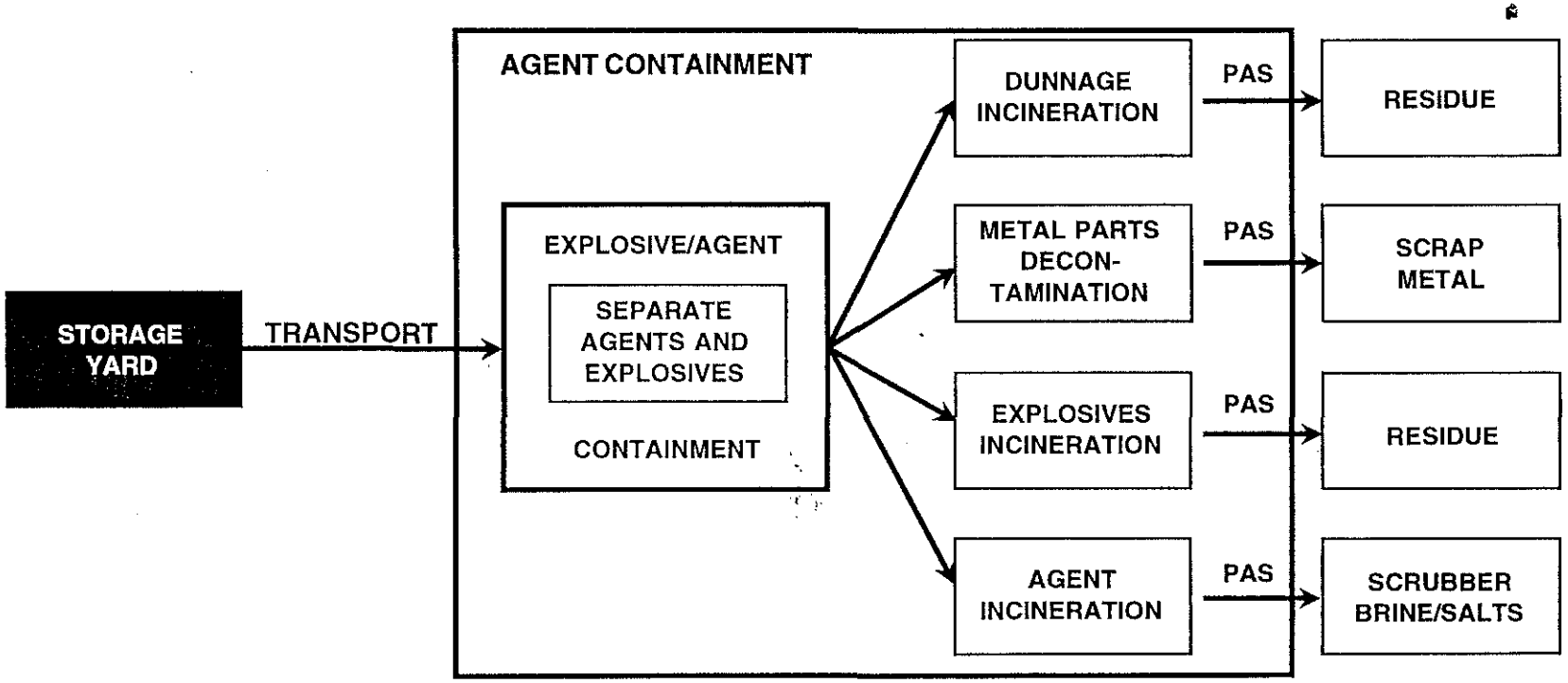
P322-5-7/10/96

CHEMICAL MUNITIONS DISPOSAL PROCESS

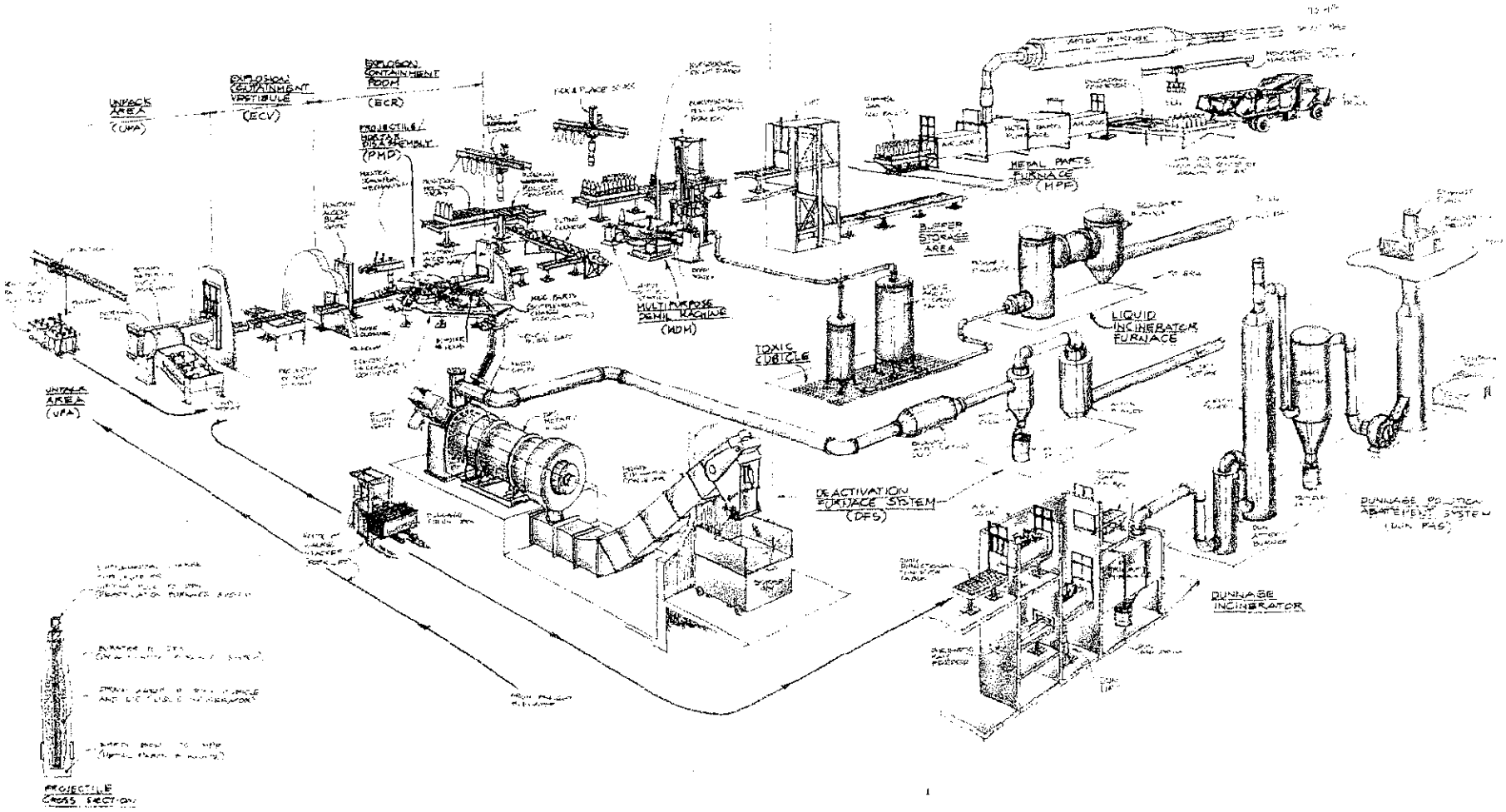




PAS - Pollution Abatement System

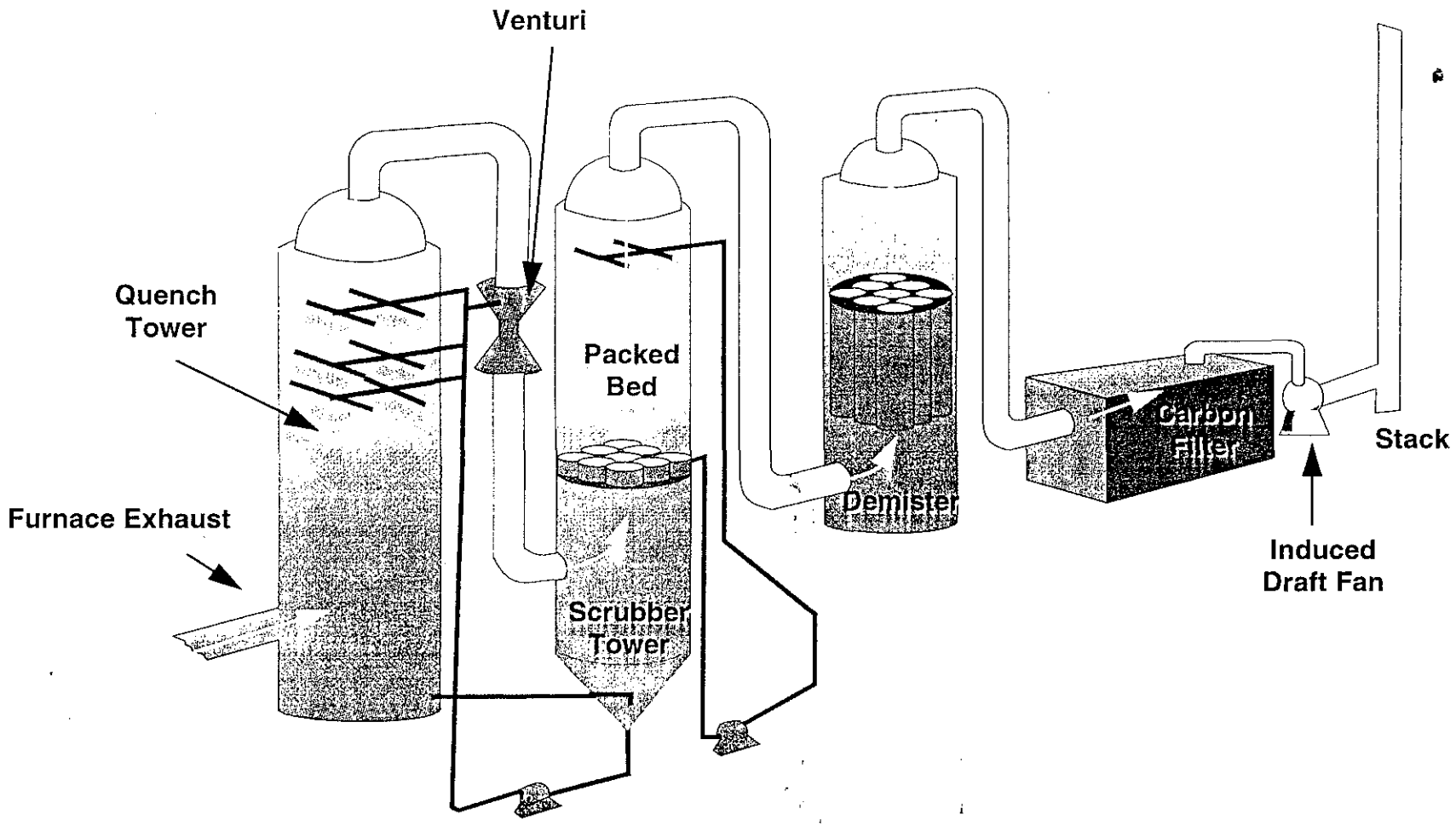
Program Manager For Chemical Demilitarization

PROJECTILE/MORTAR PROCESSING



P322-7-7/10/96

POLLUTION ABATEMENT SYSTEM



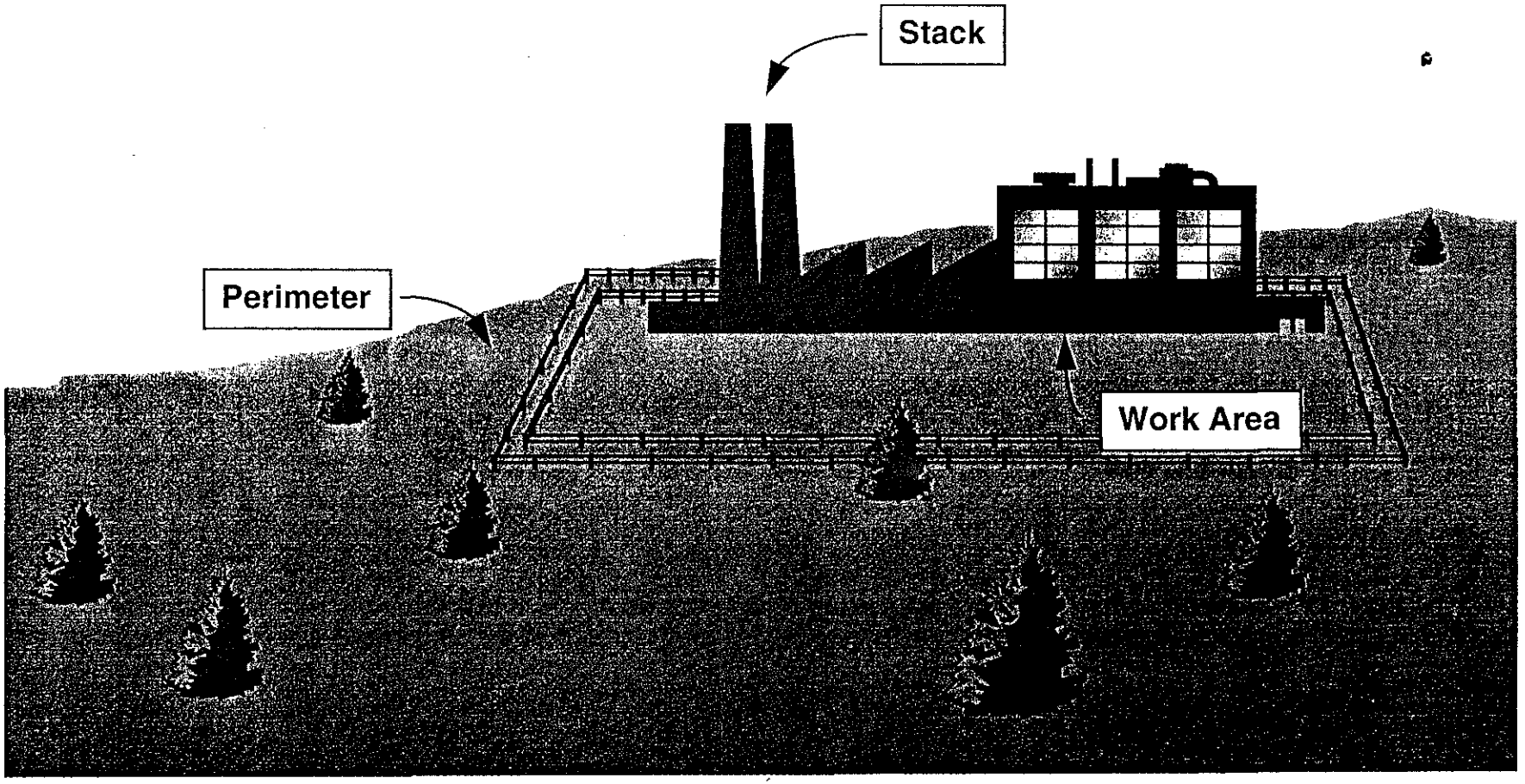
P322-8-7/10/96

PLANT DESIGN FEATURES

- Agent Containment
  - ► Negative Pressure
  - ► Cascaded Ventilation System
  - ► Redundant Filter Systems
- Extensive Use of Robotics
- Interlocks, Pre-Alarms, Waste Feed Cut-Offs
- Redundancy
  - ► After Burner
  - ► Data Links and Interlocks
  - ► Agent Monitors
- Continuous Improvements

Lessons Learned Applied

CHEMICAL AGENT MONITORING LOCATIONS



STACK EMISSIONS
HD - LIQUID INCINERATOR

Water	46.66%
Nitrogen	42.07%
Carbon Dioxide	5.39%
Oxygen	5.81%
Sulfur Dioxide	0.04%
Nitrogen Dioxide	0.02%
Carbon Monoxide	0.0053%
Hydrogen Chloride	0.0011%
Hydrocarbons	0.000449%
Dioxins/Furans	0.000000000082%

Dioxins/Furans Equivalent to
1 Second in Over 38,000 Years

DIOXIN FORMATION

- Chlorine
- Particulate Surfaces
- Organic Compounds
- Temperature (400°F - 750°F)

DIOXIN CONTROL

- Efficient Combustion Practices
  - ► Time/Temperature/Turbulence
  - ► Carbon Monoxide Levels
  - ► Oxygen Levels
- Rapid Quench (<350°F)
- Fine Particulate Control

What Do Actual Dioxin Emissions Show?

JACADS DIOXIN RESULTS

Mustard Processing	Maximum Dioxin *TEQ (ng/m^3)
Liquid Incinerator	0.0023
Metal Parts Furnace	0.1077
Non-Mustard Processing	**TEQ (ng/m^3)**
Liquid Incinerator	0.0034
Deactivation Furnace System	0.0396

Proposed EPA Standard- 0.2 ng/m^3 TEQ

*TEQ - 2,3,7,8 Dioxin Toxicity Equivalent

Efficient Combustion Practices and Engineering Design Control Dioxin Emissions Regardless of Agent Type

PRE-TRIAL BURN
HEALTH RISK ASSESSMENT
SCREENING PROTOCOL

- Quantifies Human Health Risk and Environmental Impact
- Extremely Conservative Approach
  - ► Addresses Multiple Exposure Routes and Receptors
  - ► Addresses Environmental Impact
- Used Actual JACADS Emissions Data
  - ► Composite Worst Case
- Non-Detected Compounds of Potential Concern Were Evaluated
- All Furnaces Operate Simultaneously, Continuously for Over 3 Years (Varies)
- All Three Agents Emit Simultaneously, Continuously (Stop Feed)
- Exposure Duration
  - ► 70 Years for Carcinogens
  - ► 30 Years for Noncarcinogens

Conclusion: No Adverse Impacts to Human Health or Environment

QUANTITATIVE RISK ASSESSMENT (QRA)

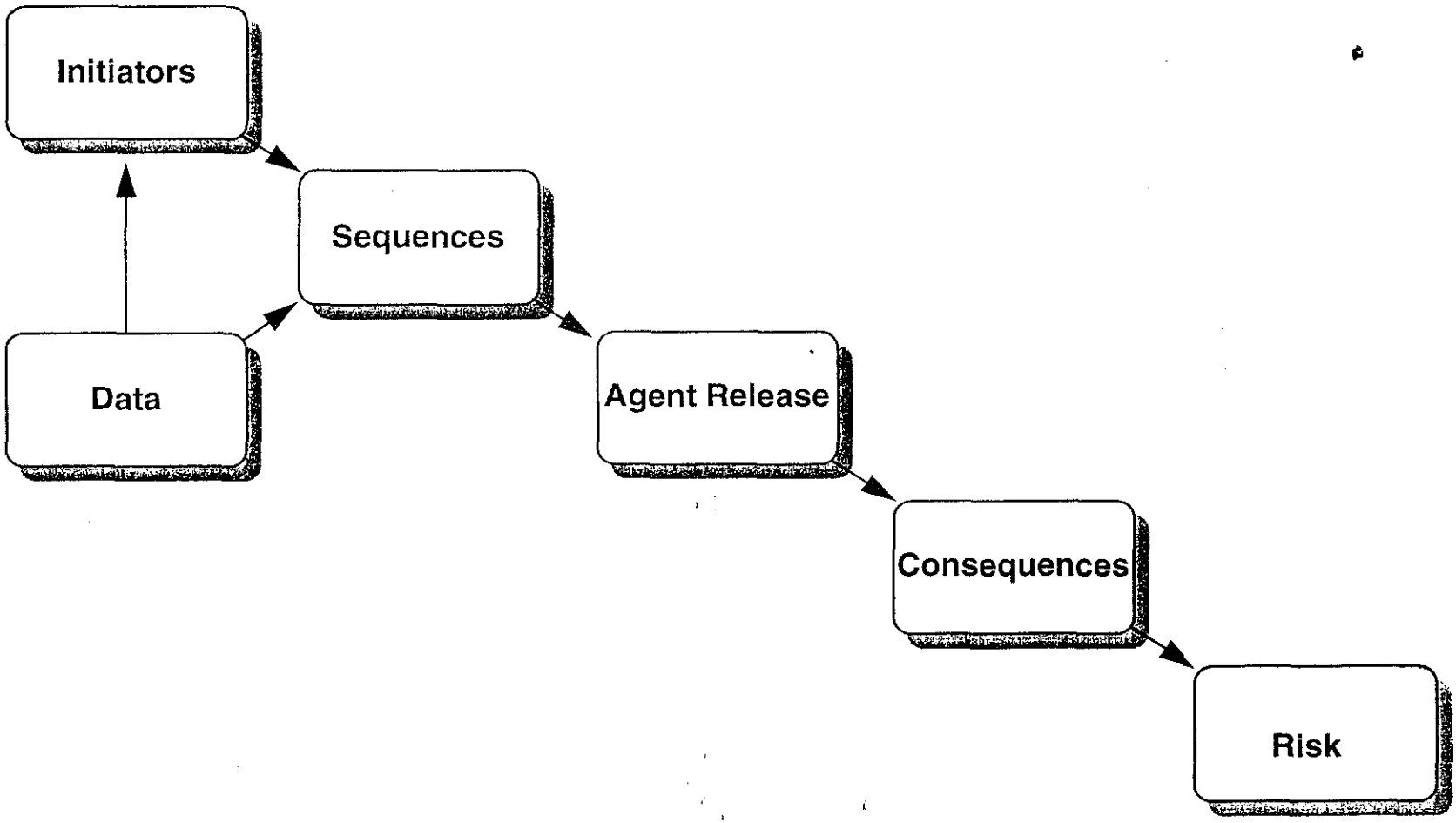
- A Systematic Process for Identifying Potential Accidents Associated With a Particular Process or Activity and Estimating, Quantitatively, the Risk Associated With These Accident Scenarios

- Three Main Parts
  - ► Identify Accident Sequences
  - ► Estimate Frequencies (e.g., Occurrences Per Year)
  - ► Estimate Consequences (e.g., Fatalities)

- Risk = Frequency X Consequence

Assess How Often and How Bad

OVERVIEW OF QRA PROCESS



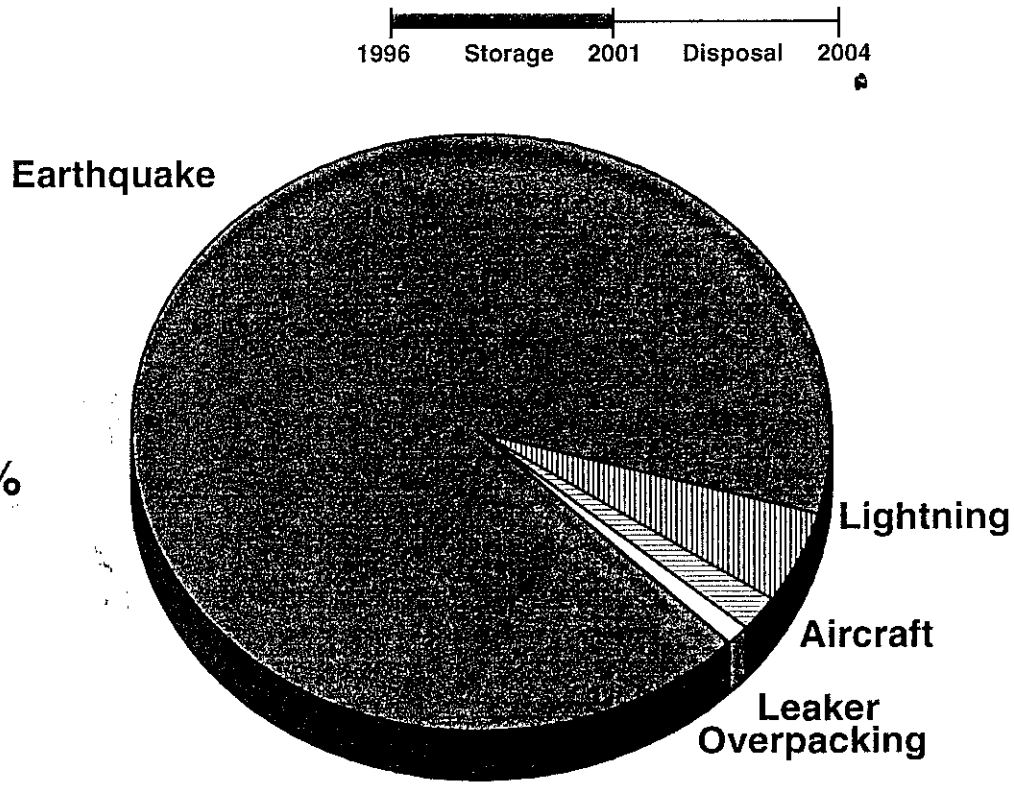
STORAGE RISK CONTRIBUTORS

Earthquake - 93%

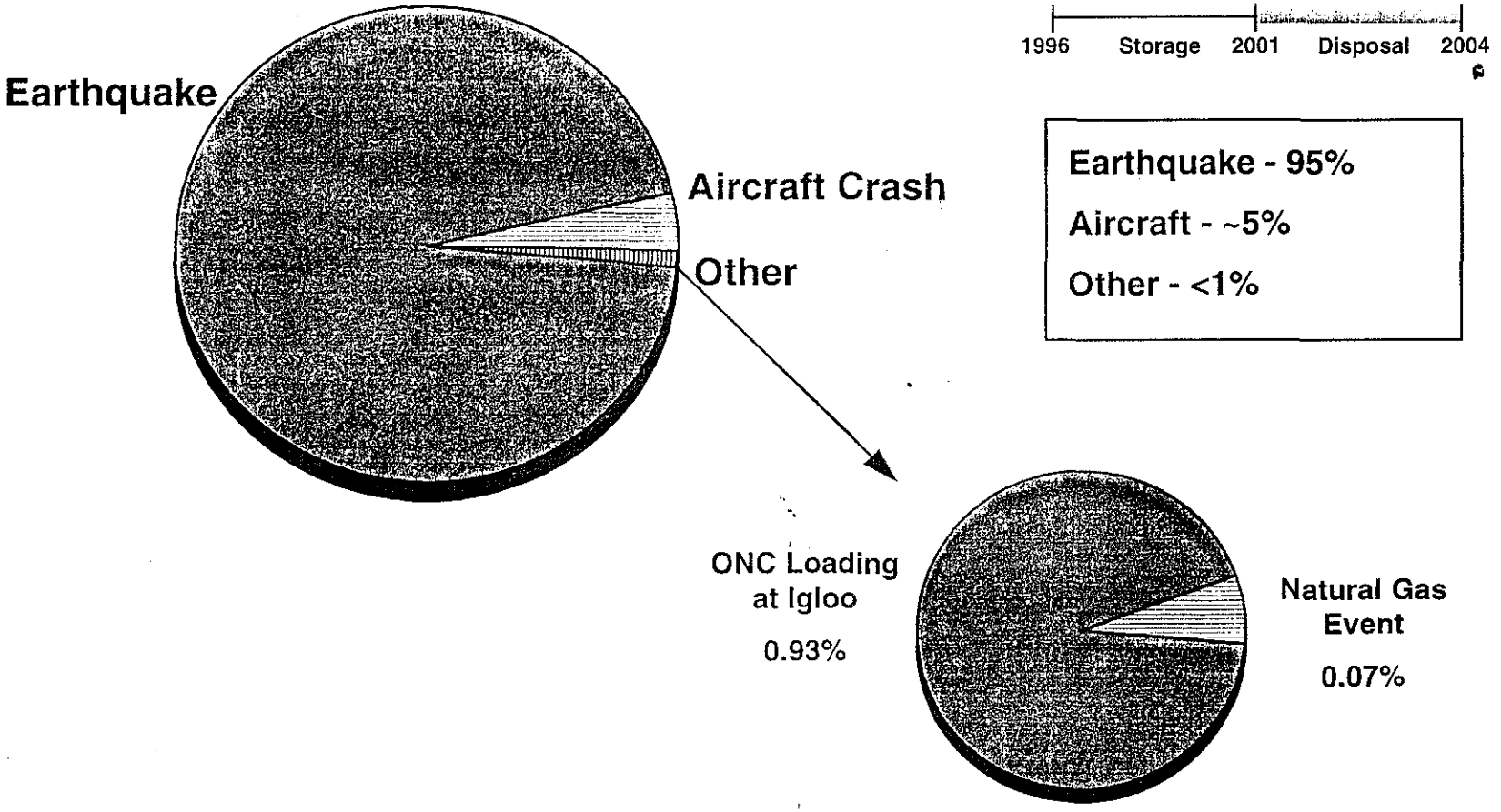
Lightning - 5%

Aircraft - ~2%

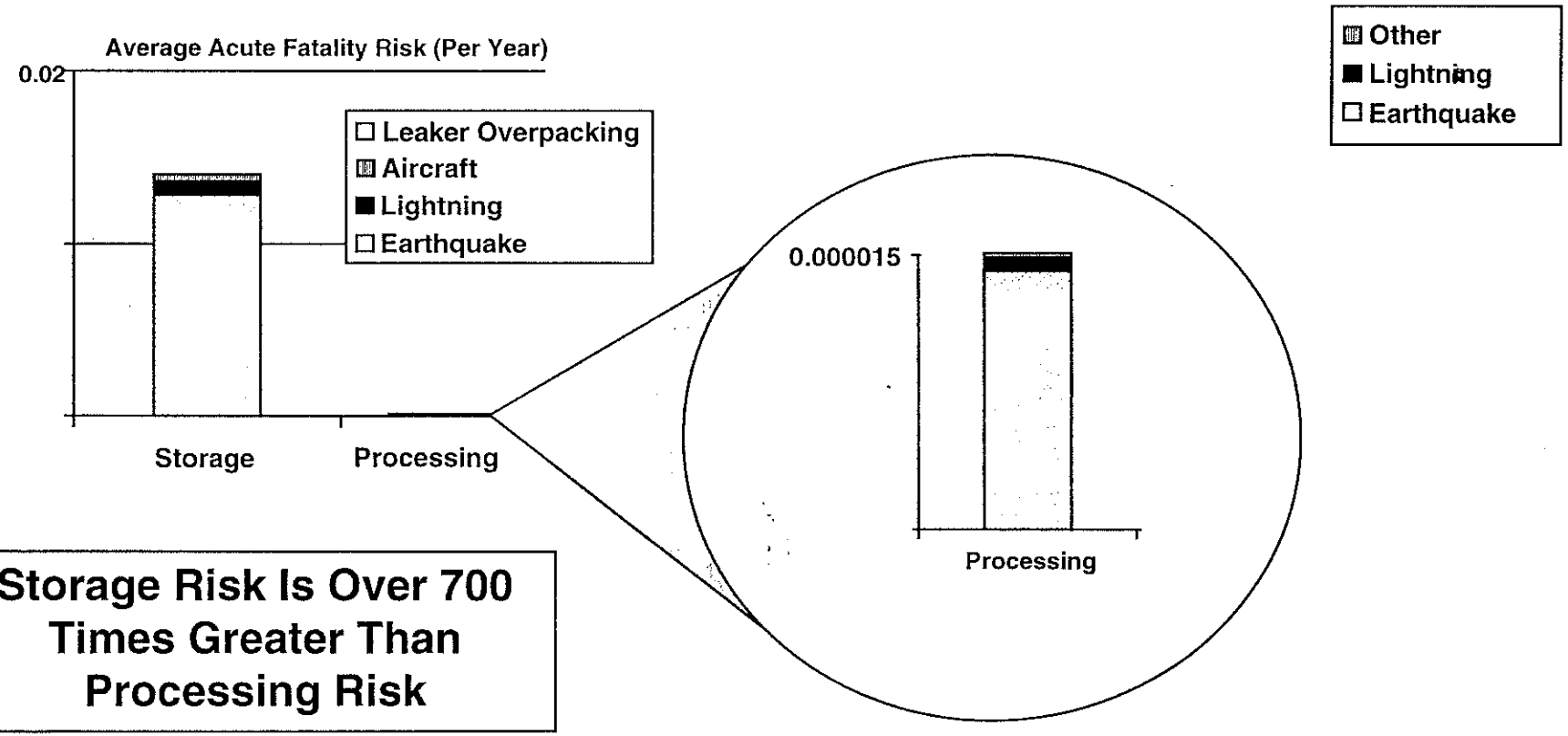
Leaker Overpacking- <1%



DISPOSAL PROCESSING RISK CONTRIBUTORS



UMATILLA RISK PROFILE



Storage Risk Is Over 700 Times Greater Than Processing Risk

2 Days of Storage Risk Is Equivalent to 3.3 Years of Processing Risk

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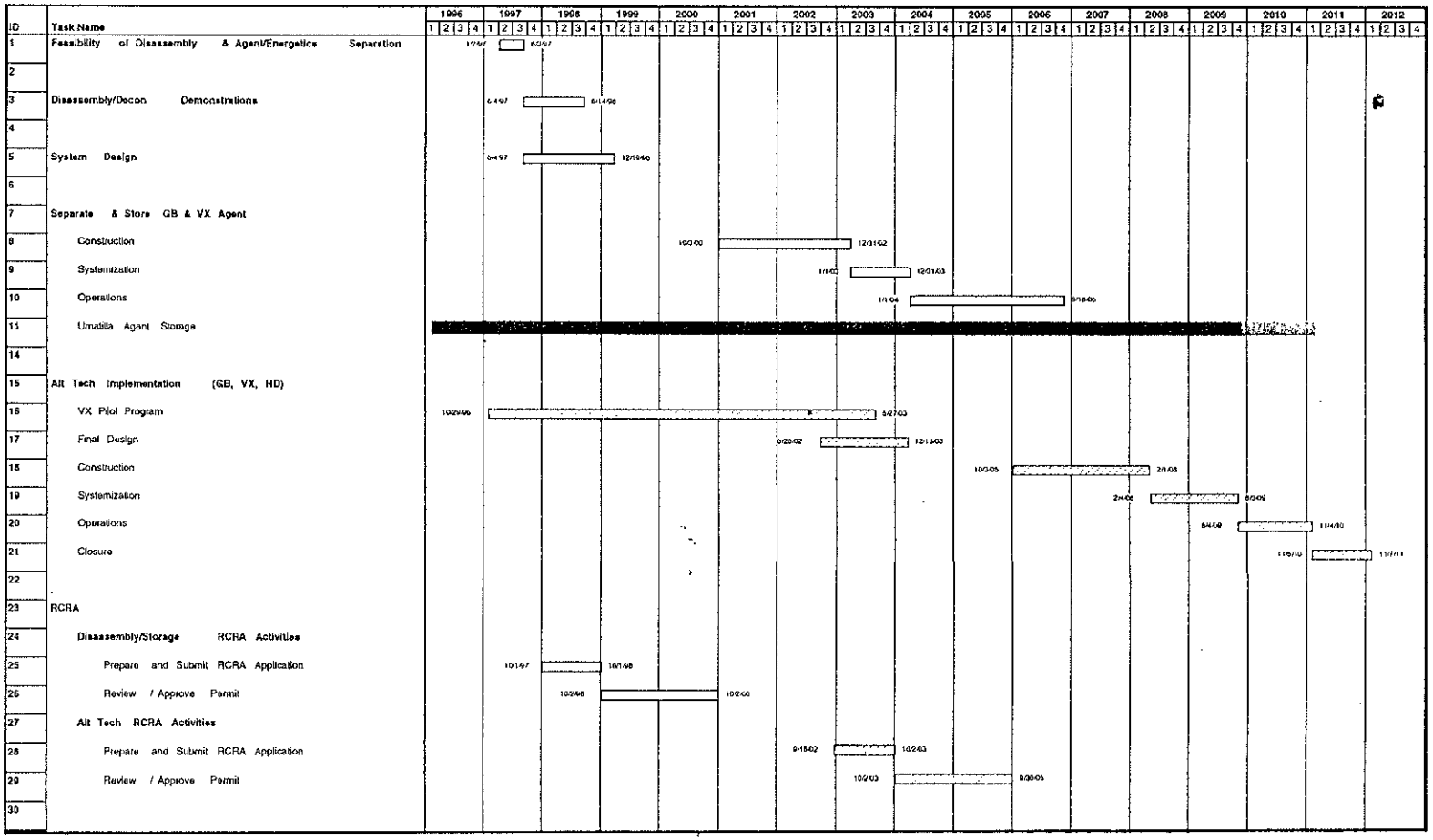
SCENARIO CONSIDERATIONS

- Must Wait for VX, HD Pilot Tests; GB Bench Test
- Must Develop Rocket/Mine Agent/Explosive Separation Technology
- Must Develop Rocket/Mine/Projectile Decontamination Technology
- Increases Number of Munition Movements
- Construction of Alternative Agent Destruction Facility Concurrent With Munitions Processing Operations (Separate Facilities)
- Two Step Process; Agent Is Not Destroyed in First Step
- Modified Proposed Umatilla Facility; Modified Aberdeen Alternative Facility
- Assumed Two Liquid Incinerator Capacity

Immature or Non-Existent Technology; Information Needed for Permit Preparation and Review

UMATILLA IMPLEMENTATION SCHEDULE
SCENARIO-1 DRAIN & STORE; ALT TECH (GB, VX, HD)

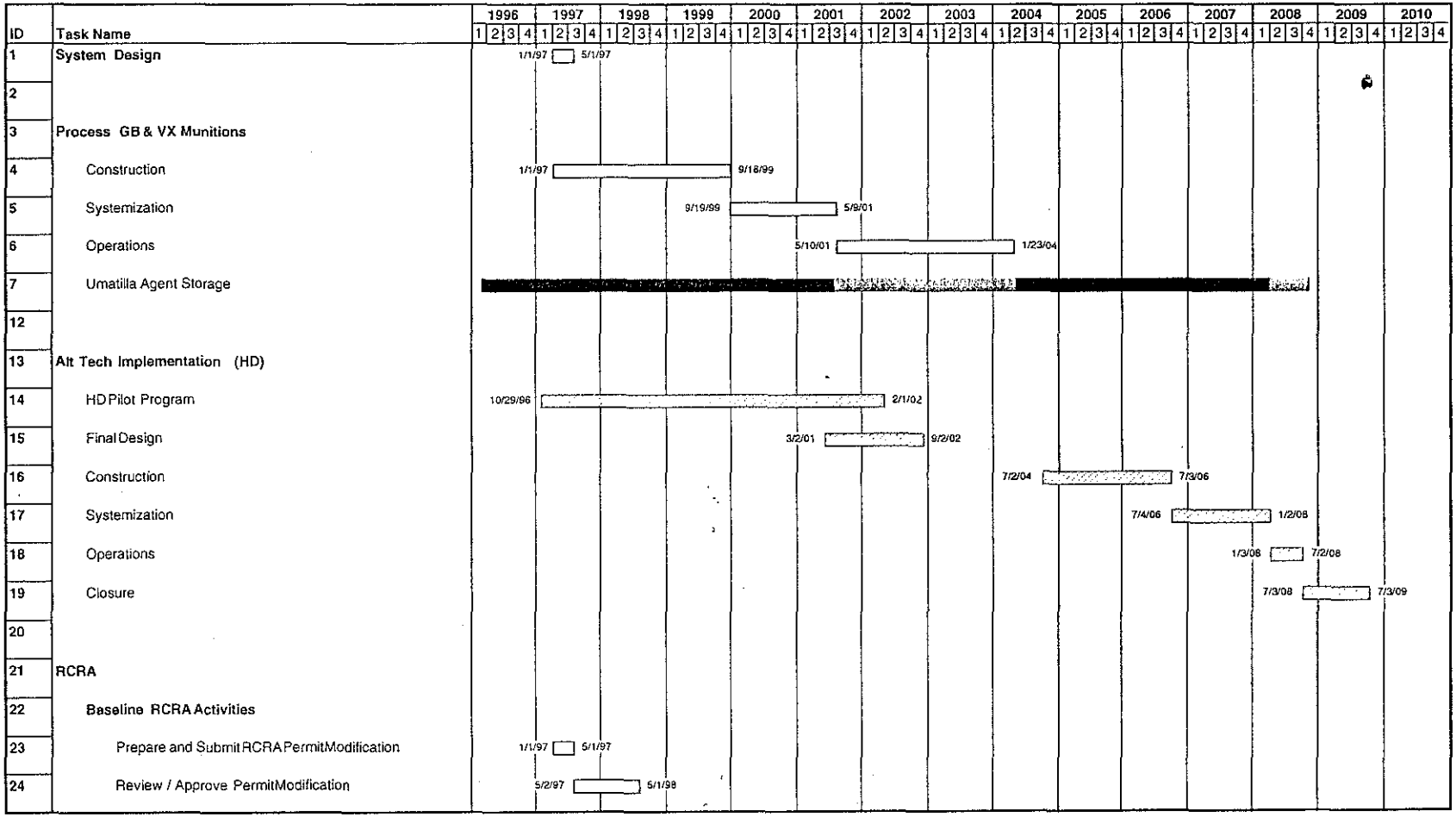


Normal Task ▭ Critical Path ▨ Milestone ◇

P322-22-7/10/96

UMATILLA IMPLEMENTATION SCHEDULE

SCENARIO-4 DFS, MPF, 1 LIC; Alt Tech (HD)



Normal Task ▭ Critical Path ▨ Milestone ◇

P322-23-7/10/96

ALTERNATIVE PROCESSING SCENARIOS

Scenario*	Public Risk	Approximate Time Ext.	Approximate Cost Increase
1) Drain and Store	Increases	6yrs	$350M
2) DFS Only	Increases	6yrs	$330M
3) MPF,DFS Only	Increases	6yrs	$350M
4) MPF, DFS, 1 LIC (GB, VX Only)	Increases	4yrs	$310M
5) No DUN	Equivalent	-	-
6) MPF, DFS, 2 LICs (GB, VX Only)	Increases	4yrs	$340M

* Compared to Proposed Disposal Facility
Generic Alternative Technology Used for Agent Destruction

Liquid Incinerator (LIC)
Deactivation Furnace system (DFS)
Metal Parts Furnace (MPF)
Dunnage Incinerator (DUN)

Alternate Processing Scenarios Increase Public Risk, Cannot Meet 2004 Date and Treaty, and Increase Cost

SUMMARY

- Any Delay Increases Public Risk
- Mature Proven Technology; Demonstrated Performance - Safe & Effective
- HRA Indicates No Adverse Environmental Impacts
- Active Lessons Learned Program
- Deliberate, Methodical Approach to Chemical Weapon Disposal
- 3rd Generation Versus Emerging Technology
- Evolutionary Versus Revolutionary

Make Decisions Based on Science and Demonstrated Performance

ENVIRONMENTAL QUALITY COMMISSION
WORK SESSION
Umatilla Army Depot
Proposed Chemical Weapons Incineration Facility

May 16, 1996

The Environmental Quality Commission work session was convened at 10:00 a.m. on Thursday, May 16, 1996, at the World Trade Center Auditorium, 25 S.W. Salmon Street, Portland, Oregon. The following members were present:

Henry Lorenzen, Chair
Melinda Eden, Member
Linda McMahan, Member
Tony Van Vliet, Member
Carol Whipple, Member

Also present were Larry Knudsen, Assistant Attorney General, Oregon Department of Justice, Langdon Marsh, Director, DEQ, and other DEQ staff.

Note: Materials submitted during this work session are on file in the Office of the Director, 811 S.W. 6th Avenue, Portland, Oregon.

Stephanie Hallock, Eastern Region Administrator, spoke briefly to the Commission and outlined the work session topics.

REVIEW OF AIR PERMIT

Peter Brewer, Air Quality Permit Writer - DEQ Eastern Region, presented this informational item to the Commission.

REVIEW OF RISK ASSESSMENT

Fredrick Moore, Hazardous Waste Permit Writer - DEQ Eastern Region, presented an overview of the risk assessment report and answered questions from the Commission.

Regina Skarzinskas, DEQ Toxicologist, provided technical information to the Commission about the risk assessment process.

Steve Whitaker with Ecology and Environment, Inc., the principal author of the Risk Assessment Report under contract to the Department, reviewed methodologies for measurement of human exposure to emissions from the proposed facility. The Commission asked questions regarding differences in the calculations of acceptable risk levels.

Rone Brewer, also with Ecology and Environment, Inc., discussed ecological risk from exposure to emissions.

REVIEW OF FINDINGS DEQ MUST MAKE

Larry Edelman, Oregon Department of Justice, clarified the statutory reasons why the permit application is before the Commission, and the ORS 466.055 findings that the Commission must make. The Commission must find that the proposed facility uses best available technology (BAT), and that the proposed facility has no major adverse effect on public health and safety or on the environment. The Commission asked Mr. Edelman questions regarding definitions and legal implications of BAT.

NOTE: Work Session was temporarily adjourned at 11:50 a.m. and reconvened at 1:00 p.m.

ALTERNATIVES TO INCINERATION PANEL

Stephanie Hallock introduced members of a panel presenting information on alternatives to incineration. Members of the panel included:

- Dr. Richard Magee, Chairman of the Committee on Review and Evaluation of the Army Chemical Stockpile Disposal Program at the National Research Council/National Academy of Sciences

- Dr. J. Richard Ward, Chief Scientist, Alternative Technology Program, US Army Aberdeen Proving Ground

- Bob Boylston, AEA Technology

- Charles Fry, M4 Environmental L.P.

- Dr. Wayland Swain, Eco Logic

- Pat Costner, Senior Research Scientist, Greenpeace

- Colonel Jim Coverstone, Deputy Program Manager for Chemical Demilitarization, US Army Aberdeen Proving Ground

Following a question and answer period between the Commission and the panel members, Chair Lorenzen adjourned the work session at 4:45 p.m.

Approved _____
Approved with Corrections _____

Minutes are not final until approved by the EQC

ENVIRONMENTAL QUALITY COMMISSION

Minutes of the Two Hundred and Fifty-Second Meeting

May 17, 1996
Regular Meeting

The Environmental Quality Commission meeting was convened at 8:30 a.m. on Friday, May 17, 1996, at the Department of Environmental Quality, 811 S.W. Sixth Avenue, Portland, Oregon. The following members were present:

Henry Lorenzen, Chair
Melinda Eden, Member
Linda McMahan, Member
Tony Van Vliet, Member
Carol Whipple, Member

Also present were Larry Knudsen, Assistant Attorney General, Oregon Department of Justice, Langdon Marsh, Director, DEQ, and other DEQ staff.

Note: Staff reports presented at this meeting, which contain the Department's recommendations, are on file in the Office of the Director, 811 S.W. Sixth Avenue, Portland, Oregon 97204. Written material submitted at this meeting is made a part of this record and is on file at the above address. These written materials are incorporated in the minutes of the meeting by reference.

Chair Lorenzen called the meeting to order at 8:30 a.m.

A. Approval of Minutes

Commissioner Whipple moved approval of the meeting minutes for the April 12, 1996 regular meeting. Commissioner McMahan seconded the motion and it was unanimously approved.

B. Approval of Tax Credits

Mike Downs, Water Quality Division Administrator, and Charles Bianchi, Water Quality Division, presented this item to the Commission. The Department recommended the Commission approve certification for the tax credit applications listed below.

Application No.	Applicant	Description
TC 4596	McKee Farms $22,200 / 92%	An Air Pollution Control "field burning" facility consisting of a 1991 Freeman 3-tie baler, Model 370
TC 4604	Carl F. Jensen dba Carl Jr. Farms $46,077	An Air Pollution Control "field burning" facility consisting of two Freeman HDY balers, Model 330, a John Deere Disk, Model 335, a Freightliner Truck (1975) and two Freightliner truck beds (1974).

In addition, the Department recommended that the Commission deny application 4219, Chevron Corporation, noting that 1) the facility is ineligible for final tax credit certification in that the return on investment exceeds the reference return on investment, and 2) the portion of the facility cost that is properly allocated to pollution control is 0%.

The Department also recommended that the Commission approve the request for a transfer of the remaining value of tax credit certificates 2841, 3154, 3214, 3215 and 3314 to Dinihanian Manufacturing, Inc., the current owner and operator of the pollution control facilities from Vahan M. Dinihanian, the previous owner and sole proprietor of Vahan M. Dinihanian Recycling and Manufacturing.

Commissioner Whipple moved approval of the tax credits, the denial and the transfer as recommended by the Department. Commissioner Eden seconded the motion and it was approved unanimously.

C. Rule Adoption: Amendments, Solid Waste and Recycling Administrative Rules

Mary Wahl, Waste Management and Cleanup Division Administrator, and Deanna Mueller-Crispin, Waste Management and Cleanup Division, presented this item to the Commission.

The amendments proposed by the Department incorporate changes required by legislation passed by the 1995 Oregon Legislature. The changes include a fee decrease for solid waste used as alternative daily cover at landfills, modifications to rigid plastic container recycling rules, changes in approval of out-of-state recycling programs (for persons sending out-of-state waste into Oregon for disposal), and several technical corrections. The proposed rule also makes permanent the rule amendments previously adopted by the Commission as temporary rule on November 17, 1995, adopting Federal rule changes allowing certain very small landfills in arid regions two additional years to meet Federal Subtitle D landfill requirements.

Commission McMahan moved approval of the Department's recommendations. Commissioner Van Vliet seconded the motion and it was approved unanimously.

Note: The following agenda items were taken out of order

F. Rule Adoption: Oregon Title V Operating Permit Fee Increase

Greg Green, Air Quality Division Administrator, and Benjamin Allen, Air Quality Division, presented this item to the Commission. The Department proposed to raise fees for the Oregon Title V Operating program by an amount equivalent to the annual rise in the Consumer Price Index (2.845 percent), as allowed by statute. The Department recommended that the Commisison adopt the proposed rules.

Commissioner Whipple noted that there had been public comment that did not oppose the fee increase, and asked the Department's response. Mr. Allen verified that there had been no opposition to the fee increase. Three members of the public had used the comment period to request details on the Department's staffing levels expenditures of Title V funds. Mr. Allen said that the Department was in the process of generating such information, and it would be available shortly.

Commissioner Van Vliet moved approval of the Department's recommendation; Commissioner Whipple seconded the motion. The motion was unanimously approved.

H. Action Item: Calvin and Annette Van Der Veen dba C&A Dairy, Case No. WQAW-NWR-93-126 -- Appeal of Hearing Order Regarding Violation and Assessment of Civil Penalty

This case came before the Commission on Calvin and Annette Van der Veen's (dba C&A Dairy) appeal of the hearings officer's Hearing Order Regarding Violation and Assessment of Civil Penalty, dated December 13, 1995. The hearings officer determined that C&A Dairy had discharged waste into the waters of the state on April 29, 1993. Larry Knudsen with the Department of Justice outlined the options available to the Commission, which included upholding or reversing either part or all of the Hearing Order Regarding Violation and Assessment of Civil Penalty.

After considering the record in this case and hearing argument from Calvin and Annette Van Der Veen, Ed Druback of the Department, and Dean O'Reilly of Yamhill Soil and Water Conservation District, Commissioner Van Vliet made a motion to reverse the hearings officer's findings. Commissioner Eden seconded the motion. A roll call vote was taken, and the motion to reverse the hearing's officer's findings was approved unanimously. Chair Lorenzen directed the Department to prepare a document reflecting the changes approved by the Commission, to be submitted for review and approval by the Commission.

D. Informational Item: Emergency Response Planning for the Umatilla Army Depot

Gary Pettit, Chemical Stockpile Emergency Preparedness Program (CSEPP) Regional Coordinator with the Oregon Emergency Management section of the Oregon Department of State Police, presented information to the Commission regarding the status of emergency response in the areas adjacent to the proposed facility. He described the mission of Oregon Emergency Management as ".. to maintain an Emergency Services System as defined and authorized in ORS 401, by planning, preparing, and providing for the prevention, mitigation, and/or management of emergencies or disasters that present a threat to the lives and property of the citizens of, and visitors to, the State of Oregon." Mr. Pettit provided a slide presentation that included information on locations and populations at risk, and details of Oregon's emergency operations plan. He also discussed the most recent CSEPP annual exercise, conducted on May 9, 1996, designed to demonstrate response capabilities.

Casey Beard, Director of Emergency Management for Morrow County, presented information to the Commission regarding the challenges the County faces in providing emergency coverage. He also reviewed the County's notification procedures in the event of an emergency (sirens, readerboards on highways, etc.), and discussed the County's plans for response timing. Mr. Beard concluded that the counties must be involved and have input regarding the siting and operating perameters of any proposed chemical demilitarization facility.

E. Informational Item: Invited Panel Presentation: Community Concerns about Umatilla Army Depot

Mick Harrison of GreenLaw addressed the Commission and expressed concerns regarding numerous aspects of the proposed permits. He discussed methodologies used in the Department's risk assessment process, his concerns about the lack of comparative risk assessment between alternative technologies and omissions regarding non-cancer risks associated with dioxins.

Dr. Mary O'Brien said "all cards must be laid out on the table" and recommended that the Commission call for a preliminary alternative technologies risk assessment prior to any final decision. Chair Lorenzen asked Dr. O'Brien several questions regarding current methods/technologies for measuring dioxins.

Note: The meeting was recessed at 11:45 a.m. and reconvened at 12:20 p.m.

Lt. Colonel Marie Baldo with the Umatilla Army Depot presented a review of the Army's community outreach efforts. She also emphasized the Army's commitment to provide accurate and timely information to the public, and reiterated the Army's concerns with the increased risks to the public due to "no action" in disposing of the chemical weapons.

Don Eppenbach, Mayor of the City of Irrigon, addressed the Commission with his concerns regarding the delay of the disposal process, and said that there is "no such thing as no risk."

Frank Harkenrider, Mayor of Hermiston, expressed concern regarding the delayed timeframe that would be required for adequate consideration of alternative technologies. He indicated that the "clock was ticking" and told the Commission that "the impact on the community at this point is storage."

Don Wysocki, a member of the Citizens Advisory Commission, presented written and verbal comments. Mr. Wysocki told the Commission that "safe, expedient and fiscally responsible destruction of the Umatilla arsenal is needed. At this time only one method meets these requirements. This being incineration." He also expressed concerns regarding the risks associated with continued storage and delays in the destruction process.

Karyn Jones, speaking against incineration as Chair of Citizens for Environmental Quality and member of the Chemical Weapons Working Group, questioned the rate at which chemical weapons stored at Umatilla Army Depot were actually degrading, and proposed the possible option of a process which would separate the chemical agent from the energetics. She also expressed concern regarding potential liability issues she believes need to be resolved prior to any permitting.

Joe Troxel with Greenpeace emphasized the importance of citizen outreach/information. He noted the importance of involving the community in every aspect of the chemical destruction process.

Jeannie Patton, representing Greenpeace, provided information regarding combustion and release of dioxin into the environment. She encouraged the Commission to do all it could to achieve "zero dioxin" in any plan it approved. The also commented that the current risk assessment provided by the Department does not reflect reproductive and hormonal risks due to dioxin exposure.

Public Forum

Dr. Richard Belsey, a member of Physicians for Social Responsibility and former chair of Oregon's Hanford Site Board Advisory Committee, urged the Commission to explore alternative technologies rather than limit the focus to incineration.

E. Informational Item: Emergency Response Planning for the Umatilla Army Depot (continued)

J.R. Wilkinson, Special Sciences and Resources Program Manager, Department of Natural Resources, with the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), presented the Commission with a notebook of information and asked that it be received into the administrative record. Mr. Wilkinson read an issue update requesting an extension of time for any decision regarding disposal of chemical weapons at

Umatilla. He also requested a meeting between members of the Commission and the CTUIR Board of Trustees.

Note: Commissioner Whipple left the meeting at 1:30 p.m.

G. Action Item: Variance Application of Mr. and Mrs. William Bones

This case came before the Commission on Mr. and Mrs. Bones' appeal of the variance officer's denial of a variance, dated March 28, 1995. On April 19, 1995, Mr. and Mrs. Bones appealed the denial. On April 2, 1996, a hearings officer issued a preliminary Order and Opinion upholding the variance officer's denial.

Mr. Knudsen with the Department of Justice gave a brief review of the facts in the case. Martin Loring and Sherm Olson of the Department's Water Quality Division were available to answer the Commission's questions.

After considering the record in this case, Commissioner McMahan moved to remand the decision to a DEQ variance officer to re-evaluate the variance decision. Commissioner Eden seconded the motion was it was approved unanimously with four votes.

I. Commissioners' Reports

Chair Lorenzen asked Director Marsh to organize a Commission retreat. Chair Lorenzen indicated he viewed the retreat as an opportunity for the Commission and key DEQ staff members to review Department policy, discuss future action plans and promote communication between the Commission and DEQ staff.

J. Director's Report

Director Marsh reported to the Commission regarding a newly organized committee within DEQ to look for ways to link agency pollution prevention measures and promote communication among divisions and programs about both opportunities and concerns. The group will include representatives of each division, the Director's Office, the regions and enforcement. Greg Green, Air Quality Division Administrator, will chair the group. The charge for him and other committee members is to serve as inter-agency catalysts to integrate pollution prevention approaches into all DEQ activities.

Director Marsh reported on the performance audit report released the week of May 6, 1996, by the Secretary of State. The report questioned the agency's commitment to regulatory enforcement of hazardous waste management rules and permits. The report called for increased enforcement and site inspections coupled with reduced technical assistance and pollution prevention efforts. Director Marsh pointed out that the audit position conflicts with several years of direction from the Commission, the Governor's office, the State Legislature and the EPA. The Department's response to the audit report emphasized continued commitment to enforcement balanced with work to reduce waste production at the front end of manufacturing processes.

Director Marsh also presented information regarding three public hearings to be held in the Portland area the week of May 20, 1996, to share information and take public comment on the proposed Portland Air Quality Maintenance plans for both ozone and carbon monoxide. Department staff will make an outreach effort in the next several months to increase public knowledge and understanding of the plans, particularly the enhanced vehicle inspection program. These proposals will be considered by the Commission at the July 12, 1996, meeting.

Director Marsh updated the Commisison on the status of the 303(d) list preparation and reviewed details of the fine that was issued in April by DEQ against Hyundai in Eugene. As requested by Chair Lorenzen, Director Marsh provided a status report on the progress of the total dissolved gas research process, and proposed that a National Marine Fisheries Service, Oregon Department of Fish and Wildlife or Columbia Inter Tribal Fish commission staff representative attend future Commission meetings to provide a brief status report.

There was no further business and Chair Lorenzen adjourned the meeting at 2:25 p.m.

Environmental Quality Commission

☐ Rule Adoption Item
X Action Item
☐ Information Item

Agenda Item B
July 12, 1996 Meeting

Title:

Approval of Tax Credit Applications

Summary:

New Applications - Fourteen (14) tax credit applications with a total facility cost of $ 1,631,627 are recommended for approval as follows:

- 1 Air Quality facility with a facility cost of:	$345,538
- 5 Air Quality CFC facilities with a total facility cost of:	$ 9,342
- 2 Field Burning related facilities recommended by the Department of Agriculture with a total facility cost of:	$301,678
- 1 Noise Pollution Abatement facility with a facility cost of:	$ 25,780
- 1 Plastics Recycling facility having a facility cost of:	$ 35,000
- 1 Solid Waste Recycling facility with a facility cost of:	$ 18,194
- 1 Water Quality facility with a facility cost of:	$577,180
- 2 Water Quality Underground Storage Tank (UST) facilities with a total cost of:	$318,915

Two applications with claimed facility cost exceeding $250,000 were reviewed by independent accounting firm contractors The review statements are attached to the application reports.

Three applications are recommended for denial and one certification is recommended for revocation in this report.

Department Recommendation:

Approve issuance of tax credit certificates for 14 applications as presented in Attachment A of the staff report.

Deny applications 4288 (Intel), 4330 (Chevron, USA), and 4461 (Portland General Electric) for the reasons discussed in this report.

Revoke tax credit certificate 3371 (Oregon Steel Mills) because the facility is not operating to prevent or control pollution.

Report Author Division Administrator Director

June 24, 1995

†Accommodations for disabilities are available upon request by contacting the Public Affairs Office at (503)229-5317(voice)/(503)229-6993(TDD).

State of Oregon
Department of Environmental Quality

Memorandum[†]

Date: July 12, 1996

To: Environmental Quality Commission

From: Langdon Marsh, Director

Subject: Agenda Item B, July 12, 1996 EQC Meeting

Approval of Tax Credit Applications

Statement of the Need for Action

This staff report presents the staff analysis of pollution control facilities tax credit applications and the Department's recommendation for Commission action on these applications. The following is a summary of the applications presented in this report:

Tax Credit Application Review Reports:

Application No.	Applicant	Description
TC 4545	Quail Mountain, Inc. $35,000	A Plastics Product Recycling Facility consisting of a GPI System 1060 Baler.
TC 4546	Elliott's Auto Service $1,195	An Air Pollution Control CFC Facility consisting of equipment that removes and recycles automobile air conditioner coolant.
TC 4547	Elliott's Auto Service $1,195	An Air Pollution Control CFC Facility consisting of equipment that removes and recycles automobile air conditioner coolant.
TC 4562	Woodstock Texaco, Inc. $1,862	An Air Pollution Control CFC Facility consisting of equipment that removes and cleans automobile air conditioner coolant.

[†]A large print copy of this report is available upon request.

Application No.	Applicant	Description
TC 4565	Scott's Inc. Dba Hilltop Shell $3,795	An Air Pollution Control CFC Facility consisting of equipment that removes and cleans automobile air conditioner coolant.
TC 4586	Beaverton Auto Rebuilders, Inc. $1,295	An Air Pollution Control CFC Facility consisting of equipment that removes and recycles automobile air conditioner coolant.
TC 4590	Willamette Industries KorPine Division $18,194	A Solid Waste Recycling Facility consisting of equipment enhancements to an existing facility that removes nails and other ferrous materials from "urban woodwaste" in processing particleboard.
TC 4597	Oregon Rootstock & Tree Co., Inc. Dba TRECO $148,842	An Air Pollution Control "Field Burning" Facility consisting of a 110' x 110' x 24' steel framed grass straw storage building.
TC 4605	Northwest Pipeline Corporation $25,780	An Air Pollution Control Noise Pollution Abatement Facility consisting of a Mueller relief valve silencer.
TC 4615	Carl Jensen Farms $152,836	An Air Pollution Control "Field Burning" Facility consisting of a straw storage building, an RMC WR40 40' wheel rake, a Steffens fork lift attachment, a 1983 Kenworth truck, a 330 Freeman baler and a 1980 Road Runner hay squeeze.
TC 4619	Stein Oil Co., Inc. $193,339/90%	A Water Pollution Control Underground Storage Tank (UST) Facility consisting of three doublewall fiberglass tanks and piping, spill containment basins, a tank gauge system with overfill alarm, sumps an oil/water separator and Stage II vapor recovery equipment.

Application No.	Applicant	Description
TC 4620	Stein Oil Co., Inc. $125,576/90%	A Water Pollution Control Underground Storage Tank (UST) Facility consisting of three doublewall fiberglass tanks and piping, spill containment basins, a tank gauge system with overfill alarm, line leak detectors, sumps, monitoring wells, automatic shutoff valves and Stage II vapor recovery equipment.

Tax Credit Application Review Reports With Facility Costs Exceeding $250,000 (Accountant Review Reports Attached).

Application No.	Applicant	Description
TC 4468	Fred Meyer, Inc. $577,180	A Water Pollution Control Facility consisting of a 30,000 gallon per day wastewater treatment plant.
TC 4473	Portland General Electric Company (Boardman Plant) $345,538	An Air Pollution Control Facility consisting of a multi-component continuous emissions monitoring (CEM) system designed to measure, control and record sulfur dioxide and nitrogen dioxide emissions.

Background and Discussion of Issues

The following discussion pertains to a claim for tax credit relief that is recommended for approval in this report.

Portland General Electric Company TC 4473 (Indirect Costs)

Tax Credit Application 4473 claims actual costs of $337,321 for a continuous emissions monitoring system, which measures, controls and records sulfur dioxide and nitrogen dioxide emissions at the applicant's Boardman, Oregon plant. The facility is eligible for pollution control tax credit relief under the statutes and rules governing the Program because the principal purpose of the facility is to comply with a requirement imposed by the EPA and the DEQ to control air pollution. The applicant used its own labor force as well as contractual services to install the facility. In addition to claiming PGE direct labor costs, the applicant claimed indirect costs associated with the project using an allocation methodology that was developed and is used internally by the applicant for costing capital projects. The

applicant also claimed capitalized costs for property taxes related to plant assets at the site and "material loading" costs that represent an allocation of estimated storage and related indirect costs associated with items that were purchased from PGE stores. Costs pertaining to the training of personnel to operate the equipment were also claimed.

Indirect costs are claimed for vacation and leave time, employee benefits, payroll taxes and injury and damage insurance costs and these costs are stratified according to whether they pertain to: a) corporate; b) generation transmission and engineering (project planning) or c) general operations supervision and engineering functions. Costs for general operations supervision and engineering were incurred both at and away from the site. Separate allocations were also made for costs pertaining to floor space and for executive supplemental retirement plans.

Neither the statutes nor the Rules specify whether indirect costs are to be considered actual costs or are deemed to be the taxpayer's cash investment in a pollution control facility. Such costs are, however, required to be capitalized in accordance with generally accepted accounting practices.

In evaluating the claim the Department, with the assistance of the accounting firm Merina, McCoy Gerritz, attempted to determine whether indirect and other capitalized costs should be considered reasonable and customary in the context of the Pollution Control Facility Tax Credit Program. In doing so the Department determined that the methodology used by the applicant to estimate the indirect costs associated with the installation of the claimed facility is the same that is used for internal cost accounting purposes by the applicant and appears to be a reasonable approach for attributing such costs to its capital projects. The Department further found that the amounts claimed accurately represented the indirect costs as calculated by the applicant's costing methodology. The accountant's review and an addendum that presents in greater detail the methodology and cost allocation procedure used by the applicant to calculate overhead costs are included with the staff report.

The Department proposes to allow the direct costs for contract labor, materials and equipment and services and for PGE labor, fringe benefit costs associated with PGE labor, employee expenses directly related to the facility's installation, training costs associated with the initial operation of the equipment and the cost of materials used on the project that were purchased by PGE prior to and during the construction of the facility. The Department also proposes to allow construction overhead costs that are estimated by PGE to apply to the supervision and administrative support of PGE direct labor at the site. The Department proposes to disallow costs for a maintenance contract to cover future maintenance of the facility, materials loading costs, which are overhead costs that are estimated to be associated with the storage and distribution of materials that were stored and used in the construction of the facility and capitalized property taxes. The Department also proposes to disallow construction overhead costs that are associated with estimated off-site costs for purposes such as corporate executive, planning and budgeting, off-site engineering and other related overhead as well as for executive supplemental retirement plan and floor space allocation overhead.

In proposing that certain of the claimed costs be disallowed the Department seeks to limit claims to the actual cash investment of the applicant for the one-time installation of the pollution control facility and to exclude costs that have a tenuous relationship with the specific facility that has been installed. Moreover, the Department believes that the intent of the statute is not to include costs for project financing, property taxes or similar costs even though they are required by accounting procedures to be capitalized. Moreover, costs associated with the future operation of a facility such as for spare parts or maintenance contracts have always been denied because they are not restricted to the time frame of the installation of the facility.

The following pertains to claims for tax credit relief that are being recommended for denial or revocation in this report.

Intel Corporation TC 4288 (AME etching system)

The applicant claims costs for an AME etching system that is used to etch the surface of silicon wafers. The system uses Boron Trichloride, instead of Carbon Tetrachloride, which was required by the previous system, to remove aluminum from the surface of silicon wafers. The production of Carbon Tetrachloride, a carcinogen and ozone depletion agent, is required to be phased out of production under the Clean Air Act.

After an intensive evaluation of alternatives, the Department, with the advice of the Office of the Attorney General, has concluded that the claimed facility does not meet the eligibility requirements of the Pollution Control Facility Tax Credit Program. It is the Department's view that the facility does not meet the "principal purpose' eligibility test because there is no requirement imposed by the Federal Environmental Protection Agency, the DEQ or a regional air pollution authority on the applicant to install the facility. Moreover, the facility cannot meet the "sole purpose" eligibility requirement because its does not have as its exclusive purpose the prevention or control of a substantial quantity of pollution (OAR 340-16-025 (1) (a) & (b). A staff report and the written advice of the Office of the Attorney General are included in this report.

Oregon Steel Mills (Tax Credit Certificate 3371)

On December 2, 1994, the applicant was granted tax credit certification for the facility cost of $12,017,469 for the cost of a baghouse dust glassification facility (Certificate # 3371) located in Portland. On May 3, 1995 Oregon Steel Mills notified the Department that the facility was being closed temporarily as of March 15, 1995. The firm's notification letter (enclosed in this report) indicated that the facility would be restarted "when the economics warrant". The applicant indicated to the Department that it has claimed tax credit relief for 1994 and may claim relief for tax year 1995. Neither the statute nor the administrative rules governing the program stipulate a minimum time period that a facility must operate during a given year to be eligible for claiming a full year's worth of credit.

ORS 315.304(4)(b) does, however, prohibit claiming a tax credit if a facility does not operate during a tax year. The Department staff has confirmed that as of May 30, 1996 the facility was not operating and that there are no specific plans to restart operations in 1996 or 1997.

Under the provisions of ORS 468.185(1)(b), the Commission may order revocation of a tax credit certification (pursuant to the procedures for a contested case hearing (ORS 183.310-183.550), if it finds that the holder of the certificate has failed substantially to operate the facility for the purpose of and to the extent necessary for preventing, controlling or reducing pollution. Given the circumstances, the Department believes that it would be appropriate for the Commission to revoke certificate 3371 at this time. At such time as the facility is placed into operation on a continuous basis the Commission may reinstate the tax credit certification under the provisions of ORS 468.185 (5).

Other tax credits recommended for denial/rejection

The following applications are recommended for denial:

Application 4330, Chevron Corporation, Aboveground Storage Tanks, Claimed Facility Cost $1,389,664.65. On numerous occasions the Department requested information from the applicant to substantiate its claim for costs pertaining to the facility. On November 6, 1995, the Department advised the applicant that if a response was not received within 180 days the Department would be required by the Rules ((OAR 340-16-020(1)(h)) to reject the application. No response was received nor did the applicant request an extension of time to complete the filing of the application. The Department therefore notified the applicant that the application was rejected. Failure of the applicant to respond also resulted in the violation the two-year application time constraint since the facility was substantially completed on August 31, 1993. A staff report and the Department's latest letter to the applicant are included in this report.

Application 4461, Portland General Electric Company, Increased HRSG and Auxiliary Boiler Stack, Claimed Facility Cost $401,789. The Air Quality Division has determined that this facility is ineligible for tax credit relief because it does not prevent, reduce or control pollution and therefore fails to meet the eligibility criteria for a pollution control facility. A staff report and the Department's letter to the applicant are included in this report.

Other Issues

1) A 1995 amendment to the Pollution Control facilities Tax Credit Statute ((ORS 468.190 (3)) restricted the application of cost allocation methodologies that can apply to facilities not exceeding $50,000 of certifiable costs to that based upon a ratio of the time that a facility is used for pollution control purposes. All other methodologies, including the return on investment approach, are null and void for facilities of $50,000 or less. At the May 17, 1996 meeting of the Commission, the Department

recommended approval of tax credit 4596 (McKee Farms), a Field Burning facility, for the certified cost of $22,200 with 92% of the cost allocable to pollution control. The cost allocation was derived from a calculation of the return on investment for the facility. This was an oversight. The correct application of the statutes should have resulted in the approval of the claim for 100% of the certifiable cost.

2) It has been the practice to use the cost allocation methodology to reduce the certified value of Air Pollution Control CFC facilities that have the capability to recharge air conditioning systems. This was done by calculating the ratio of the estimated value of this facet of the equipment ($700.00) to the value of the facility subtracted from 100%. This is no longer allowable under the revised statute. In the future the Department proposes simply to subtract the estimated value of the recharging enhancement from the eligible cost of the facility. This is proper, we believe, because the rationale for reducing the facility cost is that the recycling capability "makes an insignificant contribution to pollution control". This has always been the rationale for disallowing these costs. If the Commission approves the new approach, the Air Quality Division will continue to survey the market for this equipment periodically to determine the additional value of the recharging capability. The Department will also explore alternative approaches to allocating these costs.

3) At the meeting of May 17, 1996, the Commission asked the Department to explore developing a methodology to allocate the pollution control related costs of multi-use vehicles e.g., trucks, tractor-trailers, trailer beds, etc. that are frequently claimed under "field burning" type applications. A precedent exists for applying such a methodology to tractors, which allows for cost allocation on the basis of the estimated number of hours that a tractor would have to be in use for straw reclamation purposes in order for it to be considered in full-time use for that purpose. The current practice is to evaluate claims on a case-by-case basis and where a determination is made that a facility is not used 100% for pollution control the percentage allocable is reduced accordingly. Recent examples where this occurred include tax credit applications 4596 (baler), 4388 (stack wagon), and 4309 (disc). These claims were reduced by 8%, 10%, and 20% respectively, because the facilities were determined to be used for purposes other than field burning processes.

Representatives of the Department and Department of Agriculture with the assistance of grass seed straw farm representatives evaluated alternative methodologies and determined that an allocation methodology based upon the percentage of acreage that is under cultivation for grass seed versus other purposes is appropriate. For example, if an applicant has 50% of his total acreage in grass seed and the remainder in other crops, the percent allocable of a truck claimed as a pollution control facility would be 50%. The underlying premise is that the percentage of time the facility would be used for pollution control purposes corresponds closely to the percentage of acreage that is under grass seed cultivation and that, given this, facility claims of $50,000 or less could be evaluated under this methodology. Given that this approach is straightforward and appears to be fair to all applicants, the Department and the DOA believe that it should be extended to cover tractors also, supplanting the current methodology.

A drawback of the approach that is currently used for evaluating the cost allocation of tractors is that it can discriminate against the small farmer, who may never be able to receive approval of 100% of a tractor facility's cost even though the facility may be used exclusively for pollution control purposes. This is simply because insufficient land is available for cultivation. On the other hand, the current methodology could still be applied in situations where, for a large farming operation, an applicant claims that a tractor was purchased exclusively for field burning operations even though not all of the applicant's acreage is in grass seed.

Tax credit application 4615, Carl Jensen Farms, claims a truck and a forklift attachment as a portion of its total claim. These facilities have the potential to be used for purposes other than grass seed production. The applicant cultivates a total acreage of 1,774 acres, 1674 of which is in grass seed and 100 of which is in blueberries. Blueberries, therefore, comprise 5.6% of the total acreage under cultivation.

Using the proposed methodology, the 5.6% figure would be applied to the claimed cost of the truck ($5,500) and the forklift attachment ($2,581) producing a value of $452.54. This figure is 0.3% of the total certifiable claimed cost of the facility. Because of the fact that this is less than 1% of the certifiable cost, the application of the proposed methodology does not reduce the cost of the claimed facility that is allocable to pollution control. However, had the truck been purchased new or had the non-grass seed acreage been greater, the methodology would have reduced the cost allocable commensurately.

Authority to Address the Issue

ORS 468.150 through 468.190 and OAR 340-16-005 through 340-16-050 (Pollution Control Facilities Tax Credit).

ORS 468.925 through 468.965 and OAR 340-17-010 through 340-17-055 (Reclaimed Plastic Product Tax Credit).

Alternatives and Evaluation

Portland General Electric Company Tax Credit 4473

Portland General Electric claimed indirect as well as direct labor and contractual costs for the installation of their continuous emissions monitoring system at the Boardman plant (See Background discussion). The Commission has various options for determining the appropriate approach for evaluating indirect costs. These include:

1) allow all indirect costs if the methodology for attributing these costs is reasonable and is the same methodology used for other purposes by the applicant. This has been determined to be the case for this applicant. Were all indirect/overhead costs (including material loading costs) to be allowed, the eligible facility cost for this claim would increase to $366,486 from the Department's recommendation of $345,538. A corollary alternative would be to allow all justifiable indirect costs up to a defined percentage of direct costs e.g. 25 or 50% of direct costs. The selection of a reasonable percentage would be essentially arbitrary but would be intended to provide the applicant with a fair appraisal of such estimated costs.

2) disallow all indirect/overhead costs. This is consistent with the Business Energy Tax Credit Program approach and would result in recommended eligible costs of $335,748 or $321,895, depending upon whether or not direct labor fringe benefits were allowed.

3) allow certain indirect/overhead costs and not others (the Department's recommendation). As in alternative 1, a corollary to this approach is to allow defined indirect costs to be claimed up to a set percentage of direct labor costs e.g. 25 or 50%.

Approaches 1 and 2 have the advantage of simplicity. Moreover, there is nothing in the statutes or the Rules that govern the Program that speak to whether indirect and overhead costs are claimable. However, the instructions provided with the application form do cite indirect costs as being claimable. The derivation of this provision has not been able to be determined.

Approach 3 requires the Commission to determine which indirect and overhead costs are appropriate costs under the statutes and rules and requires the Department and its contractors to evaluate carefully both the applicant's costing methodology and the elements of costs that are claimed for each application for which such costs are claimed. This is costly and time-consuming both for the Department and for the applicant. However, one objective of the Department's recommendation is to define which costs are reasonable and to simplify the evaluation process.

Oregon Steel Mills Revocation Proposal

The Commission has the options of 1) revoking the certificate, which will force the certificate holder to apply for recertification at such time as the facility is operating on a continuous basis to reduce pollution and to produce a saleable product; 2) advising the applicant that the certificate will be revoked if the facility is not operating by a specified future date e.g., 12/31/96, according to the provisions of the statutes and Rules. This was done in the case of the Riedel Environmental Services situation where the facility was partially destroyed by fire; and 3) rely upon the applicant to notify the Department when the facility is in operation. The Rules do not require that action be taken by the Commission; they provide only that the Commission may take action, if deemed appropriate.

The Department is recommending the first alternative because it provides the Commission the opportunity to determine when the facility is meeting the pollution control requirements without the need to further monitor the operation of the facility.

Summary of Any Prior Public Input Opportunity

The Department does not solicit public comment on individual tax credit applications during the staff application review process. Opportunity for public comment exists during the Commission meeting when the applications are considered for action.

Conclusions

- The recommendations for action on the attached applications are consistent with statutory provisions and administrative rules related to the pollution control facilities and reclaimed plastic product tax credit programs.

- Proposed July 12, 1996 Pollution Control Tax Credit Totals:

Certificates	Certified Certified Costs*	Allocable Costs**	No.
Air Quality	$ 345,538	$ 345,538	1
CFC	9,342	9,342	5
Field Burning	301,678	301,678	2
Noise	25,780	25,780	1
Hazardous Waste	0	0	0
Plastics	35,000	35,000	1
SW - Recycling	18,194	18,194	1
SW - Landfill	0	0	0
Water Quality	577,180	577,180	1
UST	318,915	287,023	2
TOTALS	$1,631,627	$1,599,735	14

o Calendar Year Totals Through May 17, 1996:

Certificates	Certified Costs*	Certified Allocable Costs**	No.
Air Quality	0	0	0
CFC	0	0	0
Field Burning	292,409	215,356	6
Noise	0	0	0
Hazardous Waste	25,095	25,095	2
Plastics	10,123	10,123	1
SW - Recycling	0	0	0
SW - Landfill	0	0	0
Water Quality	263,045	263,045	2
UST	413,039	376,706	3
TOTALS	$1,003,711	$890,325	14

*These amounts represent the total facility costs. The actual dollars that can be applied as credit is calculated by multiplying the total facility cost by the determined percent allocable and dividing by 2.

**These amounts represent the total eligible facility costs that are allocable to pollution control. To calculate the actual dollars that can be applied as credit, the certifiable allocable cost is multiplied by 50 percent.

Recommendation for Commission Action

A) The Department recommends that the Commission approve certification for the tax credit applications as presented in Attachment A of the Department Staff Report.

B) The Department recommends that the Commission deny applications 4288 (Intel), 4330 (Chevron Corporation), and 4461 (Portland General Electric Company) for the reasons indicated in this report. The Department further recommends that the Commission revoke tax credit certificate 3371 (Oregon Steel Mills) because the facility is no longer operating to prevent, control or reduce pollution.

C) The Department also recommends approval of the proposed methodology for allocating the costs of farm vehicles for pollution control purposes. The Department further recommends that this time allocation methodology be applied to tractors also, supplanting the current cost allocation approach for these facilities.

D) The department further recommends that tax credit certificate, 3615, McKee Farms, be reissued in the amount of $22,200 with 100% of the cost of the facility allocable to pollution control.

Intended Follow-up Actions

Notify applicants of Environmental Quality Commission actions.

Attachments

A. Pollution Control Tax Credit Application Review Reports.

Reference Documents (available upon request)

1. ORS 468.150 through 468.190.
2. OAR 340-16-005 through 340-16-050.
3. ORS 468.925 through 468.965.
4. OAR 340-17-010 through 340-17-055.

Approved:

Section:

Division:

Report Prepared By: Charles Bianchi
Phone: 229-6149
Date Prepared: June 24, 1996

Charles Bianchi
JULYEQC

Application No. TC-4545

State of Oregon
Department of Environmental Quality

RECLAIMED PLASTIC TAX CREDIT
TAX RELIEF APPLICATION REVIEW REPORT

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1. Applicant

Quail Mountain, Inc.
dba Pepsi Cola Bottling of Klamath Falls
4033 Miller Avenue
Klamath Falls, OR 97603

The applicant is a beverage distribution company that also recycles beverage containers returned under the Oregon Bottle Bill as well as other recyclable materials.

Application was made for Reclaimed Plastic Tax Credit.

2. Description of Equipment, Machinery or Personal Property

The claimed equipment consisting of a GPI System 1060 Baler serial #60166XDRC.

The claimed facility investment costs: $35,000

A copy of the invoice for the baler and accountant's review statement were provided.

3. Procedural Requirements

The investment is governed by ORS 468.451 through 468.491, and by OAR Chapter 340, Division 17.

The investment met all statutory deadlines in that:

a. The request for preliminary certification was received on November 2, 1995. The request for preliminary certification was approved and the 30 day waiting period was waived on November 8, 1995

b. The investment was made on January 19, 1996

d. The request for final certification was submitted on February 28, 1996 and was filed complete on that day.

4. Evaluation of Application

a. The investment is eligible because the equipment is necessary to process reclaimed plastic.

b. Allocable Cost Findings

In determining the portion of the investment costs properly allocable to reclaiming and recycling plastic material, the following factors from ORS 468.486 have been considered and analyzed as indicated:

1) The extent to which the claimed collection, transportation, processing or manufacturing process is used to convert reclaimed plastic into a salable or usable commodity.

The claimed facility is necessary to bale the plastic bottles to be shipped to plastics recyclers for recycling.

2) Any other factors which are relevant in establishing the portion of the actual cost of the investment properly allocable to the collection, transportation or processing of reclaimed plastic or to the manufacture of a reclaimed plastic product.

No other factors were considered relevant.

The actual cost of the investment properly allocable to processing reclaimed plastic as determined by using these factors is 100%.

5. Summation

a. The investment was made in accordance with all regulatory deadlines.

b. The investment is eligible for final tax credit certification in that the equipment is necessary to manufacture a reclaimed plastic product.

c. The qualifying business complies with DEQ statutes and rules.

d. The portion of the investment cost that is properly allocable to reclaiming and recycling plastic is 100%.

6. Director's Recommendation

Based upon these findings, it is recommended that a Reclaimed Plastic Tax Credit Certificate bearing the cost of $35,000, with 100% allocated to reclaiming plastic material, be issued for the investment claimed in Tax Credit Application No. TC-4545.

Peter Spendelow
SWRSHARE (J:)\TAXCRED\TC4545PL.STA
(503) 229-5253
April 30, 1996

Application No. TC-4546

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

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1. Applicant

Elliott's Auto Service
4516 Sunnyside Rd. SE
Salem, OR 97302

The applicant owns and operates an automotive repair shop in Salem, Oregon.

Application was made for tax credit for an air pollution control facility which is owned by the applicant.

2. Description of Facility

Facility is a machine which removes and cleans auto air conditioner coolant. The machine is self contained and includes pumps, tubing, valves and filters which rid the spent coolant of oil, excess air, water, acids and contaminant particles.

The applicant has identified the useful life of the equipment to be 5 years.

Claimed Facility Cost: $,1895
(Costs have been documented)

A distinct portion of this automobile air conditioning coolant recovery and recycling equipment makes an insignificant contribution to the principal purpose of the claimed facility. This coolant recovery equipment has the capability to return (recharge) coolant to automobile air conditioning systems. Recharge capabilities in coolant recovery and recycling equipment is not required by state or federal law. The additional expense incurred in the purchase of equipment with recharge capabilities is not allocable to pollution control. The Department estimates the additional expense incurred is $700.00.

Adjusted Facility Cost: $1,195

3. Procedural Requirements

The facility is governed by ORS 468.150 through 468.190, and by OAR Chapter 340, Division 16.

Installation of the facility was substantially completed on December 15, 1994. The facility was placed into operation on December 15, 1994. The application for final certification was submitted to the Department on October 31, 1995, within two years of substantial completion of the facility. The application was found to be complete on March 28, 1996.

4. Evaluation of Application

a. The facility is eligible because the sole purpose of the facility is to reduce air pollution. This reduction is accomplished by capturing and/or recycling air contaminants, as defined in ORS 468.275.

Eligible equipment must be certified by Underwriters Laboratory (UL) as meeting the requirements and specifications of UL1963 and the Society of Automotive Engineers (SAE) standards, J2210, or other requirements and specifications determined by the Department as being equivalent. The facility meets these requirements.

b. Eligible Cost Findings

In determining the percent of the facility cost allocable to pollution control, the following factors from ORS 468.190 (3) have been considered and analyzed as indicated:

1) The ratio of the time the facility is used for prevention, control, or reduction of air pollution to the entire time the facility is used for any purpose.

The adjusted facility cost represents the cost of the air conditioner coolant recovery and recycling equipment. Recovery and recycling of air conditioner coolant is performed to satisfy an Environmental Protection Agency requirement for air pollution control.

2) The alternative methods, equipment and costs for achieving the same pollution control objective.

Air conditioner coolant recovery and recycling equipment are recognized to be an acceptable approach for preventing the emission of air conditioner coolant to the atmosphere.

3) Any other factors which are relevant in establishing the portion of the actual cost of the facility properly allocable to the prevention, control or reduction of air, water or noise pollution or solid or hazardous waste or to recycling or properly disposing of used oil.

Other than the adjustment to the claimed facility cost referenced in Section 2, the cost allocation review of this application has identified no issues to be resolved and confirms the cost allocation as submitted in the application. The principal purpose of the facility is to control a substantial quantity of air pollution.

The actual cost of the facility properly allocable to pollution control as determined by using these factors is 100%.

5. Summation

a. The facility was constructed in accordance with all regulatory deadlines.

b. The facility is eligible for tax credit certification in that the sole purpose of the facility is to reduce air pollution.

c. The facility complies with DEQ statutes and rules.

d. The portion of the facility cost that is properly allocable to pollution control is 100%.

6. Director's Recommendation

Based upon these findings, it is recommended that a Pollution Control Facility Certificate bearing the cost of $1,195 with 100% allocated to pollution control, be issued for the facility claimed in Tax Credit Application No. 4546.

Dennis E. Cartier
SJO Consulting Engineers

March 28, 1996

Application No. 4547

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

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1. Applicant

Elliott's Auto Service
4516 Sunnyside Rd. SE
Salem, OR 97302

The applicant owns and operates an auto repair business in Salem, Oregon.

Application was made for tax credit for an air pollution control facility which is owned by the applicant.

2. Description of Facility

The facility is a machine which removes and cleans auto air conditioner coolant. The machine is self contained and includes pumps, tubing, valves and filters which rid the spent coolant of oil, excess air, water, acids and contaminant particles.

The applicant has identified the useful life of the equipment to be 5 years.

Claimed Facility Cost: $1,895
(Costs have been documented)

A distinct portion of this automobile air conditioning coolant recovery and recycling equipment makes an insignificant contribution to the principal purpose of the claimed facility. This coolant recovery equipment has the capability to return (recharge) coolant to automobile air conditioning systems. Recharge capabilities in coolant recovery and recycling equipment is not required by state or federal law. The additional expense incurred in the purchase of equipment with recharge capabilities is not allocable to pollution control. The Department estimates the additional expense incurred is $700.00.

Adjusted Facility Cost: $1,195

3. Procedural Requirements

The facility is governed by ORS 468.150 through 468.190, and by OAR Chapter 340, Division 16.

Installation of the facility was substantially completed on December 15, 1994. The facility was placed into operation on December 15, 1994. The application for final certification was submitted to the Department on October 31, 1995. The application was found to be complete on March 28, 1996, within two years of substantial completion of the facility.

4. Evaluation of Application

a. The facility is eligible because the principal purpose of the facility is to comply with a requirement imposed by the Department, to reduce air pollution. This reduction is accomplished by capturing and/or recycling air contaminants, as defined in ORS 468.275. The requirement is to comply with ORS 468.612-621 and OAR 340-22-410 to 415.

Eligible equipment must be certified by Underwriters Laboratory (UL) as meeting the requirements and specifications of UL1963 and the Society of Automotive Engineers (SAE) standards, J1990 and J1991, or other requirements and specifications determined by the Department as being equivalent. The facility meets these requirements.

b. Eligible Cost Findings

In determining the percent of the facility cost allocable to pollution control, the following factors from ORS 468.190 (3) have been considered and analyzed as indicated:

1) The ratio of the time the facility is used for prevention, control, or reduction of air pollution to the entire time the facility is used for any purpose.

The adjusted facility cost represents the cost of the air conditioner coolant recovery and recycling equipment. Recovery and recycling of air conditioner coolant is performed to satisfy an Environmental Protection Agency requirement for air pollution control.

2) The alternative methods, equipment and costs for achieving the same pollution control objective.

Air conditioner coolant recovery and recycling equipment are recognized to be an acceptable approach for preventing the emission of air conditioner coolant to the atmosphere.

3) Any other factors which are relevant in establishing the portion of the actual cost of the facility properly allocable to the prevention, control or reduction of air, water or noise pollution or solid or hazardous waste or to recycling or properly disposing of used oil.

Other than the adjustment to the claimed facility cost referenced in Section 2, the cost allocation review of this application has identified no issues to be resolved and confirms the cost allocation as submitted in the application. The principal purpose of the facility is to control a substantial quantity of air pollution.

The actual cost of the facility properly allocable to pollution control as determined by using these factors is 100%.

5. Summation

a. The facility was constructed in accordance with all regulatory deadlines.

b. The facility is eligible for tax credit certification in that the principal purpose of the facility is to comply with a requirement imposed by the Department, to reduce air pollution.

c. The facility complies with DEQ statutes and rules.

d. The portion of the facility cost that is properly allocable to pollution control is 63%.

6. Director's Recommendation

Based upon these findings, it is recommended that a Pollution Control Facility Certificate bearing the cost of $1,195 with 100% allocated to pollution control, be issued for the facility claimed in Tax Credit Application No. 4547.

Dennis E. Cartier
SJO Consulting Engineers
March 28, 1996

Application No. TC-4562

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

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1. Applicant

Woodstock Texaco, inc.
4228 SE Woodstock
Portland, OR 97206

The applicant owns and operates a retail gasoline station in Portland, Oregon.

Application was made for tax credit for an air pollution control facility which is owned by the applicant.

2. Description of Facility

Facility is a machine which removes and cleans auto air conditioner coolant. The machine is self contained and includes pumps, tubing, valves and filters which rid the spent coolant of oil, excess air, water, acids and contaminant particles.

The applicant has identified the useful life of the equipment to be seven years.

Claimed Facility Cost: $1862
(Costs have been documented)

3. Procedural Requirements

The facility is governed by ORS 468.150 through 468.190, and by OAR Chapter 340, Division 16.

Installation of the facility was substantially completed on August 8, 1995. The facility was placed into operation on August 8, 1995. The application for final certification was submitted to the Department on December 7, 1995. The application was found to be complete on April 22, 1996, within two years of substantial completion of the facility.

4. Evaluation of Application

a. The facility is eligible because the principal purpose of the facility is to comply with a requirement imposed by the Department, to reduce air pollution. This reduction is accomplished by capturing and/or recycling air contaminants, as defined in ORS 468.275. The requirement is to comply with ORS 468.612-621 and OAR 340-22-410 to 415.

Eligible equipment must be certified by Underwriters Laboratory (UL) as meeting the requirements and specifications of UL1963 and the Society of Automotive Engineers (SAE) standards, J1990 and J1991, or other requirements and specifications determined by the Department as being equivalent. The facility meets these requirements.

b. Eligible Cost Findings

In determining the percent of the facility cost allocable to pollution control, the following factors from ORS 468.190 (3) have been considered and analyzed as indicated:

1) The ratio of the time the facility is used for prevention, control, or reduction of air pollution to the entire time the facility is used for any purpose.

The adjusted facility cost represents the cost of the air conditioner coolant recovery and recycling equipment. Recovery and recycling of air conditioner coolant is performed to satisfy an Environmental Protection Agency requirement for air pollution control.

2) The alternative methods, equipment and costs for achieving the same pollution control objective.

Air conditioner coolant recovery and recycling equipment are recognized to be an acceptable approach for preventing the emission of air conditioner coolant to the atmosphere.

3) Any other factors which are relevant in establishing the portion of the actual cost of the facility properly allocable to the prevention, control or reduction of air, water or noise pollution or solid or hazardous waste or to recycling or properly disposing of used oil.

There are no other factors to consider in establishing the actual cost of the facility properly allocable to the control of pollution. The principal purpose of the facility is to prevent a substantial quantity of air pollution.

The actual cost of the facility properly allocable to pollution control as determined by using these factors is 100%.

5. Summation

a. The facility was constructed in accordance with all regulatory deadlines.

b. The facility is eligible for tax credit certification in that the principal purpose of the facility is to comply with a requirement imposed by the Department to reduce air pollution.

c. The facility complies with DEQ statutes and rules.

d. The portion of the facility cost that is properly allocable to pollution control is 100%.

6. Director's Recommendation

Based upon these findings, it is recommended that a Pollution Control Facility Certificate bearing the cost of $1,862 with 100% allocated to pollution control, be issued for the facility claimed in Tax Credit Application No. 4562.

Dennis E. Cartier
SJO Consulting Engineers
April 22, 1996

Application No. TC-4565

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

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1. Applicant

Scott's, Inc DBA Hilltop Shell
2230 W Burnside
Portland, OR 97210

The applicant owns and operates a retail gasoline service station and a auto repair shop in Portland, Oregon.

Application was made for tax credit for an air pollution control facility which is owned by the applicant.

2. Description of Facility

Facility is a machine which removes and cleans auto air conditioner coolant. The machine is self contained and includes pumps, tubing, valves and filters which rid the spent coolant of oil, excess air, water, acids and contaminant particles.

The applicant has identified the useful life of the equipment to be 3 years.

Claimed Facility Cost: $4,495
(Costs have been documented)

A distinct portion of this automobile air conditioning coolant recovery and recycling equipment makes an insignificant contribution to the principal purpose of the claimed facility. This coolant recovery equipment has the capability to return (recharge) coolant to automobile air conditioning systems. Recharge capabilities in coolant recovery and recycling equipment is not required by state or federal law. The additional expense incurred in the purchase of equipment with recharge capabilities is not allocable to pollution control. The Department estimates the additional expense incurred is $700.00.

Adjusted Facility Cost: $3,795

3. Procedural Requirements

The facility is governed by ORS 468.150 through 468.190, and by OAR Chapter 340, Division 16.

Installation of the facility was substantially completed on November 1, 1995. The facility was placed into operation on November 1, 1995. The application for final certification was submitted to the Department on December 11, 1995. The application was found to be complete on April 23, 1996 within two years of substantial completion of the facility.

4. Evaluation of Application

a. The facility is eligible because the principal purpose of the facility is to comply with a requirement imposed by the Department, to reduce air pollution. This reduction is accomplished by capturing and/or recycling air contaminants, as defined in ORS 468.275. The requirement is to comply with ORS 468.612-621 and OAR 340-22-410 to 415.

Eligible equipment must be certified by Underwriters Laboratory (UL) as meeting the requirements and specifications of UL1963 and the Society of Automotive Engineers (SAE) standards, J1990 and J1991, or other requirements and specifications determined by the Department as being equivalent. The facility meets these requirements.

b. Eligible Cost Findings

In determining the percent of the facility cost allocable to pollution control, the following factors from ORS 468.190 (3) have been considered and analyzed as indicated:

1) The ratio of the time the facility is used for prevention, control, or reduction of air pollution to the entire time the facility is used for any purpose.

The adjusted facility cost represents the cost of the air conditioner coolant recovery and recycling equipment. Recovery and recycling of air conditioner coolant is performed to satisfy an Environmental Protection Agency requirement for air pollution control.

2) The alternative methods, equipment and costs for achieving the same pollution control objective.

Air conditioner coolant recovery and recycling equipment are recognized to be an acceptable approach for preventing the

emission of air conditioner coolant to the atmosphere.

3) Any other factors which are relevant in establishing the portion of the actual cost of the facility properly allocable to the prevention, control or reduction of air, water or noise pollution or solid or hazardous waste or to recycling or properly disposing of used oil.

Other than the adjustment to the claimed facility cost referenced in Section 2, the cost allocation review of this application has identified no issues to be resolved and confirms the cost allocation as submitted in the application. The principal purpose of the facility is to control a substantial quantity of air pollution.

The actual cost of the facility properly allocable to pollution control as determined by using these factors is 100%.

5. Summation

a. The facility was constructed in accordance with all regulatory deadlines.

b. The facility is eligible for tax credit certification in that the principal purpose of the facility is to comply with a requirement imposed by the Department to reduce air pollution.

c. The facility complies with DEQ statutes and rules.

d. The portion of the facility cost that is properly allocable to pollution control is 100%.

6. Director's Recommendation

Based upon these findings, it is recommended that a Pollution Control Facility Certificate bearing the cost of $3,795 with 100% allocated to pollution control, be issued for the facility claimed in Tax Credit Application No. 4565.

Dennis E. Cartier
SJO Consulting Engineers
April 23, 1996

Application No. TC-4586

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

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1. Applicant

Beaverton Auto Rebuilders, Inc.
4150 SW 141 AVE
Beaverton, OR 97005

The applicant owns and operates an auto body repair and painting shop in Beaverton, Oregon.

Application was made for tax credit for an air pollution control facility which is owned by the applicant.

2. Description of Facility

Facility is a machine which removes and cleans auto air conditioner coolant. The machine is self contained and includes pumps, tubing, valves and filters which rid the spent coolant of oil, excess air, water, acids and contaminant particles.

The applicant has identified the useful life of the equipment to be 3 years.

Claimed Facility Cost: $1995
(Costs have been documented)

A distinct portion of this automobile air conditioning coolant recovery and recycling equipment makes an insignificant contribution to the principal purpose of the claimed facility. This coolant recovery equipment has the capability to return (recharge) coolant to automobile air conditioning systems. Recharge capabilities in coolant recovery and recycling equipment is not required by state or federal law. The additional expense incurred in the purchase of equipment with recharge capabilities is not allocable to pollution control. The Department estimates the additional expense incurred is $700.00.

Adjusted Facility Cost: $1,295

3. Procedural Requirements

The facility is governed by ORS 468.150 through 468.190, and by OAR Chapter 340, Division 16.

Installation of the facility was substantially completed on June 30, 1995. The facility was placed into operation on June 30, 1995. The application for final certification was submitted to the Department on February 5, 1996, within two years of substantial completion of the facility. The application was found to be complete on March 28, 1996.

4. Evaluation of Application

a. The facility is eligible because the sole purpose of the facility is to reduce air pollution. This reduction is accomplished by capturing and/or recycling air contaminants, as defined in ORS 468.275.

Eligible equipment must be certified by Underwriters Laboratory (UL) as meeting the requirements and specifications of UL1963 and the Society of Automotive Engineers (SAE) standards, J2210, or other requirements and specifications determined by the Department as being equivalent. The facility meets these requirements.

b. Eligible Cost Findings

In determining the percent of the facility cost allocable to pollution control, the following factors from ORS 468.190 (3) have been considered and analyzed as indicated:

1) The ratio of the time the facility is used for prevention, control, or reduction of air pollution to the entire time the facility is used for any purpose.

The adjusted facility cost represents the cost of the air conditioner coolant recovery and recycling equipment. Recovery and recycling of air conditioner coolant is performed to satisfy an Environmental Protection Agency requirement for air pollution control.

2) The alternative methods, equipment and costs for achieving the same pollution control objective.

Air conditioner coolant recovery and recycling equipment are recognized to be an acceptable approach for preventing the emission of air conditioner coolant to the atmosphere.

3) Any other factors which are relevant in establishing the portion of the actual cost of the facility properly allocable to the prevention, control or reduction of air, water or noise pollution or solid or hazardous waste or to recycling or properly disposing of used oil.

Other than the adjustment to the claimed facility cost referenced in Section 2, the cost allocation review of this application has identified no issues to be resolved and confirms the cost allocation as submitted in the application. The principal purpose of the facility is to control a substantial quantity of air pollution.

The actual cost of the facility properly allocable to pollution control as determined by using these factors is 100%.

5. Summation

a. The facility was constructed in accordance with all regulatory deadlines.

b. The facility is eligible for tax credit certification in that the sole purpose of the facility is to reduce air pollution.

c. The facility complies with DEQ statutes and rules.

d. The portion of the facility cost that is properly allocable to pollution control is 100%.

6. Director's Recommendation

Based upon these findings, it is recommended that a Pollution Control Facility Certificate bearing the cost of $1,295 with 100% allocated to pollution control, be issued for the facility claimed in Tax Credit Application No. 4586.

Dennis E. Cartier
SJO Consulting Engineers
March 28, 1996

Application TC-4590

STATE OF OREGON
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

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1. **Applicant**

Willamette Industries KorPine Division
3800 First Interstate Tower
1300 SW Fifth Avenue
Portland, OR 97201

The applicant is a wood products company. The KorPine division of Willamette Industries has a facility in Deschutes County that produces particleboard, utilizing ground "urban woodwaste" (scrap lumber and pallets) as a raw material in making particleboard.

2. **Description of Facility**

The facility consists of additions to the existing system used to clean nails and other ferrous metal from the urban woodwaste. This facility includes:

- o Retrofitting an existing electromagnet with a self-cleaning device,
- o Installing a new head spool magnet to better remove ferrous "tramp" metal, and
- o Transportation, fittings, and installation of the above.

Total cost claimed is $18,194
Invoices documenting the cost of the facility were provided.

3. **Procedural Requirements**

The facility is governed by ORS 468.150 through 468.190 and by OAR Chapter 340, Division 16.

The facility met all statutory deadlines in that:

a. Installation of the facility was started in December 1993.
b. The facility was placed into operation on February 28, 1994.
c. The application for tax credit was filed with the Department on February 12, 1996, within two years of substantial completion of the facility.

4. **Evaluation of Application**

a. The sole purpose of the facility is to prevent or reduce a substantial amount of solid waste. This prevention or reduction uses a material recovery process which obtains useful material from material that would otherwise be solid waste, pursuant to Oregon Administrative Rule 340-16-025(1)(b) and (2)(d). Willamette Industries KorPine Division in Deschutes County utilizes several thousand tons of "urban wood

waste" (such as ground-up scrap lumber and broken pallets) per month as raw material for making particleboard. The wood waste would otherwise be disposed as solid waste if it were not used in a productive manner such as this. The magnet and self-cleaning assembly are necessary to efficiently remove contaminant metals such as nails from the urban wood waste, so the wood can be used to make particleboard.

b. Eligible Cost Findings

In determining the percent of the pollution control facility cost allocable to pollution control, the following factors from ORS 468.190 have been considered and analyzed as indicated:

1) The extent to which the facility is used to recover and convert waste products into a salable or usable commodity.

The magnets and associated equipment are used 100 percent of the time for cleaning wood waste as part of the material recovery process.

2) The estimated annual percent return on the investment in the facility.

A) The Applicant has claimed a facility cost of $18,194. The Department has identified no ineligible costs relating to the installation of the self-cleaning assembly and the magnet.

B) Annual Percentage Return on Investment

ORS 468.190, as amended by Section 4 of Enrolled House Bill 2255 (1995 Session), provides that:

> "If the cost of the facility .... does not exceed $50,000, the portion of the actual costs properly allocable shall be in the proportion that the ratio of the time the facility is used for prevention, control or reduction of air, water or noise pollution or solid or hazardous waste or to recycling or appropriately disposing of used oil bears to the entire time the facility is used for any purpose."

The self-cleaning assembly and magnet are used 100% of the time as part of a recovery process for obtaining useful material from wood waste, and so the portion of costs properly allocable is 100 percent under the new statute.

The actual cost of the facility properly allocable to pollution control as determined by using these factors is 100%.

5. **Summation**

a. The facility was constructed in accordance with all regulatory deadlines.

b. The facility is eligible for tax credit certification in that the sole purpose of the self-cleaning assembly and magnet is to clean the urban wood waste as part of a material-recovery process, converting material that would otherwise be solid waste into a usable and valuable product (particleboard).

c. The facility complies with DEQ statutes and permit conditions.

d. The portion of the facility cost that is properly allocable to pollution control is 100%.

6. **Director's Recommendation**

Based upon the findings, it is recommended that a Pollution Control Facility certificate bearing the cost of $18,194 with 100% allocable to pollution control be issued for the facility claimed in Tax Credit Application TC-4590.

Peter Spendelow:phs
SWRSHARE(J:)\TAXCRED\TC4590RR.STA
(503) 229-5253
May 1, 1996

State of Oregon
Department of Agriculture

TAX RELIEF APPLICATION REVIEW REPORT

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1. Applicant

Oregon Rootstock & Tree Co., Inc.
dba TRECO
10906 Monitor-McKee Road NE
Woodburn, Oregon 97071

The applicant owns and operates a grass seed farm operation in Marion County, Oregon.

Application was made for tax credit for an air pollution control facility.

2. Description of Claimed Facility

The facility described in this application is a 110' x 110' x 24' steel framed, grass straw storage building, located at 10906 Monitor-McKee Road NE, Woodburn, Oregon. The land and the buildings are owned by the applicant.

Claimed facility cost: $148,842
(Accountant's Certification was provided.)

3. Description of Farm Operation Plan to Reduce Open Field Burning.

The applicant has 392 acres of perennial grass varieties under cultivation. As an alternative to open field burning the applicant invested in straw removal equipment to become self-sufficient in timely straw removal and field treatment.

Storage was required to keep the straw in a usable condition throughout the year or until it was given away. A previously certified (certificate number 2855) grass straw storage building was constructed in late 1991. The applicants grass straw storage needs and that of three neighbors has outgrown the capacity of the original grass straw storage building. The applicants neighbors store 215 acres in applicants straw storage buildings for a total of 615 acres stored. The storage capacity for both buildings is approximately 610 acres.

20,160 square feet of storage / 11 sq'/ton=1,832 tons /3 t/a=610 acres

4. Procedural Requirements

The facility is governed by ORS 468.150 through 468.190, and by OAR Chapter 340, Division 16. The facility has met all statutory deadlines in that:

Construction of the facility was substantially completed on December 1, 1995. The application for final certification was found to be complete on May 31, 1996. The application was filed within two years of substantial completion of the facility.

5. Evaluation of Application

a. The facility is eligible under ORS 468.150 because the facility is an approved alternative method for field sanitation and straw utilization and disposal that reduces a substantial quantity of air pollution. This reduction is accomplished by reduction of air contaminants, defined in ORS 468A.005; by reducing the maximum acreage to be open burned in the Willamette Valley as required in OAR 340-26-013; and, the facility's qualification as a "pollution control facility", defined in OAR 340-16-025(2)(f) A): "Equipment, facilities, and land for gathering, densifying, processing, handling, storing, transporting and incorporating grass straw or straw based products which will result in reduction of open field burning."

b. Eligible Cost Findings

In determining the percent of the pollution control facility cost allocable to pollution control, the following factors from ORS 468.190 have been considered and analyzed as indicated:

1. The extent to which the facility is used to recover and convert waste products into a salable or usable commodity.

The facility promotes the conversion of a waste product (straw) into a usable commodity by providing protection from the elements until the applicant can give it away.

2. The estimated annual percent return on the investment in the facility.

There is no annual percent return on the investment as applicant claims no gross annual income.

3. The alternative methods, equipment and costs for achieving the same pollution control objective.

The method chosen is an accepted method for reduction of air pollution. The method is one of the least costly, most effective methods of reducing air pollution.

4. Any related savings or increase in costs which occur or may occur as a result of the installation of the facility.

There is an increase in operating costs of $2,153 to annually maintain and operate the facility. These costs were considered in the return on investment calculation.

5. Any other factors which are relevant in establishing the portion of the actual cost of the facility properly allocable to the prevention, control or reduction of air pollution.

There are no other factors to consider in establishing the actual cost of the facility properly allocable to prevention, control or reduction of air pollution.

The actual cost of the facility properly allocable to pollution control as determined by using these factors is 100%.

6. Summation

a. The facility was constructed in accordance with all regulatory deadlines.

b. The facility is eligible under ORS 468.150 as an approved alternative method for field sanitation and straw utilization and disposal that reduces a substantial quantity of air pollution as defined in ORS 468A.005

c. The facility complies with DEQ statutes and rules.

d. The portion of the facility that is properly allocable to pollution control is 100%.

7. The Department of Agriculture's Recommendation

Based upon these findings, it is recommended that a Pollution Control Facility Certificate bearing the cost of $148,842, with 100% allocated to pollution control, be issued for the facility claimed in Tax Credit Application Number TC-4597.

Jim Britton, Manager
Smoke Management Program
Natural Resources Division
Oregon Department of Agriculture
(503) 986-4701
FAX: (503) 986-4730

JB:rc
June 12, 1996

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

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1. Applicant

Northwest Pipeline Corporation
295 Chipeta Way
P.O. Box 58900
Salt Lake City, Utah 84158-0900

The applicant owns and operates a natural gas delivery meter station located at the intersection of 242nd Avenue and N.E. Division Street, at 1010 Northeast Hogan Place in Gresham, Oregon.

Application was made for tax credit for a noise pollution control facility.

2. Description of Facility

The claimed facility consists of a Mueller relief valve silencer which was installed on the relief valve at the meter station. The relief valve is provided at the meter station for protecting the customer's piping from over pressure conditions, which can result due to failure of regulators used to reduce the pressure of natural gas prior to its distribution to the customers. During the activation of relief valve, natural gas is released to the atmosphere at a high pressure. Release of natural gas at high pressure generates noise. Although over pressure episodes are relatively infrequent (average once per year or less), the installation of the relief valve silencer dampens the noise level considerably when they do occur.

Claimed Facility Cost: $25,780.00

Accountant's Certification was provided.

The applicant indicated the useful life of the facility is twenty years.

3. Procedural Requirements

The facility is governed by ORS 468.150 through 468.190, and by OAR Chapter 340, Division 16.

The facility met all statutory deadlines in that:

Installation of the facility was substantially completed on December 8, 1995 and placed into operation the same day. The application for final certification was received by the Department on March 27, 1996, within two years of substantial completion of the facility.

The application was found to be complete on May 3, 1996.

4. Evaluation of Application

a. Rationale For Eligibility

The claimed facility consists of a relief valve silencer designed and provided by Mueller Environmental Designs, Inc. The relief valve silencer is installed on the relief valve within the meter building of the natural gas delivery meter station.

Prior to installation of the relief valve silencer, noise from the meter station in the event of activation of relief valve was approximately 120 to 140 dBA. After the installation of the relief valve silencer, the noise level is dampened to approximately 65 dBA at 20 feet.

The relief valve is exempt from the noise control rules provided in OAR Chapter 340, Division 35, Rule 035. The relief valve is an emergency equipment as defined in OAR Chapter 340, Division 35, Rule 010, Section (15). The emergency equipment is exempt from the noise control rules in accordance with the exemption provided in OAR Chapter 340, Division 35, Rule 035, Subsection (5)(a). As such the principal purpose of the relief valve silencer installed on the relief valve is not to comply with a requirement **imposed** by the Department to control noise pollution.

However the sole purpose of the relief valve silencer is to reduce the noise pollution. Apart from reducing the noise pollution, the other reasons for installing the relief valve silencer are to address the public complaints against Northwest Pipeline, and to avoid mobilization of Gresham City emergency response personnel in the event of activation of the relief valve. However, these do not result in any economic benefit to the applicant.

b. Eligible Cost Findings

In determining the percentage of the certified cost allocable to pollution control, the following factors from ORS 468.190 have been considered and analyzed as indicated:

1) The extent to which the facility is used to recover and convert waste products into a salable or usable commodity.

The facility does not recover or convert waste products into a salable or usable commodity.

2) The estimated annual percent return on the investment in the facility.

The applicant indicated that the claimed facility does not have any annual operating expenses. Also, no income is expected to be generated from the installation of the claimed facility. The average annual cash flow will therefore be equal to zero. The annual percent return on investment (ROI) will also be equal to 0%.

3) The alternative methods, equipment and costs for achieving the same pollution control objective.

The applicant did not consider any other noise pollution control devices

other than the relief valve silencers. The silencers are suitable for handling the near sonic velocities that originate from the relief valve. Other devices will not be able to handle the high gas flow rates during the release of natural gas.

4) Related savings or increase in costs which occur or may occur as a result of the installation of the facility.

The applicant indicated that there are no annual operating expenses or income from the claimed facility. Therefore, it is anticipated that there are no savings or increase in costs as a result of installation of the claimed facility.

5) Other factors which are relevant in establishing the portion of the actual cost of the facility properly allocable to the prevention, control or reduction of air pollution.

There are no other factors to consider in establishing the actual cost of the facility properly allocable to reduction of pollution. The sole purpose of the claimed facility is to prevent noise pollution.

The actual cost of the facility properly allocable to pollution control as determined by using this factor or these factors is 100%.

5. Summation

a. The facility was constructed in accordance with all regulatory deadlines.

b. The facility is eligible for final tax credit certification in that the sole purpose of the facility is to control noise pollution.

c. The facility complies with the Department statutes and rules, and permit conditions.

d. The portion of the facility cost that is properly allocable to pollution control is 100%.

6. Director's Recommendation

Based upon these findings, it is recommended that a Pollution Control Facility Certificate bearing the cost of $25,780 with 100% allocated to pollution control, be issued for the facility claimed in Tax Credit Application No. TC-4605.

Anurag Gupta : PRC Environmental Management, Inc.
May 6, 1996

State of Oregon
Department of Agriculture

TAX RELIEF APPLICATION REVIEW REPORT

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1. Applicant

Carl Jensen Farms
6532 Howell Prairie Road NE
Silverton, Oregon 97381

The applicant owns and operates a grass seed farm operation in Marion County, Oregon.

Application was made for tax credit for an air pollution control facility.

2. Description of Claimed Facility

The facility described in this application is located at 6532 Howell Prairie Road, NE, Silverton, Oregon. The land and the buildings are owned by the applicant.

Straw storage shed	$91,703.17
RMC WR40 40' wheel rake	$11,574.73
Steffens fork lift attachment	$ 2,581.00
1983 Kenworth Truck	$ 5,500.00
330 Freeman baler	$11,477.50
1980 Road Runner hay squeeze	$30,000.00

Claimed facility cost: $152,836.40
(Accountant's Certification was provided.)

3. Description of Farm Operation Plan to Reduce Open Field Burning.

The applicant has 1,121 acres of perennial and 553 acres of annual grass seed under cultivation. Prior to exploring alternatives to thermal sanitation, the applicant open field burned and/or propane flamed as many acres as the smoke management program and weather permitted.

Before purchasing this pollution control facility and equipment, the applicant dealt with straw removal as an alternative by obtaining outside baling services but found that to be unreliable in timely removal and storage of the straw.

The applicant now rakes, bales, re-rakes, bales, transports, stores and markets the straw from all his acreage annually. The applicant has successfully eliminated open field burning, propane flaming and stack/pile burning except in instances of emergency or poor market conditions.

4. Procedural Requirements

The facility is governed by ORS 468.150 through 468.190, and by OAR Chapter 340, Division 16. The facility has met all statutory deadlines in that:

Construction of the facility was substantially completed on February 8, 1996. The application for final certification was found to be complete on May 3, 1996. The application was filed within two years of substantial completion of the facility.

5. Evaluation of Application

a. The facility is eligible under ORS 468.150 because the facility is an approved alternative method for field sanitation and straw utilization and disposal that reduces a substantial quantity of air pollution. This reduction is accomplished by reduction of air contaminants, defined in ORS 468A.005; by reducing the maximum acreage to be open burned in the Willamette Valley as required in OAR 340-26-013; and, the facility's qualification as a "pollution control facility", defined in OAR 340-16-025(2)(f)A): "Equipment, facilities, and land for gathering, densifying, processing, handling, storing, transporting and incorporating grass straw or straw based products which will result in reduction of open field burning."

b. Eligible Cost Findings

In determining the percent of the pollution control facility cost allocable to pollution control, the following factors from ORS 468.190 have been considered and analyzed as indicated:

1. The extent to which the facility is used to recover and convert waste products into a salable or usable commodity.

The facility promotes the conversion of a waste product (straw) into a salable commodity by providing removal, packaging and storage.

2. The estimated annual percent return on the investment in the facility.

There is no annual percent return on the investment as applicant claims a negative gross annual income.

3. The alternative methods, equipment and costs for achieving the same pollution control objective.

The method chosen is an accepted method for reduction of air pollution. The method is one of the least costly, most effective methods of reducing air pollution.

4. Any related savings or increase in costs which occur or may occur as a result of the installation of the facility.

There is a net increase in operating costs over gross income of $98,512 to annually maintain and operate the facility. These costs were considered in the return on investment calculation.

5. Any other factors which are relevant in establishing the portion of the actual cost cost of the facility properly allocable to the prevention, control or reduction of air pollution.

The applicant has an additional 100 acres of blueberries under cultivation. The applicant states that he already had two (2) single tandem flatbeds to transport the blueberries and did not need the Kenworth truck listed in this application for that purpose; however, he did need the Kenworth for the straw and blueberries often need transport at the same time. The applicant also indicated that the forklift attachment is used 100% for grass straw purposes.

For this application, as an example of a newly proposed methodology for calculating the cost of a pollution control facility that is allocable to pollution control, we applied the blueberry acreage as a percentage of total acreage under cultivation. Of the total acerage of 1,774, 100 acres are in blueberries (5.6% of the total). Applying the 5.6% to the claimed cost of the Kenworth truck ($5,500) and the Steffens forklift attachment ($2,581) produces $452.54 of non-field burning alternative usage. The $452.54 figure is 0.3% of the cost of all equipment ($152,836). This percentage of cost pertaining to non-field burning use is too small to affect the percentage allocation for this application.

The actual cost of the facility properly allocable to pollution control as determined by using these factors is 100%.

6. Summation

a. The facility was constructed in accordance with all regulatory deadlines.

b. The facility is eligible under ORS 468.150 as an approved alternative method for field sanitation and straw utilization and disposal that reduces a substantial quantity of air pollution as defined in ORS 468A.005.

c. The facility complies with DEQ statutes and rules.

d. The portion of the facility that is properly allocable to pollution control is 100%.

7. The Department of Agriculture's Recommendation

Based upon these findings, it is recommended that a Pollution Control Facility Certificate bearing the cost of $152,836, with 100% allocated to pollution control, be issued for the facility claimed in Tax Credit application Number TC-4615.

Jim Britton, Manager
Smoke Management Program
Natural Resources Division
Oregon Department of Agriculture
(503) 986-4701
FAX: (503) 986-4730

JB:rc

Application No. TC-4619

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

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1. Applicant

Stein Oil Co., Inc.
19805 SE McLoughlin
Gladstone, OR 97027

The applicant owns and operates a retail gas station at 13001 Clackamas River Dr., Oregon City, OR 97045, Facility ID No. 11515.

Application was made for a tax credit for a water pollution control facility involving underground storage tanks. The application also included air quality Stage II vapor recovery equipment.

2. Description of Claimed Facility

The claimed pollution control facilities described in this application are the installation of three doublewall fiberglass tanks and piping, spill containment basins, tank gauge system with overfill alarm, sumps, oil/water separator and stage II vapor recovery equipment.

Claimed facility cost $193,339
(Accountant's certification was provided)

3. Procedural Requirements

The facility is governed by ORS 468.150 through 468.190, and by OAR Chapter 340, Division 16.

The facility was substantially completed on March 7, 1996 and placed into operation on March 7, 1996. The application for certification was submitted to the Department on May 13, 1996, and was considered to be complete and filed on June 6, 1996, within two years of the completion date of the project.

4. Evaluation of Application

a. The facility is eligible because the principal purpose of the facility is to comply with underground storage tank requirements imposed by the federal Environmental Protection Agency to prevent pollution of soil, water or air. This is accomplished by preventing releases into soil, water or air. The facility qualifies as a "pollution control facility", defined in OAR 340-16-025(2)(g): "Installation or construction of facilities which will be used to detect, deter or prevent spills or unauthorized releases."

This is a new facility constructed on bare ground with no record of prior tanks.

To comply with Underground Storage Tank requirements under OAR 340-Division 150, the applicant installed:

1) For corrosion protection - Doublewall fiberglass tanks and piping.

2) For spill and overfill prevention - Spill containment basins, sumps, overfill alarm and an oil/water separator.

3) For leak detection - Tank gauge system.

In addition, the following was installed to reduce air quality emissions.

1) For VOC reduction - Stage II vapor recovery equipment.

Based on information currently available, the applicant is in compliance with DEQ permitting requirements in that the tanks are permitted and fee payments are current.

The Department concludes that the costs claimed by the applicant ($193,339) are eligible pursuant to the definition of a pollution control facility in ORS 468.155.

b. Eligible Cost Findings

In determining the percent of the eligible pollution control facility cost allocable to pollution control, the following factors from ORS 468.190 have been considered and analyzed as indicated:

1) The extent to which the facility is used to recover and convert waste products into a salable or usable commodity.

The equipment does not recover or convert waste products into a salable or usable commodity.

2) The estimated annual percent return on the investment in the facility.

There is no annual percent return on investment as the applicant claims no gross annual income from the facility.

3) The alternative methods, equipment and costs for achieving the same pollution control objective.

The applicant chose the methods recommended by the contractor. The methods chosen are acceptable for meeting the requirements of federal regulations.

4) Any related savings or increase in costs which occur or may occur as a result of the installation of the facility.

The applicant claims no savings or increase in costs as a result of the installation.

5) Any other factors which are relevant in establishing the portion of the actual cost of the facility properly allocable to pollution control.

There are no other factors to consider in establishing the actual cost of the facility properly allocable to prevention, control of reduction of pollution.

The actual cost of the facility properly allocable to pollution control is determined by using these factors as displayed in the following table:

	Eligible Facility Cost	Percent Allocable	Amount Allocable
Corrosion Protection:			
Doublewall fiberglass tanks and piping	$45,676	61% (1)	$27,862
Spill & Overfill Prevention:			
Spill containment basins	2,967	100	2,967
Sumps	3,591	100	3,591
Oil/water separator	1,976	100	1,976
Leak Detection:			
Tank gauge system w/alarm	8,998	90 (2)	8,098
VOC Reduction:			
Stage II vapor recovery	7,364	100	7,364
Labor and materials	122,767	100	122,767
Total	$193,339	90%	$174,625

(1) The Department has determined the percent allocable on the cost of a corrosion protected tank and piping system by using a formula based on the difference in cost between the protected tank and piping system and an equivalent bare steel system as a percent of the protected system. Applying this formula to the costs presented by the applicant, where the protected system cost is $45,676 and the bare steel system is $17,820, the resulting portion of the eligible tank and piping cost allocable to pollution control is 61%.

(2) The applicant's cost for a tank gauge system is reduced to 90% of cost based on a determination by the Department that this is the portion properly allocable to pollution control since the device can serve other purposes, for example, inventory control.

5. Summation

a. The facility was constructed in accordance with all regulatory requirements according to signed statements made by the installation service provider and/or owner.

b. The facility is eligible for tax credit certification in that the principal purpose of the claimed facility is to comply with requirements imposed by the federal Environmental Protection Agency to prevent pollution of soil, water or air. This is accomplished by preventing releases in soil, water or air. The facility qualifies as a "pollution control facility" defined in OAR 340-16-025(2)(g): "Installation or construction of facilities which will be used to detect, deter or prevent spills or unauthorized releases."

c. The facility complies with DEQ statutes and rules in that the appropriate compliance documents relating to the project have been submitted.

d. The portion of the facility cost that is properly allocable to pollution control is 90%.

6. Director's Recommendation

Based upon these findings, it is recommended that a Pollution Control Facility Certificate bearing the cost of $193,339 with 90% allocated to pollution control, be issued for the facility claimed in Tax Credit Application No. TC-4619.

Barbara J. Anderson
(503) 229-5870
June 6, 1996

Application No. TC-4620

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

---

1. Applicant

Stein Oil Co., Inc.
19805 SE McLoughlin
Gladstone, OR 97027

The applicant owns and operates a retail gas station at 3046 SE Harrison St., Milwaukie, OR 97222, Facility ID No. 1090.

Application was made for a tax credit for a water pollution control facility involving underground storage tanks. The application also included air quality Stage II vapor recovery equipment.

2. Description of Claimed Facility

The claimed pollution control facilities described in this application are the installation of three doublewall fiberglass tanks and piping (one tank has two compartments), spill containment basins, tank gauge system with overfill alarm, line leak detectors, sumps, monitoring wells, automatic shutoff valves and stage II vapor recovery equipment.

Claimed facility cost $125,576
(Accountant's certification was provided)

3. Procedural Requirements

The facility is governed by ORS 468.150 through 468.190, and by OAR Chapter 340, Division 16.

The facility was substantially completed on November 20, 1995 and placed into operation on November 20, 1995. The application for certification was submitted to the Department on May 13, 1996, and was considered to be complete and filed on June 6, 1996, within two years of the completion date of the project.

4. Evaluation of Application

a. The facility is eligible because the principal purpose of the facility is to comply with underground storage tank requirements imposed by the federal Environmental Protection Agency to prevent pollution of soil, water or air. This is accomplished by preventing releases into soil, water or air. The facility qualifies as a "pollution control facility", defined in OAR 340-16-025(2)(g): "Installation or construction of facilities which will be used to detect, deter or prevent spills or unauthorized releases."

This is a new facility constructed on bare ground. Previous facility was entirely removed by Unocal in 1990. There is no prior condition of the tank system to report.

To comply with Underground Storage Tank requirements under OAR 340-Division 150, the applicant installed:

1) For corrosion protection - Doublewall fiberglass tanks and piping.

2) For spill and overfill prevention - Spill containment basins, sumps, and an overfill alarm and automatic shutoff valves.

3) For leak detection - Tank gauge system, line leak detectors and monitoring wells.

In addition, the following was installed to reduce air quality emissions.

1) For VOC reduction - Stage II vapor recovery equipment.

Based on information currently available, the applicant is in compliance with DEQ permitting requirements in that the tanks are permitted and fee payments are current.

The Department concludes that the costs claimed by the applicant ($125,576) are eligible pursuant to the definition of a pollution control facility in ORS 468.155.

b. Eligible Cost Findings

In determining the percent of the eligible pollution control facility cost allocable to pollution control, the following factors from ORS 468.190 have been considered and analyzed as indicated:

1) The extent to which the facility is used to recover and convert waste products into a salable or usable commodity.

   The equipment does not recover or convert waste products into a salable or usable commodity.

2) The estimated annual percent return on the investment in the facility.

   There is no annual percent return on investment as the applicant claims no gross annual income from the facility.

3) The alternative methods, equipment and costs for achieving the same pollution control objective.

   The applicant chose the methods recommended by the contractor. The methods chosen are acceptable for meeting the requirements of federal regulations.

4) Any related savings or increase in costs which occur or may occur as a result of the installation of the facility.

   The applicant claims no savings or increase in costs as a result of the installation.

5) Any other factors which are relevant in establishing the portion of the actual cost of the facility properly allocable to pollution control.

   There are no other factors to consider in establishing the actual cost of the facility properly allocable to prevention, control of reduction of pollution.

The actual cost of the facility properly allocable to pollution control is determined by using these factors as displayed in the following table:

	Eligible Facility Cost	Percent Allocable	Amount Allocable
Corrosion Protection:			
Doublewall fiberglass tanks and piping	$32,257	62% (1)	$19,999
Spill & Overfill Prevention:			
Spill containment basins	860	100	860
Sumps	2,232	100	2,232
Automatic shutoff valves	1,361	100	1,361
Leak Detection:			
Tank gauge system w/alarm	8,426	90 (2)	7,583
Line leak detectors	1,083	100	1,083
Monitoring wells	145	100	145
VOC Reduction:			
Stage II vapor recovery	4,208	100	4,208
Labor and materials	75,004	100	75,004
Total	$125,576	90%	$112,475

(1) The Department has determined the percent allocable on the cost of a corrosion protected tank and piping system by using a formula based on the difference in cost between the protected tank and piping system and an equivalent bare steel system as a percent of the protected system. Applying this formula to the costs presented by the applicant, where the protected system cost is $32,257 and the bare steel system is $12,183, the resulting portion of the eligible tank and piping cost allocable to pollution control is 62%.

(2) The applicant's cost for a tank gauge system is reduced to 90% of cost based on a determination by the Department that this is the portion properly allocable to pollution control since the device can serve other purposes, for example, inventory control.

5. Summation

a. The facility was constructed in accordance with all regulatory requirements according to signed statements made by the installation service provider and/or owner.

b. The facility is eligible for tax credit certification in that the principal purpose of the claimed facility is to comply with requirements imposed by the federal Environmental Protection Agency to prevent pollution of soil, water or air. This is accomplished by preventing releases in soil, water or air. The facility qualifies as a "pollution control facility" defined in OAR 340-16-025(2)(g): "Installation or construction of facilities which will be used to detect, deter or prevent spills or unauthorized releases."

c. The facility complies with DEQ statutes and rules in that the appropriate compliance documents relating to the project have been submitted.

d. The portion of the facility cost that is properly allocable to pollution control is 90%.

6. Director's Recommendation

Based upon these findings, it is recommended that a Pollution Control Facility Certificate bearing the cost of $125,576 with 90% allocated to pollution control, be issued for the facility claimed in Tax Credit Application No. TC-4620.

Barbara J. Anderson
(503) 229-5870
June 6, 1996

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

---

1. Applicant

Fred Meyer Inc.
3800 SE 22nd Avenue
Portland, OR 97202

The applicant leases and operates a bakery in Clackamas, Oregon.

Application was made for tax credit for a water pollution control facility.

2. Description of Facility

The claimed facility is a 30,000 gallon per day wastewater treatment plant. The major components of the plant are as follows:

1. Lift station with submersible pumps
2. Stainless steel rotating screen
3. 30,000 gallon equalization tank
4. Decant/sludge holding tank
5. Dissolved air floatation system
6. Neutralization tank
7. Fixed film biological treatment system
8. Biological sludge digester
9. Clarifier
10. Electrical and plumbing system

Claimed Facility Cost: $539,935
Accountant's Certification was provided.

3. Procedural Requirements

The facility is governed by ORS 468.150 through 468.190 and by OAR Chapter 340, Division 16.

The facility met the statutory deadline in that construction, erection, and installation of the facility was substantially completed on May 12, 1995 and the application for certification was found to be complete on July 3, 1995, within 2 years of substantial completion of the facility.

4. Evaluation of Application

a. The facility is eligible because the principal purpose

of the facility is to comply with a requirement imposed by the Clackamas County Department of Utilities to reduce water pollution. The requirement is to comply with an industrial wastewater discharge permit issued by the Clackamas County Service District No. 1 (CCSD). This reduction is accomplished by the use of treatment works for industrial waste as defined in ORS 468B.005.

Prior to the installation of the claimed facility Fred Meyer, Inc. (FMI) was operating an old wastewater pretreatment system consisting of pH neutralization, filtration and a grease trap to pretreat the wastewater prior to discharge to the CCSD sewer system. The discharge was authorized under a permit issued by CCSD. However, FMI had numerous violations with its permit limits and was put under a compliance schedule to meet the effluent limitations. FMI was required to complete the installation of the wastewater pretreatment system on June 1, 1995.

Process wastewater from the bakery is collected in a wet well located on the west side of the bakery. From the wet well wastewater is pumped to the rotating screen located on top of the equalization (EQ) tank for the removal of large suspended solids. The wastewater in the EQ tank is thoroughly mixed and pH is stabilized at 5.5 by the use of either caustic or acid being fed by a pump and is continuously monitored by a pH control system.

The wastewater is pumped from the EQ tank by a variable speed pump to the dissolved air flotation (DAF) unit. Compressed air, coagulant and flocculent are added to the wastewater, thoroughly mixed, and clarified to allow the fats, oils, and greases (FOG), fine grit and sludges to separate from the wastewater. The partially treated wastewater from the DAF is gravity fed to a neutralization tank where caustic is added to bring the final pH to 6.5.

The neutralized wastewater is then gravity fed to the biological treatment units for the removal of additional biodegradable waste from the wastewater. Bacteria and nutrients are pumped into the wastewater stream to enhance biodegradation of the remaining waste. The wastewater then flows by gravity to the clarifier where sludge is removed from the wastewater and the clarified wastewater leaves the treatment process. The treated wastewater is discharged to the city sewer system.

FMI is in compliance with its permit limitations.

b. Eligible Cost Findings

In determining the percent of the pollution control facility cost allocable to pollution control, the following factors from ORS 468.190 have been considered and analyzed as indicated:

1) The extent to which the facility is used to recover and convert waste products into a salable or usable commodity.

The facility does not recover or convert waste products into a salable or usable commodity.

2) The estimated annual percent return on the investment in the facility.

There is no return on investment.

3) The alternative methods, equipment and costs for achieving the same pollution control objective.

The facility selected was the only system used in commercial bakeries that was consistently meeting fats, oils, and greases and pH requirements, plus substantially reduced COD, BOD, and TSS effluent levels. Fred Meyer Inc. wanted to address not only current discharge requirements, but anticipated more stringent requirements in the future. They investigated solids settling systems, larger grease traps, and membrane filtration but none would meet long term needs.

4) Any related savings or increase in costs which occur or may occur as a result of the installation of the facility.

There are no savings from the facility. The cost of maintaining and operating the facility is $147,559 annually.

5) Any other factors which are relevant in establishing the portion of the actual cost of the facility properly allocable to the prevention, control or reduction of air, water or noise pollution or solid or hazardous waste or to recycling or properly disposing of used oil.

The Environmental Quality Commission has directed

that tax credit applications of $250,000 or greater undergo a Departmental accounting review. This review was performed by the accounting firm of Symonds, Evans and Larson (see attached report). The review uncovered additional certifiable installation costs of $37,245 that were not claimed in the original application. This results in a total certifiable cost of $577,180 for this facility.

The actual cost of the facility properly allocable to pollution control as determined by using these factors is 100%.

5. Summation

a. The facility was constructed in accordance with all regulatory deadlines.

b. The facility is eligible for tax credit certification in that the principal purpose of the facility is to comply with a requirement imposed by Clackamas Department of Utilities to reduce water pollution and accomplishes this purpose by redesign to control industrial waste as defined in ORS 468B.005.

c. The facility complies with conditions for an industrial wastewater discharge permit issued by the Clackamas County Service District No. 1.

d. The portion of the facility cost that is properly allocable to pollution control is 100%.

6. Director's Recommendation

Based upon these findings, it is recommended that a Pollution Control Facility Certificate bearing the cost of $577,180 with 100% allocated to pollution control, be issued for the facility claimed in Tax Credit Application No. T-4468.

Elliot J. Zais
(503) 229-5292
January 12, 1996

FMI4468.A

SYMONDS, EVANS & LARSON
CERTIFIED PUBLIC ACCOUNTANTS

REPORT OF INDEPENDENT ACCOUNTANTS ON APPLYING AGREED-UPON PROCEDURES

Environmental Quality Commission
811 S.W. Sixth Avenue
Portland, Oregon 97204

We have performed the procedures enumerated below, which were agreed to by Fred Meyer, Inc. (the Company), the State of Oregon, Department of Environmental Quality (the DEQ) and the Environmental Quality Commission, solely to assist you with respect to the Company's Pollution Control Tax Credit Application No. T-4468 (the Application) filed with the DEQ for the Water Pollution Control Facility in Clackamas, Oregon (the Facility). This engagement to apply agreed-upon procedures was performed in accordance with standards established by the American Institute of Certified Public Accountants. The sufficiency of the procedures is solely the responsibility of the specified users of the report. Consequently, we make no representation regarding the sufficiency of the procedures described below either for the purpose for which this report has been requested or for any other purpose.

The Application has a claimed Facility cost of $539,935. Our procedures and findings are as follows:

Procedures:

1. We read the Application, the Oregon Revised Statutes on Pollution Control Facilities Tax Credits – Sections 468.150 through 468.190 (the Statutes) and the Oregon Administrative Rules on Pollution Control Tax Credits – Sections 340-16-005 through 340-16-050 (OAR's).

2. We inspected vendor invoices which aggregated approximately 97% of the adjusted allowable costs of the Facility.

3. We discussed the Application, the Statutes and OAR's with Renato Dulay of the DEQ and Charles Bianchi, a contractor for the DEQ.

4. We discussed certain components of the Application with Michael J. Miller, Financial Analyst for the Company.

5. We toured the Facility with Mr. Miller.

9600 S.W. Oak Street, Suite 380
Portland, Oregon 97223

Phone: (503) 244-7350
Fax: (503) 244-7331

6. We requested that Company personnel confirm the following assertions:

   A. There were no related parties or affiliates of the Company which had billings which were included in the Application.

   B. The capacity of the Facility is adequate for the Company's present operations and does not include significant capacity for potential future operations.

   C. There were no internal labor costs included in the Application.

   D. The $25,000 cost of the building included in the Application is required for the efficient operation of the Facility.

   E. There were no prior pollution control tax credits related to the Company's previously existing wastewater pretreatment facility.

   F. The vacuum drum filter press is a required part of the Facility to provide for alternative waste processing and disposal.

   G. There were no significant spare parts that were included in the cost of the Facility.

Findings:

1. through 5.

   As a result of applying these procedures, we noted the following matters which caused us to believe that the Application should be adjusted:

• Final payment to general contractor	$ 27,625
• Additional electrical charges	7,880
• Additional crane charges	1,740
	$ 37,245

   Accordingly, the allowable costs for the Application should be increased to $577,180.

6. Company personnel confirmed in writing that such assertions were true and correct.

We were not engaged to, and did not, perform an audit, the objective of which would be the expression of an opinion on the specified elements, accounts or items. Accordingly, we do not express such an opinion. Had we performed additional procedures, other matters might have come to our attention that would have been reported to you.

This report is intended solely for the use of the specified users above and should not be used by those who have not agreed to the procedures and taken responsibility for the sufficiency of the procedures for their purposes.

Symonds, Evans + Larson

May 6, 1996

correction page - please replace page 73 of tax credits with this page*

Application No. TC-4473

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

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1. Applicant

Portland General Electric Company
Boardman Plant
121 SW Salmon St., 1WTC-0402
Portland, OR 97204

The applicant owns and operates a coal fired electric power generating facility in Boardman, Oregon.

Application was made for tax credit for an air pollution control facility.

2. Description of Facility

The claimed facility controls sulfur dioxide and nitrogen oxides emissions. It consists of a Horiba SO_2 probe, model APSA-350E, a Horiba NO_x probe, model APNA-350E, a Horiba data acquisition system, model COMPUCEM DARS and a United Sciences UltraFlow 100 flow sensor.

Claimed Facility Cost: $377,321

A distinct portion of the claimed facility makes an insignificant contribution to the principal purpose of pollution control. The applicant claimed $1,235 for capitalized property taxes, $133 for materials loading on items that were purchased from PGE central stores, and $9,600 for a maintenance contract. The applicant also claimed $30,605.00 as construction overhead expenses of the facility. A distinct portion of these claimed expenses, $20,815 were allocated from corporate expenditure pools which were incurred from corporate activities removed from the facility site.

Ineligible Costs: $31,783

Adjusted Facility Cost: $345,538

Accountant's Certification was provided.

The applicant indicated the useful life of the facility is 15 years.

3. Procedural Requirements

The facility is governed by ORS 468.150 through 468.190, and by OAR Chapter 340, Division 16.

The facility met all statutory deadlines in that:

Installation of the facility was substantially completed on May 3, 1994 and placed into operation on October 1, 1994. The application for final certification was received by the Department on July 3, 1995. The application was found to be complete on October 6, 1995, within two years of substantial completion of the facility.

4. Evaluation of Application

a. Rationale For Eligibility

The facility is eligible because the principal purpose of the facility is to comply with a requirement imposed by the EPA and DEQ to control air pollution. This is in accordance with OAR Chapter 340, Division 25 , rule 610. The Air Contaminant Discharge Permit for this source, 25-0016, Schedule A, Conditions 2 b and c set emission limits on SO_2 and NO_X emissions. The emission reduction is accomplished by the elimination of air contaminants as defined in ORS 468A.005.

The Boardman Plant produces electricity through the combustion of coal. Coal contains a small amount of sulfur which when burned forms sulfur dioxide (SO_2). Also during the combustion process the nitrogen in the air forms nitrogen oxides (NO_x) emissions. Both of these emissions are regulated under PGE's Title V air permit. The claimed facility is a multi-component continuous emissions monitoring (CEM) system designed to measure, control and record SO_2 and NO_x emissions. The system consists of sampling probes that are inserted into the stack in which exhaust stack gas samples are drawn into an analyzer to determine the concentration of SO_2 and NO_x. This information is electronically transmitted to a computer system that converts the data into pounds per hour of emissions for each compound. The computer compares the actual readings to the predetermined set points that when exceeded will sound an alarm. PGE's Air Contaminant Discharge Permit states that the SO_2 emissions cannot exceed 6952 lbs/hr or emissions of NO_x cannot exceed 4055 lb/hr. The claimed facility will alert the operators if these levels are reached. PGE has written procedures that state if the SO_2 emissions reach the action level the operator is instructed to lower the total air flow, lower the fuel flow and lower the load. If these actions do not correct the problem, then the operator is to switch fuels. If the NO_x levels are exceeded, the operator is instructed to open the Over-Fire air ports and lower the load. The claimed

facility and the Excess Emissions Action Plan have been reviewed and certified by the United States Environmental Protection Agency.

b. Eligible Cost Findings

In determining the percent of the pollution control facility cost allocable to pollution control, the following factors from ORS 468.190 have been considered and analyzed as indicated:

1) The extent to which the facility is used to recover and convert waste products into a salable or usable commodity.

The facility does not recover or convert waste products into a salable or usable commodity.

2) The estimated annual percent return on the investment in the facility.

The applicant indicates in the application there is no income or savings from the facility, so there is no return on the investment.

3) The alternative methods, equipment and costs for achieving the same pollution control objective.

A fully automated control system could accomplish the same pollution control by using additional valves and actuators to make adjustments to the operation of the boiler.

4) Any related savings or increase in costs which occur or may occur as a result of the installation of the facility.

There is no savings or increase in costs as a result of the facility modification.

5) Any other factors which are relevant in establishing the portion of the actual cost of the facility properly allocable to the prevention, control or reduction of air pollution.

The applicant has claimed internal overhead expenses for construction of the facility. The applicant estimated these expenses using methodology which is standard for the applicants industry. However the expenditure pools from which the overhead costs are allocated are primarily corporate wide in nature. The Department is proposing that allocation of overhead expenses to a pollution control facility is only appropriate within the context the Pollution Control Facility Tax Credit Program if the expense pools from which the costs are allocated were incurred at the site of facility construction. The reasoning for this recommendation is that administrative expenses incurred in the direct oversight of a project can be viewed as the tax payers own cash investment in the facility as stipulated in OAR 340-16-020 (2bB). However expenditure pools incurred in less direct corporate activities make an insignificant contribution to the principal purpose of the facility.

The Environmental Quality Commission has directed that tax credit applications at or above $250,000 go through an additional Departmental accounting review, to determine if costs were properly allocated. This review was performed under contract with the Department by the accounting firm of Merina, MCCoy, & Gerritz (see attached report).

The actual cost of the facility properly allocable to pollution control as determined by using this factor or these factors is 100%.

5. Summation

a. The facility was constructed in accordance with all regulatory deadlines.

b. The facility is eligible for final tax credit certification in that the principal purpose of the facility is to comply with a requirement imposed by the EPA and DEQ to control air pollution.

c. The facility complies with DEQ and EPA statutes, rules and permit conditions.

d. The portion of the facility cost that is properly allocated to pollution control is 100%.

6. Director's Recommendation

Based upon these findings, it is recommended that a Pollution Control Facility Certificate bearing the cost of $345,538 with 100% allocated to pollution control, be issued for the facility claimed in Tax Credit Application No. TC-4473.

Dennis E. Cartier
SJO Consulting Engineers, Inc.
October 9, 1995
Brian Fields
Air Quality Division
June 7, 1996

MERINA McCOY GERRITZ, P.C.
CERTIFIED PUBLIC ACCOUNTANTS

PARTNERS
John W. Merina, CPA
Michael E. McCoy, CPA
Gerald V. Gerritz, Jr., CPA

CERTIFIED IN
Oregon
Washington

INDEPENDENT ACCOUNTANTS' REPORT ON APPLYING AGREED-UPON PROCEDURES

Oregon Department of
Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204

At your request, we have performed the procedures enumerated below, which were agreed to by the Oregon Department of Environmental Quality (DEQ), solely to assist the DEQ in evaluating Portland General Electric Company's (the Company) Pollution Control Tax Credit Application No. 4473 (the Application) regarding the Stack Continuous Emission Monitoring System (the Facility) in Boardman, Oregon. The claimed facility costs on the Application are $377,321. The agreed-upon procedures and related findings are:

1. We read the Application, the Oregon Revised Statutes on Pollution Control Facilities Tax Credits - Sections 469.150 - 468.190 (the Statutes) and the Oregon Administrative Rules on Pollution Control Tax Credits - Sections 340-16-050 (OARs).

2. We reviewed and discussed the Application, supporting documents, and Statutes with Charles Bianchi and Brian Fields of the Oregon Department of Environmental Quality (DEQ) and Dennis Carter of SJO Consulting Engineers, Inc.

3. We reviewed and discussed the Application, supporting documents, Statutes and OARs with Gary Young, Supervisor Operations Accounting, and Edward Miska, Corporate Tax Manager.

4. We inquired as to whether there were any direct or indirect company costs charged or allocated to the facility costs claimed in the Application.

   We were informed that engineering, materials and direct labor costs were included in the Application and that indirect company costs, captioned construction overhead, material loading costs and capitalized property taxes were included in the Application. The engineering and direct labor costs, which included payroll taxes and fringe benefits, were found to be supported, reasonable as to amount and properly included in the application. Indirect costs are presented in footnote 3 to item six for evaluation.

5. We reviewed the documents and workpapers of applicant's certified public accountants that related to the facility claim.

18670 WILLAMETTE DRIVE • WEST LINN, OR 97068-1707
(503) 636-4864 • FAX (503) 636-2318

The claimed facility cost in the Application was $377,321. The Accountant's Certificate was for costs totaling $377,321.

6. We reviewed all costs claimed in the Application for Pollution Control Tax Credit certification under the rules and statutes that govern the Program.

We determined that the claimed facility costs for pollution control tax credit certification under the rules and statutes that govern the program should be adjusted as follows:

	Original Claim	Adjustments	Adjusted Claim
Contract labor	$ 65,429	$	$ 65,429
Materials and equipment	229,968	9,600[1]	220,368
Outside services	799		799
Total outside expense	296,196	9,600	286,596
PGE labor	33,401		33,401
PGE labor fringe benefits	13,853		13,853
PGE materials	1,328		1,328
PGE materials loading	133		133
PGE employee expense	570		570
Capitalized property taxes	1,235	1,235	
Construction overhead	30,605	[2]	30,605
Total company expense	81,125	1,235	79,890
Grand total	$ 377,321	$ 10,835	$ 366,486

---

1 Remove maintenance contract

2 Construction overhead is detailed in the following schedule

SCHEDULE OF CONSTRUCTION OVERHEAD

	On Site	Off Site	Total
Direct allocations:			
Corporate overhead	$	$ 4,930	$ 4,930
Generation and transmission engineering		9,014	9,014
Generation operations supervision and engineering	7,924	2,274	10,198
Executive supplemental retirement plans		593	593
Floor space allocation	____	158	158
Total direct allocations	7,924	16,969	24,893
Indirect allocations:			
General and administrative fringe benefits	1,866	3,832	5,698
Storeroom material loading	____	14	14
Total indirect allocations	1,866	3,846	5,712
Total construction overhead	$ 9,790	$ 20,815	$ 30,605

We reviewed the methods of allocating direct and indirect overhead costs to this facility and found them to be rational and properly applied. Our review of the allocation methods did not include a judgement as to whether the overhead costs are allowable.

7. We concluded it was not necessary to visit the site and visually inspect the facility.

8. The Company has confirmed to us that no billings from related parties or affiliates of the Company have been included in the claimed costs.

9. We reviewed the calculations in Section 5 of the Application for Final Certification of Pollution Control Facility and found them to be correct.

Because the above procedures do not constitute an audit conducted in accordance with generally accepted auditing standards, we do not express an opinion on any of the items referred to above. In connection with the procedures referred to above, no matters came to our attention that caused us to believe that the Application should be adjusted, except as detailed in procedure six. Had we performed additional procedures or had we conducted an audit of the financial statements of the Company in accordance with generally accepted auditing standards, other matters might have come to our attention that would have been reported to you. The report relates only to the items specified above and does not extend to any financial statements of the Company taken as a whole.

This report is solely for the State of Oregon Department of Environmental Quality in evaluating the Company's Pollution Control Tax Credit Application and should not be used for any other purpose.

Merina McCoy & Gerritz, CPA's, P.C.
West Linn, Oregon
May 20, 1996

PORTLAND GENERAL ELECTRIC COMPANY
COMPOSITION OF CONSTRUCTION OVERHEAD
ALLOCATED TO BOARDMAN COAL PLANT

DIRECT ALLOCATIONS			Page Ref
CORPORATE OVERHEAD	$148,027		Page 2
GENERATION TRANSMISSION AND ENGINEERING (GATE)	270,655		Page 3
GENERATION OPERATIONS SUPERVISION AND ENGINEERING (GOSE)	306,184		Page 4
EXECUTIVE SUPPLEMENTAL RETIREMENT PLANS	17,800		
FLOOR SPACE ALLOCATION	4,752		
TOTAL DIRECT ALLOCATIONS		$747,418	
INDIRECT ALLOCATIONS			
GENERAL & ADMINISTRATIVE PERSONNEL EXPENSES	$171,079		Page 5
STOREROOM MATERIAL LOADING	393		
TOTAL INDIRECT ALLOCATIONS		$171,472	
GRAND TOTAL OVERHEAD ALLOCATION TO BOARDMAN		$918,890	

The $918,890 of corporate overhead allocated to the Boardman Coal Plabt by the various methods described in the following pages is then allocated to the various construction projects at Boardman. This is done by using total construction labor as the allocation base. The allocation base includes straight time, overtime, permanent, temporary and contract labor. The 1994 computation is as follows:

$$\frac{\text{Corporate Overhead Allocated to Boardman}}{\text{Construction Labor at Boardman}} = \frac{\$918,890}{\$1,467,875} = 62.61\%$$

The amount allocated to the Stack Emission Monitoring system (TC 4473) is computed as follows:

	1994	1993	Total
PGE labor	$18,075	$15,325	$33,400
Contract labor	637	64,792	65,429
Total	18,712	80,117	98,829
Allocation factor	62.61%	23.58%	30.97%
Allocated overhead	$11,716	$18,889	$30,605

The increase in the overhead allocation factor from 1993 to 1994 results from capitalizing a portion of GATE overhead. Prior to 1994 all GATE overhead was expenses to operation and maintenance.

PORTLAND GENERAL ELECTRIC COMPANY
CORPORATE OVERHEAD ALLOCATION

	Total	Allocation Factor	Allocation Amount
Corporate Accounting Services			
Accounts Payable & Receivable	337,771	0.83%	2,803
Asset Accounting	543,609	0.83%	4,512
Business Support & Budgeting	486,743	0.83%	4,040
Purchasing	594,316	0.83%	4,933
Business Results	3,291	0.83%	27
Internal Audit	471,373	0.83%	3,912
Accounting & Reporting	404,657	0.83%	3,359
Corporate Accounting & Financial Systems	757,604	0.83%	6,288
Human Resource Service			
Human Resource Operations	729,942	0.83%	6,059
Human Resource Administration	535,366	0.83%	4,444
Human Resource Total Compensation	131,622	0.83%	1,092
PGE Benefit Programs	339,170	0.83%	2,815
Vice President Human Resources	47,298	0.83%	393
Safety & Health Resources	708,020	0.83%	5,877
Organization Training & Development	503,969	0.83%	4,183
Information Processing & Distribution Services			
Corporate Services	202,954	0.83%	1,691
Records Management	257,617	0.83%	2,147
Printing Services	111,413	0.83%	928
Library Services	268,091	0.83%	2,234
Information Distribution	1,077,175	0.83%	8,976
Mail/Stationary/Copiers	154,135	0.83%	1,284
Vice President Information Services	933,852	0.83%	7,782
Information Services Support	51,301	0.83%	427
Client Support	99,840	0.83%	832
Technology Support	258,397	0.83%	2,153
Network Support	27,196	0.83%	227
System Support	2,966	0.83%	25
Equipment Planning & Installation	24,869	0.83%	207
Environmental Policy & Services			
Environmental Services	277,786	0.83%	2,315
Environmental Policy	199,113	0.83%	1,659
Vice President Of Power Operations & PGE President			
PGE President	376,468	0.83%	3,137
VP Power Operations	191,463	0.83%	1,595
Assistant to PGC CEO	117,565	0.83%	980
Miscellaneous	(83,380)	0.83%	(695)
Company Use of Electricity	61,254	0.83%	510
Use of Company Owned Vehicles	993,110	0.83%	8,276
World Trade Center Floor Space Allocation	1,417,356	0.83%	11,811
Service Provider Allocation (Computer Support)	4,148,654	0.83%	34,571
Totals	17,763,946	0.83%	148,027

PORTLAND GENERAL ELECTRIC COMPANY
GENERATION TRANSMISSION AND ENGINEERING ALLOCATION

	Total	Allocation Factor	Allocation Amount
Labor	624,088	20.00%	124,818
Materials	771	20.00%	154
Outside Material Purchases	56,269	20.00%	11,254
Professional Services	1,800	20.00%	360
Other Outside Services	63,929	20.00%	12,786
Employee Expense	14,816	20.00%	2,963
Miscellaneous	32,175	20.00%	6,435
Service Provider Allocation (Computer Support)	559,429	20.00%	111,886
Totals	1,353,277	20.00%	270,655

PORTLAND GENERAL ELECTRIC COMPANY
GENERATION OPERATIONS SUPERVISION AND ENGINEERING ALLOCATION

	Total	Allocation Factor	Allocation Amount
Boardman Maintenance Department			
Labor	715,180	19.60%	140,175
Materials	0	19.60%	0
Employee Expense	1,449	19.60%	284
Miscellaneous	3,566	19.60%	699
Boardman Administration Department			
Labor	265,880	14.48%	38,499
Materials	25,809	14.48%	3,737
Outside Material Purchases	83,301	14.48%	12,062
Professional Services	109,613	14.48%	15,872
Employee Expense	19,979	14.48%	2,893
Equipment Rent	15,124	14.48%	2,190
Fees	12,617	14.48%	1,827
Miscellaneous	135,767	14.48%	19,659
Corporate Services Allocated to Boardman	411,118	16.61%	68,287
Totals	1,799,404	17.02%	306,184

PORTLAND GENERAL ELECTRIC COMPANY
GENERAL & ADMINISTRATIVE PERSONNEL EXPENSES

	Allocation		
	Base	Factor	Amount
Vacation and Leave Time	360,205	16.28%	58,641
Employee Benefits	360,205	20.28%	73,050
Payroll Taxes	360,205	9.97%	36,326
Injury and Damages	360,205	0.85%	3,062
Total G&A Personnel Expenses	306,205	55.87%	171,079

The allocation base is the amount of straight time permanent executive, management and staff wages embedded in the Corporate, GATE and GOSE overheads. This is computed as follows:

Salaries and wages in:

Corporate Overhead	61,661
GATE Overhead	122,327
GOSE Overhead	176,217
Total	360,205

The allocation factor is the Boardman Coal Plant share of the Company wide G&A salaries. There are approximately 11 other plants which receive an allocation.

THEODORE R. KULONGOSKI
ATTORNEY GENERAL

THOMAS A. BALMER
DEPUTY ATTORNEY GENERAL

1515 SW 5th Avenue
Suite 410
Portland, Oregon 97201
FAX: (503) 229-5120
TDD: (503) 378-5938
Telephone: (503) 229-5725

DEPARTMENT OF JUSTICE
PORTLAND OFFICE

April 24, 1996

Charles Bianchi
Water Quality Division
Department of Environmental Quality
811 SW Sixth Avenue
Portland, Oregon 97204

Re: Intel Pollution Control Facility Tax Credit

Dear Mr. Bianchi:

You have asked us to re-examine the EQC's discretion in determining whether Intel's investment in its AME etching system qualifies for a pollution control facility tax credit. We conclude that the EQC has some discretion to determine what it means for a requirement to be imposed upon an applicant but that, also, that discretion does not help Intel here.

In order to qualify as a principal purpose facility, an investment's principal purpose must be "to comply with a ***requirement imposed*** by the department, the federal Environmental Protection Agency or regional air pollution authority." ORS 468.155(1)(a)(A). Neither the statute nor DEQ's rules define "requirement." Under dictionary definitions, a "requirement" is "something required" — that is, something imposed by compulsion or command or "an essential requisite." WEBSTER'S NEW COLLEGIATE DICTIONARY. Therefore, as the statute emphasizes by using the word "imposed," an investment qualifies as a principle purpose facility only if the applicant must, in the sense of being compelled by law, comply with a DEQ, EPA, or regional air authority requirement.

Legal compulsion need not be direct. For example, indirect dischargers can be required by publicly-owned treatment works (POTWs) to obey certain discharge limits so that the POTW does not violate the Clean Water Act and its regulations. The EQC has discretion to determine that these kinds of indirect requirements to assure compliance with EPA regulations can qualify a facility for a tax credit. However, violation of a true "requirement" is a violation of law. Suggestions and recommendations are clearly not requirements.

Under these standards, neither the carbon tetrachloride (CCl_4) phaseout under the Clean Air Act nor the CCl_4 provisions of the Toxic Organics Management Plan (TOMP) are requirements imposed on Intel. Intel would not violate EPA regulations if it continues to use

CCl_4. Moreover, under its description of the TOMP, elimination of CCl_4 is merely a suggested means of compliance, not a requirement imposed on Intel.

In addition, Intel has not demonstrated that its AME etching system meets the definition of "principal purpose." Under DEQ's rules, the principal purpose of a facility is "the most important or primary purpose. Each facility may have only one principal purpose." OAR 340-16-010(7). It seems obvious that the primary and most important purpose of the etching system is to etch, not to reduce pollution. This should be particularly true with regard to Intel's sewage discharge argument, which Intel did not raise until January 31, 1996, suggesting that Intel had other, more important reasons for installing the AME etching system than to prevent sewage discharges of CCl_4.

Sincerely,

Shelley K. McIntyre
Assistant Attorney General

SKM:rkc:kt/RKC0269.LET

Application No. TC-4288

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

---

1. Applicant

Intel Corporation
Oregon Site
3065 Bowers Avenue
Santa Clara, CA 95051

The applicant owns and operates a microcomputer chip manufacturing plant in Aloha, Oregon.

Application was made for tax credit for an air pollution control facility.

2. Description of Facility

The claimed facility, the AME etch process, is utilized to etch the surface of silicon wafers. This equipment replaces the previous etch process, the D&W etch process, which emitted Carbon Tetrachloride to the atmosphere.

Claimed Facility Cost: $11,014,355.00

Accountant's Certification was provided.

The applicant indicated the useful life of the facility is ten years.

3. Procedural Requirements

The facility is governed by ORS 468.150 through 468.190, and by OAR Chapter 340, Division 16.

The facility met all statutory deadlines in that:

Installation of the facility was substantially completed on December 1, 1993 and placed into operation on February 1, 1994. The application for final certification was received by the Department on September 9, 1994, within two years of substantial completion of the facility.

4. Evaluation of Application

a. Rationale for rejection of application for certification of a pollution control facility.

The AME etch process is not eligible for certification as a pollution control facility. The claimed equipment has neither a principal or sole purpose of pollution control. Since the AME etch process does not have a principal or sole purpose of pollution control it does not qualify as a pollution control facility as defined in ORS 468.155 and OAR 340-16-025.

The claimed equipment is used in the semiconductor manufacturing process. The AME etch process utilizes the gas Boron Trichloride (BCl_3) to remove a layer of aluminum from the surface of silicon wafers. The AME etch process replaced the D&W etch process which the applicant estimates emitted 1.2 tons per year of Carbon Tetrachloride (CCl_4). Carbon Tetrachloride is prohibited from manufacture by the Montreal Protocol because of its effect on the stratospheric ozone layer. The AME etch process consists of the following components: SSI Resist Spinner, Ultra Tech Stepper (Expose), SSI Developer, DUV Hard Bake, AME 8330 Metal Etcher, SRD (Verteq), Semitool SSP Resist Strip, Gasonics Plasma Clean.

The AME etch process does not have a principal purpose of pollution control because the facility was not installed to comply with a requirement imposed by the Department, the Federal Environmental Protection Agency, or a regional air pollution authority. There is currently no requirement to control or eliminate the emission of carbon tetrachloride to the atmosphere. The AME etch process does not have a sole purpose of pollution control because it is production equipment. OAR 340-16-010 (9) defines "Sole Purpose" to mean the exclusive purpose. Since the AME etch process is an integral part of the semiconductor manufacturing process, the equipment does not have a sole purpose of pollution control.

On September 14, 1994 the Department sought the advice of the Attorney General's office to confirm this determination. On November 14, 1994 the Department received a written response which supported the Department's conclusions. The

Department subsequently sought additional advice from the Attorney Generals office. The Department asked if the Commission had the discretion to consider the carbon tetrachloride production phaseout under the Clean Air Act a requirement imposed by the Department or EPA on Intel. The conclusion of the Attorney General's office was in this case that the Commission does not have the discretion to consider the Clean Air Act requirements relating to manufacture of carbon tetrachloride as a requirement imposed on consumers of carbon tetrachloride.

4. Summation

The facility is not eligible for final tax credit certification in that it does not have a principal or sole purpose of pollution control.

5. Director's Recommendation

Based upon these findings, it is recommended that the application for certification of a Pollution Control Facility for the equipment claimed in Tax Credit Application No. TC-4288 be rejected.

BKF:
^C(DOC. NO.)

April 14, 1995

OREGON STEEL MILLS

P.O. Box 2760
Portland, Oregon 97208-0363
Phone (503) 286-9651

May 3, 1995

Mr. Charles Bianchi
Oregon DEQ
811 S. W. Sixth Ave.
Portland, OR 97204-1390

Dear Mr. Bianchi:

In compliance with the terms of Certificate No. 3371 issued December 2, 1994 to Oregon Steel Mills, Inc. (OSM), we are notifying you that the subject of the credit, the OSM baghouse dust glassification™ plant, was put on temporary closure status on March 15, 1995. The plant is currently not operating to process any baghouse dust.

It is the intention of OSM to restart the plant when the economics warrant. No writeoff has been taken for financial reporting purposes. OSM is currently working to develop a product with a margin higher than those of previous products which will justify restarting plant production. At this time, we cannot predict the timeframe for this product development, although we hope that its achievement will occur in 1995.

It is our intent to continue to keep you appraised of the plant status. If you have any questions, please feel free to contact me at 240-5279.

Very truly yours,

Terry S. MacDonald
Corporate Tax Manager

Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

NORTHWEST REGION

May 13, 1996

CHEVRON USA
GORDON JOHNSON
PO BOX 5004
SAN RAMON CA 94583

RE: WQ-Multnomah County
Chevron Willbridge
5531 NW Doane Ave
WQ Tax Credit

Dear Mr. Johnson:

The Department wrote to you on November 6, 1995 (see attached letter) asking for additional information to support a water quality tax credit application for Chevron's Willbridge facility in Portland, Oregon. The letter stated that if additional information was not received within six months of the date of the letter, the application would be rejected. The information has not been received by the Department. Therefore, Tax Credit Application No. 4330 is rejected. Oregon law allows an applicant up to two years after completion of the claimed facility to file a complete pollution control tax credit application. The completion date listed on the application is 8-31-1993. This facility is no longer eligible for a water pollution tax credit.

The application fee of $6,998.32 less a nonrefundable filing fee of $50 will be refunded.

Sincerely,

Elliot J. Zais

Elliot J. Zais, PhD, PE
Senior Environmental Engineer

EJZ:ejz

Cc: Renato Dulay, WQD, DEQ
Charles Bianchi, WQD, DEQ
Attachments: November 6, 1995 letter

John A. Kitzhaber
Governor

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471
DEQ-1

recommended that a Pollution Control Facility Certificate for this facility be denied.

Elliot J. Zais, PhD,PE
(503) 229-5292
(DATE REPORT ACTUALLY TYPED)

chev4330.doc

May 21, 1996

Edward Miska
Portland General Electric Company
121 SW Salmon Street 1WTCO402
Portland OR 97204

Re: PGE Tax Credit Application 4461 for increased HRSG and auxiliary boiler stack height.

Dear Mr. Miska:

I am writing in regard to tax credit application 4461. First I would like to note that in my previous correspondence to you regarding this application I incorrectly referred to the application number as 4462. The correct number is 4461. I have received your response to the request for withdrawal of this application. I have considered your argument that increase in stack height for the HRSG and auxiliary boiler stack does have a principal purpose of pollution control. The pollution control facility statutes are specifically worded to allow for tax credits for controlling, reducing, or eliminating pollution and that this control is required by the DEQ or EPA. The wording of the statutes is such that both criteria need to be met. If only one of these criteria is met the facility does not meet the principal purpose definition. I will forward a recommendation to the Commission for denial of application 4461. I anticipate this will be placed on the agenda of the July 12, 1996 Environmental Quality Commission meeting.

I would like to address some of the assertions made in your letter in support PGE's opinion the stack extension has a principal purpose of pollution control. You suggested that complying with the requirements of the air contaminant discharge permit constitutes proper disposal of the air contaminants and no actual removal of air contaminants is required by the statute allowing for pollution equipment credits. The assertion that no actual removal of air contaminants is required to establish eligibility for certification is incorrect. ORS 468.155 (1bB) explicitly states that such control or reduction required by this rule shall be accomplished by the disposal <u>to eliminate</u> air pollution or air contamination sources. This is concise direction from the legislature requiring the elimination of air contaminants for a determination of principal or sole purpose of air pollution control. In ORS 468A.005 the statutes also provide specific definitions of what constitutes air contaminant, air contamination, air contamination source, and air pollution. These definitions are referenced in both the Pollution Control Facility Tax Credit statutes and in the Pollution Control Tax Credit administrative rules.

In your letter you raise a two additional issues. You made a reference to pollution control facility certification of stack extensions in the past. I made a search of the Department's database and found only three references to certificates issued for stack extensions. Only one of these was certified in the last fifteen years. In this case the stack extension was necessary to install continuous emission monitoring equipment. The CEM was the certified Pollution Control Facility. The other two credits were issued in 1981 and 1974. They were for stack extensions for dispersion. You are incorrect however when you assert that such certification constitutes a binding interpretation of legislative intent. In this case there is specific language contained in statute which presents criteria for establishing a principal or sole purpose. Stack extensions do not meet this criteria because they do not eliminate the emission of air contaminants to the outdoor atmosphere.

You also assert that the added stack height was solely for the purpose of meeting the requirements of state and federal law. This does not appear to be the case. The state and federal laws referenced in the tax credit application address disallowing the use of excessive stack height as a dispersion technique for meeting ambient air quality standards.

The Department will recommend the Environmental Quality Commission reject TC-4461 at the July 12, 1996 Commission meeting. Portland General Electric will have the opportunity to petition the Commission for approval of TC-4461 at that time. If you have any question please call me at (503) 229-5810.

Sincerely,

Brian K. Fields
Environmental Specialist
Air Quality Division

BKF:j

Application No. 4461

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

---

1. Applicant

Portland General Electric
Coyote Springs Coyote Springs Cogeneration Project
121 SW Salmon Street
Portland, OR, 97204

The applicant owns operates a single combined cycle combustion turbine electric generating unit Boardman Oregon.

Application was made for tax credit for an air pollution control facility.

2. Description of Facility

The claimed facility consists of increased stack height for the applicants HRSG stack and auxiliary boiler stack. The applicant indicated on the application the purpose of the stack is for additional emission dispersion.

Claimed Facility Cost: $401,789

Accountant's Certification was provided.

3. Procedural Requirements

The facility is governed by ORS 468.150 through 468.190, and by OAR Chapter 340, Division 16.

The facility has not met all statutory deadlines in that:

The application as currently submitted is incomplete and cannot be considered filed.

4. Evaluation of Application

a. Rationale For Eligibility

The facility is not eligible for pollution control facility certification because it does not control pollution. Because the facility does not control pollution it can not have a principal purpose or sole purpose. This is in accordance with ORS 488.155 and ORS 468A.005.

The claimed facility consists the increased stack height on the applicants HRSG and auxiliary boiler stack which vent emissions from the applicants electrical generating process. The applicant indicated the stack heights were increased for the purpose of additional emission dispersion. The Department acknowledges that in some cases increasing the height of an emission point can increase the dispersion of atmospheric contaminants. In some cases this dispersion can improve ambient concentrations of atmospheric pollutants. However ORS 468.155 defines that the prevention, control or reduction be accomplished by the elimination of air contaminants as defined in ORS 468A.005. This section of the statutes define Air-cleaning device, air contaminant, air contamination, air contamination source, and air pollution. Stack extensions do not eliminate air contaminants they spread them out. Since stack extensions do not eliminate any air contaminants they can not have a principal or sole purpose of pollution control.

b. Eligible Cost Findings

In determining the percent of the pollution control facility cost allocable to pollution control, the following factors from ORS 468.190 have been considered and analyzed as indicated:

1) The extent to which the facility is used to recover and convert waste products into a salable or usable commodity.

The facility does not recover or convert waste products into a salable or usable commodity.

A portion of the waste product is converted into a salable or usable commodity consisting of

2) The estimated annual percent return on the investment in the facility.

The applicant indicates in the application there is no income or savings from the facility, so there is no return on the investment.

3) The alternative methods, equipment and costs for achieving the same pollution control objective.

The facility does not achieve pollution control as defined within the scope of the pollution control tax credit statutes.

4) Any related savings or increase in costs which occur or may occur as a result of the installation of the facility.

There is no savings or increase in costs as a result of the facility modification.

5) Any other factors which are relevant in establishing the portion of the actual cost of the facility properly allocable to the prevention, control or reduction of air pollution.

There are no other factors to consider in establishing the actual cost of the facility properly allocable to prevention, control or reduction of pollution.

The actual cost of the facility properly allocable to pollution control as determined by using this factor or these factors is 0%.

5. Summation

a. The facility was constructed in accordance with all regulatory deadlines.

b. The facility is ineligible for final tax credit certification in that the principal sole purpose of the facility is to comply with a requirement imposed by to prevent control reduce air pollution.

c. The facility complies with DEQ statutes and rules, Commission orders, permit conditions.

d. The portion of the facility cost that is properly allocable to pollution control is 0%.

6. Director's Recommendation

Based upon these findings, it is recommended that a the Environmental Quality Commission reject application 4461 for Pollution Control Facility Certification.

Brian Fields
Air Quality Division
June 7, 1996

Application No. TC-4473

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

---

1. Applicant

Portland General Electric Company
Boardman Plant
121 SW Salmon St., 1WTC-0402
Portland, OR 97204

The applicant owns and operates a coal fired electric power generating facility in Boardman, Oregon.

Application was made for tax credit for an air pollution control facility.

2. Description of Facility

The claimed facility controls sulfur dioxide and nitrogen oxides emissions. It consists of a Horiba SO_2 probe, model APSA-350E, a Horiba NO_x probe, model APNA-350E, a Horiba data acquisition system, model COMPUCEM DARS and a United Sciences UltraFlow 100 flow sensor.

Claimed Facility Cost: $377,321

A distinct portion of the claimed facility makes an insignificant contribution to the principal purpose of pollution control. The applicant claimed $1,235 for capitalized property taxes, $133 for materials loading on items that were purchased from PGE central stores, and $9,600 for a maintenance contract. The applicant also claimed $30,605.00 as construction overhead expenses of the facility. A distinct portion of these claimed expenses, $20,815 were allocated from corporate expenditure pools which were incurred from corporate activities removed from the facility site.

Ineligible Costs: $31,783

Adjusted Facility Cost: $345,538

Accountant's Certification was provided.

The applicant indicated the useful life of the facility is 15 years.

Application No. TC-4473

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

---

1. Applicant

Portland General Electric Company
Boardman Plant
121 SW Salmon St., 1WTC-0402
Portland, OR 97204

The applicant owns and operates a coal fired electric power generating facility in Boardman, Oregon.

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Application No. TC-4473

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

---

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Portland General Electric Company
Boardman Plant
121 SW Salmon St., 1WTC-0402
Portland, OR 97204

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Application No. TC-4473

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

---

1. Applicant

Portland General Electric Company
Boardman Plant
121 SW Salmon St., 1WTC-0402
Portland, OR 97204

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Application No. TC-4473

State of Oregon
Department of Environmental Quality

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Boardman Plant
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Portland, OR 97204

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Application was made for tax credit for an air pollution control facility.

2. Description of Facility

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Claimed Facility Cost: $377,321

A distinct portion of the claimed facility makes an insignificant contribution to the principal purpose of pollution control. The applicant claimed $1,235 for capitalized property taxes, $133 for materials loading on items that were purchased from PGE central stores, and $9,600 for a maintenance contract. The applicant also claimed $30,605.00 as construction overhead expenses of the facility. A distinct portion of these claimed expenses, $20,815 were allocated from corporate expenditure pools which were incurred from corporate activities removed from the facility site.

Ineligible Costs: $31,783

Adjusted Facility Cost: $345,538

Accountant's Certification was provided.

The applicant indicated the useful life of the facility is 15 years.

Application No. TC-4473

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

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1. Applicant

Portland General Electric Company
Boardman Plant
121 SW Salmon St., 1WTC-0402
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Ineligible Costs: $31,783

Adjusted Facility Cost: $345,538

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State of Oregon
Department of Environmental Quality Memorandum

Date: July 12, 1996

To: Environmental Quality Commission

From: Langdon Marsh

Subject: Technical Corrections - Portland Area Air Quality Maintenance Plans and Rules

Attached are minor technical corrections that should be made to the following three agenda items scheduled for your July 12 meeting. These changes do not affect the substance of the plans or rules.

Agenda Item C, Portland Area Carbon Monoxide Maintenance Plan

Four of the proposed changes to the original rulemaking made in response to public comment and shown as additions/deletions in Attachment E were not carried forward to Attachment A, which is the edited version proposed for adoption. The necessary changes are shown in strike through and underline on revised attached pages xv, 35, 37 and 44.

A small correction to three interim year point source emission levels should have been added to Attachments A and E. This change is shown in strike through and underline on revised attached page 29 of Attachment A.

Agenda Item D, Ozone Maintenance Plan for the Portland AQMA

An increase in the VOC emission forecasts for 2003 and 2006 of one ton/day is needed because some of the expected permanent donation of unused permitted emissions actually turned out to be temporary donations. The change is shown in strike through and underline on revised attached pages 16 and 17 of Attachment A.

Agenda Item F, Employee Commute Options Program

Two changes are needed to avoid confusion about the criteria for complying with ECO through parking restrictions. These changes make it clear that an employer can exceed DEQ parking ratios and still meet ECO requirements by meeting other conditions. These changes are shown in strike through and underline on revised attached Rule 340-030-0990 and Rule 340-030-1000 of Attachment A.

Contingency Plan Elements

The maintenance plan must contain contingency measures that would be implemented either to prevent or correct a violation of the CO standard after the area has been redesignated to attainment. The FCAA requires that measures in the original attainment plan be reinstated if a standards violation occurs. Under the proposed contingency plan, adopted under the CCTMP and recommended by Metro, the DEQ would convene a planning group if the validated second highest (within one calendar year) 8-hour CO concentration equals or exceeds 8.1 ppm (90 percent of the 8-hour CO standard). A range of action would be considered from implementing candidate measures to deciding to do nothing. However, if a violation of the 8-hour CO standard were to occur, control measures that would be restored include Lowest Achievable Emission Rate (LAER) requirements plus offsets for major new and modified industrial sources and wintertime oxygenated gasoline at 2.7 percent weight for motor vehicles ~~[(if the oxygenated fuels program is repealed prior to the occurrence of violations)]~~. If the violation occurred within the defined area of the former Downtown Parking and Circulation Policy, roughly the Central Business District of downtown Portland, then the parking lid would be reinstated. The parking lid would not be reinstated if a violation occurred outside the downtown area.

To make the growth allowance "pool" last as long as possible, sources will be encouraged to provide offsets, if possible, for all or part of the proposed increase. Once the growth allowance is fully allocated, offsets for all proposed major sources and major modifications will again be required.

DEQ will prepare a thorough accounting of any activity in the growth allowance program for each period identified in Table 4.51.3.1, including any allocations to sources and any increases in the growth allowance. This information will be reported to EPA within 12 months following the end of the reporting period. If there are any increases to the growth allowance since the last report, DEQ will include a clear discussion of how each increase to the growth allowance is based on a surplus and federally enforceable emission reduction. This is also discussed in Section 4.51.4.4 "Maintenance Plan Commitments" and Appendix D2-11 (New Source Review Rules).

If a violation of the CO standard occurs after the Portland area has been redesignated to attainment, the LAER and offset requirement will be reimposed, and any remaining growth allowance will be eliminated (see Contingency Plan, below, Section 4.51.3.3).

Transportation Control Measures (TCM's)

The TCMs identified in the maintenance plan fall into two categories: non-funding based TCMs and funding based TCMs. The non-funding based TCMs reduce transportation emissions through land-use requirements and regulatory programs. The funding based TCMs reduce transportation emissions by increasing the supply of transit, bicycle and pedestrian facilities. The funding based TCMs were established in the financially constrained transportation network of Metro's interim federal RTP, adopted July, 1995, in accordance with the requirements of the federal Intermodal Surface Transportation Efficiency Act (ISTEA). This network includes only projects that can be supported based on historical funding level trends.

The funding based TCMs must receive priority funding **in Metro's transportation planning process,** and all TCMs identified in the maintenance plan must receive timely implementation. If the TCMs do not receive priority funding and timely implementation, a conformity determination can not be made for Metro's transportation plans and ~~[federal funding will be withheld]~~ **all regionally significant projects will be held up until a conformity determination can be made**. These requirements are specified in the transportation conformity rules, OAR 340-020-0710 through 340-020-1080. In general, "priority funding" means that all state and local agencies with influence over approvals or funding of the TCMs are giving maximum priority to approval of funding of the TCMs over other projects within their control. "Timely implementation" means that the TCMs are being implemented consistent with the schedule established in the maintenance plan. The determination of whether priority funding and timely implementation have been achieved is made in the context of interagency consultation as specified in the transportation conformity rules.

the Zoning Code Amendments, containing the maximum parking ratios for new development, the requirements for providing structured parking to serve older historic buildings and other regulations on parking. Key elements of the Zoning Code Amendments related to CO air quality projections are incorporated into this document as given below.

The CCTMP replaced the former Downtown Parking and Circulation Policy, first adopted in 1975 and updated in 1980 and 1985. The 1980 update of the parking policy served as a foundation for the 1982 Portland area CO attainment plan. The CCTMP is designed to minimize new vehicle traffic in the Central City and encourage alternative travel modes by extending the downtown maximum parking ratio concept to the entire Central City area. The CCTMP provided for the lifting of the downtown parking lid upon EPA approval of the maintenance plan and the request for attainment redesignation. However, until EPA approval, the CCTMP retains the parking lid.

The parking offset program (OAR 340-020-0400 through OAR 340-020-0430), designed to allow the city to increase the parking lid by up to a maximum of 1,370 spaces, was also retained until after EPA approval of the maintenance plan. The DEQ's emission projection figures for the CCTMP emissions inventory area include an estimate for the emissions associated with 827 parking spaces, as documented in Appendix D2-4-4. These are the parking spaces yet to be developed, but which were authorized by the parking offset program.

The following is a list of zoning code amendments that were incorporated directly into the Portland Carbon Monoxide Maintenance Plan. The text of critical code provisions (such as maximum parking ratios for new development and parking provisions for existing buildings) is contained in Appendix D2-8. A list of other zoning code amendments used as supporting documents for the maintenance plan is contained in Appendix D2-13 of Volume 3 of the Oregon State Implementation Plan.

Items in Volume 3 of the SIP are federally enforceable. With regard to Volume 3 items, EPA has allowed DEQ to make changes which are merely administrative, without requiring public process. DEQ and EPA make a determination as to whether a proposed change by the City of Portland is merely administrative rather than substantive.

Section 1: **Incorporated Amendments to Chapter 33.510, Central City Plan District**

Code Number	Code Title
33.510.261 -	Parking
33.510.261.E	Site split by subdistrict or parking sector boundaries

(33.510.261.E.1.a(1)-(2),b,E.2.a(1)-(2),b)

quality impact) will be modified. The requirement to install Best Available Control Technology (BACT) will be replaced with a requirement to install Lowest Achievable Emission Rate (LAER) technology. In addition, the industrial growth allowance established in Section 4.51.3.2.3 will be eliminated. These requirements will take effect upon validation of the violation. BACT and a growth allowance may be reinstated if provided for in a new maintenance plan adopted and approved by EPA.

(2) Oxygenated gasoline at 2.7 percent weight will be required. OAR 340-022-0460 (see Appendix D2-14-3) delineates the "reinstatement" procedures. Subsection (8) (b) states that a validated violation of the 8-hour CO standard will result in the requirements of OAR 340-022-0440 through 022-0640 being **reinstated**~~[*reinstituted. Subsection (8) (c) states the oxygenated fuel program would be reinstituted*]~~ **beginning** in the winter season following ~~[*a validated*]~~ **the** violation, but no~~[*t*]~~ sooner than 6 months following that violation. Subsection (8) ~~[*(d)*]~~ **(c)** states that such reinstatement will be automatic and that no further rulemaking will be required.

(3) The downtown parking lid will be reinstated. (This measure will be implemented only if the violation occurs in the downtown area formerly under the parking lid requirement.)

Table 4.51.3.1: CO Emissions Attainment and Projection Inventories

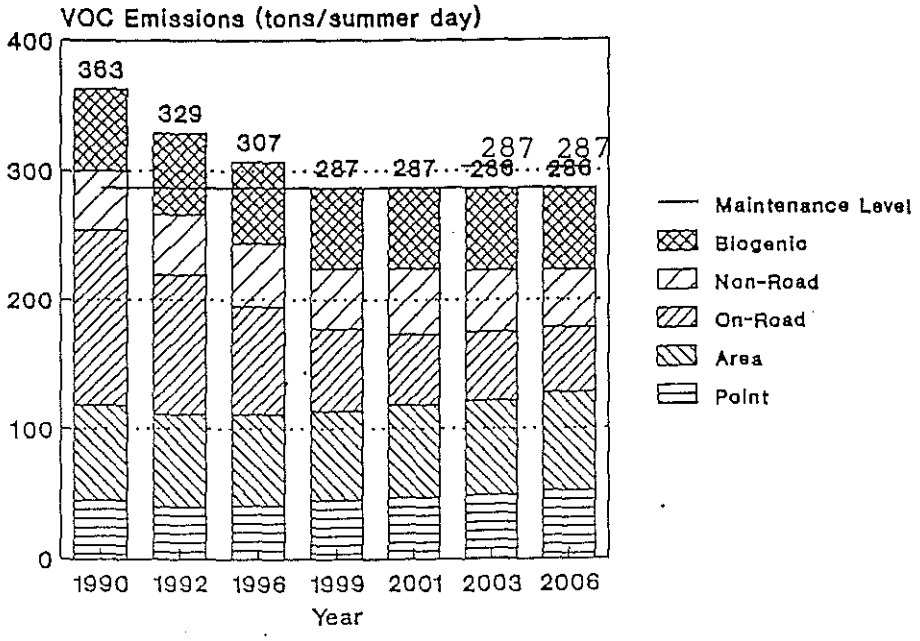
CO Emissions: Region (=CO Nonattainment Area=Metro Boundary)
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	2007
Area Sources	411	382	392	405	417	447
Non-Road Mobile Sources	135	146	151	160	163	169
Large Point Sources	116	124	~~*165*~~ **167**	~~*170*~~ **171**	~~*171*~~ **173**	178
On-Road Mobile Sources	1812	1217	1075	1074	1011	947
Total	2474	1868	~~*1783*~~ **1785**	~~*1808*~~ **1810**	~~*1762*~~ **1764**	1741

CO Emissions: CCTMP Sub-Area
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	2007
Area Sources	9.3	8	8	8	9	9
Non-Road Mobile Sources	3.4	4	4	4	4	4
Large Point Sources	0	0	0	0	0	0
On-Road Mobile Sources	192	123	107	103	95	86
Total	204	135	119	115	107	98

Figure 4.50.3.3: Portland/Vancouver AQMA VOC Emission Projections



VOC emissions are projected to be a total of ~~[286]~~287 tons/day for the Portland/Vancouver airshed in 2006. The 2006 VOC emissions for the Oregon portion, after the public education and incentive program credits, are a total of ~~[230]~~231 tons/day (80%) of the interstate airshed total.

Total VOC emissions stay well below the 1992 attainment emission level throughout the 10-year maintenance plan period, and VOC emissions do not exceed the maintenance emission level ("airshed capacity") as shown in Table 4.50.3.1. The on-road mobile emissions decrease from 1992 to 2006 is largely due to fleet turnover and the vehicle inspection and maintenance program. Point sources are expected to increase slightly due to growth in the area; this growth includes minor increases from existing and new sources as well as a growth allowance for major new and expanding industry. Area sources and non-road emissions are projected to grow slightly in some categories but have reductions in others due to implementation of EPA emission standards on several non-road categories and local VOC Area Source Rules (i.e, motor vehicle refinishing, architectural coatings, consumer products and spray paint).

Table 4.50.3.1: Portland/Vancouver AQMA VOC Emission Projections (tons/day)

Vancouver Emissions

	1990	1992	1996	1999	2001	2003	2006
Point Sources	5	4	4	4	4	5	5
Area Sources	15	14	14	14	15	15	16
On-road	22	16	13	11	9	9	9
Non-road	8	8	9	9	10	9	9
Biogenic	17	17	17	17	17	17	17
Total	67	59	57	55	55	55	56

Portland Emissions

	1990	1992	1996	1999	2001	2003	2006
Point Sources	40	36	37	41	43	~~[44]~~ 45	~~[47]~~ 48
Area Sources	58	57	56	56	57	59	61
On-road	114	92	70	52	46	44	41
Non-road	38	39	41	38	41	39	36
Biogenic	46	46	46	46	46	46	46
Total	296	270	250	233	233	~~[232]~~ 233	~~[231]~~ 232
Education and Incentive credits	--	--	--	(1)	(1)	(1)	(1)
Total Portland & Vancouver	363	329	307	287	287	~~[286]~~ 287	~~[286]~~ 287

Maintenance Emission Level = 287 tons/day

Can a new or relocating employer comply with ECO through restricted parking ratios?

340-030-0990 An employer locating at a work site within the AQMA after the effective date of the ECO rules will be exempt from the ECO rules for that work site if:

(1) The new work site meets the requirements of the Department's Voluntary Parking Ratio rules (OAR 340-030-1100 through 340-030-1190); ~~and~~ or

(2) If the employer provides free or subsidized parking, including leased parking, above the Department's maximum parking ratio to any employees at the work site (except to employees required to have a vehicle at the work site as a condition of employment), then either:

(a) A transportation allowance is offered to those employees provided free or subsidized parking that exceeds the Department's maximum parking ratio. The transportation allowance must be offered in lieu of the free or subsidized parking in an amount equal to or greater than the amount of the subsidy, but not to exceed the maximum allowed for transit by the Internal Revenue Service for the Qualified Transportation Fringe Benefits included under Section 132(F), Notice 94-3 of the tax code; OR

(b) All employees at the work site are offered a transit subsidy or its equivalent at least equal to 50 percent of the value of a Tri-Met all-zone transit pass.

An employer must submit this documentation with an exemption application to the Department by the deadline for plan or notice submittal specified in **Table 1.** Employers meeting the requirements of this rule do not need to conduct a baseline survey of employees. However, employers whose applications are denied must then conduct a baseline survey and submit the findings to the Department within 90 days of notice by the Department.

Can an existing employer comply with ECO through restricted parking ratios?

340-030-1000 An employer will be considered to have met the target trip reduction and is exempt from the ECO rules if the employer provides documentation of the following:

(1) Work site is located in an area with maximum parking ratio requirements at least as stringent as the Department's maximum parking ratios *(see OAR 340-030-1100 through 340-030-1190);*

(2) Free or subsidized all-day parking is generally unavailable within a one-half mile radius of the work site; and

~~(3) The work site parking meets the requirements of the Department's Voluntary Parking Ratio rules; and~~

(34) If the employer provides free or subsidized parking, including leased parking, above the Department's maximum parking ratio to any employees at the work site (except to employees required to have a vehicle at the work site as a condition of employment), then either:

(a) A transportation allowance is offered to those employees provided free or subsidized parking that exceeds the Department's maximum parking ratio. The transportation allowance must be offered in lieu of the free or subsidized parking in an amount equal to or greater than the amount of the subsidy, but not to exceed the

maximum allowed for transit by the Internal Revenue Service for the Qualified Transportation Fringe Benefits included under Section 132(F), Notice 94-3 of the tax code; OR

(b) All employees at the work site are offered a transit subsidy or its equivalent at least equal to 50 percent of the value of a Tri-Met all-zone transit pass.

An employer must submit this documentation with an exemption application to the Department by the deadline for plan or notice submittal specified in **Table 1.** Employers meeting the requirements of this rule do not need to conduct a baseline survey of employees. However, employers whose applications are denied must then conduct a baseline survey and submit the findings to the Department within 90 days of notice by the Department.

Environmental Quality Commission

- ☒ Rule Adoption Item
- ☐ Action Item
- ☐ Information Item

Agenda Item C
July 12, 1996 Meeting

Title:

Portland Area Carbon Monoxide Maintenance Plan

Summary:

The Portland area has the necessary ambient carbon monoxide (CO) monitoring data, which demonstrates attainment with national standards, and the Department has assembled the necessary maintenance plan documentation to allow the Portland area to be redesignated by EPA from a nonattainment area to an attainment area for CO. Continued emission control improvements from the federal new car program, and implementation of an enhanced vehicle inspection program as well as improvements to transit, bike and pedestrian facilities, and new parking requirements for the Central City will provide for maintenance of the 8-hour CO health standard for at least a ten-year period. Maintenance can be demonstrated without the downtown parking lid and without a continuation of oxygenated fuels, two programs that have significant negative economic impact.

Department Recommendation:

The proposed maintenance plan includes improvements to the Motor Vehicle Inspection and Maintenance Program, incorporation of the City of Portland's Central City Transportation Management Plan, other transportation control measures, and a two-year extension of the oxygenated fuel program.

The Department recommends that the Commission adopt the carbon monoxide maintenance plan for the Portland area, as presented in Attachment A of this report, including the supporting rule amendments and emission inventories, as an amendment to the federal Clean Air Act State Implementation Plan; and repeal the carbon monoxide attainment plan for the Portland area, originally adopted on July 12, 1982 and the 1990 amendment on parking offsets that included modification of the parking lid, effective upon EPA redesignation of the Portland area to attainment for carbon monoxide.

Howard W. Harris — Report Author | John J. Kowalczyk for Greg Green — Division Administrator | [signature] — Director

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Accommodations for disabilities are available upon request by contacting the Public Affairs Office at (503)229-5317(voice)/(503)229-6993(TDD).

State of Oregon
Department of Environmental Quality Memorandum

Date: June 24, 1996

To: Environmental Quality Commission

From: Langdon Marsh

Subject: Agenda Item C, July 12, 1996 EQC Meeting

Portland Area Carbon Monoxide Maintenance Plan

Background

On April 12, 1996, the Director authorized the Air Quality Division to proceed to a rulemaking hearing on a proposed carbon monoxide maintenance plan for the Portland area. The proposed maintenance plan, which would amend the federal Clean Air Act State Implementation Plan (SIP), is designed to ensure compliance with the federal carbon monoxide air quality standard for the next ten years.

Pursuant to the authorization, hearing notice was published in the Secretary of State's Bulletin on May 1, 1996. The Hearing Notice and informational materials were mailed to the mailing list of those persons who have asked to be notified of rulemaking actions, and to a mailing list of persons known by the Department to be potentially affected by or interested in the proposed rulemaking action on April 18, 1996. Supporting procedural documentation for the hearing notice is included in Attachment B.

Public Hearings were held on May 22, 1996 and May 23, 1996 with Mike Grant and Lawrence Smith serving as Presiding Officers. Written comment was received through May 24, 1996. The Presiding Officer's Report (Attachment C) summarizes the oral testimony presented at the hearing and lists all the written comments received. (A copy of the comments is available upon request.)

Department staff have evaluated the comments received (Attachment D). Based upon that evaluation, modifications to the initial rulemaking proposal are being recommended by the Department. These modifications are summarized below and detailed in Attachment E.

The following sections summarize the issue that this proposed rulemaking action is intended to address, the authority to address the issue, the process for development of the rulemaking proposal including alternatives considered, a summary of the rulemaking proposal presented for public hearing, a summary of the significant public comments and the changes proposed in response to those comments, a summary of how the rule will work and how it is proposed to be implemented, and a

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recommendation for Commission action.

Issue this Proposed Rulemaking Action is Intended to Address

The carbon monoxide maintenance plan is designed to protect public health by preventing violations of the federal carbon monoxide standard, and will allow EPA to redesignate the area from nonattainment to attainment status. An EPA-approved maintenance plan will also remove Clean Air Act impediments to industrial development and will help alleviate the possibility of Clean Air Act sanctions on federal transportation funds.

Carbon monoxide (CO) is a colorless, odorless, poisonous gas. It decreases the oxygen carrying capacity of the blood. High concentrations can severely impair the function of oxygen-dependent tissues, including the brain, heart and muscle. Prolonged exposure to even lower levels of CO can aggravate existing conditions in people with heart disease or circulatory disorders. Motor vehicles are the predominate source of CO in Oregon, but another significant source is wood stoves.

The Portland area exceeded the federal 8-hour CO standard of 9 parts per million approximately one day out of every three in the early 1970's. Maximum 8-hour CO levels were more than twice the standard level. CO control strategies, including the federal new car program, the DEQ vehicle inspection program, the City of Portland's downtown parking policy, and other measures have been successful in bringing the Portland area into attainment with the 8-hour CO standard. Area wide compliance was achieved in 1991. To ensure continued compliance and keep healthful air quality, some additional control measures, outlined on pages 5-7, are needed to combat the effects of a growing population and increased motor vehicle travel.

This proposal would allow the DEQ to submit a plan to EPA that provides for maintenance of the CO standard for ten years. The maintenance plan is designed to protect the public health while still allowing for reasonable industrial growth. Once adopted by the EQC and approved by EPA, impediments to industrial growth will be removed and the Portland area will not be subject to Clean Air Act sanctions on federal transportation funds.

To redesignate Portland from nonattainment to attainment, EPA requires an enforceable plan that demonstrates how the area will continue to meet the carbon monoxide standard for a minimum of ten years. The carbon monoxide maintenance plan includes emission reduction strategies that are sufficient to ensure that attainment will be maintained for the next ten years. An EPA-approved carbon monoxide maintenance plan and redesignation to attainment will:

- Assure that public health will be protected from adverse impacts of carbon monoxide;
- Protect against possible Clean Air Act sanctions on federal transportation funds;
- Remove requirements for Lowest Achievable Emission Rate (LAER) and emission offsets for new

or expanding industries;

- Eliminate the Portland downtown parking lid and extend maximum parking ratios for new development to the entire Central City area.

Relationship to Federal and Adjacent State Rules

The Portland metropolitan area was first designated by the EPA as a nonattainment area for CO on March 3, 1978. Following enactment of the Clean Air Act Amendments of 1990 (CAAA90), the EPA classified the Portland-Vancouver area as a moderate CO nonattainment area based on a 1988-1989 design value of 10.0 ppm recorded at the Atlas & Cox site in Vancouver, Washington.

The Portland area attained the CO standard well before the deadline of December 31, 1995. The downtown Portland area has been in compliance with the National Ambient Air Quality Standards (NAAQS) for CO since 1984, and the 82nd and Division monitoring site has been in compliance since 1989. If a subsequent violation of the NAAQS for CO occurs prior to redesignation, the Portland area would be automatically "bumped up" to the "serious" level of nonattainment. This would require submittal of a new attainment plan with more stringent requirements in a shorter time than proposed in the maintenance plan. For an area to be redesignated to attainment, the Clean Air Act requires a demonstration that the area has attained the standard and EPA approval of a ten-year maintenance plan. There is no deadline for submittal of a maintenance plan. Once the area is redesignated, a new maintenance plan must be submitted two years prior to the expiration of the existing plan.

In November 1995 the EPA approved a formal separation of the Portland-Vancouver area into two distinct nonattainment areas. Washington's Southwest Air Pollution Control Authority (SWAPCA) developed a CO maintenance plan during 1995 in cooperation with the Washington Department of Ecology. The final CO maintenance plan proposal for the Vancouver area was submitted to EPA in June 1996. Although Portland and Vancouver are now separate CO nonattainment areas, there has been coordination on the respective oxygenated fuel programs, since most of Vancouver's gasoline supplies come from Portland terminals.

A key aspect of Vancouver's proposed CO maintenance plan is to eliminate the requirements for oxygenated fuels in the Vancouver area upon EPA approval of the maintenance plan. The future of the oxygenated fuel program was controversial in the development of both states' CO maintenance plans. The Department went to public hearings on the proposed CO maintenance plan without making a recommendation on the oxygenated fuel program. Instead, the staff report announcing the public hearings listed several options for consideration, from eliminating the program after the 1996/1997 winter to continuing the program through the ten-year life of the maintenance plan. SWAPCA anticipates that EPA may take final action on the Vancouver CO maintenance plan by October 1996, meaning that the oxygenated fuel requirements in the Vancouver area could be lifted by the next winter season. This would not materially affect the Department's CO projections, since a scenario without oxygenated fuel (for both areas) was modeled for the 1996/1997 winter.

Authority to Address the Issue

The EQC has the statutory authority to address this issue under Oregon Revised Statutes (ORS) Chapter 468A, which gives the Commission the power to adopt plans and programs to achieve and maintain federal and state ambient air quality health standards.

Process for Development of the Rulemaking Proposal (including Advisory Committee and alternatives considered)

The Department primarily used the City of Portland's process for developing the Central City Transportation Management Plan (CCTMP) to develop the CO maintenance plan provisions. This nearly five-year planning process to address a high growth scenario by 2010 and beyond culminated in the City Council's adoption of implementing ordinances in December 1995. This plan included:

- retaining the maximum parking ratios in effect for the last twenty years in the downtown area with slight modification (some residential parking ratios were increased from 1.2 parking spaces per dwelling unit to 1.35 spaces per dwelling unit in the core area of the downtown; also, office ratios in the close-in North Burnside area were changed from 0.8/0.9 spaces per 1,000 sq. ft. of net building area to 1.5 spaces per 1,000 sq. ft. of net building area, and the North Burnside area closest to the River was increased to 2.0 spaces per 1,000 sq. ft. of net building area.)
- applying maximum parking ratios to the entire Central City area,
- allowing new structured parking to serve existing older buildings, and
- eliminating the downtown parking lid.

In addition, Metro intensively reviewed and made recommendations on the transportation control measures (TCMs) supporting the plan, and the transportation emissions budgets reflected by the plan. These elements will be used for setting priorities for use of transportation funds and for transportation conformity determinations, enabling continued flow of federal transportation funds.

Most of the discussion of alternatives during the Metro review process revolved around the proposed mix of TCMs and the level of commitment to the various measures. The emissions budgets received scrutiny, especially on whether to include two subarea emissions budgets for the CO maintenance plan. Another key area of discussion was the future of the oxygenated fuel program. Most of the TCMs considered by the Metro committees are common to the CO and ozone maintenance plans (Employee Commute Options and the Voluntary Parking Ratio program are proposed for the ozone maintenance plan only).

Among the TCMs considered, there was discussion of whether to include the Metro 2040 Growth Concept, with enforceable measures including the Urban Growth Boundary and a set of interim land use measures to enable the region to begin achieving the Concept. A consensus was reached to

incorporate the interim measures and the Urban Growth Boundary into the CO and ozone maintenance plans. Another key TCM element was whether to commit to an annual transit service expansion of 1.5 percent and a similar commitment to the Central City. Some candidate TCMs, like ramp metering, were dropped from consideration.

There was consensus to equalize the Tri-Met service commitment between the Central City and the rest of the regional system, with proportional adjustments depending upon the actual distribution and location of employment growth. Agreement was also reached on the emissions budgets to set them at the level of projected growth currently forecast by Metro for mobile sources, and to establish two subarea budgets for the CO maintenance plan: 1) the Central City Transportation Management Plan area; and 2) the 82nd Avenue Corridor, roughly from SE Division Street to SE Foster Road. (The City of Portland had concerns about the establishment of a subarea budget for the 82nd Avenue subarea--see the following section, Summary of Rulemaking Proposal Presented for Public Hearing and Discussion of Significant Issues Involved.)

The most controversial aspect of the CO maintenance plan has been the oxygenated fuel program and whether it should be discontinued, and if so, when. Metro committees considered several options for the oxygenated fuel program. The Transportation Policy Alternatives Committee (TPAC) and Joint Policy Advisory Committee on Transportation (JPACT) reached early consensus on a recommendation to maintain the wintertime oxygenated fuel program at least until the winter of 1998/1999 when enhanced vehicle inspection is fully phased in and at that time to reevaluate whether it should be continued. The Metro Council ultimately endorsed the CO and ozone maintenance plan strategies through Resolution No. 96-2260, which included the oxygenated fuel recommendation. The Resolution was approved by a vote of 4 to 2 on February 29, 1996. Two of the Metro Councilors dissented and wrote to the Department explaining that their vote against the overall recommendation was due to their opposition to any continuation of the oxygenated fuel program.

Summary of Rulemaking Proposal Presented for Public Hearing and Discussion of Significant Issues Involved.

The carbon monoxide maintenance plan and redesignation request includes an attainment demonstration, an attainment emission inventory, a maintenance demonstration, a contingency plan, and documentation that administrative requirements for redesignation have been met. The plan includes a number of emission reduction strategies to ensure that the area does not violate the carbon monoxide standard during the next ten years. The Enhanced Vehicle Inspection program and conforming amendments to the major New Source Review program will be presented to the EQC for adoption at the November 15, 1996 meeting.

The complete set of emission reduction strategies presented for public hearing as elements of the carbon monoxide maintenance plan were:

- **On-road vehicle strategies**

    - Improvements to the Motor Vehicle Inspection and Maintenance Program

      Changes to the Motor Vehicle Inspection Program are proposed as part of the ozone maintenance plan for the Portland area. However, CO emission reduction benefits will also accrue from the proposed changes (tailpipe CO emissions would be reduced by approximately 22 percent when the program is fully phased in). The proposed Motor Vehicle Inspection Program changes include improvements to the test method (enhanced testing), expansion of the inspection boundary, and elimination of the old vehicle exemption for 1975 and newer vehicles. The enhanced testing will require an increase in the testing fee. Because of the improved test, the failure rate and average repair costs will increase, but this will be partially offset by savings from improved fuel economy. About 10 percent more vehicles from areas surrounding the airshed will be subject to testing due to the expanded boundary. Additional vehicles will be tested due to elimination of the old vehicle exemption. Fleet operators will have to upgrade their testing equipment or rely on DEQ testing. Repair mechanics may opt to take additional training and upgrade testing equipment.

- **CCTMP Parking Restrictions and the Elimination of the Parking Lid**

  DEQ proposes to incorporate the City of Portland's Central City Transportation Management Plan (CCTMP), as adopted in December 1995, into the maintenance plan. The main elements of the CCTMP include:

    - Retention of the maximum parking ratios in effect for the last twenty years in the downtown area, with some slight modifications for residential parking and office parking in the North Burnside area;
    - Extension of maximum parking ratios beyond the downtown core to the entire Central City area;
    - Allowance for new structured parking to serve existing older buildings; and
    - Elimination of the downtown parking lid. For developers of downtown commercial property, the removal of the parking lid should provide additional incentives to build in the downtown and encourage an increase in development density in areas with excellent transit service, reducing vehicle miles traveled within the region.

- **Other Transportation Control Measures**

  Metro's new Region 2040 Growth Concept is a land use and transportation plan designed to significantly improve the balance between motor vehicles and other less polluting forms of transportation. The Region 2040 Growth Concept and associated transportation control measures (including improved transit and improvements in bicycling and pedestrian facilities) affect developers, local governments, and the general public. Emission reductions from Metro's land use and transportation plan are incorporated in the maintenance plan and reflected in a transportation emissions budget. Metro must give priority funding to these transportation control measures.

- **Oxygenated Fuels**

  The Clean Air Act Amendments of 1990 required the Department to implement an oxygenated fuel program. The program was implemented in the winter of 1992/1993. The Department projects the CO standard can be maintained without oxygenated fuel with a safety margin of eleven percent after the winter of 1996/1997. The margin of safety would increase to 28 percent after the winter of 1998/1999 when the enhanced vehicle inspection program is fully phased in and then decrease to 21 percent by 2007 as an expected large increase in auto traffic erodes improvements in vehicle emission controls. Local governments are concerned that the safety margin is not enough in the early years of the plan. The petroleum industry indicated the community should not bear the large costs of oxygenated fuel if the program is not needed.

  The Department considered several options for the oxygenated fuel program, but decided not to make a specific recommendation for the public hearings. Instead, public comment on options was especially encouraged. Options for the oxygenated fuel program that were identified for the public hearings are shown below.

  1. Repeal the oxygenated fuel program after the winter of 1996-1997.[1]
  2. Continue the program for another two winters with an automatic repeal (when the enhanced vehicle inspection program is close to full implementation).
  3. Continue the program for another two winters and reevaluate whether to continue it beyond the 1997/1998 winter.[2]
  4. Continue the oxygenated fuel program during the ten-year life of the maintenance plan.

[1] This is based on the expected earliest time for EPA approval, but sooner action may be possible.

[2] Metro recommended continuation of the program for three winters before reevaluating whether to continue it.

The Department identified the following key issues related to oxygenated fuel:

1. Emission reductions gained from the phase-in of the enhanced vehicle inspection program (completed in 1999) will substantially offset the CO emission increase that would otherwise result if the oxygenated fuel requirements were removed.
2. Removal of the oxygenated fuel program should lower petroleum marketing costs and increase the fuel economy of most cars.
3. Suppliers of oxygenates would be negatively affected through reduced revenues with the elimination of the oxygenated fuel program.
4. There are somewhat different toxic emissions from oxygenated fuels versus non-oxygenated fuels. Although oxygenated fuel reduces benzene, some other air toxics are increased. The Health Effects Institute released a comprehensive report on the issue in April 1996, recognizing this tradeoff on toxics and suggesting specific areas for additional research.
5. A repeal of the oxygenated fuel program after two years would ensure CO emissions do not increase above the levels of last winter (1995/1996).
6. The petroleum industry questions whether the Department may continue the oxygenated fuel program in the maintenance plan because of what it perceives as Clean Air Act limitations. The Attorney General's office provided preliminary advice indicating the Department would not be preempted from requiring an oxygenated fuel program and helped formulate specific questions on this issue addressed to EPA. In response to a legal inquiry to EPA, the agency indicated DEQ could continue the program under the State's own authority.

- **CO Emissions Budgets (for on-road motor vehicles)**

Transportation conformity regulations, required by the 1990 federal Clean Air Act Amendments, provide for the creation of motor vehicle emissions budgets in the State Implementation Plan (SIP). An emissions budget is explicitly identified from the motor vehicle portion of a projected emission inventory. Emissions budgets establish a cap on emissions which cannot be exceeded by predicted motor vehicle emissions. In the Portland area, Metro forecasts motor vehicle emissions as part of periodically updating the long-range, regional transportation plan (RTP) and the short-range Transportation Improvement Program (TIP). Metro's emission forecast must not exceed the SIP emissions budget(s). The proposed maintenance plan replaces two types of conformity tests that generally are more difficult to meet than an emissions budget test. The new tests should be relatively easier for Metro to show conformity, because its long-range transportation plan was closely coordinated with the maintenance plan development.

For CO, three emissions budgets have been developed: an overall regional budget and two hot spot budgets (areas of past CO standard violations), one for the Central City and the other for the 82nd Avenue Corridor between SE Division and SE Foster Rd. The budgets would be

adjusted for whatever decision is made with respect to the oxygenated fuel program. Therefore, whatever changes are made to the oxygenated fuel program would not affect Metro's conformity determinations.

- **Contingency plan**

  If the maintenance plan fails, a contingency plan will be implemented as required by the Clean Air Act. The contingency plan will affect new and expanding major industry by eliminating the industrial growth allowance and reinstating emission offset and LAER requirements. The contingency plan will also affect the general public, the petroleum industry and local governments by reinstituting the oxygenated fuel program in the Portland area and reinstituting the parking lid in downtown Portland (if a violation occurred at a downtown CO monitor). The contingency plan was not controversial at the public hearings.

Summary of Significant Public Comment and Changes Proposed in Response

The following is a brief summary of significant public comment and the Department's response. See Attachment D for the Department's Evaluation of Public Comment and Attachment E for a description of changes made in response to public comment.

1. Comment: EPA submitted a number of comments regarding approvability of the plan. Key issues are:

- Showing maintenance until November 1, 2007 would meet the requirement of section 175A(a) of the Clean Air Act to show maintenance at least 10 years after the redesignation occurs.

- The oxygenated fuel program may be continued under State authority even if it is not required for maintenance, and no violations have triggered the requirement for reimplementation of oxygenated fuel.

- Enhanced vehicle inspection rules must be submitted to EPA by November 1996. EPA approval of credit for the Oregon enhanced vehicle inspection program is needed by then in order to keep approval of the maintenance plan on schedule.

- The proposed Transportation Control Measure (TCM) substitution process needs to be resolved with EPA Headquarters.

Department Response: The Department has proposed changes (Attachment E) in the maintenance plan as needed to address EPA's comments.

2. Comment (A brief summary of the comments received on the oxygenated fuel issue follows): The bulk of the comments on the CO maintenance plan were on the oxygenated fuel program in the Portland area. The Department received thirty-nine (39) letters for the record in favor of continuing the oxygenated fuel

program. One commenter attached an additional nineteen (19) letters, previously written in support of continuing the program. Several of the commenters on this side of the issue supported the Metro recommendation to evaluate whether the projected improvement in CO air quality actually occurs within three years and consider continuation or repeal of the oxygenated fuel program at that time. In addition to Metro, two State agencies (Agriculture and Energy), the City of Portland, some legislators, environmental interest groups and businesses, and other individuals supported continuation of the oxygenated fuel program. Key reasons for supporting this position included a lack of comfort with the calculated safety margin (particularly in the early years of the plan), the fact that ethanol is a renewable fuel which can be produced using waste agricultural products, and a desire to go beyond just meeting federal air quality standards. A number of commenters also cited air toxics reduction benefits from oxygenated fuels.

The Department received six (6) letters in support of discontinuing the oxygenated fuel program as soon as possible. One commenter attached an additional thirteen (13) letters in favor of discontinuing the program. This action was favored by the petroleum industry, several business groups and/or associations, some legislators, and other individuals. Key reasons for supporting this position included an indication that the safety margin calculated by the Department was conservative, the program was not needed to maintain the CO standard through the ten-year maintenance period, and the cost impact on the public could be up to $15 million per year.

Also, up to the time of the public hearing notice, the Department had received over thirty (30) letters on both sides of the oxygenated fuel issue (with approximately a 2 to 1 ratio in favor of discontinuing the oxygenated fuel program).

Department Response: Three basic alternatives on oxygenated fuel surfaced as the result of public comment:

1. Repeal the oxygenated fuel program as soon as possible. This alternative is favored by the petroleum industry, several business groups and/or associations, some legislators, one environmental organization, and other individuals.

2. Determine whether the projected improvement in CO air quality over the next two or three years actually occurs and reevaluate whether to continue the oxygenated fuel program at that time. This is essentially the action recommended by some State agencies, Metro, the City of Portland, some environmental interest groups and businesses, and other individuals.

3. Continue the oxygenated fuel program through the life of the CO maintenance plan. This was favored by the Northwest Bio Products Coalition, three businesses, and several individuals.

After a thorough consideration of the alternatives, the Department proposes repealing the oxygenated fuel program in the Portland control area after the 1997/1998 winter season. The Department proposes to conduct an evaluation of actual CO air quality data by March of 1998. Based on an evaluation of the

projected safety factor versus the actual safety factor reflected by the monitoring data, the Department will recommend to the EQC whether to maintain the program repeal, or to begin rulemaking to reinstate the program. Affected parties will be notified as soon as possible so that a continuity of oxygenated fuel use could be maintained in the winter of 1998/1999, if so recommended. The recommendation to repeal the oxygenated fuel program after two winter seasons is based on the following specific considerations:

A. Repeal of the oxygenated fuel program after one winter season (the 1996/1997 winter) would result in an increase of CO emissions over the levels of this winter (1995/1996).

B. Repeal of the oxygenated fuel program after two winter seasons (the 1997/1998 winter) would keep CO emissions in the critical Central City area from rising above the level of this winter (1995/1996). Regionally, CO emissions would be slightly higher after the 1997/1998 winter, but the increase would be less than one percent.

C. The calculated safety margin for compliance with the CO standard is very conservative, based on a projection of high downtown growth and worst case meteorology. The Enhanced Vehicle Inspection program will substantially make up for the lost emission credit from repeal of oxygenated fuel. The safety margin would be 21 percent for the first winter season (1998/1999) without oxygenated fuel (with the Enhanced Vehicle Inspection program approximately one-half phased in), compared to eleven percent if it were repealed after the 1996/1997 winter (when the enhanced program would just be starting).

D. The cost impact of oxygenated fuel on the public could be up to $7 million per year (based on the Fiscal and Economic Impact Statement shown in Attachment B2). While this cost is acceptable to avoid an increase in CO levels for the winter of 1997/1998 and any possible violation, elimination of the requirement after that time, if not needed for maintenance purposes, will partially mitigate the new cost of the proposed Enhanced Vehicle Inspection program and other increased costs of maintaining air quality in this region.

E. The other air quality benefits of oxygenated fuel compared to clear gasoline, such as toxic reduction, are unclear or uncertain.

The proposed changes to the Oxygenated Fuel Rule are shown in Attachment E.

3. Comment: The City of Portland submitted a number of comments regarding the plan.

Issue 1: The major issue raised by the city in its testimony was over the proposed 82nd Avenue Subarea CO Emissions Budget. Although the city originally supported the Metro recommendation to include this subarea budget as part of the CO maintenance plan, the city had second thoughts on the issue. The city is concerned about the establishment of an emissions budget for such a small area and one that has traffic and land uses that are similar to other locations in the region and believes it is unnecessary and could trigger an unwarranted conformity problem.

Department Response: Because the 82nd Avenue subarea is the most critical monitored CO area in the region, the Department proposes leaving the emissions budget as proposed and recommended by Metro. However, if exceedance of the budget is projected in the future, and actual air quality measurements and air quality projections indicate a safety margin with these projections, then the Department will commit to increasing the budget as a revision to the SIP.

Issue 2: The city had a number of technical comments (with recommended additions to section 4.51.3.2.3.A.2 of the maintenance plan document) and also recommended specific corrections to the text regarding the directly incorporated elements of the city's Zoning Code Amendments for the Central City Transportation Management Plan (CCTMP). Some corrections were noted for the supporting elements of the Zoning Code Amendments, as well.

Department Response: The city and the Department developed language prior to the hearing authorization to accompany the section of the plan incorporating parts of the city's Zoning Code Amendments. The language was inadvertently omitted from the document that went to hearing. The purpose of the additional text is to distinguish between the parts of the Zoning Code Amendments that are directly incorporated into Volume 2 of the CO maintenance plan, requiring EPA approval for any subsequent, substantive changes, and those parts that are supportive, but could be changed without EPA approval. The Department proposes some minor changes to the offered, additional text for purposes of clarity, which should be acceptable to the city. The added text is shown in Attachment E and has been incorporated into section 4.51.3.2.3.A.2 of the maintenance plan document. The Department is also incorporating the noted corrections to the text, specifically enumerating the included subparagraphs of the Zoning Code Amendments (Attachment E).

In the course of reviewing the recommended changes associated with Issue 2, the Department discovered an oversight involving the treatment of parking for existing buildings. A parking pool of 4,600 spaces was set up to allocate spaces to existing buildings in tandem with a Parking Reserve, initially set at 750 spaces for the downtown area. These requirements are referenced in the city's Zoning Code Amendments, but the actual numbers and the procedures for administering the program are contained in the Administration Section of the CCTMP. To correct this oversight, the Department proposes including the relevant sections of the Administration Section in the Control Measures section of the CO maintenance plan. This change is proposed along with the corrections and other changes recommended by the city. The Department believes this will be acceptable to the city. The detailed changes are shown in Attachment E.

Summary of How the Proposed Rule Will Work and How it Will be Implemented

The carbon monoxide maintenance plan includes a number of mechanisms to ensure that emission reduction strategies are implemented and that the carbon monoxide standard is not violated during the ten-year maintenance plan.

The Department will prepare emission inventory updates every two to three years to compare against emission forecasts in the maintenance plan. The updates will be used to verify the growth factors and control levels assumed in the plan.

The Department will also continue to monitor carbon monoxide air quality. If monitored CO levels at any site within the monitoring system in the Portland area equal or exceed 90 percent of the standard level during a calendar year period, the Department will convene a planning group to recommend preventive or corrective action. In the event of an actual violation of the standard, the Department will implement control measures that were contained in the attainment plan. In this case, oxygenated fuels would be reintroduced into the Portland Control Area during the winter months. If the violation is recorded in the downtown area governed by the former parking policy, the parking lid will also be reinstated. Also, any remaining growth allowance for industrial sources will be eliminated, and major new and modified industry will be required to meet nonattainment area New Source Review requirements (Lowest Achievable Emission Rate control technology and offsets). Industrial sources within 25 kilometers of the Portland Maintenance Area boundary (defined as the Metro boundary) will be required to provide offsets, but not LAER.

Recommendation for Commission Action

The Department recommends that the Commission adopt the carbon monoxide maintenance plan for the Portland area, as presented in Attachment A of this report, including the supporting rule amendments and emission inventories, as an amendment to the federal Clean Air Act State Implementation Plan.

The Department also recommends that the Commission repeal the carbon monoxide attainment plan for the Portland area, originally adopted on July 12, 1982, and the December 1990 amendment to the SIP incorporating the parking offset program and revised downtown Portland parking lid, effective upon EPA redesignation of the Portland area to attainment for carbon monoxide.

Attachments

A. Rule and Rule Amendments Proposed for Adoption
B. Supporting Procedural Documentation:
    1. Legal Notice of Hearing
    2. Fiscal and Economic Impact Statement
    3. Land Use Evaluation Statement
    4. Questions to be Answered to Reveal Potential Justification for Differing from Federal Requirements
    5. Cover Memorandum from Public Notice
C. Presiding Officer's Report on Public Hearing
D. Department's Evaluation of Public Comment
E. Detailed Changes to Original Rulemaking Proposal made in Response to Public

Comment

F. Advisory Committee Membership and Report (See Appendix D2-7 of the carbon monoxide maintenance plan included in Attachment A of this report)

G. Rule Implementation Plan

Reference Documents (available upon request)

- Written comments received (listed in Attachment C)
- EPA guidance documents regarding redesignation requests.

Approved:

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Date Prepared: June 24, 1996

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Attachment A

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Portland Carbon Monoxide Maintenance Plan

July 12, 1996

Rule and Rule Amendments Proposed for Adoption

A1 Portland Carbon Monoxide Maintenance Plan and Redesignation Request for the Portland area, State of Oregon Air Quality Control Program

- **Volume 2, Section 4.51**
- **Volume 3, Appendix D2**

(All new rules)

A2 Miscellaneous supporting rule amendments

- **A2-1 State Implementation Plan (OAR 340-020-0047)**
- **A2-2 Motor Vehicle Fuel Specifications for Oxygenated Gasoline, Purpose and General Requirements (OAR 340-022-0460)**
- **A2-3 Maintenance Area Designation (OAR 340-031-0520 and 340-031-0530)**

ATTACHMENT A1

Portland Carbon Monoxide Maintenance Plan and Redesignation Request for the Portland Area

July 12, 1996

SECTION 4.51

MAINTENANCE PLAN AND REDESIGNATION REQUEST

FOR

PORTLAND (METRO) AREA

STATE IMPLEMENTATION PLAN REVISION

FOR CARBON MONOXIDE

July 12 , 1996

Prepared by

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PORTLAND CARBON MONOXIDE MAINTENANCE PLAN

4.51.0 Acknowledgement and Summary

4.51.0.1 Acknowledgements

Without the efforts of numerous individuals in local, regional and state governments, this supplement to the Oregon State Implementation Plan would not have been possible. Special appreciation goes to:

- Metro as lead agency for transportation control measures in the maintenance plan;
- Metro's Transportation Policy Alternatives Committee (TPAC) and Joint Policy Advisory Committee on Transportation (JPACT);
- Members of the City of Portland committees which developed the Central City Transportation Management Plan (CCTMP);
- City of Portland staff involved in the development of the CCTMP.

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4.51.0.2 Executive Summary: The Portland Carbon Monoxide Maintenance Plan

The Portland area has met the National Ambient Air Quality Standards (NAAQS) for carbon monoxide (CO) as demonstrated through air quality monitoring data. In accordance with the 1990 federal Clean Air Act Amendments, the Department of Environmental Quality (DEQ) is now applying to the Environmental Protection Agency (EPA) for redesignation of the area to attainment status by submitting a Redesignation Request including a 10-year maintenance plan. This Redesignation Request/Maintenance Plan has been adopted by the Oregon Environmental Quality Commission (EQC) and submitted to EPA as an amendment to the State Implementation Plan (SIP).

The DEQ primarily used the City of Portland's Central City Transportation Management Plan (CCTMP) development process to develop the CO Maintenance Plan provisions. The CCTMP was intended to address a "buildout" condition by 2010 and beyond. Under buildout, the developed density of the Central City would be substantially increased to accommodate 15,000 new housing units and 75,000 new jobs. The Portland City Council adopted the CCTMP and implementing ordinances in December, 1995. The Maintenance Plan is designed to ensure continued compliance with federal CO standards even under this high growth scenario.

The CO maintenance plan, which incorporates key elements of the CCTMP, provides for maintenance of the CO standard for ten years, with repeal of the oxygenated fuels program beginning with the 1998/99 winter season. The maintenance plan will also remove Federal Clean Air Act (FCAA) impediments to industrial growth and shield the Portland area from Federal Clean Air Act sanctions on federal transportation funds while providing for protection of public health.

4.51.0.2.1 Background

What is Carbon Monoxide?

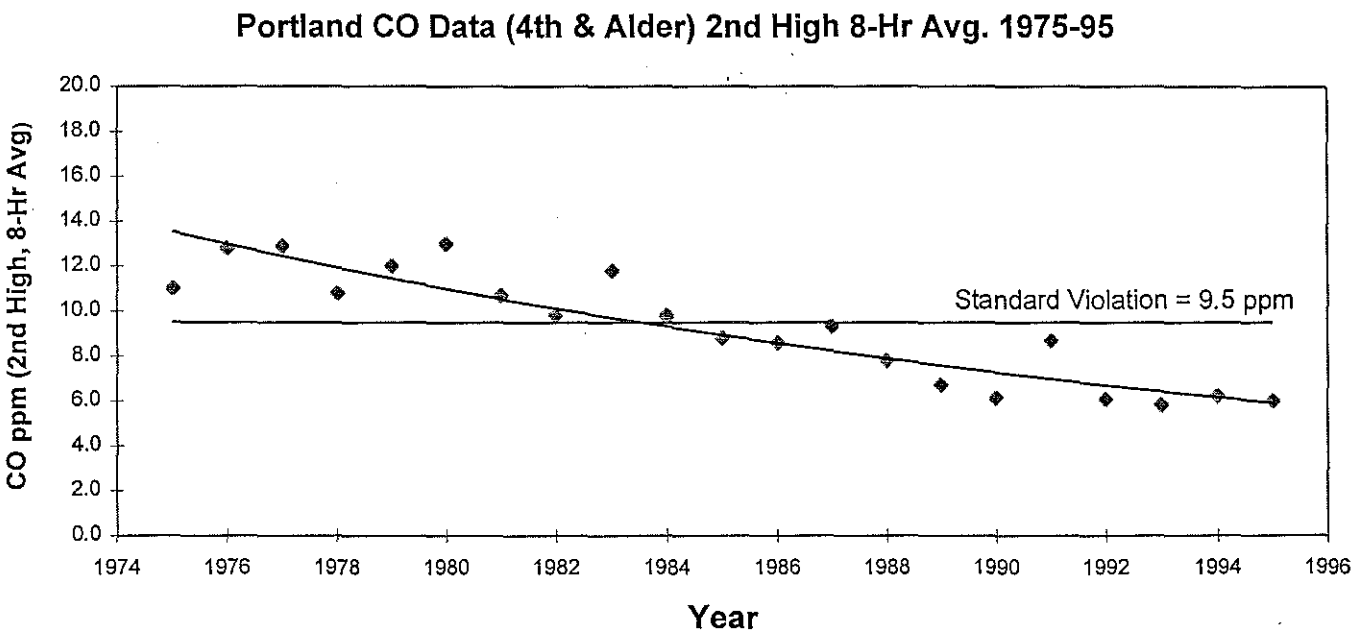
Carbon monoxide (CO) is a colorless, odorless, poisonous gas. It decreases the oxygen carrying capacity of the blood. High concentrations can severely impair the function of oxygen-dependent tissues, including the brain, heart and muscle. Prolonged exposure to even low levels of CO can aggravate existing conditions in people with heart disease or circulatory disorders. Motor vehicles are the predominate source of CO in Oregon, but another significant source includes wood stoves.

Past CO Problem

The Portland area exceeded the federal 8-hour CO standard of 9 parts per million approximately one day out of every three in the early 1970's. Maximum 8-hour CO levels were more than twice the standard level. By the mid to late 1970's, the frequency of

exceedances had declined dramatically, but maximum levels were still about 50 percent above the standard level. The trend in CO from the long-term 4th & Alder CO monitor in downtown Portland is shown below in Figure 4.51.0.1.

Figure 4.51.0.1: Portland Downtown CO Trend



Success in Controlling CO

CO control strategies have been successful in bringing the Portland area into attainment with the 8-hour CO standard. Attainment was achieved at the 4th & Alder site by 1985. Full compliance was achieved in 1991, based on the more recently established 82nd and Division CO monitor. These strategies focused primarily on:

Motor vehicles (federal new car emission standards, DEQ vehicle inspection program, Tri-Met transit improvements, traffic flow improvements, and City of Portland Downtown Parking and Circulation Policy, which included maximum parking ratios and a parking lid); and

Gasoline (additional emission reductions from implementation of a wintertime oxygenated fuel program, starting in 1992).

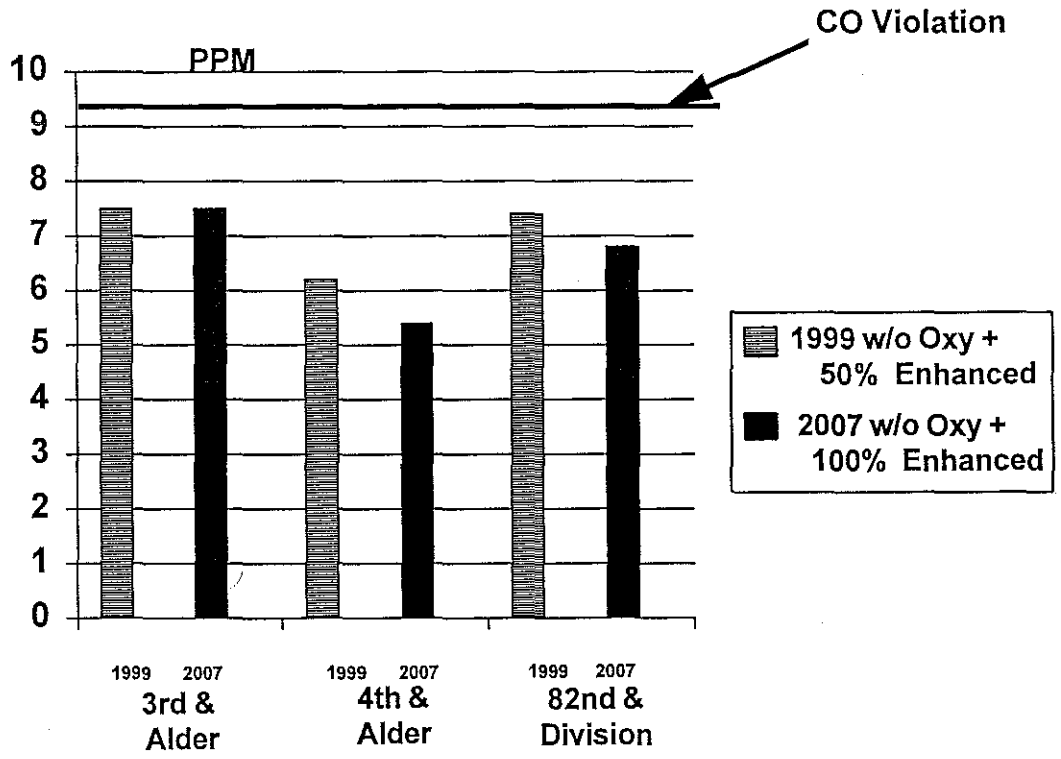
4.51.0.2.2 Need for Maintenance Plan

Projections of Future CO Levels

Motor vehicle CO emission controls are projected to be increasingly effective in future years. The fleet average emission rate is expected to decrease by 55 percent from 1990 to 2007.

A high growth scenario was analyzed for the critical Central City area to determine the combined effect on CO air quality of the increased effectiveness of vehicle emission controls and increased vehicle travel caused by growth. The high growth scenario included adding 75,000 new jobs and 15,000 new housing units in the area over the next 20 years, extension of the downtown maximum parking ratio concept to the Central City area and elimination of the downtown parking lid. Results indicate that compliance with the CO standard can be maintained with repeal of the oxygenated fuels program beginning with the 1998/99 winter season, as shown in Figure 4.51.0.2.

Figure 4.51.0.2: 8-Hour CO Concentrations for DEQ Hot Spots



Benefits of Maintenance Plan

In order for the Environmental Protection Agency (EPA) to redesignate the Portland area from nonattainment to attainment, EPA requires an enforceable plan demonstrating how the area will continue to meet the CO standard for a minimum of ten years. An EPA-approved CO maintenance plan and redesignation to attainment will provide the following benefits:

Assurance that public health will be protected from adverse impacts of CO;

Removal of industrial growth impediments (LAER and offsets);

Protection against Federal Clean Air Act sanctions on federal transportation funds;

Elimination of the downtown parking lid, which was an impediment to growth in the area.

4.51.0.2.3 Maintenance Plan Development Process

The DEQ primarily used the Central City Transportation Management Plan (CCTMP) development process to develop the CO maintenance plan provisions. The CCTMP was intended to address a "buildout" condition by 2010 and beyond. Under "buildout", the developed density of the Central City would be substantially increased to accommodate 15,000 new housing units and 75,000 new jobs. The Portland City Council adopted the CCTMP and implementing ordinances in December, 1995. This plan included:

Retention of the maximum parking ratios in effect for the last twenty years in the downtown area with slight modification (some residential parking ratios were increased from 1.2 parking spaces per dwelling unit to 1.35 spaces per dwelling unit in the core area of the downtown; also, office ratios in the close-in North Burnside area were changed from 0.8/0.9 spaces per 1,000 sq. ft. of net building area to 1.5 spaces per 1,000 sq. ft. of net building area, and ratios for the North Burnside area closest to the River were increased to 2.0 spaces per 1,000 sq. ft. of net building area.),

Application of maximum parking ratios to the entire Central City area,

Allowance for new structured parking to serve existing older buildings, and

Elimination of the downtown parking lid.

In addition, Metro intensively reviewed and made recommendations on the transportation control measures supporting the plan, and the transportation emission budgets reflected by

the plan. These elements would be used for setting priorities for use of transportation funds and for transportation conformity determinations enabling continued flow of federal transportation funds.

4.51.0.2.4 Maintenance Plan Summary

Federal New Car Program

The federal new car program has been and will continue to be the most effective CO emission reduction strategy. In contrast to other pollutants, vehicle CO emission controls have not experienced much deterioration of performance with increased age and mileage. An additional 54 percent reduction in the fleet average emission rate is expected over the next ten years. Expected improvements in CO emission control technology include heated catalysts which will help reduce the higher emissions from cold starts.

Enhanced Vehicle Emission Inspection

This strategy is being implemented as a strategy for the Portland area ozone maintenance plan, but provides CO emission reductions as well. The inspection program is being modified to test emissions while vehicles are put through a driving cycle that includes acceleration and deceleration. This test applies to cars in the 1981 model year through cars that are six years old. The basic test applies to 1975-1980 model year vehicles and three to five year old vehicles. The enhanced program phases in over a two-year period beginning in 1997.

Expanded Vehicle Inspection Boundary

Like enhanced vehicle inspection, this strategy is being implemented as a strategy for the Portland ozone maintenance plan, but provides CO emission reductions as well. The EQC adopted an expanded boundary in July 1994 which included the more densely populated portions of the Tri-County area and small neighboring portions of Columbia, Marion and Yamhill Counties. DEQ relied on U.S. Census Bureau data to select areas that had high commute rates into the Portland airshed.

The 1995 Legislature expressed concern about the boundary expansion into the three Counties outside of the Tri-County area. Based on further evaluation of Census Bureau data by DEQ, the EQC removed from the expanded boundary those areas with less than 40 percent of their work force commuting into the Portland airshed. This removed from the expansion some areas in Clackamas, Marion and Yamhill Counties, but retained some areas in Columbia and Yamhill Counties.

Removal of Old Vehicle Exemption from Vehicle Inspection Program

This strategy eliminated the exemption from testing for vehicles when they become 20 years old. Vehicles made in 1975 and later model years are permanently included in the testing program. This strategy was adopted by the Oregon Legislature in 1993, and was submitted as a revision to the Oregon State Implementation Plan on August 30, 1994.

Parking Restrictions

Maximum parking ratios for new development and a parking lid played a significant role over the last twenty years in keeping the downtown Portland CO problem from getting worse while CO tail pipe emission controls were phased in. The parking lid was perceived as creating a barrier to growth in the downtown, and contributing to sprawl in the region. The Central City Transportation Management Plan (CCTMP) was designed to minimize new vehicle traffic in the Central City and encourage alternative travel modes by extending the downtown maximum parking ratio concept to the entire Central City area, while lifting the downtown parking lid.

Transportation Control Measures

The CCTMP high growth scenario assumed implementation of several significant Transportation Control Measures (TCMs). The Clean Air Act requires such TCMs to be included in the air quality plans. TCMs are thereby made federally enforceable, and local governments must give TCM projects priority funding, and implement them in a timely manner. Metro has agreed to include the following TCMs in the CO maintenance plan:

2040 Growth Concept (explained below);

An average 1.5 percent increase in regional transit service, with an equal increase for the Central City;

Completion of Westside Light Rail;

South-North Light Rail by 2007;

Pedestrian and bicycle improvements where such facilities do not exist on all major roadway expansion, or reconstruction projects;

At least 28 miles of additional bikeways over the next ten years; and

At least 9 miles of additional pedestrian facilities over the next ten years.

A provision was added to the maintenance plan allowing Metro to substitute equivalent TCMs should the need arise.

Metro 2040 Growth Concept

Metro's new land use and transportation plan is designed to significantly improve the mode split between motor vehicles and other less polluting forms of transportation. The concept calls for increasing density, building residences within walking distance of businesses, and substantially expanding infrastructure for transit and other alternative modes. Credit for this program was included in the motor vehicle emission forecast prepared by Metro for the maintenance plan. The Urban Growth Boundary and Metro's Interim Region 2040 Implementation Measures were included in the maintenance plan to meet EPA enforceability requirements for emission control strategies.

Oxygenated Fuels

The 1990 Federal Clean Air Act Amendments required the Portland area to implement an oxygenated fuel program to control CO, because the area was still designated nonattainment, even though compliance with the federal CO standard was achieved in 1991. The program was implemented in 1992. The DEQ projects that compliance with the CO standard can be maintained with a safety margin of 21 percent for the first winter season (1998/1999) without oxygenated fuel (with the Enhanced Vehicle Inspection program approximately one-half phased in). The margin of safety would increase to 28 percent after the winter of 1998/1999 when the Enhanced Vehicle Inspection program is fully phased in and then decrease to 21 percent by 2007 as an expected large increase in auto traffic erodes improvements in vehicle emission controls.

CO Emissions Budgets

Transportation conformity regulations, required by the 1990 Federal Clean Air Act Amendments, provide for the creation/identification of motor vehicle emissions budgets in the State Implementation Plan (SIP). Emissions budgets establish a cap on emissions which may not be exceeded by predicted motor vehicle emissions. In the Portland area, Metro forecasts motor vehicle emissions as part of periodically updating the long-range, regional transportation plan (RTP) and the Transportation Improvement Program (TIP). Metro's emission forecast must be consistent with the SIP emissions budget(s).

For CO, three emissions budgets were developed for on-road motor vehicles: an overall regional budget and two hot spot budgets (areas around monitors with past CO standard violations): one for the Central City and the other for the 82nd Avenue Corridor between SE Division and SE Woodstock. The emissions budgets were explicitly identified from the motor vehicle portion of a projected emission inventory. The emissions budgets are shown in Section 4.51.3.2.2 in Tables 4.51.3.2 and 4.51.3.3.

Contingency Plan Elements

The maintenance plan must contain contingency measures that would be implemented either to prevent or correct a violation of the CO standard after the area has been redesignated to attainment. The FCAA requires that measures in the original attainment plan be reinstated if a standards violation occurs. Under the proposed contingency plan, adopted under the CCTMP and recommended by Metro, the DEQ would convene a planning group if the validated second highest (within one calendar year) 8-hour CO concentration equals or exceeds 8.1 ppm (90 percent of the 8-hour CO standard). A range of action would be considered from implementing candidate measures to deciding to do nothing. However, if a violation of the 8-hour CO standard were to occur, control measures that would be restored include Lowest Achievable Emission Rate (LAER) requirements plus offsets for major new and modified industrial sources and wintertime oxygenated gasoline at 2.7 percent weight for motor vehicles (if the oxygenated fuels program is repealed prior to the occurrence of violations. If the violation occurred within the defined area of the former Downtown Parking and Circulation Policy, roughly the Central Business District of downtown Portland, then the parking lid would be reinstated. The parking lid would not be reinstated if a violation occurred outside the downtown area.

4.51.1 Introduction

4.51.1.1 Purpose of Redesignation Request and Maintenance Plan Document

This is a Redesignation Request and Maintenance Plan to document and ensure continued attainment of the National Ambient Air Quality Standards (NAAQS) for carbon monoxide (CO) in the Portland, Oregon nonattainment area (Metro Boundary). This document complies with applicable 1990 Federal Clean Air Act (FCAA) requirements and Environmental Protection Agency (EPA) policies.

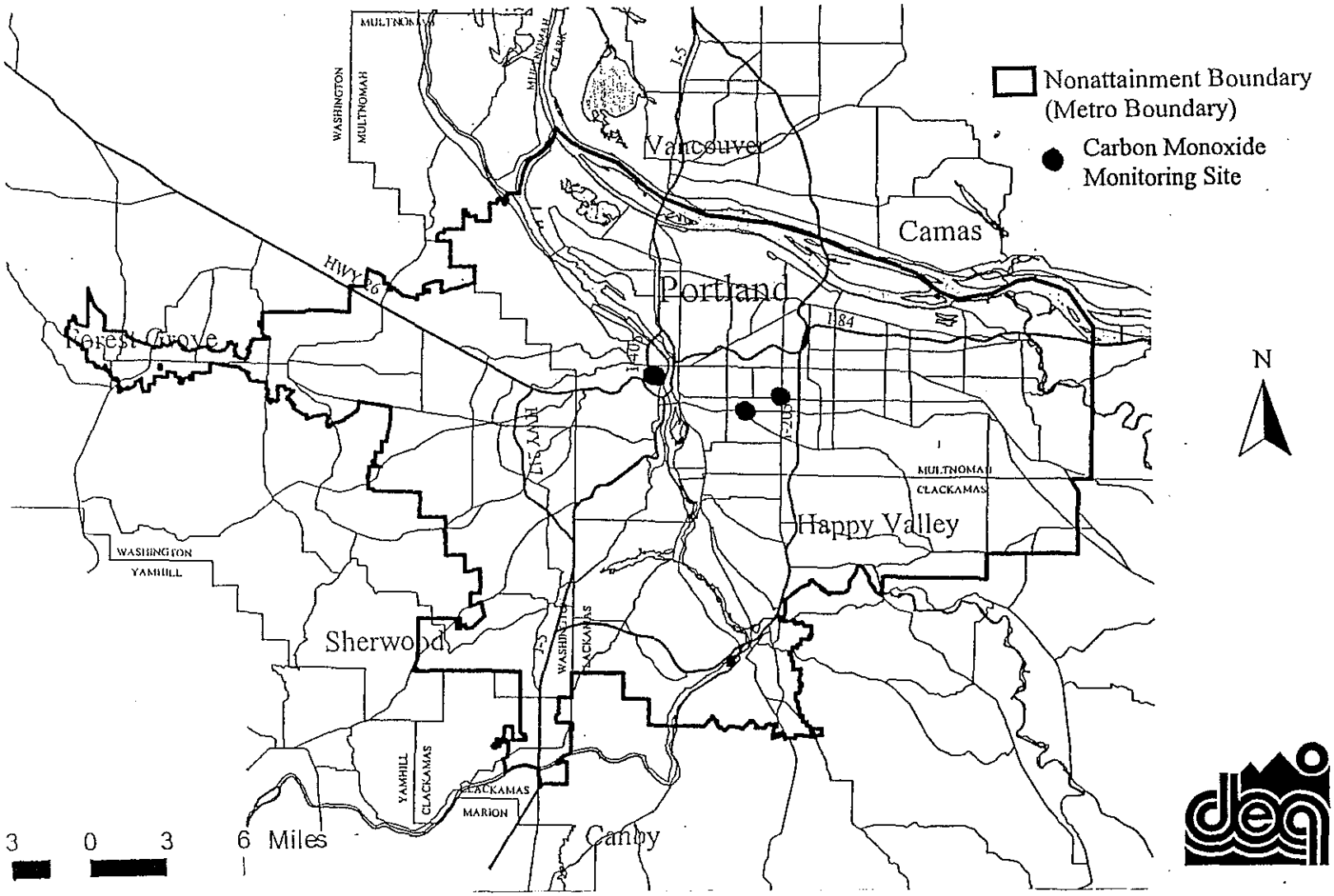
The Maintenance Plan removes unnecessary impediments to economic growth in the Portland area, while ensuring that sufficient control strategies are retained to prevent future carbon monoxide violations.

4.51.1.2 History of CO Problem in Portland Area/Design Values

The Portland metropolitan area was designated by the Environmental Protection Agency (EPA) as a nonattainment area for carbon monoxide on March 3, 1978. Pursuant to the 1977 Clean Air Act, a CO Control Strategy was submitted on June 20, 1979 with a request for an extension beyond 1982 to show attainment of the CO standard. At that time, the design value was 14.9 ppm, based on the Central Air Monitoring Station measurements from 1977 to 1979. This design value was derived from a statistical procedure in accordance with EPA guidance in effect at the time. EPA approved the DEQ's 1979 plan and the extension, giving the DEQ until December 31, 1987 to bring the Portland nonattainment area into compliance. An updated Control Strategy was submitted in 1982 showing attainment in 1985, with a request to change the nonattainment boundary to an area within downtown Portland, defined by the City of Portland's Downtown Parking and Circulation Policy boundary. EPA approved the plan in 1982. The legal boundary for the CO nonattainment area (Oregon portion) was expanded to the Metro boundary in 1991.

Following enactment of the 1990 FCAA, the EPA classified the Portland-Vancouver area as a moderate CO nonattainment area based on a 1988-89 design value of 10.0 ppm recorded at the Atlas & Cox site in Vancouver, Washington. In November 1995 the EPA approved a formal separation of the Portland-Vancouver area into two distinct nonattainment areas. The Vancouver CO nonattainment boundary utilizes the interstate Air Quality Maintenance Area line within Washington and then follows the Oregon/Washington State line, forming the southern boundary. The Portland CO nonattainment area is based on the aforementioned Metro Boundary shown in Figure 4.51.1.1. The design value for the Portland CO nonattainment area is 9.8 ppm. This value is based on the annual second highest 8-hour CO concentration in 1988-89 for CO monitoring sites operated by the Oregon Department of Environmental Quality. The highest such value occurred at the SE 82nd and Division monitoring site.

Figure 4.51.1.1 Portland Area Carbon Monoxide Nonattainment Area



Portland fell into the category of moderate CO nonattainment areas with design values $\geq$ 9.1 ppm but $\leq$ 12.7 ppm. Such areas were given until December 31, 1995 to meet the NAAQS for CO.

Historically, several carbon monoxide monitoring sites in the Portland nonattainment area violated NAAQS for CO. Exceedances were recorded approximately one out of every three days in 1972. However, downtown Portland has been in compliance with the NAAQS for CO since 1984, and the 82nd and Division site has been in compliance since 1989. Based on this record of compliance, the Portland area was able to apply for redesignation to attainment in accordance with the 1990 FCAA. This document is part of the formal procedure to redesignate the area to attainment status.

4.51.1.3 National Ambient Air Quality Standards for Carbon Monoxide

This Maintenance Plan addresses the ambient air quality standards for carbon monoxide as defined in the 1990 FCAA.

Carbon monoxide is a colorless, odorless gas which replaces the oxygen in the body's red blood cells through normal respiration. Exposure to high levels of CO can slow reflexes, cause confusion and drowsiness, and in high enough doses and/or long exposure can result in death. People with heart disease are more susceptible to develop chest pains when exposed to high levels of CO. The major human-caused source of CO is incomplete combustion of carbon-based fuels. The primary source of CO is gasoline-powered motor vehicles. How a motor vehicle is operated and maintained has an effect on the amount of CO emitted. For example, in stop and go driving conditions, CO emissions are increased. Other important sources are woodstoves, open burning and fuel combustion in industrial and utility boilers. Most serious CO problems occur during the winter in urban areas, when CO is trapped near the ground by atmospheric inversions.

EPA has established the NAAQS for carbon monoxide at 35 parts per million (ppm) 1-hour average and 9 ppm 8-hour average. Any CO value monitored above these levels is considered an exceedance. Two exceedances within one calendar year is considered a violation. If an area is in violation of the standard, it is designated by EPA as a nonattainment area. Experience has demonstrated that the 8-hour average is the more likely of the two standards to be exceeded. The formal statement of the national 8-hour standard is contained in the Code of Federal Regulations (40 CFR part 50.8), which states:

> *The national primary ambient air quality standards for carbon monoxide are: (1) 9 parts per million (10 milligrams per cubic meter) for an 8-hour average concentration not to be exceeded more than once per year...*

40 CFR part 50.8 also contains reference methods for measuring CO concentrations in ambient air, procedures for averaging data to determine 8-hour concentrations, and requirements regarding presentation of data. In addition, EPA has also issued guidance which specifies that two complete consecutive years of quality-assured ambient monitoring data with no violations of the NAAQS must be collected before an area can be considered to have attained the standard.

40 CFR part 50.8 also defines how ambient air quality monitoring data are to be compared to the applicable NAAQS. It states that all monitoring data should be expressed to one decimal place, and indicates that standards defined in parts per million should be compared "in terms of integers with fractional parts of 0.5 or greater rounding." This led to an interpretation by EPA that any 8-hour CO concentration of less than 9.5 ppm would be equivalent to attainment. This rounding convention is therefore used for CO monitoring data in this Maintenance Plan to demonstrate maintenance with the CO NAAQS.

In general, demonstrating "attainment" requires the collection of representative monitoring data using approved measuring instruments and procedures, with adequate quality assurance and quality control. All locations within an area must meet the standard. No monitor may exceed the 9 ppm standard for more than one day during either of the two most recent calendar years. Air quality measurements in the Portland area satisfy this requirement, as shown in Section 4.51.2 of this document.

4.51.1.4 Redesignation Criteria/Organization of Document

Section 107(d)(3)(E) and related subsections of the FCAA establish five key criteria which must be satisfied in order for a nonattainment area to be redesignated to attainment status:

- Attainment of NAAQS for CO: minimum 2 calendar years
- Full approval of SIP under section 110(k)[1]
- Demonstration that air quality improvement is due to permanent and enforceable reductions (see section 4.51.2.4)
- Full approval of CO Maintenance Plan under section 175A
- Fulfillment of all applicable Section 110 and Part D requirements[2]

Presented below is a summary of these redesignation criteria and a reference to the discussion of each criterion in this document.

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[1] Section 110(k) requires that the State satisfy all FCAA requirements applying to a specific nonattainment area in order to be redesignated.

[2] Section 110 contains general provisions needed in a SIP.

Attainment Verification

The nonattainment area seeking redesignation must have attained the applicable NAAQS. Attainment of the NAAQS for CO in the Portland area is discussed in Section 4.51.2, "Attainment Demonstration."

SIP Approval

EPA must have fully approved the applicable SIP for the area under Section 110(k) of the FCAA. EPA approved the 1982 CO attainment plan submittal on October 7, 1982. The 1990 FCAA required carbon monoxide nonattainment areas to submit plan revisions in the following areas: 1) 1990 Emission Inventory; 2) Oxygenated Fuel Program for the wintertime; 3) Vehicle Inspection Program changes; 4) Transportation Conformity Requirements; 5) New Source Review Rules for major sources; and 6) Contingency Plan. The 1990 Emission Inventory was submitted in November 1992. The administrative rules for the oxygenated fuel program were submitted in October 1992. The 1990 emissions inventory was revised in response to EPA comments and is expected to be approved in parallel with the Redesignation Request approval. DEQ submitted Vehicle Inspection Program related SIP revisions to EPA in 1993 and 1994, which were approved by EPA in 1994. DEQ submitted transportation conformity rules to EPA in 1995. DEQ submitted New Source Review Rule revisions to EPA in 1992. The carbon monoxide Contingency Plan was submitted in November 1993. These SIP revisions and compliance with Section 110(k) of the FCAA, are discussed in Section 4.51.4.1, "SIP Requirements/Nonattainment Area Requirements."

Permanent and Enforceable Improvements in Air Quality

The improvement in air quality must be due to permanent and enforceable reductions in emissions resulting from the implementation of the applicable SIP, federal air pollution control regulations, and other permanent and enforceable reductions. The permanent and enforceable nature of the reductions in emissions, which are responsible for improvements in ambient CO concentrations in the Portland area are discussed in Section 4.51.2.4, "Permanent and Enforceable Improvements in Air Quality."

Nonattainment Area Requirements

The State must have met all requirements applicable to the nonattainment area under Section 110 and Part D of the FCAA. Compliance with Section 110 and Part D of the FCAA is discussed in Section 4.51.4.1, "SIP Requirements/Nonattainment Area Requirements."

Maintenance Plan Elements

EPA must have fully approved a maintenance plan for the area meeting the requirements of

Section 175A of the FCAA. Concurrent approval of the maintenance plan and redesignation request is expected. There are essentially five parts to a Maintenance Plan which are as follows: an attainment inventory, a maintenance demonstration, a commitment to the continuation of operating the monitoring network, a commitment to continue to verify attainment, and a contingency plan. These sections are outlined below in Table 4.51.1.1 along with the rest of the Redesignation Requirements.

Table 4.51.1.1: Summary of Redesignation Requirements

Required Element	Section of Plan	
Attainment Verification	Section 4.51.2:	ATTAINMENT DEMONSTRATION
SIP Approval	Section 4.51.4:	ADMINISTRATIVE REQUIREMENTS
Permanent and Enforceable Improvements in Air Quality	Section 4.51.2:	ATTAINMENT DEMONSTRATION
Nonattainment Area Requirements	Section 4.51.4:	ADMINISTRATIVE REQUIREMENTS
Maintenance Plan Elements		
Attainment Inventory	Section 4.51.3:	MAINTENANCE PLAN
Maintenance Demonstration	Section 4.51.3:	MAINTENANCE PLAN
Monitoring Network	Section 4.51.4:	ADMINISTRATIVE REQUIREMENTS
Verification of Continued Attainment	Section 4.51.4:	ADMINISTRATIVE REQUIREMENTS
Contingency Plan	Section 4.51.3:	MAINTENANCE PLAN

4.51.2 ATTAINMENT DEMONSTRATION

4.51.2.1 Ambient Air Quality Monitoring Data

The Portland area has four carbon monoxide monitoring sites (see Appendix[3] D2-1). Two of the sites are located in downtown Portland and the other two sites are located on the Portland eastside. The downtown Portland sites are in the following locations: SW 4th and Alder (Newberry's); and SW 3rd between Alder and Washington (Portland Postal Building). The Portland eastside sites are in the following locations: SE 82nd and Division and SE 58th and Lafayette. The monitoring sites are operated seasonally from October through March, except for the 4th & Alder site, which operates 12 months a year. The 4th and Alder site has been operated since 1975. The SE 58th and Lafayette monitor is a neighborhood scale monitor measuring a number of pollutants. This monitor was established in 1981. The SW 3rd and Alder/Washington site began operating in 1988, and the SE 82nd and Division monitor began operation in 1989. Historical sites, which were discontinued, include the Central Air Monitoring Station (CAMS) at West Burnside between SW Broadway and SW 8th and the Hollywood Station at 4112 NE Sandy Blvd. The CAMS site was shut down after three years of compliance data so that monitoring could be shifted to the Portland Postal Building, where concentrations appeared to be higher. The Hollywood site was discontinued after six years of compliance data.

During the CO monitoring season, the monitors run continuously with hourly and 8-hour averages derived electronically via data loggers and integrators. After rigorous quality assurance, the data is input into Aerometric Information Retrieval System (AIRS) which provides EPA with DEQ's air quality monitoring data.

4.51.2.2 Attainment Years and Concentrations

Downtown Portland has been in compliance with the NAAQS for CO for nine consecutive calendar years. The site at SE 82nd and Division has been in compliance for five consecutive years.

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[3]Note: All appendix references in this Maintenance Plan refer to Volume 3 of the Oregon State Implementation Plan, unless otherwise noted.

Below are the last violations recorded at each monitoring site:

Year	8-Hr 2nd High	Location
1989	9.8 ppm	82nd & Division
1984	9.9 ppm	4th & Alder
1983	10.1 ppm	SE Lafayette
1983	9.7 ppm	W. Burnside (discontinued 1987)
1983	12.2 ppm	NE Sandy (discontinued 1990)

Note: No violations recorded at Postal Building (3rd & Alder)

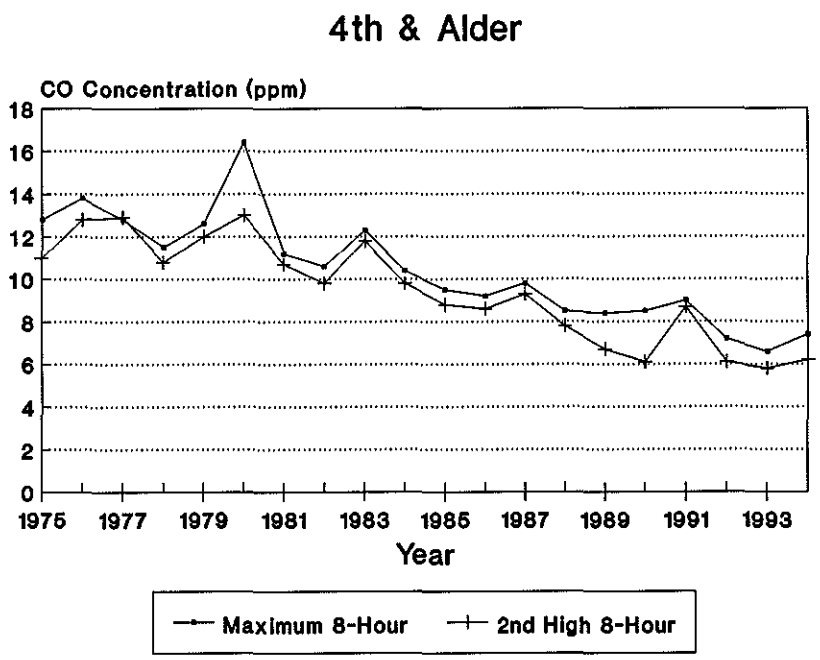
The last exceedance of the NAAQS for CO in downtown Portland occurred on 2/1/91 (10.6 ppm) at 3rd and Alder. Based on short-term monitoring during the winter of 1984-85 and follow-up monitoring at two different eastside locations, DEQ placed a permanent monitor at 82nd and Division in 1989. The last exceedance at this site occurred on 1/31/91 (10.2 ppm). The five highest 8-hour CO concentrations for the four-year period from 1991 to 1994 are shown in Table 4.51.2.1.

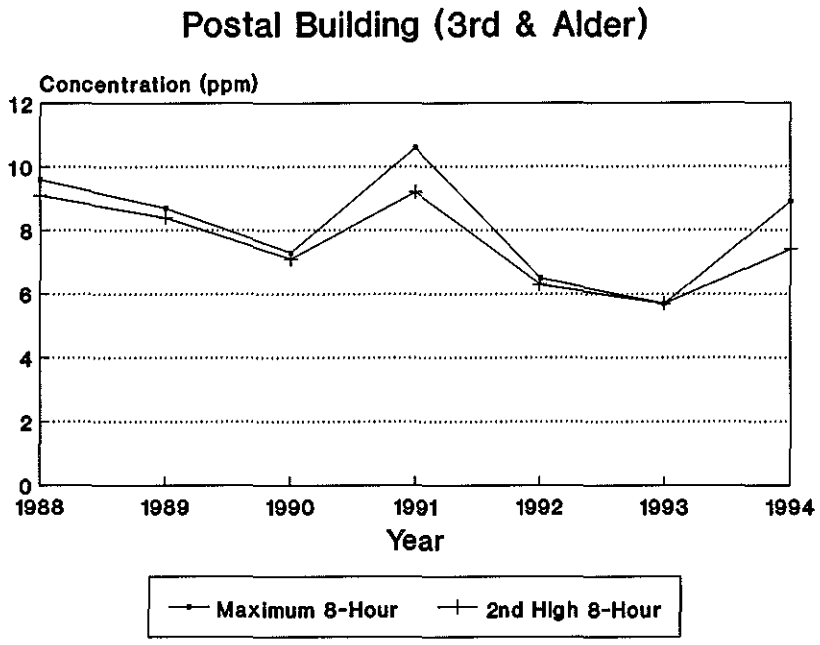
Table 4.51.2.1: Portland Carbon Monoxide: Five Highest Values from 1991 to 1994 (Non-Overlapping 8-Hour Averages in Parts Per Million)

Monitoring Site Concentrations	Date	Monitoring Site Concentrations	Date
Fourth & Alder		82nd & Division	
9.0	2/1/91	10.2	1/31/91
8.7	10/11/91	9.0	10/15/91
8.1	1/10/91	8.8	1/29/91
7.8	10/10/91	8.8	11/21/91
7.6	1/30/91	8.7	11/14/91
Third & Alder (Postal)		SE Lafayette	
10.6	2/1/91	8.3	2/8/91
9.2	10/11/91	8.1	1/22/91
8.7	10/10/91	7.9	1/27/91
8.3	1/30/91	7.7	1/30/91
7.7	11/21/91	7.6	1/31/91

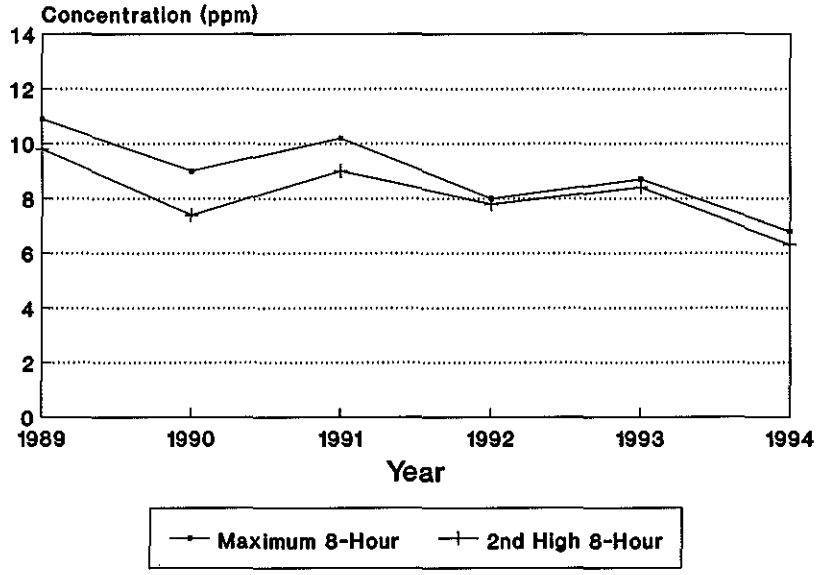
The long-term concentration trends for the four Portland CO monitoring sites are shown in Figure 4.51.2.1. The downtown Portland CO emission trend is shown in Figure 4.51.2.2.

Figure 4.51.2.1: Carbon Monoxide Concentration Trends





82nd & Division



SE Lafayette

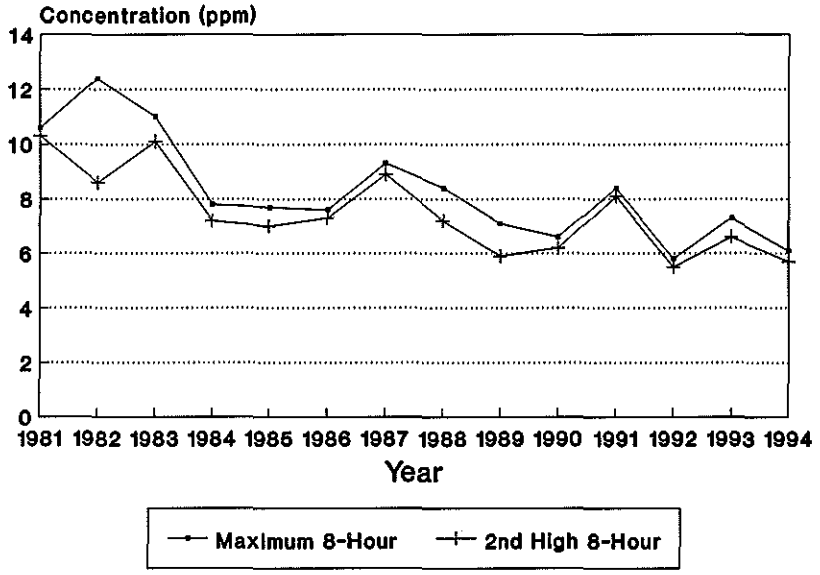
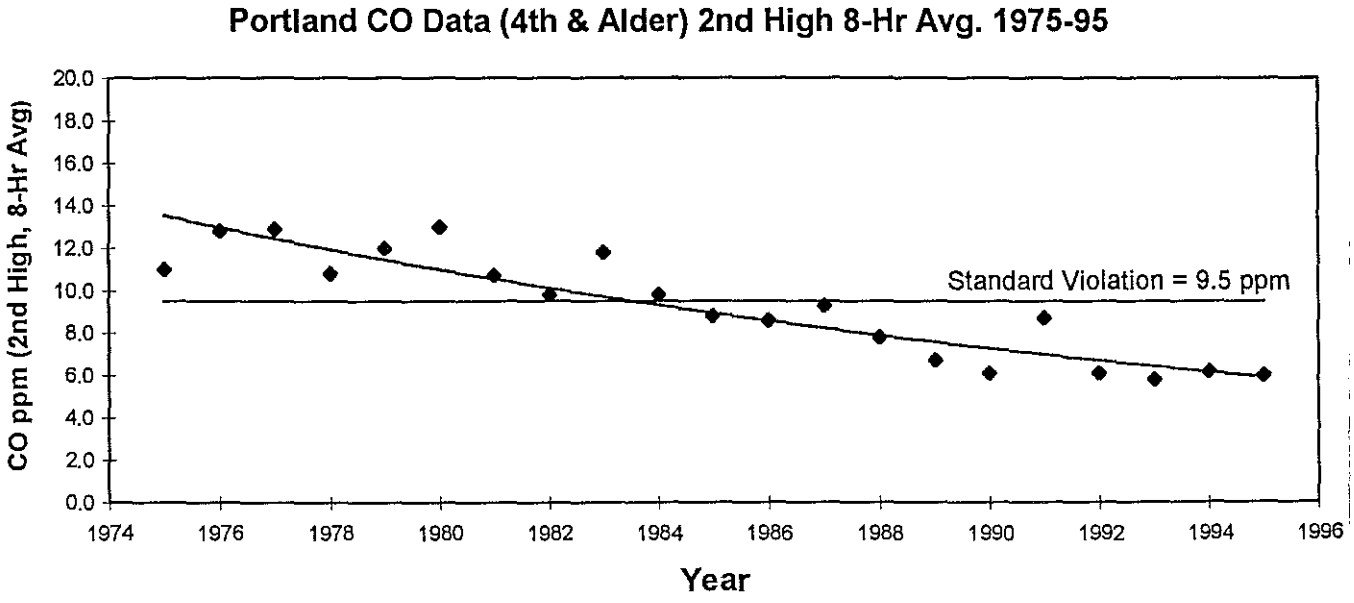


Figure 4.51.2.2: Long-Term CO Emissions Trend at 4th & Alder Monitor



4.51.2.3 Summary of Ambient Air Quality Data

Table 4.51.2.2 below summarizes the second highest 8-hour CO concentrations which have been recorded since 1975 at the DEQ's current CO monitoring locations.

Table 4.51.2.2
Second High 8-Hour Carbon Monoxide Concentrations (1975-1994)
(in Parts Per Million)

Year	4th & Alder	3rd Avenue	SE Lafayette	82nd & Division
1975	11.0			
1976	12.8			
1977	12.9			
1978	10.8			
1979	12.0			
1980	13.0			
1981	10.7			
1982	9.8			
1983	11.8			
1984	9.8			
1985	8.8			
1986	8.6			
1987	9.3		8.9	
1988	7.8	9.1	7.2	
1989	6.7	8.4	5.9	9.8
1990	6.1	7.1	6.2	7.4
1991	8.7	9.2	8.1	9.0
1992	6.1	6.3	5.5	7.8
1993	5.8	5.7	6.6	8.4
1994	6.2	6.3	5.7	6.3

4.51.2.4 Permanent and Enforceable Improvement in Air Quality

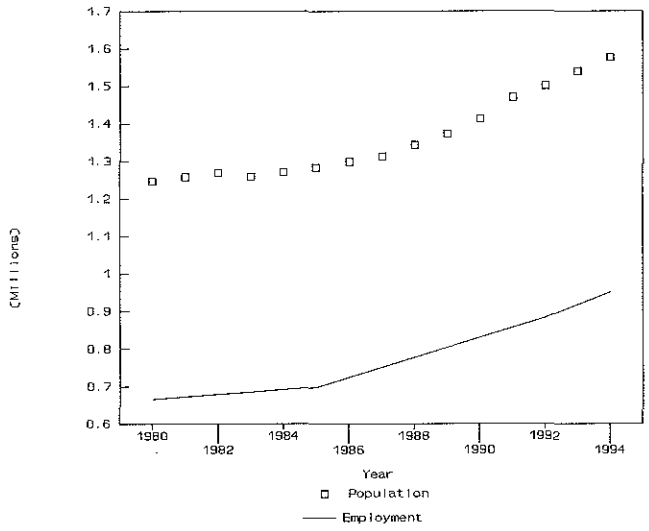
The EPA has issued guidance which specifies that, in order for an area to be redesignated to attainment, a state must be able to reasonably attribute improvements in air quality to emission reductions which are permanent and enforceable. Economic downturns and/or

unusual meteorology are factors cited that might result in temporarily lower CO concentrations and an attainment record that is "artificial." Thus EPA desires some analysis demonstrating that achieved attainment has not been attributable to either a temporary economic downturn or to especially favorable meteorology. The control measures that brought about attainment must be permanent as well as enforceable. This section addresses these issues.

Economic Effects

Historical trend data were collected for the Portland/Vancouver metropolitan area's population and employment as indices of the overall level of economic activity and growth in the area. The data includes population for Clackamas, Multnomah and Washington Counties in Oregon, and Clark County in Washington. This data is summarized in Figure 4.51.2.3. The data shows the area has been growing rapidly since the early 1980's. Information on the population and household projection figures used in developing this maintenance plan is presented in Appendix D2-6.

Figure 4.51.2.3: Portland/Vancouver Historical Population and Employment



The Portland area reached attainment in 1991 when there was rapid growth occurring throughout the Portland metropolitan area. Attainment for CO was achieved despite this growth; therefore, the improvement in Portland's CO air quality has not been due to a downturn in economic conditions.

Meteorological Effects

DEQ evaluated Portland area meteorological patterns over the 1985-1994 period, and concluded that recent compliance with CO standards is not attributable to favorable meteorology. This section summarizes the meteorological analysis procedures and conclusions. Detailed evaluation work is presented in Appendix D2-2.

First, a compilation was prepared of meteorological conditions that occurred when the highest and second highest 8-hour CO concentrations were recorded at each of three sites (two downtown sites and 82nd & Division) in every year since 1984 for which monitoring data was available. This evaluation found that low average wind speed conditions generally were present on high CO concentration days.

In the second part of this analysis, a similar compilation was prepared for the full 24-hour day associated with the 8-hour high and second-high concentrations cited just above. A

comparison of the two indicated good similarity--both the 8-hour periods and the 24-hour associated days had low wind speed conditions on a high percentage of the days.

In the third part of this analysis, years 1985 through 1994 were characterized in terms of the frequency of days with various average wind speed conditions. Since there was no obvious way to compare 8-hour periods, average wind speeds over 24-hour periods were evaluated. Conditions present during 1991, 1992, 1993, and 1994 were compared to 10-year average conditions. Evaluation of this data indicates that 1991 had much worse than normal ventilation conditions (i.e. more poor ventilation days than normal), that 1994 had better than typical conditions, and that years 1992 and 1993 had a normal share or greater than normal share of low wind speed days.

This latter portion of the analysis indicates that the low CO levels of 1992, 1993, and 1994 do not appear to be attributable to high average wind speed conditions or especially favorable meteorology.

Evaluation work was also conducted with regard to temperature, to look at whether high CO days tend to have especially low temperatures. This was considered important to evaluate because motor vehicle emission factors are much higher at lower temperatures. If recent years had been atypically warm, there was the possibility that the drop in CO concentrations in recent years could be an artifact of atypically warm winter weather.

Regarding temperature information on high CO days, the data set evaluated was the high and second-high days in each year since 1985 with available data for the sites at 3rd & Alder, 4th & Alder, and 82nd & Division. For those high CO 8-hour periods, frequency distribution analysis was done characterizing those periods in terms of their temperatures in 5 degree ranges (i.e. 40.1-45.0, 45.1 to 50.0, etc. in degrees F.). Conclusions were that high 8-hour periods tend to occur in the afternoon to evening with average temperatures ranging fairly evenly between 36 and 55 degrees F. and that they rarely occur during periods with average temperatures less than 36 degrees. Given these findings, there does not appear to be a way to characterize various years as more likely or less likely to produce high CO concentrations based on temperature alone.

The conclusions of the meteorological evaluation work were that:

- Low wind speeds are the meteorological conditions most commonly present on high CO days. Frequency of occurrence of low wind speed days is the best identified analysis method for characterizing whether a given year had better or worse than average dispersion conditions.

- Since peak CO concentrations are not particularly associated with lower temperature days, winter temperature conditions cannot be

used to evaluate whether a year had a meteorological tendency to generate more or less high CO days than average.

- When the frequency of occurrence of low wind speed days is evaluated over the last 10 years, the conclusion is that 1991 had especially restrictive meteorological conditions (i.e. more poor dispersion days than average); that 1994 had better than average conditions; and that 1992 and 1993 had a normal share or greater than normal share of low wind speed days.

- This body of evidence in aggregate indicates that the recent decrease in CO concentrations was not associated with atypically favorable meteorological dispersion conditions.

Permanent and Enforceable Emission Reductions

Control strategies that were in place during the attainment period, all of which are permanent and enforceable measures, are listed below.

1. Federal Measures: Federal Motor Vehicle Control Program establishing emission standards for new motor vehicles.

2. SIP measures:
   a. Major New Source Review Program (Lowest Achievable Emission Rate and offsets). [Rule citation: OAR 340-028-1900 through 340-28-2000.]
   b. "Basic" vehicle inspection and maintenance within the Portland area (Metro boundary) since 1975. [Rule citation: OAR 340-024-0300 through OAR 340-024-0355.]
   c. Improved public transit (expanded bus fleet, service improvements, increased bus shelters, expanded park and ride lots and light rail transit between downtown Portland and Gresham).
   d. Carpool matching program and carpool parking program in downtown Portland.
   e. Traffic flow improvements (ramp metering, computerized signalization, on-street parking limits).
   f. City of Portland bicycle parking program.
   g. Downtown Portland Air Quality Plan (1980 Updated Downtown Parking and Circulation Policy).
   h. Downtown Portland Parking Offset Program (allowed parking ceiling to be increased by up to 1,370 spaces), adopted in 1990. [Rule citation: OAR 340-020-0400 through OAR 340-020-0430.]

All of these measures helped counteract the increased activity of CO pollution sources in the Portland area and helped bring the area into attainment. A wintertime oxygenated fuel program was implemented in Portland and Vancouver during 1992, as required by the 1990 FCAA. As shown by the air quality data, compliance levels were achieved within the Portland CO nonattainment area before the oxygenated fuel program started.

4.51.2.5 Demonstration that DEQ's CO Network May Reasonably Be Considered To Be Representative of Worst Case CO Concentrations

A variety of evidence is presented in this section to demonstrate that the locations where the DEQ monitors for CO represent "worst case" or peak level concentrations. The specific elements include:

- Wide ranging field sampling has been conducted by the DEQ in comprehensive efforts to identify areas with high peak CO levels.
- Screening techniques were used to identify intersections with apparent potential for high CO concentrations.
- Available data from historical field studies indicates that the DEQ CO site network tends to record higher CO concentrations than all of the screened intersections.

4.51.2.5.1 DEQ Has Conducted Comprehensive CO Field Studies

The DEQ has made vigorous efforts to identify the localized areas which experience the highest peak CO concentrations. It conducted studies which entailed monitoring at more than 100 different locations during the winters of 1984/85, 1988/89, and 1993/94. When those special studies identified areas which seemed to record peak CO levels higher than did the DEQ's existing network, action was taken to add a new monitoring location. This is how the sites at 510 SW 3rd (Postal Building) and 82nd & Division were added to the network in 1988 and 1989. This large body of work by itself is prima facie evidence that the DEQ CO site network can reasonably be considered to be representative of worst case CO concentrations.

The DEQ conducted a meteorological evaluation of conditions present in general during those special sampling studies. That analysis is presented in detail in the second portion of Appendix D2-2 (Meteorological Analysis). It found that the conditions present during the 1984-85 sampling included typical average winter conditions (with a number of especially high wind speed days). The protocol for selecting sampling days was changed for the 1988-89 and 1993-94 field studies such that a higher percentage of sampling days in those studies were lower wind speed/poorer air dispersion days. This means it is reasonable to use findings from these field studies as a basis for drawing conclusions about whether the DEQ CO monitoring network appears to be representative of worst case concentrations.

As an extension of this past commitment to vigorously seek out the locations of peak CO concentrations, the DEQ commits to conduct future saturation studies every four years, as discussed in Section 4.51.4.2.

4.51.2.5.2 Screening Techniques Used To Identify Intersections With Potential For High CO Concentrations

Traffic volume and congestion parameters were utilized to demonstrate that the areas with greatest CO potential have been evaluated. A screening analysis was used to identify the six intersections with the greatest indicated potential for high CO concentrations. The specific algorithm used was "V * V/C", or volume weighted by volume divided by capacity, based on Metro's transportation model outputs. The volume term alone generates a higher screening value for those intersections with higher traffic volumes. The term "V/C" yields a weighting factor that is higher as volumes approach roadway capacity values. This is a screening value used by many other CO planning areas , and its use yields a screening value that weights both traffic volumes and congestion. Having an indicator of congestion weighted in the algorithm is important because congestion implies lower average speeds which are associated with higher average emission rates.

A value of "V * V/C" was determined for each intersection leg (V is constrained to be less than C), and then those values for each leg were summed to derive a screening indicator for the intersection as a whole. Table 4.51.2.3 below lists the six intersections with the highest screening values in rank order.

Table 4.51.2.3
List of Six Intersections with Highest Derived Screening Values Using the "V * V/C" Algorithm with Metro 2010 Projections

Intersection	Screening Value (Sum for Legs of V/C * V)
1. Hwy 99/Barbur/Hall @ Hwy 217	5995
2. NE 82nd/Airport Way	5736
3. SW TV Hwy/ Canyon Rd./ Hwy 217	5333
4. SE Powell/39th	5101
5. MLK/ E. Burnside	5074
6. SE 82nd/Sunnyside/Harmony Rd.	4979

These six intersections were projected by this screening method to have the greatest potential for high peak CO concentrations. In section 4.51.2.5.3 below, analysis of special sampling study results is presented which demonstrates that the DEQ's network of CO sites experience higher peak concentrations than each of the above screened intersections. This provides a further basis for accepting the DEQ's monitoring network peak values as representative of "worst case" CO concentrations.

4.51.2.5.3 Available Data From Historical Field Studies Indicates That the DEQ's CO Network Records Higher Peak Concentrations Than The Screened Intersections.

In this section a variety of evidence is referenced which substantiates that the DEQ's network of CO sites, in aggregate, records concentrations higher than at each of the six intersection locations with the highest screening values. The details underlying the conclusions discussed in this section are presented in Appendix D2-3.

For five of the six screened intersections (Barbur Blvd. @ Hall, TV Hwy & Canyon Road by 217, Powell & 39th, MLK & E. Burnside, and 82nd @ Sunnyside/Harmony Rd.), a review of the DEQ's bagger study results showed that the peak CO concentrations at those intersections were less than the highest values recorded concurrently at the aggregate of the DEQ network locations. Appendix D2-3 discusses actual monitoring data for those 5 intersections versus the DEQ network of CO sites.

DEQ has not conducted bagger studies at the 6th screened intersection, located at NE Airport Way and 82nd Avenue. This is because DEQ staff have historically considered that intersections located more northerly, such as this one, have only a limited potential for CO concentration build-up because locations closer to the Columbia River typically have greater ventilation. With regard to this intersection, traffic volume counts versus capacity figures were compared, and it was determined this intersection has an LOS[4] C or better rating. According to EPA guidance on CO screening and CAL3QHC[5], intersections rated as LOS A, B, or C, can generally be excluded from further review because their low level of congestion implies CO concentration problems are improbable. This analysis is also discussed in Appendix D2-3.

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[4]Level of Service: a traffic engineering method of characterizing the quality of traffic flow through an intersection, with values ranging from A (best) to F (worst).

[5]CAL3QHC: a computer model for predicting CO concentrations from motor vehicles.

4.51.2.6 Conclusions Regarding Demonstration of Attainment

This section 4.51.2 has referenced monitoring data that shows the Portland area CO monitors are now in attainment with the NAAQS for CO, and it has presented a wide variety of evidence to demonstrate such data can be reasonably characterized as representative of "worst case" peak concentrations. Economic data was cited to show attainment has not been attributable to a "downturn" in the Portland area economy. Meteorological data evaluation was presented to show recent year compliance was not attributable to especially favorable meteorology. Intersection screening analysis was used to identify intersections with high potential for peak CO concentrations. The DEQ's three bagger studies of 84/85, 88/89, and 93/94 were utilized together with some actual traffic volume data to demonstrate that the DEQ network of CO sites captures peak concentrations which are higher than are recorded at the six screened intersections.

DEQ has conducted field studies which sampled concentrations at more than 100 locations, all towards the goal of finding the locations with peak CO levels. New CO sites have been added when evidence indicated other locations were recording high peak values. Meteorological analysis was conducted to show that the meteorological conditions during the bagger studies included conditions commonly associated with high CO periods. This provides further evidence that the bag sampling studies effectively identified areas of maximum CO exposure. The comprehensive nature of the special studies, bolstered by the meteorological analysis, demonstrates that the DEQ network of CO sites both represents worst case CO concentrations and also indicates current attainment.

As discussed in Section 4.51.4.2, the DEQ will conduct future saturation studies every four years, in order to help ensure that locations of peak CO concentrations are identified and appropriately addressed.

An additional factor of conservatism in the DEQ's analysis is that meteorological conditions during 1991 (the year being used as the "Attainment Year") were more restrictive than during any other year in the 1985 to 1994 period.

Thus, this section has demonstrated attainment of standards in the Portland area, and has demonstrated that the monitoring data may reasonably be considered to be representative of "worst case" concentrations.

4.51.3 MAINTENANCE PLAN

As part of a Redesignation Request/Maintenance Plan under FCAA Section 175A(a), it must be shown that attainment will be maintained for at least 10 years after the date of redesignation. This maintenance demonstration through the 2006/07 CO season is documented below. The maintenance demonstration shows that the CO NAAQS will not be violated at least until the beginning of the 2007/08 CO season or November 1, 2007.

4.51.3.1 Attainment Inventory

As part of the Maintenance Plan, an "attainment" emission inventory was developed. Future emission inventories must be shown to remain at or below this attainment level. The "attainment" emission inventory is meant to represent emissions during a time when attainment of the standard was occurring; 1991 was chosen for Portland since it fell within the attainment period and also had meteorology more conducive to the build up of air pollution than other attainment years. As the meteorological analysis indicated, 1991 had less favorable conditions for the dispersion of air pollutants than any other year in the 1985 to 1994 period. For CO Maintenance Plan purposes, emission levels in the Portland (Metro) CO area must stay below 1991 emission levels to be consistent with EPA guidance on approval conditions for Maintenance Plans.

An emission inventory consists of emission estimates from all sources that emit carbon monoxide. These sources include industrial sources, on-road mobile sources (e.g. cars and trucks), non-road mobile sources (e.g. construction equipment, recreational vehicles, lawn and garden equipment), and area sources (e.g. outdoor burning, woodstoves, wildfires). These emission sources are tabulated based on pounds of CO emitted during a typical winter day.

A 1991 CO attainment emission inventory was prepared for the Portland area which is summarized in Table 4.51.3.1 (see Section 4.51.3.2.1 below, which presents the 1991 inventory along with inventories for five projection years). On-road mobile sources were calculated by applying the Mobile5a and Mobile5a_h EPA computer programs to the Metro transportation network. The procedures for calculating the attainment emission inventories and detailed results are presented in Appendix D2-4.

The Department also created two subregional emission inventories for 1991: one for an area around downtown Portland, referred to as the CCTMP[6] area; and one for an 82nd Avenue Corridor area, extending south from SE Division along SE 82nd Avenue. These are also presented in Section 4.51.3.2.1 below, with projection years in the same table. The purpose for generating emissions inventories for these two areas was to better track emissions in

[6]Central City Transportation Management Plan.

localized areas around CO monitors with historically high CO levels. Figure 4.51.3.1 shows where the CCTMP and 82nd Corridor subareas are located relative to the whole region and the Metro boundary. Smaller focus maps for the CCTMP and 82nd Avenue Corridor subareas are shown in Figures 4.51.3.2 and 4.51.3.3.

4.51.3.2 Maintenance Demonstration

4.51.3.2.1 Inventory Projections

Figure 4.51.3.4 shows the Portland area CO emissions projected to the year 2007, with bar graphs for the region, the CCTMP subarea, and the 82nd Avenue subarea. Table 4.51.3.2.1 presents the 1991 figures and projection year figures on CO emissions in four major source categories, and also includes emission projections for the CCTMP and 82nd Avenue Corridor subareas. The procedures used for projecting these emissions and detailed results for individual sources are presented in Appendix D2-4.

Regional emissions are projected to be a total of 1,741 thousand pounds/winter day in 2007; this is about a 30 percent decrease from the 1991 level. Emissions were projected assuming the oxygenated fuel program would be discontinued in the year 1998. As shown, the total emissions in all years after 1991 stay well below the 1991 attainment emission level. The decrease in emissions from 1991 to 2007 is largely due to the decrease in mobile emissions from fleet turnover and the vehicle inspection and maintenance program. Point sources are expected to increase slightly from the growth in the area; this growth includes production increases from existing sources and growth for new industry. Area source emissions are projected to grow about 9 percent during the 1991-2007 period, and non-road mobile source emissions are projected to grow about 25 percent during the 1991-2007 period. On-road mobile sources accounted for about 73 percent of total regional emissions in 1991 and are projected to account for about 54 percent of total regional emissions in 2007.

Total emissions in the two subareas are projected to decrease by an even greater proportion. Total CO emissions in the CCTMP drop from 204 thousand pounds per day in 1991 to about 98 thousand pounds per day in 2007. Total CO emissions in the 82nd Avenue subarea drop from about 13.5 thousand pounds per day in 1991 to about 6.2 thousand pounds per day in 2007.

Figure 4.51.3.1: Portland Area Carbon Monoxide Emissions Budget Areas

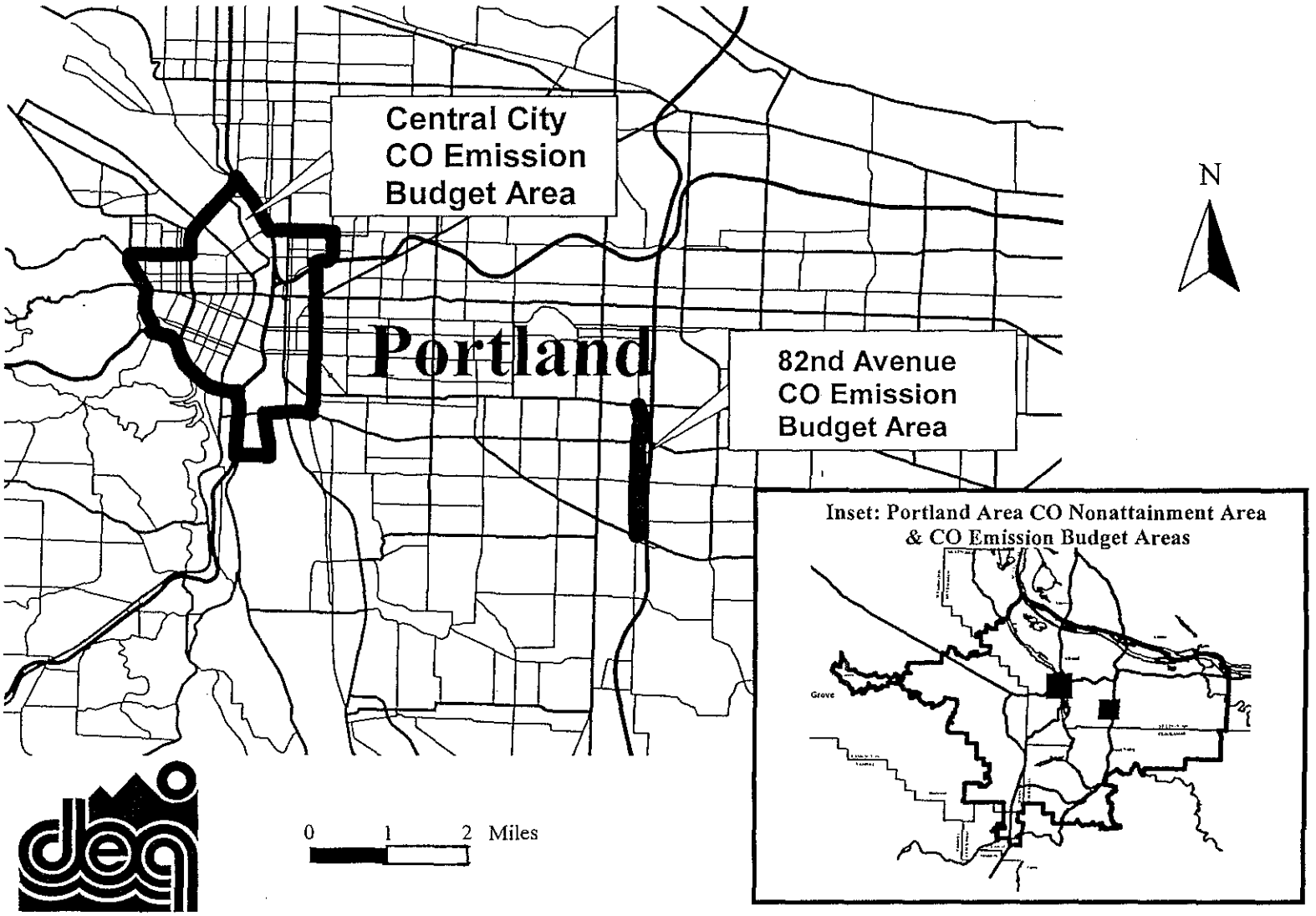

Figure 4.51.3.2: CO Emissions Budget Area - Central City

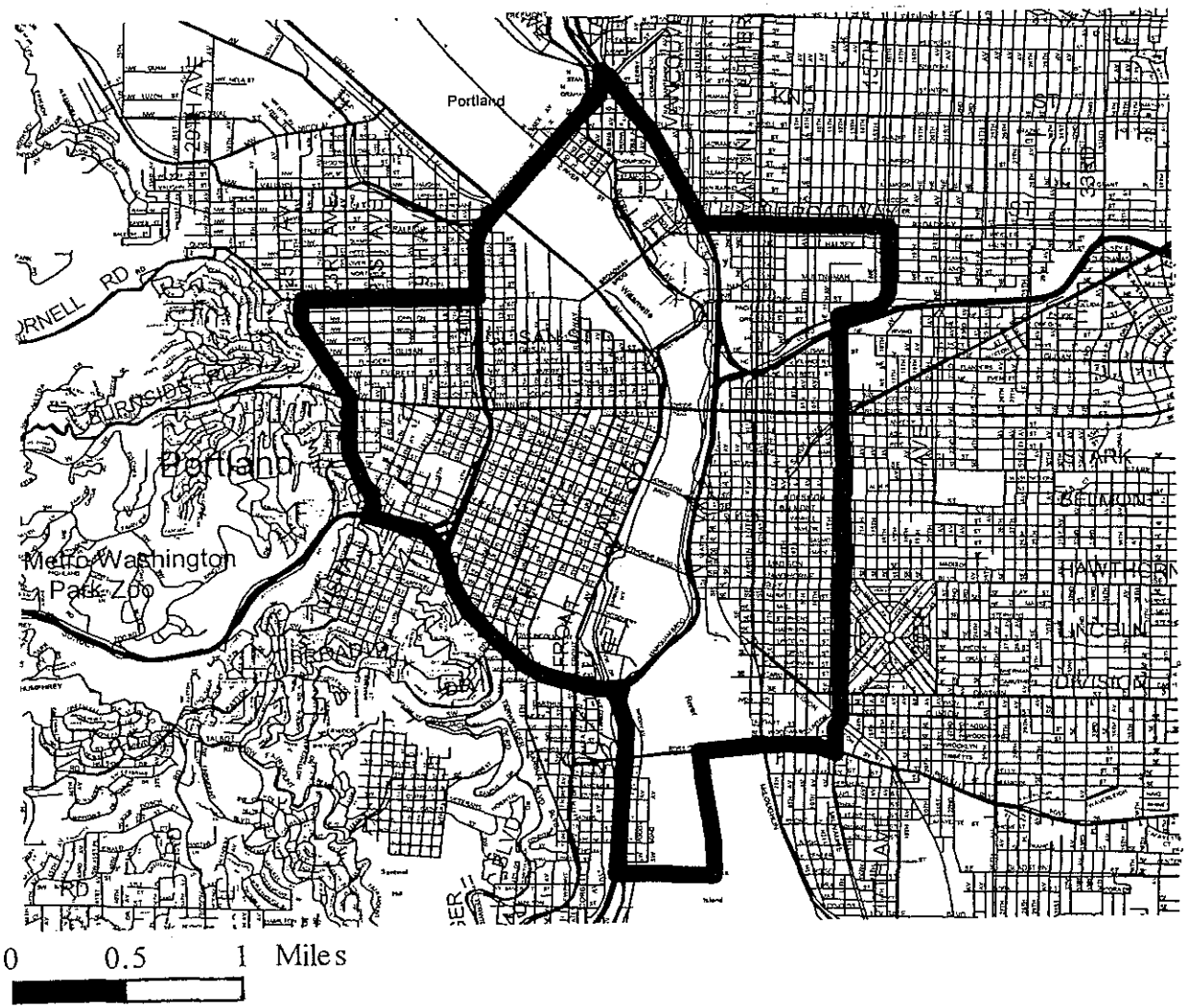

Figure 4.51.3.3: CO Emisssions Budget Area - 82nd Avenue Corridor

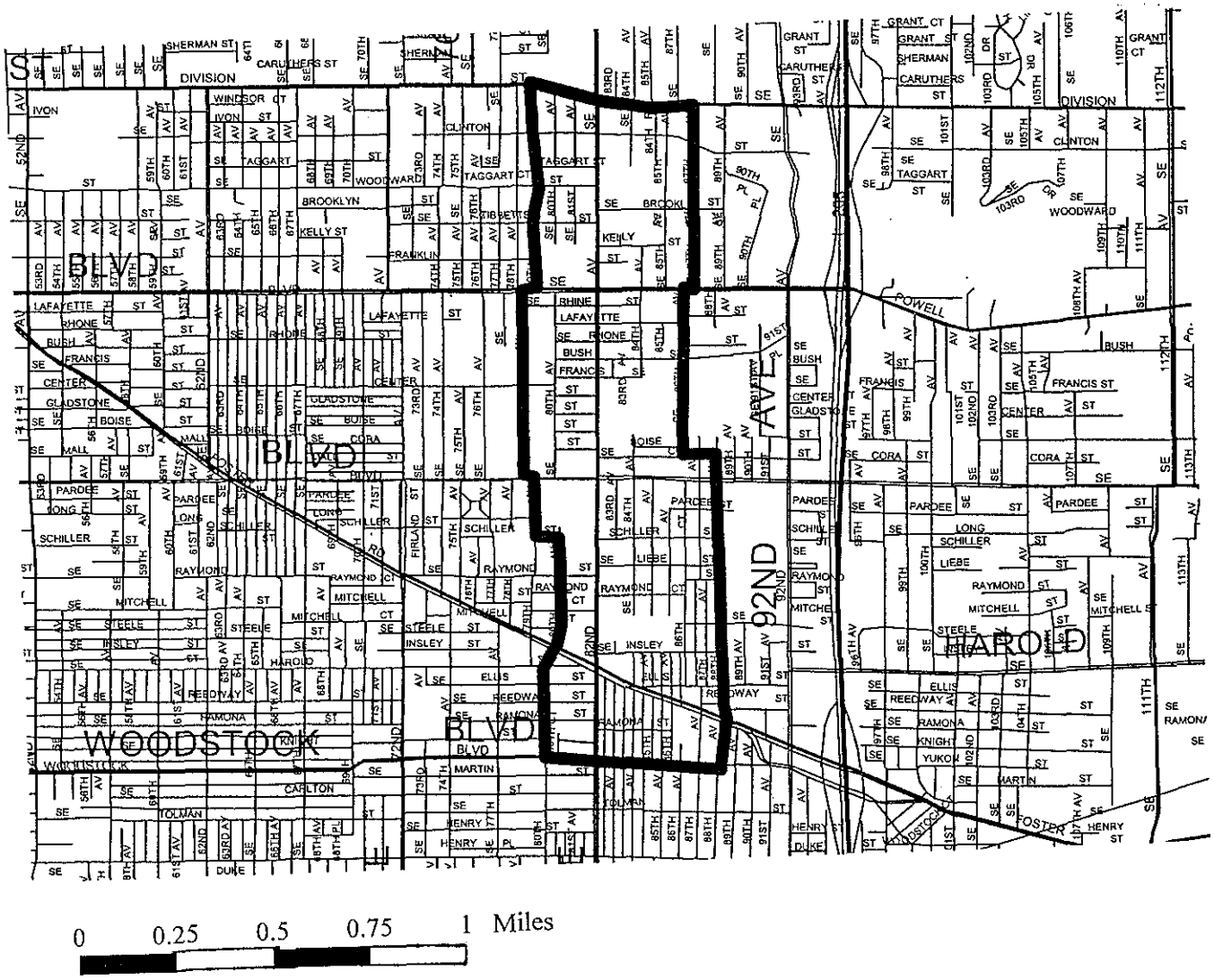

Figure 4.51.3.4: CO Emission Projections

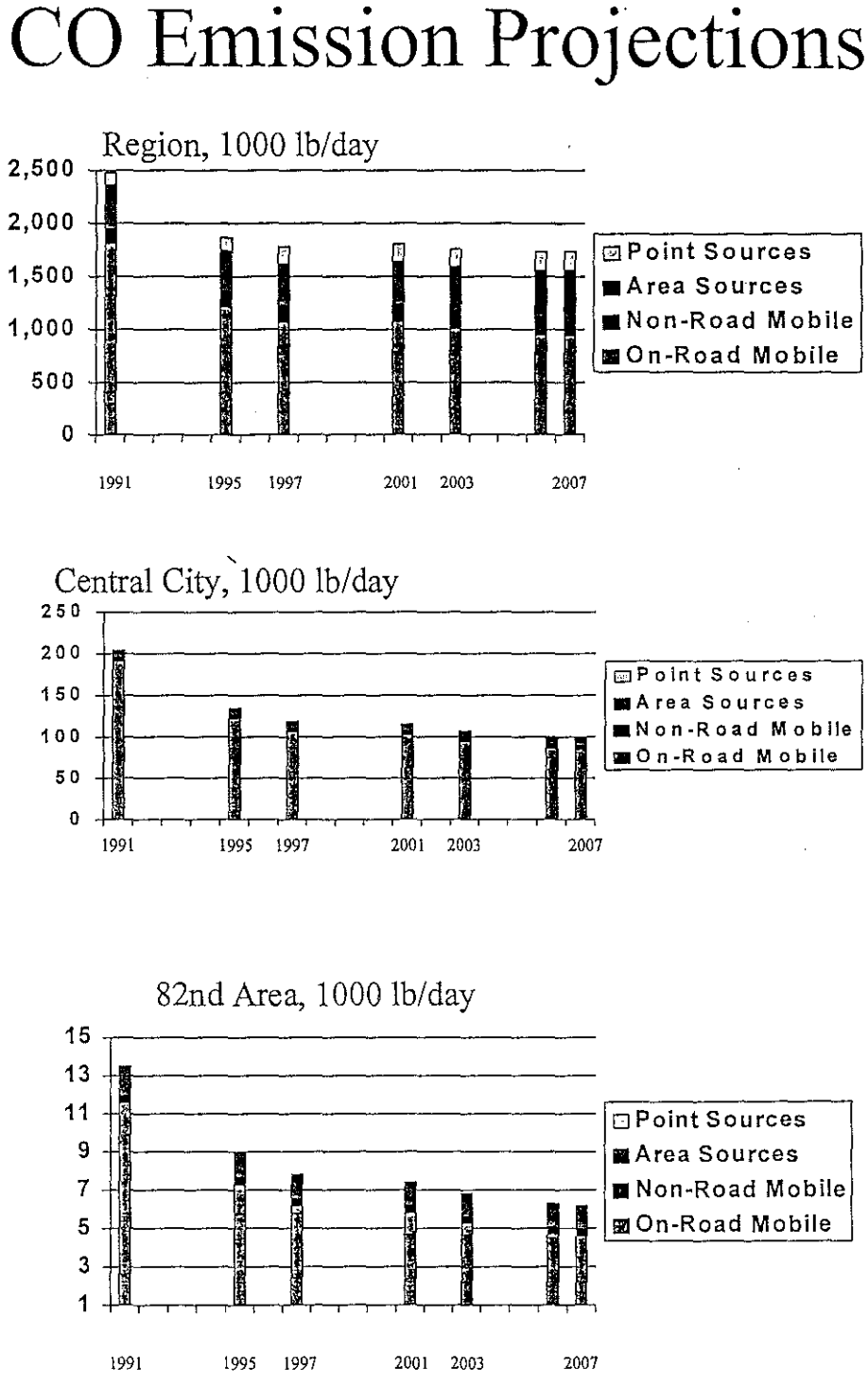

Table 4.51.3.1: CO Emissions Attainment and Projection Inventories

CO Emissions: Region (=CO Nonattainment Area=Metro Boundary)
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	2007
Area Sources	411	382	392	405	417	447
Non-Road Mobile Sources	135	146	151	160	163	169
Large Point Sources	116	124	165	170	171	178
On-Road Mobile Sources	1812	1217	1075	1074	1011	947
Total	2474	1868	1783	1808	1762	1741

CO Emissions: CCTMP Sub-Area
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	2007
Area Sources	9.3	8	8	8	9	9
Non-Road Mobile Sources	3.4	4	4	4	4	4
Large Point Sources	0	0	0	0	0	0
On-Road Mobile Sources	192	123	107	103	95	86
Total	204	135	119	115	107	98

Table 4.51.3.1 (continued)
CO Emissions: 82nd Avenue Corridor Sub-Area
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	2007
Area Sources	1.5	1.3	1.3	1.2	1.2	1.2
Non-Road Mobile Sources	.4	.4	.4	.4	.4	.4
Large Point Sources	0	0	0	0	0	0
On-Road Mobile Sources	11.6	7.3	6.2	5.8	5.3	4.6
Total	13.5	8.9	7.8	7.4	6.8	6.2

4.51.3.2.2 Transportation Emissions Budgets for Conformity

The federal and state transportation conformity regulations require that mobile source emissions resulting from implementation of the regional transportation plan (RTP) and transportation improvement program (TIP) meet certain criteria to ensure compliance with the FCAA.

Prior to approval of the maintenance plan, there are two major tests with which RTP's and TIP's must comply. The first test is a comparison of the proposed RTP and TIP (or "action scenarios") to the existing situation (or "baseline scenario"). This test, often referred to as the "build/no-build" test, ensures that the emissions from the action scenario do not exceed the emissions from the baseline scenario. The second test is a comparison of the action scenario to the emission inventory for the year 1990, referred to as the "1990 test."

After EQC approval of the Maintenance Plan, an additional conformity test applies: the RTP and TIP must comply with the transportation emissions budgets specified in this maintenance plan. This test is designed to prevent violation of the NAAQS because transportation emissions are not allowed to exceed the levels relied upon in the maintenance demonstration. Upon EPA approval of the Maintenance Plan, the build/no-build test and the 1990 test will be eliminated, leaving only the emissions budget test. For a CO air quality maintenance area, transportation emission budgets are established for CO.

For transportation conformity purposes, there will be three emissions budgets as follows: 1) regional on-road motor vehicle emissions for the Metro boundary; 2) CCTMP on-road motor vehicle emissions; and 3) 82nd Avenue Corridor on-road motor vehicle emissions. The emissions budgets for the two subareas are included in the regional emissions budget. The transportation emissions budget numbers are shown in Tables 4.51.3.2. and 4.51.3.3.

Table 4.51.3.2.: Transportation Emissions Budgets Through 2007

Regional Transportation CO Emissions Budget
(CO Non-Attainment Area=Metro Boundary)
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	2007
Budget	1812	1217	1075	1074	1011	947

CO Transportation Emissions Budget: CCTMP Sub-Area
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	2007
Budget	192	123	107	103	95	86

CO Transportation Emissions Budget: 82nd Avenue Corridor Sub-Area
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	2007
Budget	12	7	6	6	5	5

Because the transportation emissions budgets were developed based on Metro forecasts, DEQ anticipates that the identified budgets will be sufficient for conformity determinations conducted through the year 2007, the last year of the Maintenance Plan, provided that Metro funds and implements the Transportation Control Measures (TCMs) identified in the financially constrained network included in the interim federal RTP (adopted July 1995).

However, DEQ and Metro anticipate that the 2007 CO transportation emissions budget will not be sufficient for conformity analyses of years beyond the end of the Maintenance Plan. For this reason, separate transportation emission budgets have been established for this post-Maintenance Plan timeframe (see Table 4.51.3.3).

Table 4.51.3.3: Post-Plan Transportation Emissions Budgets

Post-Plan Regional Transportation CO Emissions Budget
(CO Non-Attainment Area=Metro Boundary)
(Thousand Pounds CO/Winter Day)

Year	2010	2015	For Years 2020 and Beyond
Budget	942	975	1033

Post-Plan CO Transportation Emission Budget: CCTMP Sub-Area
(Thousand Pounds CO/Winter Day)

Year	2010	2015	For Years 2020 and Beyond
Budget	84	87	92

Post-Plan CO Transportation Emissions Budget: 82nd Avenue Corridor Sub-Area
(Thousand Pounds CO/Winter Day)

Year	2010	2015	For Years 2020 and Beyond
Budget	4	5	5

These post-Maintenance Plan transportation emissions budgets still meet EPA approvability criteria because the budgets, when combined with emissions from all other source categories, do not exceed the attainment year (1991) emission inventories.

Appendix D2-5 describes DEQ's transportation conformity rules and the transportation conformity process in Oregon.

4.51.3.2.3 Control Measures

The emissions projections showed an overall decrease without additional controls. Credit is being taken for the enhanced vehicle inspection and maintenance program required for the Ozone Maintenance Plan. This credit will largely offset the emissions increase associated with repealing the oxygenated fuel program. Also, the Portland City Council adopted the Central City Transportation Management Plan (CCTMP) on December 6, 1995, after a five-year planning process. The CCTMP is intended to advance a "buildout" vision of the Central City Plan to the year 2010 and beyond. The chief implementing mechanism is the Zoning Code amendments, also adopted by the Portland City Council on December 6, 1995. Key portions of the City of Portland Zoning Code amendments are included in this maintenance plan under the Non-funding Based TCM's section. The CCTMP replaced the 1980 Updated Parking and Circulation Policy. Although the CCTMP eliminated the ceiling on downtown parking, it provided for the expansion of the system of maximum parking ratios to the entire area of the Central City. (The CCTMP provided for the maximum parking inventory, augmented by the Parking Offset program, to remain in effect until EPA approval of the CO maintenance plan.) Metro's adopted resolution regarding the carbon monoxide maintenance plan strategies and emissions budgets is presented in Appendix D2-7.

As a result of the CCTMP planning process, and Metro's review of proposed strategies, several control measures were identified to achieve the emission reductions for the CO maintenance plan. These measures are summarized below.

Vehicle Inspection and Maintenance Program Improvements

An enhanced vehicle inspection and maintenance program is being implemented for the Portland area ozone maintenance plan, but it provides CO emission reductions as well. The inspection program is being modified to test emissions while vehicles are put through a driving cycle on a dynamometer that includes acceleration and deceleration. This test applies to cars in the 1981 model year through models that are six years old. The basic test applies to 1975-1980 model year vehicles and three to five years old vehicles. The enhanced program phases in over a two-year period beginning in 1997. Appendix D2-9-2 describes the enhanced program in greater detail.

In July 1994, the EQC expanded the vehicle inspection boundary from the Metro boundary to include additional portions of the Tri-County area (Multnomah, Clackamas and Washington Counties) and small neighboring portions of Columbia, Marion and Yamhill Counties. This strategy was primarily adopted as a strategy to generate VOC emission reductions needed for the Portland Ozone Maintenance Plan, but it also provides CO emission reductions. U.S. Census Bureau data were used to select areas that had relatively high population densities and

commute rates into the AQMA[7]. Concurrent with adoption of the maintenance plan, the vehicle inspection boundary was revised to remove those areas with less than 40 percent of their work force commuting into the AQMA. This removed from the expansion some areas in Clackamas, Marion and Yamhill Counties, but retained some areas in Columbia and Yamhill Counties. Appendix D2-9-1 contains additional information about the vehicle inspection boundary expansion.

The 1993 Oregon Legislature adopted rules (in ORS 815.300) which eliminated the exemption from the vehicle inspection program for vehicles from model year 1975 and newer. These rules were submitted to EPA as a State Implementation Plan revision on August 30, 1994. Vehicles made in 1975 and later model years are now permanently included in the testing program. The emission projections for motor vehicles, as documented in Appendix D2-4, incorporate this change as well.

Major New Source Review

Until the Portland Nonattainment Area is redesignated to attainment, proposed major sources and major modifications to existing sources are required to comply with nonattainment area New Source Review (NSR) rules, including Lowest Achievable Emission Rate (LAER) control technology and offsets for CO. Offsets must be provided within the area of significant air quality impact to provide a net air quality benefit.

After redesignation to attainment, the LAER requirement will be replaced by Best Available Control Technology (BACT), and a growth allowance will be provided for use in meeting the offset requirement. The owner or operator of a proposed major source or major modification may apply to DEQ for an allocation of the growth allowance in lieu of providing an offset. DEQ will allocate the growth allowance on a first-come/first-served basis, until the growth allowance is fully allocated. No applicant may be awarded more than 50 percent of the remaining growth allowance or 10 tons per year, whichever is greater, unless an exception is approved by the EQC on a case-by-case basis.

The industrial growth allowance for CO amounts to 14,880 pounds CO/winter day (and 2700 tons/year). The growth allowance for CO was derived based on 1 percent per year growth in industrial emissions. Because there is sufficient airshed capacity, the entire growth allowance is available for allocation at any time between plan approval and 2007.

[7]AQMA refers to the Portland Air Quality Maintenance Area, which is slightly larger than the Metro boundary. The ozone nonattainment area boundary is the AQMA. Since this strategy was originally selected in connection with the ozone plan, evaluations of commute trips focussed on commuters into the AQMA.

To make the growth allowance "pool" last as long as possible, sources will be encouraged to provide offsets, if possible, for all or part of the proposed increase. Once the growth allowance is fully allocated, offsets for all proposed major sources and major modifications will again be required.

DEQ will prepare a thorough accounting of any activity in the growth allowance program for each period identified in Table 4.51.3.1, including any allocations to sources and any increases in the growth allowance. This information will be reported to EPA within 12 months following the end of the reporting period. If there are any increases to the growth allowance since the last report, DEQ will include a clear discussion of how each increase to the growth allowance is based on a surplus and federally enforceable emission reduction. This is also discussed in Section 4.51.4.4 "Maintenance Plan Commitments" and Appendix D2-11 (New Source Review Rules).

If a violation of the CO standard occurs after the Portland area has been redesignated to attainment, the LAER and offset requirement will be reimposed, and any remaining growth allowance will be eliminated (see Contingency Plan, below, Section 4.51.3.3).

Transportation Control Measures (TCM's)

The TCMs identified in the maintenance plan fall into two categories: non-funding based TCMs and funding based TCMs. The non-funding based TCMs reduce transportation emissions through land-use requirements and regulatory programs. The funding based TCMs reduce transportation emissions by increasing the supply of transit, bicycle and pedestrian facilities. The funding based TCMs were established in the financially constrained transportation network of Metro's interim federal RTP, adopted July, 1995, in accordance with the requirements of the federal Intermodal Surface Transportation Efficiency Act (ISTEA). This network includes only projects that can be supported based on historical funding level trends.

The funding based TCMs must receive priority funding and all TCMs identified in the maintenance plan must receive timely implementation. If the TCMs do not receive priority funding and timely implementation, a conformity determination can not be made for Metro's transportation plans and federal funding will be withheld. These requirements are specified in the transportation conformity rules, OAR 340-020-0710 through 340-020-1080. In general, "priority funding" means that all state and local agencies with influence over approvals or funding of the TCMs are giving maximum priority to approval of funding of the TCMs over other projects within their control. "Timely implementation" means that the TCMs are being implemented consistent with the schedule established in the maintenance plan. The determination of whether priority funding and timely implementation have been achieved is made in the context of interagency consultation as specified in the transportation conformity rules.

Identified TCMs may be substituted in whole, or in part, with other TCMs providing equivalent emission reductions. Substitution occurs through consultation with Metro's Transportation Policy Alternatives Committee (TPAC) and Joint Policy Advisory Committee on Transportation (JPACT). Such substitution requires public notice, EQC approval and concurrence from EPA, but does not require a revision to the State Implementation Plan. See appendix D2-10 for the TCM substitution requirements.

The TCMs included in the maintenance plan are:

A. Non-funding based Transportation Control Measures.

1. Metro 2040 Growth Concept

Metro's 2040 Growth Concept is included because it changes typical growth patterns to be less reliant on motor vehicle travel, thereby reducing motor vehicle emissions. Two elements of the land use plan (the Interim Measures and the Urban Growth Boundary) provide appropriate implementation mechanisms to meet FCAA enforceability requirements for control strategies.

a. Metro Interim Land Use Measures relating to:

- Requirements for Accommodation of Growth;
- Regional Parking Policy; and
- Retail in Employment and Industrial Areas.

The text of the interim land-use measures is included in Appendix D2-10.

b. Urban Growth Boundary

The Maintenance Plan includes the Urban Growth Boundary (UGB) as currently adopted or amended before EPA approval of the maintenance plan assuming an amendment does not significantly affect the air quality plan's transportation emission projections.

2. Central City Parking Requirements

The Portland City Council adopted the Central City Transportation Management Plan, Plan and Policy, and other supporting documents on December 6, 1995. The Central City Transportation Management Plan (CCTMP) was adopted by **Ordinance No. 169535, Resolution 35472**. The Ordinance became effective January 8, 1996. A key supporting document was

the Zoning Code Amendments, containing the maximum parking ratios for new development, the requirements for providing structured parking to serve older historic buildings and other regulations on parking. Key elements of the Zoning Code Amendments related to CO air quality projections are incorporated into this document as given below.

The CCTMP replaced the former Downtown Parking and Circulation Policy, first adopted in 1975 and updated in 1980 and 1985. The 1980 update of the parking policy served as a foundation for the 1982 Portland area CO attainment plan. The CCTMP is designed to minimize new vehicle traffic in the Central City and encourage alternative travel modes by extending the downtown maximum parking ratio concept to the entire Central City area. The CCTMP provided for the lifting of the downtown parking lid upon EPA approval of the maintenance plan and the request for attainment redesignation. However, until EPA approval, the CCTMP retains the parking lid.

The parking offset program (OAR 340-020-0400 through OAR 340-020-0430), designed to allow the city to increase the parking lid by up to a maximum of 1,370 spaces, was also retained until after EPA approval of the maintenance plan. The DEQ's emission projection figures for the CCTMP emissions inventory area include an estimate for the emissions associated with 827 parking spaces, as documented in Appendix D2-4-4. These are the parking spaces yet to be developed, but which were authorized by the parking offset program.

The following is a list of zoning code amendments that were incorporated directly into the Portland Carbon Monoxide Maintenance Plan. The text of critical code provisions (such as maximum parking ratios for new development and parking provisions for existing buildings) is contained in Appendix D2-8. A list of other zoning code amendments used as supporting documents for the maintenance plan is contained in Appendix D2-13 of Volume 3 of the Oregon State Implementation Plan.

Section 1: Incorporated Amendments to Chapter 33.510, Central City Plan District

Code Number	Code Title
33.510.261 - 33.510.261.E (33.510.261.E.1.a(1)-(2),b,E.2.a(1)-(2),b)	Parking Site split by subdistrict or parking sector boundaries

33.510.263 - Parking in the Core Area
33.510.263.A Growth Parking
(33.510.263.A.1.a-c(1)-(4),A.2-4.a-b(1)-(3),A.5-7.a-c)

33.510.263.B - Preservation Parking
(33.510.263.B.1.a-c(1)-(2),B.2-4.a)

33.510.263.E - Residential/Hotel Parking
(33.510.263.E.1.a-b,E.3.a-c)

33.510.263.F - RX Zone Parking
33.510.263.F.2

33.510.263.G - All Parking
33.510.263.G.4 - Surface parking lots.
(33.510.263.G.4.a.(1)-(2),G.4.d(1)-(3))

33.510.264 Parking in Lloyd District

33.510.264.A Growth Parking
(33.510.264.A.1.a-c(1)-(4),A.2.a,A.4.a)

33.510.264.B Preservation Parking
33.510.264.B.1.a-c(1)-(2),B.2.a-c,B.4.a-c)

33.510.264.F All Parking

33.510.264.F Surface parking lots
(33.510.264.F.4.e.(1)-(3))

33.510.265 Parking in the Goose Hollow Subdistrict and Central Eastside Sectors 2 and 3

33.510.265.A Growth Parking
(33.510.265.A.1.a-c,A.2.a,A.4.a)

33.510.265.B Preservation Parking

(33.510.265.B.1.a-c(1)-(4),B.2.a,b)
(33.510.265.B.4.a-c)

VI.D.1.a.(1)-(5)	Administration Section: Preservation Parking

Section 2: Incorporated Portion of New Chapter 33.808, Central City Parking Review

Code Number	Code Title
33.808.050	Loss of Central City Parking Review Status
33.808.100	General Approval Criteria for Central City Parking Review
33.808.100.G	
33.808.100.J 33.808.100.J.2.a	If the site is in the Core Area:
33.808.100.M	

Section 3: Incorporated Maps

Map Number	Map Title
510-8	Core and Parking Sectors - EPA

Unless it is a substitution of a Transportation Control Measure producing equivalent emission reduction, any change in the Portland Metro Area CO Maintenance Plan language will require adoption of a formal amendment by the EQC and approval by EPA. The City of Portland may make changes to City policies and regulations which are included in the Portland Metro Area CO Maintenance Plan provided they do not relax the stringency of the air quality control strategies. DEQ will work with the City to notify EPA of such changes. These changes will be incorporated into the Portland Metro Area CO Maintenance Plan at a future convenient time.

Changes to documents supporting the Portland Metro Area CO Maintenance Plan (zoning code amendments not directly incorporated into the Portland Metro Area CO Maintenance Plan, but listed in Appendix D2-13 of Volume 3 of the Oregon State Implementation Plan) which do not affect the stringency of the air quality control strategies will not require adoption of a formal amendment by the EQC and approval by EPA. DEQ and the City of Portland will review potential changes to the supporting documents to determine whether they affect the stringency of the air quality strategies. If it is determined that stringency will not

be affected, DEQ will submit those changes to EPA for concurrence and administrative incorporation into the Portland Metro Area CO Maintenance Plan.

B. Funding based Transportation Control Measures.

1. Increased Transit Service

a. **Regional increase in transit service hours averaging 1.5 percent annually**. This commitment includes an average annual capacity increase in the Central City area equal to the regional capacity increase. The level of transit capacity increase is based on the regional employment growth projections adopted by Metro Council on Dec. 21, 1995. These projections assume that the Central City will maintain its current share of the regional employment. Should less employment growth occur in the Region and/or the Central City, the transit service increase may be reduced proportionally.

b. **Completion of the Westside Light Rail Transit facility.**

c. **Completion of Light Rail Transit (LRT) in the South/North corridor by the year 2007.**

2. Bicycle and Pedestrian Facilities

a. **Multimodal facilities.**
Consistent with ORS 366.514[8], all major roadway expansion or reconstruction projects on an arterial or major collector shall include pedestrian and bicycle improvements where such facilities do not currently exist. Pedestrian improvements are defined as sidewalks on both sides of the street. Bicycle improvements are defined as bikeways within the Metro boundary and shoulders outside the Metro boundary but within the Air Quality Maintenance Area.

b. **RTP Constrained Bicycle System.**
In addition to (B)(2)(a) above, the region will add at least a total of 28 miles of bicycle lanes, shoulder bikeways or multi-use trails to the Regional Bicycle System as defined in the Financially Constrained Network of Metro's Interim Federal RTP (adopted July

[8] This provides for the following exceptions:
- absence of any need;
- contrary to public safety; and
- excessively disproportionate cost.

1995) by the year 2006. Reasonable progress toward implementation shall mean a minimum of five miles of new bike lanes, shoulder bikeways or multi-use trails shall be funded in each two year Transportation Improvement Program funding cycle.

Bike lanes are striped lanes dedicated for bicycle travel on curbed streets: a width of five to six feet is preferred; four feet is acceptable in rare circumstances. Use by autos is prohibited. Shoulder bikeways are five to six foot shoulders for bicycle travel and emergency parking. Multi-use trails are eight to 12 foot paths separate from the roadway open to non-motorized users.

c. **Pedestrian facilities.**
In addition to (B)(2)(a) above, the region will add at least a total of nine miles of major pedestrian upgrades in the following areas, as defined by Metro's Region 2040 Growth Concept: Central City/Regional Centers, Town Centers, Corridors & Station Communities, and Main Streets. Reasonable progress toward implementation shall mean a minimum of one and a half miles of major pedestrian upgrades in these areas shall be funded in each two year Transportation Improvement Program funding cycle.

4.51.3.2.4 Rollforward Analysis

A worst case analysis, with a higher number of future parking spaces than expected, was undertaken to project hot spot CO concentrations at the DEQ downtown monitoring stations, in order to demonstrate that attainment is projected to continue through 2007. A rollforward projection was also done for the SE 82nd and Division CO monitoring site (The methodology and calculations are contained in Appendix D2-12).

For the downtown area, the CCTMP transportation modeling was based on a 20-year period from 1990 to 2010. The key growth assumptions incorporated into the modeling included the addition of 75,000 jobs and 15,000 housing units to the Central City area over twenty years to 2010 and parking costs increasing at 1 percent above the inflation rate. With increased housing densities and relatively high parking costs, the modeling indicated the number of parking spaces in downtown Portland would increase by a net of 2,573 spaces, assuming the existing sites of off-street surface parking (approximately 5,800 spaces) were redeveloped.

The worst case scenario was undertaken to determine the air quality effects of a higher level of parking and traffic than given by the baseline modeling, since the parking lid would not be in place to limit the growth in parking. The same level of development was assumed, but

parking costs were assumed to increase at the level of inflation. This had the effect of increasing the number of commuter trips by car into the downtown area and increasing the demand for commuter parking by 7,204 spaces.

For this increased level of parking, traffic volumes and speeds adjacent to the DEQ CO monitors in the downtown were determined. Block face CO emissions were calculated with Mobile5a and applied to the respective design values at the two monitors (9.2 parts per million (ppm) at the Postal Building site and 8.7 ppm at the 4th and Alder site, both recorded in 1991). The worst case scenario resulted in the following 8-hour CO concentration projections for 1999 and 2007 (both years without the oxygenated fuel program and with the enhanced inspection program; 1999 with the enhanced inspection program assumed to be 50 percent phased in):

Postal Building (SW 3rd and Alder)	7.5 ppm (1999)	7.5 ppm (2007)
4th and Alder	6.2 ppm (1999)	5.4 ppm (2007)

For the SE 82nd and Division DEQ hot spot monitoring location, Metro's transportation model indicated a traffic growth rate of 0.4 percent per year from 1990 to 2010. By contrast the Oregon Department of Transportation Traffic Volume Tables (1984 and 1993) indicated an annual growth rate of 0.7 percent per year. ODOT's 0.7 percent growth rate was used. Traffic counts taken by the City of Portland in 1989 on SE 82nd Avenue at SE Division were used in conjunction with the baseline 8-hour CO concentration of 9.8 ppm, recorded in 1989 as the Portland area design value. Speed runs[9] conducted by DEQ in 1994 were used to establish the speeds used in the Mobile5a emission factor model. The modeling resulted in the following predictions for 1999 and 2007 (both years without oxygenated fuel and with enhanced vehicle inspection; 1999 with the enhanced program 50 percent phased in):

82nd and Division	7.4 ppm (1999)	6.8 ppm (2007)

The rollforward analysis indicated continued attainment for all 3 sites through the year 2007.

4.51.3.3 Contingency Plan

The Maintenance Plan must contain contingency measures that would be implemented in the event of: 1) a violation of the CO standard after the area has been redesignated to attainment, or 2) other appropriate triggering protocol contained in the plan. Portland's contingency plan

[9]Driving tests conducted to determine typical traffic speeds on a particular street at particular time periods. The operator attempts to drive the vehicle at a speed equal to the average of other vehicles on the road at that time. The purpose is to determine average travel speeds by dividing distance travelled by elapsed time (including stops).

is outlined below.

FCAA Section 175A(d) requires that all control measures contained in the State Implementation Plan (SIP) prior to redesignation be retained as a contingency measure in the Maintenance Plan. Therefore, the oxygenated fuel program, the DPCP parking lid, and LAER and offsets for major industrial sources must be contingency measures in the CO Maintenance Plan.

Phase 1: Risk of Violation

If monitored (8-hour) CO levels at any site within the Central City on the National Air Monitoring System or the State and Local Air Monitoring System registers a second high concentration equaling or exceeding 90 percent (equal to or greater than 8.1 ppm) of the National Ambient Air Quality Standard (NAAQS) level during a calendar year period, then the DEQ will identify a planning group to recommend which of the following strategies should be considered for implementation. Within six months of the validated 90 percent second high CO concentration, the planning group will determine a schedule of selected strategies to either prevent or correct any violation of the 8-Hour NAAQS for CO. This will allow a choice to be made to implement these measures before or after an actual violation has occurred.

The contingency strategies that would be considered will include, but are not limited to:

(1) increased parking pricing in the Central City;
(2) increased funding for transit;
(3) congestion pricing on major regional transportation corridors;
(4) oxygenated fuel;
(5) a trip reduction program;
(6) regional mandatory parking ratios; and
(7) accelerated implementation of bicycle and pedestrian networks.

In the event of a second occurrence in a calendar year of an 8-hour CO concentration equalling or exceeding 8.1 ppm, the planning group may also choose to conduct further studies to determine if further measures are necessary or to take no further action at all if the problem was caused by an exceptional event.

Phase 2: Actual Violation

If a violation of the CO NAAQS standard occurs, and is validated by DEQ, the following contingency measures will automatically be implemented:

(1) New Source Review requirements for proposed major sources and major modifications in the Maintenance Plan area (and the area of significant air

quality impact) will be modified. The requirement to install Best Available Control Technology (BACT) will be replaced with a requirement to install Lowest Achievable Emission Rate (LAER) technology. In addition, the industrial growth allowance established in Section 4.51.3.2.3 will be eliminated. These requirements will take effect upon validation of the violation. BACT and a growth allowance may be reinstated if provided for in a new maintenance plan adopted and approved by EPA.

(2) Oxygenated gasoline at 2.7 percent weight will be required. OAR 340-022-0460 (see Appendix D2-14-3) delineates the "reinstatement" procedures. Subsection (8) (b) states that a validated violation of the 8-hour CO standard will result in the requirements of OAR 340-022-0440 through 022-0640 being reinstituted. Subsection (8) (c) states the oxygenated fuel program would be reinstituted in the winter season following a validated violation, but not sooner than 6 months following that violation. Subsection (8) (d) states that such reinstatement will be automatic and that no further rulemaking will be required.

(3) The downtown parking lid will be reinstated. (This measure will be implemented only if the violation occurs in the downtown area formerly under the parking lid requirement.)

4.51.4 ADMINISTRATIVE REQUIREMENTS

The criteria that must be satisfied for a nonattainment area to be redesignated to attainment include several administrative requirements related to compliance with various FCAA provisions. Each of these elements is described below.

4.51.4.1 SIP Requirements/Nonattainment Area Requirements

Portland has met all SIP requirements specified in Section 110 and Part D of the FCAA.

In summary, Section 110 says that a state shall submit a plan, which becomes part of the State Implementation Plan (SIP), which provides for the implementation, maintenance, and enforcement of an air quality standard. Part D outlines specific plan requirements for nonattainment areas.

4.51.4.1.1 Summary of Fully Approved SIP

The Portland Carbon Monoxide Nonattainment plan, as adopted in 1979 and amended in 1982, utilized several control strategies. Because motor vehicles represent the vast majority of the total CO emissions generated in the Portland area (95 percent in 1977 and 85 percent in 1987), the control strategies focussed primarily on transportation control measures. EPA approved the nonattainment plan in October, 1982. The strategies in the approved nonattainment plan include:

a. A vehicle inspection/maintenance program for motor vehicles registered within the control area. This program became a mandatory program in 1975 and requires affected vehicles to pass a biennial emission inspection before that vehicle may be registered. In the program's first twelve years, it achieved more than a 25 percent reduction in CO emissions.

b. Improved public transit in the Portland Metropolitan area that includes expanded service, a downtown transit mall, bus shelters, park and ride lots, and a fareless square in the downtown area. Portland has also established exclusive buslanes and built several park-and-ride facilities to improve public transit.

c. An areawide carpool program has been offered by Tri-Met since 1974. This program encourages shared-ride as opposed to single occupant vehicle travel. The program includes a matching service and various incentives, such as reduced or free parking in the downtown area.

d. A light rail line linking downtown Portland to Gresham (East side) has been operating for years.

e. Traffic flow improvements have been made throughout Portland in recent years. Some of these improvements include the installation of computerized traffic signal and the banning or limiting of on-street parking on several streets in downtown Portland.

f. The establishment of bicycle lanes and other programs to encourage bicycling as a trip option.

g. A downtown parking and circulation program that includes a maximum number of parking spaces allowed in the downtown area, a program for improving roads to divert traffic away from downtown, a program to encourage the use of "employee flex-time" by downtown business, etc.

h. Federal Motor Vehicle Emission Control Program

In addition to the control measures listed in the carbon monoxide attainment plan and summarized above, Portland undertook several projects that were implemented after the original 1979 submittal which had a beneficial impact on air quality. These projects included:

a. More transit improvements, especially the establishment of a new route grid system for Tri-Met that increased ridership by up to 25,000 passengers per day within 3 years of its implementation;

b. More bus purchase and service improvements aimed at doubling the transit capacity of 1982;

c. Transit fare incentives, including monthly bus passes at a reduced rate;

d. More ramp metering;

e. More traffic flow improvements, especially the connection of traffic signals in the Coliseum area and on Hall Blvd. by TV Hwy. and Denny Road, construction of the Tualatin Bypass, and establishment of one-way couplets in residential areas in NW Portland;

f. McLoughlin Corridor Rideshare program;

g. Employer bicycle planning project similar to rideshare programs already in place;

h. State legislation to encourage ridesharing;

i. Shop and Ride program;

j. City of Portland Bicycle Parking program;

k. An employee flexible working hours program;

l. Traffic signal system project that more efficiently coordinated and interconnected traffic signals throughout Portland;

m. Downtown Portland air quality plan under the Carbon Monoxide attainment plan, including:

1. Maintenance of a downtown parking inventory and the establishment of a maximum parking ratio,
2. Measures to improve downtown traffic circulation (i.e., improved road connections, limiting access new off-street parking facilities, etc.)
3. Measures to encourage the use of employee flex-time,
4. Measures to encourage the use of bicycling,
5. Measures to control on-street parking,
6. Measures to encourage ridesharing, and
7. Measures to improve transit;

n. City of Portland employee travel project that included a reduction in work-related travel; and

o. Construction of a light rail line running from the Beaverton-Hillsboro area into downtown, to be completed in the Spring of 1997.

4.51.4.1.2 1990 Clean Air Act Requirements and Status

The 1990 Clean Air Act Amendments place additional requirements on moderate CO nonattainment areas. Following are the DEQ submittal dates and EPA approval dates of submissions required by section 110 and Part D of the 1990 Clean Air Act Amendments:

a. *1990 Emissions inventory, to be revised every three years thereafter until attainment.* On November 16, 1992, DEQ submitted to EPA a comprehensive 1990 carbon monoxide emission inventory for the Portland nonattainment area. EPA provided comments on the submittal in March, 1993. The 1990 emission inventory has been revised in response to EPA comments, and is being

resubmitted together with this redesignation request (see Appendix D2-4-1). The 1991 (Appendix D2-4-2) and projected 1993 emission inventories (Appendix D2-4-3, which includes all projection years) in this Redesignation Request/Maintenance Plan submittal will be used to meet the periodic inventory requirement.

b. *Oxygenated gasoline.* On November 16, 1992, the DEQ submitted to EPA an oxygenated gasoline program for the Portland area. The regulations were effective November 1, 1992. The program mandated the use of gasoline with no less than 2.7 percent oxygen content in the winter months.

Because Portland was classified with a design value for CO above 9.5 ppm, Portland was required to establish a wintertime oxygenated fuel program. The DEQ adopted rules (OAR 340-022-0440 through 022-0640) which meet this requirement. These regulations require that all gasoline suppliers in the Portland metropolitan area register with the DEQ and pay a registration fee based on the volume of fuel sold by the supplier. These regulations further require that the average blend of any gasoline sold by the supplier should be at least 2.7 percent oxygen by weight and in no case be less than 2.0 percent oxygen content by weight (actual) from the months of November 1 through February 29. The FCAA allows the elimination of this program upon redesignation to attainment status. Section 175A(d) requires, however, that all control measures contained in the SIP prior to redesignation be included as contingency measures in the Maintenance Plan.

c. *Vehicle Inspection and Maintenance Program.* DEQ submitted a technical change to the vehicle inspection and maintenance program on November 15, 1993 and committed to several administrative revisions at that time. The technical change was the replacement of all vehicle testing equipment with computerized equipment. EPA approved this revision on January 29, 1994. On June 13, 1994, the DEQ submitted several administrative revisions to the program. These revisions to Volume 2, Section 5.4 of the SIP included:

1. Specification of how vehicles registered in an I/M area but temporarily operated outside an I/M area were to be tested;
2. Requirements and procedures for inspector training;
3. Testing equipment specifications, procedures, quality assurance, and auditing requirements;
4. Requirements for the testing of fleet vehicles registered outside an I/M area but operating within an I/M area; and
5. A committal to monitor compliance with the I/M program through parking lot registration surveys.

These changes were approved by EPA on September 9, 1994.

d. *Transportation Conformity Requirements.* Section 176(c) of the Clean Air Act requires states to revise the SIPs to establish criteria and procedures for demonstrating transportation plan conformity to a SIP. On April 14, 1995, DEQ submitted to EPA a revision to the Oregon SIP establishing transportation conformity requirements for Oregon (OAR 340-020-0710 through 340-020-1080). General Conformity requirements (OAR 340-020-1500 through 340-020-1600) were submitted on September 27, 1995. EPA approved the transportation conformity rules as a SIP revision on May 16, 1996.

e. *New Source Review Rules (NSR) for "major sources"* On November 16, 1992, DEQ submitted revisions to the New Source Review permit program. These revisions included a requirement that offsets come from contemporaneous, actual emission reductions under OAR 340-028-1970(5), and other changes.

DEQ expects these NSR revisions to be approved by EPA before, or concurrent with, this redesignation request/maintenance plan, although approval is not required prior to redesignation according to EPA guidance. DEQ will also submit further revisions to establish NSR requirements for the Portland area effective upon redesignation (see Control Measures in Section 4.51.3.2.3, Maintenance Plan Commitments in Section 4.51.4.4, and New Source Review Program Changes in Appendix 2-11).

f. *Contingency measures.* These measures were required to be established in the event that the Portland area did not meet attainment by the end of 1995. Contingency measures were submitted to EPA on November 15, 1993. DEQ expects approval before, or concurrent with approval of this maintenance plan.

4.51.4.2 Monitoring Network and Commitments

The DEQ is responsible for the operation of the permanent ambient CO monitors in the Portland area. The DEQ oversees the quality control and quality assurance program for the CO data.

The DEQ will continue to comply with the air monitoring requirements of Title III, Section 319, of the FCAA. The monitoring sites will also continue to be operated in compliance with EPA monitoring guidelines set forth in 40 CFR Part 58, "Ambient Air Quality Surveillance," and Appendices A through G of Part 58. In addition, DEQ will continue to comply with the "Ambient Air Quality Monitoring Program" specified in Volume 2, Section 6 of the SIP. Further, DEQ will continue to operate and maintain the network of State and Local Air Monitoring Stations (SLAMS) and National Air Monitoring Stations (NAMS) in

accordance with the terms of the State/EPA Agreement (SEA)

The DEQ also periodically conducts saturation studies to verify that the existing monitors are recording the highest CO concentrations in the area. The DEQ commits to doing a saturation study in the Portland area every four years, in order to validate the existing monitoring network. The saturation studies will provide the same type of information that was presented in the 1993/1994 saturation study report.

4.51.4.3 Verification of Continued Attainment

The DEQ will analyze on an annual basis the CO air quality monitoring data to verify continued attainment of the CO standard, in accordance with 40 CFR Part 50 and EPA's Redesignation guidance. This data, along with the previous year data, will provide the necessary information for determining whether the region continues to attain the NAAQS.

The DEQ will also prepare an updated emission inventory summary for 1996, 1999, 2001, 2003 and 2007. These updates will be submitted to EPA Region 10 within 12 months following the end of the periodic emission inventory calendar year. In preparing the updates, DEQ will review the emission factors, growth factors, rule effectiveness and penetration factors, and other significant assumptions used to prepare the emission forecast. DEQ will confirm these factors and/or adjust them where more accurate information is available. Any new emission sources will be included in the update.

DEQ will compare the updated emission summary to the emission forecast and the attainment inventory in Tables 4.51.3.1 through 4.51.3.3, and evaluate any changes that have occurred. If there have been significant changes, DEQ will, in consultation with EPA Region 10, determine if a more extensive periodic emission inventory is necessary. If a more extensive inventory is necessary, it will be submitted to EPA within 23 months after the end of the reporting year.

See Commitments in Section 4.51.4.4 "Maintenance Plan Commitments".

4.51.4.4 Maintenance Plan Commitments

As part of the CO Maintenance Plan, DEQ commits to do the following:

The DEQ will continue to coordinate with the Southwest Washington Air Pollution Control Authority (Vancouver) on CO air quality interstate issues even though the two areas have been officially designated as two separate areas.

DEQ will submit rules to implement the enhanced vehicle inspection program, as described

in Appendix D2-9, before EPA approval of the maintenance plan.

DEQ will submit revisions to the New Source Review regulations, as described in Appendix D2-11, before EPA approval of the maintenance plan.

DEQ will prepare periodic emission inventory updates for 1995, 1997, 2001, 2003, and 2007. The emission inventory updates will be submitted to EPA within 12 months following the end of the periodic emission inventory calendar year as specified in Section 4.51.4.3.

DEQ will submit a backup emission reduction measure as a revision to the SIP if the federal Low Emission Vehicle (fedLEV) is delayed beyond 2001. The measure will be proposed for adoption by the EQC by November 1, 1999.

DEQ will prepare reports on activity in the industrial growth allowance program for the periods 1996-1997, 1998-2001, 2002-2003, and 2004-2007. These reports will be submitted to EPA within 12 months following the end of the period as specified in Section 4.51.3.2.3.

DEQ will maintain documentation of approved TCM substitutions as specified in Appendix D2-10.

DEQ will develop the next ten year maintenance plan (2007-2017) in coordination/ conjunction with Metro. This plan will be submitted to EPA by December 31, 2004.

Carbon Monoxide Maintenance Plan
and Redesignation Request

for the

Portland Metro Area

APPENDIX D2:
CARBON MONOXIDE MAINTENANCE PLAN APPENDICES

(Appendices D2-1 through D2-14 incorporated by reference)

(Appendices are available upon request)

State Implementation Plan Appendices
Volume 3

ATTACHMENT A2

Miscellaneous supporting rule amendments

A2-1 State Implementation Plan (OAR 340-020-0047)

A2-2 Motor Vehicle Fuel Specifications for Oxygenated Gasoline, Purpose and General Requirements (OAR 340-022-0460)

A2-3 Maintenance Area Designation (OAR 340-031-0520 and 340-031-0530)

Attachment A2-1

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Portland Carbon Monoxide Maintenance Plan

"State of Oregon Clean Air Act Implementation Plan"
340-020-0047

(1) This implementation plan, consisting of Volumes 2 and 3 of the State of Oregon Air Quality Control Program, contains control strategies, rules and standards prepared by the Department of Environmental Quality and is adopted as the state implementation plan (SIP) of the State of Oregon pursuant to the federal **Clean Air Act**, Public Law 88-206 as last amended by Public Law 101-549.

(2) Except as provided in section (3) of this rule, revisions to the SIP shall be made pursuant to the Commission's rule-making procedures in Division 11 of this Chapter and any other requirements contained in the SIP and shall be submitted to the United States Environmental Protection Agency for approval.

(3) Notwithstanding any other requirement contained in the SIP, the Department is authorized to submit to the Environmental Protection Agency any permit condition implementing a rule that is part of the federally-approved SIP as a source-specific SIP revision after the Department has complied with the public hearings provisions of 40 **CFR 51.102 (July 1, 1992)**.

[**NOTE:** Revisions to the State of Oregon Clean Air Act Implementation Plan become federally enforceable upon approval by the United States Environmental Protection Agency. If any provision of the federally approved Implementation Plan conflicts with any provision adopted by the Commission, the Department shall enforce the more stringent provision.]

[**Publications:** The publication(s) referred to or incorporated by reference in this rule are available from the office of the Department of Environmental Quality.]

Stat. Auth.: ORS Ch. 468 & 468A
Hist.: DEQ 35, f. 2-3-72, ef. 2-15-72; DEQ 54, f. 6-21-73, ef. 7-1-73; DEQ 19-1979, f. & ef. 6-25-79; DEQ 21-1979, f. & ef. 7-2-79; DEQ 22-1980, f. & ef. 9-26-80; DEQ 11-1981, f. & ef. 3-26-81; DEQ 14-1982, f. & ef. 7-21-82; DEQ 21-1982, f. & ef. 10-27-82; DEQ 1-1983, f. & ef. 1-21-83; DEQ 6-1983, f. & ef. 4-18-83; DEQ 18-1984, f. & ef. 10-16-84; DEQ 25-1984, f. & ef. 11-27-84; DEQ 3-1985, f. & ef. 2-1-85; DEQ 12-1985, f. & ef. 9-30-85; DEQ 5-1986, f. & ef. 2-21-86; DEQ 10-1986, f. & ef. 5-9-86; DEQ 20-1986, f. & ef. 11-7-86; DEQ 21-1986, f. & ef. 11-7-86; DEQ 4-1987, f. & ef. 3-2-87; DEQ 5-1987, f. & ef. 3-2-87; DEQ 8-1987, f. & ef. 4-23-87; DEQ 21-1987, f. & ef. 12-16-87; DEQ 31-1988, f. 12-20-88, cert. ef. 12-23-88; DEQ 2-1991, f. & cert. ef. 2-14-91; DEQ 19-1991, f. & cert. ef. 11-13-91; DEQ 20-1991, f. & cert. ef. 11-13-91; DEQ 21-1991, f. & cert. ef. 11-13-91; DEQ 22-1991, f. & cert. ef. 11-13-1991; DEQ 23-1991, f. & cert. ef. 11-13-91; DEQ 24-1991, f. & cert. ef. 11-13-91; DEQ 25-1991, f. & cert. ef. 11-13-91; DEQ 1-1992,f. & cert. ef. 2-4-92; DEQ 3-1992, f. & cert. ef. 2-4-92; DEQ 7-1992, f. & cert. ef. 3-30-92; DEQ 19-1992, f. & cert. ef. 8-11-92; DEQ 20-1992, f. & cert. ef. 8-11-92; DEQ 25-1992, f. 10-30-92, cert. ef. 11-1-92; DEQ 26-1992, f. & cert. ef. 11-2-92; DEQ 27-1992, f. & cert. ef. 11-12-92; DEQ 4-1993, f. & cert. ef. 3-10-93; DEQ 8-1993, f. & cert. ef. 5-11-93; DEQ 12-1993, f. & ef. 9-24-93; DEQ 13-1993, f. & cert. ef. 9-24-93; DEQ 15-1993, f. & cert. ef. 11-4-93; DEQ 16-1993, f. & cert. ef. 11-4-93; DEQ 19-1993, f. & cert. ef. 11-4-93; DEQ 1-1994, f. & cert. ef. 1-3-94; DEQ 5-1994, f. & ef. 3-21-94; DEQ 14-1994, f. & ef. 5-31-94; DEQ 15-1994, f. 6-8-94 & ef. 7-1-94; DEQ 22-1994, f. & ef. 10-14-94; DEQ 24-1994, f. & ef. 10-28-94; DEQ 25-1994, f. & ef. 11-2-94; DEQ 32-1994, f. & ef. 12-22-94; DEQ 1-1995, f. 1-10-95 & ef. 5-1-95;

DEQ 4-1995, f. & ef. 2-17-95; DEQ 7-1995, f. & ef. 3-19-95; DEQ 9-1995, f. & ef. 5-1-95; DEQ 10-1995, f. & ef. 5-1-95; DEQ 12-1995, f. & ef. 5-25-95; DEQ 13-1995, f. & ef. 5-25-95; DEQ 14-1995, f. & ef. 5-25-95; DEQ 17-1995, f. & ef. 7-12-95; DEQ 22-1995, f. & ef. 10-6-95; DEQ 24-1995, f. & ef. 10-11-95

Attachment A2-2

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Portland Carbon Monoxide Maintenance Plan

Motor Vehicle Fuel Specifications for Oxygenated Gasoline

Purpose and General Requirements
340-022-0460

(1) Pursuant to ORS 468A.420, OAR 340-022-0450 through OAR 340-022-0650 apply to:
  (a) a person who refines, distributes, blends, supplies, sells, offers for sale, or otherwise markets gasoline for use in motor vehicles and,
  (b) Permitted Control area responsible parties who own gasoline being imported or being sold at or from terminals who market gasoline.

(2) Except as provided in OAR 340-022-0640, the requirements of OAR 340-022-0460 through OAR 340-022-0650 apply only from November 1 to February 29, and only within a control area listed in OAR 340-022-0470.

(3) The labeling requirements of OAR 340-022-0640 apply only within a control area during the control period.

NOTE: This applies only to the Department rules and a dispenser is still responsible for complying with the disclosure requirements of ORS 646.915.

(4) To reduce carbon monoxide air pollution from motor vehicles in a control area, OAR 340-022-0460 through OAR 340-022-0650 requires:
  (a) the dispensing into gasoline powered motor vehicles of an oxygenated gasoline with an oxygen content that meets the requirements of OAR 340-022-0503 or OAR 340-022-0507, and OAR 340-022-0510, as applicable;
  (b) that a dispenser where an oxygenated gasoline is dispensed be labeled as required by OAR 340-022-0640;
  (c) that oxygenated gasoline be blended as required by OAR 340-022-0520; and
  (d) a person who refines, distributes, blends, supplies, or sells an oxygenated gasoline to meet the recordkeeping and reporting requirements of OAR 340-022-0460 through OAR 340-022-0650.

(5) Nothing in OAR 340-022-0460 through OAR 340-022-0650 precludes a person from using, refining, distributing, blending, supplying, selling, or otherwise marketing fuel that meets the requirements of OAR 340-022-0460 through OAR 340-022-0650:
  (a) between March 1 and October 31 in a control area; or
  (b) at any time in any other location statewide.

(6) Nothing in OAR 340-022-0460 through OAR 340-022-0650 precludes a person from using, refining, distributing, blending, supplying, selling, or otherwise marketing nonoxygenated fuel:

(a) Between November 1 and February 29 outside of control areas
(b) At dispensing facilities where motor vehicles are not fueled.

(7) Except as provided in OAR 340-022-0570, the following dispensing sites are exempt from OAR 340-022-0460 through OAR 340-022-0650 and may dispense nonoxygenated gasoline in control areas during control periods if fuel will not be used in motor vehicles, including but not limited to: airports, marinas, saw shops, farms dispensing to farm equipment not used as a motor vehicle, and other facilities not dispensing fuel into motor vehicles.

(8) Portland Control Area:
(a) Notwithstanding OAR 340-022-0470(1), the requirements in OAR 340-022-0440 through 022-0640 will cease to apply in the control area encompassing Clackamas, Multnomah, Washington, and Yamhill counties (the Portland Control Area) on and after March 1, 1998.
(b) Should a validated violation of the carbon monoxide standard occur within the Portland Carbon Monoxide Maintenance Area at any time throughout the duration of the Portland Carbon Monoxide Maintenance Plan, the requirements in OAR 340-022-0440 through 022-0640 will be reinstated in the Portland Control Area beginning in the winter season following a violation, but no sooner than six (6) months following that violation.
(c) In the event of a validated violation, the reinstatement of the oxygenated fuel program in the Portland Control Area will be automatic, and no further rulemaking will be required.

Stat. Auth.: ORS Ch. 468A
Hist.: DEQ 25-1992, f. 10-30-92, ef. 11-1-92; DEQ 4-1993, f. & cert. ef. 3-10-93; DEQ 15-1993, f & cert. ef. 11-4-93

[NOTE: This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-020-0047.]

Attachment A2-3

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Portland Carbon Monoxide Maintenance Plan

The Air Quality Control Regions and Nonattainment and Maintenance Areas of Oregon

Nonattainment Areas

340-031-0520 The following areas are designated as Nonattainment Areas:

(1) Carbon Monoxide Nonattainment Areas:

(a) The Grants Pass Nonattainment Area for Carbon Monoxide is the Grants Pass CBD as defined in OAR 340-031-0500.

(b) The Klamath Falls Nonattainment Area for Carbon Monoxide is the Klamath Falls UGB as defined in OAR 340-031-0500.

(c) The Medford Nonattainment Area for Carbon Monoxide is the Medford-Ashland UGB as defined in OAR 340-031-0500.

(d) The Salem Nonattainment Area for Carbon Monoxide is the Salem Area Transportation Study as defined in OAR 340-031-0500.

(2) Ozone Nonattainment Areas:(a) The Oregon portion of the Portland-Vancouver Interstate Nonattainment Area for Ozone is the Portland AQMA as defined in OAR 340-031-0500.

(b) The Salem Nonattainment Area for Ozone is the Salem Area Transportation Study as defined in OAR 340-031-0500.

(3) PM_{10} Nonattainment Areas:

(a) The Eugene Nonattainment Area for PM_{10} is the Eugene UGA as defined in OAR 340-031-0500.

(b) The Grants Pass Nonattainment Area for PM_{10} is the Grants Pass UGB as defined in OAR 340-031-0500.

(c) The Klamath Falls Nonattainment Area for PM_{10} is the Klamath Falls UGB as defined in OAR 340-031-0500.

(d) The LaGrande Nonattainment Area for PM_{10} is the LaGrande UGB as defined in OAR 340-031-0500.

(e) The Lakeview Nonattainment Area for PM_{10} is the Lakeview UGB as defined in OAR 340-031-0500.

(f) The Medford Nonattainment Area for PM_{10} is the Medford AQMA as defined in OAR 340-031-0500.

(g) The Oakridge Nonattainment Area for PM_{10} is the Oakridge UGB as defined in OAR 340-031-0500.

(4) Total Suspended Particulate (TSP) Nonattainment Areas:

(a) The Eugene Nonattainment Area for TSP is the Eugene-Springfield AQMA as defined in OAR 340-031-0500.

(b) The Medford Nonattainment Area for TSP is the Medford-Ashland AQMA as defined in OAR 340-031-0500.

(c) The Portland Nonattainment Area for TSP includes areas within the Portland AQMA as set out and defined in OAR 340-031-0500.

NOTE: Total Suspended Particulate is now a state-enforceable standard only. The US EPA now enforces PM_{10} in the place of TSP. The Department has decided to retain TSP as an enforceable standard.

Stat. Auth.: ORS Ch. 468 & 468A
Hist.: DEQ 14-1995, f. & ef. 5-25-95

[**NOTE:** This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-020-0047.]

Maintenance Areas

340-031-0530 The following areas are designated as maintenance areas:

(1) Carbon Monoxide Maintenance Areas:
  (a) The Eugene Maintenance Area for Carbon Monoxide is the Eugene-Springfield AQMA as defined in OAR 340-031-0500.
  (b) The Portland Maintenance Area for Carbon Monoxide is the Portland Metropolitan Service District, as referenced in OAR 340-031-0500.

(2) Ozone Maintenance Areas:
  (a) The Medford Maintenance Area for Ozone is the Medford-Ashland AQMA as defined in OAR 340-031-0500.

(3) PM_{10} Maintenance Areas:
There are no areas in the state that have been designated by the EQC as PM_{10} Maintenance Areas.

(4) Total Suspended Particulates (TSP) Maintenance Areas:
There are no areas in the state that have been designated by the EQC as TSP Maintenance Areas.

Stat. Auth.: ORS Ch. 468 & 468A
Hist.: DEQ 14-1995, f. & ef. 5-25-95

[**NOTE:** This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-020-0047.]

Attachment B

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Portland Carbon Monoxide Maintenance Plan

Supporting Procedural Documentation

NOTICE OF PROPOSED RULEMAKING HEARING

Department of Environmental Quality

OAR Chapter: **340-020-0047, 340-018-0030, 340-022-0440, 340-024-0301, 340-030-0700 through -030-0750, 340-030-0800 through 1090, 340-030-1100 through 1200, 340-031-0520 through -031-0530**

DATE:	TIME:	LOCATION:
May 22, 1996	10:00 a.m.	Oregon Department of Environmental Quality Headquarters 811 SW Sixth Avenue, 3rd Floor (Room 3A) Portland (Question and answer session from 9:00 to 10:00)
May 22, 1996	7:00 p.m.	State Office Building, Room 140 800 NE Oregon Portland (Question and answer session from 6:00 to 7:00)
May 23, 1996	7:00 p.m.	City of Tigard Water Department Auditorium 8777 SW Burnham Street Tigard, Oregon (Question and answer session from 6:00 to 7:00)

HEARINGS OFFICER(s): A Professional Hearings Officer

STATUTORY AUTHORITY: or OTHER AUTHORITY: ORS 468.020, ORS 468A.035

STATUTES IMPLEMENTED: ORS 468.065, ORS 468A.310, ORS 468A.363, ORS 468.390, ORS 468A.405, ORS 468A.420

ADOPT: 340-030-0700 through -030-0750, 340-030-0800 through 1090, 340-030-1100 through 1200

AMEND: OAR 340-020-0047, OAR 340-018-0030, OAR 340-022-0460, OAR 340-24-0301, OAR 340-031-0520 through 340-031-0530

☑ This hearing notice is the initial notice given for this rulemaking action.

☑ Auxiliary aids for persons with disabilities are available upon advance request.

SUMMARY: The Department of Environmental Quality (DEQ) is proposing that the Environmental Quality Commission adopt plans to ensure that the Portland area

does not experience a recurrence of violations of the federal air quality standards for carbon monoxide and ozone. These plans and supporting rules, if adopted, will be submitted to the US Environmental Protection Agency (EPA) as revisions to the State Implementation Plan, which is a requirement of the Clean Air Act. If approved by EPA, the Portland area would be redesignated from a "nonattainment area" to an "attainment area" for carbon monoxide and ozone. The plans and supporting rules demonstrate how the Portland area will maintain compliance with the federal ambient air standards for carbon monoxide and ozone over the next ten years despite expected unprecedented growth in the area. Existing attainment plans for carbon monoxide and ozone, which will be replaced by these maintenance plans, are proposed to be repealed.

Both the carbon monoxide and ozone maintenance plans include an emission inventory, an enhanced motor vehicle inspection program, a revision to the motor vehicle inspection boundary, and transportation control measures to be implemented by Metro. Additionally, the carbon monoxide maintenance plan includes a parking management program for the Central City that will be implemented by the City of Portland. Comments are being solicited on options for continuing or repealing the current oxygenated fuel program under the carbon monoxide maintenance plan. The ozone maintenance plan includes an Employee Commute Options Program, a Voluntary Parking Ratio Program, an Industrial Emission Management Program, existing Rules for Auto Body Refinishing, Paints, and various Consumer Products, and existing Stage II Vapor Recovery Rules for gasoline service stations.

LAST DATE FOR COMMENT: May 24, 1996, 5:00 p.m.

AGENCY RULES COORDINATOR: Susan M. Greco, (503) 229-5213

AGENCY CONTACT FOR THIS PROPOSAL: Andy Ginsburg (Ozone Maintenance Plan and related rules) (503) 229-5581
Howard Harris (CO Maintenance Plan and related rules) (503) 229-6086

ADDRESS: 811 SW Sixth Avenue
Portland, Oregon 97204

TELEPHONE: 1-800-452-4011
(503) 229-5675 (FAX)

Interested persons may comment on the proposed rules orally or in writing at the hearing. Written comments will also be considered if received by the date indicated above.

Susan M. Greco
Signature

4/15/96
Date

Attachment B2

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Carbon Monoxide Maintenance Plan for the Portland Area

Fiscal and Economic Impact Statement

Introduction

- Statement of overall degree of economic impact

The Portland Carbon Monoxide Maintenance Plan consists of several different control strategies. These control strategies could have varying economic impacts, which are addressed below. The overall maintenance plan will have a beneficial economic impact on the Portland area because it removes impediments to growth and encourages more efficient transportation systems.

- Summary Chart

The following is a chart listing the various strategies in the carbon monoxide maintenance plan that will have a fiscal and/or economic impact on the Portland area. In addition to the listed strategies, the Portland CO plan is taking advantage of the Enhanced Vehicle Inspection and Maintenance Program being implemented as part of the Portland Ozone Maintenance Plan, which is being proposed simultaneously with the CO plan. The Portland Ozone Maintenance Plan discusses the impacts of the enhanced I/M program.

Control Strategy

(1) Oxygenated Fuels
(2) Parking Restrictions under the CCTMP
(3) Transportation Control Measures, including transit improvements, improvements to bicycling and pedestrian facilities, and the Metro 2040 Growth Concept
(4) CO Emission Budgets
(5) Automatically triggered contingency plan elements

General Public

(1) Oxygenated fuels

The estimated fiscal and economic impact on the general public of the elimination of the oxygenated fuel program in Portland varies widely depending on the group providing the estimate. The following charts summarize the cost estimates for the 1994/1995 oxygenated fuel season (based on 183,968,547 gallons of oxygenated gasoline sold for the season) provided by Western States Petroleum Association and by Northwest Bio-Products Coalition (representing suppliers of oxygenates). Continuation of the program would maintain the current economic impacts. Elimination of the program would reverse these estimated fiscal and economic impacts.

Western States Petroleum Association

	Annual Cost	*Equivalent Dollars per gallon*
Fuel Economy Loss (1.9% average, based on EPA figure)	$4,404,200	N/A
Wholesale Cost Increase (based on $1.28 per gallon cost for ethanol)	$2,955,800	$0.016, based on regular unleaded grade gasoline
Federal Subsidy ($0.042 per gallon)	$7,750,000	N/A

Northwest Bio-Products Coalition

	Annual Cost	*Equivalent Dollars per gallon*
Fuel Economy Loss (1.9%, based on EPA figure)	Assert that fuel economy loss is more than offset by lower gasoline prices in winter	N/A
Producer Cost (based on $1.25 per gallon cost for ethanol)		
(a) Producer who does not modify subgrade	$380,815	$0.003, average cost for all grades ($0.014 for regular unleaded grade only)
(b) Producer who modifies subgrade	-$399,312	-$0.007 (represents a savings)
Federal Renewable Alcohol Excise Tax Exemption	$0.0 [see next column]	$0.0 [net savings to the federal treasury as indicated in Report 95-273R (9/14/95) from Gen. Accounting Office]

The Department believes that the cost savings of over $4 million per year to motorists from fuel economy improvements is real and is independent from the fact that gas prices are lower in the winter because of lower demand and greater supply.

The Department believes the cost of oxygenated fuel production is better reflected by wholesale prices than by producer (pipeline) prices because wholesale prices take into account the local blending costs and other related costs. The following data results in an estimated cost of slightly over $0.01 per gallon, or about $2.7 million per year. There appear to be some oxygenated fuel suppliers who use a lower octane subgrade fuel (lower cost gasoline to which the oxygenate is added) to take advantage of the octane enhancement provided by ethanol. This practice could reduce the estimated cost. At least some of the effects of sub-blending are reflected in the clear gas price in the calculation below.

1) Ethanol at 7.8 percent of fuel product (volume of ethanol required for 2.7 percent oxygen content)
2) Ethanol cost = $1.35/gallon*
3) Clear gas = $0.6361/gallon**
4) Federal tax credit for ethanol = $0.042/gal

Oxygenated fuel cost = ($1.35/gal) (0.078) + ($0.6361/gal) (0.922) = $0.692/gal

Differential cost = $0.692/gal - $0.636/gal = $0.056/gal

Differential Cost after Tax Credit = $0.056/gal - $0.042/gal = $0.014/gal

* Upper end of ethanol price is based on individual communications with industry for the 1995/1996 winter season.

** Based on Portland Branded prices for clear gas (without oxygenate) for November and December, 1995, Oil Price Information Service

This calculated maximum cost differential is slightly higher than the average wholesale price differential of $0.012 per gallon, based on Portland Branded prices for both clear and oxygenated gasoline for November/December 1995. A price differential of $0.012 would lead to a cost of $2.3 million per year.

The Department believes the impact of the federal tax credit for ethanol most likely would not trickle down to Oregon or Oregon motorists. Therefore, the Department characterizes the tax credit as having no fiscal or economic impact in Oregon.

In summary, the Department believes there is a cost to Oregon motorists and to the petroleum manufacturers from the oxygenated fuel program. The Department believes the best estimate of the cost, based on the 1995/1996 season, is up to $7.1 million per year ($4.4 million fuel economy loss plus $2.7 million production cost) depending primarily on the price of oxygenate relative to normal gasoline. The annual cost could be lower than $7.1 million because of price competition at the retail level and sub-blending not reflected in the above calculation.

(2) Parking Restrictions under the CCTMP

The parking restrictions under the CCTMP have been imposed by the City of Portland and will have a fiscal impact independently of the Portland Carbon Monoxide Maintenance Plan. The precise fiscal impacts associated with the CCTMP parking requirements are difficult to determine at this time, because they are linked to future growth and development patterns. However, once EPA approves the maintenance plan, parking restrictions will be eased in some downtown areas and more parking spaces will be allowed. This increase in supply may lead to a decrease in cost to the consumer.

(3) Transportation Control Measures

Transportation Control Measures (TCMs) adopted by Metro include the Metro 2040 Growth Concept, significant transit system expansion and bicycle and pedestrian facility improvements. In general, the TCMs are designed to reduce transportation costs by encouraging compact development, increasing transit availability, and providing additional walking and bicycling opportunities through mixed-use development and improved facilities. These measures should reduce congestion and reduce transportation costs associated with automobile use. Land values could be positively or negatively affected depending on location (i.e., whether the land lies inside or outside Metro's Urban Growth Boundary) and other factors.

(4) CO Emissions Budgets

CO emissions budgets should have no direct impact on the general public. See impacts on local governments for the discussion of possible CO emissions budgets impacts.

(5) Automatically triggered contingency plan elements

If a violation of the carbon monoxide standard occurs in the downtown Portland area, the parking lid would be reinstated. This could make parking more expensive for consumers.

Small Business

(1) Oxygenated fuels

It is possible that some terminals that dispensing oxygenated fuels and some of the distributors of oxygenated fuels qualify as small businesses. Those terminals and distributors that provide oxygenated fuel solely to the Portland area are subject to permit fees. Currently those fees are $2,500 per year for terminals and $250 per year for distributors.

Terminals also have annual maintenance costs. These costs could be in the same range as those noted for large businesses.

(2) Parking Restrictions under the CCTMP

See Impacts on Large Business, below.

(3) Transportation Control Measures

Transportation Control Measures (TCMs) adopted by Metro include the Metro 2040 Growth Concept, significant transit system expansion and bicycle and pedestrian facility improvements. The TCMs should have a positive economic effect by improving customer and employee access and reducing delivery times. In general, the TCMs are designed to reduce transportation costs by encouraging compact development, increasing transit availability, and providing additional walking and bicycling opportunities through mixed-use development and improved facilities. These measures should reduce congestion and reduce transportation costs associated with automobile use. Because the transit growth rates are based on existing revenue sources, the transit system expansion identified in the maintenance plan should not result in an increase in the business transit tax rate. Land values could be positively or negatively affected depending on location and other factors. The land-use changes may also provide innovative siting opportunities, such as for mixed-use developments.

(4) CO Emission Budgets

CO emissions budgets should have no direct impact on small businesses. See impacts on local governments for the discussion of possible CO emissions budgets impacts.

(5) Automatically triggered contingency plan elements

Contingency measures could include a reinstatement of the downtown parking lid, which could harm the accessibility of some small businesses The contingency plan also includes reinstatement of current control requirements for major new and modified emission sources (i.e., LAER and offsets), which tend to be very expensive.

Large Business

(1) Oxygenated fuels

Some of the terminals dispensing oxygenated fuels and some of the distributors of oxygenated fuels may be large businesses. Those terminals and distributors that provide oxygenated fuel solely to the Portland area are subject to permit fees. Currently those fees are $2,500 per year for terminals and $250 per year for distributors.

There are also annual maintenance costs for terminals. Based on industry contact, these costs could range from $5,000 to $10,000 per year.

Eliminating the oxygenated fuel program in the Portland area would negatively impact the ethanol industry by reducing overall revenues. Maintaining the oxygenated fuel program negatively impacts the petroleum industry because it reduces petroleum industry revenues during the control period.

(2) Parking Restrictions under the CCTMP

The precise fiscal impacts associated with the CCTMP parking requirements are difficult to determine at this time since they are linked to future growth and development patterns. Prior to adoption of the CCTMP, each increased parking space in downtown Portland required parking review by the City of Portland and parking offsets. The fee for City of Portland parking review is $2500; parking offsets vary in cost. Once EPA approves the CO Maintenance Plan , the restrictions on downtown parking will be eased by allowing for some new parking that can be constructed without parking review or offsets. However, the CCTMP regulates parking in some areas, such as the Lloyd District, where previously no maximums existed. If a developer proposes to add more than 60 new parking spaces in these areas, parking review is now required.

(3) Transportation Control Measures

The economic impact of Metro's Transportation Control Measures on large business would be the same as the impact on small business.

(4) CO Emissions Budgets

CO emissions budgets should have no direct impact on large businesses. See impacts on local governments for the discussion of possible CO emissions budgets impacts.

(5) Automatically triggered contingency plan elements

The economic impact of the contingency plan on large business would be the same as the impact on small business.

Local Governments

(1) Oxygenated fuels

There should be no impact on local governments, except for local government motor vehicle fleets in the Portland area. The impacts for fleets are the same as they would be for the general public.

(2) Parking Restrictions under the CCTMP

See Impacts on General Public, above.

(3) Transportation Control Measures

The maintenance plan identifies Transportation Control Measures (TCMs) that will reduce emissions from motor vehicle use. The measures included in the plan are from the financially constrained transportation network adopted by Metro. Metro has determined that these projects can be funded based on historical and committed sources of funding.

With or without the carbon monoxide maintenance plan, Metro, Tri-Met and local governments intend to implement the TCMs. However, by including the TCMs in the maintenance plan, Metro, Tri-Met and local governments will be required to give them priority funding and implement them in a timely manner. This could mean that funding may not be available for other transportation projects if revenues are less than projected.

The maintenance plan includes a TCM substitution provision. This allows Metro to change the TCMs that will be implemented if regional priorities change, provided that the substituted measures achieve the same emission reduction and public notice provisions are met. Depending on the measures selected, TCM substitution could decrease or increase the cost to local governments.

(4) CO Emissions Budgets

Emissions budgets establish a cap on emissions which cannot be exceeded by predicted motor vehicle emissions. There should be no direct economic impact on local governments because of the implementation of carbon monoxide emissions budgets. However, if actual

emissions were to exceed budgeted emissions, federal funding for transportation projects throughout the region would be threatened.

(5) Automatically triggered contingency plan elements

There should be no direct economic impact on local governments from the automatically triggered contingency plan elements.

State Agencies

- DEQ

(1) Oxygenated fuels

- FTE's

The Department currently has approximately 1.7 FTE statewide working in the oxygenated fuel program. Approximately 0.5 to 1.0 FTE are in the Portland area. If the oxygenated fuel program were terminated in the Portland area, the FTE requirement for the oxygenated fuel program would fall to approximately 1.0 FTE. However, if the contingency measures are triggered, the need for that 0.7 FTE will return.

- Revenues

In 1995, the Department imposed a $2,500 fee on approximately 21 gasoline terminals and a $250 fee on approximately 48 gasoline distributors for the oxygenated fuel program, for a total of $64,500. If the oxygenated fuel program were terminated, those terminals and distributors that deal solely in the Portland area would no longer be subject to those fees. Revenues would fall accordingly.

- Expenses

In 1994, the Department amended the fees for the oxygenated fuel program to more closely reflect the cost of administering the program. A $100 fee on gasoline dispensing sites was dropped entirely, a $500 fee on gasoline distributors was dropped to $250, and a $5,700 fee on gasoline terminals was dropped to $2,500.

(2) Parking Restrictions under the CCTMP

DEQ will continue to consult with the City of Portland regarding parking restrictions and other incorporated elements of the CCTMP. This will be included as part of the existing interagency consultation process.

(3) Transportation Control Measures

DEQ is required by the transportation conformity rule to conduct interagency consultation with Metro regarding transportation system emissions. DEQ's oversight role in the funding and implementation of TCMs will be included as part of the existing interagency consultation process.

(4) CO EmissionsBudgets

The establishment of CO emissions budgets will require DEQ to evaluate and monitor data. DEQ will continue to evaluate and monitor data to determine whether actual emissions are in line with the emissions budget. This evaluation is expected to be conducted using existing Department resources.

(5) Contingency plan elements

If the contingency plan is triggered, DEQ must evaluate emission and monitoring data to determine if additional emission reduction strategies are needed. This evaluation is expected to be conducted using existing Department resources. Depending on the strategy selected, implementation costs for the Department could vary significantly. If additional contingency measures are recommended for adoption, the fiscal and economic impacts of selected measures would be thoroughly evaluated as part of that rulemaking.

- Other Agencies

(1) Oxygenated fuels

The Department of Agriculture currently has a grant from the state Environmental Board to inspect all gasoline stations at least once a year for, among other things, oxygenates. Because the Portland area comprises the bulk of the oxygenated fuel program, the work load on the Department of Agriculture should decrease if the program is eliminated in the Portland area, probably leading to a decrease in the amount of the grant.

(2) Parking Restrictions under the CCTMP

See Impacts on General Public, above.

(3) Transportation Control Measures

The Oregon Department of Transportation (ODOT), which funds and implements a number of major transportation programs in the Portland area, will be significantly affected by inclusion of the TCMs in the maintenance plan. ODOT's project schedule could be delayed and costs could be increased if the region does not provide priority funding to TCMs and implement them in a timely fashion. ODOT could be required to increase funding for TCMs or substitute measures due to conformity requirements.

(4) CO Emissions Budgets

The establishment of CO emissions budgets should have no impact on other state agencies. If actual emissions exceed budgeted emissions, other state agencies (particularly ODOT) may be at risk of losing federal funding for regional transportation projects.

(5) Automatically triggered contingency plan elements

There should be no economic impact on other state agencies for the automatically triggered contingency plan elements. Impacts from other elements that might be selected are highly variable. These impacts will be thoroughly evaluated if such rules are proposed in the future.

Assumptions

(1) Oxygenated fuels

The higher cost of manufacturing oxygenated fuel is being passed along to the consumer, rather than being absorbed by the producers and distributors.

Attachment B3

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Carbon Monoxide Maintenance Plan

Land Use Evaluation Statement

1. Explain the purpose of the proposed rules.

The Carbon Monoxide Maintenance Plan is designed to maintain compliance with the federal carbon monoxide standards in the Portland area for the next ten years. The federal Clean Air Act requires maintenance plans for areas seeking redesignation from nonattainment to attainment of national ambient air quality standards.

The Plan includes a number of emission reduction strategies, some of which affect land-use. In addition, the maintenance plan as a whole affects land use programs. These land use impacts are described in this document, under the following headings:

(1) Overall Maintenance Plan
(2) Transportation Control Measures, including transit improvements, improvements to bicycling and pedestrian facilities, and the Metro 2040 Growth Concept
(3) Oxygenated Fuels
(4) Automatically triggered contingency plan elements

2. Assessment of land use impacts and procedures for statewide goal compliance and local plan compatibility

Overall Maintenance Plan

The maintenance plan will make changes to the major New Source Review program. Existing requirements for costly Lowest Achievable Emission Rate (LAER) technology and emission offsets will be replaced by less costly Best Available Control Technology (BACT) and a growth allowance. These changes will make it easier for major new industry to locate in the Portland area and for existing industry to make major modifications to their facilities. The major New Source Review program is implemented through the Air Contaminant Discharge Permit (ACDP) program, which is an existing activity identified in the LCDC-approved DEQ State Agency Coordination (SAC) agreement. The existing procedure for statewide goal compliance and local plan compatibility adequately covers the changes to the New Source Review program. Under this procedure, the Department requires applicants for an ACDP to obtain a land use compatibility statement from the appropriate local jurisdiction before issuing an ACDP.

Metro Transportation Control Measures (TCMs)

The carbon monoxide Maintenance Plan relies on emission reductions from Transportation Control Measures (TCMs) adopted by Metro, including the Region 2040 growth concept and improvements in transit, bicycle and pedestrian facilities identified in the Regional Transportation Plan. The TCMs affect goal 2 (land use planning), goal 6 (Air, water and land resources quality), goal 11 (Public Facilities and Services) and goal 12 (Transportation). However, because Metro and local governments are primarily responsible for implementing the TCMs, they are not technically DEQ land use programs. Metro will ensure that the local comprehensive plans are compatible with the TCMs. DEQ, through the transportation conformity process, will ensure that Metro implements the TCMs or substitute measures that achieve equivalent emission reduction. One of the identified TCMs is the Central City Transportation Management Plan (CCTMP). The CCTMP replaces the "Approval of Parking and Traffic Circulation Plans, " which is a an existing activity identified in the LCDC approved DEQ State Agency Coordination (SAC) agreement.

Oxygenated Fuel Program

The oxygenated fuel program is not specifically referenced in the statewide planning goals, is not expected to have significant effects on resources, objectives or areas identified in the statewide planning goals, and is not expected to have significant effects on present or future land uses identified in acknowledged comprehensive plans. The program establishes specifications for gasoline during the winter months, and is designed to reduce carbon monoxide emissions from motor vehicles.

Contingency Plan

The contingency plan includes reinstatement of current New Source Review requirements for major new and modified emission sources. This affects an existing land use program as described above (under overall maintenance plan). Contingency measures could also include the reinstatement of a downtown parking lid and continuation of the oxygenated fuel program for the life of the maintenance plan. A reinstatement of the downtown parking lid could affect goal 2 (land use planning), goal 6 (Air, water and land resources quality), goal 11 (Public Facilities and Services) and goal 12 (Transportation). If the contingency plan is triggered, these measures would be evaluated for adoption by rule, and a land use evaluation of selected contingency measures would be included as part of that rulemaking.

Gregory A. Green
Division

Intergovernmental Coord.

4/9/96
Date

Attachment B4

Questions to be Answered to Reveal Potential Justification for Differing from Federal Requirements.

1. Are there federal requirements that are applicable to this situation? If so, exactly what are they?

Yes, there are federal requirements applicable to this situation. The Clean Air Act requires areas that wish to be redesignated from "nonattainment" to "attainment" status to submit a plan that will ensure that air quality standards are not violated for 10 years after Environmental Protection Agency (EPA) approval of the plan. These plans are called Maintenance Plans.

2. Are the applicable federal requirements performance based, technology based, or both with the most stringent controlling?

The requirements are performance based. The Carbon Monoxide Maintenance Plan must demonstrate that future emissions will not cause a violation of the carbon monoxide standard.. As long as the Portland area stays in attainment with the federal carbon monoxide standard, the Clean Air Act allows states to identify the specific emission reduction strategies that will be used to maintain attainment. Selected emission reductions strategies are required to meet EPA enforceability requirements.

3. Do the applicable federal requirements specifically address the issues that are of concern in Oregon? Was data or information that would reasonably reflect Oregon's concern and situation considered in the federal process that established the federal requirements?

The applicable federal requirements do not specifically address issues that are of concern to Oregon. The federal requirements are specifically designed to give each state the flexibility to adopt emission reduction strategies that are best suited for that area.

4. Will the proposed requirement improve the ability of the regulated community to comply in a more cost effective way by clarifying confusing or potentially conflicting requirements (within or cross-media), increasing certainty, or preventing or reducing the need for costly retrofit to meet more stringent requirements later?

The emission reduction strategies included in the Maintenance Plan will ensure that air quality standards are maintained and will allow EPA to redesignate the Portland area to attainment for carbon monoxide. Once the area is redesignated, the existing stringent control requirements for major new and expanding industry will be replaced with less stringent and less expensive control requirements. In addition, the Portland area will be shielded from potential "bump-up" to a more stringent nonattainment classification. Such a bump-up would result in the imposition of prescriptive federal control requirements.

5. Is there a timing issue which might justify changing the time frame for implementation of federal requirements?

There is no deadline in the Clean Air Act for submitting a maintenance plan. However, there are benefits to the local economy to act expediently in order to remove barriers to growth in the downtown Portland area and to growth of industrial sources.

6. Will the proposed requirement assist in establishing and maintaining a reasonable margin for accommodation of uncertainty and future growth?

Ambient levels of carbon monoxide are dependent on temperature and other weather conditions. The maintenance plan is designed to address expected weather fluctuations over a 10-year period, and includes surplus carbon monoxide emission reductions, resulting in about a ten percent safety factor even with the repeal of the oxygenated fuel program. The maintenance plan is also designed to accommodate projected growth. Emission forecasts are based on growth rates for all emission source categories, and a growth allowance is included for major new and modified industry. Further, the maintenance plan includes a contingency plan as required by the Clean Air Act to address unforeseen growth in emissions and other uncertainties..

7. Does the proposed requirement establish or maintain reasonable equity in the requirements for various sources? (level the playing field)

Motor vehicles are the predominant source of carbon monoxide emissions and, as such, are the primary target of the maintenance plan strategies.

8. Would others face increased costs if a more stringent rule is not enacted?

If a maintenance plan is not adopted and a future violation of the carbon monoxide standard occurs, a new attainment plan will be required including prescriptive federal control requirements. In addition, Metro could experience difficulty demonstrating conformity of their transportation plan with air quality plans. If conformity can not be demonstrated, Metro would not be eligible to receive federal transportation funds.

9. Does the proposed requirement include procedural requirements, reporting or monitoring requirements that are different from applicable federal requirements? If so, Why? What is the "compelling reason" for different procedural, reporting or monitoring requirements?

No. The procedural requirements in the maintenance plan are required to meet EPA enforceability requirements.

10. Is demonstrated technology available to comply with the proposed requirement?

Yes. Demonstrated technology exists to comply with all state emission reduction strategies in the maintenance plan.

11. Will the proposed requirement contribute to the prevention of pollution or address a potential problem and represent a more cost effective environmental gain?

The proposed maintenance plan is designed the prevent air pollution. In particular, transportation control measures (i.e. Metro's Region 2040 growth concept) are cost-effective ways to prevent air pollution. These measures generally increase the use of lower-cost transportation alternatives and reduce road congestion and maintenance costs. The maintenance plan will also reduce the cost of controls on new business that are interested in locating in the Portland area.

Attachment B5

State of Oregon
Department of Environmental Quality — Memorandum

Date: April 17, 1996

To: Interested and Affected Public

Subject: Rulemaking Proposal and Rulemaking Statements - Portland Area Carbon Monoxide Maintenance Plan

This memorandum contains information on a proposal by the Department of Environmental Quality (DEQ) to adopt a rule amendment to the Federal Clean Air Act, State Implementation Plan (SIP) to prevent the Portland area from experiencing a recurrence of non-compliance with the federal carbon monoxide (CO) standard. Pursuant to ORS 183.335, this memorandum also provides information about the Environmental Quality Commission's intended action to adopt a rule.

Carbon monoxide (CO) is a colorless, odorless, poisonous gas. It decreases the oxygen carrying capacity of the blood. High concentrations can severely impair the function of oxygen-dependent tissues, including the brain, heart and muscle. Prolonged exposure to even lower levels of CO can aggravate existing conditions in people with heart disease or circulatory disorders. Motor vehicles are the predominate source of CO in Oregon, but another significant source is wood stoves.

The Portland area exceeded the federal 8-hour CO standard of 9 parts per million approximately one day out of every three in the early 1970's. Maximum 8-hour CO levels were more than twice the standard level. CO control strategies, including the federal new car program, the DEQ vehicle inspection program, the City of Portland's downtown parking policy, and other measures have been successful in bringing the Portland area into attainment with the 8-hour CO standard. Area wide compliance was achieved in 1991. To ensure continued compliance and keep healthful air quality, some additional control measures, outlined on pages 5-8, are needed to combat the effects of a growing population and increased motor vehicle travel.

This proposal would allow the DEQ to submit a plan to the U.S. Environmental Protection Agency (EPA) that provides for maintenance of the CO health standard for ten years. The maintenance plan is designed to protect public health and will allow EPA to redesignate the area from nonattainment to attainment status. An EPA-approved maintenance plan will remove Clean Air Act impediments to industrial growth and will help shield the Portland area from Clean Air Act sanctions on federal transportation funds.

The Department has the statutory authority to address this issue under Oregon Revised Statutes (ORS) chapter 468A, which gives the Commission the power to adopt plans and programs to achieve and maintain federal and state ambient air quality health standards.

What's in this Package?

Attachments to this memorandum provide details on the proposal as follows:

Attachment A:	The official statement describing the fiscal and economic impact of the proposed rule. (required by ORS 183.335)
Attachment B:	A statement providing assurance that the proposed rules are consistent with statewide land use goals and compatible with local land use plans.
Attachment C:	Questions to be Answered to Reveal Potential Justification for Differing from Federal Requirements.
Attachment D:	The actual language of the proposed maintenance plan, associated rule amendments, and Emission Inventories for 1990 and 1991.

Hearing Process Details

You are invited to review these materials and present written or oral comments. Three public hearings will be held, one during the day and the other two during evening hours as follows:

Date: Wednesday, May 22, 1996
Time: 10:00 a.m. (Question and answer session from 9:00 a.m. to 10:00 a.m.)
Place: Oregon Department of Environmental Quality Headquarters
811 SW 6th Ave., 3rd Floor (Room 3A), Portland

Date: Wednesday, May 22, 1996
Time: 7:00 p.m. (Question and answer session from 6:00 p.m.to 7:00 p.m.)
Place: State Office Building, Room 140
800 NE Oregon
Portland

Date: Thursday, May 23, 1996
Time: 7:00 p.m. (Question and answer session from 6:00 p.m.to 7:00 p.m.)
Place: City of Tigard Water Department Auditorium
8777 SW Burnham St.
Tigard, Oregon

Deadline for Receipt of Written Comments: May 24, 1996, 5:00 p.m.

In accordance with ORS 183.335(13), no comments from any party can be accepted after the deadline for receipt of comments has passed. Thus if you wish your comments to be considered by the Department in the development of these rules, your comments must be received before the close of the comment period. The Department recommends that comments be submitted as early as possible to allow adequate review and evaluation of the comments submitted.

Following close of the public comment period, the Presiding Officer will prepare a report which summarizes the oral testimony presented and identifies written comments submitted. The Environmental Quality Commission (EQC) will receive a copy of the Presiding Officer's report and all written comments submitted. The public hearing will be tape recorded, but the tape will not be transcribed.

If you wish to be kept advised of this proceeding and receive a copy of the recommendation that is presented to the EQC for adoption, you should request that your name be placed on the mailing list for this rulemaking proposal.

What Happens After the Public Comment Period Closes?

The EQC will consider the Department's recommendation for adoption of the maintenance plan during one of their regularly scheduled public meetings. The targeted meeting date for consideration of this rulemaking proposal is July 12, 1996. This date may be delayed if needed to provide additional time for evaluation and response to testimony received in the hearing process. You will be notified of the time and place for final EQC action if you present oral testimony at the hearing or submit written comment during the comment period or ask to be notified of the proposed final action on this rulemaking proposal.

The EQC expects testimony and comment on proposed rules to be presented **during** the hearing process so that full consideration by the Department may occur before a final recommendation is made. In accordance with ORS 183.335(13), no comments can be accepted by either the EQC or the Department after the public comment period has closed. Thus the EQC strongly encourages people with concerns regarding the proposed rule to communicate those concerns to the Department prior to the close of the public comment period so that an effort may be made to understand the issues and develop options for resolution where possible.

Background on Development of the Rulemaking Proposal

Why is there a need for the rule?

To redesignate the Portland area from nonattainment to attainment, EPA requires an enforceable plan that demonstrates how the area will continue to meet the CO standard for a minimum of ten years. The CO maintenance plan includes emission reduction strategies that are sufficient to ensure attainment for the next ten years. An EPA-approved CO maintenance plan and redesignation to attainment will provide the following benefits:

- Assure that public health will be protected from adverse impacts of CO;
- Protect against possible Clean Air Act sanctions on federal transportation funds;
- Eliminate industrial growth impediments, including costly Lowest Achievable Emission Rates (LAER) and Emission Offsets;
- Eliminate the Portland downtown parking lid, which is now an impediment to growth in the area.

How was the rule developed?

The Department primarily used the City of Portland's Central City Transportation Management Plan (CCTMP) development process to develop the CO maintenance plan provisions. The CCTMP was intended to address a "build out" condition by 2010 and beyond. After nearly five years of planning, the Portland City Council adopted the CCTMP and implementing ordinances in December 1995. This plan includes:

- retention of the maximum parking ratios in effect for the last twenty years in the downtown area with slight modification,
- application of maximum parking ratios to the entire Central City area,
- allowance for new structured parking to serve existing older buildings, and
- elimination of the downtown parking lid.

In addition Metro intensively reviewed and made recommendations on the transportation control measures supporting the plan and the transportation emission budgets reflected by the plan. These elements will be used for setting priorities for use of transportation funds and for transportation conformity determinations, enabling continued flow of federal transportation

funds.

Key documents relied upon in developing the maintenance plan include:

- EPA guidance documents:
  - "Procedures for Processing Requests to Redesignate Areas to Attainment," John Calcagni, 9/4/92
  - "Final Procedure and General Guidance for Redesignating Nonattainment Areas to Attainment in Region 10," George Lauderdale, 6/27/94
  - "Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone, Volume 1," EPA-450/4-91-016, May 1991
  - "User's Guide to Mobile 5a," EPA Office of Mobile Sources, May 1994
  - "Procedures for Preparing Emissions Projections," EPA Office of Air Quality Planning and Standards, July 1991

- Maintenance Plan-Related Reports:
  - ORS 468A.363 (House Bill 2214)
  - "Ozone and CO Maintenance Plan Model Assumptions," Metro Travel Forecasting Section, November 1995
  - "Central City Transportation Management Plan," City of Portland, December 1995

Whom does this rule affect including the public, regulated community or other agencies, and how does it affect these groups?

The Portland area CO maintenance plan will affect the general public, developers of commercial property in the Central City, large and small businesses involved in petroleum marketing, motorists in the tri-county and Yamhill County area, and Metro. The plan includes the following emission reduction strategies:

- **On-road vehicle strategies**

  - Improvements to the Motor Vehicle Inspection and Maintenance Program

    Changes to the Motor Vehicle Inspection Program are proposed as part of the ozone maintenance plan for the Portland area. However, CO emission reduction benefits will also accrue from the proposed changes. The proposed Motor Vehicle Inspection Program changes include improvements to the test method (enhanced testing), expansion of the inspection boundary, and elimination of the

old vehicle exemption for 1975 and newer vehicles. The enhanced testing will require an increase in the testing fee. The existing fee of $10 will have to increase to a range of $15 to $20 per test to cover the cost of the program. DEQ's best estimate is that the fee will increase to $16 per test. Because of the improved test, the failure rate and average repair costs will increase, but this will be offset by savings from improved fuel economy. About 10 percent more vehicles from areas surrounding the airshed will be subject to testing due to the expanded boundary. Additional vehicles will be tested due to elimination of the old vehicle exemption. Fleet operators will have to upgrade their testing equipment or rely on DEQ testing. Repair mechanics may opt to take additional training and upgrade testing equipment. The Rulemaking Hearing Proposal for the Portland Ozone Maintenance Plan discusses specific impacts of these proposed changes. For specific information on the Portland Ozone Maintenance Plan, contact Andy Ginsburg at (503) 229-5581.

- **Other Transportation Control Measures**

  Metro's new Region 2040 Growth Concept is a land use and transportation plan designed to significantly improve the balance between motor vehicles and other less polluting forms of transportation. The Region 2040 Growth Concept and associated transportation control measures (including improved transit and improvements in bicycling and pedestrian facilities) affect developers, local governments, and the general public. Emission reductions from Metro's land use and transportation plan are incorporated in the maintenance plan and reflected in a transportation emission budget. Metro must give priority funding to these transportation control measures.

- **Oxygenated Fuels**

  The Clean Air Act Amendments of 1990 required the Department to implement an oxygenated fuel program. The program was implemented in the winter of 1992/1993. The Department projects the CO standard can be maintained without oxygenated fuel with a safety margin of ten percent in the winter of 1996/1997. The margin of safety would increase to 21 percent by 2006. Local governments are concerned that the ten percent safety margin is not enough in the early years of the plan. The petroleum industry indicated the community should not bear the large costs of oxygenated fuel if the program is not needed.

The Department is considering several options for the oxygenated fuel program. Public comment on these options is especially encouraged. The Department is considering at least four possible options for the oxygenated fuel program, shown below.

1. Repeal the oxygenated fuel program after next winter.*
2. Continue the program for another two winters with an automatic repeal (when the enhanced vehicle inspection program is close to full implementation).
3. Continue the program for another two winters and reevaluate whether to continue it beyond the 1997/1998 winter.**
4. Continue the oxygenated fuel program during the ten-year life of the maintenance plan.

Other options, or variations of these four options, may emerge as a result of the public hearings. Some of the factors to consider include the following:

1. Emission reductions gained from the phase-in of the enhanced vehicle inspection program (completed in 1999) will substantially offset the CO emission increase that would otherwise result if the oxygenated fuel requirements were removed.
2. Removal of the oxygenated fuel program would lower petroleum marketing costs and increase the fuel economy of most cars.
3. Suppliers of oxygenates would be negatively affected through reduced revenues with the elimination of the oxygenated fuel program.
4. There are somewhat different toxic emissions from oxygenated fuels versus non-oxygenated fuels. Although oxygenated fuel reduces benzene, some other air toxics are increased. EPA expects to release a comprehensive report on the issue, shortly.
5. A repeal of the oxygenated fuel program after two years would ensure CO emissions do not increase above the levels of last winter (1995/1996).
6. A question has been raised whether the Department could continue the oxygenated fuel program in the maintenance plan because of Clean Air Act limitations. EPA recently indicated the DEQ could continue the program under the contingency provisions of the Clean Air Act.

* This is based on the expected earliest time for EPA approval, but sooner action may be possible.

** Metro has recommended continuation of the program for three winters before reevaluating whether to continue it.

- **CCTMP Parking Restrictions and the Elimination of the Parking Lid**

  DEQ proposes to incorporate the City of Portland's Central City Transportation Management Plan (CCTMP), as adopted in December 1995, into the maintenance plan. The main elements of the CCTMP include:

  - Retention of the maximum parking ratios in effect for the last twenty years in the downtown area, with slight modification;
  - Application of maximum parking ratios to the entire Central City area;
  - Allowance for new structured parking to serve existing older buildings; and
  - Elimination of the downtown parking lid. For developers of downtown commercial property, the removal of the parking lid should provide additional incentives to build in the downtown and encourage an increase in development density in areas with excellent transit service, envisioned in Metro's Region 2040 plan.

- **CO Emissions Budgets (for on-road motor vehicles)**

  Transportation conformity regulations, required by the 1990 federal Clean Air Act Amendments, provide for the creation of motor vehicle emissions budgets in the State Implementation Plan (SIP). An emissions budget is explicitly identified from the motor vehicle portion of a projected emission inventory. Emissions budgets establish a cap on emissions which cannot be exceeded by predicted motor vehicle emissions. In the Portland area, Metro forecasts motor vehicle emissions as part of periodically updating the long-range, regional transportation plan (RTP) and the short-range Transportation Improvement Program (TIP). Metro's emission forecast must be consistent with the SIP emissions budget(s). The proposed maintenance plan replaces two types of conformity tests that generally are more difficult to meet than an emissions budget test. The new tests should be relatively easier for Metro to show conformity, because its long-range transportation plan was closely coordinated with the maintenance plan development.

  For CO, three emissions budgets have been developed: an overall regional budget and two hot spot budgets (areas of past CO standard violations), one for the Central City and the other for the 82nd Avenue Corridor between SE Division and SE Foster Rd.

- **Contingency Plan Elements**

  The maintenance plan must contain contingency measures that would be implemented to correct a violation of the CO standard after the area has been redesignated to attainment.

The Clean Air Act requires reinstatement of measures that were in the original attainment plan if a standard violation occurs. Under the proposed contingency plan, adopted under the CCTMP and recommended by Metro, the Department would convene a planning group if the validated second highest 8-hour CO concentration equals or exceeds 8.1 ppm (90 percent of the 8-hour CO standard). The group would consider a range of action, from implementing candidate measures to deciding to do nothing. However, if a violation of the 8-hour CO standard were to occur within the defined area of the former Downtown Parking and Circulation Policy, roughly the Central Business District of downtown Portland, then the parking lid would be reinstated. Other restored control measures would include Lowest Achievable Emission Rate (LAER) plus emission offsets for major new and modified industrial sources and wintertime oxygenated gasoline at 2.7 percent weight for motor vehicles if the oxygenated fuel program is repealed prior to the occurrence of violation(s). The parking lid would not be reinstated if a violation occurred outside the downtown area.

How will the maintenance plan and associated rules be implemented?

The Department will implement the CO maintenance plan through ongoing air quality monitoring, periodic emission inventory updates, and implementation of emission reduction strategies. The existing attainment plan will be repealed upon EPA approval of the maintenance plan. However, existing emission reduction strategies required by Oregon Administrative Rules will remain in effect, except as specifically amended or repealed by the Environmental Quality Commission and approved by EPA as part of this maintenance plan.

- The Department will implement the Enhanced Motor Vehicle Inspection Program through the DEQ's existing Vehicle Inspection Program. DEQ already has begun implementing the expanded boundary. Additional test centers are being constructed to better serve the expanded boundary. The Department will add equipment to conduct the enhanced test, which will begin phasing in by July 1997. An amendment to the expanded boundary rule is proposed concurrently with the Portland ozone maintenance plan, and enhanced testing rules will be proposed in August, 1996 for adoption in November, 1996. The Department is evaluating the cost-effectiveness of privatizing this program.

- The City of Portland's Central City Transportation Management Plan is effective now under the city's separate adoption of ordinances. The city adopted the plan in December, 1995. The City of Portland will implement the relevant measures.

- Metro and local governments are implementing Metro's Region 2040 plan and associated transportation control measures. The transportation conformity process will be used to ensure that Transportation Control Measures (TCMs) receive priority funding and are implemented in a timely manner. The conformity process will also be used to ensure that transportation emissions do not exceed the transportation emission budgets included in the maintenance plan.

- The Department will evaluate public testimony on the oxygenated fuel issue. The Department will present its recommendations to the EQC as part of proposed action on the maintenance plan.

Are there time constraints?

There is no deadline in the Clean Air Act Amendments of 1990 for maintenance plans. It is in the best interest of the community from the standpoint of health protection and cost impact to adopt the plan as soon as practicable to eliminate industrial growth impediments and constraints to growth in the downtown area.

Contact for more information

If you would like more information on this rulemaking proposal, or would like to be added to the mailing list, please contact:

Howard Harris, (503) 229-6086
Oregon Department of Environmental Quality
Air Quality Division
811 SW Sixth Ave.
Portland, OR 97204-1390

Attachment C

State of Oregon

Department of Environmental Quality

Memorandum

Date: June 24, 1996

To: Environmental Quality Commission

From: Lawrence Smith, ALJ, Employment Department
Mike Grant, ALJ, Public Utility Commission

Subject: Presiding Officer's Report for Rulemaking Hearing, Attachment C

Hearings Date and Time: May 22, 1996, beginning at 10:00 am.
May 22, 1996, beginning at 7 pm.
May 23, 1996, beginning at 7 pm.

Hearings Location: Room 3A, DEQ Headquarters, 811 SW Sixth Avenue, Portland, OR
Room 140, State Office Building, 700 NE Oregon Avenue, Portland, OR
Auditorium, Tigard Water Bureau, 8777 SW Burnham Road, Tigard, OR

Titles of Proposals: Portland Area Ozone Maintenance Plan
Portland Area Carbon Monoxide Maintenance Plan
Employee Commute Options Program
Voluntary Parking Ratios Program
Expanded Vehicle Inspection Boundary
Industrial Emissions Management Program

Three rulemaking hearings were held on the above titled proposals. The hearings were convened at 10:00 am and 7:00 pm on May 22, 1996, and 7:00 pm May 23, 1996. All the proposals were open for comment at each hearing. People were asked to sign witness registration forms if they wished to present testimony. People were also advised that the hearings were being tape recorded and of the procedures to be followed.

The morning hearing on May 22, 1996, was conducted by Lawrence Smith, an Administrative Law Judge with the Employment Department. Forty-five people were in attendance, ten people signed up to give testimony.

Memo To: Environmental Quality Commission
June 24, 1996
Presiding Officer's Report on
May 22, 23, 1996, Rulemaking Hearing
Attachment C, Page 2

The evening hearings on May 22, and May 23, 1996, were conducted by Mike Grant, an Administrative Law Judge with the Public Utility Commission. Eleven people were in attendance the evening of May 22, and three people signed up to give testimony. Thirteen people were in attendance the evening of May 23, and three people signed up to give testimony.

Prior to receiving testimony, the Department provided informational tables and the opportunity for people to informally discuss any questions concerning the proposals with Department staff. Andy Ginsburg was available for questions concerning the Portland Area Ozone Maintenance Plan. Howard Harris was available for questions concerning the Portland Area Carbon Monoxide Maintenance Plan. Patti Seastrom was available for questions concerning the Employee Commute Options Program. Susan Turner was available for question concerning the Voluntary Parking Ration Program. David Collier was available for questions concerning the Expanded Vehicle Inspection Boundary. Brian Finneran was available for questions concerning the Industrial Emissions Management Program.

Summary of Oral Testimony

May 22, 1996, 10:00 am

1. Jim Craven, American Electronic Association.

Mr. Craven gave testimony concerning the Industrial Emissions Management Program. He read his comments into the record. He focused on the Unused PSEL Management Backup Program of OAR 340-030-0730. He stated that this program conflicted with the purpose of the Plant Site Emission Limits (PSEL) program. He stated that the proposed program could adversely affect the electronics industry.

Mr. Craven also submitted written comments which are summarized in the Department's Evaluations of Public Comments (Attachment D).

2. Bob Okren, Citizen.

Mr. Okren gave testimony concerning the Employee Commute Option Program (ECO). He stated that regulating employees lives is onerous, communistic, and unconstitutional since employers will suffer penalties if employees don't cooperate. He considered ECO is another challenge to doing business in Portland.

Memo To: Environmental Quality Commission
June 24, 1996
Presiding Officer's Report on
May 22, 23, 1996, Rulemaking Hearing
Attachment C, Page 3

3. Francie Royce, City of Portland, Office of Transportation.

Ms. Royce gave testimony concerning the Carbon Monoxide (CO) and Ozone Maintenance Plans, and the Voluntary Parking Ratios Program. Ms. Royce stated that the City was pleased the DEQ has completed its work on the plans and were supportive of both. She noted the City's participation in the five-year process leading to this point and appreciated the long hours and hard work on the part of DEQ staff.

Ms. Royce highlighted some specific concerns regarding the CO maintenance plan. The Portland City Council has taken a position endorsing the retention of the oxygenated fuels program and supports the position adopted by the Metro Council and Joint Policy Advisory Committee on Transportation (JPACT) to continue the program for another two winters and reevaluate whether to continue the program. She stated the city is particularly at risk in the event the CO standard is violated in the downtown area, as the parking lid will be automatically reinstated, and for that reason the city would like see the oxygenated fuels continue.

Ms. Royce pointed out that the CO maintenance plan contains three transportation emissions budgets: a regional emissions budget, a budget for the Central City Transportation Management Plan (CCTMP) area, and a budget for 82nd Avenue. The city is concerned about the establishment of an emissions budget for such a small area as the 82nd Avenue area and believes it is unnecessary and could trigger an unwarranted conformity problem. The city believes the Environmental Quality Commission (EQC) should remove the 82nd Avenue emissions budget from the CO plan and rely on the 82nd Avenue monitor to track CO concentrations in the area.

Ms. Royce stated that various timelines have been projected for approval of the maintenance plans by EPA. She cited delays of up to 18 months for the agency to pass similar plans and urged the Commission and DEQ to persuade EPA to approve the submitted maintenance plans as soon as possible. She also indicated the city is willing and able to help effect a timely approval.

Ms. Royce stated that other comments dealing with the CO maintenance plan, the Ozone maintenance plan and voluntary parking ratio program would be submitted in writing. She stated that the other comments were mostly technical in nature and dealt with provisions of the CCTMP that are to be incorporated into the CO maintenance plan.

The City of Portland also submitted written comments which are summarized in the Department's Evaluations of Public Comments (Attachment D).

4. Adrian Albrecht, PED Manufacturing Inc.

Mr. Albrecht gave testimony concerning the ECO program. He stated that credit should be given for existing low auto trip rates even where an employer does not have an active program.

Mr. Albrecht also submitted written comments which are summarized in the Department's Evaluation of Public Comment (Attachment D).

5. Bill Smith, American Lung Association

Mr. Smith gave testimony in support of the Enhanced Vehicle Inspection Program. Mr. Smith supported the enhanced motor vehicle inspection program and expanded inspection boundary as a good investment in air quality. He stated that the problems reported in implementing enhanced inspection in other states have been due to poor public relations, not problems with the technology.

6. Darrell Fuller, Oregon Automobile Dealers Association.

Mr. Fuller gave testimony concerning the ECO program. He requested supporting data demonstrating need for ECO, as well as information on impact of programs in other states. He stated that the government requiring business to require employees to change commute habits presents problems, such as policing employees, carpooling liability, and employee backlash. He suggested that OAR 340-030-0820 be modified from "have the potential to" to "mandated", since that is what is intended. He also suggested that OAR 340-030-0850 be expanded to include disabled and field personnel "transporting goods and services" or "reasonably need to have vehicle".

Mr. Fuller also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

7. Melissa Sherlock, Western States Petroleum Association and 76 Products Company.

Ms. Sherlock is a fuels planning engineer for 76 Products Company. She gave testimony concerning the CO Maintenance Plan. She stated that WSPA is a trade association whose member companies account for the majority of petroleum produced, refined, transported and marketed in six western states, including Oregon. She congratulated the staff, residents and industries of the Portland area on attaining the National Ambient Air Quality Standards for carbon monoxide (CO) and ozone, making the Portland region a fine place to live and work.

Second, she expressed WSPA's belief that the winter oxygenated fuel program is not necessary in the Portland region and should be discontinued prior to the start of the 1996/97 winter season. She stated that WSPA's position is based on the following facts:

1) The Portland metropolitan area began attaining the standard in 1990, two full years before oxygenated gasoline was required in 1992.

2) DEQ's thorough and extremely conservative analysis demonstrates that oxygenated gasoline is not needed in order for CO levels in the region to remain well below the federal health standards in the winter of 1996/1997 and throughout the ten-year maintenance period.

3) Oxygenated fuel mandates are expensive; WSPA estimates that the program costs the region's consumers, businesses and taxpayers approximately $7.4 million for increased fuel costs and losses in fuel efficiency and potentially $7.7 million in lost revenue from the federal highway trust fund.

4) Continuing an oxygenated fuel mandate when it is not needed for attainment is inconsistent with the provisions of the federal Clean Air Act Amendments of 1990.

Ms. Sherlock cited the historical record of numerous violations (in excess of 100) throughout the late 60's and early 70's. However, by the late 70's and early 80's, the number of violations were reduced significantly, with only one violation since 1985.

Ms. Sherlock explained that the reason for that big improvement in CO air quality was based on two factors and neither one of those is oxygenated gasoline: 1) more stringent new motor vehicle emission standards which resulted in the increased technological sophistication of new motor vehicle emission control systems; and 2) the State's vehicle inspection and maintenance program, ensuring that the emission control systems maintain their effectiveness. Those programs started during the late 70's and early 80's, and oxygenated gasoline came in during the winter of 1992, well after the area's big improvement. She concluded that oxygenated gasoline did not play any role at all in the marked improvement in air quality.

Ms. Sherlock indicated that the Portland area has experienced only one violation of the CO standard in the last ten years and that violation occurred at the 82nd and Division monitor in December of 1989, immediately after the monitor's installation. The monitor has not measured a CO violation since, and all the other monitors in the Portland area show that the area has been attaining the standard since 1985, without the use of oxygenated gasoline.

Ms. Sherlock indicated that the DEQ analysis in the Plan shows compliance can be maintained without an oxygenated fuels program with a safety margin of ten percent, even in the winter of 1996/97. She stated that the analysis is based on a number of very conservative assumptions as follows: 1) worst case base year for meteorological conditions and measured concentrations; 2) extremely conservative background CO; 3) a worst case growth modeling analysis; 4) a calculated base year CO concentration that averages 40 percent higher than the actual measured concentrations during the base year; 5) a peak traffic period in the downtown area that is twice as long as the actual peak period; and 6) a traffic volume growth rate around the 82nd and Division monitor that is 75 percent higher than the traffic volume growth rate estimated by Metro.

These conservative assumptions indicate that the actual safety margin is most likely significantly greater than the ten percent that has been estimated. Ms. Sherlock concluded that an oxygenated fuel program is clearly not necessary for the Portland metropolitan area to stay well below the CO standard, beginning in the winter of 1996/97 and throughout the ten-year maintenance period. In summary, she stated that WSPA urges DEQ to discontinue the winter oxygenated fuel program prior to the start of the 1996/97 winter season.

Ms. Sherlock also submitted written testimony on behalf of WSPA and 76 Products Company. Those comments are summarized in the Department's Evaluation of Public Comments (Attachment D).

8. Joe Gilliam, National Federation of Independent Business.

Mr. Gilliam gave testimony concerning the CO maintenance plan. He stated that the National Federation of Independent Business was the largest small business group in the State, with over 17,000 employers. He indicated that his concerns were similar to those given by Ms. Sherlock for the Western States Petroleum Association, but from a slightly different angle. His organization is concerned over the size of government and overall regulation. He said that the oxygenated fuel program is unneeded, by the Department's own recommendation. The oxygenated fuel program does not make a difference between the Portland area being in attainment or nonattainment, with no significant benefit to the Metro area as far as the air shed is concerned. Mr. Gilliam also cited the costs for the Metro area, estimated at $7 million in fuel related costs and a potential of $7 million in lost transportation funds. He stated that his organization would like to see the DEQ take the action to repeal the program before the 1996/97 winter. He said that the National Federation of Independent Business cannot see a need to extend a program like oxygenated fuel and cost the region the kind of money cited. As a goodwill gesture, the DEQ should act immediately to repeal the program.

9. E. John Resha, Portland Community College and Westside Transportation Alliance.

Mr. Resha gave testimony concerning the ECO Program. He was supportive of the Ozone Maintenance Plan and the ECO Program. He stated that the definition of "Good Faith Effort" was not clear as to what was an acceptable effort. He also stated that there was a need to understand how the trip reduction goal of 10% helped to achieve and maintain the Ozone standard.

Mr. Resha also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

10. Linda Odekirk, Nike and Westside Transportation Alliance

Ms. Odekirk gave testimony concerning the ECO program. She stated that the baseline requirement should be changed from employer baseline to area baseline so that employers will be sure to get credit for work already done.

May 22, 1996, 7:00 pm

11. Peter Fry, Central Eastside Industrial Council

Mr. Fry gave testimony concerning the ECO program. He requested that the record stay open an additional 30 days to provide adequate time to review the ECO proposal. He stated that the Central City Transportation Management Plan (CCTMP) was already consistent with State law. He asked why additional requirements were needed for employers in the CCTMP area. He said that employers were under the impression that participation in the CCTMP would meet any additional rules. He wanted to know how DEQ would determine what parking is free or paid. He stated that Central Eastside parking costs were incorporated into the business, wage rates, and the way the business operated. Mr. Fry said that the Central Eastside had lost businesses because of ill-founded regulatory issues. He stated that the Central Eastside should be included in the definition of "Central Business District". He expressed the concern that the Central Eastside has been closed out of the process.

Mr. Fry also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

12. Kathleen Dotten, Oregon Metals Industry Council

Ms. Dotten gave testimony concerning the Expanded Vehicle Inspection Boundary, the ECO Program, the Ozone Maintenance Plan, and the Industrial Emission Management Program. She read her comments into the record.

Ms. Dotten stated that she did not support the removal of the Newberg, Dundee, Aurora and Marquam areas from the Expanded Vehicle Inspection Boundary. She also stated that the ECO Program shifted the burden of reducing vehicle miles traveled from the driver to the employer. She objected to that shift.

Ms. Dotten stated that the contingency plan should not focus on industry. She said that industry had already made significant emission reductions. She noted that the contingency plan called for further control of industry, even if the problem is caused by another source category. She stated that the maintenance plan should include an emissions allocation for each source category. She suggested that if one category exceeded the allocation, the contingency plan should require reductions from that category, rather than further reductions from industry. As an example, she suggested that congestion pricing could be required if auto emissions exceed their allocation.

Ms. Dotten's testimony concerning the Industrial Emissions Management Program focused on the growth allowance. She stated that the industrial growth allowance should be larger. She suggested that the industrial growth allowance should be at least 1000 tons per year as this would allow existing industry to expand and new industry to develop. She stated that the result would be more high wage jobs. She said that future emission reductions made by industry should be available for increases in industrial sources, not increases in mobile sources.

Ms. Dotten also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

13. David Stoller, Small Business Owner

Mr. Stoller gave testimony concerning the ECO Program. He was concerned that government was becoming larger with more regulations that small business must follow. He said that ECO placed an unfair burden on the small business owner. He suggested that ECO be replaced with a fuel tax to target all types of auto trips. He stated that ECO singled out the employer and was a drastic means to reduce emissions.

May 23, 1996, 7:00 pm

14. Mauri Scott, Iwasake Brothers, Inc.

Ms. Scott gave testimony concerning the ECO Program. She stated that the nature of her business, a nursery, was not taken into account. She explained that employees tending plants cannot telecommute or work a compressed work week, and truck drivers work a non-scheduled work week. She stated that the current auto trip rate was .48, but she couldn't take credit because no programs had been sponsored. She suggested that employers with lower auto trip rates should have lower goals. She also pointed out the need for the survey to be provided in other languages and in an alternate form for illiterate employees (e.g. pictograms). She suggested that the rules should allow for an easier method, such as counting cars in the parking lot.

Ms. Scott also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

15. John Williams , Citizen.

Mr. Williams gave testimony concerning the Ozone Maintenance Plan. He read his comments into the record.

He stated that DEQ should actively support the gasoline pipeline. He said the maintenance plan assumed emissions reductions from the future operation of a planned gasoline pipeline which would reduce emissions from barge loading. He said the plan, which was relatively detailed regarding the other elements of its control strategies, was silent about what steps the DEQ would take to insure that this planned pipeline would actually be constructed, and that the resulting emissions reductions would be achieved. Mr. Williams stated that this was a very important issue because of the large amount of emissions involved. He said that DEQ should consider taking some action to support the pipeline. He suggested that, for instance, DEQ could intervene or testify in the hearings and proceedings before the Washington Energy Siting Council regarding the Olympic pipeline.

Mr. Williams also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

16. Tom Tucker, Citizen

Mr. Tucker gave testimony concerning the Ozone Maintenance Plan. He read his comments into the record.

He stated that the selected strategies were not cost-effective. He said that the maintenance plan relied on tools at DEQ's disposal, rather than the most cost-effective solutions. He suggested that DEQ should explore options to control population growth as a means of reducing air pollution. His suggested alternatives included the deportation of illegal aliens, reducing teenage pregnancies, training workers locally, helping the unemployed find work outside of the state, voter approval prior to annexation, and voter initiatives to require future development to pay for all needed infrastructure.

Mr. Tucker also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

Written Testimony

The following people handed in written comments at the hearings, but did not present oral testimony:

17. Thomasina Gabriele, Gabriele Development Services for Institutional Facilities Coalition.
18. Joy Voline

There was no further testimony and the hearing was closed at 11:15 am, 7:30 pm, and 7:45 pm, respectively.

The public comment period closed at 5:00 pm on Friday, May 24, 1996. All comments received during the public comment are indexed in Attachment C1, which has been attached to this report. All oral and written comments are summarized in Attachment D, The Department's Evaluation of Public Comments.

Attachment C1
Index of Public Comments Received
Attachment to the Presiding Officer's Report for Rulemaking Hearing

State of Oregon
Department of Environmental Quality

	Name/Representing	Subject	Comment Type
1	Jim Craven, American Electronics Association	Industrial Emissions Management Program	Written/ Oral
2	Bob Okren	Employee Commute Options Program	Oral
3	Francie Royce, City of Portland	Ozone and CO Maintenance Plans, Voluntary Parking Ratio Program	Oral
4	Adrian Albrecht, PED Manufacturing Ltd.	Employee Commute Options Program	Written/ Oral
5	Bill Smith, American Lung Association	Ozone Maintenance Plan (Enhanced Vehicle Inspection)	Oral
6	Darrell Fuller, Oregon Automobile Dealers Association	Employee Commute Options Program	Written/ Oral
7	Melissa Sherlock, 76 Products Company, Western States Petroleum Association	Carbon Monoxide Maintenance Plan	Written/ Oral
8	Joe Gilliam	Carbon Monoxide Maintenance Plan	Oral
9	John Resha, Westside Transportation Alliance/ Portland Community College	Ozone Maintenance Plan, Employee Commute Options Program	Written/ Oral
10	Linda Odekirk, Westside Transportation Alliance/ Nike	Ozone Maintenance Plan, Employee Commute Options Program	Oral
11	Peter F. Fry, AICP, Central Eastside Industrial Council	Employee Commute Options Program	Written/ Oral
12	Kathleen Curtis Dotten, Oregon Metals Industry Council	Ozone Maintenance Plan (Enhanced Vehicle Inspection), Expanded Motor Vehicle Inspection Boundary, Industrial Emission Management Program, Employee Commute Optionss Program,	Written/ Oral
13	David Stoller	Employee Commute Options Program	Oral
14	Mairi J. Scott, Iwasake Brothers, Inc.	Employee Commute Options Program	Written/ Oral
15	John Williams	Ozone Maintenance Plan	Written/ Oral
16	Tom Tucker	Ozone Maintenance Plan	Written/ Oral
17	Thomasina Gabriele, Gabriele Development Services, (representing Institutional Facilities Coalition)	Employee Commute Options Program, Voluntary Parking Ratio Program	Written

	Name/Representing	Subject	Comment Type
18	Joy Voline	Employee Commute Options Program	Written
19	Gayle Evans, Standard Insurance Co.	Employee Commute Options Program	Written
20	Rick Gustafson, Shiels, Obletz, Johnsen (Representing Association for Portland Progress)	Employee Commute Options Program	Written
21	Bradford R. Tracy, Maletis Beverage	Employee Commute Options Program	Written
22	Doug Hayden, Columbia Distributing Co., Henny Hinsdale, Admiralty Beverage	Employee Commute Options Program	Written
23	Jerry Griffin, Swan Island Business Association	Employee Commute Options Program	Written
24	Juan Baez, Pacificorp	Employee Commute Options Program	Written
25	Steve Klein, Epson	Employee Commute Options Program	Written
26	Elizabeth Archer, Taylor Made Labels, Inc.	Employee Commute Options Program	Written
27	Elda Orr, Multnomah Athletic Club	Employee Commute Options Program	Written
28	Virginia W. Lang, USWest Communications	Employee Commute Options Program	Written
29	L. Guy Marshall, Columbia Steel Casting Co.	Employee Commute Options Program	Written
30	Susan Duley, Saks Fifth Avenue	Employee Commute Options Program	Written
31	Gary A. Benson, Pendleton Woolen Mills	Employee Commute Options Program	Written
32	Ralph Woll/Dari Buckner, Interstate Brands Corporation	Employee Commute Options Program	Written
33	John Bohlinger, Core-Mark International	Employee Commute Options Program	Written
34	Harriet Sherburne, Portland Center for the Performing Arts	Employee Commute Options Program	Written
35	Douglas Pratt, Jr., Fulton Provision Company	Employee Commute Options Program	Written
36	J. Mark Morford, Stoel, Rives	Employee Commute Options Program	Written
37	Katy Johnson, Pacific Metal Company	Employee Commute Options Program	Written
38	Mike McGee, Oregon Department of Corrections	Employee Commute Options Program	Written
39	Debi Wali, Bullseye Glass Company	Employee Commute Options Program	Written
40	Colin Lamb, Lamb's Thriftway	Employee Commute Options Program	Written
41	William R. Johnson, Valley Wine Company	Employee Commute Options Program	Written
42	Anne Mersereau, Portland Hilton	Employee Commute Options Program	Written
43	David M. Fogle, Pacific Coast Restaurants	Employee Commute Options Program	Written
44	Denice DePaepe, Sears, Roebuck and Company	Employee Commute Options Program	Written

	Name/Representing	Subject	Comment Type
45	Fred Loomis, Gaston Public Schools	Employee Commute Options Program	Written
46	Gordon Slatford, Travelodge Hotel	Employee Commute Options Program	Written
47	S. G. Gray, E.E. Schenck Company	Employee Commute Options Program	Written
48	Louis A. Ornelas, Oregon Health Sciences University	Employee Commute Options Program	Written
49	Michael J.P.C. Kane, UEI	Employee Commute Options Program	Written
50	Charlie Young	Employee Commute Options Program	Written
51	Dan E. Mercer, Mercer Industries, Inc.	Employee Commute Options Program	Written
52	John P. Buckinger, Miller Paint Company	Employee Commute Options Program	Written
53	Ray Alford, Tom Richardson, Doug Jarmer, Pete Szambelan, Oregon Association of Temporary and Staffing Services	Employee Commute Options Program	Written
54	David H. Cook, OSF International, Inc.	Employee Commute Options Program	Written
55	G. Kent Ballantyne, Oregon Association of Hospitals and Health Systems	Employee Commute Options Program	Written
56	Donna M. Marx, The Sweetbrier Inn	Employee Commute Options Program	Written
57	William M. Hedgebeth, USEPA	Carbon Monoxide (CO) Maintenance Plan	Written
58	Jinx Faulkner	CO Maintenance Plan (oxygenated fuels)	Written
59	Matt Rahpael	CO Maintenance Plan (oxygenated fuels)	Written
60	Tom Novick, NW Bio Products Coalition	CO Maintenance Plan (oxygenated fuels)	Written
61	Neil M. Koehler, Parallel Products	CO Maintenance Plan (oxygenated fuels)	Written
62	Del J. Fogelquist, Western States Petroleum Association	CO Maintenance Plan	Written
63	Jim Alan	CO Maintenance Plan (oxygenated fuels)	Written
64	Andrea Benson	CO Maintenance Plan (oxygenated fuels)	Written
65	Kari Easton	CO Maintenance Plan (oxygenated fuels)	Written
66	Todd Easton	CO Maintenance Plan (oxygenated fuels)	Written
67	Michael Madden	CO Maintenance Plan (oxygenated fuels)	Written
68	Steven Schlesser, Schlesser Company, Inc.	CO Maintenance Plan (oxygenated fuels)	Written
69	N. Blosser	CO Maintenance Plan (oxygenated fuels)	Written
70	Chris Beck	CO Maintenance Plan (oxygenated fuels)	Written
71	Harrison Pettit	CO Maintenance Plan (oxygenated fuels)	Written
72	Dave Bernard	CO Maintenance Plan (oxygenated fuels)	Written
73	Maura Hanlon	CO Maintenance Plan (oxygenated fuels)	Written
74	Robert von Borstel, MD	CO Maintenance Plan (oxygenated fuels)	Written
75	David E. Ortman, Friends of the Earth	CO Maintenance Plan (oxygenated fuels)	Written
76	John Fletcher, Container Recovery, Inc.	CO Maintenance Plan (oxygenated fuels)	Written
77	Kim B. Puzey, Port of Umatilla	CO Maintenance Plan (oxygenated fuels)	Written
78	Caroline Weitzer, Media Mania Group	CO Maintenance Plan (oxygenated fuels)	Written

	Name/Representing	Subject	Comment Type
79	John G. White, Oregon Department of Energy	CO Maintenance Plan (oxygenated fuels)	Written
80	Dennis W. Lamb, 76 Products Company	CO Maintenance Plan (oxygenated fuels)	Written
81	Moneeka Settles	CO Maintenance Plan (oxygenated fuels)	Written
82	Claudia Burnett	CO Maintenance Plan (oxygenated fuels)	Written
83	Michelle Gallon	CO Maintenance Plan (oxygenated fuels)	Written
84	Ilene S. Moss	CO Maintenance Plan (oxygenated fuels)	Written
85	Nic Warmenhoven	CO Maintenance Plan (oxygenated fuels)	Written
86	Kenneth Lein	CO Maintenance Plan (oxygenated fuels)	Written
87	Matthew Pennewell	CO Maintenance Plan (oxygenated fuels)	Written
88	Benjamin Basin	CO Maintenance Plan (oxygenated fuels)	Written
89	Karen Notzeo	CO Maintenance Plan (oxygenated fuels)	Written
90	Lucas M. Haley	CO Maintenance Plan (oxygenated fuels)	Written
91	Carr Grey	CO Maintenance Plan (oxygenated fuels)	Written
92	Tim Cowles	CO Maintenance Plan (oxygenated fuels)	Written
93	Abigail Marble	CO Maintenance Plan (oxygenated fuels)	Written
94	Paul Reineke	CO Maintenance Plan (oxygenated fuels)	Written
95	Cynthia Toy	CO Maintenance Plan (oxygenated fuels)	Written
96	Christian G. Sturm	CO Maintenance Plan (oxygenated fuels)	Written
97	Rod Monroe, Metro Councilor, District 6	CO Maintenance Plan (oxygenated fuels)	Written
98	Robert Palzer, Sierra Club	Ozone Maintenance Plan	Written
99	Richard Ledbetter, Metro, Senior Transportation Planner	Ozone Maintenance Plan	Written
100	Ralph Engel, Chemical Specialties Manufacturers Association	Ozone Maintenance Plan	Written
101	Ted Hughes, Pacific Northwest Paint Council	Ozone Maintenance Plan	Written
102	Robert D. Elliot, Southwest Air Pollution Control Authority (Vancouver, WA)	Ozone Maintenance Plan	Written
103	Gil Haselberger, USEPA	Ozone Maintenance Plan	Written
104	Stan R. Holm, Mobil	Industrial Emission Management Program	Written
105	Chris Davies, Texaco Refining and Marketing, Inc.	Industrial Emission Management Program	Written
106	Kirk J. Thomson, Boeing	Industrial Emission Management Program	Written
107	Joseph W. Angel, Oregon Resturant Association	Voluntary Parking Ratio Program	Written
108	Larry Lazar, The Westwind Group	Voluntary Parking Ratio Program	Written
109	Steve Alverdes	Expanded Motor Vehicle Inspection Boundary	Written
110	Rita M. Bernhard, Mayor, City of Scappose	Expanded Motor Vehicle Inspection Boundary	Written

	Name/Representing	Subject	Comment Type
111	John A. Charles, Oregon Environmental Council	Industrial Emisstion Management Program, Expanded Motor Vehicle Inspection Boundary, Voluntary Parking Ratio Program, Employee Commute Options Program, Ozone Maintenance Plan	Written
112	Stanely P. Richardson, Jr.	Ozone and CO Maintenance Plans (Enhanced Vehicle Inspection and oxygenated fuels)	Written
113	Jim Whitty, Associated Oregon Industries	Ozone and CO Maintenance Plans (Enhanced Vehicle Inspection and oxygenated fuels), Industrial Emissions Management Program, Employee Commute Options Program, Voluntary Parking Ratio Program	Written
114	David F. Bartz, Jr., Schwabe, Williamson & Wyatt (representing Simpson Timber Co.)	Industrial Emissions Management Program, Employee Commute Options Program, Ozone Maintenance Plan	Written
115	Felicia Trader, City of Portland	Ozone and CO Maintenance Plans, Voluntary Parking RatioProgram	Written
116	Kristin K. Nadermann, Reynolds Metals Co.	Ozone Maintenance Plan (Enhanced Vehicle Inspection), Industrial Emissions Managment Program, Employee Commute Options Program	Written
117	Randy Tucker, OSPIRG	CO Maintenance Plan (oxygenated fuel)	Written
118	C.L. (Lew) Blackwell, Chevron Products	CO Maintenance Plan (oxygenated fuel)	Written
119	Matt Klein, Lloyd District Transportation Management Association	Employee Commute Options Program	Written
120	Lisa Logie, Westside Transportation Alliance	Employee Commute Options Program	Written
121	Mike Salsgiver, Westside Transportation Alliance	Ozone Maintenance Plan, Employee Commute Options Program	Written
122	Bonnie Gariepy, Intel	Industrial Emission Management Program	Written
123	Gary Slabaugh, Safeway, Inc.	Employee Commute Options Program	Written

Attachment D

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Carbon Monoxide Maintenance Plan

Department's Evaluation of Public Comment

[Note: Commenter number refers to the list in Attachment C.]

Comment 1: Revisions are needed to meet EPA approvability criteria. (Commenter 57) EPA recommended the following:

a) **Rollforward Analysis to 2007.** Showing maintenance until November 1, 2007 would appear to meet the requirement of section 175A(a) of the Clean Air Act to show maintenance at least 10 years after the redesignation occurs. The EPA understands that the Department will redo the rollforward modeling to include 2007, using January 7, 2007 emission factors.

b) **Oxyfuel under State Authority.** If the oxygenated fuel program is continued when it is not required for maintenance, and no violations have triggered the requirement for reimplementation of oxygenated fuel, then the program is being conducted strictly under State authority and is not being run under the contingency provisions of the Clean Air Act.

c) **Transportation Control Measure (TCM) Substitution.** Ensure that any issues regarding the TCM substitution procedures are worked out with EPA Region 10 and EPA Headquarters.

d) **Maximum Parking Ratios.** On page xiii, Section 4.51.0.2.3, Acknowledgement and Summary, it indicates that the plan includes "[r]etention of the maximum parking ratios in effect for the last twenty years in the downtown area with slight modifications." The "slight modifications" should be identified.

e) **Removal of Old Vehicle Exemption.** On page xiv, Section 4.51.0.2.4, under Removal of Old Vehicle Exemption from Vehicle Inspection Program, the first two

sentences appear to be contradictory. The first sentence should add something like, "...except for vehicles made prior to 1975" to clarify.

f) **Compliance Period at the 82nd and Division Monitor.** On p. 7, Section 4.51.2.2, the language indicates the 82nd and Division monitor has been in compliance for four consecutive years. This should be five years. The same comment applies on p. 34.

g) **CCTMP Zoning Code Amendments.** On p. 36, a discussion on how the CCTMP Zoning Code Amendments will be federally enforceable would be helpful.

h) **EPA Approval of Conformity SIP Submittals.** The transportation and general conformity SIPs do not have to be approved prior to or simultaneously with approval of CO redesignation.

i) **EPA Approval of NSR.** It is not clear that these rules, which were submitted to EPA on November 16, 1992, and the anticipated revisions to them, have to be approved by EPA prior to EPA's approving the redesignation request and maintenance plan.

j) **Stationary Sources.** On p. D2-4-1-1, third paragraph, change "Stationary sources" to "Stationary area sources."

k) **Timing for Periodic EI Updates.** Change the period for submittal of the periodic emission inventory update to 12 months instead of 23 months.

l) **Time Period for next Maintenance Plan Update.** Change the period for the next maintenance plan update to 2008-2017.

Response: Comments acknowledged. With respect to Comment (i), the Department will change the text to indicate that the NSR revisions submitted to EPA are not required to be approved prior to or concurrent with EPA's approving the redesignation request. For the rest of the comments, the Department will either make the exact revisions requested by EPA, or add appropriate explanatory text as requested.

Comment 2: The Metro compromise recommendation to keep the wintertime oxygenated fuel program for at least the three-year period (through 1998-99), with an evaluation on continuation was not included in the options being considered. (Commenter 97)

Response: Metro's recommendation on this issue was identified in a footnote in the public notice. The Department sought comment on the oxygenated fuel program, and no option was meant to be precluded. The Department's staff report to the Environmental Quality Commission explicitly identifies Metro's recommendation on this issue as one of the three main options favored in public testimony.

Comment 3: Retain the oxygenated fuel program. (Commenters 3, 60, 61, 63, 65, 67, 69, 70, 74, 84, 87, 89, 92-94, 97, 115, 117) The local government plan review process (conducted through Metro), set up and sanctioned by DEQ, recommended that oxygenated fuels be continued for at least three years with a review to assess continuation. This recommendation was based upon several factors, including uncertainty on the air quality projections, a desire to go beyond federal standards, the additional (beneficial) air quality and environmental impacts of oxygenated fuels. Other commenters cited the reduction of CO from oxygenated fuels as a reason to continue the program.

Response: There is always some level of uncertainty pertaining to projections of future air quality. To overcome inherent uncertainty, the technical foundation for the air quality projections was deliberately conservative in several ways. For the downtown area, projections of future air quality were based on the highest measured 8-hour concentrations in the last eight years. A higher level of traffic growth was assumed, than is likely to materialize, at least in the first few years of the maintenance period (a parking increase of 7,204 spaces was assumed versus an increase of 2,262 spaces in the original consultant modeling for downtown Portland). The number of conservative assumptions built into the analysis should give a high degree of confidence in the projections of continued maintenance of the National Ambient Air Quality Standards (NAAQS) for CO.

With respect to going beyond federal standards for CO, the Department is not aware of any material benefit from imposing controls designed to maintain CO air quality at a level below the NAAQS. The Department relies upon the Environmental Protection Agency's (EPA's) national process for reviewing and recommending appropriate air pollution health standard thresholds. The adequacy of the CO standards to protect public health with a safety margin was assessed nationally and reaffirmed by EPA in a 1994 rulemaking. While there would be a temporary increase in CO emissions when the oxygenated fuel program is eliminated, the phase-in of the Enhanced Vehicle Inspection Program will largely offset this increase in CO.

Comment 4: The Cost impact of the oxygenated fuel program is not accurate. (Commenters 60, 61) DEQ's cost estimate did not take into account octane adjustments and downward pressures on price reflected by increase in supply during the oxyfuel season.

Response: The economic analysis documented a wholesale price difference of 1.2 cents per gallon between clear gasoline and oxygenated gasoline from published Portland prices. Any octane adjustments of major suppliers would have been reflected in that price differential. With respect to supply effects on price, the published price data should reflect the impact of supply, as well as demand.

Comment 5: DEQ's cost estimate did not reflect the negative effect on the local industry from repeal of oxyfuels. (Commenters 60,61) The local industry built fueling infrastructure around the assumption that the oxygenated fuel program would stay. Parallel products has made large capital investments to capture waste streams for

conversion to ethanol. Discontinuing the requirement for use of oxyfuels will have negative economic effects on their company and on waste stream suppliers.

Response: This potential negative effect was acknowledged in the economic analysis in terms of reduced revenues for ethanol suppliers. The oxygenated fuel requirement is not being repealed statewide, and local markets in southern Oregon would be unaffected. There was no indication from the Department to any party that the oxygenated fuel regulation would remain in effect for any set period of time. In an informational report to the Environmental Quality Commission in December 1993, the Department informed the Commission that oxygenated fuels might not be needed to maintain the CO standard in the Portland area.

Comment 6: DEQ should coordinate with sister state agencies. (Commenter 60) Oregon Department of Agriculture and Energy have policies and statements reflecting support for ethanol. DEQ should not make air quality plans in a policy vacuum.

Response: This issue has been addressed through the Governor's office, which is responsible for coordinating among state agencies.

Comment 7: DEQ should make air quality plans based upon a comprehensive environmental approach. (Commenters 60, 61, 64, 66, 71, 72, 75, 76, 77, 78, 82, 85, 90, 91, 95, 117) DEQ's air quality planning should take into account other factors, including pollution prevention and multiple environmental benefit, rather than taking on one pollutant at a time. Several commenters cited the fact that the ethanol production process in the Northwest can utilize waste streams and/or locally grown raw agricultural products and also noted that ethanol is a renewable fuel.

Response: The Department acknowledges some possible cross-media benefits in terms of waste utilization for ethanol production, but the primary issue has to be whether a costly oxygenated fuel program is needed to maintain the CO standards. Other programs with multiple benefits, such as Metro's 2040 Growth Concept, are included in the plan.

Comment 8: The oxygenated fuels program can reduce greenhouse gas emissions. (Commenters 60. 61, 79, 117)

Response: Some reductions in greenhouse gas emissions have been quantified for renewable oxygenates like ethanol. However, the Department can not justify continuing the program solely for greenhouse gas emission reductions.

Comment 9: Oxygenated fuels reduce CO and air toxics. (Commenters 58-61, 68, 73, 81, 83, 86, 88, 97, 117)

Response: The Health Effects Institute (HEI) is an independent organization, established in 1980 to provide information on the health effects of motor vehicle emissions. The Board of Directors is composed of prominent individuals on the national scene. HEI

supports research on regulated pollutants (carbon monoxide, ozone, nitrogen dioxide, and particulate matter) and also on unregulated pollutants, such as diesel engine exhaust, methanol, and aldehydes. HEI recently evaluated the potential health effects of oxygenates (The Potential Health Effects of Oxygenates Added to Gasoline, A Review of the Current Literature, A Special Report of the Institute's Oxygenates Evaluation Committee, Health Effects Institute, April 1996). The HEI Oxygenates Evaluation Committee's report made the following key conclusions:

"Adding oxygenates to gasoline reduces the emission of CO and benzene from motor vehicles, and thereby potentially lowers certain risks for members of the population. At the same time, using oxygenates increases exposure to aldehydes and to the oxygenates themselves."

"Adding oxygenates to fuel is unlikely to substantially increase health risks associated with fuel used in motor vehicles; hence, the potential health risks from oxygenates are not sufficient to warrant an immediate reduction in oxygenate use."

"However, given that observation in some experiments suggested potential health risks from these substances, a number of important questions should be answered if these substances are to continue in widespread use over the long term."

In summary, HEI could not clearly determine whether there is an overall beneficial effect of oxygenated gasoline on the reduction of toxic emissions from gasoline. The Department does not feel qualified to provide any further viewpoint on this issue.

Comment 10: The rollforward analysis does not take into consideration peak spreading, or increases in traffic congestion. (Commenters 60, 61, 117)

Response: The rollforward analysis assumed a two-hour peak period for the downtown. This was done because the city's traffic model uses a peak period of 5:00 pm to 6:00 pm, even though the actual peak period is between 4:30 pm and 5:30 pm. Volume to capacity considerations (congestion effects) were taken into account. The city's analysis indicated that traffic speed on SW 3rd Avenue would decrease by 2.3 mph between 1990 and 2010 due to the forecast of increased traffic for the worst case analysis.

Comment 11: There is a lack of monitors in key areas. (Commenters 60, 61)

Response: The Department has run a very aggressive CO monitoring program in the Portland area, with three major bag sampling studies conducted within the last twelve years (1984/85, 1988/89 and 1993/94), measuring more than 100 locations . The most recent survey was performed in 1993/1994 and covered a wide geographic area of Portland. An evaluation of the data obtained during those field studies (Appendix D2-3) found no locations that appeared to have higher CO peak levels than the DEQ CO monitoring network in aggregate (except for the 82nd and Division location, which became a permanent site). Based on the special studies, we are confident that our existing

network of three microscale CO monitors and one neighborhood scale site captures maximum CO exposure levels in the Portland area.

Comment 12: The current data has been based upon unseasonably warm and windy weather. (Commenters 60, 61)

1. The last 3 winters have been warmer than normal.
2. 1994 wind speeds were higher than normal.
3. 1995 wind analysis wasn't addressed in DEQ mailing.
4. Appendix D (on meteorological issues) wasn't included in the mailing, making it impossible to verify conclusions.

Response:

Issue 1: Appendix D2-2 focused specifically on the question of whether lower CO levels in recent years could be attributable to warmer weather in those years. That analysis found that CO violations most commonly occur in a temperature range between 36 and 55 degrees Fahrenheit, and evenly distributed throughout that range. That analysis of 41 violation days during 1985-1994 found no basis for characterizing years as more prone to high CO levels based on temperature conditions alone.

Issue 2: Comment acknowledged. However, this does not negate the conclusions of the ten-year meteorological analysis. Years 1991, 1992, and 1993 had the highest number of low wind speed days out of the ten-year period, and no violations occurred during those years. The Department was deliberately conservative in the air quality analyses and based predictions of future peak CO levels on values from 1991 for the downtown CO monitors. Based on the meteorological record, 1991 was the worst case year out of the ten-year period.

Issue 3: 1995 data was not available at the time of the analysis. Focusing on ten years worth of meteorological data represents a vigorous and reasonable approach.

Issue 4: The appendices were not mailed out with the package, as they totaled more than 300 pages. However, copies of the Appendices were available at public libraries and at Department offices, and written notice was provided in the hearings notice packages that Appendices were available upon request.

Comment 13: Has bag sampling occurred by I-5 or I-84 when roads were backed up? (Commenter 61)

Response: The Oregon Department of Transportation (ODOT) operated a continuous CO monitoring station adjacent to the Banfield Freeway (I-84) near Providence Hospital between 1982 and 1987 in fulfillment of requirements of the Indirect Source Construction Permit for reconstruction of the Banfield Freeway. Measured concentrations were generally below NAAQS and were less than measurements at DEQ's highest sites (one

exceedance was recorded in 1983). Based on the facts that the monitoring site was registering compliance levels and the Department's permanent sites were recording higher maximums, the Department concurred with ODOT's recommendation to discontinue the monitoring site.

Comment 14: DEQ should discontinue the winter oxygenated fuel program prior to the start of the 1996/97 winter season. (Commenters 7, 62, 80, 96, 112, 113, 118) DEQ's analysis projects that the CO standard can be maintained without oxygenated fuel with a safety margin of 10 percent if the program is eliminated prior to the winter of 1996/97. This analysis was based on a number of very conservative assumptions.

Response: The Department agrees that the analysis was conservative, based on the worst case analysis of high downtown growth, which is not likely to be realized in the first few years of the maintenance plan, or even within the ten-year life of the plan. The Department is proposing to repeal the oxygenated fuel program prior to the start of the 1997/1998 winter season, and the Oxygenated Fuel Rule has been amended, accordingly. This will mesh with EPA's expected plan approval time frame of late summer, early fall of 1997.

Comment 15: The Portland Metropolitan Area began attaining the standard in 1990, two full years before oxygenated gasoline was required in 1992. (Commenters 7, 62, 80, 118) In the last ten years the Portland metropolitan area has experienced only one violation of the CO standard. The single violation in December 1989 alone triggered the federal requirement for an oxygenated fuel program.

Response: Comment acknowledged. The City of Portland is implementing a traffic signal improvement project along 82nd Avenue, which includes the section of 82nd Avenue next to DEQ's monitoring site near SE Division St. The project may provide additional emission reduction benefits to help insure that the 82nd Avenue corridor will remain in attainment during the ten-year maintenance plan period.

Comment 16: Continuing an oxygenated fuel mandate when it is not needed for attainment is inconsistent with the provisions of the Clean Air Act Amendments of 1990 (CAAA90). (Commenters 7, 62, 80, 118)

Response: The Department requested a clarification from EPA on the State's authority to continue an oxygenated fuel program without a demonstration of need. EPA responded to the Department's inquiry in a March 21, 1996, letter to Gregory Green (Air Quality Division Administrator from Anita Frankel (EPA Region 10, Office of Air Quality Director). EPA stated that nothing in Section 211(c)(4)(C) would prevent the State of Oregon from continuing the oxygenated fuel program under its own authority. EPA further stated that the oxygenated fuel program could be included in the maintenance plan as long as the plan indicated oxygenated fuel is not being required for maintenance, and the program is included as a State control measure.

Comment 17: In the rollforward analysis of the 82nd and Division CO monitor, DEQ used a higher growth rate than the Metro modeling indicates. The higher rate of growth was taken from Oregon Department of Transportation Traffic (ODOT) Volume Tables and does not seem to pertain to a specific region or area, whereas the Metro modeling analysis pertains specifically to the vicinity of the 82nd and Division CO monitor. The use of a potentially inflated growth for the area around the 82nd and Division CO monitor adds an additional safety factor onto the DEQ estimate. (Commenters 7, 62, 80, 118)

Response: The Metro numbers came from its model output for the portion of 82nd Avenue next to the DEQ monitor. The ODOT Traffic Volume Tables are based on periodic measurements of traffic for each facility on the State highway system, so the reported numbers were also specific to 82nd Avenue, a part of the State Cascade Highway North No. 68. The 1984 and 1993 counts were reported for 82nd Avenue at Mile Post 4.33, which is 0.09 mile south of SE Division Street and close to the DEQ monitor. Thus, both sets of traffic volume numbers (from Metro and ODOT) are specific to 82nd Avenue. EPA's guidance is to use actual traffic volume trend data for locations where modeling output indicates a lower rate of growth.

Comment 18: DEQ did not recognize the economic impact of the decrease in revenue from the federal highway fund due to the federal excise tax money (credit) for ethanol. (Commenters 7, 62, 80, 113, 118) AAA of Oregon estimated the excise tax credit costs the federal highway trust fund between $500 to $600 million a year.

Response: The Department acknowledges the estimated total impact on the federal highway fund. However, there is not a one to one relationship between the amount of federal gas tax collected in Oregon and federal highway dollars flowing back to the State. It is not certain, therefore, that the State would get any return of the potential savings of the federal excise tax credit for ethanol. The Department concluded that the calculation of a funding impact on Oregon would be too speculative and uncertain.

Comment 19: Oxygenated fuel has a fleet average fuel economy penalty. (Commenters 7, 62, 80, 96, 112, 118) This penalty increases every year as the proportion of computer-controlled vehicles increases. Actual fleet studies in other areas found a 2.4 to 2.7 percent mileage penalty for computer- controlled vehicles. Some motorists see fuel economy losses in the 7-15 percent range.

Response: EPA and Washington Department of Ecology methodology was used to determine an estimated fuel economy penalty for the Portland area. The theoretical fuel economy loss of 3.5% was weighted for the proportion of computer-controlled vehicles in proper operating condition. This was the basis for the estimated 1.9 percent fuel economy loss.

Comment 20: Oxyfuels cause fuel filter clogging at the beginning of each oxyfuel season. (Commenter 96)

Response: Comment acknowledged. When the oxygenated fuel program was initially implemented in the winter of 1992/1993, the Department received a number of complaints related to plugged fuel filters. However, that problem seems to have diminished, with little or no complaints from the most recent winter season. There was not enough data on this problem in the Portland area to allow it to be quantified accurately.

Comment 21: Remove the 82nd Avenue emissions budget from the CO plan. (Commenters 3, 115) The City of Portland is concerned about the establishment of an emissions budget for such a small area and one that has traffic and land uses that are similar to other locations in the region and believes it is unnecessary and could trigger an unwarranted conformity problem. The city believes the Environmental Quality Commission (EQC) should remove the 82nd Avenue emissions budget from the CO plan and rely on the 82nd Avenue monitor to track CO concentrations in the area.

Response: The Department disagrees with the city's recommendation on the 82nd Avenue emissions budget. This area was the most recent and severe CO hot spot problem and needs to be closely tracked through the transportation conformity process. The Department is proposing to leave the emissions budget for the 82nd Avenue area unchanged as originally recommended through the Metro committee review process. However, if an exceedance of the budget is projected in the future and both air quality measurements and air quality projections at the time indicate a safety margin, then the Department would support an increase in the budget as a revision to the SIP and seek expedited approval from EPA.

Comment 22: Additional text needed in the main body of the CO maintenance plan regarding the CCTMP. (Commenters 3, 115) The City of Portland offered additional explanatory text to accompany section 4.51.3.2.3.A.2. Central City Parking Requirements on page 38.

Response: Comment acknowledged. The city and the Department worked prior to the hearing authorization on language that would accompany the section of the plan incorporating parts of the city's Zoning Code Amendments. The language was inadvertently omitted from the documentation that went to hearing. The purpose of the additional text is to make a distinction between the parts of the Zoning Code Amendments that are directly incorporated into Volume 2 of the CO maintenance plan, requiring EPA approval for any subsequent, substantive changes and those parts that are supportive, but could potentially be changed without EPA approval.

The Department is proposing some minor changes to the offered text for purposes of clarity which should be acceptable to the city. The added text is shown in Attachment E and has been incorporated into section 4.51.3.2.3.A.2 of the maintenance plan document.

Comment 23: Additions and corrections needed for Appendix D2-8, Volume 3. (Commenters 3, 115) The City of Portland requested the following additional language for page 1 of Appendix D2-8: "The commentary to the Zoning Code is not included in the Maintenance Plan. Code provisions cited include only the text associated with that provision. Subsections are not included unless specifically mentioned." Three corrections are needed for page 2 of the appendix.

Response: The Department agrees that the companion commentary for the incorporated Zoning Code Amendments is explanatory and does not need to be included. The Department is proposing to make the city's recommended changes to the text and make the three corrections noted for page 2 of the appendix. The proposed changes are shown in Attachment E.

Comment 24: Additions and corrections needed for Appendix D2-1, Volume 4. (Commenters 3, 115) The City of Portland requested some clarifying language for the appendix containing the supporting documents. These documents are not supposed to be directly incorporated into the SIP, as opposed to D2-8 which is incorporated. Use of the word "incorporated" defeats the purpose of the distinction and is very confusing. The Department should use "included" or some other term. "Incorporated" appears twice on page 1 of Appendix D2-1, Volume 4. Fourteen (14) corrections need to be made to the text with respect to various Zoning Code Amendments.

Response: Comment acknowledged. The Department agrees with the importance of making the distinction between the two sets of Zoning Code Amendments. The Department, however, mistakenly placed the supporting elements of the Zoning Code Amendments into Volume 4. The Department is proposing to put the supporting elements of the Zoning Code Amendments into Volume 3, Appendix D2-13 and will use the term "supporting documents" and "included" to address the city's concern. The proposed changes are shown in Attachment E.

Attachment E

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Carbon Monoxide Maintenance Plan

Detailed Changes to the Original Rulemaking Proposal Made in Response to Public Comment

Changes Made to the Maintenance Plan

1. Section 4.51.3.2.3, Control Measures

. . .

Transportation Control Measures

The TCMs identified in the maintenance plan fall into two categories: non-funding based TCMs and funding based TCMs. The non-funding based TCMs reduce transportation emissions through land-use requirements and regulatory programs. The funding based TCMs reduce transportation emissions by increasing the supply of transit, bicycle and pedestrian facilities. The funding based TCMs were established in the financially constrained transportation network of Metro's interim federal RTP, adopted July, 1995, in accordance with the requirements of the federal Intermodal Surface Transportation Efficiency Act (ISTEA). This network includes only projects that can be supported based on historical funding level trends.

The funding based TCMs must receive priority funding in Metro's transportation planning process and all TCMs identified in the maintenance plan must receive timely implementation. If the TCMs do not receive priority funding and timely implementation, a conformity determination can not be made for Metro's transportation plans and all regionally significant projects will be held up until a conformity determination can be made. These requirements

are specified in the transportation conformity rules, OAR 340-020-0710 through 340-020-1080. In general, "priority funding" means that all state and local agencies with influence over approvals or funding of the TCMs are giving maximum priority to approval of funding of the TCMs over other projects within their control. "Timely implementation" means that the TCMs are being implemented consistent with the schedule established in the maintenance plan. The determination of whether priority funding and timely implementation have been achieved is made in the context of interagency consultation as specified in the transportation conformity rules.

Identified TCMs may be substituted in whole, or in part, with other TCMs providing equivalent emission reductions. Substitution occurs through consultation with Metro's Transportation Policy Alternatives Committee (TPAC) and Joint Policy Advisory Committee on Transportation (JPACT). Such substitution requires public notice, EQC approval and concurrence from EPA, but does not require a revision to the State Implementation Plan. See appendix D1-17 for the TCM substitution requirements.

The TCMs included in the maintenance plan are:

. . .

A. Non-funding based Transportation Control Measures.

. . .

2. Central City Parking Requirements

. . .

The following is a list of zoning code amendments that are being incorporated directly into the Portland Carbon Monoxide Maintenance Plan. The text of critical code provisions (such as maximum parking ratios for new development and parking provisions for existing buildings) is contained in Appendix D2-8. A list of other zoning code amendments being used as supporting documents for the maintenance plan is contained in Appendix ~~[D2-1, of Volume 4]~~D2-13 of Volume 3 of the Oregon State Implementation Plan.

Section 1: Incorporated Amendments to Chapter 33.510, Central City Plan District

Code Number	Code Title

. . .

~~(33.510.261.E.1-2)~~
(33.510.261.E.1.a(1)-(2),b,E.2.a(1)-(2),b)

~~(33.510.263.A.1-7)~~
(33.510.263.A.1.a-c(1)-(4),A.2-4.a-b(1)-(3),A.5-7.a-c)

~~(33.510.263.B.1-4.a)~~
(33.510.263.B.1.a-c(1)-(2),B.2-4.a)

~~33.510.263.E.1,3~~
(33.510.263.E.1.a-b,E.3.a-c)

~~(33.510.263.G.4.a.1-2,d)~~
(33.510.263.G.4.a.(1)-(2),G.4.d(1)-(3))

~~(33.510.264.A.1,2.a,4.a)~~
(33.510.264.A.1.a-c(1)-(4),A.2.a,A.4.a)

~~(33.510.264.B.1.2.a-c.4.a-c)~~
33.510.264.B.1.a-c(1)-(2),B.2.a-c,B.4.a-c)

~~(33.510.264.F.4.e.1-3)~~

(33.510.264.F.4.e.(1)-(3))

~~(33.510.265.A.1.2.a.4.a)~~
(33.510.265.A.1.a-c,A.2.a,A.4.a)

~~(33.510.265.B.1.2.a b)~~
(33.510.265.B.1.a-c (1)-(4), B.2.a, b)

33.510.265.B.4.a-c
(33.510.265.B.4.a-c)
VI.D.1.a. (1) - (5) Administration Section: Preservation Parking

. . .

Section 3: Incorporated Maps

Map Number	Map Title
510-8	Core and Parking Sectors - EPA

Unless it is a substitution of a Transportation Control Measure producing equivalent emission reduction, any change in the Portland Metro Area CO Maintenance Plan language will require adoption of a formal amendment by the EQC and approval by EPA. The City of Portland may make changes to City policies and regulations which are included in the Portland Metro Area CO Maintenance Plan provided they do not relax the stringency of the air quality control strategies. DEQ will work with the City to notify EPA of such changes. These changes will be incorporated into the Portland Metro Area CO Maintenance Plan at a future convenient time.

Changes to documents supporting the Portland Metro Area CO Maintenance Plan (zoning code amendments not directly incorporated into the Portland Metro Area CO Maintenance Plan, but listed in Appendix D2-13 of Volume 3 of the Oregon State Implementation Plan) which do not affect the stringency of the air quality control strategies will not require adoption of a formal amendment by the EQC and approval by EPA. DEQ and the City of Portland will review potential changes to the supporting documents to determine whether they affect the stringency of the air quality strategies. If it is determined that stringency will not be affected, DEQ will submit those changes to EPA for concurrence and administrative incorporation into the Portland Metro Area CO Maintenance Plan.

. . .

B. Funding based Transportation Control Measures.

. . .

~~[C. TCM Substitution.~~

~~TCMs identified may be substituted in whole, or in part, with other TCMs providing equivalent emission reductions. Substitution will occur through consultation with Metro's Transportation Policy Alternatives Committee (TPAC) and Joint Policy Advisory Committee on Transportation (JPACT). Such substitution will require EQC, but not EPA, approval. Appendix D2 10 2 provides further details on TCM substitution requirements.~~]

2. Section 4.51.3.2.3, Control Measures

The emissions projections showed an overall decrease without additional controls. Credit is being taken for the enhanced vehicle inspection and maintenance program required for the Ozone maintenance plan. This credit will largely offset the emissions increase associated with repealing the oxygenated fuel program[~~, if the EQC elects to do so~~].

3. Section 4.51.3.2.3, Control Measures

. . .

Vehicle Inspection and Maintenance Program Improvements

. . .

The 1993 Oregon Legislature adopted rules (in ORS 815.300) which eliminated the exemption from the vehicle inspection program for [~~testing for vehicles that are 20 or more years old~~]vehicles from model year 1975 and newer. These rules have previously been submitted to EPA. Vehicles made in 1975 and later model years will be permanently included in the testing program. The emission projections for motor vehicles, as documented in Appendix D2-4, incorporate this change as well.

4. Section 4.51.3.2.3, Control Measures

. . .

Major New Source Review

. . .

The industrial growth allowance for CO amounts to ~~[13,640]~~ 14880 pounds CO/winter day (and ~~[2475]~~ 2700 tons/year). The growth allowance for CO was derived based on 1 percent per year growth in industrial emissions. Because there is sufficient airshed capacity, the entire growth allowance is available for allocation at any time between plan approval and ~~[2006]~~2007.

To make the growth allowance "pool" last as long as possible, sources will be encouraged to provide offsets, if possible, for all or part of the proposed increase. Once the growth allowance is fully allocated, offsets for all proposed major sources and major modifications will again be required.

~~[DEQ will track allocations of the growth allowance, and include this information in attainment verification reports to EPA described in Section 4.51.4.2.]~~ DEQ will prepare a thorough accounting of any activity in the growth allowance program for each period identified in Table 4.51.3.1, including any allocations to sources and any increases in the growth allowance. This information will be reported to EPA within 12 months following the end of the reporting period. If there were any increases to the growth allowance since the last report, DEQ will include a clear discussion of how each increase to the growth allowance is based on a surplus and federally enforceable emission reduction. This is also discussed in Section 4.51.4.4 "Maintenance Plan Commitments" and Appendix D2-11 (New Source Review Rules).

5. Section 4.51.3.3, Contingency Plan

. . .

Phase 1: Risk of Violation

. . .

Phase 2: Actual Violation

. . .

If a violation of the CO NAAQS standard occurs, and is validated by DEQ, the following contingency measures will automatically be implemented:

(1) ~~[*Major new and modified industry will be required to meet nonattainment area New Source Review requirements (LAER and offsets). Any remaining growth allowance will be eliminated.*]~~
New Source Review requirements for proposed major sources and major modifications in the Maintenance Plan area (and the area of significant air quality impact) will be modified. The requirement to install Best Available Control Technology (BACT) will be replaced with a requirement to install Lowest Achievable Emission Rate (LAER) technology. In addition, the industrial growth allowance established in Section 4.51.3.2.3 will be eliminated. These requirements will take effect upon validation of the violation. BACT and a growth allowance allowance may be reinstated if provided for in a new maintenance plan adopted and approved by EPA.

(2) Oxygenated gasoline at 2.7 percent weight will be required. Oar 340-022-0460 (see Appendix D2-14-3) delineates the "reinstatement" procedures. Subsection (8) (b) states that a validated violation of the 8-hour CO standard will result in the requirements of OAR 340-022-0440 through 022-0640 being reinstated beginning in the winter season following the violation, but no sooner than six (6) months following that violation. Subsection (8) (c) states that such reinstatement will be automatic and that no further rule making will be required.

(3) The downtown parking lid will be reinstated. (This measure will ~~only~~ be implemented only if the violation occurs in the downtown area formerly under the parking lid requirement.)

~~The oxygenated fuel program would be automatically reinstated without further rulemaking if any violation (two or more exceedances of the 8 hour standard at a permanent monitoring site in a calendar year) were recorded.~~

6. Section 4.51.4.1.2, 1990 Clean Air Act Requirements and Status

. . .

d. *Transportation Conformity Requirements.* Section 176(c) of the Clean Air Act requires states to revise the SIPs to establish criteria and procedures for demonstrating transportation plan conformity to a SIP. On April 14, 1995, DEQ submitted to EPA a revision to the Oregon SIP establishing transportation conformity requirements for Oregon (OAR 340-020-0710 through 340-020-1080). General Conformity requirements (OAR 340-020-1500 through 340-020-1600) were submitted on September 27, 1995. ~~[*DEQ expects these*~~

~~*conformity rules to be approved by EPA prior to, or concurrent with, this redesignation request/maintenance plan.*~~]EPA approved the transportation conformity rules as a SIP revision on May 16, 1996.

e. *New Source Review Rules (NSR) for "major sources"* On November 16, 1992, DEQ submitted revisions to the New Source Review permit program. These revisions included a requirement that offsets come from contemporaneous, actual emission reductions under OAR 340-028-1970(5), and other changes.

DEQ expects these NSR revisions to be approved by EPA before, or concurrent with, this redesignation request/maintenance plan, although approval is not required prior to redesignation according to EPA guidance. DEQ will also submit further revisions to establish NSR requirements for the Portland area effective upon redesignation (see Control Measures in Section 4.51.3.2.3, Maintenance Plan Commitments in Section 4.51.4.4, and New Source Review Program Changes in Appendix 2-11).

7. Section 4.51.4.3, Verification of Continued Attainment

. . .

The DEQ will also [~~*update the CO emission inventory for each of the years listed in Tables 4.51.3.1 through 4.51.3.3, compare it to the emission forecast and attainment inventory, and evaluate any changes that may have occurred. The emission inventories will be submitted to EPA within 23 months following the end of the periodic emission inventory calendar year.*~~] prepare an updated emission inventory summary for 1996, 1999, 2001, 2003 and 2007. These updates will be submitted to EPA Region 10 within 12 months following the end of the periodic emission inventory calendar year. In preparing the updates, DEQ will review the emission factors, growth factors, rule effectiveness and penetration factors, and other significant assumptions used to prepare the emission forecast. DEQ will confirm these factors and/or adjust them where more accurate information is available. Any new emission sources will be included in the update.

DEQ will compare the updated emission summary to the emission forecast and the attainment inventory in Tables 4.51.3.1 through 4.51.3.3, and evaluate any changes that have occurred. If there have been significant changes, DEQ will, in consultation with EPA Region 10, determine if a more extensive periodic emission inventory is necessary. If a more extensive inventory is necessary, it will be submitted to EPA within 23 months after the end of the reporting year.

See Commitments in Section 4.51.4.4 "Maintenance Plan Commitments".

8. Section 4.51.4.4, Maintenance Plan Commitments

. . .

DEQ will prepare periodic emission inventory updates for 1995, 1997, 2001, 2003, and ~~[2006]~~2007. The emission inventor~~[ies]~~y updates will be submitted to EPA within ~~[23]~~ 12 months following the end of the periodic emission inventory calendar year as specified in Section 4.51.4.3.

DEQ will submit a backup emission reduction measure as a revision to the SIP if the federal Low Emission Vehicle (fedLEV) is delayed beyond 2001. The measure will be proposed for adoption by the EQC by November 1, 1999.

DEQ will prepare reports on activity in the industrial growth allowance program for the periods 1996-1997, 1998-2001, 2002-2003, and 2004-2007. These reports will be submitted to EPA within 12 months following the end of the period as specified in Section 4.51.3.2.3.

DEQ will maintain documentation of approved TCM substitutions as specified in Appendix D2-10.

DEQ will develop the next ten year maintenance plan ~~[(2007-2016)]~~ (2007-2017) in coordination/ conjunction with Metro. This plan will be submitted to EPA by December 31, 2004.

9. Appendix D2-11, New Source Review Program Changes

. . .

DEQ plans to propose amendments to the NSR program to specifically establish NSR requirements for redesignated (maintenance) areas. These requirements will include:

- Best Available Control Technology (BACT);
- offsets
- growth allowance for use in lieu of offsets if provided for in the maintenance plan for the area; and
- an alternatives analysis.

For proposed major sources and major modifications with potential emissions of 250 tons per year or more (100 tons per year or more in certain source categories), the remaining PSD requirements will apply as well. The amendments will also ~~[require sources in a redesignated area to comply with NSR requirements for nonattainment areas]~~replace BACT with LAER and prohibit the use of a growth allowance to meet offset requirements if the contingency plan in the maintenance plan has been triggered.

~~[The NSR amendments will be included as part of a comprehensive update of the NSR and Plant Site Emission Limit (PSEL) rules.]~~The rule adoption schedule is as follows:

- Public notice - 8/1/96 to 9/6/96
- EQC adoption - 11/15/96

10. Appendix D2-10, Land Use Measures and TCM Substitution

In the event that a Transportation Control Measure (TCM) is not included in the Regional Transportation Plan (RTP) or Transportation Improvement Program (TIP) in the time frame contained for that measure in ~~[a SIP]~~ this maintenance plan adopted by the Environmental Quality Commission (EQC), the parties in the interagency consultation process established pursuant to OAR 340-020-0760 shall assess whether such measure continues to be appropriate. Where the Metro and the Department of Environmental Quality (DEQ) concur that a transportation control measure identified in the SIP is no longer appropriate, the agencies may initiate the process described in this Appendix to identify and adopt a substitute transportation control measure.

A substitute TCM must provide for equivalent or greater emissions reductions than the measure contained in the maintenance plan. In addition, a replacement measure must be implemented in the time frame established for the measure contained in this plan. Where such implementation date has already passed, funding based measures selected pursuant to this Appendix must be included in the first year of the next TIP and long range plan adopted by Metro. The substitution process described in this Appendix may be a basis for a finding of timely implementation under OAR 340-020-0840 for no more than two years after the implementation date established for the measure to be replaced.

Metro will convene a committee (or working group) to identify and evaluate possible substitute measures. The committee shall include members from all affected jurisdictions, state and/or local air quality agencies and local transportation agencies. In addition, the working group shall consult with EPA. Consultation with EPA may be accomplished by sending copies of all draft and final documents, agendas and reports to EPA Region 10.

Metro ~~and~~, DEQ, and EPA Region 10 must concur ~~[in]~~with the appropriateness and equivalency of the substitute TCM. All substitute measures must be adopted by the Environmental Quality Commission following the public comment period and EPA's 14-day concurrence period described below. The measure to be replaced shall stay in effect until the substitute measure has been adopted.

The TCM to be replaced must be rescinded for the new TCM substituted pursuant to this Appendix to be effective. By adopting a substitution under this Appendix, the EQC formally rescinds the previously applicable TCM and adopts the substitute measures.

Prior to adopting a substitute measure under this Appendix, the substitute transportation control measure(s) must have been subject to a public hearing and comment process. This means there must be at least one public hearing on the substitution. The hearing can only be held after reasonable public notice, which will be considered to include, at least 30 days prior to the hearing:

- notice given to the public by prominent advertising in the area affected announcing the date time and place of the hearing;
- availability of each proposed plan or revision for public inspection in at least one location in each region to which it will apply;
- notification to interested parties in accordance with the Oregon Administrative Procedures Act;
- notification to the Administrator (through the Region 10 Office);
- notification to the Southwest Washington Air Pollution Control Agency and the Washington Department of Ecology; and
- notification of the chief executives of affected local governments, planning agencies, transportation agencies, environmental control agencies, and economic development agencies.

A description of the measure(s) and analysis supporting the proposal, including assumptions and methodology must be made available to the public, ~~[and]~~ DEQ, and EPA Region 10 within a reasonable time before the public hearing, and at least 30 days prior to the close of the comment period. DEQ shall submit to EPA Region 10 a summary of comments received during the public comment period along with DEQ's responses following the close of the public comment period. EPA shall notify DEQ within 14 days if the Agency's concurrence with the substitution has changed as a result of the public comments. Where EPA fails to notify DEQ within 14 days, EPA is deemed to concur.

The analysis of substitute measures under this Appendix must be consistent with the methodology used for evaluating measures in the ~~[*SIP*]~~maintenance plan. Where emissions models and/or transportation models have changed since those used for purposes of evaluating measures in the ~~[*SIP*]~~maintenance plan, the ~~[*original SIP*~~]TCM to be replaced and the substitute measure(s) shall be evaluated using the latest modeling techniques to demonstrate equivalent or greater emissions reductions will be achieved through implementation of the substitute measure(s).

~~[*DEQ shall submit the proposed methodology with an explanation of the discrepancies and their effect to the appropriate person in EPA Region 10. EPA shall approve or disapprove the proposed methodology by sending a written response to the Director of DEQ within 30 days. Where EPA fails to approve or disapprove within 30 days, EPA is deemed to approve.*]~~

Key methodologies and assumptions that must be consistent, and reconciled in the event of a discrepancy, are, for example:

- EPA approved regional and hot-spot (for CO and PM-10) emissions models;
- the area's transportation model; and
- population and employment growth projections~~[,]~~.

DEQ will maintain documentation of approved TCM substitutions. The documentation will provide a description of the substitute and replaced TCMs, including the requirements and schedules. The documentation will also provide a description of the substitution process including the committee or working group members, the public hearing and comment process, EPA's concurrence, and EQC adoption. The documentation will be submitted to EPA following adoption of the substitute measure by EQC, and made available to the public as an attachment to the maintenance plan. See Section 4.51.4.4, Maintenance Plan Commitments.

~~[*Any TCM replaced pursuant to this Appendix must provide for equivalent or greater emissions reductions than the measure contained in the SIP. In addition, a replacement measure must be implemented in the time frame established for the measure contained in this plan. Where such implementation date has already passed, transportation facility based measures selected pursuant to this Appendix must be included in the first year of the next TIP and long range plan adopted by Metro.*~~

~~*The TCMs in the previous SIP revision must be rescinded for the new TCMs substituted pursuant to this Appendix to be effective. By adopting a substitution under this Appendix, the Environmental Quality Commission formally rescinds the previously applicable TCMs and adopts the measures presented in this document.*]~~

11. Miscellaneous changes

A number of typographical, grammatical and editorial changes were made throughout the carbon monoxide maintenance plan.

12. Section 4.51.0.2.4, Maintenance Plan Summary

. . .

Removal of Old Vehicle Exemption from Vehicle Inspection Program

This strategy eliminates the exemption from testing for vehicles ~~[*that are*]~~ when they become 20 ~~[*or more*]~~ years old. Vehicles made in 1975 and later model years will now be permanently included in the testing program. This strategy was adopted by the Oregon Legislature in 1993, and was submitted as a revision to the Oregon State Implementation Plan on August 30, 1994.

13. Section 4.51.0.2.3, Maintenance Plan Development Process

The DEQ primarily used the Central City Transportation Management Plan (CCTMP) development process to develop the CO maintenance plan provisions. The CCTMP was intended to address a "buildout" condition by 2010 and beyond. Under "buildout", the developed density of the Central City would be substantially increased to accommodate 15,000 new housing units and 75,000 new jobs. The Portland City Council adopted the CCTMP and implementing ordinances in December, 1995. This plan included:

> Retention of the maximum parking ratios in effect for the last twenty years in the downtown area with slight modification (some residential parking ratios were increased from 1.2 parking spaces per dwelling unit to 1.35 spaces per dwelling unit in the core area of the downtown; also, office ratios in the close-in North Burnside area were changed from 0.8/0.9 spaces per 1,000 sq. ft. of net building area to 1.5 spaces per 1,000 sq. ft. of net building area, and ratios for the North Burnside area closest to the River were increased to 2.0 spaces per 1,000 sq. ft. of net building area.), ...

14. Section 4.51.2.2, Attainment Years and Concentrations

Downtown Portland has been in compliance with the NAAQS for CO for nine consecutive calendar years. The site at SE 82nd and Division has been in compliance for ~~[*four*]~~ five consecutive years.

15. Section 4.51.3.2.3 Control Measures

. . .

Transportation Control Measures (TCM's)

. . .

A. Non-funding based Transportation Control Measures.

. . .

2. Central City Parking Requirements

. . .

The following is a list of zoning code amendments that are being incorporated directly into the Portland Carbon Monoxide Maintenance Plan. The text of critical code provisions (such as maximum parking ratios for new development and parking provisions for existing buildings) is contained in Appendix D2-8. A list of other zoning code amendments being used as supporting documents for the maintenance plan is contained in Appendix ~~*[D2-1, of Volume 4]*~~D2-13 of Volume 3 of the Oregon State Implementation Plan.

Items in Volume 3 of the SIP are federally enforceable. With regard to Volume 3 items, EPA has allowed DEQ to make changes which are merely administrative, without requiring public process. DEQ and EPA make a determination as to whether a proposed change by the City of Portland is merely administrative rather than substantive.

16. Appendix D2-4-1, Base Year (1990) Emission Inventory

. . .

Stationary area sources comprised 17% of the total CO emissions in the Portland area on a winter season day. Within the area source category, residential wood combustion accounted for 94% of the emissions. Wood combustion in fireplaces accounted for 52% of the total area source emissions, and wood combustion in stoves accounted for 42% of the area source emissions.

17. Appendix D2-4-1, Attainment Year (1991) Emission Inventory

. . .

Stationary area sources comprised 17% of the total CO emissions in the Portland area on a winter season day. Within the area source category, residential wood combustion accounted

for 93% of the emissions. Wood combustion in fireplaces accounted for 57% of the total area source emissions, and wood combustion in stoves accounted for 37% of the area source emissions.

18. Table of Contents

D2-13 ~~[*Other Supporting Documentation/Technical Analysis*]~~
CCTMP Zoning Codes Used As Supporting Documentation in the Portland Carbon Monoxide Maintenance Plan

19. Section 4.51.0.2, Executive Summary; The Portland Carbon Monoxide Maintenance Plan

. . .

The CO maintenance plan, which incorporates key elements of the CCTMP, provides for maintenance of the CO standard for ten years, ~~[*with or without a wintertime oxygenated fuel program*]~~with repeal of the oxygenated fuels program beginning with the 1998/99 winter season. The maintenance plan will also remove Federal Clean Air Act (FCAA) impediments to industrial growth and shield the Portland area from Federal Clean Air Act sanctions on federal transportation funds while providing for protection of public health.

20. Section 4.51.0.2.2, Need for Maintenance Plan

Projections of Future CO Levels

Motor vehicle CO emission controls are projected to be increasingly effective in future years. The fleet average emission rate is expected to decrease by ~~[54]~~55 percent from 1990 to ~~[2006]~~2007.

A high growth scenario was analyzed for the critical Central City area to determine the combined effect on CO air quality of the increased effectiveness of vehicle emission controls and increased vehicle travel caused by growth. The high growth scenario included adding 75,000 new jobs and 15,000 new housing units in the area over the next 20 years, extension of the downtown maximum parking ratio concept to the Central City area and elimination of the downtown parking lid. Results indicate that compliance with the CO standard can be maintained with ~~[*or without the continuation of the oxygenated fuels program*]~~ repeal of the oxygenated fuels program beginning with the 1998/99 winter season, as shown in Figure 4.51.0.2.

21. Section 4.51.0.2.4, Maintenance Plan Summary

Oxygenated Fuels

The 1990 Federal Clean Air Act Amendments required the Portland area to implement an oxygenated fuel program to control CO, because the area was still designated nonattainment, even though compliance with the federal CO standard was achieved in 1991. The program was implemented in 1992. The DEQ projects that compliance with the CO standard can be maintained ~~without oxygenated fuel~~ with a safety margin of ~~[*10*]~~21 percent (~~[*0.9*]parts per million) in the~~ for the first winter seasonof ~~[*1996/1997*]~~(1998/1999) without oxygenated fuel (with the Enhanced Vehicle Inspection program approximately one-half phased in). ~~[*With oxygenated fuel, the margin would be 27 percent (2.6 ppm) in the winter of 1996/1997. Without oxygenated fuel, t*]~~The margin of safety would increase~~be~~ to ~~21~~ 28 percent ~~(2.0 ppm) by [*2006*]~~after the winter of 1998/1999 when the Enhanced Vehicle Inspection program is fully phased in and then decrease to 21 percent by 2007 as an expected large increase in auto traffic erodes improvements in vehicle emission controls. ~~In either case the margin would increase with time, as the federal new car program continues and the enhanced vehicle inspection program is phased in.~~

~~[*Metro has recommended that the oxygenated fuel program be continued until the 1998/1999 winter and then evaluated for continued need. The ethanol industry supports continued operation of the program. The petroleum industry supports an immediate repeal, based on a lack of need for the program and cost impacts.*]~~

~~[*[Note to reviewers: The DEQ has not taken a position on the oxygenated fuels issue. The DEQ seeks comment during the public hearing process refer to pages six and seven of the cover memo for a list of potential options and factors to consider.]]~~

22. Section 4.51.0.2.4, Maintenance Plan Summary

. . .

Contingency Plan Elements

The maintenance plan must contain contingency measures that would be implemented either to prevent or correct a violation of the CO standard after the area has been redesignated to attainment. The FCAA requires that measures in the original attainment plan be reinstated if a standards violation occurs. Under the proposed contingency plan, adopted under the CCTMP and recommended by Metro, the DEQ would convene a planning group if the validated second highest (within one calendar year) 8-hour CO concentration equals or exceeds 8.1 ppm (90 percent of the 8-hour CO standard). A range of action would be considered from implementing candidate measures to deciding to do nothing. However, if a violation of the 8-hour CO standard were to occur, control measures that would be restored include Lowest Achievable Emission Rate (LAER) requirements plus offsets for major new and modified industrial sources and wintertime oxygenated gasoline at 2.7 percent weight for motor vehicles

~~[(if the oxygenated fuels program is repealed prior to the occurrence of violations)]~~. If the violation occurred within the defined area of the former Downtown Parking and Circulation Policy, roughly the Central Business District of downtown Portland, then the parking lid would be reinstated. The parking lid would not be reinstated if a violation occurred outside the downtown area.

23. Section 4.51.3.2.1, Inventory Projections

Figure 4.51.3.4 shows the Portland area CO emissions projected to the year ~~[2006]~~2007, with bar graphs for the region, the CCTMP subarea, and the 82nd Avenue subarea. Table 4.51.3.2.1 presents the 1991 figures and projection year figures on CO emissions in four major source categories, and also includes emission projections for the CCTMP and 82nd Avenue Corridor subareas. The procedures used for projecting these emissions and detailed results for individual sources are presented in Appendix D2-4.

Regional emissions are projected to be a total of ~~[1,736]~~1741 thousand pounds/winter day in ~~[2006]~~2007; this is about a 30 percent decrease from the 1991 level. ~~[Emissions were projected assuming the oxygenated fuel program would be discontinued in the year 1998.~~[1] As shown, the total emissions in all years after 1991 stay well below the 1991 attainment emission level. The decrease in emissions from 1991 to ~~[2006]~~2007 is largely due to the decrease in mobile emissions from fleet turnover and the vehicle inspection and maintenance program. Point sources are expected to increase slightly from the growth in the area; this growth includes production increases from existing sources and growth for new industry. Area source emissions are projected to grow about ~~[7]~~ 9 percent during the 1991-~~[2006]~~2007 period, and non-road mobile source emissions are projected to grow about ~~[24]~~ 25 percent during the 1991-~~[2006]~~2007 period. On-road mobile sources accounted for about 73 percent of total regional emissions in 1991 and are projected to account for about ~~[55]~~54 percent of total regional emissions in ~~[2006]~~2007.

Total emissions in the two subareas are projected to decrease by an even greater proportion. Total CO emissions in the CCTMP drop from 204 thousand pounds per day in 1991 to about ~~[99]~~98 thousand pounds per day in ~~[2006]~~2007. Total CO emissions in the 82nd Avenue subarea drop from about 13.5 thousand pounds per day in 1991 to about ~~[6.3]~~6.2 thousand pounds per day in ~~[2006]~~2007.

24. Section 4.51.3.2.3, Control Measures

The emissions projections showed an overall decrease without additional controls. Credit is being taken for the enhanced vehicle inspection and maintenance program required for the Ozone maintenance plan. This credit will largely offset the emissions increase associated with

repealing the oxygenated fuel program~~[, if the EQC elects to do so]~~. Also, the Portland City Council adopted the Central City Transportation Management Plan (CCTMP) on December 6, 1995, after a five-year planning process. The CCTMP is intended to advance a "buildout" vision of the Central City Plan to the year 2010 and beyond. The chief implementing mechanism is the Zoning Code amendments, also adopted by the Portland City Council on December 6, 1995. Key portions of the City of Portland Zoning Code amendments are included in this maintenance plan under the Non-funding Based TCM's section. The CCTMP replaced the 1980 Updated Parking and Circulation Policy. Although the CCTMP eliminated the ceiling on downtown parking, it provided for the expansion of the system of maximum parking ratios to the entire area of the Central City. (The CCTMP provided for the maximum parking inventory, augmented by the Parking Offset program, to remain in effect until EPA approval of the CO maintenance plan.) Metro's adopted resolution regarding the carbon monoxide maintenance plan strategies and emissions budgets is presented in Appendix D2-7.

25. Section 4.51.3.2.4, Rollforward Analysis

A worst case analysis, with a higher number of future parking spaces than expected, was undertaken to project hot spot CO concentrations at the DEQ downtown monitoring stations, in order to demonstrate that attainment is projected to continue through ~~[2006]~~2007. A rollforward projection was also done for the SE 82nd and Division CO monitoring site (The methodology and calculations are contained in Appendix D2-12).

For the downtown area, the CCTMP transportation modeling was based on a 20-year period from 1990 to 2010. The key growth assumptions incorporated into the modeling included the addition of 75,000 jobs and 15,000 housing units to the Central City area over twenty years to 2010 and parking costs increasing at 1 percent above the inflation rate. With increased housing densities and relatively high parking costs, the modeling indicated the number of parking spaces in downtown Portland would increase by a net of 2,573 spaces, assuming the existing sites of off-street surface parking (approximately 5,800 spaces) were redeveloped.

The worst case scenario was undertaken to determine the air quality effects of a higher level of parking and traffic than given by the baseline modeling, since the parking lid would not be in place to limit the growth in parking. The same level of development was assumed, but parking costs were assumed to increase at the level of inflation. This had the effect of increasing the number of commuter trips by car into the downtown area and increasing the demand for commuter parking by 7,204 spaces.

For this increased level of parking, traffic volumes and speeds adjacent to the DEQ CO monitors in the downtown were determined. Block face CO emissions were calculated with Mobile5a and applied to the respective design values at the two monitors (9.2 parts per million (ppm) at the Postal Building site and 8.7 ppm at the 4th and Alder site, both recorded in 1991). The worst case scenario resulted in the following 8-hour CO concentration projections

for 1999 and [~~2006~~]2007 (both years without the oxygenated fuel emission reduction credit and with the enhanced inspection program; 1999 with the enhanced program 50 percent phased-in):

Postal Building (SW 3rd and Alder)	~~8.5~~7.5 ppm (~~1997~~1999)	7.5 ppm ([~~2006~~]2007)
4th and Alder	~~7.2~~6.2 ppm (~~1997~~1999)	[~~5.5~~]5.4 ppm ([~~2006~~]2007)

For the SE 82nd and Division DEQ hot spot monitoring location, Metro's transportation model indicated a traffic growth rate of 0.4 percent per year from 1990 to 2010. By contrast the Oregon Department of Transportation Traffic Volume Tables (1984 and 1993) indicated an annual growth rate of 0.7 percent per year. ODOT's 0.7 percent growth rate was used. Traffic counts taken by the City of Portland in 1989 on SE 82nd Avenue at SE Division were used in conjunction with the baseline 8-hour CO concentration of 9.8 ppm, recorded in 1989 as the Portland area design value. Speed runs[2] conducted by DEQ in 1994 were used to establish the speeds used in the Mobile5a emission factor model. The modeling resulted in the following predictions for ~~1997~~1998 and [~~2006~~]2007 (without oxygenated fuel):

82nd and Division	~~8.4~~7.4 ppm (~~1997~~1999)	[~~7.1~~]6.8 ppm ([~~2006~~]2007)

The rollforward analysis indicates continued attainment for all 3 sites through the year [~~2006~~]2007.

26. Contingency Plan, Section 4.51.3.3

The Maintenance Plan must contain contingency measures that would be implemented in the event of: 1) a violation of the CO standard after the area has been redesignated to attainment, or 2) other appropriate triggering protocol contained in the plan. Portland's contingency plan is outlined below.

FCAA Section 175A(d) requires that all control measures contained in the State Implementation Plan (SIP) prior to redesignation be retained as a contingency measure in the Maintenance Plan. Therefore, [~~*Portland's current*~~]the oxygenated fuel program, the DPCP parking lid, and LAER and offsets for major industrial sources must be contingency measures in the CO Maintenance Plan.

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[2]Driving tests conducted to determine typical traffic speeds on a particular street at particular time periods. The operator attempts to drive the vehicle at a speed equal to the average of other vehicles on the road at that time. The purpose is to determine average travel speeds by dividing distance traveled by elapsed time (including stops).

27. Section 4.51.3.2.1, Inventory Projections
Table 4.51.3.1: CO Emissions Attainment and Projection Inventories[3]

CO Emissions: Region (=CO Nonattainment Area=Metro Boundary)
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	~~[2006]~~ 2007
Area Sources	411	382	392	405	417	~~[440]~~ 447
Non-Road Mobile Sources	135	146	151	160	163	~~[168]~~ 169
Large Point Sources	116	124	165	170	171	~~175~~ 178
On-Road Mobile Sources	1812	1217	1075	1074	1011	~~[953]~~ 947
Total	2474	1868	1783	1808	1762	~~[1736]~~ 1741

FOOTNOTE BELOW DELETED

[3]Emissions budget figures are for on-road motor vehicle emissions, assuming repeal of the oxygenated fuel program after the winter of 1997-1998. These tabulated numbers will be adjusted appropriately as required by the EQC's ultimate action regarding oxygenated fuels.

CO Emissions: CCTMP Sub-Area
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	~~[2006~~ 2007
Area Sources	9.3	8	8	8	9	9
Non-Road Mobile Sources	3.4	4	4	4	4	4
Large Point Sources	0	0	0	0	0	0
On-Road Mobile Sources	192	123	107	103	95	~~[87]~~ 86
Total	204	135	119	115	107	~~[99]~~ 98

Table 4.51.3.1 (continued)[4]
CO Emissions: 82nd Avenue Corridor Sub-Area
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	~~[2006]~~2007
Area Sources	1.5	1.3	1.3	1.2	1.2	1.2
Non-Road Mobile Sources	.4	.4	.4	.4	.4	.4
Large Point Sources	0	0	0	0	0	0
On-Road Mobile Sources	11.6	7.3	6.2	5.8	5.3	~~[4.7]~~ 4.6
Total	13.5	8.9	7.8	7.4	6.8	~~[6.3]~~ 6.2

FOOTNOTE BELOW DELETED

[4]Emissions budget figures are for on-road motor vehicle emissions, assuming repeal of the oxygenated fuel program after the winter of 1997-1998. These tabulated numbers will be adjusted as required by the EQC's ultimate action regarding oxygenated fuel.

28. Section 4.51.3.2.1, Inventory Projections

Table 4.51.3.2.: Transportation Emissions Budgets Through 20072006[5]

Regional Transportation CO Emissions Budget
(CO Non-Attainment Area=Metro Boundary)
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	[2006] 2007
Budget	1812	1217	1075	1074	1011	[953] 947

CO Transportation Emissions Budget: CCTMP Sub-Area
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	[2006] 2007
Budget	192	123	107	103	95	[87] 86

CO Transportation Emissions Budget: 82nd Avenue Corridor SubArea
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	[2006] 2007
Budget	12	7	6	6	5	5

FOOTNOTE BELOW DELETED

[5]Emissions budget figures are for on-road motor vehicle emissions, assuming repeal of the oxygenated fuel program after the winter of 1997-1998. These tabulated numbers will be adjusted appropriately as required by the EQC's ultimate action regarding oxygenated fuels,

29. Section 4.51.3.2.1, Inventory Projections

Because the transportation emissions budgets were developed based on Metro forecasts, DEQ anticipates that the identified budgets will be sufficient for conformity determinations conducted through the year ~~[2006]~~2007, the last year of the Maintenance Plan, provided that Metro funds and implements the Transportation Control Measures (TCMs) identified in the financially constrained network included in the interim federal RTP (adopted July 1995). However, DEQ and Metro anticipate that the ~~[2006]~~2007 CO transportation emissions budget will not be sufficient for conformity analyses of years beyond the end of the Maintenance Plan. For this reason, separate transportation emission budgets have been established for this post-Maintenance Plan timeframe (see Table 4.51.3.3).

Table 4.51.3.3: Post-Plan Transportation Emissions Budgets[6]

FOOTNOTE BELOW DELETED

[6]Emissions budget figures are for on-road motor vehicle emissions, assuming repeal of the oxygenated fuel program after the winter of 1997-1998. These tabulated numbers will be adjusted appropriately as required by the EQC's ultimate action regarding oxygenated fuels.

30. **Appendix D2-4-3**
Regional Emission Forecast, Portland (Metro) Area

On-road Mobile Source Emissions Forecast(p. D2-4-3-25)

Because of the Oregon enhanced testing program applies a number of different tests to different model years, the tested area factors could not be calculated directly by Mobile 5a_H. Therefore, several Mobile 5a_H model runs were conducted for each year to calculate the emission reduction credit from the Basic test, the Bar 31 test, and the under hood inspection conducted on specified vehicle model years. In addition, emission factors were calculated with and without oxygenated fuels for each year from 1996 through 2001 ~~[*because a final decision on retaining or eliminating the oxygenated fuel program has not yet been made.*[7]]~~ to aid in the evaluation of the oxygenated fuels program. These model runs were then combined according to the methodology described in Appendix D2-4-5.

Transportation emissions budgets after ~~[*2006*]~~ 2007

. . .

Emissions budgets after ~~[*2006*]~~2007 are discussed in Section 4.51.3.2.2.

31. **Appendix D2-4-3**
Regional Emission Forecast, Portland (Metro) Area

Exhibit D2-4-3-8
Emission Forecast Summary(p. D2-4-3-55)

The forecasts for CO emissions are summarized in Exhibit D2-4-3-8. The exhibit summarizes emissions from point, non-road mobile sources, on-road mobile sources, and area sources. Emissions are subtotaled for 1991, 1995, 1997, 2001, 2003, and ~~[*2006*]~~ 2007, consistent with the years analyzed in the maintenance demonstration (see Section 4.51.3.1 and Table 4.51.3.1).

FOOTNOTE BELOW DELETED

[7] The forecasts in this appendix assume repeal of the oxygenated fuel program after the winter of 1997-1998. These tabulated numbers will be adjusted appropriately as required by the EQC's ultimate action regarding oxygenated fuels.

32. **Appendix D2-4-3**
Regional Emission Forecast, Portland (Metro) Area

. . .

Industrial Emissions Forecast (p. D2-4-3-10)

The last table shows the results generated by year for sources in two categories - durable and non-durable goods manufacturing. A growth cushion equal to 1% of 1995 emission levels was assumed to be added each year. Because there is sufficient airshed capacity, the entire growth cushion is available for allocation at any time between plan approval and [~~2006~~]2007. The figure of [~~13,640~~]14480 pounds/day cited as "industrial growth cushion" for years 1996 through [~~2006~~]2007 represents the sum of [~~11~~]12 years of a 1% growth cushion. The growth cushion figures cited for years [~~2007~~]2008 to 2010 are to be considered draft values, to be specified in the next CO Maintenance Plan. The last row in the table is the sum of a) non-durable goods manufacturing projected emissions b) durable goods manufacturing projected emissions, and c) the growth cushion.

A figure of [~~2475~~]2700 tons/year growth cushion was derived by analogous procedures, based on the actual tons/year emission figures presented in the first table.

33. **Appendix D2-4-3**
Regional Emission Forecast, Portland (Metro) Area

Exhibit D2-4-3-8
Emission Forecast Summary (p. D2-4-3-56)

The forecasts for CO emissions are summarized in Exhibit D2-4-3-8. The exhibit summarizes emissions from point, non-road mobile sources, on-road mobile sources, and area sources. Emissions are subtotaled for 1991, 1995, 1997, 2001, 2003, and [~~2006~~]2007, consistent with the years analyzed in the maintenance demonstration (see Section 4.51.3.1 and Table 4.51.3.1).

CO Emissions: Region (=CO Nonattainment Area=Metro Boundary)[8]
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	~~[2006]~~ 2007
Area Sources	411	382	392	405	417	~~[440]~~447
Non-Road Mobile Sources	135	146	151	160	163	~~[168]~~169
Large Point Sources	116	124	~~[165]~~ 167	~~[170]~~ 171 -	~~[171]~~ 173	[175]178
On-Road Mobile Sources	1812	1217	1075	1074	1011	~~[953]~~947
Total	2474	1868	1783	1808	1762	~~[1736]~~ 1741

FOOTNOTE BELOW DELETED

[8]Emissions budget figures are for on-road motor vehicle emissions, assuming repeal of the oxygenated fuel program after the winter of 1997-1998. These tabulated numbers will be adjusted appropriately as required by the EQC's ultimate action regarding oxygenated fuels.

34. **APPENDIX D2-4-4**
(Volume 3)

SUBREGIONAL EMISSION INVENTORIES AND FORECAST

Central City Subarea Emission Inventory and Forecast

On-Road Mobile Sources (Central City Area)

. . .

Sixteen pages of tables for on-road sources are available for the CCTMP area in exactly the same format and order as was presented in the on-road mobile source section within Appendix D2-4-3. The reader may refer to that discussion to understand which tables were included and how this information was used. Following those 16 tables, a summary table is presented showing estimated on-road mobile source CO emissions (average winter weekday) for each of the years between 1991 and 2010. Within the CCTMP area, on-road mobile source emissions are projected to drop by more than 50% from approximately 192 thousand pounds per day in 1991 to about ~~[87]~~86 thousand pounds per day by ~~[2006]~~2007.

35. **APPENDIX D2-4-4**
(Volume 3)

SUBREGIONAL EMISSION INVENTORIES AND FORECAST

Central City Subarea Emission Inventory and Forecast

Emission Forecast Summary For Central City Subarea (p. D2-4-4-45)

The table below shows how emission rates within the Central City Area are projected to change between 1991 and ~~[2006]~~2007 for the major emission source categories. The total of all sources is projected to drop by more than 50% from 204 thousand pounds per day in 1991 to about ~~[99]~~98 thousand pounds in ~~[2006]~~2007. This large decrease is projected to occur because of the 50% plus decrease in on-road mobile source emissions during that time frame.

CO Emissions: CCTMP Sub-Area
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	~~[2006]~~ 2007
Area Sources	9	8	8	8	9	9
Non-Road Mobile Sources	3	4	4	4	4	4
Large Point Sources	0	0	0	0	0	0
On-Road Mobile Sources	192	123	107	103	95	~~[87]~~ 86
Total	204	135	119	115	107	~~[99]~~ 98

CENTRAL CITY SUBAREA
CO EMISSIONS
(Pounds/Day)

	1991	1992	1993	1994	1995	1996	1997
On-Road Mobile Sources (per Metro Modeling)	191,491	144,141	137,267	130,672	123,179	113,534	106,859
Em's From 827 Spaces						217.1	268.8
Total On-Rd Mobile	191,491	144,141	137,267	130,672	123,179	113,752	107,128

	1998	1999	2000	2001	2002	2003	2004
On-Road Mobile Sources (per Metro Modeling)	97,036	111,561	107,036	102,910	99,116	94,996	91,137
Em's From 827 Spaces	255.1	247.8	240.5	233.2	228.1	223.1	218.9
Total On-Rd Mobile	97,291	111,809	107,277	103,143	99,344	95,219	91,356

	2005	2006	2007	2008	2009	2010
On-Road Mobile Sources (per Metro Modeling)	89,017	87,010	85736	85315	84570	83648
Em's From 827 Spaces	214.7	210.5	207 (Not Est'ed for years		2007 after 2006)	
Total On-Rd Mobile	89,231	87,221	~~85,736~~ 85943	85,315	84,570	83,468

POINT SOURCE
PROJECTION SUMMARY
(Pounds/Winter Day)

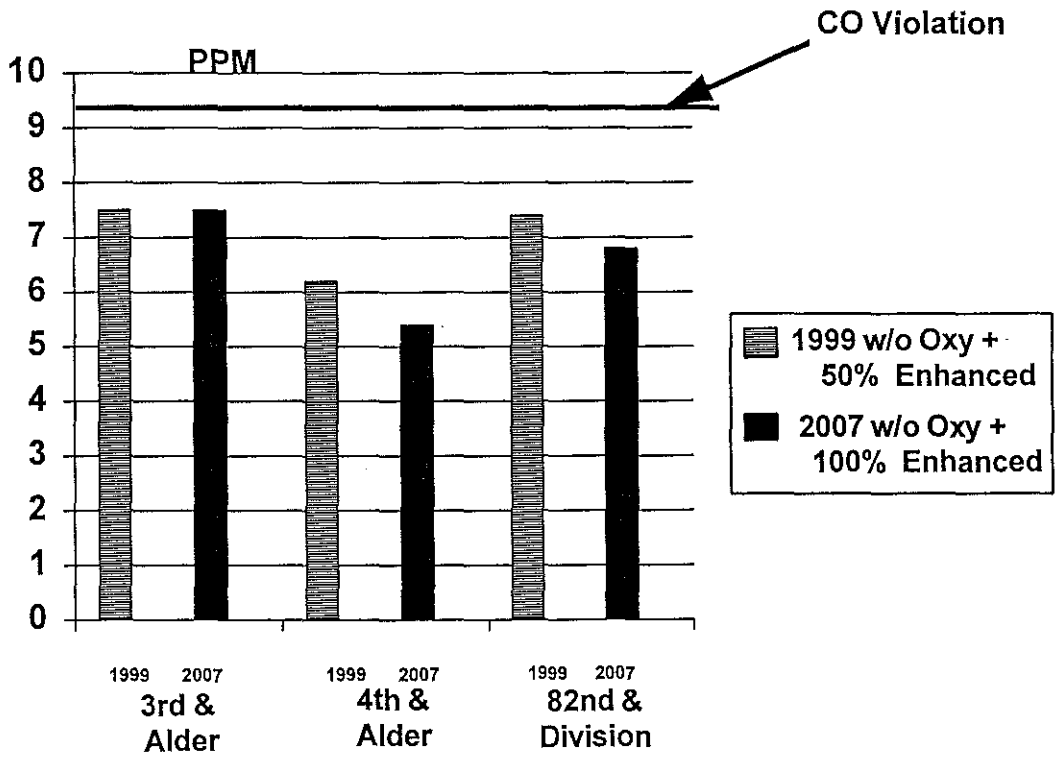
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Projected Emissions For "Durable Goods" Sources	70114	71250	72404	73577	74769	91029	91359	91690	92037	92391
Projected Emissions For Non-Durable" Goods Sources	45832	46616	47413	48223	49048	59679	60407	61147	61897	62659
Industrial Growth Cushion	0	0	0	0	0	~~13640~~ 14880	~~13640~~ 14880	~~13640~~ 14880	~~13640~~ 14880	~~13640~~ 14880
Total Projected Emissions From Point Sources	115946	117866	119817	121801	123817	~~164347~~ 165587	~~165406~~ 166646	~~166477~~ 167717	~~167574~~ 168814	~~168690~~ 16993

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Projected Emissions For "Durable Goods" Sources	92676	92962	93249	93600	94534	95316	96105	96902	97705	98517
Projected Emissions For Non-Durable" Goods Sources	63239	63825	64417	65016	65622	66112	66607	67105	67609	68117
Industrial Growth Cushion	~~13640~~ 14880	~~13640~~ 14880	~~13640~~ 14880	~~13640~~ 14880	~~13640~~ 14880	~~13640~~ 14880	14880	16120	17360	18600
Total Projected Emissions	~~169555~~ 170795	~~170427~~ 171667	~~171307~~ 172547	~~172256~~ 173496	~~173796~~ 175036	~~175068~~ 176308	177592	180127	182674	185233

38. Section 4.51.0.2.2 Need For Maintenance Plan (p. x)

This figure formerly showed concentrations for years 1997 and 2006 with and without oxygenated fuels. The figure now shows concentrations for 1999 and 2007 without oxygenated fuels and with the enhanced vehicle inspection program (the enhanced program is assumed in 1999 to be 50% phased-in).

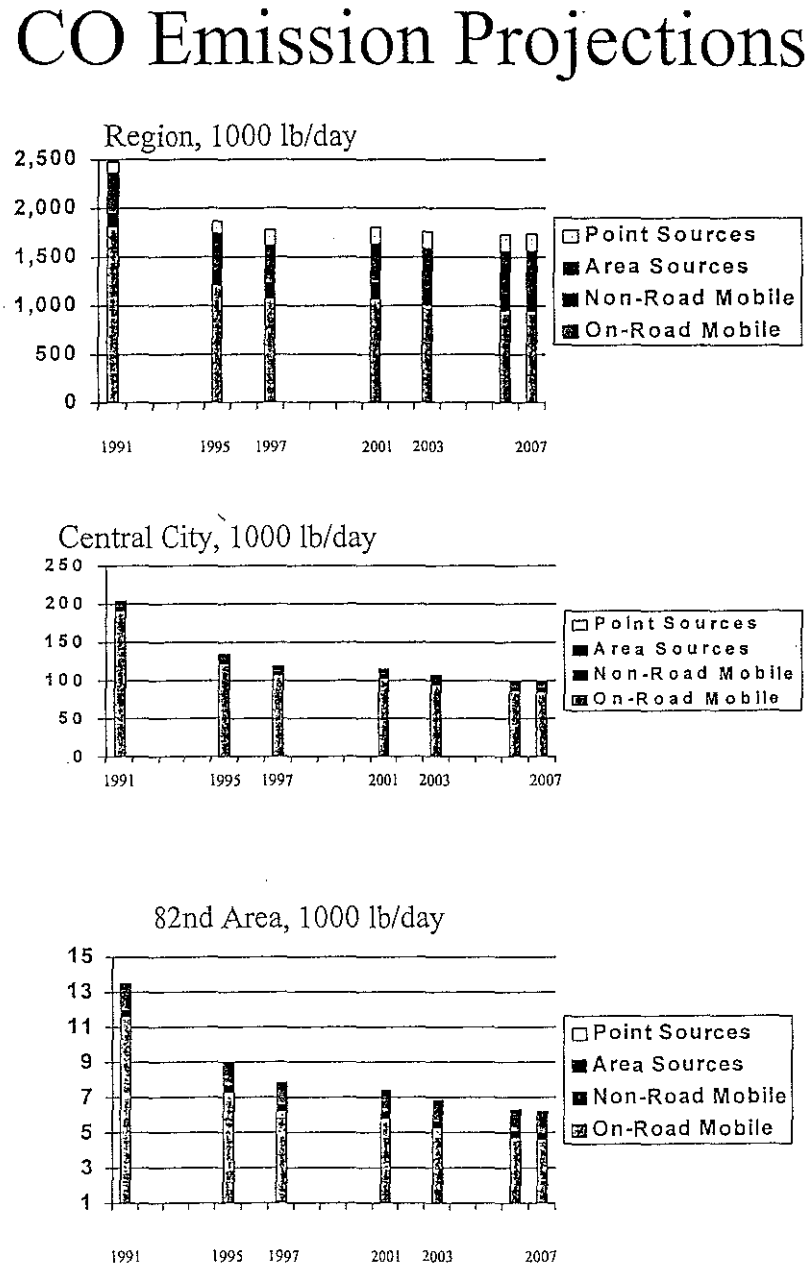
Figure 4.51.0.2 8-Hour CO Concentrations For DEQ Hot Spots



39. Section 4.51.3.2.1 Inventory Projection

Figure 4.51.3.4: CO Emission Projections

Values for year 2007 were added to previous versions of this figure.



40. **APPENDIX D2-4-4**
(Volume 3)

SUBREGIONAL EMISSION INVENTORIES AND FORECAST

82nd Avenue Corridor Subarea Emission Inventory and Forecast

On-Road Mobile Sources (82nd Avenue Corridor Subarea)(p. D2-4-4-50)

. . .

Sixteen pages of tables for on-road sources are available for the 82nd Avenue Corridor subarea in exactly the same format and order as was presented in the on-road mobile source section within Appendix D2-4-3. The reader may refer to that discussion to understand which tables were included and how this information was used. Following those 16 tables, a summary table is presented showing estimated on-road mobile source CO emissions (average winter weekday) for each of the years between 1991 and 2010. Within the area, on-road mobile source emissions are projected to drop about 50% from approximately 11.6 thousand pounds per day in 1991 to about ~~[4.7]~~4.6 thousand pounds per day by ~~[2006]~~2007.

41. **APPENDIX D2-4-4**
(Volume 3)

SUBREGIONAL EMISSION INVENTORIES AND FORECAST

82nd Avenue Corridor Subarea Emission Inventory and Forecast

Emission Forecast Summary For 82nd Avenue Corridor Subarea

The table below shows how emission rates within the 82nd Avenue Corridor Subarea are projected to change between 1991 and 2006 for the major emission source categories. The total of all sources is projected to drop by about 50% from 13 thousand pounds (plus) per day in 1991 to about 6 thousand pounds in ~~[2006]~~2007. This large decrease is projected to occur because of the 50% plus decrease in on-road mobile source emissions during that time frame.

CO Emissions: 82nd Avenue Corridor Sub-Area
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	~~[2006]~~ 2007
Area Sources	1.5	1.3	1.3	1.2	1.2	1.2
Non-Road Mobile Sources	.4	.4	.4	.4	.4	.4
Large Point Sources	0	0	0	0	0	0
On-Road Mobile Sources	11.6	7.3	6.2	5.8	5.3	~~[4.7]~~ 4.6
Total	13.5	8.9	7.8	7.4	6.8	~~[6.3]~~ 6.2

42. Appendix D2-12 Rollforward Analysis

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For this analysis, 8-hour average CO concentrations were calculated using corresponding 8-hour CO emissions. The 8-hour CO emissions calculations were segmented into two parts: an off peak period portion and a peak period portion. For the downtown Portland former "hot spot"

locations (DEQ monitoring sites), now in attainment, 1991 design concentrations were use in the analysis: 9.2 ppm at the 3rd & Alder site (Postal Building), recorded on October 11, 1991; and 8.7 ppm at the 4th & Alder site (Newberrys), also recorded on October 11, 1991. For the 82nd & Division DEQ monitoring site, the 1989 design concentration of 9.8 ppm (12/29/89) was used without adjustment, since the analysis was based on 1989 traffic count data projected to ~~1997~~1999 and ~~2006~~2007. For the 1999 concentrations, the analysis was based on the Enhanced Vehicle Inspection program being one-half phased in (50 percent of the full credit was assumed).

...

To account for the effect of increased traffic volumes on speeds in the projection years (~~1997~~1999 and ~~2006~~2007), the city used a conical volume delay curve for arterials. The congestion function for the conical formula is given below.

...

Application of this function to SW 3rd Avenue indicated a speed decrease of 2.3 mph between 1990 and 2010 for the PM peak period. This decrease in speed was applied to the actual baseline peak period speeds determined in the speed runs conducted by DEQ. The applicable speed decreases for the 1997 and ~~2006~~2007 projection years were interpolated. For SW 3rd Avenue, the ~~2006~~2007 PM peak period speed was determined to be 5.9 mph.

...

Emission calculations for SW 3rd Avenue for 1990 and ~~2006~~ 2007 are shown below, followed by the calculation of the ~~2006~~2007, 8-hour CO concentration without oxygenated fuel. The 5-6 PM peak volume was converted into an 8-hour volume by dividing it by a factor of 0.11, derived from the 10-21-91 and 10-22-91 counts on SW 3rd Avenue. The Peak Period Volume was calculated as twice the calibrated 5-6 PM volume and assumed to operate at the PM peak hour speed. All CO emission factors for ~~2006~~2007 were calculated with the Basic vehicle inspection and maintenance (I/M) program parameters and without oxygenated fuel.

...

~~2006~~2007 Pk-Hr Vol = (2010 Pk-Hr Vol - 1990 Calib. Vol)(~~16~~17)/(20) + 1990 Calib. Vol
= (1240 veh - 813 veh)(~~16~~17)/(20) + 813 veh
= ~~1,155~~1,176 veh

~~2006~~2007 6-Hr Vol = (~~2006~~2007 Pk-Hr Vol)/0.11 - (2)(~~2006~~2007 Pk-Hr Vol)
= (~~1,155~~1,176 veh)/0.11 - (2)(~~1,155~~1,176 veh)
= ~~10,500~~10,691 veh - ~~2,310~~2,352 veh

= ~~8,190~~8,339 veh

~~2006~~2007 Pk Period Speed = -[(~~1,155~~1,176 veh - 813 veh)/(1,240 veh - 813 veh)][2.3 mph] +7.7 mph

2006 Pk Per. Speed = ~~5.9~~5.7 mph

The off peak period speed of 12.4 mph was lowered by 1.2 mph, based on application of the arterial conical to the projected change in the volumes for the off peak period. Hence, the ~~2006~~2007 6-Hr CO emissions number, without oxygenated fuel, was calculated as follows.

~~2006~~2007 6-Hr CO Ems = (~~2006~~2007 6-Hr Vol)(~~2006~~2007 CO EF @ 11.2 mph)
= (~~8,190~~ 8,339 veh)(~~36.75~~ 36.35 gm/VMT)
= ~~300,982~~303,123 gm/mi

~~2006~~2007 Pk Per. CO Ems = (~~2006~~2007 Pk-Hr Vol)(2)(~~2006~~2007CO EF @ ~~5.9~~ 5.7 mph)
= (~~1,155~~ 1,176 veh)(2)(~~57.82~~ 58.51 gm/VMT)
= ~~133,546~~ 137,616 gm/mi

~~2006~~2007 8-Hr CO Ems = ~~2006~~2007 6-Hr CO Ems + ~~2006~~2007Pk Per. CO Ems
= ~~300,982~~303,123 gm/mi + ~~133,546~~137,616 gm/mi
= ~~434,528~~ 440,739 gm/mi

Using the rollforward formula, the estimated ~~2006~~2007 8-hour CO concentration was calculated as follows.

~~2006~~2007 8-Hr CO Conc. = (9.5 ppm - 2.0 ppm)(~~2006~~2007 8-Hr CO Ems)/(1990 8-Hr CO Ems) + 2.0 ppm
= (7.5 ppm)(~~434,528~~440,739 gm/mi)/(465,894 gm/mi) + 2.0 ppm
= ~~9.0~~ 9.1 ppm

A Mobile5a_H-based spreadsheet calculation of the difference between the proposed Enhanced I/M program and the Basic I/M program was used to adjust the ~~2006~~2007 8-hour CO concentrations to yield an estimated concentration with the Enhanced I/M program in effect. DEQ was also able to estimate the effect of continuing the oxygenated fuel program in a similar adjustment procedure. The factor adjustments for oxygenated fuel and Enhanced I/M to Basic I/M are given below.

Enhanced I/M to Basic I/M Adjustment = 14.815 gm/VMT/18.966 gm/VMT
= 0.781

Oxy-Fuel to No Oxy-Fuel Adjustment = 17.423 gm/VMT/23.323 gm/VMT
Oxy-Fuel to No Oxy-Fuel Adjustment = 0.747

Application of these adjustments resulted in estimated ~~2006~~2007 8-hour CO concentrations of ~~7.2~~ 7.3 ppm with oxygenated fuel and 7.5 ppm with Enhanced I/M, but without oxygenated fuel.

82nd Avenue

...

To simplify the emission calculations, 8-hour average volumes were calculated and a weighted 8-hour speed was determined using peak and off peak speeds. For the 1989 baseline, 82nd Avenue had a weighted 8-hour average speed of 20.2 mph, and Division St. had a weighted 8-hour average speed of 21.7 mph. All CO emission factors for ~~2006~~2007 were calculated with the Basic vehicle inspection and maintenance (I/M) program parameters and without oxygenated fuel. The calculations of the 8-hour average CO emission rate for 82nd Avenue and Division St. are shown below.

...

For ~~2006~~2007, application of the higher growth rate yielded 8-hour average volumes of ~~1,436~~ 1,444 vehicles and ~~1,268~~ 1,276 vehicles for 82nd Avenue and Division St., respectively. The PM peak hour speed was assumed to decrease to 15 mph for both street segments. (The conical formula for 82nd Avenue indicated a speed decrease of 1.6 mph. versus 2.6 mph with the 15 mph assumption.) The resulting weighted 8-hour speed for 82nd Avenue was ~~16.7~~ 19.7 mph. For Division St., the 8-hour average speed was assumed to decrease by 2 mph in ~~2006~~2007, yielding a speed of 19.7 mph. The ~~2006~~2007 8-hour average CO emission rate calculations are shown below.

~~2006~~2007 8-Hr Avg CO Ems
82nd Ave. = (~~2006~~2007 8-Hr Avg Vol)(~~2006~~2007 CO EF @ ~~16.7~~ 19.7 mph)
= (~~1,436~~1,444 veh)(~~28.64~~26.27 gm/VMT)
= ~~41,127~~37,934 gm/mi

~~2006~~2007 8-Hr Avg CO Ems
Division St. = (~~2006~~2007 8-Hr Avg Vol)(2006 CO EF @ 19.7 mph)
= (~~1,268~~1,276 veh)(~~25.95~~26.27 gm/VMT)
= ~~32,904~~33,521 gm/mi

Combined ~~06~~2007 8-Hr Avg CO Ems = ~~41,127~~37,934 gm/mi + ~~32,904~~33,521 gm/mi
= ~~74,031~~ 71,455 gm/mi

Using the rollforward formula, the estimated ~~2006~~2007 8-hour CO concentration was calculated as follows.

~~2006~~2007 8-Hr CO Conc. = (9.8 ppm - 2.0 ppm)(~~2006~~2007 8-Hr Avg CO Ems)/
(1989 8-Hr Avg CO Ems) + 2.0 ppm
= (7.8 ppm)(~~74,031~~ 71,455 gm/mi)/(89,550 gm/mi) +
2.0 ppm
= ~~8.5~~ 8.2 ppm

Summary of Results

The resulting rollforward calculations are tabulated below for ~~1997~~1999 and ~~2006~~2007 for the three DEQ monitoring sites.

Summary of Rollforward Calculations
8-hour Average CO Concentrations (Conc.) in Parts Per Million (ppm)

Site	~~1997~~1999 CO Conc. w/o Oxy-Fuel	~~1997~~1999 CO Conc. w/o Oxy Fuel + 50% Enhanced I/M	~~2006~~2007 CO Conc. w/o Oxy-Fuel	~~2006~~2007 CO Conc. w/ Oxy-Fuel	~~2006~~2007 CO Conc.w/o Oxy-Fuel + Enhanced I/M
3rd & Alder Postal Bldg.	~~8.6~~8.2	~~7.3~~7.5	~~9.0~~9.1	~~7.2~~7.3	7.5
4th & Alder Newberrys	~~7.2~~6.7	~~6.1~~6.2	~~6.5~~6.4	~~5.4~~5.3	~~5.5~~5.4
82nd & Division	~~8.4~~8.1	~~6.8~~7.4	~~8.5~~8.2	~~6.8~~6.6	~~7.1~~6.8

43. Relocation of Volume 4, Appendix D2-1 Material to Volume 3, Appendix D2-13; and Modifications to That Material

~~Appendix D2-13 (Volume 3), Other Supporting Documentation/Technical Analysis~~

~~APPENDIX D2-1~~
~~Volume 4~~

APPENDIX D2-13
(Volume 3)
CCTMP ZONING CODES USED AS SUPPORTING DOCUMENTATION IN THE PORTLAND CARBON MONOXIDE MAINTENANCE PLAN

...

~~APPENDIX D2-1~~
APPENDIX D2-13

~~LIST OF~~ CCTMP ZONING CODES USED AS SUPPORTING DOCUMENTATION FOR THE CARBON MONOXIDE MAINTENANCE PLAN

Zoning Code Items:
Amendments to Portland's Central City Transportation Management Plan

The following is a list of the zoning code amendments to Portland's Central City Plan District that are being ~~incorporated~~ included as supporting documentation into an appendix to the Portland Carbon Monoxide Maintenance Plan. The text of the relevant code provisions follows this list.

Section 1: ~~Incorporated~~ Included Amendments to Chapter 33.510. Central City Plan District

Code Number	Code Title

...

33.510.264.A.6.~~a~~-b.1-3	Operations Reports

...

33.510.264.B	Preservation Parking
33.510.264.B~~.~~.5.~~a~~-b.1-3	Operation Reports
b.1	Physical: Number of parking spaces, amount of net building area.

~~33.510.264.C Visitor Parking~~

...

33.510.265	Parking in the Goose Hollow Subdistrict and Central Eastside Sectors 2 and 3

...

33.510.265.B	Preservation Parking
33.510.265.~~5~~.B.~~a~~-.5.b,1-3	

~~33.510.265.C Visitor Parking~~

~~33.510.265.D Undedicated General Parking~~

~~33.510.265.E Residential/Hotel Parking~~

~~33.510.265.F All Parking~~

~~33.510.265.G Special regulations for existing parking~~

...

~~33.510.267.F All Parking~~

~~33.510.267.G Special regulations for existing parking~~

Section 2: ~~Incorporated~~ Included Portion of New Chapter 33.808, Central City Parking Review

Code Number	Code Title
~~33.808.050~~	~~Loss of Central City Parking Review Status~~
~~33.808.100~~	~~General Approval Criteria for Central City Parking Review~~

...

~~33.808.100.L.1-2~~
33.808.100.L.1.a, b, L.2.a-c

...

33.808.200 33.808.200.A,B	Renewal of Surface Parking Lots

. . .

~~33.808.300~~	~~Conversion of Surface Parking Lots~~

Section 3: Other ~~Incorporated~~ Included amendments to the Zoning Code

...

~~APPENDIX D2-1~~
APPENDIX D2-13

COMPLETE TEXT OF CCTMP ZONING CODES USED AS SUPPORTING DOCUMENTATION FOR THE PORTLAND CARBON MONOXIDE MAINTENANCE PLAN

...

CHANGES MADE TO ACCOMPANYING RULES

44. Oxygenated Fuel Requirements

The following new section will be added to the rules for Motor Vehicle Fuel Specifications for Oxygenated Gasoline:

Purpose and General Requirements
340-022-0460: . . .

(8) Portland Control Area:

(a) Notwithstanding OAR 340-022-0470(1), the requirements in OAR 340-022-0440 through 022-0640 will cease to apply in the control area encompassing Clackamas, Multnomah, Washington, and Yamhill counties (the Portland Control Area) on and after March 1, 1998.

(b) Should a validated violation of the carbon monoxide standard occur within the Portland Carbon Monoxide Maintenance Area at any time throughout the duration of the Portland Carbon Monoxide Maintenance Plan, the requirements in OAR 340-022-0440 through 022-0640 will be reinstated in the Portland Control Area beginning in the winter season following a validated violation, but no sooner than six (6) months following that violation.

(c) In the event of a validated violation, the reinstatement of the oxygenated fuel program in the Portland Control Area will be automatic and no further rulemaking will be required.

Stat. Auth.: ORS Ch. 468A
Hist.: DEQ 25-1992, f. 10-30-92, ef. 11-1-92; DEQ 4-1993, f. & cert. ef. 3-10-93; DEQ 15-1993, f & cert. ef. 11-4-93

Attachment F

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Portland Carbon Monoxide Maintenance Plan

Advisory Committee Membership and Report

(See Appendix D2-7 of the Portland Carbon Monoxide Maintenance Plan, included in Attachment A1 of this report)

Attachment G

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
The Portland Carbon Monoxide Maintenance Plan:
Elimination of the Oxygenated Fuel Program in the Portland Area

Rule Implementation Plan

Summary of the Proposed Rule

The proposed rule would eliminate the requirements for oxygenated fuel in the Portland control area after the 1997/1998 Winter season. This would eliminate the need for service station inspection during the oxgenated fuel season in the Department's Northwest region. The elimination of the oxygenated fuel program in the Portland area will have no effect on the oxygenated fuel programs currently operated in southern Oregon.

Proposed Effective Date of the Rule

The amendment will be effective upon filing with the Secretary of State, which will be approximately July 19, 1996.

Proposal for Notification of Affected Persons

Notice will be provided to all blenders of oxygenated fuels supplying the Portland area and Western States Petroleum Association

Proposed Implementing Actions

This rule amendment does not require any active implementation by the Department. To the contrary, the Department will no longer have to conduct inspections of gasoline service stations in the Portland area during the oxygenated fuel season to determine compliance with the oxygenated fuel requirements.

Proposed Training/Assistance Actions

Training will not be necessary for the implementation of this amendment.

State of Oregon
Department of Environmental Quality Memorandum

Date: June 24, 1996

To: Environmental Quality Commission

From: Langdon Marsh

Subject: Agenda Item D, July 12, 1996 EQC Meeting

Ozone Maintenance Plan for the Portland AQMA

Background

On April 12, 1996, the Director authorized the Air Quality Division to proceed to a rulemaking hearing on a proposed ozone maintenance plan for the Portland Air Quality Maintenance Area (AQMA). The proposed maintenance plan, which would amend the federal Clean Air Act State Implementation Plan (SIP), is designed to ensure compliance with the federal ozone air quality standard for the next ten years.

Pursuant to the authorization, hearing notice was published in the Secretary of State's Bulletin on May 1, 1996. The Hearing Notice and informational materials were mailed to the mailing list of those persons who have asked to be notified of rulemaking actions, and to a mailing list of persons known by the Department to be potentially affected by or interested in the proposed rulemaking action on April 17, 1996. Supporting procedural documentation for the hearing notice is included in Attachment B.

Public Hearings were held on May 22, 1996 and May 23, 1996 with Mike Grant and Lawrence Smith serving as Presiding Officers. Written comment was received through May 24, 1996. The Presiding Officer's Report (Attachment C) summarizes the oral testimony presented at the hearing and lists all the written comments received. (A copy of the comments is available upon request.)

Department staff have evaluated the comments received (Attachment D). Based upon that evaluation, modifications to the initial rulemaking proposal are being recommended by the Department. These modifications are summarized below and detailed in Attachment E.

The following sections summarize the issue that this proposed rulemaking action is intended to address, the authority to address the issue, the process for development of the rulemaking proposal including alternatives considered, a summary of the rulemaking proposal presented for public hearing, a summary of the significant public comments and the changes proposed in response to those comments, a summary of how the rule will work and how it is proposed to be implemented, and a recommendation for Environmental Quality Commission (EQC) action.

Issue this Proposed Rulemaking Action is Intended to Address

The ozone maintenance plan is designed to protect public health by preventing violations of the federal ozone standard, and will allow the Environmental Protection Agency (EPA) to redesignate the area from nonattainment to attainment status. An EPA approved maintenance plan will remove Clean Air Act impediments to industrial growth and will help alleviate the possibility of Clean Air Act sanctions on federal transportation funds.

Ground level ozone, also known as smog, is an air pollutant formed in the atmosphere by a chemical reaction of volatile organic compounds (VOC) and oxides of nitrogen (NO_x). Ozone is a strong respiratory system irritant that aggravates respiratory illnesses, impairs athletic performance and can cause permanent respiratory system damage. Ozone can be especially harmful to older people and children, and can damage crops and other materials. In the past, motor vehicles and industrial operations have been the major sources of ozone precursors, but other sources such as household products, paints and lawn mowers are fast becoming major contributors due to rapid population growth.

The AQMA has violated the national ambient air quality standard for ground level ozone since monitoring began in the early 1970s. Levels have been as high as 50 percent over the federal standard which was established to protect public health and welfare. Ozone control strategies, including the federal new car program, the DEQ vehicle inspection program, industrial emission control programs, and other measures have been successful in bringing the AQMA into attainment with the ozone standard.

DEQ projections indicate that, without new emission reduction strategies, the AQMA will once again exceed the federal standard within the next few years because of unprecedented population growth and related increases in driving and other sources of emissions. Metro expects more than 300,000 new residents in the next ten years. During the same time, employment will increase by nearly 250,000 workers and driving in the area will increase by over 4.8 million miles per day. Without early implementation of new emission reduction measures, emission increases from this population growth and related activities (such as more automobile use) would likely cause violations of the ozone standard to recur.

To redesignate the AQMA from nonattainment to attainment, EPA requires an enforceable plan that demonstrates how the area will continue to meet the ozone standard for a minimum of ten years. The ozone maintenance plan includes emission reduction strategies that are sufficient to ensure that attainment will be maintained for the next ten years. An EPA-approved ozone maintenance plan and redesignation to attainment will:

- Assure that public health will be protected from adverse impacts of ozone;
- Protect against possible Clean Air Act sanctions on federal transportation funds;
- Remove industrial growth impediments including costly Lowest Achievable Emission Rate (LAER) and emission offset requirements;
- Avoid federally-imposed prescriptive and more costly control strategies, such as retrofit NO_x controls on existing industries.

Relationship to Federal and Adjacent State Rules

The ozone standard was adopted by EPA and the EQC. EPA designated the Portland/Vancouver Interstate AQMA as nonattainment for ozone on March 3, 1978. For an area to be redesignated to attainment, the Clean Air Act requires a demonstration that the area attained the standard and EPA approval of a ten year maintenance plan. There is no deadline for submittal of a maintenance plan. Once the area is redesignated, a new maintenance plan must be submitted two years prior to the expiration of the existing plan.

Portland attained the ozone standard by the Clean Air Act deadline of November 15, 1993. If a subsequent violation occurs prior to redesignation, the area will be automatically "bumped-up" to a higher level of nonattainment. This will require submittal of a new attainment plan with more stringent requirements in a shorter time than proposed in the maintenance plan including requirements for existing industry to install Reasonably Available Control Technology (RACT) for NO_x emissions.

Because the AQMA is an interstate ozone nonattainment area including part of Clark County, Washington, Washington's SouthWest Air Pollution Control Authority (SWAPCA) and the Washington Department of Ecology must also submit a maintenance plan for the area to be redesignated. The proposed maintenance plans for the two areas were developed in close coordination and contain comparable emission reductions from similar emission reduction strategies. SWAPCA and Ecology are on the same schedule as the Department for plan development.

Authority to Address the Issue

The EQC has the statutory authority to address this issue under Oregon Revised Statutes (ORS) Chapter 468A, which gives the Commission the power to adopt plans and programs to achieve and maintain federal and state ambient air quality health standards. In particular, the elements of the ozone maintenance plan are specified in ORS 468A.363.

Process for Development of the Rulemaking Proposal (including Advisory Committee and alternatives considered)

An extensive public process covering a four year period was used to develop the ozone maintenance plan. This process is described in detail in Appendix D1-7 of the maintenance plan, included in Attachment A of this report. The process included the following steps:

- 1992 - Governor's Task Force recommended strategies to include in the maintenance plan;
- 1993 - The Oregon Legislature adopted House Bill 2214, which endorsed most of the recommendations of the Governor's Task Force but made some changes to the plan;
- 1994 - Several DEQ Advisory Committees were appointed and recommended specific details of maintenance plan strategies;
- 1995 - The Legislature passed a bill that would change some maintenance plan strategies, but the Governor vetoed the bill;
- December 1995 - DEQ proposed to revise some strategies to address concerns of the Legislature and Advisory Committees;
- February 1996 - Metro made recommendations on transportation elements of the plan;
- May 1996 - A final public comment/hearing process was held; and
- July 1996 - The Environmental Quality Commission (EQC) is scheduled to take final action on the plan.

The Governor's Task Force on Motor Vehicle Emission Reductions in the Portland Area recommended forecasting assumptions and emission reduction strategies for the ozone maintenance plan after a series of public meetings during 1992. The Task Force based its recommendations on EPA guidance for maintenance plans as well as information presented by DEQ, Metro and a number of business, citizen, environmental and government organizations.

Significant changes were made to the maintenance plan since the Governor's Task Force made its recommendations.

- A motor vehicle emission fee recommended by the Governor's Task Force was eliminated by the 1993 Legislature. To make up the lost emission reduction credit, the Legislature directed DEQ to increase the stringency of the Employee Commute Options (ECO) program that was recommended by the Governor's Task Force and add a maximum parking ratio program to limit parking at new non-residential development.

- The Governor's Task Force recommended that DEQ adopt California standards for new lawn and garden gasoline engines. However, EPA adopted emission standards for new lawn and garden equipment and other non-road engines in 1994/1995, making state rules unnecessary.

- EPA delayed adoption of anticipated regulations for various area sources. The EQC adopted rules for paints and household products in 1995 because of a need for early emission reductions.

- Due to concerns expressed by the 1995 Legislature, advisory committees and businesses, the Department proposed to reduce the stringency of ECO, change the parking ratio program to a voluntary program, and modify the vehicle inspection boundary expansion. The industrial growth allowance built into the plan had to be reduced to compensate for lost emission reduction credits from these changes.

- To meet EPA requirements designed to ensure that increases in industrial emissions do not jeopardize maintenance of the ozone standard, the Department added a donation program to reduce currently unused permitted industrial emissions to the airshed capacity for industrial emissions identified in the plan.

Summary of Rulemaking Proposal Presented for Public Hearing and Discussion of Significant Issues Involved.

The ozone maintenance plan and redesignation request includes an attainment demonstration, an attainment emission inventory, a maintenance demonstration, a contingency plan, and documentation that administrative requirements for redesignation have been met. The plan includes a number of emission reduction strategies to ensure that the AQMA does not violate the ozone standard during the next 10 years. Four of these strategies - Vehicle Inspection Boundary changes, Employee Commute Options, Voluntary Parking Ratios, Industrial Emission Management Rules - are scheduled for EQC action at the July 12, 1996 meeting as Agenda Items E through H, respectively. Most of the remaining strategies were either previously adopted or are strategies to be implemented by EPA. The specific Enhanced Vehicle Inspection program and conforming amendments to the major New Source Review program will be presented to the EQC at the November 15, 1996 meeting.

The complete set of emission reduction strategies presented for public hearing as elements of the ozone maintenance plan were:

- **On-road vehicle strategies**

  - Improvements to the Motor Vehicle Inspection and Maintenance Program

    Changes to the Motor Vehicle Inspection Program include improvements to the test method (enhanced testing), expansion of the inspection boundary, and elimination of the old vehicle exemption for 1975 and newer vehicles. The enhanced testing will require an increase in the testing fee which will be proposed for adoption by the EQC in November. The existing fee of $10 will have to increase to a range of $15 to $21 to cover the cost of the program. The actual fee will depend on a number of variables such as the test time and the number of free re-tests. Because of the improved test, the failure rate and average repair costs will increase, but this will be offset by savings from improved fuel economy. About 10 percent more vehicles from areas surrounding the airshed will be subject to testing due to the expanded boundary. Additional vehicles will be tested due to elimination of the old vehicle exemption. Fleet operators will have to upgrade their testing equipment or rely on DEQ testing. Repair mechanics may opt to take additional training and upgrade testing equipment.

  - Motor Vehicle Trip Reduction Measures

    An Employee Commute Options (ECO) program will require employers with more than 50 employees to provide alternatives to drive-alone commuting to work. A voluntary Parking Ratio program will provide incentives for developers to meet voluntary limits for the maximum number of parking spaces constructed for new non-residential development.

    Metro's new Region 2040 land use and transportation plan is included as a vehicle emission reduction strategy. It is designed to significantly improve the balance between motor vehicles and other less polluting forms of transportation. The Region 2040 plan and associated transportation control measures (TCMs) are referenced in the maintenance plan. These measures include the Region 2040 growth concept, significant transit system expansion and bicycle and pedestrian facility improvements. The TCMs affect developers, local governments and the general public and must receive priority funding by Metro.

- **Non-road engine strategies**

  Credit is included in the plan for recent EPA emission standards for new non-road engines such as lawn and garden equipment, motor boats and construction equipment. These standards affect the engine manufacturers, but compliance costs will likely be passed on to consumers.

- **Area source strategies**

  In 1995, EQC adopted rules which will reduce VOC emissions from motor vehicle refinishing, architectural coatings (such as house paints) and a variety of consumer products (such as aerosol sprays, air fresheners and windshield washer fluids). Product costs may increase or decrease depending on formulations chosen. The product manufacturers will be required to meet VOC content limits. Motor vehicle refinishing shops are required to use lower-emitting equipment.

- **Industrial emission strategies**

  The maintenance plan includes a donation program for unused permitted emissions, and a number of industrial sources have agreed to reduce their permit limits under this program. The public notice also included a backup plan in case the donation program was unsuccessful. The backup plan was dropped because sufficient donations were received to allow the Department to balance the maintenance plan.

  The maintenance plan also includes a growth allowance for major new and expanding industries, which will eliminate the compliance costs of emission offsets. Offsets would need to be reinstated if the growth allowance were used up. Finally, the maintenance plan relies on emission reduction credit from installation of Reasonably Available Control Technology (RACT) or equivalent at existing major industrial VOC sources.

- **Public education and incentive program**

  A public education and incentive program is included to encourage the public to choose consumer products that emit fewer VOCs, reduce motor vehicle trips, use electric and hand gardening tools, and curtail polluting activities such as lawn mowing on high pollution days. Private sector partners will be asked to participate in advertising, discounts and other incentives. After a pilot implementation period, the Department will quantify the emission reductions achieved by the program. If the program does not achieve the target emission reductions and other surplus emission reductions are not available, a backup emission control measure will be proposed by the Department.

- **Contingency plan**

  If the maintenance plan fails, a contingency plan will be implemented as required by the Clean Air Act. The contingency plan will affect new and expanding major industry by reinstating emission offset requirements. The contingency plan could also affect the general public, the petroleum industry and local governments by requiring reformulated gasoline, congestion pricing or an equivalent program. The specific contingency program would be adopted by rule if and when needed to prevent violations of the ozone standard.

Summary of Significant Public Comment and Changes Proposed in Response

The Department received a number of comments supporting adoption of the maintenance plan, although some objected to specific elements of the plan. No commenters were opposed to adoption of the plan or requesting EPA to redesignate the AQMA to attainment. The following is a brief summary of significant public comment and the Department's response. See Attachment D for the Department's Evaluation of Public Comment and Attachment E for a description of changes made in response to public comment.

1. **Comment:** The Department received comments on the stringency of several strategies in the maintenance plan including the vehicle inspection boundary, ECO, parking ratios, and industrial emission management rules.

   Department's Response: The Department's responses to these comments are described in the companion Agenda Items E through H for the July 12, 1996 meeting. The Department has proposed some changes in these programs where possible without jeopardizing the maintenance demonstration and EPA approval of the plan. Changes that reduce the emission reduction credit from these strategies would require compensating additional new strategies for the plan to be approvable by EPA.

2. **Comment:** EPA submitted a number of comments regarding approvability of the plan. Key issues are:

   - Enhanced vehicle inspection rules must be submitted to EPA by November. EPA approval of credit for the Oregon enhanced vehicle inspection program is needed by that time in order to keep approval of the maintenance plan on schedule.

   - Commitments for backup strategies and quantification need to be clarified and expanded.

- The proposed Transportation Control Measure (TCM) substitution process needs to be resolved with EPA Headquarters.

- Emission reductions used to increase the growth allowance during the life of the maintenance plan must be federally enforceable and fully documented in periodic reports to EPA.

- Certain sources subject to federal Prevention of Significant Deterioration (PSD) requirements must be subject to federal PSD requirements in addition to any state New Source Review (NSR) requirements.

Department's Response: The Department believes that the revisions requested by EPA are reasonable and has proposed changes in the maintenance plan as needed to address these comments.

3. **Comment:** The Department received comments regarding assumed emission reduction credit for the planned gasoline pipeline from Seattle to Eastern Washington to replace most barge loading in the Portland area. Concern was raised that if the pipeline is not built, there will be a shortfall in emission reduction credit for the plan. The commenter urged the Department take more proactive steps to ensure that the pipeline is constructed.

Department's Response: The Department will monitor progress in constructing the pipeline or other emission controls implemented by the gasoline terminals and barge operators. If the pipeline is not constructed and equivalent emission reductions have not been achieved by other measures beyond those in the current plan, the Department will propose alternate control measures for adoption by the EQC and implementation prior to the 1999 ozone season.

4. **Comment:** The Department received comments regarding whether the Transportation Control Measures (TCMs) adopted by Metro, especially the 2040 growth concept, meet the enforceability requirements of the Clean Air Act.

Department's Response: The Department believes that the TCMs meet EPA's enforceability requirements. The urban growth boundary and interim implementation measures will be adopted by the Metro Council as binding requirements on local governments. In addition, timely implementation and priority funding of TCMs identified in the maintenance plan is a transportation conformity requirement. Further, Metro will be required to meet an emissions budget which was developed assuming implementation of the TCMs.

5. **Comment:** The Department received several comments supporting and opposing enhanced vehicle inspection. Supporters argued that testing is a good investment in air quality and that the plan should achieve significant emission reductions from motor vehicles. Opponents argued that the need for enhanced testing has not been demonstrated and that there are a number of problems with the enhanced test.

   Department's Response: The Department believes that the enhanced inspection program is a cost-effective control measure for the maintenance plan and that the program can be implemented smoothly in the Portland metropolitan area. The specific elements of the enhanced test will be proposed for consideration by the EQC at the November 15, 1996 meeting.

Summary of How the Proposed Rule Will Work and How it Will be Implemented

The ozone maintenance plan includes a number of mechanisms to ensure that emission reduction strategies are implemented and that the ozone standard is not exceeded.

Implementation plans have been developed for each emission reduction strategy in the maintenance plan. Implementation plans for Vehicle Inspection Boundary changes, ECO, Voluntary Parking Ratios, and Industrial Emission Management Rules are described in Agenda Items E through H for the July 12, 1996 meeting. Enhanced vehicle testing will be implemented through the existing vehicle inspection program through a change in the test procedure and pass/fail criteria. The transportation control measures will be implemented through the transportation conformity process including interagency consultation and the emissions budgets. The non-road engine rules will be implemented by EPA through emission standards for new non-road engines. The area source rules are currently being implemented by the Department through product registration, site inspections, and product sampling. The public education and incentive program will be implemented through information and incentives offered by DEQ and private sector partners, and will be quantified through surveys and sales records.

In addition, the Department will prepare emission inventory updates every 2 to 3 years to compare against emission forecasts in the maintenance plan. The updates will be used to verify the growth factors and control levels assumed in the plan. If the update indicates that emissions may exceed the maintenance emission level, the Department would, in consultation with EPA and SWAPCA, conduct a more thorough emissions inventory and/or implement phase 1 of the contingency plan. Under phase 1 of the contingency plan, the Department would determine if additional emission reduction strategies are needed to prevent a violation of the ozone standard, and, if so, propose these strategies for adoption by the EQC.

The Department will also continue to monitor ozone air quality. If there were a risk of violation of the ozone standard, the Department would implement phase 1 of the contingency plan. If there were an actual violation of the standard, the Department would implement phase 2 of the contingency plan. In this case, the industrial growth allowance would be eliminated and the Department would recommend reformulated gasoline or an equivalent measure for adoption by the EQC.

Recommendation for Commission Action

The Department recommends that the Commission adopt the ozone maintenance plan for the Portland AQMA, as presented in Attachment A of this report, including the supporting rule amendments and emission inventories, as an amendment to the federal Clean Air Act State Implementation Plan.

The Department also recommends that the Commission repeal the ozone attainment plan for the Portland AQMA, originally adopted on July 16, 1982, effective upon EPA redesignation of the AQMA to attainment for ozone.

Attachments

A. Rule and Rule Amendments Proposed for Adoption
B. Supporting Procedural Documentation:
    1. Legal Notice of Hearing
    2. Fiscal and Economic Impact Statement
    3. Land Use Evaluation Statement
    4. Questions to be Answered to Reveal Potential Justification for Differing from Federal Requirements
    5. Cover Memorandum from Public Notice
C. Presiding Officer's Report on Public Hearing
D. Department's Evaluation of Public Comment
E. Detailed Changes to Original Rulemaking Proposal made in Response to Public Comment
F. Advisory Committee Membership and Report (See Appendix D1-7 of the ozone maintenance plan included in Attachment A of this report)
G. Rule Implementation Plan

Reference Documents (available upon request)

- Written comments received (listed in Attachment C)
- EPA guidance documents regarding redesignation requests.
- "Final Report," State Task Force on Motor Vehicle Emission Reductions in the Portland Area, 2/4/93
- "Findings and Recommendations," House Special Task Force on Emissions, 3/31/93
- ORS 468A.363 (House Bill 2214, 1993 Legislative Assembly)

Approved:

Section: John Kowalczyk

Division: Signed Pursuant to Greg Green

Report Prepared By: Andy Ginsburg

Phone: 503/229-5581

Date Prepared: June 10, 1996

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Attachment A

Rule and Rule Amendments Proposed for Adoption

Ozone Maintenance Plan
for the
Portland AQMA

A1 Ozone Maintenance Plan and Redesignation Request for the Portland AQMA

State of Oregon Air Quality Control Program

- SIP Volume 2, Section 4.50
- SIP Volume 3, Appendix D1

(All new rules)

A2 Miscellaneous supporting rule amendments

- A2-1 State Implementation Plan (OAR 340-020-0047)
- A2-2 Maintenance Area Designation (OAR 340-031-0520 and 340-031-0530)
- A2-3 Cross References Corrections (OAR 340-022-0710, 340-022-0810, 340-022-0910, 340-022-1010)
- A2-4 State Agency Coordination Program (OAR 340-018-0030)
- A2-5 Transfer and Dispensing Operations (OAR 340-022-0400 through 340-022-0403)

ATTACHMENT A1

OZONE MAINTENANCE PLAN AND REDESIGNATION REQUEST

FOR THE

PORTLAND AQMA

SECTION 4.50

MAINTENANCE PLAN AND REDESIGNATION REQUEST

FOR

PORTLAND/VANCOUVER INTERSTATE AIR QUALITY MAINTENANCE AREA (AQMA) (OREGON PORTION)

STATE IMPLEMENTATION PLAN REVISION

FOR OZONE

July 12, 1996

Prepared by

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APPENDIX D: MAINTENANCE PLANS AND REDESIGNATION REQUESTS

4.50.0 EXECUTIVE SUMMARY AND ACKNOWLEDGMENTS

4.50.0.1 ACKNOWLEDGMENTS

Without the efforts of numerous individuals in local, regional and state governments, as well as representatives of business, citizen and environmental organizations who served on advisory committees, this supplement to the Oregon State Implementation Plan would not have been possible. The Department of Environmental Quality (DEQ) appreciates the individuals and agencies who contributed to this effort. Special appreciation goes to:

- Metro as lead agency for transportation control measures in the maintenance plan;
- Metro's Transportation Policy Alternatives Committee (TPAC) and Joint Policy Advisory Committee on Transportation (JPACT);
- Members of the Governor's Task Force on Motor Vehicle Emission Reductions in the Portland Area;
- Members of DEQ Advisory Committees for ECO, Parking Ratios, Motor Vehicle Refinishing, AIM Coatings/Consumer Products, and Vehicle Inspection Boundary;
- Washington's Southwest Air Pollution Control Authority (SWAPCA) and Regional Transportation Council (RTC).

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4.50.0.2 EXECUTIVE SUMMARY

4.50.0.2.1 OVERVIEW

The Portland/Vancouver Interstate Air Quality Maintenance Area (AQMA) has met the National Ambient Air Quality Standards (NAAQS) for ozone as demonstrated through air quality monitoring data. In accordance with the 1990 federal Clean Air Act Amendments, the Department of Environmental Quality (DEQ) is now applying to the Environmental Protection Agency (EPA) for redesignation of the area to attainment status by submitting a Redesignation Request including a 10-year maintenance plan. This Redesignation Request/Maintenance Plan has been adopted by the Oregon Environmental Quality Commission (EQC) and submitted to EPA as an amendment to the State Implementation Plan (SIP). Because the nonattainment area is interstate, the Southwest Air Pollution Control Authority (SWAPCA) and the Washington State Department of Ecology (WDOE) have also submitted a comparable Redesignation Request/Maintenance Plan.

Although the Portland/Vancouver AQMA has attained the federal ozone standard, rapid population and traffic growth would have resulted in future violations without the additional control measures adopted as elements of this maintenance plan. DEQ, in close coordination with SWAPCA, WDOE, Metro, and the Southwest Washington Regional Transportation Council (RTC), has developed this ozone maintenance plan through an extensive public process covering a four-year period. The plan includes emission reduction strategies affecting all major categories of ozone precursors, and generally represents the most cost-effective approaches of possible alternatives. The plan provides for maintenance of the ozone standard for ten years and will allow EPA to redesignate the Portland/Vancouver AQMA to an attainment area for ozone. The maintenance plan and redesignation will assure that public health is protected, will remove Clean Air Act impediments to industrial growth, and will help alleviate the possibility of Clean Air Act sanctions on federal transportation funds in the AQMA.

Key elements of the plan are as follows:

- Attainment demonstration;
- Attainment emission inventory;
- Maintenance demonstration consisting of emission inventory projections, the implementation of existing and new emission reduction programs, and the revision of some existing emission reduction programs;
- Contingency measures to prevent, or correct for, failure to maintain the ozone standard; and
- Compliance with all applicable SIP/Nonattainment area requirements.

4.50.0.2.2 BACKGROUND

What is Ozone

Ground level ozone, also known as smog, is an air pollutant formed in the atmosphere by a chemical reaction of volatile organic compounds (VOC) and oxides of nitrogen (NO_x). This reaction is most intense on hot summer days with poor ventilation. Ozone is a strong respiratory system irritant that aggravates respiratory illnesses, impairs athletic performance, and can cause permanent respiratory system damage. Ozone can be especially harmful to older people and children, and can damage crops and other materials. In the past, motor vehicles and industrial operations have been the major sources of ozone precursors, but other sources such as household products, paints and lawn mowers are fast becoming major contributors due to rapid population growth.

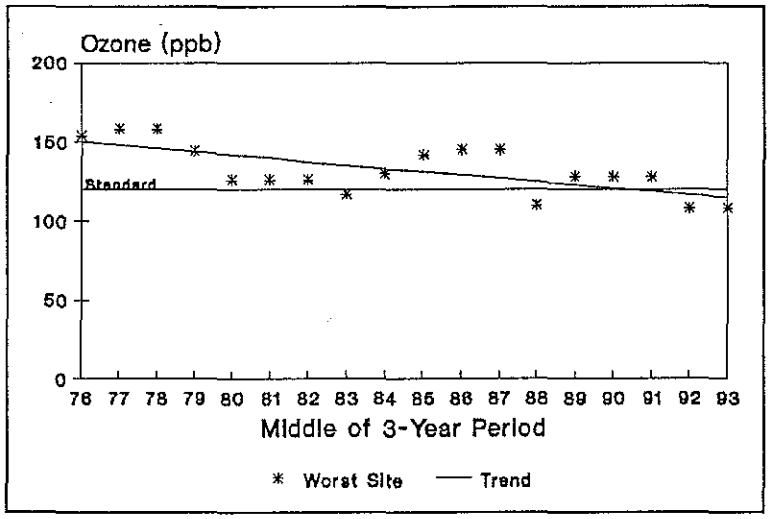
Past Ozone Problem

The Portland/Vancouver AQMA violated the national ambient air quality standard for ground level ozone since monitoring began in the early 1970s. Levels have been as high as 50 percent over the federal standard, which was designed to protect public health and welfare. As a result of these violations, the AQMA was designated nonattainment for ozone on March 3, 1978 under the 1977 Clean Air Act Amendments.

Success in Controlling Ozone

Although there have been year-to-year fluctuations due to weather cycles, Figure 4.50.0.1 shows that ozone levels have generally declined. This improvement in air quality resulted from federal and state emission control strategies implemented since the mid 1970s.

Figure 4.50.0.1
Portland/Vancouver Ozone Trend



The attainment strategies focused primarily on:

- Motor vehicles
  - federal new car emission standards
  - DEQ vehicle inspection program
  - Tri-Met transit improvements

- Gasoline
  - reduction in volatility
  - control of refueling vapors at service stations

- Industry
  - Reasonably Available Control Technology (RACT) requirements for a variety of existing industry
  - costly Lowest Achievable Emission Rate (LAER) technology and emission offsets for major new and modified industry.

These strategies brought the AQMA into attainment with the national ambient ozone standard by the federal Clean Air Act deadline of November 15, 1993.

4.50.0.2.3 NEED FOR MAINTENANCE PLAN

Projections of Future Ozone Levels

DEQ projections indicate that, without additional control measures, the AQMA would once again exceed the federal standard within the next few years because of unprecedented population growth. Metro expects more than 300,000 new residents in the Portland/Vancouver area in the next ten years. During the same time, employment will increase by nearly 250,000 workers and driving in the area will increase by over 4.8 million miles per day. Without early implementation of new emission reduction measures, emission increases from this population growth and related driving would likely cause violations of the ozone standard to recur.

Figures 4.50.0.2 and 4.50.0.3 show projected ozone precursor emissions. These figures indicate that a 19.0 percent reduction in VOC and 10.3 percent reduction in NO_x emissions is needed from new control strategies in order to keep the area in attainment over the next ten years.[1]

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[1] Based on DEQ projections of emissions in 2006 without new emission reduction strategies described in Section 4.50.0.2.5. The required reduction is expressed as a percent of human-caused emissions, excluding biogenic emissions. The attainment emission levels in Figures 4.50.0.2 and 4.50.0.3 exclude emissions from the Washington portion of the AQMA.

Figure 4.50.0.2
Portland AQMA Projected VOC Emissions

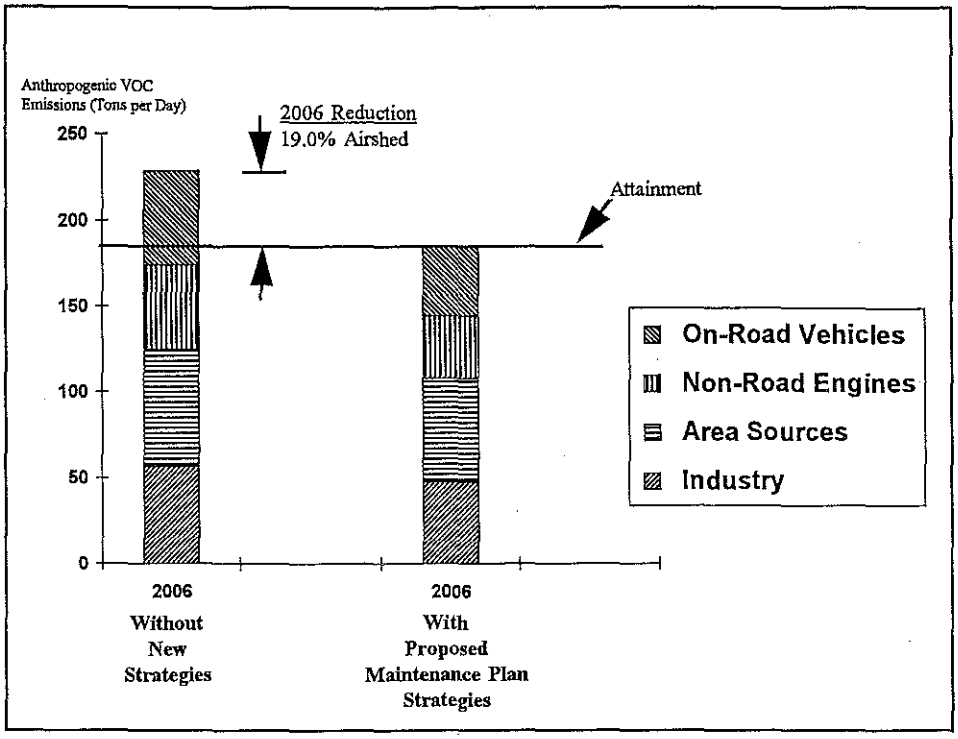
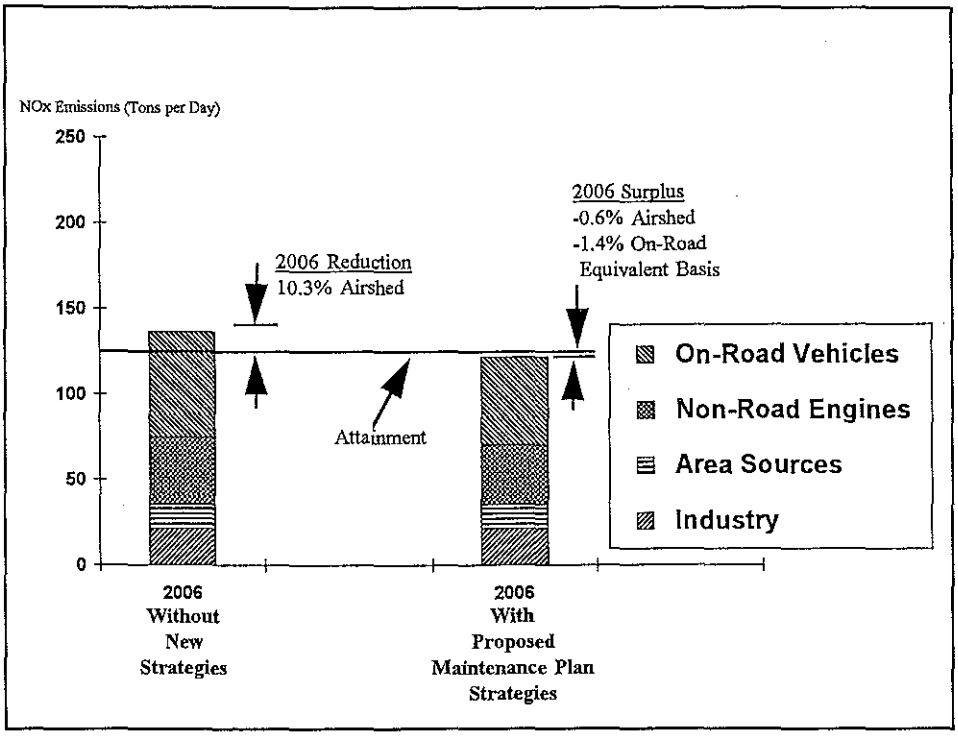


Figure 4.50.0.3
Portland AQMA Projected NO_x Emissions



Benefits of Maintenance Plan

To redesignate the AQMA from nonattainment to attainment, the Environmental Protection Agency (EPA) requires an enforceable plan that demonstrates how the area will continue to meet the ozone standard for a minimum of ten years. An EPA-approved ozone maintenance plan and redesignation to attainment:

- Assures that Public Health is protected from adverse impacts of ozone;
- Removes industrial growth impediments (LAER and Offsets);
- Protects against Clean Air Act sanctions on federal transportation funds;
- Avoids federally-imposed prescriptive and more costly control strategies, such as retrofit NO_x controls on existing industries.

4.50.0.2.4 MAINTENANCE PLAN DEVELOPMENT PROCESS

An extensive public process was used to develop the ozone maintenance plan for the Oregon portion of the AQMA. This process included the following steps:

- 1992 - Governor's Task Force recommended strategies to include in the maintenance plan;
- 1993 - The Oregon Legislature adopted House Bill 2214, which endorsed most of the recommendations of the Governor's Task Force but made some changes to the plan;
- 1994 - Several DEQ Advisory Committees were appointed and recommended specific details of maintenance plan strategies;
- 1995 - The Legislature passed a bill that would change some maintenance plan strategies, but the Governor vetoed the bill;
- December 1995 - DEQ proposed to revise some strategies to address concerns of the Legislature and Advisory Committees;
- February 1996 - Metro made recommendations on transportation elements of the plan;
- May 1996 - The public comment period and public hearings were held; and
- July 1996 - The EQC adopted the plan.

The Governor's Task Force on Motor Vehicle Emission Reduction in the Portland Area recommended forecasting assumptions and emission reduction strategies for the ozone maintenance plan after a series of public meetings during 1992. The Task Force based its recommendations on EPA guidance for maintenance plans as well as information presented by DEQ, Metro and a number of business, citizen, environmental and governmental organizations.

Significant changes were made to the maintenance plan since the Governor's Task Force made its recommendations.

- The Governor's Task Force recommended a motor vehicle emission fee that was not adopted by the 1993 Legislature. To make up the lost emission reduction credit, the Legislature increased the stringency of the Employee Commute Options (ECO) program and added a maximum parking ratio program to limit the amount of parking spaces constructed at new non-residential development.

- The Governor's Task Force recommended that DEQ adopt California standards for new lawn and garden gasoline engines. However, EPA adopted emission standards for new Lawn and Garden equipment and other non-road engines in 1994/1995, making state rules unnecessary.

- EPA delayed adoption of rules for various non-industrial (area) sources. The EQC adopted rules for paints and household products in 1995 due to a need for early emission reductions.

- Due to concerns expressed by the Legislature, advisory committees and businesses, DEQ reduced the stringency of ECO, changed the parking ratio program to a voluntary program, and modified the vehicle inspection boundary expansion.

- To meet EPA requirements designed to ensure that increases in industrial emissions do not jeopardize maintenance of the ozone standard, a donation program was added to reduce unused permitted industrial emissions.

4.50.0.2.5 MAINTENANCE PLAN SUMMARY

The maintenance plan strategies include federal, state and local emission control programs. All four major source categories of ozone precursors (i.e. on-road vehicles, non-road engines such as lawn and garden equipment, area sources such as paints and household products, and industry) are affected by these strategies. Selected strategies generally represent the most cost-effective approaches of possible alternatives. Several of the strategies provide benefits beyond emission reductions such as traffic congestion reduction, energy savings and overall cost-savings for the transportation system. The plan accounts for expected weather fluctuations that affect ozone, but provides no surplus VOC emission reduction (there is a small NO_x surplus). Figures 4.50.0.4 and 4.50.0.5 show emission reductions expected from strategy elements for the four major source categories.

Figure 4.50.0.4
VOC Emission Reductions From New Strategies

	% Reduction in Anthropogenic VOC Emissions in 2006
On-Road Vehicles	6.0%
Non-Road Engines	5.6%
Area Sources	3.4%
Industry	4.0%
Total	19.0%

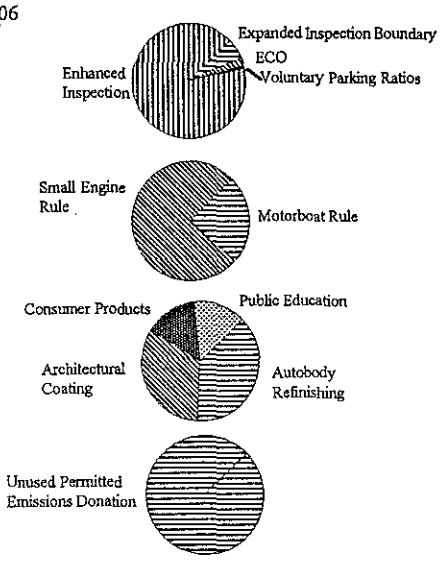
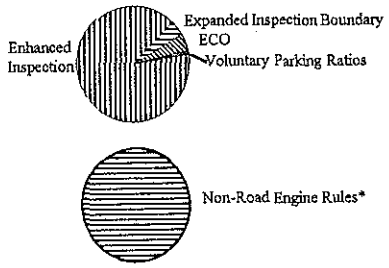


Figure 4.50.0.5
NO_x Emission Reductions From New Strategies

	% Reduction in Airshed NOx Emissions in 2006
On-Road Vehicles	7.5%
Non-Road Engines	3.4%
Area Sources	0%
Industry	0%
Total	10.9%



* Note: Diesel rule results in NOx reduction. Small engine rule and motorboat rules result in small NOx increases - net change shown

4.50.0.2.6 ON-ROAD VEHICLE STRATEGIES

Enhanced Vehicle Emission Inspection

The largest proposed VOC and NO_x emission reductions in the plan come from improvements to the DEQ vehicle inspection program. Under the enhanced inspection, emissions are tested while vehicles are put through a driving cycle that includes acceleration and deceleration. In addition, the evaporative control system, including the charcoal canister and gas cap, is tested for proper function. These tests apply to cars for which they are most cost-effective, that is the 1981 model year through models that are 6 years old. The program also includes an inspection of on-board emission control diagnostic systems installed in 1996 and newer vehicles. The basic test, with the addition of the gas cap test, applies to vehicles built from 1975 to 1980 and to vehicles up to 5 years old. The enhanced program phases in over a two-year period beginning in 1997.

Expanded Vehicle Inspection Boundary

The 1993 Legislature directed the EQC to expand the vehicle inspection boundary as one element of the maintenance plan. The EQC adopted an expanded boundary in July 1994 which included the more densely populated portions of the Tri-County area and small neighboring portions of Columbia, Marion and Yamhill Counties. DEQ relied on U.S. Census Bureau data to select areas that had high commute rates into the AQMA.

The 1995 Legislature expressed concern about the boundary expansion into the three Counties outside of the Tri-County area. Based on further evaluation of Census data by DEQ, the EQC removed from the expanded boundary those areas with less than 40 percent of their work force commuting into the AQMA. This removed from the expansion some areas in Clackamas, Marion and Yamhill Counties, but retain some areas in Columbia and Yamhill Counties.

Removal of Old Vehicle Exemption from Vehicle Inspection Program

This strategy eliminated the exemption from testing for vehicles that are 20 or more years old. Vehicles made in 1975 and later model years are permanently included in the testing program.

Employee Commute Option Program

This program requires employers with more than 50 employees to provide alternatives to drive-alone commuting to work. The program has a 10 percent trip reduction target, and helps reduce congestion in addition to reducing emissions. Based on recommendations from DEQ advisory committees, the program is designed to minimize administrative burdens, provide alternative compliance options, give credits for past efforts to reduce commute trips, and allow exemptions when no practical alternatives exist. Employers are free to choose commute options that work best for their businesses. Some commute options, such as a four-day work week and telecomuting, offer the opportunity for businesses and commuters to save money. Carpools,

vanpools and transit assistance are other options. Employers may choose to reduce emissions at the work site as an alternative to reducing commute trips. Alternative emission reduction strategies, such as replacing propane or gasoline forklift trucks with cleaner and less costly electric forklifts, offer businesses additional ways to save money.

Employers that make good faith efforts to meet the trip reduction target, but do not meet it, are considered in compliance with the program and are not penalized.

Voluntary Parking Ratio Program

This program establishes a voluntary maximum number of parking spaces for new non-residential development based on the size and type of facility. The objective of the program is to encourage developers to design and locate new facilities in ways that reduce parking needs by providing good opportunities for walking, bicycling and using transit. The program was originally intended to be mandatory, but it is being implemented on a voluntary basis because of concerns expressed by developers and because Metro is developing regional maximum parking ratios. Incentives to participate in the voluntary program include exemption from the ECO program and priority processing of any applicable DEQ permit.

Metro Transportation Control Measures

Metro's 2040 growth concept is designed to significantly improve the balance between motor vehicles and other less polluting forms of transportation. The concept calls for increasing density, building residences within walking distance of businesses, and substantially expanding infrastructure for transit and other alternative modes. Credit for this program was included in the motor vehicle emission forecast prepared by Metro for the maintenance plan. The Urban Growth Boundary and Metro's Interim Region 2040 Implementation Measures are identified as Transportation Control Measures in the maintenance plan to meet EPA enforceability requirements for emission control strategies.

In addition to the 2040 growth concept, several significant public transportation improvements identified in Metro's Regional Transportation Plan were included in motor vehicle emission forecasts prepared by Metro for the maintenance plan. Because these improvements reduce motor vehicle emissions, they are identified in the maintenance plan to ensure that they are funded and implemented in a timely manner as required by the Clean Air Act/Transportation Conformity process. The improvements over the next ten years include:

- South-North Light Rail Lines;
- An average 1.5 percent per year increase in regional transit service;

- Bicycle and pedestrian improvements, where such facilities do not exist, when major roads are expanded or reconstructed;

- At least 28 miles of additional bikeways; and

- At least nine miles of additional pedestrian facilities.

Transportation Emissions Budget

The Clean Air Act requires Metro to demonstrate that its transportation plans conform to air quality plans. This conformity analysis is required to receive federal transportation funding. Prior to adoption of the maintenance plan, Metro was required to show that projected emissions from implementation of a transportation plan (i.e. "build" case) do not exceed either the 1990 emissions or the projected emissions without the transportation plan (i.e. "no-build" case).

The maintenance plan includes transportation emissions budgets to ensure that emissions from on-road transportation sources do not exceed the levels forecast for the maintenance plan. Metro now must demonstrate that transportation plans conform to the emissions budgets. Upon EPA approval of the emissions budgets in the maintenance plan, the 1990 and build/no-build conformity tests will be eliminated. This gives Metro greater flexibility in planning and implementing the Region's transportation system.

4.50.0.2.7 NON-ROAD ENGINE STRATEGIES

Credit is included in the plan for recent EPA emission standards for new non-road engines. These standards affect new small gasoline engines (such as lawn mowers and chain saws), motor boat engines (such as 2-cycle outboards and inboard pleasure boat engines), and heavy-duty diesel engines (such as construction equipment).

4.50.0.2.8 AREA SOURCE STRATEGIES

In 1995, EQC adopted rules to reduce VOC emissions from autobody refinishing, architectural coatings (such as house paints) and a variety of consumer products (such as aerosol sprays, air fresheners and windshield washer fluids). Although EPA may adopt similar programs, state rules were required to ensure that emission reductions are achieved during the early years of the maintenance plan.

4.50.0.2.9 INDUSTRIAL EMISSION STRATEGIES

Industrial PSEL Management Program

To meet EPA requirements, the maintenance plan must be based on allowable emissions that are established as Plant Site Emission Limits (PSELs) in industrial source permits. However, when attainment of the ozone standard was reached in 1992, industrial sources held a substantial amount of unused PSEL (over 5000 tons per year of VOCs). If industry increased emissions to the full permitted level, maintenance of the ozone standard could not be demonstrated.

Normally, to meet EPA requirements, a regulatory program would be needed to limit PSELs closer to actual emission levels occurring in the attainment year. However, a voluntary program for donation of unused PSEL was conceived to achieve this objective. Incentives to participate were offered to businesses that held large amounts of unused permitted emissions, including exemption from the ECO program, priority permit processing, and priority use of an industrial growth allowance built into the plan for new and expanding industries. As a result of these incentives, industrial sources have donated sufficient unused PSEL to enable DEQ to balance the maintenance plan.

Industrial Growth Allowance Program

The maintenance plan includes a VOC and NO_x growth allowance for major new and expanding industries. The growth allowance may be used in lieu of emission offsets otherwise required for these sources. It will be allocated on a first-come, first-served basis, except that sources that voluntarily donated PSEL will receive priority over sources that did not donate. No business may be awarded more than 50 percent of the remaining growth allowance or 10 tons, whichever is greater, unless an exception is approved by the EQC on a case-by-case basis.

The growth allowance was designed to match historic industrial emission growth rates. The amount of growth allowance available to allocate increases over time as the emission control strategies on which it is based phase in. By the year 2006, the VOC growth allowance builds up to at least 1,056 tons per year and the NO_x growth allowance builds up to 438 tons per year. Because of a shortfall in the voluntary donation program and other changes to the plan, the VOC growth allowance available from 1997 through 2003 was reduced by 25 percent from the historic growth rate. DEQ will work to increase the growth allowance during the maintenance plan period by utilizing additional voluntary donations and any future emission reductions that were not relied upon in demonstrating maintenance of the ozone standard. In particular, the growth allowance will be increased when EPA determines the emission reduction credit available from its gasoline detergent additive program.

Reasonably Available Control Technology (RACT)

Industrial emissions were reduced significantly under the original attainment plan by installation of Reasonably Available Control Technology (RACT) at existing major sources. These RACT requirements remain in place under the maintenance plan. In addition, the maintenance plan relies on emission reductions from RACT updates required by the 1990 Clean Air Act Amendments. This includes source-specific RACT requirements for two surface coating operations, a solvent metal cleaning operation, and a mineral products firm. The plan also assumes emission reductions from RACT requirements for several industrial source categories, including aerospace component coating operations and barge loading operations at gasoline terminals. A planned gasoline pipeline is expected to provide emission reductions equivalent to barge loading RACT.

4.50.0.2.10 PUBLIC EDUCATION AND INCENTIVE PROGRAM

An intensive and long term public education and incentive program is included to achieve additional emission reductions and to help implement other programs in the maintenance plan. Because this is an experimental program, EPA required DEQ to commit to quantify the reductions achieved within 3 years and implement a mandatory back-up strategy if the program fails to meet its objectives. DEQ, along with private sector partners, will encourage the public to choose consumer products that emit fewer VOCs, reduce motor vehicle trips, use electric and hand gardening tools, and curtail polluting activities such as lawn mowing on high pollution days. Advertising, discounts and other incentives will be used to achieve measurable emission reductions.

4.50.0.2.11 CONTINGENCY PLAN

The Clean Air Act requires that maintenance plans include contingency plans to be implemented if the maintenance plan fails. The Governor's Task Force recommended that reformulated gasoline and congestion pricing be the primary contingency measures. Alternatives may be identified if and when the contingency must be implemented. The Clean Air Act also requires the contingency plan to include any emission reduction strategies that are discontinued under the maintenance plan.

If future emissions are higher than forecast or the ozone standard is exceeded twice in three years (four exceedances in three years at the same monitoring site would be a violation), DEQ will conduct a study and recommend one or more of the following:

- reformulated gasoline (after 2005), congestion pricing, or other appropriate control measure;

- additional studies to determine if further measures are needed; or

- no further action because the problem was caused by emission factor changes, temporary emission increases, or an exceptional event.

If a violation of the ozone standard occurs:

- the industrial growth allowance will be eliminated, and LAER and emission offsets will again be required for major new and modified industry in the AQMA and within a 30 kilometer buffer area;

- DEQ will consider opting-in to the federal reformulated gasoline program unless it is prior to 2005 or EPA rules do not allow the Portland area to opt-in. If reformulated gasoline is not implementable, DEQ will convene an advisory committee to develop a regional congestion pricing program or identify an equivalent measure.

4.50.0.2.12 MAINTENANCE PLAN COMMITMENTS

The EQC adopted the expanded vehicle inspection boundary in July, 1994 and the area source rules in May, 1995. Most of the remaining supporting rules were adopted concurrently with the maintenance plan in July, 1996, including ECO, voluntary parking ratios, the final vehicle inspection boundary, and the unused PSEL management program. However, the enhanced testing procedures for the vehicle inspection program, including a fee increase, will be adopted in late 1996 after DEQ has had more experience with test lanes currently in operation. Changes to the New Source Review program required for the maintenance plan will also be adopted in late 1996. These elements of the maintenance plan will be submitted to EPA before EPA action on the redesignation request.

In addition, DEQ and SWAPCA are committing to a future study of the roles of VOC and oxides of nitrogen (NO_x) in ozone formation in the Portland/Vancouver area. The redesignation request also includes commitments to continue air quality monitoring for ozone, to submit periodic reports to EPA, and to adopt backup measures if key emission reduction programs relied upon in the maintenance plan are not implemented or are not as effective as anticipated.

4.50.1 INTRODUCTION

This is a redesignation request and maintenance plan to document and ensure continued attainment of the National Ambient Air Quality Standard (NAAQS) for ozone in the Portland/Vancouver interstate Air Quality Maintenance Area (AQMA). This document complies with the applicable 1990 federal Clean Air Act (FCAA) requirements and Environmental Protection Agency (EPA) policies. Appendix D1-1 contains the Technical Analysis Protocol for the redesignation request/maintenance plan.

The Portland/Vancouver AQMA was designated an interstate ozone nonattainment area in 1978 under the 1977 FCAA. The area was further classified as a marginal ozone nonattainment area under the 1990 FCAA, and an attainment deadline of November 15, 1993 was established. This interstate nonattainment area consists of the southern portion of Clark County, Washington and portions of Multnomah, Clackamas, and Washington Counties in Oregon. See Figures 4.50.1.1 and 4.50.1.2.

There are four ozone monitoring sites in the Portland/Vancouver AQMA (see Appendix D1-2). In the past, these sites have shown violations of the NAAQS for ozone. The area attained the standard during the 1987 to 1989 period, but violated again in 1990. Since the 1990 to 1992 period, the area has attained the ozone standard and redesignation to attainment is being applied for in accordance with the 1990 FCAA. This document is part of the formal procedure to redesignate the area to attainment status.

4.50.1.1 National Ambient Air Quality Standards for Ozone

The maintenance plan addresses the NAAQS for ozone as defined in the 1990 FCAA. Specifically, the maintenance plan addresses tropospheric, or ground-level, ozone, commonly referred to as a component of urban smog. It does not address stratospheric ozone, or the "ozone layer", which shields the earth from harmful solar radiation.

Ozone is a pungent, toxic, highly reactive form of oxygen. Exposure to ozone can cause increased airway resistance and decreased efficiency of the respiratory system. Ozone can cause sore throat, chest pain, cough and headaches in individuals involved in strenuous physical activity and in people with pre-existing respiratory disease. Plants can also be affected; reductions in growth and crop yield have been attributed to ozone.

The formation of tropospheric ozone is directly related to warm, stable meteorological conditions (major factors being sunlight, temperature, humidity and mixing height). As a result, maximum ozone concentration levels typically occur during the summer months, also referred to as the ozone season.

Figure 4.50.1.1: Oregon Portion of the Nonattainment Area

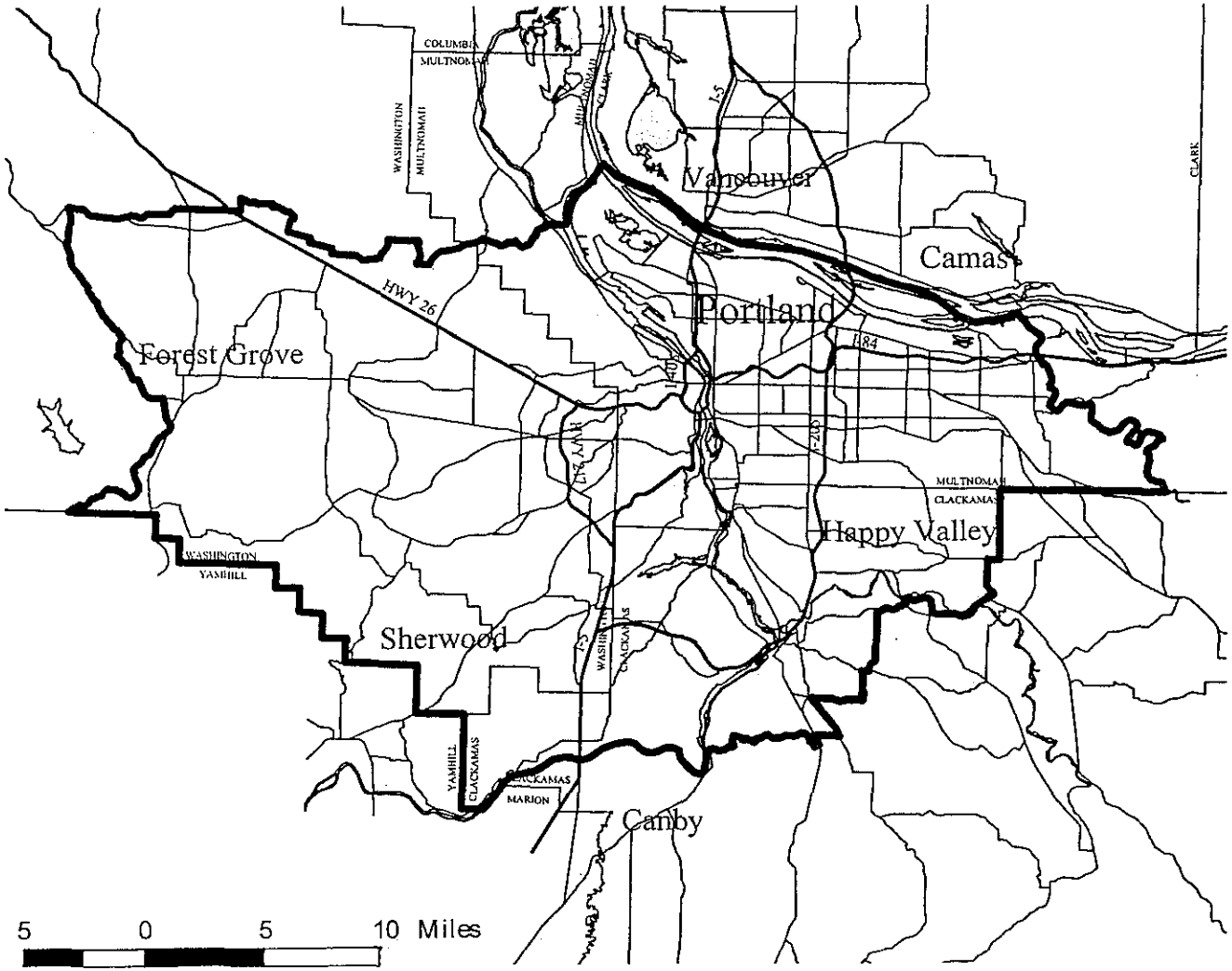
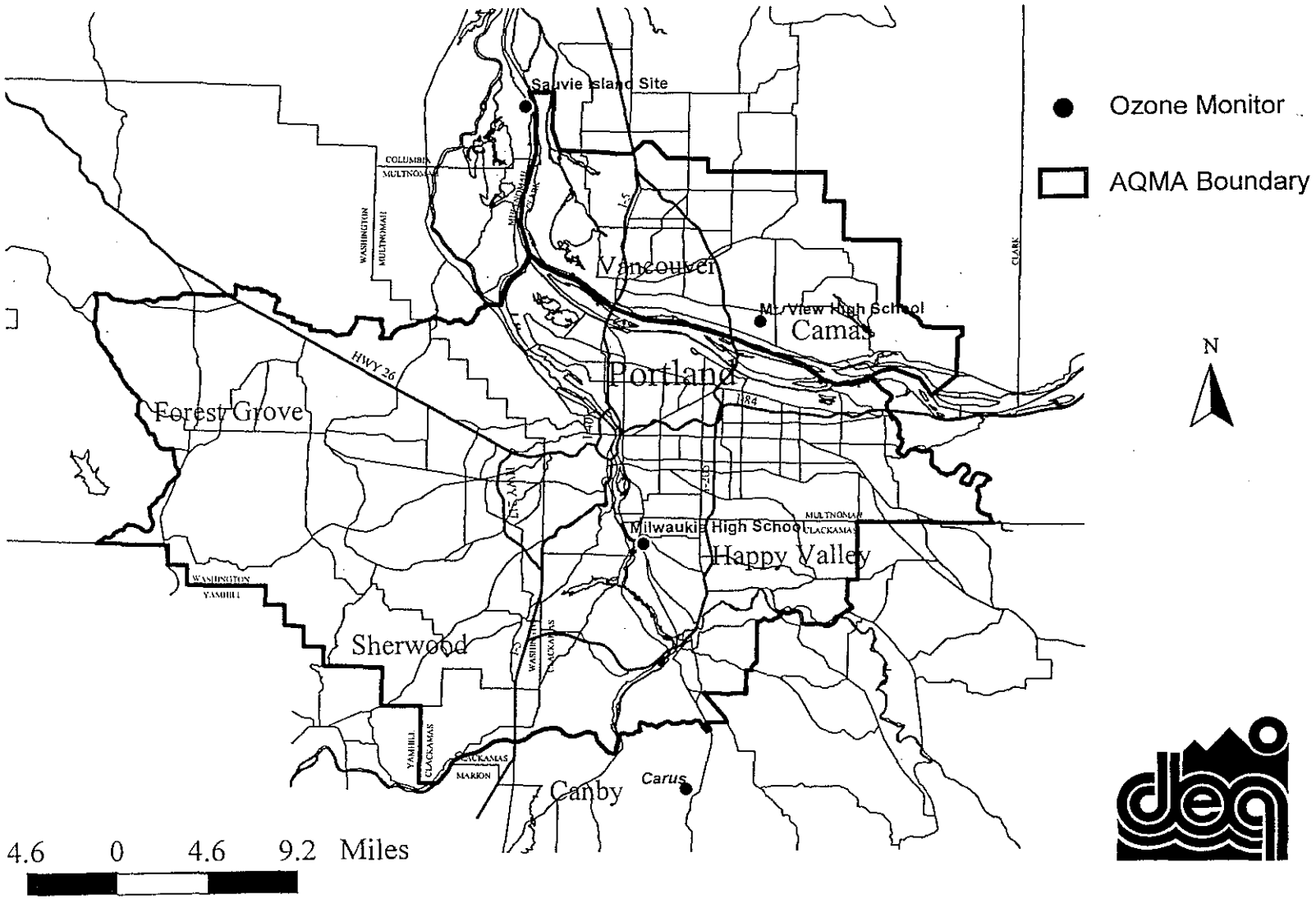


Figure 4.50.1.2: Portland/Vancouver Nonattainment Area



Ozone is formed through a series of complex photochemical (sunlight-requiring) reactions between other pollutants and oxygen. The most important of these pollutants are nitrogen oxides (NO_x) and volatile organic compounds (VOCs), often referred to as ozone precursors. Carbon monoxide is also considered a precursor of ozone; although much less reactive than VOC, it is often present in urban areas in sufficient concentration to contribute to the formation of ozone.

In addition to meteorological conditions, key factors in the formation of ozone are the ratios of VOC to NO_x concentrations and NO to NO_2 concentrations in the atmosphere, the reactivity of the specific VOC species present, local precursor emissions, and transport of precursors and ozone from upwind sources. To control ozone pollution, it is most common to control both VOC and NO_x emissions. If the VOC to NO_x ratio is very low, controlling VOC emissions may be most effective in reducing ozone. If the VOC to NO_x ratio is very high, controlling NO_x emission may be most effective in reducing ozone, depending on the NO to NO_2 ratio and other factors.

In the Portland/Vancouver AQMA, the VOC to NO_x ratio is in the range where controlling emissions of both VOC and NO_x is important to reducing ozone. Therefore, the ozone control strategy in the maintenance plan relies on the control of both precursors. Appendix D1-9 describes a study that Oregon and Washington plan to perform over the next several years to confirm that controlling both VOC and NO_x is more effective than focussing control efforts on only one of the two pollutants.

EPA has established the NAAQS for ozone at 0.12 parts per million (ppm), 1-hour average. Any ozone monitored value above this level is considered an exceedance. More than three exceedances within a three-year period at any one monitoring site is considered a violation. If an area is in violation of the standard, it is designated as a nonattainment area. The formal statement of the ozone national 1-hour standard is contained in the Code of Federal Regulations (40 CFR 50.9), which states:

> *The national primary and secondary ambient air quality standard for ozone ...is 0.120 parts per million (235 micrograms per cubic meter). The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 parts per million (235 micrograms per cubic meter) is equal to or less than 1 as determined by Appendix H.*

Appendix H to 40 CFR Part 50 provides an interpretation of the standard and a procedure for estimating the number of exceedances per year. EPA has also issued guidance which specifies that three complete consecutive years of quality-assured ambient monitoring data from all monitoring sites in the area must be used in determining ozone attainment status.

In addition, 40 CFR 50.8 defines how ambient air quality monitoring data are to be compared to the applicable NAAQS. It states that all monitoring data should be expressed to one decimal place, and indicates that standards defined in parts per million (ppm) should be compared "in terms of integers with fractional parts of 0.5 or greater rounding." Thus, the ozone standard is considered to be attained when the average number of days per calendar year with a maximum hourly average concentration above 0.124 ppm is one day or less. Again, the ozone NAAQS is met if no monitor has more than three days with exceedances of 0.125 or greater during the three most recent calendar years.

In general, demonstrating "attainment" requires the collection of representative monitoring data using approved measuring instruments and procedures, with adequate quality assurance and quality control. All monitoring locations within an area must meet the standard. Air quality measurements in the Portland/Vancouver AQMA satisfy this requirement, as shown in Section 4.50.2, "Attainment Demonstration".

4.50.1.2 Redesignation Criteria/Organization of Document

Presented below is a summary of the redesignation criteria, mandated in Section 107(d)(3)(E) and related subsections of the FCAA, that must be met before an area can be redesignated to attainment status. Included with this summary is a reference to the discussion of each redesignation criterion in this document.

Attainment Verification

The nonattainment area seeking redesignation must have attained the applicable NAAQS. Attainment of the NAAQS for ozone in the Portland/Vancouver AQMA is discussed in Section 4.50.2, "Attainment Demonstration".

SIP Approval

EPA must have fully approved the applicable State Implementation Plan (SIP) for the area under Section 110(k) of the FCAA. DEQ submitted the attainment strategy for the Oregon portion of the AQMA in 1982 and supplements required by the 1990 FCAA on May 14, 1991, November 16, 1992, May 14, 1993, November 15, 1993 and April 14, 1995. DEQ expects that these submittals will be fully approved before, or in parallel with, the Redesignation Request approval. These SIP revisions, and compliance with Section 110(k) of the FCAA, are discussed in Section 4.50.4.1, "SIP Requirements/Nonattainment Area Requirements".

Permanent and Enforceable Improvements in Air Quality

The improvement in air quality must be due to permanent and enforceable reductions in emissions resulting from the implementation of the applicable SIP, enforceable air pollution control regulations, and other permanent and enforceable reductions. The permanent and enforceable nature of the reductions in emissions, which are responsible for improvements in ambient ozone concentrations in the Portland/Vancouver AQMA, are discussed in Section 4.50.2.2, "Permanent and Enforceable Improvements in Air Quality".

Nonattainment Area Requirements

The state must have met all requirements applicable to the nonattainment area under Section 110 and Part D of the FCAA. Compliance with Section 110 and Part D of the FCAA is discussed in Section 4.50.4.1, "SIP Requirements/Nonattainment Area Requirements".

Maintenance Plan Elements

The EPA must have fully approved a maintenance plan for the area meeting the requirements of Section 175A of the FCAA. Concurrent approval of the maintenance plan and redesignation request is expected. There are essentially five parts to a maintenance plan which are as follows: (1) an attainment inventory, (2) a maintenance demonstration, (3) a commitment to continue operating the monitoring network, (4) a commitment to continue to verify attainment and (5) a contingency plan. These sections are outlined below in Table 4.50.1.1 along with the rest of the Redesignation Requirements.

Table 4.50.1.1: Summary of Redesignation Requirements

Required Element	Section of Redesignation Request	
Attainment Verification	Section 4.50.2	ATTAINMENT DEMONSTRATION
SIP Approval	Section 4.50.4	ADMINISTRATIVE REQUIREMENTS
Permanent and Enforceable Improvements in Air Quality	Section 4.50.2	ATTAINMENT DEMONSTRATION
Nonattainment Area Requirements	Section 4.50.4	ADMINISTRATIVE REQUIREMENTS
Maintenance Plan Elements		
Attainment Inventory	Section 4.50.3	MAINTENANCE PLAN
Maintenance Demonstration	Section 4.50.3	MAINTENANCE PLAN
Monitoring Network	Section 4.50.4	ADMINISTRATIVE REQUIREMENTS
Verification of Continued Attainment	Section 4.50.4	ADMINISTRATIVE REQUIREMENTS
Contingency Plan	Section 4.50.3	MAINTENANCE PLAN

4.50.2 ATTAINMENT DEMONSTRATION

4.50.2.1 Ambient Air Quality Monitoring Data

The Portland/Vancouver AQMA has four ozone monitoring sites. Three sites are in Oregon at the following locations: Sauvie Island, Milwaukie High School, and Carus (Sprangler Road). One site is located at Mt. View High School in Vancouver, Washington. See Figure 4.50.1.2 and Appendix D1-2 for locations. The Oregon monitors have been in operation since the mid 1970's. The current Vancouver site has only been in operation since 1988. Before this date, there was an ozone monitor located at the Columbia River High School from 1979 to 1987.

The ozone monitors run continuously from May through September with hourly averages derived electronically via data loggers and integrators. After rigorous quality assurance, the data is entered into the Aerometric Information Retrieval System (AIRS), which supplies EPA with the air quality monitoring data. This data provides the basis for Portland/Vancouver's air quality status.

The Portland/Vancouver AQMA has attained the ozone NAAQS based on air quality monitoring data from these four sites from 1991 to the present. Figure 4.50.2.1 shows the total number of exceedances recorded in the Portland/Vancouver AQMA at all monitoring sites since 1979. Table 4.50.2.1 shows the highest ozone values at each site from 1991 through 1994. See Appendix D1-3 for historical ozone monitoring data.

Figure 4.50.2.1: Exceedances of the Ozone NAAQS in Portland/Vancouver 1979 to the Present

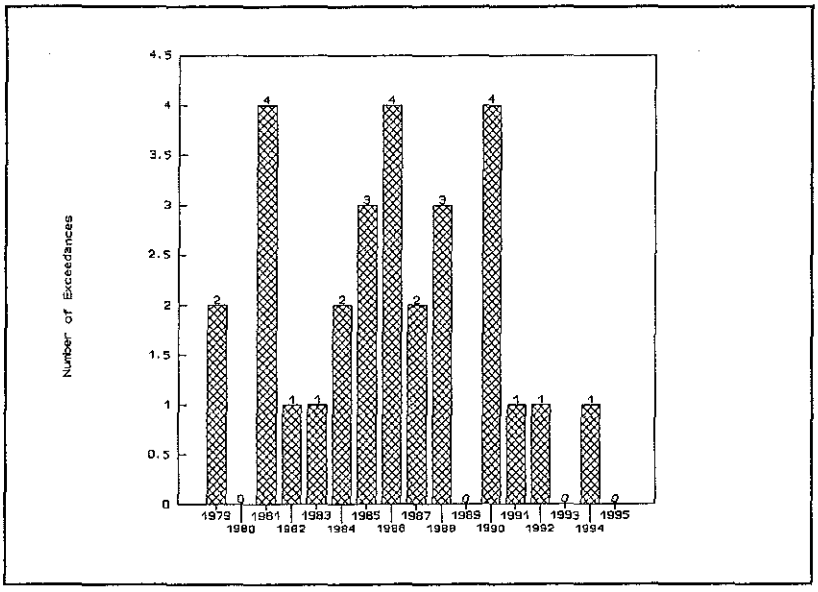


Table 4.50.2.1: Four Highest Ozone Values from 1991 to the Present For Each Monitoring Site (1-hour averages)

Monitoring Site Concentrations	Date	Monitoring Site Concentration	Date
Mt. View:		Milwaukie:	
0.102 ppm	8/15/91	0.110 ppm	7/23/91
0.121 ppm	7/30/92	0.123 ppm	8/13/92
0.112 ppm	8/4/93	0.112 ppm	8/4/93
0.130 ppm	7/20/94	0.103 ppm	7/20/94
Sauvie Island:		Carus:	
0.061 ppm	7/22/91	0.129 ppm	7/2/91
0.095 ppm	8/13/92	0.126 ppm	8/17/92
0.091 ppm	8/4/93	0.092 ppm	8/4/93
0.102 ppm	7/20/94	0.117 ppm	7/21/94

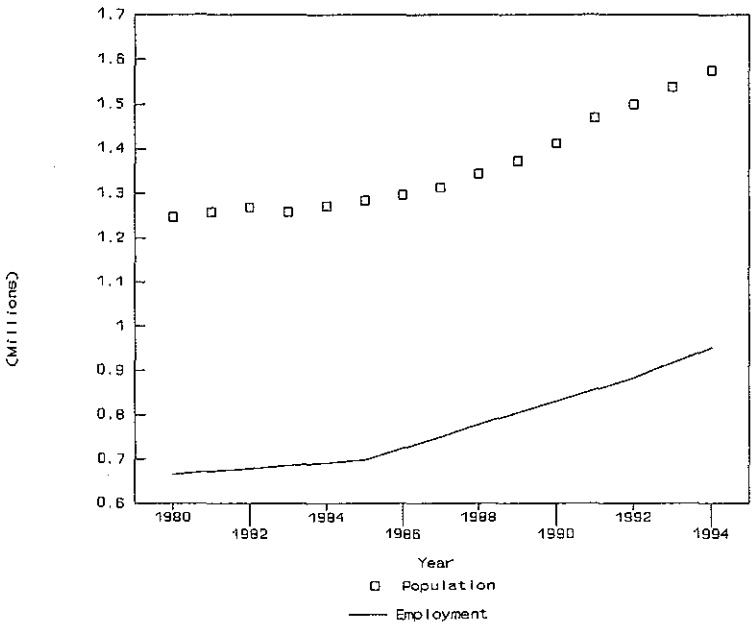
The Mt. View site only recorded one exceedance from 1991 through 1995. This condition occurred on July 20, 1994. The Carus site experienced two exceedances during this same time period. None of the other sites experienced an exceedance from 1991 through 1994. Therefore, based on the definition of attainment described in Section 4.50.1.1, the data shows that the Portland/Vancouver AQMA has attained the NAAQS for ozone.

4.50.2.2 Permanent and Enforceable Improvement in Air Quality

The EPA has issued guidance which specifies that, in order for an area to be redesignated to attainment, a state must be able to reasonably attribute improvements in air quality to emission reductions which are permanent and enforceable. Economic downturns and/or unusual meteorology are factors that might result in lower ozone concentrations and an attainment record that it is "artificial." In this case, attainment might not be sustainable if there is a return to "normal" economic conditions and meteorology.

Economic Effects: Historical trend data were collected for the Portland/Vancouver metropolitan area's population and employment as indices of the overall level of economic activity and growth in the area. The data includes population for Clackamas, Multnomah and Washington Counties in Oregon, and Clark County in Washington. This data is summarized in Figure 4.50.2.2. The data shows the area has been growing rapidly since the early 1980's.

Figure 4.50.2.2: Portland/Vancouver Historical Population and Employment



The Portland/Vancouver area reached attainment in 1993 when there was rapid growth occurring throughout the Portland/Vancouver region. Attainment for ozone was achieved despite this growth; therefore, the improvement in Portland/Vancouver's ozone air quality has not been due to a downturn in economic conditions. See Appendix D1-6 for a tabulation of historical and projected population, employment and household data.

Meteorological Effects: Peak ozone levels occur in the Portland/Vancouver AQMA during hot summer days with low wind speeds. Although ozone formation is complex and dependent on a number of factors, high ambient temperatures can be considered a general indicator of potential regional ozone episodes or "ozone conducive" days. Table 4.50.2.2 displays the number of days that were above 90 °F from 1979 through 1994.

Table 4.50.2.2: High Temperature Days in Portland/Vancouver 1979 through 1994

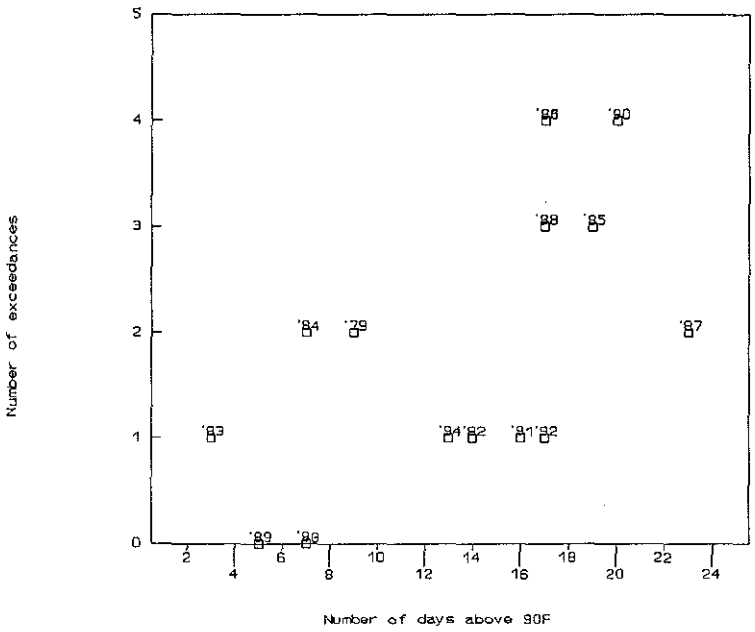
Year	Days with Maximum Temperature Above 90 °F	Year	Days with Maximum Temperature Above 90 °F
1979	9	1987	23
1980	7	1988	17
1981	17	1989	5
1982	14	1990	20
1983	3	1991	16
1984	7	1992	17
1985	19	1993	7
1986	17	1994	13

*Data based on Portland International Airport Temperature data.

Figure 4.50.2.3 shows there were just as many potential "ozone conducive" days from 1991 to the present, the attainment period, as there were in the 1980's when there were up to 3 and 4 exceedances each year. Therefore, the ozone attainment in the Portland/Vancouver area has not been due to favorable weather conditions.

Nevertheless, future violations of the ozone standard could occur under meteorological conditions that have occurred during the past 20 years unless emissions are reduced to below the attainment period emission levels. Calculation of the maintenance emission level to address future weather fluctuations is presented in Section 4.50.3.2 and Appendix D1-8.

Figure 4.50.2.3: Portland/Vancouver Temperature Ozone Relationship



Permanent and Enforceable Emission Reductions

Control strategies that were in place during the attainment period, all of which are permanent and enforceable measures, are listed below.

1. Federal measures:
   a. Federal Motor Vehicle Control Program establishing emission standards for new motor vehicles.
   b. Summertime Reid Vapor Pressure (RVP) of 7.8 psi for gasoline for the Oregon portion of the AQMA. Most all gasoline supplied to the Vancouver area service stations are supplied by Portland bulk terminals. Therefore, the Vancouver area also receives the benefit of 7.8 psi RVP.

2. SIP measures:
   a. Major New Source Review Program (Lowest Achievable Emission Rate and offsets). [Rule citations: OAR 340-028-1900 through 340-028-2000, SWAPCA 400-112.]
   b. "Basic" vehicle inspection and maintenance within the Portland area (Metro boundary) since 1975 and within the Washington portion of the

AQMA since June 1993. [Rule citations: OAR 340-024-0300 through 340-024-0355, WAC 173-422.]

c. Stage I vapor recovery for Portland and Vancouver. [Rule citations: OAR 340-022-0400 through 340-022-0403, WAC 173-490.]

d. Reasonably Available Control Technology (RACT) on major industrial sources of VOC. [Rule citations: OAR 340-022-0100 through OAR 340-022-0220, WAC 173-490.]

3. Additional state and local measures:

a. Stage II vapor recovery at gasoline transfer and dispensing operations for both Portland and Vancouver. [Rule citations: OAR 340-022-0400 through 340-022-0403, SWAPCA 491.]

b. Improved public transportation for both areas (expanded bus fleet, improved shelters, park and ride lots, and light rail in the Portland area only).

c. Voluntary Transportation Demand Management (TDM) measures (carpool matching, transit fare incentives).

d. Traffic flow improvements (ramp metering, computerized signalization, on-street parking limits).

All of these measures helped counteract the growth in the Portland/Vancouver AQMA and helped bring the area into attainment.

4.50.3 MAINTENANCE PLAN

As part of a Redesignation Request/Maintenance Plan under FCAA Section 175A(a), DEQ must show that attainment will be maintained for at least 10 years after the date of redesignation. This maintenance demonstration through the 2006 ozone season is documented below. The maintenance demonstration shows that the ozone NAAQS will not be violated at least until the beginning of the 2007 ozone season on May 1, 2007.

4.50.3.1 Attainment Inventory

States must develop an attainment emission inventory as part of a maintenance plan. The attainment period for the Portland/Vancouver AQMA was from 1991 to 1993. DEQ and SWAPCA selected 1992, the middle of the attainment period, for the attainment inventory.

An emission inventory consists of emission estimates from all sources that emit volatile organic compounds, nitrogen oxides, and carbon monoxide. These sources include point sources (i.e., industry), mobile sources (e.g., cars and trucks), non-road mobile sources (e.g., construction equipment, recreational vehicles, lawn and garden equipment), and area sources (e.g., gasoline marketing, solvent usage, outdoor burning). These emissions are tabulated based on pounds of VOC, NO_x, and CO emitted during a typical summer day.

A 1992 ozone attainment emission inventory was prepared for the Oregon portion of the AQMA and for the Washington portion of the AQMA, and then combined for the entire nonattainment area. Tables 4.50.3.1, 4.50.3.2, and 4.50.3.3 summarize the results along with the projected emissions. (Appendix D1-4-2 contains the detailed calculations of the 1992 ozone emission inventory for the Oregon portion of the AQMA.)

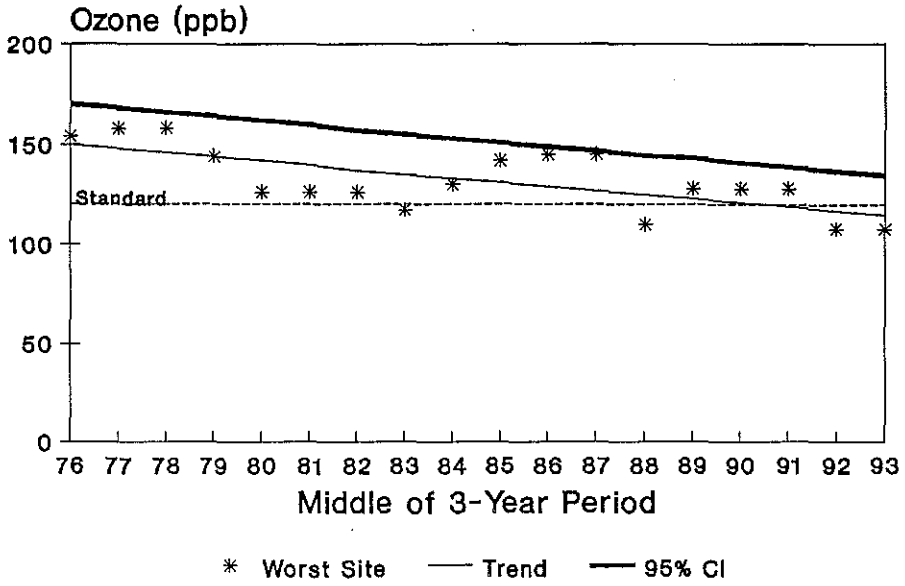
4.50.3.2 Maintenance Demonstration

This Section demonstrates that the projected emission inventories do not exceed the maintenance emission level throughout the maintenance plan period. This Section also describes control measures and transportation emissions budgets relied upon in the maintenance demonstration.

4.50.3.2.1 Maintenance Emission Level

Although 1992 was a typical summer, it does not reflect the high end of ozone fluctuations that could occur over a 10 year period. As shown in Figure 4.50.3.1, the ozone concentration in the Portland/Vancouver AQMA has generally declined over the past two decades, consistent with the decline in emissions resulting from federal and state emission control strategies. However, figure 4.50.3.1 also shows considerable annual variations in ozone concentrations. As a result, the Portland/Vancouver AQMA attained the ozone standard during the 3-year period centered around 1988, but then violated the standard during subsequent 3-year periods until attaining again in the 1991 to 1993 period.

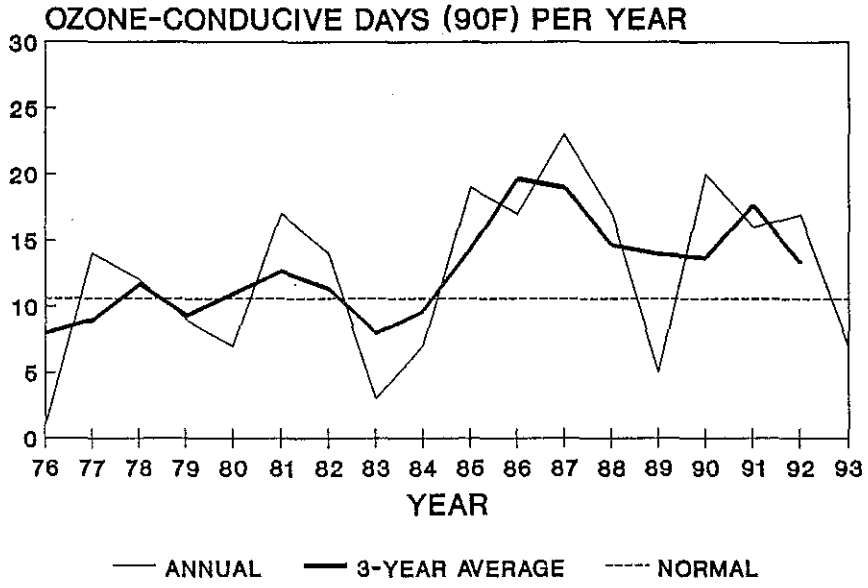
Figure 4.50.3.1: Portland/Vancouver Ozone Trend



This year to year variation in the ozone concentration is due to weather fluctuations, primarily temperature as shown in Figure 4.50.3.2. Had the most severe ozone-conducive weather conditions occurred during the attainment period, the area could have violated the ozone standard with the attainment inventory emission level. This can be seen by comparing the 95 percentile ozone concentration with the ozone standard shown in figure 4.50.3.1.

In order to provide a 95 percent confidence that future weather fluctuations will not cause a violation of the ozone standard, the maintenance emission level must be established below the 1992 attainment emission level. The methodology for calculating the maintenance emission level ("airshed capacity") can be found in Appendix D1-8. This methodology utilizes the 1990 emission inventory which was submitted to EPA in draft form in 1993 and is included in final form in Appendix D1-4-1. The 1990, 1992 and maintenance emission levels are summarized in Tables 4.50.3.1 through 4.50.3.3 and figures 4.50.3.3 through 4.50.3.5.

Figure 4.50.3.2: Portland/Vancouver Temperature Trend



Portland Airport Data

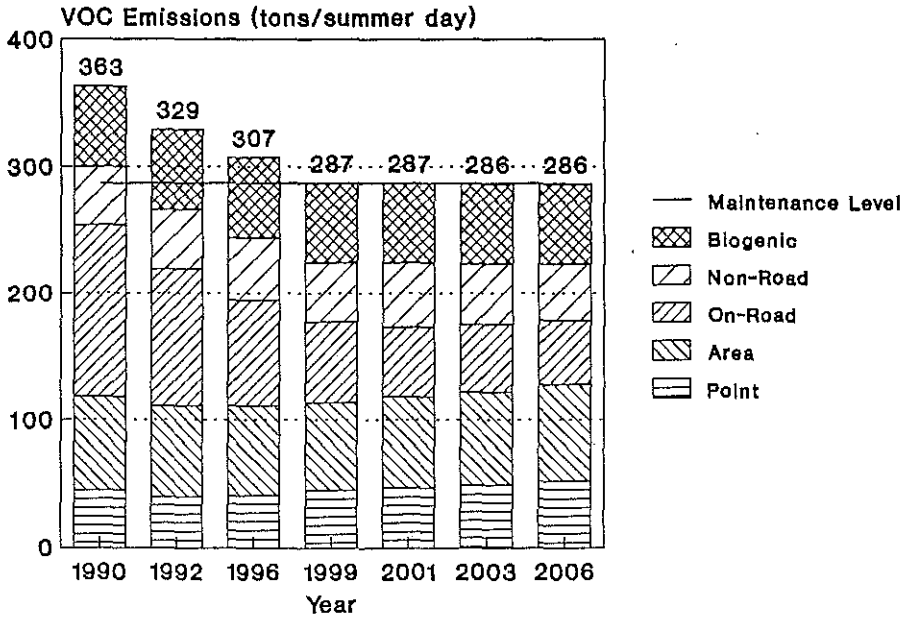
4.50.3.2.2 Inventory Projections

Figures 4.50.3.3 through 4.50.3.5 and Tables 4.50.3.1 through 4.50.3.3 summarize projected emissions for the AQMA as compared to the maintenance emission level described in Section 4.50.3.2.1. Appendix D1-4-3 contains detailed calculations of the projected emissions for the Oregon portion of the AQMA.

VOC Emission Projections:

Projected VOC emissions for the Portland/Vancouver AQMA are shown in Figure 4.50.3.3 and Table 4.50.3.1. DEQ projections for the Oregon portion of the AQMA are based on the following emission control measures: phase-in of the EPA non-road engine rules for small gasoline engines, heavy-duty compression ignition engines, and outboard marine engines starting in 1996; phase-out of open burning; phase-in of stage I and II vapor recovery on gasoline station dispensing; emission reductions from motor vehicle refinishing rules, architectural coatings rules, consumer products rules, and spray paint rules; vehicle emission reductions from an expanded vehicle inspection boundary, an enhanced vehicle emission test with on-board diagnostics beginning in 1997, and phase-in of a federal Low Emission Vehicle (LEV) beginning in 2001; an Employee Commute Options Program; a voluntary Parking Ratio Program; an Industrial PSEL Management Program; and a public education and incentive program. The new emission control measures are described in Section 4.50.3.2.3.

Figure 4.50.3.3: Portland/Vancouver AQMA VOC Emission Projections



VOC emissions are projected to be a total of 286 tons/day for the Portland/Vancouver airshed in 2006. The 2006 VOC emissions for the Oregon portion, after the public education and incentive program credits, are a total of 230 tons/day (80%) of the interstate airshed total.

Total VOC emissions stay well below the 1992 attainment emission level throughout the 10-year maintenance plan period, and VOC emissions do not exceed the maintenance emission level ("airshed capacity") as shown in Table 4.50.3.1. The on-road mobile emissions decrease from 1992 to 2006 is largely due to fleet turnover and the vehicle inspection and maintenance program. Point sources are expected to increase slightly due to growth in the area; this growth includes minor increases from existing and new sources as well as a growth allowance for major new and expanding industry. Area sources and non-road emissions are projected to grow slightly in some categories but have reductions in others due to implementation of EPA emission standards on several non-road categories and local VOC Area Source Rules (i.e, motor vehicle refinishing, architectural coatings, consumer products and spray paint).

Table 4.50.3.1: Portland/Vancouver AQMA VOC Emission Projections (tons/day)

Vancouver Emissions

	1990	1992	1996	1999	2001	2003	2006
Point Sources	5	4	4	4	4	5	5
Area Sources	15	14	14	14	15	15	16
On-road	22	16	13	11	9	9	9
Non-road	8	8	9	9	10	9	9
Biogenic	17	17	17	17	17	17	17
Total	67	59	57	55	55	55	56

Portland Emissions

	1990	1992	1996	1999	2001	2003	2006
Point Sources	40	36	37	41	43	44	47
Area Sources	58	57	56	56	57	59	61
On-road	114	92	70	52	46	44	41
Non-road	38	39	41	38	41	39	36
Biogenic	46	46	46	46	46	46	46
Total	296	270	250	233	233	232	231

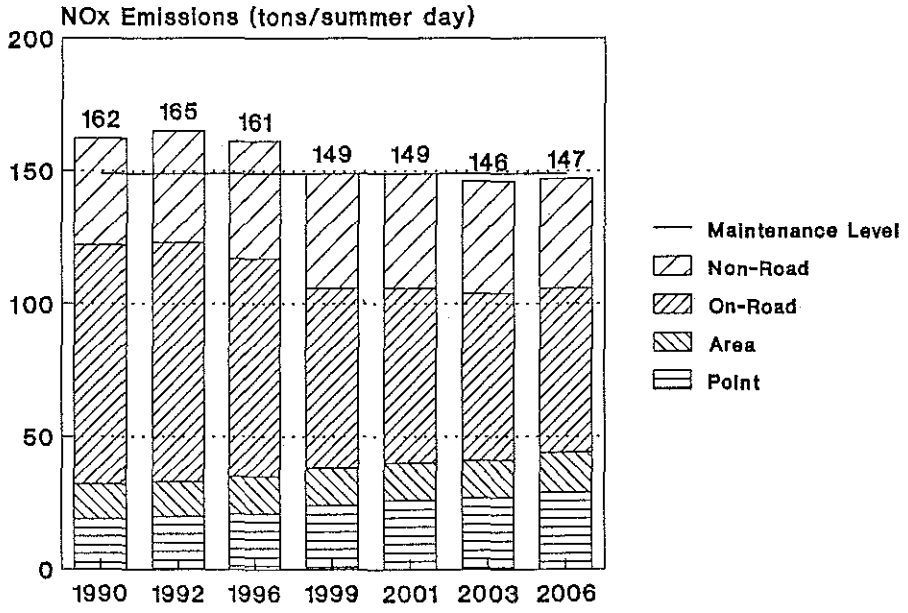
Education and Incentive credits	--	--	--	(1)	(1)	(1)	(1)
Total Portland & Vancouver	363	329	307	287	287	286	286

Maintenance Emission Level = **287** tons/day

NO_x Emission Projections:

Projected NO_x emissions for the Portland/Vancouver AQMA are shown in Figure 4.50.3.4 and Table 4.50.3.2. DEQ projections for the Oregon portion of the AQMA are based on the following emission control measures: phase-in of the EPA non-road engine rules starting in 1996; phase-out of open burning; motor vehicle emission reductions from an expanded vehicle inspection boundary, an enhanced vehicles inspection test with on-board diagnostics beginning in 1997, and phase-in of a federal Low Emission Vehicle (LEV) beginning in 2001; an Employee Commute Options Program; a voluntary Parking Ratio Program; and an Industrial PSEL Management Program. The new emission control measures are described in Section 4.50.3.2.3.

Figure 4.50.3.4: Portland/Vancouver AQMA NO_x Emission Projections



NO_x emissions are projected to be a total of 147 tons/day for the Portland/Vancouver airshed in 2006. The 2006 NO_x emissions for the Oregon portion are a total of 122 tons/day (83%) of the interstate airshed total.

Table 4.50.3.2: Portland/Vancouver AQMA NO_x Emission Projections (tons/day)

Vancouver Emissions

	1990	1992	1996	1999	2001	2003	2006
Point Sources	6	5	5	6	6	6	7
Area Sources	1	1	1	1	1	1	1
On-road	14	15	14	12	12	11	11
Non-road	7	7	7	7	7	7	6
Total	28	28	27	26	26	25	25

Portland Emissions

	1990	1992	1996	1999	2001	2003	2006
Point Sources	13	15	16	18	20	21	22
Area Sources	12	12	13	13	13	13	14
On-road	76	75	68	56	54	52	51
Non-road	33	35	37	36	36	35	35
Total	134	137	134	123	123	121	122

Total Portland & Vancouver	162	165	161	149	149	146	147

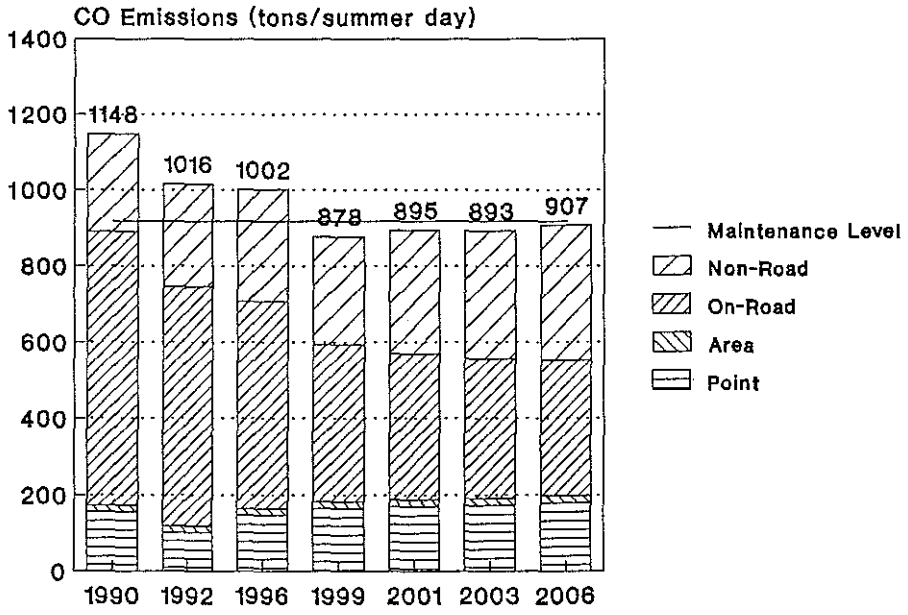
Maintenance Emission Level = **149** tons/day

Total NO_x emissions stay well below the 1992 attainment emission level throughout the 10-year maintenance plan period, and NO_x emissions do not exceed the maintenance emission level ("airshed capacity") as shown in Table 4.50.3.2. The on-road mobile emissions decrease from 1992 to 2006 is largely due to fleet turnover and the vehicle inspection and maintenance program. Point sources are expected to increase slightly due to growth in the area; this growth includes minor increases from existing and new sources as well as a growth allowance for major new and expanding industry. Area sources and non-road emissions are projected to grow slightly in some categories, but have reductions in others due to implementation of EPA emission standards on several non-road categories.

CO Projected Emissions:

Projected summer CO emissions for the Portland/Vancouver AQMA are shown in Figure 4.50.3.5 and Table 4.50.3.3. DEQ projections for the Oregon portion of the AQMA are based on the following emission control measures: phase-out of open burning; motor vehicle emission reductions from an expanded vehicle inspection boundary, an enhanced vehicle inspection test with on-board diagnostics beginning in 1997, and phase-in of a federal Low Emission Vehicle (LEV) beginning in 2001; an Employee Commute Options Program; and a voluntary Parking Ratio Program. The new emission control measures are described in Section 4.50.3.2.3.

Figure 4.50.3.5: Portland/Vancouver AQMA Summer CO Emission Projections



Summer CO emissions are projected to be a total of 907 tons/day for the Portland/Vancouver airshed in 2006. Summer CO emissions for the Oregon portion are a total of 672 tons/day (74%) of the interstate airshed total.

Table 4.50.3.3: Portland/Vancouver AQMA Summer CO Emission Projections (tons/day)

Vancouver Emissions

	1990	1992	1996	1999	2001	2003	2006
Point Sources	82	68	73	77	80	82	86
Area Sources	4	4	3	4	4	4	4
On-road	131	118	92	77	68	65	65
Non-road	50	53	60	60	70	74	80
Total	267	243	228	218	222	225	235

Portland Emissions

	1990	1992	1996	1999	2001	2003	2006
Point Sources	73	34	74	87	89	90	93
Area Sources	13	12	14	14	14	15	15
On-road	588	509	450	334	315	300	290
Non-road	207	218	236	225	255	263	274
Total	881	773	774	660	673	668	672

Total Portland & Vancouver	1,148	1,016	1,002	878	895	893	907

Maintenance Emission Level = **918** tons/day

Total summer CO emissions stay well below the 1992 attainment emission level throughout the maintenance plan period, and CO emissions do not exceed the maintenance emission level ("airshed capacity") as shown in Table 4.50.3.3. The on-road mobile emissions decrease from 1992 to 2006 is largely due to fleet turnover and the vehicle inspection and maintenance program. Point sources are expected to increase slightly due to the growth in the area.

4.50.3.2.3 Control Measures

Based on emission forecasts without new emission control strategies (only emission controls adopted prior to initial development of the maintenance plan) and the maintenance emission level calculated in Appendix D1-8, an emission reduction need was determined for each year of the maintenance plan. Using this evaluation, control measures for both the Portland and Vancouver areas were identified through an extensive planning process. The maintenance planning process for the Oregon portion of the AQMA is described in Appendix D1-7.

As a result of this process, several control measures were identified to achieve emission reductions for the ozone maintenance plan. These measures are:

4.50.3.2.3.1 ON-ROAD VEHICLE STRATEGIES

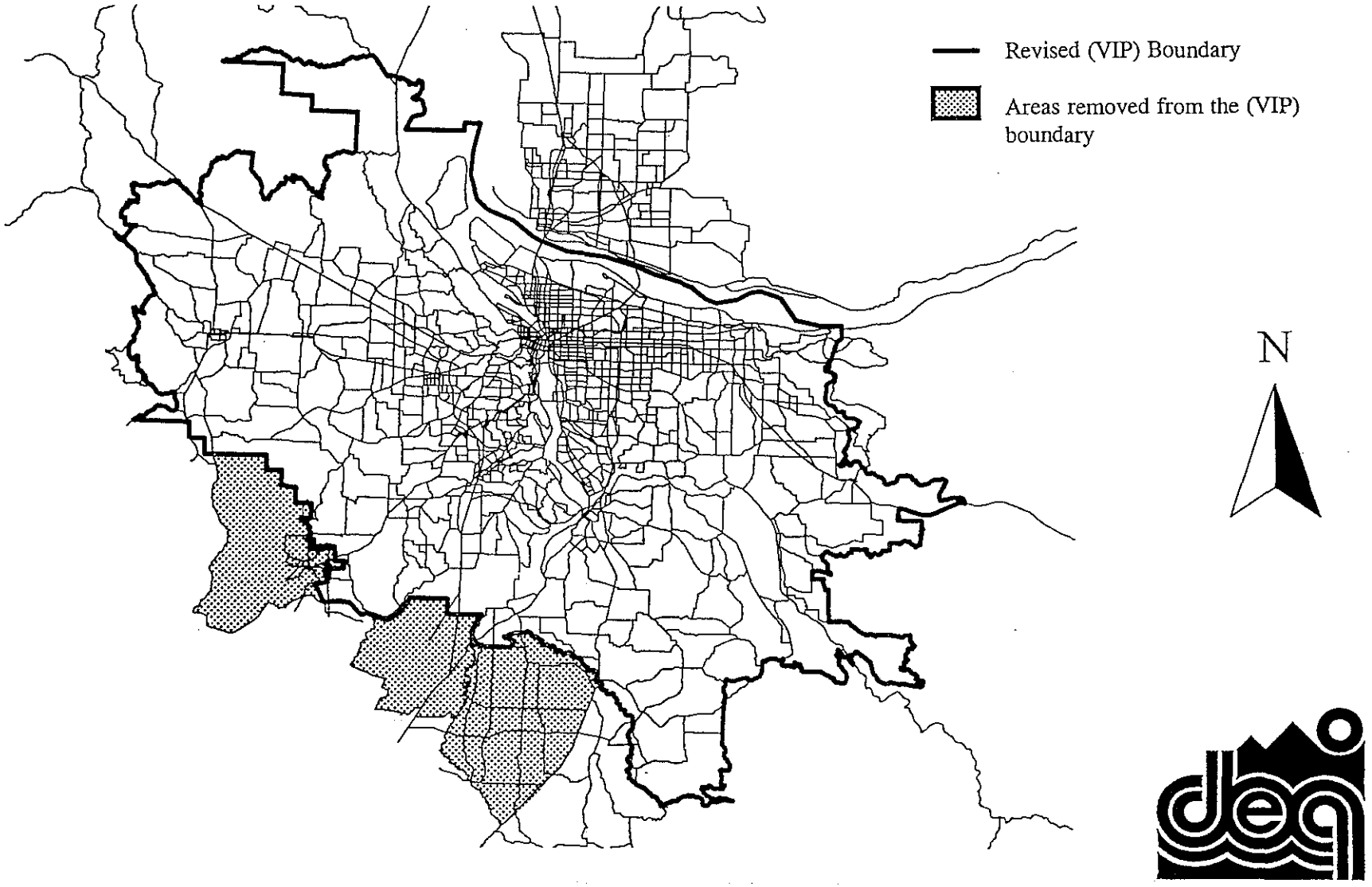
Enhanced Vehicle Emission Inspection

The largest VOC/NO_x emission reductions in the plan come from improvements to the DEQ vehicle inspection program. Under the enhanced inspection, emissions are tested while vehicles are put through a driving cycle that includes acceleration and deceleration (transient test). In addition, the charcoal canister purge system is tested using a helium injection system. These tests apply to vehicles from the 1981 model year through models that are 6 years old. The idle/2500 RPM basic test applies to 1975 to 1980 vehicles and to vehicles up to 5 years old. In addition, a gas cap pressure test was added for all vehicles subject to inspection. Finally, the program includes an inspection of on-board emission control diagnostic systems installed in 1996 and newer vehicles. The enhanced program phases in over a two year period beginning in 1997. See Appendix D1-10-2 for a description of the enhanced testing program. See Appendix D1-4-3 for an explanation of emission reductions expected from enhanced testing.

Expanded Vehicle Inspection Boundary

In July 1994, the EQC expanded the vehicle inspection boundary from the Metro boundary to include additional portions of the Tri-County area (Multnomah, Clackamas and Washington Counties) and small neighboring portions of Columbia, Marion and Yamhill Counties. US Census Bureau data were used to select areas that had relatively high population densities and commute rates into the AQMA. Concurrent with adoption of the maintenance plan, the vehicle inspection boundary was further revised to remove those areas with less than 40 percent of their work force commuting into the AQMA. This removed from the expansion some areas in Clackamas, Marion and Yamhill Counties, but retained some areas in Columbia and Yamhill Counties. Figure 4.50.3.11 shows the revised inspection boundary and the areas removed from the boundary. Appendix D1-10-1 contains additional information about the vehicle inspection boundary expansion. Appendix D1-4-3 presents the emission reductions expected from the expanded inspection boundary.

Figure 4.50.3.11: Motor Vehicle Inspection Boundary



Removal of Old Vehicle Exemption from Vehicle Inspection Program

This strategy eliminated the exemption from testing for vehicles that are 20 or more years old. Vehicles made in 1975 and later model years are permanently included in the testing program. The 1993 Oregon Legislature adopted this strategy in Oregon Revised Statutes (ORS) 815.300, which was submitted as a revision to the Oregon SIP on August 30, 1994. Appendix D1-4-3 includes the emission reductions expected from this strategy.

Employee Commute Option (ECO) Program

This program requires employers with more than 50 employees to provide alternatives to drive-alone commuting to work. The program has a 10 percent trip reduction target. Trip reductions will be measured using baseline and follow-up employee trip surveys. Employers are free to choose commute options such as compressed work schedules, telecomuting, ridesharing and transit assistance. Employers may also choose to reduce emissions at the work site as an alternative to reducing commute trips. Credit is provided for previously implemented trip reduction measures, and exemptions are provided in cases where no practical alternatives are available.

Employers that make good faith efforts to meet the trip reduction target, but do not meet it, are considered in compliance with the program. Employers are not penalized if they are unable to meet the trip reduction target despite these efforts.

See Appendix D1-13 for a description of the ECO program. See Appendix D1-4-3 for an explanation of the emission reductions expected from ECO.

Voluntary Parking Ratio Program

This program establishes a maximum number of parking spaces for new non-residential development based on the size and type of facility. The objective of the program is to encourage developers to design and locate new facilities in ways that provide good opportunities for walking, bicycling and using transit. Incentives to participate in the voluntary program include exemption from the ECO program and priority processing of any applicable DEQ permit.

See Appendix D1-14 for a description of the parking ratio program. See Appendix D1-4-3 for an explanation of the emission reductions expected from parking ratios.

Transportation Control Measures

Several significant Transportation Control Measures (TCMs) identified in Metro's Regional Transportation Plan (RTP) were included in motor vehicle emission forecasts prepared by Metro for the maintenance plan. Because these measures reduce motor vehicle emissions, the FCAA transportation conformity process requires DEQ to identify them in the maintenance plan to ensure that they are funded and implemented in a timely manner.

The TCMs identified in the maintenance plan fall into two categories: non-funding based TCMs and funding based TCMs. The non-funding based TCMs reduce transportation emissions through land-use requirements and regulatory programs. The funding based TCMs reduce transportation emissions by increasing the supply of transit, bicycle and pedestrian facilities. The funding based TCMs were established in the financially constrained transportation network of Metro's interim federal RTP, adopted July, 1995, in accordance with the requirements of the federal Intermodal Surface Transportation Efficiency Act (ISTEA). This network includes only projects that can be financially supported based on historical trends.

The funding based TCMs must receive priority funding in Metro's transportation planning process and all TCMs identified in the maintenance plan must receive timely implementation. If the TCMs do not receive priority funding and timely implementation, a conformity determination can not be made for Metro's transportation plans and all regionally significant projects will be held up until a conformity determination can be made. These requirements are specified in the transportation conformity rules, OAR 340-020-0710 through 340-020-1080. In general, "priority funding" means that all state and local agencies with influence over approvals or funding of the TCMs are giving maximum priority to approval of funding of the TCMs over other projects within their control. "Timely implementation" means that the TCMs are being implemented consistent with the schedule established in the maintenance plan. The determination of whether priority funding and timely implementation have been achieved is made in the context of interagency consultation as specified in the transportation conformity rules.

Identified TCMs may be substituted in whole, or in part, with other TCMs providing equivalent emission reductions. Substitution occurs through consultation with Metro's Transportation Policy Alternatives Committee (TPAC) and Joint Policy Advisory Committee on Transportation (JPACT). Such substitution requires public notice, EQC approval and concurrence from EPA, but does not require a revision to the State Implementation Plan. See appendix D1-17 for the TCM substitution requirements.

The TCMs included in the maintenance plan are:

Non-funding based Transportation Control Measures

1. Metro 2040 Growth Concept

Metro's 2040 Growth Concept is included because it changes typical growth patterns to be less reliant on motor vehicle travel, thereby reducing motor vehicle emissions. Two elements of the land use plan (the Interim Measures and the Urban Growth Boundary) provide appropriate implementation mechanisms to meet FCAA enforceability requirements for control strategies.

a. Metro Interim Land Use Measures relating to:

- Requirements for Accommodation of Growth;
- Regional Parking Policy; and
- Retail in Employment and Industrial Areas.

The text of the interim land-use measures is included in Appendix D1-17.

b. Urban Growth Boundary.

The Urban Growth Boundary (UGB) as currently adopted or amended before EPA approval of the maintenance plan, assuming an amendment does not significantly affect the air quality plan's transportation emission projections.

2. DEQ Employee Commute Options Program

A 10% trip reduction target is required for employers who employ more than 50 employees at the same work site. See discussion above and Appendix D1-13.

3. DEQ Voluntary Parking Ratio Program

Implement a voluntary parking ratio program providing incentives to solicit participation, including exemption from the Employee Commute Options program. See discussion above and Appendix D1-14.

Funding based Transportation Control Measures

1. Increased Transit Service

a. Regional increase in transit service hours averaging 1.5% annually.

This commitment includes an average annual capacity increase in the Central City area equal to the regional capacity increase. The level of transit capacity increase is based on the regional employment growth projections adopted by Metro Council on Dec. 21, 1995. These projections assume that the Central City will maintain its current share of the regional employment. Should less employment growth occur in the Region and/or the Central City, transit service increase may be reduced proportionately.

b. Completion of the Westside Light Rail Transit facility.

c. Completion of Light Rail Transit (LRT) in the South/North corridor by the year 2007.

2. Bicycle and Pedestrian Facilities

a. Multimodal facilities.

Consistent with ORS 366.514[1], all major roadway expansion or reconstruction projects on an arterial or major collector shall include pedestrian and bicycle improvements where such facilities do not currently exist. Pedestrian improvements are defined as sidewalks on both sides of the street. Bicycle improvements are defined as bikeways within the Metro boundary and shoulders outside the Metro boundary but within the Air Quality Maintenance Area.

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[1] This provides for the following exceptions:
- absence of any need;
- contrary to public safety; and
- excessively disproportionate cost.

b. RTP Constrained Bicycle System.

In addition to the multimodal facilities commitment, the region will add at least a total of 28 miles of bicycle lanes, shoulder bikeways or multi-use trails to the Regional Bicycle System as defined in the Financially Constrained Network of Metro's Interim Federal RTP (adopted July 1995) by the year 2006. Reasonable progress toward implementation means a minimum of five miles of new bike lanes, shoulder bikeways or multi-use trails shall be funded in each two-year Transportation Improvement Program (TIP) funding cycle.

Bike lanes are striped lanes dedicated for bicycle travel on curbed streets, a width of five to six feet is preferred; four feet is acceptable in rare circumstances. Use by autos is prohibited. Shoulder bikeways are five to six foot shoulders for bicycle travel and emergency parking. Multi-use trails are eight to 12 foot paths separate from the roadway and open to non-motorized users.

c. Pedestrian facilities.

In addition to the multimodal facilities commitment, the region will add at least a total of nine miles of major pedestrian upgrades in the following areas, as defined by Metro's Region 2040 Growth Concept: Central City/Regional Centers, Town Centers, Corridors & Station Communities, and Main Streets. Reasonable progress toward implementation means a minimum of one and a half miles of major pedestrian upgrades in these areas shall be funded in each two-year TIP funding cycle.

4.50.3.2.3.2 NON-ROAD ENGINE STRATEGIES

Credit is included in the plan for recent EPA emission standards for new non-road engines. These standards affect new small non-road spark ignition engines (such as lawn and garden equipment), heavy duty compression ignition engines (such as diesel construction equipment) and outboard/inboard marine engines. The standards phase in beginning in model year 1996. See Appendix D1-4-3 for an explanation of the emission reductions expected from EPA's non-road engine standards.

4.50.3.2.3.3 AREA SOURCE STRATEGIES

In 1995, EQC adopted rules to reduce VOC emissions from a variety of area sources, including:

- Motor Vehicle Refinishing;
- Architectural Coatings;
- Consumer Products (such as aerosol sprays, air fresheners and windshield washer fluids); and
- Spray Paints

The rules require manufacturers to meet VOC content limitations, and include some user requirements.

The maintenance plan also relies on emission reductions from stage II vapor recovery at gasoline service stations. The EQC adopted stage II vapor recovery rules in 1991. These rules, along with the new area source rules, are being submitted as a revision to the Oregon SIP concurrently with the maintenance plan.

Appendix D1-11 includes a description of the area source rules and a calculation of the emission reductions expected from the rules for motor vehicle refinishing, architectural coatings, consumer products and spray paints. See also Appendix D1-4-3.

4.50.3.2.3.4 INDUSTRIAL EMISSION STRATEGIES

Industrial PSEL Management Program

DEQ established a voluntary program for donation of unused Plant Site Emission Limits (PSELs). Incentives to participate were offered to businesses that held large amounts of unused PSEL, including exemption from the ECO program, priority permit processing, and priority use of the industrial growth allowance. Significant permanent reductions in PSELs were achieved by the program. In addition, a number of sources made temporary donations of PSEL to enable DEQ to demonstrate maintenance during the interim years of the plan while other emission reduction strategies are phasing-in.

See Appendix D1-15 for a description of the industrial PSEL management program. See Appendix D1-4-3 for a tabulation of donated PSEL and a comparison of forecast actual emissions to PSEL emissions after permanent and temporary donations.

State of Oregon

Department of Environmental Quality Memorandum

Date: July 12, 1996

To: Environmental Quality Commission

From: Langdon Marsh

Subject: Technical Corrections - Portland Area Air Quality Maintenance Plans and Rules

Attached are minor technical corrections that should be made to the following three agenda items scheduled for your July 12 meeting. These changes do not affect the substance of the plans or rules.

Agenda Item C, Portland Area Carbon Monoxide Maintenance Plan

Four of the proposed changes to the original rulemaking made in response to public comment and shown as additions/deletions in Attachment E were not carried forward to Attachment A, which is the edited version proposed for adoption. The necessary changes are shown in strike through and underline on revised attached pages xv, 35, 37 and 44.

A small correction to three interim year point source emission levels should have been added to Attachments A and E. This change is shown in strike through and underline on revised attached page 29 of Attachment A.

Agenda Item D, Ozone Maintenance Plan for the Portland AQMA

An increase in the VOC emission forecasts for 2003 and 2006 of one ton/day is needed because some of the expected permanent donation of unused permitted emissions actually turned out to be temporary donations. The change is shown in strike through and underline on revised attached pages 16 and 17 of Attachment A.

Agenda Item F, Employee Commute Options Program

Two changes are needed to avoid confusion about the criteria for complying with ECO through parking restrictions. These changes make it clear that an employer can exceed DEQ parking ratios and still meet ECO requirements by meeting other conditions. These changes are shown in strike through and underline on revised attached Rule 340-030-0990 and Rule 340-030-1000 of Attachment A.

Contingency Plan Elements

The maintenance plan must contain contingency measures that would be implemented either to prevent or correct a violation of the CO standard after the area has been redesignated to attainment. The FCAA requires that measures in the original attainment plan be reinstated if a standards violation occurs. Under the proposed contingency plan, adopted under the CCTMP and recommended by Metro, the DEQ would convene a planning group if the validated second highest (within one calendar year) 8-hour CO concentration equals or exceeds 8.1 ppm (90 percent of the 8-hour CO standard). A range of action would be considered from implementing candidate measures to deciding to do nothing. However, if a violation of the 8-hour CO standard were to occur, control measures that would be restored include Lowest Achievable Emission Rate (LAER) requirements plus offsets for major new and modified industrial sources and wintertime oxygenated gasoline at 2.7 percent weight for motor vehicles ~~[(if the oxygenated fuels program is repealed prior to the occurrence of violations)]~~. If the violation occurred within the defined area of the former Downtown Parking and Circulation Policy, roughly the Central Business District of downtown Portland, then the parking lid would be reinstated. The parking lid would not be reinstated if a violation occurred outside the downtown area.

To make the growth allowance "pool" last as long as possible, sources will be encouraged to provide offsets, if possible, for all or part of the proposed increase. Once the growth allowance is fully allocated, offsets for all proposed major sources and major modifications will again be required.

DEQ will prepare a thorough accounting of any activity in the growth allowance program for each period identified in Table 4.51.3.1, including any allocations to sources and any increases in the growth allowance. This information will be reported to EPA within 12 months following the end of the reporting period. If there are any increases to the growth allowance since the last report, DEQ will include a clear discussion of how each increase to the growth allowance is based on a surplus and federally enforceable emission reduction. This is also discussed in Section 4.51.4.4 "Maintenance Plan Commitments" and Appendix D2-11 (New Source Review Rules).

If a violation of the CO standard occurs after the Portland area has been redesignated to attainment, the LAER and offset requirement will be reimposed, and any remaining growth allowance will be eliminated (see Contingency Plan, below, Section 4.51.3.3).

Transportation Control Measures (TCM's)

The TCMs identified in the maintenance plan fall into two categories: non-funding based TCMs and funding based TCMs. The non-funding based TCMs reduce transportation emissions through land-use requirements and regulatory programs. The funding based TCMs reduce transportation emissions by increasing the supply of transit, bicycle and pedestrian facilities. The funding based TCMs were established in the financially constrained transportation network of Metro's interim federal RTP, adopted July, 1995, in accordance with the requirements of the federal Intermodal Surface Transportation Efficiency Act (ISTEA). This network includes only projects that can be supported based on historical funding level trends.

The funding based TCMs must receive priority funding **in Metro's transportation planning process,** and all TCMs identified in the maintenance plan must receive timely implementation. If the TCMs do not receive priority funding and timely implementation, a conformity determination can not be made for Metro's transportation plans and ~~[federal funding will be withheld]~~ **all regionally significant projects will be held up until a conformity determination can be made**. These requirements are specified in the transportation conformity rules, OAR 340-020-0710 through 340-020-1080. In general, "priority funding" means that all state and local agencies with influence over approvals or funding of the TCMs are giving maximum priority to approval of funding of the TCMs over other projects within their control. "Timely implementation" means that the TCMs are being implemented consistent with the schedule established in the maintenance plan. The determination of whether priority funding and timely implementation have been achieved is made in the context of interagency consultation as specified in the transportation conformity rules.

the Zoning Code Amendments, containing the maximum parking ratios for new development, the requirements for providing structured parking to serve older historic buildings and other regulations on parking. Key elements of the Zoning Code Amendments related to CO air quality projections are incorporated into this document as given below.

The CCTMP replaced the former Downtown Parking and Circulation Policy, first adopted in 1975 and updated in 1980 and 1985. The 1980 update of the parking policy served as a foundation for the 1982 Portland area CO attainment plan. The CCTMP is designed to minimize new vehicle traffic in the Central City and encourage alternative travel modes by extending the downtown maximum parking ratio concept to the entire Central City area. The CCTMP provided for the lifting of the downtown parking lid upon EPA approval of the maintenance plan and the request for attainment redesignation. However, until EPA approval, the CCTMP retains the parking lid.

The parking offset program (OAR 340-020-0400 through OAR 340-020-0430), designed to allow the city to increase the parking lid by up to a maximum of 1,370 spaces, was also retained until after EPA approval of the maintenance plan. The DEQ's emission projection figures for the CCTMP emissions inventory area include an estimate for the emissions associated with 827 parking spaces, as documented in Appendix D2-4-4. These are the parking spaces yet to be developed, but which were authorized by the parking offset program.

The following is a list of zoning code amendments that were incorporated directly into the Portland Carbon Monoxide Maintenance Plan. The text of critical code provisions (such as maximum parking ratios for new development and parking provisions for existing buildings) is contained in Appendix D2-8. A list of other zoning code amendments used as supporting documents for the maintenance plan is contained in Appendix D2-13 of Volume 3 of the Oregon State Implementation Plan.

Items in Volume 3 of the SIP are federally enforceable. With regard to Volume 3 items, EPA has allowed DEQ to make changes which are merely administrative, without requiring public process. DEQ and EPA make a determination as to whether a proposed change by the City of Portland is merely administrative rather than substantive.

Section 1: **Incorporated Amendments to Chapter 33.510, Central City Plan District**

Code Number	Code Title
33.510.261 -	Parking
33.510.261.E	Site split by subdistrict or parking sector boundaries

(33.510.261.E.1.a(1)-(2),b,E.2.a(1)-(2),b)

quality impact) will be modified. The requirement to install Best Available Control Technology (BACT) will be replaced with a requirement to install Lowest Achievable Emission Rate (LAER) technology. In addition, the industrial growth allowance established in Section 4.51.3.2.3 will be eliminated. These requirements will take effect upon validation of the violation. BACT and a growth allowance may be reinstated if provided for in a new maintenance plan adopted and approved by EPA.

(2) Oxygenated gasoline at 2.7 percent weight will be required. OAR 340-022-0460 (see Appendix D2-14-3) delineates the "reinstatement" procedures. Subsection (8) (b) states that a validated violation of the 8-hour CO standard will result in the requirements of OAR 340-022-0440 through 022-0640 being **reinstated**~~[reinstituted. Subsection (8) (c) states the oxygenated fuel program would be reinstituted]~~ **beginning** in the winter season following ~~[a validated]~~ **the** violation, but no~~[t]~~ sooner than 6 months following that violation. Subsection (8) ~~[(d)]~~ **(c)** states that such reinstatement will be automatic and that no further rulemaking will be required.

(3) The downtown parking lid will be reinstated. (This measure will be implemented only if the violation occurs in the downtown area formerly under the parking lid requirement.)

Table 4.51.3.1: CO Emissions Attainment and Projection Inventories

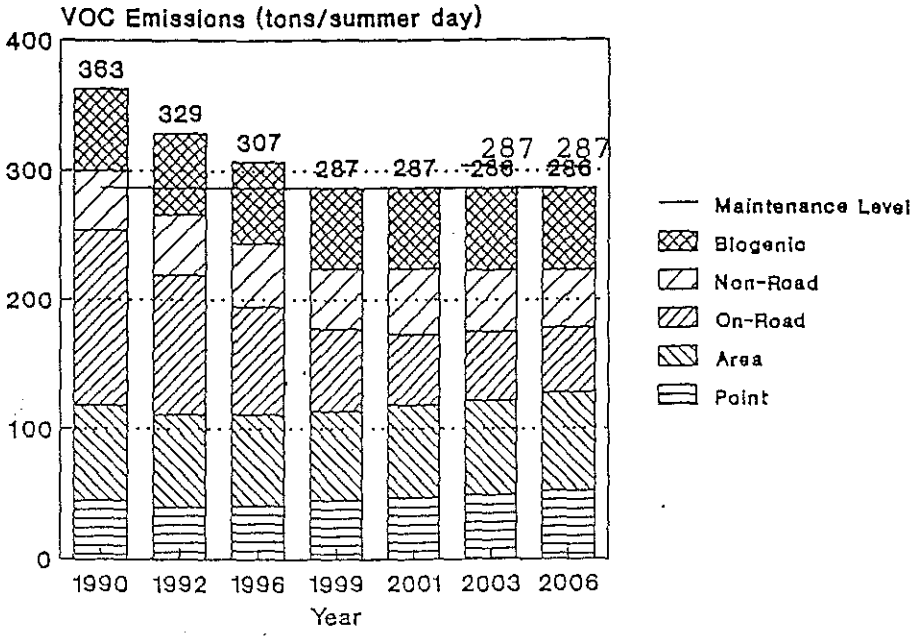
CO Emissions: Region (=CO Nonattainment Area=Metro Boundary)
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	2007
Area Sources	411	382	392	405	417	447
Non-Road Mobile Sources	135	146	151	160	163	169
Large Point Sources	116	124	~~[165]~~ **167**	~~[170]~~ **171**	~~[171]~~ **173**	178
On-Road Mobile Sources	1812	1217	1075	1074	1011	947
Total	2474	1868	~~[1783]~~ **1785**	~~[1808]~~ **1810**	~~[1762]~~ **1764**	1741

CO Emissions: CCTMP Sub-Area
(Thousand Pounds CO/Winter Day)

Year	1991	1995	1997	2001	2003	2007
Area Sources	9.3	8	8	8	9	9
Non-Road Mobile Sources	3.4	4	4	4	4	4
Large Point Sources	0	0	0	0	0	0
On-Road Mobile Sources	192	123	107	103	95	86
Total	204	135	119	115	107	98

Figure 4.50.3.3: Portland/Vancouver AQMA VOC Emission Projections



VOC emissions are projected to be a total of ~~[286]~~287 tons/day for the Portland/Vancouver airshed in 2006. The 2006 VOC emissions for the Oregon portion, after the public education and incentive program credits, are a total of ~~[230]~~231 tons/day (80%) of the interstate airshed total.

Total VOC emissions stay well below the 1992 attainment emission level throughout the 10-year maintenance plan period, and VOC emissions do not exceed the maintenance emission level ("airshed capacity") as shown in Table 4.50.3.1. The on-road mobile emissions decrease from 1992 to 2006 is largely due to fleet turnover and the vehicle inspection and maintenance program. Point sources are expected to increase slightly due to growth in the area; this growth includes minor increases from existing and new sources as well as a growth allowance for major new and expanding industry. Area sources and non-road emissions are projected to grow slightly in some categories but have reductions in others due to implementation of EPA emission standards on several non-road categories and local VOC Area Source Rules (i.e, motor vehicle refinishing, architectural coatings, consumer products and spray paint).

Table 4.50.3.1: Portland/Vancouver AQMA VOC Emission Projections (tons/day)

Vancouver Emissions

	1990	1992	1996	1999	2001	2003	2006
Point Sources	5	4	4	4	4	5	5
Area Sources	15	14	14	14	15	15	16
On-road	22	16	13	11	9	9	9
Non-road	8	8	9	9	10	9	9
Biogenic	17	17	17	17	17	17	17
Total	67	59	57	55	55	55	56

Portland Emissions

	1990	1992	1996	1999	2001	2003	2006
Point Sources	40	36	37	41	43	~~[44]~~45	~~[47]~~48
Area Sources	58	57	56	56	57	59	61
On-road	114	92	70	52	46	44	41
Non-road	38	39	41	38	41	39	36
Biogenic	46	46	46	46	46	46	46
Total	296	270	250	233	233	~~[232]~~ 233	~~[231]~~ 232
Education and Incentive credits	--	--	--	(1)	(1)	(1)	(1)
Total Portland & Vancouver	363	329	307	287	287	~~[286]~~ 287	~~[286]~~ 287

Maintenance Emission Level = **287** tons/day

Can a new or relocating employer comply with ECO through restricted parking ratios?

340-030-0990 An employer locating at a work site within the AQMA after the effective date of the ECO rules will be exempt from the ECO rules for that work site if:

(1) The new work site meets the requirements of the Department's Voluntary Parking Ratio rules (OAR 340-030-1100 through 340-030-1190); ~~and~~ or

(2) If the employer provides free or subsidized parking, including leased parking, above the Department's maximum parking ratio to any employees at the work site (except to employees required to have a vehicle at the work site as a condition of employment), then either:

(a) A transportation allowance is offered to those employees provided free or subsidized parking that exceeds the Department's maximum parking ratio. The transportation allowance must be offered in lieu of the free or subsidized parking in an amount equal to or greater than the amount of the subsidy, but not to exceed the maximum allowed for transit by the Internal Revenue Service for the Qualified Transportation Fringe Benefits included under Section 132(F), Notice 94-3 of the tax code; OR

(b) All employees at the work site are offered a transit subsidy or its equivalent at least equal to 50 percent of the value of a Tri-Met all-zone transit pass.

An employer must submit this documentation with an exemption application to the Department by the deadline for plan or notice submittal specified in **Table 1.** Employers meeting the requirements of this rule do not need to conduct a baseline survey of employees. However, employers whose applications are denied must then conduct a baseline survey and submit the findings to the Department within 90 days of notice by the Department.

Can an existing employer comply with ECO through restricted parking ratios?

340-030-1000 An employer will be considered to have met the target trip reduction and is exempt from the ECO rules if the employer provides documentation of the following:

(1) Work site is located in an area with maximum parking ratio requirements at least as stringent as the Department's maximum parking ratios *(see OAR 340-030-1100 through 340-030-1190);*

(2) Free or subsidized all-day parking is generally unavailable within a one-half mile radius of the work site; and

~~(3) The work site parking meets the requirements of the Department's Voluntary Parking Ratio rules; and~~

(34) If the employer provides free or subsidized parking, including leased parking, above the Department's maximum parking ratio to any employees at the work site (except to employees required to have a vehicle at the work site as a condition of employment), then either:

(a) A transportation allowance is offered to those employees provided free or subsidized parking that exceeds the Department's maximum parking ratio. The transportation allowance must be offered in lieu of the free or subsidized parking in an amount equal to or greater than the amount of the subsidy, but not to exceed the

maximum allowed for transit by the Internal Revenue Service for the Qualified Transportation Fringe Benefits included under Section 132(F), Notice 94-3 of the tax code; OR

(b) All employees at the work site are offered a transit subsidy or its equivalent at least equal to 50 percent of the value of a Tri-Met all-zone transit pass.

An employer must submit this documentation with an exemption application to the Department by the deadline for plan or notice submittal specified in **Table 1.** Employers meeting the requirements of this rule do not need to conduct a baseline survey of employees. However, employers whose applications are denied must then conduct a baseline survey and submit the findings to the Department within 90 days of notice by the Department.

Environmental Quality Commission

☒ Rule Adoption Item
☐ Action Item
☐ Information Item

Agenda Item D
July 12, 1996 Meeting

Title:

Ozone Maintenance Plan for the Portland AQMA

Summary:

The Portland area has attained compliance with the federal standard for ground-level ozone. However, rapid population and traffic growth will result in future violations unless additional control measures are implemented. DEQ has developed an ozone maintenance plan through an extensive public process over a four year period. The proposed plan includes emission reduction strategies affecting all major categories of ozone producing substances, and generally represents the most cost-effective approaches of possible alternatives. The plan provides for maintenance of the ozone standard for ten years, and will allow EPA to redesignate the Portland area to an attainment area for ozone. The maintenance plan and redesignation will assure that public health is protected, will remove Clean Air Act impediments to industrial growth, and will help shield the Portland area from Clean Air Act sanctions on federal transportation funds.

Department Recommendation:

The Department recommends that the Commission adopt the ozone maintenance plan for the Portland AQMA, as presented in Attachment A of this report, including the supporting rule amendments and emission inventories, as an amendment to the federal Clean Air Act State Implementation Plan.

The Department also recommends that the Commission repeal the ozone attainment plan for the Portland AQMA, originally adopted on July 16, 1982, effective upon EPA redesignation of the AQMA to attainment for ozone.

John Kowalczyk for Andy Ginsburg — Report Author
Stephanie J. Hallock for Greg Green — Division Administrator
Director

Accommodations for disabilities are available upon request by contacting the Public Affairs Office at (503)229-5317(voice)/(503)229-6993(TDD).

Major New Source Review

Until the Portland/Vancouver AQMA is redesignated to attainment, proposed major sources and major modifications to existing sources are required to comply with nonattainment area New Source Review (NSR), including Lowest Achievable Emission Rate (LAER) control technology and offsets for VOC and NO_x. The offset ratio applicable to a marginal ozone nonattainment area is 1.1 to 1 (i.e., 1.1 tons per year reduction for each proposed 1.0 ton per year increase).

After redesignation to attainment, the LAER requirement will be replaced by Best Available Control Technology (BACT), and a growth allowance will be provided for use in meeting the offset requirement. The owner or operator of a proposed major source or major modification may apply to DEQ for an allocation of the growth allowance in lieu of providing an offset. DEQ will allocate the growth allowance on a first-come/first-served basis, until the growth allowance is fully allocated. In the event that DEQ receives two complete requests for an allocation of the growth allowance at the same time, sources that donated unused PSEL will receive priority. No applicant may be awarded more than 50% of the remaining growth allowance or 10 tons per year, whichever is greater, unless an exception is approved by the EQC on a case-by-case basis.

The growth allowances for VOC and NO_x were originally derived based on 1% per year growth in industrial emissions. The VOC growth allowance was reduced somewhat from 1997 through 2003 because the full growth allowance could not be accommodated in the maintenance demonstration. The growth allowance for each year is listed in Table 4.50.3.4. See also Appendix D1-4-3.

To make the growth allowance "pool" last as long as possible, sources will be encouraged to provide offsets, if possible, for all or part of the proposed increase. Once the growth allowance is fully allocated, offsets for all proposed major sources and major modifications will be required. The offset ratio of 1.1 to 1 will remain in effect.

Table 4.50.3.4: Cumulative Industrial Growth Allowance

VOC	1997 to 1999	2000 to 2001	2002 to 2003	2004 to 2006
Lbs/day	2,215	3,322	4,430	8,121
Ton/Year	288	432	576	1056

NO_x	1997 to 1999	2000 to 2001	2002 to 2003	2004 to 2006
Lbs/day	1,225	1,837	2,450	3,368
Tons/year	159	239	318	438

Note: Cumulative growth allowance listed for each period. Tons/year based on an average 5 day per week operating schedule.

During the life of the maintenance plan, DEQ will attempt to increase the growth allowance by utilizing new federally enforceable emission reductions or shutdown credits that were not relied upon in the maintenance demonstration. In particular, the growth allowance will be increased upon revision of the transportation emissions budgets to reflect emission reductions from EPA's gasoline detergent additive program (see Section 4.50.3.3.3). Any such increases in the growth allowance will be subject to approval by EPA Region 10. Federally enforceable emission reductions include requirements adopted by EPA, requirements adopted by EQC and approved by EPA as a revision to the Oregon SIP, and requirements established by a federally enforceable permit condition. DEQ may also temporarily or permanently reduce the growth allowance, if necessary, to prevent emissions from exceeding the maintenance emission level.

DEQ will prepare a thorough accounting of any activity in the growth allowance program for each period identified in Table 4.50.3.4, including any allocations to sources and any increases in the growth allowance. This information will be reported to EPA within 12 months following the end of the reporting period. If there were any increases to the growth allowance since the last report, DEQ will include a clear discussion of how each increase to the growth allowance is based on a surplus and federally enforceable emission reduction. See also commitments in Section 4.50.4.3 "Maintenance Plan Commitments".

If a violation of the ozone standard occurs after the Portland/Vancouver AQMA has been redesignated to attainment, the LAER and offset requirement will be reimposed, and any remaining growth allowance will be eliminated (see Section 4.50.3.3 "Contingency Plan").

New Source Review program changes are further described in Appendix D1-16.

Reasonably Available Control Technology (RACT)

Industrial emissions were reduced significantly under the original attainment plan by installation of Reasonably Available Control Technology (RACT) at existing major sources. These RACT requirements remain in place under the maintenance plan. In addition, the maintenance plan relies on emission reductions from RACT updates required by the 1990 Clean Air Act Amendments. This includes source-specific RACT requirements for two surface coating operations, a solvent metal cleaning operation, and a mineral products firm. The plan also assumes emission reductions from RACT requirements for several industrial source categories, including aerospace component coating operations and barge loading operations at gasoline terminals. A planned gasoline pipeline is expected to provide emission reductions equivalent to barge loading RACT. Appendix D1-4-3 presents the emission reductions from the source-specific RACT standards and the gasoline pipeline.

4.50.3.2.3.5 PUBLIC EDUCATION AND INCENTIVE PROGRAM

An intensive and long term public education and incentive program is included to achieve additional emission reductions and to help implement other programs in the maintenance plan. DEQ, along with private sector partners, will encourage the public to choose consumer products that emit fewer VOCs, reduce motor vehicle trips, use electric and hand gardening tools, and curtail polluting activities such as lawn mowing on ozone conducive days. Advertising, discounts and other incentives will be used to achieve measurable emission reductions. DEQ will quantify the emission reduction achieved after a 3-year pilot program. If the emission reduction achieved is less than the target, DEQ will implement a backup plan.

See appendix D1-12 for a description of the Public Education and Incentive Program and the Voluntary Lawn and Garden Equipment Curtailment Program.

4.50.3.2.4 Transportation Emissions Budgets for Conformity

The federal and state transportation conformity regulations require that projected emissions resulting from implementation of the Regional Transportation Plan (RTP) and Transportation Improvement Program (TIP) are consistent with the SIP.

Before EQC approval of the maintenance plan, there were two emissions tests for RTPs and TIPs. The first test was a comparison of the proposed RTP and TIP (or "action scenarios") to the existing situation (or "baseline scenario"). This test, often referred to as the "build/no-build" test, ensures that the emissions from the action scenario are less than emissions from the baseline scenario. The second test was a comparison of action scenario to transportation emissions in 1990.

Upon EQC approval of the maintenance plan, an additional conformity test applies: projected emissions from implementation of the RTP and TIP must be no greater than the budgets specified in this maintenance plan. This test is designed to prevent violation of the NAAQS because transportation emissions are not allowed to exceed the levels relied upon in the maintenance demonstration. Once EPA approves the maintenance plan, the build/no-build test and the 1990 test will be eliminated, leaving only the emissions budget test. For an ozone air quality maintenance area, transportation emissions budgets are established for both VOC and NO_x.

For transportation conformity purposes, the on-road emission totals specified in Tables 4.50.3.5 and 4.50.3.6 for each year are designated as the emissions budgets for VOC and NO_x for the Oregon portion of the AQMA. An RTP or TIP approved by Metro must be consistent with these emissions budgets for analysis years specified by the federal Intermodal Surface Transportation Efficiency ACT (ISTEA) and the Conformity rules. Emissions budgets are to be interpolated for analysis years that fall between the budget years listed.

Table 4.50.3.5: AQMA (Oregon Portion)
Transportation VOC Emissions Budget (tons/day)

Year	1992	1996	1999	2001	2003	2006
Budget	92	70	52	46	44	41

Table 4.50.3.6: AQMA (Oregon Portion)
Transportation NO_x Emissions Budget (tons/day)

Year	1992	1996	1999	2001	2003	2006
Budget	75	68	56	54	52	51

Because the transportation emissions budgets were developed based on Metro's forecasts, DEQ anticipates that the identified budgets will be sufficient for conformity determinations conducted through the year 2006, provided that Metro funds and implements the Transportation Control Measures (TCMs) identified in this maintenance plan. However, DEQ and Metro anticipate that the 2006 NO_x transportation emissions budget will not be sufficient for analysis years beyond the end of the maintenance plan. For this reason, separate transportation emissions budgets have been established for this post-maintenance plan timeframe (see Table 4.50.3.7).

These post-maintenance plan transportation emissions budgets still meet EPA approvability criteria because the budgets, when combined with emissions from all other source categories, do not exceed the attainment year (1992) emission inventories. DEQ commits to adopting control strategies as needed to ensure that emissions remain within the airshed capacity during the next maintenance plan period from 2007 through 2016 (see Section 4.50.4.3, "Maintenance Plan Commitments".

Table 4.50.3.7: AQMA (Oregon Portion)
Post-Plan Transportation Emissions Budgets (tons/day)

	2010	2015	For years 2020 and beyond
VOC	40	40	40
NO_x	52	55	59

DEQ anticipates that EPA's gasoline detergent additive program will result in additional emission reduction during the maintenance plan period. This program is designed to reduce emissions by controlling fuel injector and intake valve deposits. Once the emission reduction credit for this program is quantified by EPA, the emissions budgets in tables 4.50.3.5 through 4.50.3.7 will be reduced to reflect the additional emission reduction. DEQ will notify EPA Region 10 and Metro when this change occurs.

Appendix D1-5 describes the conformity process in Oregon.

4.50.3.3 Contingency Plan

The maintenance plan must contain contingency measures that would be implemented if a violation of the ozone standard occurs after the AQMA has been redesignated to attainment or other conditions specified in the plan are met. The contingency plan for the Oregon portion of the AQMA is outlined below.

Phase 1: Risk of Violation

Upon determination that an emission inventory exceeds the maintenance emission level identified in section 4.50.3.2.2 of this plan, or that two exceedances are recorded and validated at the same permanent monitoring site within three years, DEQ will evaluate and identify the reason for the condition in consultation with SWAPCA. Based on the results of this evaluation, DEQ will make one or more of the following recommendations:

1. Implement additional emission reduction measures, such as:

   - reformulated gasoline (after 2005);
   - regional, full-scale, congestion pricing; or
   - other appropriate measure identified in the evaluation.

2. Conduct further studies to determine which, if any, additional emission reduction measures are needed. For example, recommended studies could include:

   - preparing more frequent emission inventories or periodic assessments of growth factors to evaluate emission trends;
   - evaluating the effect of specified emission sources and/or specified pollutants on maintenance of the ozone standard;
   - evaluating the effect of changes in meteorological conditions on maintenance of the ozone standard;
   - assessing the monitoring network and, if necessary, installing additional ambient monitors.

3. No further action is necessary because conditions suggest that a future violation of the ozone standard is unlikely. For example, a recommendation of no further action could be warranted if:

   - excess emissions are within the margin of error in emission forecasts;
   - changes in emission factors caused an apparent increase in emissions;
   - changes in the definition of volatile organic compounds caused an apparent emission increase;
   - The condition was due to a temporary increase in emissions that has ceased;
   - the situation was due to exceptional meteorological conditions.

This evaluation will be based on the best information available and will be completed expeditiously but no later than 6 months following implementation of the contingency plan. DEQ will present the findings of this evaluation to the EQC and will notify EPA Region 10.

Where rules are necessary to implement DEQ's recommendation, DEQ will develop any necessary rules in accordance with 40 CFR Section 51.102 and present them to the EQC no later than 12 months after the completion of the evaluation described above.

Where further studies are necessary to implement DEQ's recommendation, DEQ will establish a time frame for completion of the studies. The results of these studies will be presented to the EQC consistent with the time frame established in DEQ's recommendations unless otherwise specified by the EQC.

Phase 2: Actual Violation

If a violation of the ozone NAAQS is recorded and validated by DEQ:

1. New Source Review requirements for proposed major sources and major modifications in the AQMA (and the area of significant air quality impact) will be modified. The requirement to install Best Available Control Technology (BACT) in the AQMA will be replaced with a requirement to install Lowest Achievable Emission Rate (LAER) technology. In addition, the industrial growth allowance established in Section 4.50.3.2.3.4 will be eliminated. These requirements will take effect upon validation of the violation. BACT and a growth allowance may be reinstated if provided for in a new maintenance plan adopted by the EQC and approved by EPA.

2. DEQ will develop and present to the EQC rules requiring the sale of reformulated gasoline unless:

   - The additional violation is recorded and validated before the year 2005. In this case, DEQ will convene an advisory committee to develop a regional, full-scale congestion pricing program and an implementation strategy, or DEQ will identify measures that will achieve equivalent air quality benefit.

   - EPA has not developed regulations that allow attainment and/or maintenance areas to opt-in to the federal reformulated gasoline program. In this case, DEQ will petition EPA to make a finding pursuant to Section 211(c)(4)(C) of the FCAA permitting adoption of rules by the EQC requiring the sale of reformulated gasoline that meets or exceeds requirements for federal Phase I reformulated gasoline established in 40 C.F.R. Part 80, subpart D. If this petition is denied, DEQ will convene an advisory committee to develop a regional, full-scale congestion pricing program and an implementation strategy, or DEQ will identify measures that will achieve equivalent air quality benefits.

   Rules to implement reformulated gasoline, congestion pricing or other measures identified to achieve equivalent emission reductions will be presented to the EQC for adoption within 12 months after the violation is recorded and validated. Where TCMs are identified as control strategies, they will be included in the Metro's TIP and RTP within 12 months after the violation is recorded and validated. Emission reduction measures will be implemented as soon as possible, and every attempt will be made to implement the measures no later than 12 months after adoption.

3. DEQ will consult with SWAPCA and EPA to assess whether the state should request redesignation to nonattainment.

4.50.4 ADMINISTRATIVE REQUIREMENTS

Several administrative requirements related to compliance with various FCAA provisions must be satisfied for a nonattainment area to be redesignated to attainment. Each of these requirements is described below.

4.50.4.1 SIP Requirements/Nonattainment Area Requirements

The Oregon portion of the AQMA has met all SIP requirements specified in Section 110 and Part D of the FCAA. In summary, Section 110 says that a state shall submit a plan, which becomes part of the SIP, that provides for the implementation, maintenance, and enforcement of an air quality standard. Part D outlines specific plan requirements for nonattainment areas.

DEQ adopted an attainment plan for the Oregon portion of the AQMA on July 16, 1982. SWAPCA/WDOE adopted an attainment plan for the Washington portion of the AQMA in May 1982. EPA approved the plans on October 7, 1982. Amendments to the SIP required by the 1990 FCAA were submitted each year from 1991 through 1995.

The following is a summary of the attainment plan adopted on July 16, 1982 and further requirements imposed by the 1990 FCAA Amendments.

4.50.4.1.1 Summary of 1982 Ozone Attainment Plan

EPA designated the Portland/Vancouver Interstate AQMA as a nonattainment area for ground level ozone on March 3, 1978. The design value was established as 0.146 ppm/1-hour average, and the attainment date was initially established as December 31, 1982. On December 12, 1978, the Governor designated Metro as the lead agency responsible for developing the ozone attainment plan for the Oregon portion of the AQMA. On June 29, 1979, an initial plan was submitted to EPA with a request to extend the attainment date to 1987. EPA granted the extension on June 29, 1980. Metro adopted the ozone attainment plan for the Oregon portion of the AQMA on February 25, 1982. The EQC adopted the ozone attainment plan as a revision to the SIP on July 16, 1982 and EPA approved the plan on October 7, 1982.

The control measures in the approved ozone nonattainment plan included:

1. A vehicle inspection and maintenance program.

   The 1975 Legislative Assembly enacted legislation implementing a mandatory biennial motor vehicle emission control inspection program. The legislation required that vehicles registered within the Metro boundary, which incorporates the urban area in parts of three counties around Portland, show evidence of compliance with emission control requirements before vehicle registration renewal. The program included an idle/2500 RPM exhaust test and an under hood inspection.

DEQ augments its inspection program operations with a fleet inspection program, which allows licensed fleets to inspect their own vehicles. To qualify for this program, a company or government agency must have approved exhaust gas analysis equipment, and its employees must complete an operating training session.

2. Motor vehicle trip reduction and traffic flow improvement measures.

   a. Major transit improvements, including:

      - Downtown Transit Mall. The Transit Mall is composed of approximately 22 blocks in downtown Portland, giving public transit exclusive right-of-way on two of three lanes.

      - Bus Purchases. Tri-Met has purchased new buses to increase its level of service and to provide necessary bus links to light rail facilities.

      - Bus Shelters. About 700 bus shelters have been installed in the Portland metropolitan area.

      - Fareless Square. The Square is an area in the Central Business District where passengers may ride at no charge.

      - Construction and operation of the Banfield Corridor Transitway and highway improvements by Tri-Met. The project includes a number of park and ride lots, ramp metering, and improved feeder bus service.

   b. A carpool program, offered by Tri-Met, that encourages ride sharing as opposed to single occupant vehicle travel. This program includes a matching service, employer contacts, and a continuing promotional effort. In cooperation with the City of Portland, Tri-Met administers the Downtown Parking Permit Program, providing preferential carpool parking at six-hour meters. In addition, these agencies administer a preferential on-street Carpool Parking Program in the Lloyd Center area.

   c. Park and Ride Lots. There are 67 park and ride lots throughout the region being used by over 2,000 vehicles. These major lots are in the following locations: Forest Grove, Gresham, Hillsboro, Oregon City, North Portland (Hayden Island), Northeast Portland (at 102nd Avenue and Sandy Boulevard), Southeast Portland (Mall 205), Southwest Portland (at Sunset Boulevard and at Barbur Boulevard), Clackamas Town Center, Washington Square, and the Tanasbourne Shopping Center.

d. Traffic flow improvements, including:

- Implementing computerized traffic signals on several major arterials and in the Transit Mall;
- Prohibiting turns in the downtown Transit Mall where there is heavy pedestrian traffic; and,
- Banning or limiting on-street parking on several streets in downtown Portland to help traffic flow.

e. A five percent reduction of work trips by 1985 by bicycling. The 1971 State Legislature authorized expenditure of at least 1% of all Oregon Highway Fund monies for establishment of bicycle trails and footpaths. By 1982, 120 km of bikeways were added in the AQMA.

3. Emission standards for industrial sources.

The EQC adopted emission standards that require Reasonably Available Control Technology (RACT) to be implemented at all sources of VOC for which EPA has published a control technology guideline. In addition, the rules require source-specific RACT for major sources not subject to categorical RACT requirements. These emission standards are set forth in Oregon Administrative Rules 340-022-0100 through 340-022-0220.

In addition to the control measures listed in the ozone attainment plan and summarized above, the region undertook several projects that had a beneficial impact on air quality. No air quality credit was taken for these projects, which included:

- More transit improvements, especially the establishment of a new route grid system for Tri-Met that increased ridership by up to 25,000 passengers per day within 3 years of its implementation;
- More bus purchase and service improvements aimed at doubling the transit capacity of 1982;
- Transit fare incentives, including monthly bus passes at a reduced rate;
- More ramp metering;

- More traffic flow improvements, especially the connection of traffic signals in the Coliseum area and on Hall Boulevard between the Tualatin Valley Highway and Denny Road, construction of Tualatin Bypass, and establishment of one-way couplets in residential areas in Northwest Portland;

- McLoughlin Corridor Rideshare program;

- Employer bicycle planning project similar to rideshare programs already in place;

- State legislation to encourage ridesharing;

- Shop and Ride program;

- City of Portland Bicycle Parking program;

- Employee flexible working hours program;

- Traffic signal system project that more efficiently coordinated and interconnected traffic signals throughout Portland;

- Downtown Portland air quality plan under the Carbon Monoxide attainment plan;

- City of Portland employee travel project that included a reduction in work-related travel; and

- Construction of a light rail line running from the Beaverton-Hillsboro area into downtown, to be completed in the Spring of 1997.

4.50.4.1.2 Summary of SIP Revisions to Meet 1990 Clean Air Act Requirements

The following is a summary of the 1992 through 1995 SIP revisions which address all of the requirements in Section 110 and Part D of the FCAA.

The Portland/Vancouver AQMA was designated a marginal ozone nonattainment area in 1991. The established design value was 0.128 ppm/1-hour average based on 1988 and 1989 data. Specific control measures and requirements that apply to the Portland marginal ozone nonattainment area (as stated in the Section 182(a) and 176(c) of the FCAA) are as follows:

1. *1990 Emissions inventory, to be revised every three years thereafter until attainment.* On November 16, 1992, DEQ submitted to EPA a comprehensive 1990 ozone emission inventory for the Oregon portion of the AQMA. EPA provided comments on the submittal on March 10, 1993. The 1990 base year emission inventory has been revised in response to EPA comments, and is being resubmitted together with this redesignation request (see Appendix D1-4-1). The 1992 attainment year emission inventory (Appendix D1-4-2) and projected 1993 emission inventory (Appendix D1-4-3) in this Redesignation Request/Maintenance Plan submittal will be used to meet the periodic inventory requirement.

2. *VOC RACT fix-up rules.* On May 14, 1991, DEQ submitted to EPA rules updating the Reasonably Available Control Technology (RACT) requirements (OAR 340-022-0100 through 022-0220). This submittal included changes to RACT requirements for small surface coating sources, high performance architectural coating sources, and bulk gasoline plants. New RACT requirements were established for aerospace component coatings, and a requirement for case-by-case VOC RACT was added for those major sources not covered by specific federal RACT guidelines. In addition, definitions and exemptions were revised. EPA approved these revisions on September 29, 1993.

3. *Provision for a Vehicle Inspection and Maintenance Program.* DEQ submitted a technical change to the vehicle inspection and maintenance program on November 15, 1993 and committed to several administrative revisions at that time. The technical change was the replacement of all vehicle testing equipment with computerized equipment. EPA approved this revision on January 29, 1994.

   On June 13, 1994, DEQ submitted several administrative revisions to the program. These revisions to Volume 2, Section 5.4 of the SIP included:

   a. Specifying how vehicles registered in an I/M area but temporarily operated outside an I/M area were to be tested;

   b. Requirements and procedures for inspector training;

   c. Testing equipment specifications, procedures, quality assurance, and auditing requirements;

   d. Requirements for testing fleet vehicles registered outside an I/M area but operating within an I/M area; and

   e. A committal to monitor compliance with the I/M program through parking lot registration surveys.

   EPA approved these changes on September 9, 1994.

4. *New Source Review Rules (NSR) for "major sources."* On November 16, 1992, DEQ submitted revisions to the New Source Review permit program. These revisions include:

   a. A requirement that offsets come from contemporaneous, actual emission reductions under OAR 340-028-1970(5);

   b. A 1.1 to 1 offset ratio for emission reductions for new major sources or major modifications (i.e., a ten percent reduction) under OAR 340-028-1970(3)(c); and

   c. The elimination of remaining VOC growth allowance that existed before 1990.

   DEQ expects these NSR revisions to be approved by EPA before, or concurrent with, this redesignation request/maintenance plan, although approval is not required prior to redesignation according to EPA guidance. DEQ will also submit further revisions to establish NSR requirements for the Oregon portion of the AQMA effective upon redesignation (see Control Measures in Section 4.50.3.2.3, Maintenance Plan Commitments in Section 4.50.4.3, and New Source Review Program Changes in Appendix D1-16).

5. *Emission Statement Requirements.* Stationary sources that emit 25 tons/year or more of NO_x and/or VOC are required to submit emission statements to DEQ. These statements must include estimated actual VOC and NO_x emissions on an average weekday basis during the preceding year's ozone season and a description of the estimation method or procedure used to calculate those emissions. Emission statement requirements (OAR 340-028-1500 through 340-028-1520) were submitted to EPA on November 16, 1992. Revisions were submitted on November 15, 1993. EPA approved this SIP revision on March 24, 1994.

6. *Transportation Conformity Requirements.* Section 176(c) of the FCAA requires states to revise the SIPs to establish criteria and procedures for demonstrating transportation plan conformity to a SIP. On April 14, 1995, DEQ submitted to EPA a revision to the Oregon SIP establishing transportation conformity requirements for Oregon (OAR 340-020-0710 through 340-020-1080). In addition, general conformity requirements (OAR 340-020-1500 through 340-020-1600) were submitted on September 27, 1995. EPA approved the transportation conformity rules a SIP revision on May 16, 1996.

4.50.4.2 Continued Air Monitoring and Attainment Verification

Monitoring Network

DEQ is responsible for the operation of permanent ambient ozone monitors in the Oregon portion of the AQMA. In addition, DEQ is responsible for the quality control and quality assurance program for the ozone data.

DEQ will continue to comply with the air monitoring requirements of Title III, Section 319, of the FCAA. DEQ will continue to operate the monitors in compliance with EPA monitoring guidelines set forth in 40 CFR Part 58, "Ambient Air Quality Surveillance," and Appendices A through G of Part 58. In addition, DEQ will continue to comply with the "Ambient Air Quality Monitoring Program" specified in Volume 2, Section 6 of the SIP. Further, DEQ will continue to operate and maintain the network of State and Local Air Monitoring Stations (SLAMS) and National Air Monitoring Stations (NAMS) in accordance with the terms of the State/EPA Agreement (SEA).

If two exceedances of the ozone NAAQS are recorded and validated at the same permanent monitoring site within three years, DEQ will implement phase 1 of the contingency plan as specified in Section 4.50.3.3. If a violation of the ozone NAAQS is recorded and validated, DEQ will implement phase 2 of the contingency plan.

Attainment Verification

DEQ will analyze annually the ozone air quality monitoring data to verify continued attainment of the ozone standard in accordance with 40 CFR Part 50 and EPA's redesignation guidance. This data, along with data collected by SWAPCA for the Washington portion of the AQMA, will provide the necessary information for determining whether the AQMA continues to attain the NAAQS.

DEQ will also prepare an updated emission inventory summary for 1996, 1999, 2001, 2003 and 2006. These updates will be submitted to EPA Region 10 within 12 months following the end of the periodic emission inventory calendar year. In preparing the updates, DEQ will review the emission factors, growth factors, rule effectiveness and penetration factors, and other significant assumptions used to prepare the emission forecast. DEQ will confirm these factors and/or adjust them where more accurate information is available. Any new emission sources will be included in the update.

DEQ will compare the updated emission summary to the emission forecast and the attainment inventory in Tables 4.50.3.1 through 4.50.3.3, and evaluate any changes that have occurred. If there have been significant changes, DEQ will, in consultation with EPA Region 10, determine if a more extensive periodic emission inventory is necessary. If a more extensive inventory is necessary, it will be submitted to EPA within 23 months after the end of the reporting year.

If the emission inventory, in combination with the inventory for the Washington portion of the AQMA, exceeds the maintenance emission level, DEQ will implement phase 1 of the contingency plan as specified in Section 4.50.3.3.

See Commitments in Section 4.50.4.3 "Maintenance Plan Commitments".

4.50.4.3 Maintenance Plan Commitments

As part of the ozone maintenance plan, DEQ commits to the following:

- DEQ will continue to coordinate with the SWAPCA on interstate ozone air quality issues.
- DEQ will coordinate with SWAPCA on a public education and incentive program and a voluntary lawn and garden equipment curtailment program. See Appendix D1-12 for a description of these programs. DEQ will submit documentation of the effectiveness of the public education and incentive program to EPA Region 10 and, if necessary, will implement the backup plan as specified in Appendix D1-12-1.
- DEQ will submit documentation of the effectiveness of the voluntary parking ratio program to EPA Region 10 and, if necessary, will implement the backup plan as specified in Appendix D1-14.
- DEQ will submit a backup emission reduction measure as a revision to the SIP in the event that EPA ultimately provides less emission reduction credit for on-board diagnostics than forecast in Appendix D1-4-3. The backup measure will be proposed for adoption by the EQC within 12 months after EPA makes such a determination.
- DEQ will submit a backup emission reduction measure as a revision to the SIP if the federal Low Emission Vehicle (fedLEV) is delayed beyond 2001. The measure will be proposed for adoption by the EQC by November 1, 1999.

- DEQ will monitor progress in constructing the cross-Cascades pipeline, which was assumed in the emissions forecast in Appendix D1-4-3 to significantly reduce VOC emissions from barge loading operations at bulk gasoline terminals by the 1999 ozone season. If the pipeline is not constructed and emission reductions have not been achieved by other measures, DEQ will propose alternate measures for adoption by the EQC to be effective by May 1, 1999.

- DEQ will submit rules to implement the enhanced vehicle inspection program, as described in Appendix D1-10, before EPA approval of the maintenance plan.

- DEQ will submit revisions to the New Source Review regulations required to support the maintenance plan, as described in Appendix D1-16, before EPA approval of the maintenance plan.

- DEQ will work with SWAPCA, WDOE and EPA to satisfy the conditions set forth in Section 4.50.3.3 "Contingency Plan".

- DEQ will prepare periodic emission inventory updates for 1996, 1999, 2001, 2003 and 2006. The emission inventory updates will be submitted to EPA within 12 months following the end of the periodic emission inventory calendar year as specified in Section 4.50.4.2.

- DEQ will prepare reports on activity in the industrial growth allowance program for the periods 1997-1999, 2000-2001, 2002-2003, and 2004-2006. These reports will be submitted to EPA within 12 months following the end of the period as specified in Section 4.50.3.2.3.4.

- DEQ will maintain documentation of approved TCM substitutions as specified in Appendix D1-17-2.

- DEQ will conduct "future studies" in conjunction with SWAPCA, WDOE and EPA, on the role of VOC/NO_x in ozone formation in the Portland/Vancouver area. These studies will:

    - incorporate computer modeling and analysis of the role that upwind sources may or may not have in influencing ozone air quality in Portland/Vancouver, and

    - determine the role of NO_x versus VOC in ozone formation in the Portland/Vancouver area.

  See Appendix D1-9 for an outline of the proposed study.

- DEQ will develop the next ten-year maintenance plan (2007-2016) in coordination with SWAPCA, WDOE, Metro and RTC that can appropriately incorporate the post-plan transportation emissions budgets established in Table 4.50.3.7. This plan will be submitted to EPA by December 31, 2004.

Ozone Maintenance Plan
and Redesignation Request

for the

Portland/Vancouver AQMA (Oregon Portion)

APPENDIX D1: OZONE MAINTENANCE PLAN APPENDICES

(Appendices D1-1 through D1-17 incorporated by reference)

(Appendices are available upon request)

ATTACHMENT A2

MISCELLANEOUS SUPPORTING RULE AMENDMENTS

A2-1 State Implementation Plan (OAR 340-020-0047)

A2-2 Maintenance Area Designation (OAR 340-031-0520 and 340-031-0530)

A2-3 Cross References Corrections (OAR 340-022-0710, 340-022-0810, 340-022-0910, 340-022-1010)

A2-4 State Agency Coordination Program (OAR 340-018-0030)

A2-5 Transfer and Dispensing Operations (OAR 340-022-0400 through 340-022-0403)

Attachment A2-1

State Implementation Plan
(OAR 340-020-0047)

Attachment A2-1
State Implementation Plan
(OAR 340-020-0047)

"State of Oregon Clean Air Act Implementation Plan"
340-020-0047

(1) This implementation plan, consisting of Volumes 2 and 3 of the State of Oregon Air Quality Control Program, contains control strategies, rules and standards prepared by the Department of Environmental Quality and is adopted as the state implementation plan (SIP) of the State of Oregon pursuant to the federal **Clean Air Act**, Public Law 88-206 as last amended by Public Law 101-549.

(2) Except as provided in section (3) of this rule, revisions to the SIP shall be made pursuant to the Commission's rule-making procedures in Division 11 of this Chapter and any other requirements contained in the SIP and shall be submitted to the United States Environmental Protection Agency for approval.

(3) Notwithstanding any other requirement contained in the SIP, the Department is authorized to submit to the Environmental Protection Agency any permit condition implementing a rule that is part of the federally-approved SIP as a source-specific SIP revision after the Department has complied with the public hearings provisions of 40 **CFR 51.102 (July 1, 1992)**.

[**NOTE:** Revisions to the State of Oregon Clean Air Act Implementation Plan become federally enforceable upon approval by the United States Environmental Protection Agency. If any provision of the federally approved Implementation Plan conflicts with any provision adopted by the Commission, the Department shall enforce the more stringent provision.]

[**Publications:** The publication(s) referred to or incorporated by reference in this rule are available from the office of the Department of Environmental Quality.]

Stat. Auth.: ORS Ch. 468 & 468A
Hist.: DEQ 35, f. 2-3-72, ef. 2-15-72; DEQ 54, f. 6-21-73, ef. 7-1-73; DEQ 19-1979, f. & ef. 6-25-79; DEQ 21-1979, f. & ef. 7-2-79; DEQ 22-1980, f. & ef. 9-26-80; DEQ 11-1981, f. & ef. 3-26-81; DEQ 14-1982, f. & ef. 7-21-82; DEQ 21-1982, f. & ef. 10-27-82; DEQ 1-1983, f. & ef. 1-21-83; DEQ 6-1983, f. & ef. 4-18-83; DEQ 18-1984, f. & ef. 10-16-84; DEQ 25-1984, f. & ef. 11-27-84; DEQ 3-1985, f. & ef. 2-1-85; DEQ 12-1985, f. & ef. 9-30-85; DEQ 5-1986, f. & ef. 2-21-86; DEQ 10-1986, f. & ef. 5-9-86; DEQ 20-1986, f. & ef. 11-7-86; DEQ 21-1986, f. & ef. 11-7-86; DEQ 4-1987, f. & ef. 3-2-87; DEQ 5-1987, f. & ef. 3-2-87; DEQ 8-1987, f. & ef. 4-23-87; DEQ 21-1987, f. & ef. 12-16-87; DEQ 31-1988, f. 12-20-88, cert. ef. 12-23-88; DEQ 2-1991, f. & cert. ef. 2-14-91; DEQ 19-1991, f. & cert. ef. 11-13-91; DEQ 20-1991, f. & cert. ef. 11-13-91; DEQ 21-1991, f. & cert. ef. 11-13-91; DEQ 22-1991, f. & cert. ef. 11-13-1991; DEQ 23-1991, f. & cert. ef. 11-13-91; DEQ 24-1991, f. & cert. ef. 11-13-91; DEQ 25-1991, f. & cert. ef. 11-13-91; DEQ 1-1992,f. & cert. ef. 2-4-92; DEQ 3-1992, f. & cert. ef. 2-4-92; DEQ 7-1992, f. & cert. ef. 3-30-92; DEQ 19-1992, f. & cert. ef. 8-11-92; DEQ 20-1992, f. & cert. ef. 8-11-92; DEQ 25-1992, f. 10-30-92, cert. ef. 11-1-92; DEQ 26-1992, f. & cert. ef. 11-2-92; DEQ 27-1992, f. & cert. ef. 11-12-92; DEQ 4-1993, f. & cert. ef. 3-10-93; DEQ 8-1993, f. & cert. ef. 5-11-93; DEQ 12-1993, f. & ef. 9-24-93; DEQ 13-1993, f. & cert. ef. 9-24-93; DEQ 15-1993, f. & cert. ef. 11-4-93; DEQ 16-1993, f. & cert. ef. 11-4-93; DEQ 19-1993, f. & cert. ef. 11-4-93; DEQ 1-1994, f. & cert. ef. 1-3-94; DEQ 5-1994, f. & ef. 3-21-94; DEQ 14-1994, f. & ef. 5-31-94; DEQ 15-1994, f. 6-8-94 & ef. 7-1-94; DEQ 22-1994, f. & ef. 10-14-94; DEQ 24-1994, f. & ef. 10-28-94; DEQ 25-1994, f. & ef. 11-2-94; DEQ 32-1994, f. & ef. 12-22-94; DEQ 1-1995, f. 1-10-95 & ef. 5-1-95; DEQ 4-1995, f. & ef. 2-17-95; DEQ 7-1995, f. & ef. 3-19-95; DEQ 9-1995, f. & ef. 5-1-95; DEQ 10-1995, f. & ef. 5-1-95; DEQ 12-1995, f. & ef. 5-25-95; DEQ 13-1995, f. & ef. 5-25-95; DEQ 14-1995, f. & ef. 5-25-95; DEQ 17-1995, f. & ef. 7-12-95; DEQ 22-1995, f. & ef. 10-6-95; DEQ 24-1995, f. & ef. 10-11-95

Attachment A2-2

Maintenance Area Designation
(OAR 340-031-520 and 340-031-530)

Attachment A2-2
Maintenance Area Designation
(OAR 340-031-0520 and 340-031-0530)

Nonattainment Areas

340-031-0520 The following areas are designated as Nonattainment Areas:

(1) Carbon Monoxide Nonattainment Areas:

(a) The Grants Pass Nonattainment Area for Carbon Monoxide is the Grants Pass CBD as defined in OAR 340-031-0500.

(b) The Klamath Falls Nonattainment Area for Carbon Monoxide is the Klamath Falls UGB as defined in OAR 340-031-0500.

(c) The Medford Nonattainment Area for Carbon Monoxide is the Medford-Ashland UGB as defined in OAR 340-031-0500.

(d) The Portland Nonattainment Area for Carbon Monoxide is the Portland Metropolitan Service District as referenced in OAR 340-031-0500.

(e) The Salem Nonattainment Area for Carbon Monoxide is the Salem Area Transportation Study as defined in OAR 340-031-0500.

(2) Ozone Nonattainment Areas:~~[~~

~~*(a) The Oregon portion of the Portland-Vancouver Interstate Nonattainment Area for Ozone is the Portland AQMA as defined in OAR 340-031-0500.*~~

~~*(b)*~~ ~~]~~The Salem Nonattainment Area for Ozone is the Salem Area Transportation Study as defined in OAR 340-031-0500.

(3) PM_{10} Nonattainment Areas:

(a) The Eugene Nonattainment Area for PM_{10} is the Eugene UGA as defined in OAR 340-031-0500.

(b) The Grants Pass Nonattainment Area for PM_{10} is the Grants Pass UGB as defined in OAR 340-031-0500.

(c) The Klamath Falls Nonattainment Area for PM_{10} is the Klamath Falls UGB as defined in OAR 340-031-0500.

(d) The LaGrande Nonattainment Area for PM_{10} is the LaGrande UGB as defined in OAR 340-031-0500.

(e) The Lakeview Nonattainment Area for PM_{10} is the Lakeview UGB as defined in OAR 340-031-0500.

(f) The Medford Nonattainment Area for PM_{10} is the Medford AQMA as defined in OAR 340-031-0500.

(g) The Oakridge Nonattainment Area for PM_{10} is the Oakridge UGB as defined in OAR 340-031-0500.

(4) Total Suspended Particulate (TSP) Nonattainment Areas:

(a) The Eugene Nonattainment Area for TSP is the Eugene-Springfield AQMA as defined in OAR 340-031-0500.

(b) The Medford Nonattainment Area for TSP is the Medford-Ashland AQMA as defined in OAR 340-031-0500.

(c) The Portland Nonattainment Area for TSP includes areas within the Portland AQMA as set out and defined in OAR 340-031-0500.

NOTE: Total Suspended Particulate is now a state-enforceable standard only. The US EPA now enforces PM_{10} in the place of TSP. The Department has decided to retain TSP as an enforceable standard.

Stat. Auth.: ORS Ch. 468 & 468A
Hist.: DEQ 14-1995, f. & ef. 5-25-95

[**NOTE:** This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-020-0047.]

Maintenance Areas

340-031-0530 The following areas are designated as maintenance areas:

(1) Carbon Monoxide Maintenance Areas:

(a) The Eugene Maintenance Area for Carbon Monoxide is the Eugene-Springfield AQMA as defined in OAR 340-031-0500.

(2) Ozone Maintenance Areas:

(a) The Medford Maintenance Area for Ozone is the Medford-Ashland AQMA as defined in OAR 340-031-0500.

(b) The Oregon portion of the Portland- Vancouver Interstate Maintenance Area for Ozone is the Portland AQMA, as defined in OAR 340-031-0500.

(3) PM_{10} Maintenance Areas:

There are no areas in the state that have been designated by the EQC as PM_{10} Maintenance Areas.

(4) Total Suspended Particulates (TSP) Maintenance Areas:

There are no areas in the state that have been designated by the EQC as TSP Maintenance Areas.

Stat. Auth.: ORS Ch. 468 & 468A
Hist.: DEQ 14-1995, f. & ef. 5-25-95

[**NOTE:** This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-020-0047.]

Attachment A2-3

Cross References Corrections
(OAR 340-022-0710, 340-022-0810, 340-022-0910, 340-022-1010)

Attachment A2-3
Cross References Corrections
(OAR 340-022-0710, 340-022-0810, 340-022-0910, 340-022-1010)

Motor Vehicle Refinishing

Definitions

OAR 340-022-0710 As used in OAR 340-022-0700 through 340-022-0760:

(1) "Aerosol Spray" coating means a pre-mixed coating supplied in pressurized containers of 16 ounces or less.

(2) "Anti-glare/Safety Coating" means a coating formulated to minimize light reflection to interior areas of a vehicle and which shows a reflectance of 25 or less on a 60 degree gloss meter.

(3) "Basecoat" means a pigmented topcoat which is the first topcoat applied as a part of a multistage topcoat system.

(4) "Basecoat/Clearcoat Topcoat System" means a topcoat system composed of a basecoat portion and a clearcoat portion. The VOC content of a basecoat/clearcoat topcoat system shall be calculated according to the following formula:

$$VOC_{bc/cc} = (VOC_{bc} + 2\ VOC_{cc})/3$$

Where:

$VOC_{bc/cc}$ = the composite VOC content, less water and less exempt compounds to be used for compliance determination under the basecoat/clearcoat topcoat system coating category.

VOC_{bc} = the VOC content of any given basecoat as prepared for use, less water and less exempt compounds.

$2VOC_{cc}$ = twice the VOC content of any given clearcoat as prepared for use, less water and less exempt compounds.

(5) "Bright Metal Trim Repair Coating" means a coating applied directly to chrome-plated metal surfaces for the purposes of appearance.

(6) "Clearcoat" means a topcoat which contains no pigments or only transparent pigments and which is the final topcoat applied as a part of a multistage topcoat system.

(7) "Department" means the Oregon Department of Environmental Quality.

(8) "Elastomeric Materials" mean coatings which are specifically formulated and applied over coated or uncoated flexible plastic substrates for the purpose of adhesion.

(9) "Exempt compounds" means compounds of carbon excluded from the definition of VOC.

(10) "Graphic Design Application" means the application of logos, letters, numbers, or artistic representations such as murals, landscapes, and portraits.

(11) "High Volume, Low Pressure Spray", or "HVLP" means equipment used to apply coatings with a spray device which operates at a nozzle air pressure between 0.1 and 10 pounds per square inch gravity (psig).

(12) "Impact Resistant Coating" means any coating applied to a rocker panel for the purpose of chip resistance to road debris.

(13) "Manufacturer" means the company, firm or establishment which is listed on the coating container. If the container lists two companies, firms or establishments, the manufacturer is the party which the coating was "manufactured for" or "distributed by", as noted on the product.

(14) "Midcoat" means a semi-transparent topcoat which is the middle topcoat applied as part of a three-stage topcoat system.

(15) "Motor Vehicle" means a vehicle that is self-propelled or designed for self-propulsion as defined in ORS 801.360.

(16) "Motor Vehicle Refinishing" means the application of surface coating to on-road motor vehicles or non-road motor vehicles, or their existing parts and components, except Original Equipment Manufacturer (OEM) coatings applied at manufacturing plants.

(17) "Motor Vehicle Refinishing Coating" means any coating designed for, or represented by the manufacturer as being suitable for motor vehicle refinishing.

(18) "Motor Vehicle Refinishing Facility" means a location at which motor vehicle refinishing is performed.

(19) "Multi-Color Coating" means a coating which is packaged in a single container that exhibits more than one color when applied, and is used to protect surfaces of vehicle cargo areas.

(20) "Multistage Topcoat System" means any basecoat/clearcoat topcoat system or any three-stage topcoat system manufactured as a system, and used as specified by the manufacturer.

(21) "Non-Road Motor Vehicle" means any motor vehicle other than an on-road motor vehicle. "Non-Road Motor Vehicle" includes, but is not limited to, fixed load vehicles, farm tractors, farm trailers, all-terrain vehicles, and golf carts as these vehicles are defined in ORS Chapter 801.

(22) "On-Road Motor Vehicle" means any motor vehicle which is required to be registered under ORS 803.300 or exempt from registration under ORS 803.305(5), 803.305(6), or 803.305(15) through 803.305(19). "On-Road Motor Vehicle" includes, but is not limited to: passenger cars, trucks, vans, motorcycles, mopeds, motor homes, truck tractors, buses, tow vehicles, trailers other than farm trailers, and camper shells.

(23) "Person" means the federal government, any state, individual, public or private corporation, political subdivision, governmental agency, municipality, partnership, association, firm, trust, estate, or any other legal entity whatsoever.

(24) "Portland Air Quality Maintenance Area" or "Portland AQMA" ~~[is the Oregon portion of the Portland-Vancouver Interstate Nonattainment Area for Ozone a]~~is defined in OAR 340-031-0500. (The Portland AQMA includes portions of Clackamas, Multnomah and Washington Counties.)

(25) "Precoat Coating" means a coating applied to bare metal primarily to deactivate the surface for corrosion resistance to a subsequent water-base primer.

(26) "Pretreatment Wash Primer" means a coating which contains at least 0.5% acid, by weight, which is used to provide surface etching and is applied directly to bare metal surfaces to promote corrosion resistance and adhesion.

(27) "Primer" means a coating applied for purposes of corrosion resistance or adhesion of subsequent coatings.

(28) "Primer Sealer" means a coating applied prior to the application of a topcoat for the purpose of color uniformity, or to promote the ability of a underlying coating to resist penetration by the topcoat.

(29) "Primer Surfacer" means a coating applied for the purpose of corrosion resistance or adhesion, and which promotes a uniform surface by filling in surface imperfections.

(30) "Public Highway" means every public way, road, street, thoroughfare and place, including bridges, viaducts and other structures open, used or intended for use of the general public for vehicles or vehicular traffic as a matter of right.

(31) "Rocker Panel" means the panel area of a motor vehicle which is no more than 10 inches from the bottom of a door, quarter panel, of fender.

(32) "Rubberized Asphaltic Underbody Coating" means a coating applied to the wheel wells, the inside of door panels or fenders, the underside of a trunk or hood, of the underside of the motor vehicle itself for the purpose of sound deadening or protection.

(33) "Specialty Coating" means any of the following coatings when used in accordance with each coating's specialized design purpose: adhesion promoters, uniform finish blenders, elastomeric materials, impact-resistant coatings, anti-glare safety coatings, rubberized asphaltic underbody coatings, water hold-out coatings, weld-through coatings, bright metal trim repair coatings, and surface appearance additives.

(34) "Spot Repairs" mean motor vehicle refinishing repairs in which the damaged area to be repaired is limited to only a portion of any given panel so that an entire panel need not be repaired.

(35) "Stencil Coating" means an ink or a pigmented coating which is rolled or brushed onto a template or a stamp in order to add identifying letters, symbols, or numbers to motor vehicles, mobile equipment, or their parts and components.

(36) "Surface Appearance Additive" means gloss control additives, fish-eye eliminators, retarders, and other additives designed to achieve the surface appearance of the original equipment specifications.

(37) "Three-Stage Coating System" means a topcoat system composed of a basecoat portion, a midcoat portion, and a transparent clearcoat portion. For compliance purposes, the VOC content of a three-stage coating system shall be calculated according to the following formula:

$$VOC_{3\text{-stage}} = (VOC_{bc} + VOC_{mc} + 2\ VOC_{cc})/4$$

Where:

$VOC_{3\text{-stage}}$ = the composite VOC content, less water and less exempt compounds in the three-stage coating system.

VOC_{bc} = the VOC content of any given basecoat as prepared for use, less water and less exempt compounds.

VOC_{mc} = the VOC content of any given midcoat as prepared for use, less water and less exempt compounds.

$2VOC_{cc}$ = twice the VOC content, as prepared for application, of any given clearcoat.

(38) "Topcoat" means a coating applied over any coating, for the purpose of appearance, identification, or protection.

(39) "Touch-up Coating"means a coating applied by brush or non-refillable aerosol can to cover minor surface damage and dispensed in containers of no more than 8 ounces.

(40) "Uniform Finish Blender" means a coating which is applied in spot repairs for the purpose of blending a paint overspray area of a repaired topcoat to match the appearance of an adjacent existing topcoat.

(41) "Vehicle" means any device in, upon or by which any person or property is or may be transported or drawn upon a public highway and includes vehicles that are propelled or powered by any means.

(42) "Volatile Organic Compound" or "VOC" means those compounds of carbon defined in OAR 340-022-0102. For purposes of determining compliance with VOC content limits, VOC shall be measured by an applicable method identified in OAR 340-022-0760.

(43) "Water Hold-Out Coating" means a coating applied to the interior cavity areas of doors, quarter panels, and rocker panels for the purpose of corrosion resistance to prolonged water exposure.

(44) "Weld-Through Coating" means a coating applied to metal immediately prior to welding to provide corrosion resistance.

Stat. Auth.: ORS Ch. 468A
Hist: DEQ 13-1995, f. & cert. ef. 5-25-95

[**NOTE:** This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-020-0047.]

Consumer Products

Definitions

OAR 340-022-0810 As used in OAR 340-022-0800 through 340-022-0860:

(1) "Aerosol product" means a pressurized spray system that dispenses product ingredients by means of propellant or mechanically induced force. This does not include pump sprays.

(2) "Agricultural use" means the use of any pesticide or method or device for the control of pests in connection with the commercial production, storage, or processing of any animal or plant crop. This does not include the sale or use of pesticides in properly labeled packages or containers which are intended for home use, use in structural pest control, industrial use, or institutional use. Subsections (a) through (d) are for purposes of this section only.

(a) Home use means use in a household or its immediate environment.

(b) Structural pest control means a use requiring a license.

(c) Industrial use means use for or in a manufacturing, mining, or chemical process, or use in the operation of factories, processing plants, and similar sites.

(d) Institutional use means use within the confines of, or on property necessary for the operation of buildings such as hospitals, schools, libraries, auditoriums, and office complexes.

(3) "Air freshener" means any consumer product including, but not limited to sprays, wicks, powders, and crystals, designed for the purpose of masking odors, or freshening, cleaning, scenting, or deodorizing the air. This does not include products that are used on the human body, products that function primarily as cleaning products, or disinfectant products claiming to deodorize by killing germs on surfaces. It does include spray disinfectants and other products that are expressly represented for use as air fresheners. To determine whether a product is an air freshener, all verbal and visual representations regarding product use on the label and packaging, and in the product's literature and advertising may be considered. The presence of and representations about a product's fragrance and ability to deodorize (resulting from surface application) shall not constitute a claim of air freshening.

(4) "All other forms" means all consumer product forms for which no form-specific VOC standard is specified under OAR 340-022-0820(1). Unless specified otherwise by the applicable VOC standard, this includes, but is not limited to, solids, liquids, wicks, powders, crystals, and cloth or paper wipes (towelettes).

(5) "Antiperspirant" means any product including, but not limited to, aerosols, roll-ons, sticks, pumps, pads, creams, and squeeze-bottles, that is intended by the manufacturer to be used to reduce perspiration in the human axilla by at least 20% in at least 50% of a target population.

(6) "ASTM" means the American Society for Testing and Materials.

(7) "Automotive windshield washer fluid" means Any liquid designed for use in a motor vehicle windshield washer fluid system either as an anti-freeze of for the purpose of cleaning, washing, or wetting the windshield(s). This does not include any fluid which is placed in the washer fluid system of a motor vehicle prior to the time of initial sale.

(8) "Bait station insecticide" means a container enclosing an insecticidal bait, where the bait is designed to be ingested by insects and is composed of solid material feeding stimulants with less than 5.0% active ingredients.

(9) "Bathroom and tile cleaner" means a product designed to clean tile or surfaces in bathrooms. This does not include products specifically designed to clean toilet bowls or toilet tanks.

(10) "Carburetor-choke cleaner" means a product designed to remove dirt and other contaminants from a carburetor. This does not include products designed to be introduced directly into the fuel lines or fuel storage tank prior to introduction into the carburetor.

(11) "Charcoal lighter material" means any combustible material designed to be applied on, incorporated in, added to, or used with charcoal to enhance ignition. This does not include subsections (a) through (d):

(a) Electrical starters and probes,

(b) Metallic cylinders using paper tinder,

(c) Natural gas, and

(d) Propane.

(12) "Commission" means the Environmental Quality Commission.

(13) "Complying consumer product" means a consumer product which complies with the VOC content limits in OAR 340-022-0820.

(14) "Construction and panel adhesive" means any one-component household adhesive sold in containers of one gallon or less, having gap filling capabilities, and which distributes stress throughout the bonded area resulting in reduction or elimination of mechanical fasteners.

(15) "Consumer" means any person who purchases or acquires any consumer product for personal, family, household, or institutional use. Persons acquiring a consumer product for resale are not considered consumers of that product.

(16) "Consumer product" means any chemically formulated product, or article, held by any person, the use, consumption, storage, disposal, or destruction of which may result in the release of volatile organic compounds, and which is included in the product categories listed in OAR 340-022-0820(1). This does not include fuels, fuel additives, motor vehicles, non-road vehicles, non-road engines, architectural coatings or aerosol spray paint.

(17) "Contact adhesive" means any household adhesive that:

(a) Is nitrile-based, or contains polychloro-butadiene (neoprene, chloroprene, bayprene), or latex;

(b) When applied to two substrates, forms an instantaneous, non-repositionable bond;

(c) When dried to touch, exhibits a minimum 30-minute bonding range; and,

(d) Bonds only to itself without the need of reactivation by solvents or heat.

(18) "Container" or "Packaging" means the part or parts of the consumer or institutional product which serve only to contain, enclose, incorporate, deliver, dispense, wrap, or store the chemically formulated substance or mixture of substances which is solely responsible for accomplishing the purposes for which the product was designed or

intended. This includes any article onto or into which the principal display panel is incorporated, etched, printed, or attached.

(19) "Cooking spray aerosols" means any aerosol product designed either to reduce sticking in or on cooking and baking surfaces or to be applied on food, or both.

(20) "Crawling bug insecticide" means any insecticide product that is designed for use against ants, cockroaches, or other household crawling arthropods, including, but not limited to, mites, silverfish, or spiders. This does not include products designed to be used exclusively on humans or animals.

(21) "Deodorant" means any product including, but not limited to, aerosols, roll-ons, sticks, pumps, pads, creams, and squeeze-bottles, that is intended by the manufacturer to be used to minimize odor in the human axilla by retarding the growth of bacteria which cause the decomposition of perspiration.

(22) "Device" means any instrument or contrivance (other than a fire-arm) which is designed for trapping, destroying, repelling, or mitigating any pest or any other form of plant or animal life (other than humans and other than bacteria, viruses, or other micro-organism on or in living humans or other living animals), but not including equipment used for the application of pesticides for which the pesticides are sold separately.

(23) "Department" means the Oregon Department of Environmental Quality.

(24) "Distributor" means any person who sells or supplies a consumer product for the purposes of resale or distribution in commerce. "Distributor" includes activities of a self-distributing retailer related to the distribution of products to individual retail outlets. "Distributor" does not include manufacturers except for a manufacturer who sells or supplies consumer products directly to a retail outlet. "Distributor" does not include consumers.

(25) "Double-phase aerosol air freshener" means an aerosol air freshener with the contents in two or more distinct phases that require the product container be shaken before use to mix the phases, producing an emulsion.

(26) "Dusting aid" means a product designed to assist in removing dust and other soils from floors and other surfaces without leaving a wax or silicone-based coating. This does not include products which consist entirely of compressed gases for use in electronic or other specialty applications.

(27) "Exempt compounds" means compounds of carbon specifically excluded from the definition of VOC.

(28) "Exempt VOCs" means VOCs exempted from OAR 340-022-0820(1) under OAR 340-022-0820(3).

(29) "Engine degreaser" means a cleaning product designed to remove grease, grime, oil, and other contaminants from the external surfaces of engines and other mechanical parts.

(30) "Fabric protectant" means a product designed to be applied to fabric substrates to protect the surface from soiling from dirt and other impurities or to reduce absorption of water into the fabric's fibers. This does not include silicone-based products whose function is to provide water repellency, or products designed for use solely on fabrics which are labeled "for dry clean only" and sold in containers of ten fluid ounces or less.

(31) "Flea and tick insecticide" means any insecticide product that is designed for use against fleas, ticks, their larvae, or their eggs. This does not include products that are designed to be used exclusively on humans or animals and their bedding.

(32) "Flexible flooring material" means asphalt, cork, linoleum, no-wax, rubber seamless vinyl, and vinyl composite flooring.

(33) "Floor polish or wax" means a wax, polish, or any other product designed to polish, protect, or enhance floor surfaces by leaving a protective coating that is designed to be periodically replenished. This does not include spray buff products, products designed solely for the purpose of cleaning floors, floor finish strippers, products designed for unfinished wood floors, or coatings subject to architectural and industrial maintenance coating regulations.

(34) "Flying bug insecticide" means any insecticide product that is designed for use against flying insects or other flying arthropods, including, but not limited to, flies, mosquitoes, moths, or gnats. This does not include wasp and hornet insecticide, or products that are designed to be used exclusively on humans or animals.

(35) "Fragrance" means a substance or complex mixture of aroma chemicals, natural essential oils, and other functional components with a combined vapor pressure not in excess of 2mm mercury at 20° Celsius (C), which is added to a consumer product to impart an odor or scent or to counteract a objectionable odor.

(36) "Furniture maintenance product" means a wax, polish, conditioner, or any other product designed for the purpose of polishing, protecting, or enhancing finished wood surfaces other than floors. This does not include dusting aids, products designed solely for the purpose of cleaning, and products designed to leave a permanent finish such as stains, sanding sealers, and lacquers.

(37) "Gel" means a colloid in which the disperse phase has combined with the continuous phase to produce a semisolid material, such as jelly.

(38) "General purpose adhesive" means any non-aerosol household adhesive designed for use on a variety of substrates, not including contact adhesives or construction and panel adhesives.

(39) "General purpose cleaner" means a product designed for general all-purpose cleaning, in contrast to cleaning products designed to clean specific substrates in certain situations. This includes products designed for general floor cleaning, kitchen or countertop cleaning, and cleaners designed to be used on a variety of hard surfaces. This does not include non-water-based degreasers.

(40) "Glass cleaner" means a cleaning product designed primarily for cleaning surfaces made of glass. This does not include products designed solely for the purpose of cleaning optical materials used in eyeglasses, photographic equipment, scientific equipment, or photocopying machines.

(41) "Hairspray" means a consumer product designed primarily for the purpose of dispensing droplets of a resin on and into a hair coiffure which will impart sufficient rigidity to the coiffure to establish or retain the style for a period of time.

(42) "Hair mousse" means a hairstyling foam designed to facilitate styling of a coiffure and provide limited holding power.

(43) "Hair styling gel" means a high viscosity, often gelatinous product that contains a resin and is designed for application to hair to aid in styling and sculpting of the hair coiffure.

(44) "High volatility organic compound or "HVOC" means any volatile organic compound that exerts a vapor pressure greater than 80 millimeters mercury when measured at 20°C.

(45) "Household adhesive" means any household product that is used to bond one surface to another by attachment. This does not include products used on humans and animals, adhesive tape, contact paper, wallpaper, shelf liners, two part resorcinol resin based adhesive, or any other product with an adhesive incorporated onto or in an inert substrate.

(46) "Household product" means any consumer product that is primarily designed to be used in or in the vicinity of living quarters or residences that are occupied or intended for habitation.

(47) "Initial sale" means the bargain, sale, transfer, or delivery with intent to pass an interest therein, other than a lien, of a motor vehicle which has not been previously registered or licensed in Oregon or elsewhere; and such a bargain, sale, transfer, or delivery, accompanied by registration or licensing of said vehicle in Oregon or elsewhere, shall constitute the first sale of said vehicle, irrespective of where such bargain, sale, transfer, or delivery occurred.

(48) "Insecticide" means a pesticide product that is designed for use against insects or other arthropods, but excluding products that are:

(a) For agricultural use;

(b) For use in maintaining building structures; or

(c) Restricted materials that require a permit for use and possession.

(49) "Insecticide fogger" means any insecticide product designed to release all or most of its content, as a fog or mist, into indoor areas during a single application.

(50) "Institutional product" means a consumer product that is designed for use in the maintenance or operation of an establishment that manufactures, transports, or sells goods or commodities, or provides services for profit; or is engaged in the nonprofit promotion of a particular public, educational, or charitable cause. Establishments include, but are not limited to, government agencies, factories, schools, hospitals, sanitariums, prisons, restaurants, hotels, stores, automobile service and parts centers, health clubs, theaters, or transportation companies. Institutional products do not include household products and products that are incorporated into or used exclusively in the manufacture or construction of the goods or commodities at the site of the establishment.

(51) "Label" means any written, printed, or graphic matter affixed to, applied to, attached to, blown into, formed, molded into, embossed on, or appearing upon any consumer product or consumer product package, for purposes of branding, identifying, or giving information with respect to the product or to the contents of the package.

(52) "Laundry prewash" means a product that is designed for application to a fabric prior to laundering and that supplements or contributes to the effectiveness of laundry detergents or provides specialized performance.

(53) "Laundry starch product" means a product that is designed for application to a fabric, either during or after laundering, to impart and prolong a crisp, fresh look and may also

act to help ease ironing of the fabric. This includes, but is not limited to, fabric finish, sizing, and starch.

(54) "Lawn and garden insecticide" means an insecticide product designed primarily to be used in household lawn and garden areas to protect plants from insects or other arthropods.

(55) "Liquid" means a substance or mixture of substances which is capable of flow as determined under **ASTM D-4359-90**. This does not include powders or other materials that are composed entirely of solid particles.

(56) "Manufacturer" means the company, firm or establishment which is listed on the product container or package. If the product container or package lists two companies, firms or establishments, the manufacturer is the party which the product was "manufactured for" or "distributed by", as noted on the product container or package. If the product container or package does not list a company, firm or establishment, the manufacturer is the party who imported, produced, packaged or assembled the product.

(57) "Nail polish" means any clear or colored coating designed for application to the fingernails or toenails and including, but not limited to, lacquers, enamels, acrylics, base coats, and top coats.

(58) "Nail polish remover" means a product designed to remove nail polish and coatings from fingernails or toenails.

(59) "Non-aerosol product" means any product that is not dispensed by a pressurized spray system.

(60) "Noncomplying consumer product" means a consumer product which does not comply with the VOC content limits in OAR 340-022-0820.

(61) "Nonresilient flooring" means flooring of a mineral content which is not flexible, including but not limited to, terrazzo, marble, slate, granite, brick, stone, ceramic tile, and concrete.

(62) "Oven cleaner" means any product designed to clean or remove dried food deposits from oven walls.

(63) "Percent-by-weight" means the total weight of VOC less exempt VOCs, expressed as a percentage of the total net weight of the product exclusive of the container or package as calculated according to the following equation:

Percent-By-Weight $=[(B - C) \times 100] / A$

Where:

A = net weight of unit (excluding container and packaging)
B = weight of VOCs, per unit
C = weight of VOCs, exempted under OAR 340-022-0820(3), per unit

(64) "Pesticide" means any substance or mixture of substances labeled, designed, or intended for use in preventing, destroying, repelling, or mitigating any pest, or any substance or mixture of substances labeled, designed, or intended for use as a defoliant, desiccant, or plant regulator, providing that the term pesticide will not include any substance, mixture

of substances, or device which the U.S. Environmental Protection Agency does not consider to be a pesticide.

(65) "Portland Air Quality Maintenance Area" or "Portland AQMA" ~~[is the Oregon portion of the Portland-Vancouver Interstate Nonattainment Area for Ozone a]~~is defined in OAR 340-031-0500. (The Portland AQMA includes portions of Clackamas, Multnomah and Washington Counties.)

(66) "Principal display panel or panels" means that part, or those parts of a label that are so designed as to most likely be displayed, presented, shown, or examined under normal and customary conditions of display or purchase. Whenever a principal display panel appears more than once, all requirements pertaining to the principal display panel shall pertain to all such principal display panels.

(67) "Product category" means the applicable category which best describes the product as listed in this rule.

(68) "Product form" means the applicable form which most accurately describes the product's dispensing form, including aerosol products, gels, liquids, pump sprays, and solids.

(69) "Propellant" means a liquefied or compressed gas that is used in whole or in part, such as a co-solvent, to expel a liquid or any other material from the same self-pressurized container or from a separate container.

(70) "Pump spray" means a packaging system in which the product ingredients within the container are not under pressure and in which the product is expelled only while a pumping action is applied to a button, trigger, or other actuator.

(71) "Restricted materials" means any pesticides established for restricted use under Section 3(d) of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), 7 United States Code § 136, et seq.

(72) "Retailer" means any person who sells, supplies, or offers consumer products for sale directly to consumers.

(73) "Retail outlet" means any establishment at which consumer products are sold, supplied, or offered for sale directly to consumers.

(74) "Single-phase aerosol air freshener" means an aerosol air freshener with the liquid contents in a single homogeneous phase and which does not require that the product container be shaken before use.

(75) "Shaving cream" means an aerosol product which dispenses a foam lather intended for use with a blade, cartridge razor, or other wet shaving system in the removal of facial or other bodily hair.

(76) "Solid" means a substance or mixture of substances which, either whole or subdivided (such as the particles comprising a powder), is not capable of flow as determined under **ASTM D-4359-90**.

(77) "Spray buff product" means a product designed to restore a worn floor finish in conjunction with a floor buffing machine and special pad.

(78) "Subsequent sale" means the bargain, sale, transfer, or delivery, with intent to pass an interest therein, other than alien, of a motor vehicle which has been registered or licensed outside of the Portland AQMA, except when such vehicle is not required under law to be registered or licensed in Oregon or elsewhere; and any such bargain, sale, transfer, or delivery of a motor vehicle after same has been registered or licensed shall

constitute a subsequent sale, irrespective of where bargain, sale, transfer, or delivery occurred.

(79) "Usage directions" means the text or graphics on the product's label or accompanying literature which describes to the user the manner and quantity in which the product is to be employed.

(80) "Volatile Organic Compound" or "VOC" means those compounds of carbon defined in OAR 340-022-0102(73). For purposes of determining compliance with VOC content limits, VOC shall be measured by an applicable method identified in OAR 340-022-0860.

(81) "Wasp and hornet insecticide" means any insecticide product that is designed for use against wasps, hornets, yellow jackets, or bees by allowing the user to spray a high-volume directed stream or burst from a safe distance at the intended pest or its hiding place.

(82) "Wax" means a material or synthetic thermoplastic substance generally of high molecular weight hydrocarbons or high molecular weight esters of fatty acids or alcohols, except glycerol and high polymers (plastics). Wax includes, but is not limited to, substances derived from the secretions of plants and animals such as carnauba wax and beeswax, substances of a mineral origin such as ozocerite and paraffin, and synthetic polymers such as polyethylene.

(83) "Wood floor wax" means wax-based products for use solely on wood floors.

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Hist: DEQ 13-1995, f. & cert. ef. 5-25-95

[**Publications:** The publication(s) referred to or incorporated by reference in this rule are available from the office of the Department of Environmental Quality.]

[**NOTE:** This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-020-0047.]

Spray Paint

Definitions

OAR 340-022-0910 As used in OAR 340-022-0900 through 340-022-0950:

(1) "Adhesive" means a product used to bond one surface to another.

(2) "Anti-Static Spray" means a product used to prevent or inhibit the accumulation of static electricity.

(3) "Art Fixative or Sealant" means a clear coating, including art varnish, workable art fixative, and ceramic coating, which is designed and labeled exclusively for application to paintings, pencil, chalk, or pastel drawings, ceramic art pieces, or other closely related art uses, to provide a final protective coating or to fix preliminary stages of art work while providing a workable surface for subsequent revisions.

(4) "ASTM" means the American Society for Testing and Materials.

(5) "Auto Body Primer" means an automotive primer or primer surfacer coating designed and labeled exclusively to be applied to a vehicle body substrate for the purpose of corrosion resistance and building a repair area which can be sanded to a smooth condition after drying.

(6) "Automotive Bumper and Trim Product" means a product, including adhesion promoters and chip sealants, designed and labeled exclusively to repair and refinish automotive bumpers and plastic trim parts.

(7) "Automotive Underbody Coating" means a flexible coating which contains asphalt or rubber and is labeled exclusively for use on the underbody of motor vehicles to resist rust, abrasion and vibration, and to deaden sound.

(8) "Aviation Propeller Coating" means a coating designed and labeled exclusively to provide abrasion resistance and corrosion protection for aircraft propellers.

(9) "Aviation or Marine Primer": means a coating designed and labeled exclusively to meet federal specification TT-P-1757.

(10) "Belt Dressing" means a product applied on auto fan belts, water pump belting, power transmission belting, industrial equipment belting, or farm machinery belting to prevent slipping, and to extend belt life.

(11) "Cleaner" means a product designed and labeled primarily to remove soil or other contaminants from surfaces.

(12) "Clear Coating" means a coating which is colorless, containing resins but no pigments, except flatting agents, and is designed and labelled to form a transparent or translucent solid film.

(13) "Coating Solids" means the nonvolatile portion of a spray paint, consisting of the film forming ingredients, including pigments and resins.

(14) "Complying spray paint" means a spray paint which complies with the VOC content limits in OAR 340-022-0820.

(15) "Consumer" means any person who purchases or acquires any spray paint for personal, family, or household use. Persons acquiring a spray paint product for resale are not considered consumers of that product.

(16) "Commercial Applicator" means any person who purchases, acquires, applies, or contracts for the application of spray paint for commercial, industrial or institutional

uses, or any person who applies spray paint in the course of an activity from which compensation is derived.

(17) "Corrosion Resistant Brass, Bronze, or Copper Coating" means a clear coating formulated and labeled exclusively to prevent tarnish and corrosion of uncoated brass, bronze or copper metal surfaces.

(18) "Department" means the Oregon Department of Environmental Quality.

(19) "Distributor" means any person who sells or supplies spray paint for the purposes of resale or distribution in commerce. "Distributor" includes activities of a self-distributing retailer related to the distribution of products to individual retail outlets. "Distributor" does not include manufacturers except for a manufacturer who sells or supplies spray paint products directly to a retail outlet. "Distributor" does not include consumers.

(20) "Dye" means a product containing no resins which is used to color a surface or object without building a film.

(21) "Electrical Coating" means a coating designed and labeled to be used exclusively to coat electrical components such as electric motor windings to provide electrical insulation or corrosion protection.

(22) "Enamel" means a coating which cures by chemical cross-linking of its base resin and is not resoluble in its original solvent.

(23) "Engine Paint" means a coating designed and labeled exclusively as such, which is used exclusively to coat engines and their components.

(24) "Environmental Protection Agency" or "EPA" means the United States Environmental Protection Agency.

(25) "Exact Match Finish, Automotive" means a topcoat which meets all of the criteria in subsections (a) through (c) of this section:

(a) The product is designed and labeled exclusively to exactly match the color of an original, factory-applied automotive coating during the touch-up of automobile finishes;

(b) The product is labeled with the original equipment manufacturer's name for which it was formulated; and

(c) The product is labeled with one of the following:

(A) The original equipment manufacturer's (OEM) color code;

(B) The color name; or

(C) Other designation identifying the specific OEM color to the purchaser.

(d) Notwithstanding subsections (a) through (c) of this section, automotive clear coatings designed and labeled exclusively for use over automotive exact match finishes to replicate the original factory applied finish shall be considered to be automotive exact match finishes.

(26) "Exact Match Finish, Engine Paint" means a coating which meets all of the criteria in subsections (a) through (c) of this section:

(a) The product is designed and labeled exclusively to exactly match the color of an original, factory-applied engine paint;

(b) the product is labeled with the original equipment manufacturer's name for which it was formulated; and

(c) the product is labeled with one of the following:

(A) The original equipment manufacturer's (OEM) color code;
(B) The color name; or
(C) Other designation identifying the specific OEM color to the purchaser.

(27) "Exact Match Finish, Industrial" means a coating which meets all of the criteria in subsections (a) through (c) of this section:
(a) The product is designed and labeled exclusively to exactly match the color of an original, factory-applied industrial coating during the touch-up of manufactured products;
(b) The product is labeled with the original equipment manufacturer's name for which it was formulated; and
(c) The product is labeled with one of the following:
(A) The original equipment manufacturer's (OEM) color code;
(B) The color name; or
(C) Other designation identifying the specific OEM color to the purchaser.

(28) "Exempt compounds" means compounds of carbon specifically excluded from the definition of VOC.

(29) "Flat Paint Product" means a coating which, when fully dry, registers specular gloss less than or equal to 15 on an 85° gloss meter, or less than or equal to 5 on a 60° gloss meter, or which is labeled as a flat coating.

(30) "Flatting Agent" means a compound added to a coating to reduce the gloss of the coating without adding color to the coating.

(31) "Floral Spray" means a coating designed and labeled exclusively for use on fresh flowers, dried flowers, or other items in a floral arrangement for the purpose of coloring, preserving or protecting their appearance.

(32) "Fluorescent Coating" means a coating labeled as such which converts absorbed incident light energy into emitted light of a different hue.

(33) "Glass Coating" means a coating designed and labeled exclusively to be applied to glass or other transparent material, to create a soft, translucent light effect, or to create a tinted or darkened color while retaining transparency.

(34) "Ground/Traffic Marking Coating" means a coating designed and labeled exclusively to be applied to dirt, gravel, grass, concrete, asphalt, warehouse floors, or parking lots. Such coatings must be in a container equipped with a valve and sprayhead designed to direct the spray downward when the can is held in an inverted position.

(35) "High Temperature Coating" means a coating, excluding engine paint, which is designed and labeled exclusively for use on substrates which will, in normal use, be subjected to temperatures in excess of 400 degrees Fahrenheit.

(36) "Hobby/Model/Craft Coating" means a coating which is designed and labeled exclusively for hobby applications and is sold in aerosol containers of 6 ounces in weight or less.

(37) "Ink" means a fluid or viscous substance used in the printing industry to produce letters, symbols or illustrations, but not to coat an entire surface.

(38) "Lacquer" means a thermoplastic film-forming finish dissolved in organic solvent, which dries primarily by solvent evaporation, and is resoluble in its original solvent.

(39) "Layout Fluid" or "Toolmaker's Ink" means a coating designed and labeled exclusively to be sprayed on metal, glass or plastic, to provide a glare-free surface on which to scribe designs, patterns or engineering guide lines prior to shaping the piece.

(40) "Leather Preservative" means a leather treatment material applied exclusively to clean, condition or preserve leather.

(41) "Lubricant" means a substance such as oil, petroleum distillates, grease, graphite, silicone, lithium, etc., that is applied to surfaces to reduce friction, heat, or wear when applied between surfaces.

(42) "Manufacturer" means the company, firm or establishment which is listed on the product container or package. If the product container or package lists two companies, firms or establishments, the manufacturer is the party which the product was "manufactured for" or "distributed by", as noted on the product container or package.

(43) "Marine Spar Varnish" means a coating designed and labeled to be exclusively used as a protective sealant for marine wood products.

(44) "Maskant" means a coating applied directly to a component to protect surfaces during chemical milling, anodizing, aging, bonding, plating, etching, or other chemical operations.

(45) "Metallic Coating" means a topcoat which contains at least 0.5 percent by weight elemental metallic pigment in the formulation, including propellant, and is labeled as "metallic", or with the name of a specific metallic finish such as "gold", "silver", or "bronze".

(46) "Mold Release" means a coating applied to molds to prevent products from sticking to mold surfaces.

(47) "Multi-Component Kit" means a spray paint system which requires the application of more than one component, (e.g. foundation coat and top coat), where both components are sold together in one package.

(48) "Noncomplying spray paint" means a spray paint which does not comply with the VOC content limits in OAR 340-022-0820.

(49) "Non-Flat Paint Product" means a coating which, when fully dry, registers a specular gloss greater than 15 on an 85° gloss meter or greater than 5 on a 60° gloss meter.

(50) "Photograph Coating" means a coating designed and labeled exclusively to be applied to finished photographs to allow corrective retouching, protection of the image, changes in gloss level, or to cover fingerprints.

(51) "Pleasure Craft" means privately owned boats used for noncommercial purposes.

(52) "Pleasure Craft Finish Primer/Surfacer/Undercoat" means any coating designed and labeled exclusively to be applied before the application of a pleasure craft topcoat for the purpose of corrosion resistance and adhesion of a topcoat, and which promotes a uniform surface by filling in surface imperfections.

(53) "Pleasure Craft Topcoat" means a coating designed and labeled exclusively to be applied to a pleasure craft as a final coat above the water line and above and below the water line when stored out of water. This category does not include clear coatings.

(54) "Portland Air Quality Maintenance Area" or "Portland AQMA" ~~[is the Oregon portion of the Portland-Vancouver Interstate Nonattainment Area for Ozone a]~~is defined in OAR

340-031-0500. (The Portland AQMA includes portions of Clackamas, Multnomah and Washington Counties.)

(55) "Primer" means a coating labeled as such, which is designed to be applied to a surface to promote a bond between that surface and subsequent coats.

(56) "Propellant" means a liquefied or compressed gas that is used in whole or in part, such as a cosolvent, to expel a liquid or other material from a container.

(57) "Retailer" means any person who sells, supplies, or offers spray paint for sale directly to consumers or commercial applicators.

(58) "Retail Outlet" means any establishment where spray paints are sold, supplied, or offered for sale directly to consumers or commercial applicators.

(59) "Rust Converter" means a product which is designed and labeled exclusively to convert rust to an inert material, and which has a minimum acid content of 0.5 percent by weight, and which has a maximum coating solids content of 0.5 percent by weight.

(60) "Shellac Sealer" means a clear or pigmented coating formulated solely with the resinous secretion of the lac beetle (Laccifer lacca), thinned with alcohol, and formulated to dry by evaporation without a chemical reaction.

(61) "Slip-Resistant Coating" means a coating designed and labeled exclusively as such which is formulated with synthetic grit, and used a safety coating.

(62) "Spatter Coating/Multicolor Coating" means a coating labeled exclusively as such in which spots, globules, or spatters of contrasting colors appear on or within the surface of a contrasting or similar background.

(63) "Spray Paint" means a pressurized coating product containing pigments or resins that dispenses product ingredients by means of a propellant, and is packaged in a disposable can for hand-held application, or for use in specialized equipment for ground traffic/marking applications.

(64) "Spray Paint Category" means the applicable category which best describes a spray paint listed in this rule.

(65) "Stain" means a coating labeled as such which is designed and labeled to change the color of a surface without concealing the surface from view.

(66) "Topcoat" means a coating applied over any coating, for the purpose of appearance, identification, or protection.

(67) "Vinyl/Fabric/Polycarbonate Coating" means a coating designed and labeled exclusively to coat vinyl, fabric, or polycarbonate substrates.

(68) "Volatile Organic Compound" or "VOC" means those compounds of carbon defined in OAR 340-022-0102. For purposes of determining compliance with VOC content limits, VOC shall be measured by an applicable method identified in OAR 340-022-0950.

(69) "VOC Content" means the ratio of the weight of VOC to the total weight of the product contents expressed as follows:

$$\text{VOC Content} = W_{VOC}/W_{TOTAL} \times 100$$

Where:

W_{VOC} = the weight of volatile organic compounds; and

W_{total} = the total weight of the product's contents.

(70) "Webbing/Veiling Coating" means a spray product designed and labeled exclusively to produce a stranded or spider-webbed decorative effect.

(71) "Weld-Through Primer" means a coating designed and labeled exclusively to provide a bridging or conducting effect to provide corrosion protection following welding.

(72) "Wood Stain" means a coating which is formulated to change the color of a wood surface without concealing the surface from view.

(73) "Wood Touch-Up/Repair/Restoration Coatings" mean coatings designed and labeled exclusively to provide an exact color or sheen match on finished wood products.

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Hist: DEQ 13-1995, f. & cert. ef. 5-25-95

[**NOTE:** This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-020-0047.]

Architectural Coatings

Definitions

OAR 340-022-1010 As used in OAR 340-022-1000 through 340-022-1050:

(1) "AAMA" means the American Architectural Manufacturers Association.

(2) "Alkali Resistant Primers" mean high performance primers formulated to resist reaction with alkaline materials including, but not limited to, lime, cement, and soap.

(3) "Antenna Coatings" mean coatings formulated and recommended for application to equipment and associated structural appurtenances that are used to receive or transmit electromagnetic signals.

(4) "Anti-Fouling Coatings" mean high performance coatings formulated and recommended for application to submerged stationary structures and their appurtenances to prevent or reduce the attachment of marine or freshwater biological organisms, including, but not limited to, coatings registered with the EPA under the Federal Insecticide, Fungicide, and Rodenticide Act (7 USC § 136, et seq.) and nontoxic foul-release coatings.

(5) "Anti-Graffiti Coatings" mean clear or opaque high performance coatings specifically labelled as anti-graffiti coatings and both formulated and recommended for application to graffiti-prone surfaces to deter adhesion of graffiti and to facilitate graffiti removal.

(6) "Appurtenance" means an accessory to a stationary structure, whether installed or detached at the proximate site of installation, including but not limited to: bathroom and kitchen fixtures; cabinets; concrete forms; doors; elevators; fences; hand railings; heating, air conditioning, or other fixed mechanical equipment or large stationary tools; lamp posts; partitions; piping systems; rain gutters and downspouts; stairways, fixed ladders, catwalks and fire escapes; and window screens.

(7) "Architectural Coatings" mean coatings formulated and recommended for field application to stationary structures and their appurtenances, to portable buildings, to pavements, or to curbs.

(8) "ASTM" means the American Society for Testing and Materials.

(9) "Below-Ground Wood Preservatives" mean coatings formulated and recommended to protect below-ground wood from decay or insect attack which are registered with the U.S. EPA under the Federal Insecticide, Fungicide, and Rodenticide Act (7 USC § 136, et seq.).

(10) "Bituminous Coatings and Mastics" mean coatings and mastics formulated and recommended for roofing, pavement sealing, or waterproofing that incorporate bitumens as a principal component. Bitumens are black or brownish materials which are soluble in carbon disulfide, which consist mainly of hydrocarbons, and which are obtained from natural deposits or as residues from the distillation of crude petroleum or low grades of coal. Bitumens include asphalt, tar, pitch and asphaltite.

(11) "Bond Breakers" mean coatings formulated and recommended for application to concrete to prevent the formation of a bond to a subsequently placed concrete layer.

(12) "Chalkboard Resurfacers" mean coatings formulated and recommended for application to chalkboards to restore a suitable surface for writing with chalk.

(13) "Clear Coating" means a coating that when dry allows light to pass so the substrate may be distinctly seen.

(14) "Clear & Semitransparent Stains" mean transparent or translucent coatings formulated and recommended for application to wood-based substrates to impart a desired color without completely concealing the surface or its natural texture or grain pattern.

(15) "Clear & Semitransparent Wood Preservatives" mean coatings formulated and recommended to protect exposed wood from decay or insect attack, registered with the EPA under the Federal Insecticide, Fungicide, and Rodenticide Act (7 USC § 136, et seq.), that may change the color of the substrate but do not completely conceal the substrate.

(16) "Clear Waterproofing Sealers & Treatments" mean coatings which are formulated and recommended for application to porous substrates for the primary purpose of preventing the penetration of water and which do not alter the surface appearance or texture.

(17) "Coating Category" means the applicable category which best describes the coating as listed in this rule.

(18) "Colorant" means a concentrated pigment dispersion of water, solvent, or binder that is added to an architectural coating or tint base after the coating or tint base has been shipped from its place of manufacture.

(19) "Commercial Applicator" means any person who purchases, hires, acquires, applies or contracts for the application of architectural coatings for commercial, industrial or institutional uses, or any person who applies architectural coatings for compensation.

(20) "Complying Architectural Coating" means a coating which complies with the VOC content limits of OAR 340-022-1020.

(21) "Concrete Curing Compounds" mean coatings formulated and recommended for application to recently cast concrete to retard the evaporation of water.

(22) "Concrete Protective Coatings" mean high build coatings formulated and recommended for application in a single coat over concrete, plaster, or other cementitious surface. These coatings are formulated to be primerless, one-coat systems which can be applied over form release compounds or uncured concrete. These coatings prevent spalling of concrete in freezing temperatures by providing long term protection from water and chloride ion intrusion.

(23) "Department" means the Oregon Department of Environmental Quality.

(24) "Distributor" means any person who sells or supplies architectural coating for the purposes of resale or distribution in commerce. "Distributor" includes activities of a self-distributing retailer related to the distribution of products to individual retail outlets. "Distributor" does not include manufacturers except for a manufacturer who sells or supplies products directly to a retail outlet. "Distributor" does not include consumers.

(25) "Dry Fog Coatings" mean coatings formulated and recommended only for circumstances in which overspray droplets are desired to dry before contacting incidental surfaces in the vicinity of a surface coating activity.

(26) "Environmental Protection Agency", or "EPA" means the United States Environmental Protection Agency.

(27) "Exempt compounds" mean compounds of carbon excluded from the definition of VOC.

(28) "Exterior Coatings" mean coatings formulated and recommended for use in conditions exposed to the weather.

(29) "Extreme High Durability Coatings" mean air dry flouropolymer based coatings formulated and recommended for the protection of architectural subsections and which meet the weathering requirements of **AAMA 605.2-1985 Section 7.9**.

(30) "Fire-Retardant/Resistive Coatings" mean clear or opaque coatings formulated and recommended to retard ignition and flame spread, or to delay melting or structural weakening due to high heat, and which are fire-tested and rated by a certified laboratory for use in bringing buildings or construction materials into compliance with building code requirements applicable to the place of use.

(31) "Flat Coatings" mean coatings which register gloss less than 15 on an 85 degree meter and less than 5 on a 60 degree meter according to **ASTM Method D 523, Standard Test Method for Specular Gloss**.

(32) "Floor Coatings" mean coatings formulated and recommended for application to flooring, including, but not limited to, decks, porches, and steps, and which have a high degree of abrasion resistance.

(33) "Flow Coatings" mean coating materials formulated and recommended to maintain the protective coating systems present on utility transformers.

(34) "Form-Release Compounds" mean coatings formulated and recommended for application to concrete forms to prevent formation of a bond between the form and concrete cast within.

(35) "Graphic Arts Coatings" or "Sign Paints" mean coatings formulated and recommended for hand-application either on-site or in-shop by artists using brush or roller techniques to indoor or outdoor signs (excluding structural components) and murals, including lettering enamels, poster colors, and copy blockers.

(36) "Heat Reactive Coatings" mean high performance phenolic based coatings requiring a minimum temperature of 191° Celsius (C) [375° Fahrenheit (F)] to 204° C (400° F) to obtain complete polymerization or cure. These coatings are formulated and recommended for commercial and industrial use to protect substrates from degradation and maintain product purity in which one or more of the following extreme conditions exist:

(a) Continuous or repeated immersion exposure to 90 to 98% sulfuric acid or oleum;

(b) Continuous or repeated immersion exposure to strong organic solvents;

(c) Continuous or repeated immersion exposure to petroleum processing at high temperatures and pressures; or,

(d) Continuous or repeated immersion exposure to food or pharmaceutical products which may or may not require high temperature sterilization.

(37) "High Temperature Coatings" mean high performance coatings formulated and recommended for application to substrates exposed continuously or intermittently to temperatures above 201° C (400° F).

(38) "Impacted Immersion Coatings" mean high performance maintenance coatings formulated and recommended for application to steel structures subject to immersion in turbulent, debris-laden water. These coatings are specifically resistant to high-energy impact damage caused by floating ice or debris.

(39) "Industrial Maintenance Coatings" mean high performance architectural coatings including primers, sealers, undercoaters, intermediate coats, and topcoats formulated and

recommended for application to substrates exposed to one or more of the following extreme environmental conditions:

(a) Immersion in water, wastewater or chemical solutions (aqueous and nonaqueous solutions), or chronic exposure of interior surfaces to moisture condensation;

(b) Acute or chronic exposure to corrosive, caustic, or acidic agents, or to chemicals, chemical fumes, chemical mixtures or solutions;

(c) Repeated exposure to temperatures above 120° C (250° F);

(d) Frequent heavy abrasion, including mechanical wear and frequent scrubbing with industrial solvents, cleansers, or scouring agents; or

(e) Exterior exposure of metal structures and structural components.

(40) "Interior Coatings" mean coatings formulated and recommended for use in conditions not exposed to natural weathering.

(41) "Interior Clear Wood Sealers" mean low viscosity coatings formulated and recommended for sealing and preparing porous wood by penetrating the wood and creating a uniform and smooth substrate for a finish coat of paint or varnish.

(42) "Lacquers" mean clear or opaque wood finishes, including lacquer sanding sealers, formulated with cellulosic or synthetic resins to cure by evaporation without chemical reaction, and to provide a solid, protective film.

(43) "Lacquer Stains" mean interior semitransparent stains formulated and recommended specifically for use in conjunction with clear lacquer finishes and lacquer sanding sealers.

(44) "Manufacturer" means the company, firm or establishment which is listed on the coating container. If the container lists two companies, firms or establishments, the manufacturer is the party which the coating was "manufactured for" or "distributed by", as noted on the product.

(45) "Magnesite Cement Coatings" mean coatings formulated and recommended for application to magnesite cement decking to protect against water erosion.

(46) "Mastic Texture Coatings" mean coatings formulated and recommended for concealing holes, minor cracks, or surface irregularities, and which are applied in a single coat of at least 10 mils (0.010 inches) dry film thickness.

(47) "Metallic Pigmented Coatings" mean non-bituminous coatings containing at least 0.4 pounds of metallic pigment per gallon (0.048 kilograms per liter) of coating, including but not limited to zinc pigment.

(48) "Multi-Color Coatings" mean coatings that exhibit more than one color when applied and which are packaged in a single container.

(49) "Noncomplying Architectural Coating" means a coating which does not comply with the VOC content limits of OAR 340-022-1020.

(50) "Nonferrous Metal Lacquers & Surface Protectants" mean clear coatings formulated and recommended for application to ornamental architectural surfaces of bronze, stainless steel, copper, brass or anodized aluminum to prevent oxidation, corrosion, or surface degradation.

(51) "Non-Flat Coatings" mean coatings that register a gloss of 15 or greater on an 85 degree gloss meter, or 5 or greater on a 60 degree gloss meter.

(52) "Not Otherwise Specified" or "N.O.S." means not otherwise specified as a coating category.

(53) "Nuclear Power Plant Coatings" mean any protective coating formulated and recommended to seal porous surfaces such as steel or concrete that otherwise would be subject to intrusion by radioactive materials. These coatings must be resistant to service-life cumulative radiation exposure as determined by **ASTM D 4082-83**, relatively easy to decontaminate as determined by **ASTM D 4256-83**, and resistant to various chemicals to which the coatings are likely to be exposed as determined by **ASTM D 3912-80**. General protective requirements are outlined by the Department of Energy, formerly U.S. Atomic Energy Commission, **Regulatory Guide 1.54**).

(54) "Opaque Coating" means a coating producing a dry film that does not allow light to pass, so the substrate is concealed from view.

(55) "Opaque Stains" mean coatings labeled as stains that are recommended to hide a surface but not conceal its texture.

(56) "Opaque Waterproofing Sealers & Treatments" mean coatings with pigments that are formulated and recommended for application to porous substrates for the primary purpose of preventing the penetration of water and which alter the surface appearance and texture.

(57) "Opaque Wood Preservatives" mean coatings formulated and recommended to protect wood from decay or insect attack, and that are not classified as clear, semitransparent, or below-ground wood preservatives, and are registered with the EPA under the Federal Insecticide, Fungicide, and Rodenticide Act (**7 USC 136 et seq.**).

(58) "Other Surfaces" mean paved parking areas (both publicly and privately owned), airport runways, airport taxiways, driveways, sidewalks, bikepaths and curbs.

(59) "Post-Consumer Coating" means a leftover architectural coating collected as a waste product from previous users that is employed as a raw material in the manufacture of a recycled coating product for reentry to the marketplace.

(60) "Portland Air Quality Maintenance Area" or "Portland AQMA" ~~[is the Oregon portion of the Portland-Vancouver Interstate Nonattainment Area for Ozone a]~~is defined in OAR 340-031-0500. (The Portland AQMA includes portions of Clackamas, Multnomah and Washington Counties.)

(61) "Pre-treatment Wash Primers" mean primers which contain a minimum of 0.5 percent acid by weight, and that are applied directly to bare metal surfaces in thin films to provide corrosion resistance, and to promote adhesion of subsequent topcoats.

(62) "Primers" mean coatings formulated and recommended for application directly to substrates to provide a firm bond between the substrate and subsequent coats.

(63) "Public Streets & Highways" mean publicly owned surfaces used primarily for vehicular traffic such as streets, roads, and highways.

(64) "Quick-Dry Enamels" mean non-flat coatings that:

(a) Are capable of being applied directly from the container under normal conditions, with ambient temperatures between 19° Celsius (C) [60° Fahrenheit (F)] and 27°C (80°F); and

(b) When tested in accordance with **ASTM Method D 1640, Standard Test Method for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature**, are set to touch in two hours or less, are tack free in four hours or less, and dry hard in eight hours or less by the mechanical method.

(65) "Quick-Dry Primers, Sealers, and Undercoaters" mean primers, sealers and undercoaters which are dry to touch in one-half hour, and can be recoated in two hours, when tested in accordance with **ASTM D 1640, Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature.**

(66) "Recycled Coating Product" means an architectural coating that contains post-consumer coating.

(67) "Repair and Maintenance Thermoplastic Coatings" mean industrial maintenance coatings with a primary resin of vinyl or chlorinated rubber which are formulated and recommended solely for the repair of existing coatings that also have a primary resin of vinyl or chlorinated rubber without the full removal of the existing coating system.

(68) "Retailer" means any person who sells, supplies, or offers architectural coating for sale directly to consumers or commercial applicators.

(69) "Retail Outlet" means any establishment where architectural coatings are sold, supplied, or offered for sale directly to consumers or commercial applicators.

(70) "Roof Coatings" mean non-bituminous and non-thermoplastic rubber coatings formulated and recommended for application to exterior roofs for the primary purpose of preventing penetration of the substrate by water, or reflecting heat and reflecting ultraviolet radiation.

(71) "Rust Preventive Coatings" mean coatings formulated and recommended for use in preventing the corrosion of ferrous metal surfaces.

(72) "Sanding Sealers" mean clear wood coatings formulated and recommended for application to bare wood to seal the wood and to provide a coating that can be sanded to create a smooth surface.

(73) "Sealers" means coatings formulated and recommended for application to substrates for one or more of the following purposes: to prevent subsequent coatings from being absorbed by the substrate; to prevent harm to subsequent coatings from materials in the substrate; to block stains, odors, or efflorescence; to seal water, smoke or fire damage; or to condition chalky surfaces.

(74) "Shellacs" mean clear or opaque coatings formulated solely with the resinous secretions of the lac beetle, (laciffer lacca), that are soluble in alcohol, and dry by evaporation without chemical reaction.

(75) "Solicit" means to require for use or to specify, by written or oral contract.

(76) "Swimming Pool Coatings" mean coatings formulated and recommended to coat the interior of swimming pools and to resist swimming pool chemicals.

(77) "Thermoplastic Rubber Coatings & Mastics" mean coatings and mastics formulated and recommended for application to roofing and other structural surfaces which incorporate no less than 40% thermoplastic rubbers by weight of the total resin solids and may also contain other ingredients, including, but not limited to, fillers, pigments, and modifying resins.

(78) "Tint Base" means an architectural coating to which colorants are added after the coating has been shipped from its place of manufacture.

(79) "Topcoat" means a coating applied over any coating, for the purpose of appearance, identification, or protection.

(80) "Traffic Marking Paints" mean coatings formulated and recommended to be used for marking or striping streets, highways and other traffic surfaces including, but not limited to, curbs, berms, driveways, parking lots and airport runways.

(81) "Undercoaters" mean coatings formulated and recommended to provide a smooth surface for subsequent coats.

(82) "Varnishes" mean clear or semitransparent coatings which are not lacquers or shellacs, and which are formulated to provide a durable, solid protective film. Varnishes may contain small amounts of pigment to color a surface, or to control the final sheen or gloss of the finish.

(83) "Volatile Organic Compound" or "VOC" means compounds of carbon defined in OAR 340-022-0102. For purposes of determining compliance with VOC content limits, VOC shall be measured by an applicable method identified in OAR 340-022-1050.

(84) "VOC Content" means the weight of VOCs contained in a volume of architectural coating. For products listed in OAR 340-022-1020(1) Table G, VOC content shall be determined on a "VOC Per Liter - Less Water Basis".

(85) "VOC Per Liter - Less Water Basis" means the weight of VOCs per combined volume of VOC and coating solids at the maximum thinning level recommended by the manufacturer, less water, less exempt compounds, and before the addition of colorants added to tint bases, and shall be calculated as follows:

$$\text{VOC Content} = W_{VOC}/(V_M - V_{H2O} - V_{EC})$$

Where:

W_{VOC} = weight of VOCs not consumed during curing, in grams.

V_M = volume of material prior to curing, in liters.

V_{H2O} = volume of water not consumed during curing, in liters.

V_{EC} = volume of exempt compounds not consumed during curing, in liters.

Stat. Auth.: ORS Ch. 468A
Hist: DEQ 13-1995, f. & cert. ef. 5-25-95

[**Publications:** The publication(s) referred to or incorporated by reference in this rule are available from the office of the Department of Environmental Quality.]

[**NOTE:** This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-020-0047.]

Attachment A2-4

State Agency Coordination Program

Attachment A2-4
State Agency Coordination Program

Applicability

340-018-0030 The provisions of this rule, OAR 340-018-0000 through 340-018-0200 apply to Department programs and actions subsequently determined to have significant effects on land use pursuant to ORS 197.180 and OAR 660-030-0075. Department land use actions are identified below:

(1) Air Quality Division:
- (a) Approval of Noise Impact Boundaries for Motor Racing Facilities;
- (b) Approval of Airport Noise Abatement Program and Noise Impact Boundaries;
- (c) Approval of Notice of Construction;
- (d) Issuance of Air Contaminant Discharge Permit;
- (e) Issuance of Indirect Source Construction Permit;
- (f) Approval of Parking and Traffic Circulation Plan.
- **(g) Employee Commute Options**

(2) Environmental Cleanup Division: Issuance of Environmental Hazard Notice.

(3) Hazardous and Solid Waste Division:
- (a) Issuance of Solid Waste Disposal Permit;
- (b) Issuance of Waste Tire Storage Permit; and
- (c) Issuance of Hazardous Waste and PCB Storage, Treatment and Disposal Permit.

(4) Management Services Division: Approval of Pollution Control Bond Fund Application.

(5) Water Quality Division:
- (a) Approval of Wastewater System and Facility Plans;
- (b) Approval of Construction Grant Program Application;
- (c) Approval of State Revolving Loan Application;
- (d) Issuance of On-site Sewer Permit;
- (e) Issuance of NPDES and WPCF Permits;
- (f) Development of Water Quality Wetland Protection Criteria;
- (g) Requirement of an Implementation Plan to Meet Restrictions for Waste Load Allocations on Water Quality Limited Waterways (TMDLS);
- (h) Certification of Water Quality Standards for Federal Permits, Licenses;
- (i) Development of Action Plan for Declared Ground Water Management Area;
- (j) Development of Nonpoint Source Management Plan;
- (k) Development of Estuary Plans;
- (l) Development of Oil Spill Regulations.

Stat. Auth.: ORS Ch. 197
Hist.: DEQ 36-1990, f. & cert. ef. 8-28-90

Attachment A2-5

Transfer and Dispensing Operations

Attachment A2-5
Transfer and Dispensing Operations

Purpose

340-022-0400

(1) Gasoline vapors contribute to the formation of ozone. OAR 340-022-0400 through 340-022-0403 require the control of gasoline vapors from gasoline transfer and dispensing operations.

(2) OAR 340-022-0400 through 340-022-0403 apply to gasoline dispensing sites located within Clackamas, Multnomah and Washington Counties.

Stat. Auth.: ORS Ch. 468 & 468A
Hist.: DEQ 7-1991, f. & cert. ef. 5-7-91 (and corrected 6-7-91); DEQ 4-1993, f. & cert. ef. 3-10-93

[NOTE: This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-020-0047.]

Definitions

340-022-0401 As used in OAR 340-022-0400 through 340-022-0403:

(1) "Equivalent control" means the use of alternate operational and/or equipment controls for the reduction of gasoline vapor emissions, that have been approved by the Department, such that the aggregate emissions of gasoline vapor from the facility do not exceed those from the application of defined reasonably available control technology.

(2) "Gasoline" means any petroleum distillate having a Reid vapor pressure of four pounds per square inch (28 kilopascals) or higher, used as a motor fuel.

(3) "Gasoline dispensing site" means any site where gasoline is dispensed into vehicle fuel tanks or into portable containers used to fuel any motor from any stationary storage container(s) larger than 550 gallons.

(4) "Annual throughput" means the amount of gasoline transferred into or dispensed from a gasoline dispensing site during 12 consecutive months.

(5) "Stage I vapor collection system" means a system where gasoline vapors are forced from a tank into a vapor-tight holding system or vapor control system through direct displacement by the gasoline being loaded.

(6) "Stage II vapor collection system" means a system where at least 90 percent, by weight, of the gasoline vapors that are displaced or drawn from a vehicle fuel tank during refueling are transferred to a vapor-tight holding system or vapor control system.

(7) "Substantially modified" means a modification of an existing gasoline-dispensing site which involves the addition of one or more new stationary gasoline storage tanks or the repair, replacement or reconditioning of an existing tank.

(8) "Vapor control systems" means a system that prevents emissions to the outdoor atmosphere from exceeding 4.7 grains per gallon (80 grams per 1,000 liters) of petroleum liquid loaded.

Stat. Auth.: ORS Ch. 468 & 468A
Hist.: DEQ 7-1991, f. & cert. ef. 5-7-91 (and corrected 6-7-91); DEQ 4-1993, f. & cert. ef. 3-10-93

[NOTE: This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-020-0047.]

General Provisions

340-022-0402

(1) No person shall transfer or allow the transfer of gasoline into storage tanks, at gasoline-dispensing sites located in Clackamas, Multnomah or Washington Counties, whose annual throughput exceeds 120,000 gallons, unless the storage tank is equipped with:
  (a) A stage I vapor collection system consisting of a vapor-tight return line from the storage tank, or its vent, to the gasoline transport vehicle;
  (b) A properly installed on-site vapor control system connected to a vapor collection system; or
  (c) An equivalent control system.

(2) A stage I vapor collection system and submerged filling are not required for storage tanks with a capacity less than 550 gallons. A stage II vapor collection system is not required at gasoline-dispensing sites that are not subject to the stage I requirements of this section.

(3) No owner and/or operator of a gasoline-dispensing site shall transfer or allow the transfer of gasoline into a motor vehicle fuel tank at gasoline-dispensing sites located in Clackamas, Multnomah or Washington Counties whose annual throughput exceeds 600,000 gallons, unless the gasoline-dispensing site is equipped with a stage II vapor collection system which must be approved by the Department before it is installed.

NOTES:

-1- Underground piping requirements are described in OAR 340-150-001 through 340-150-003 and **40 CFR 280.20(d)**. Systems installed according to American Petroleum Institute Publication 1615, "Installation of Underground Petroleum Storage System" or Petroleum Equipment Institute Publication RP100, "Recommended Practices for Installation of Underground Liquid Storage Systems" or American National Standards Institute Standard B31.4 "Liquid Petroleum Transportation Piping System" are considered approved systems.

-2- Above-ground stage II equipment requirements are based on systems recently approved in other states with established stage II program. See the Oregon Department of Environmental Quality, Air Quality Division, for the list of approved equipment. Any other proposed equivalent systems must be submitted to the Department of Environmental Quality, Air Quality Division, for approval before installation.

(4) Owners and/or operators of gasoline storage tanks, gasoline transport vehicles and gasoline-dispensing sites subject to stage I or stage II vapor collection requirements must:
  (a) Install all necessary stage I and stage II vapor collection and control systems, and make any modifications necessary to comply with the requirements;
  (b) Provide adequate training and written instructions to the operator of the affected gasoline-dispensing site and the gasoline transport vehicle;

(c) Replace, repair or modify any worn or ineffective component or design element to ensure the vapor-tight integrity and efficiency of the stage I and stage II vapor collection systems; and

(d) Connect and ensure proper operation of the stage I and stage II vapor collection systems whenever gasoline is being loaded, unloaded or dispensed.

(5) Approval of a stage I or stage II vapor collection system by the Department does not relieve the owner and/or operator of the responsibility to comply with other applicable codes and regulations pertaining to fire prevention, weights and measures and safety matters.

(6) Regarding installation and testing of piping for stage I and stage II vapor collection systems:

(a) Piping shall be installed in accordance with standards in OAR 340 Division 150;

(b) Piping shall be installed by a licensed installation service provider pursuant to OAR 340 Division 160; and

(c) Piping shall be tested prior to being placed into operation by an installation or tank tightness testing service provider licensed pursuant to OAR 340 Division 160.

(7) Owners and/or operators of gasoline-dispensing sites subject to stage II vapor collection requirements must obtain an annual stage II vapor collection permit from the Department. This permit shall be displayed or kept on file at the facility. Persons applying for this permit shall at the time of application pay a fee of $100.

NOTE: Test methods are based on methods used in other states with established stage II programs. See the Oregon Department of Environmental Quality, Air Quality Division, for copies of the approved test methods.

[Publications: The publication(s) referred to or incorporated by reference in this rule are available from the office of the Department of Environmental Quality.]

Stat. Auth.: ORS Ch. 468 & 468A
Hist.: DEQ 7-1991, f. & cert. ef. 5-7-91 (and corrected 6-7-91); DEQ 25-1994, f. & ef. 11-2-94

[NOTE: This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-020-0047.]

Compliance Schedules

340-022-0403

(1) Owners of gasoline-dispensing sites subject to the stage I vapor collection requirements of this rule within the Portland Air Quality Maintenance Area are required to be in compliance with all stage I requirements by April 1, 1981.

(2) Owners of gasoline-dispensing sites subject to the stage I vapor collection requirements of this rule outside the Portland Air Quality Maintenance Area but within Clackamas, Multnomah or Washington Counties must be in compliance with stage I vapor collection requirements by December 31, 1993, or at the time the gasoline-dispensing site is required to install a stage II vapor collection system, whichever is sooner.

(3) Owners of gasoline-dispensing sites subject to the stage II vapor collection requirements of this rule must be in compliance with stage II vapor collection requirements:
  (a) For gasoline-dispensing sites whose annual throughput exceeds 1,800,000 gallons, by no later than April 30, 1992;
  (b) For gasoline-dispensing sites whose annual throughput exceeds 1,080,000 gallons, by no later than April 30, 1993;
  (c) For gasoline-dispensing sites whose annual throughput exceeds 600,000 gallons, by no later than April 30, 1994; or
  (d) At the time the gasoline-dispensing site is substantially modified after May 7, 1991; whichever is sooner.

Stat. Auth.: ORS Ch. 468 & 468A
Hist.: DEQ 7-1991, f. & cert. ef. 5-7-91 (and corrected 6-7-91); DEQ 4-1993, f. & cert. ef. 3-10-93

[NOTE: This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-020-0047.]

Attachment B

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Ozone Maintenance Plan

Supporting Procedural Documentation

1. Legal Notice of Hearing
2. Fiscal and Economic Impact Statement
3. Land Use Evaluation Statement
4. Questions to be Answered to Reveal Potential Justification for Differing from Federal Requirements
5. Cover Memorandum from Public Notice

NOTICE OF PROPOSED RULEMAKING HEARING

Department of Environmental Quality

OAR Chapter: **340-020-0047, 340-018-0030, 340-022-0440, 340-024-0301, 340-030-0700 through -030-0750, 340-030-0800 through 1090, 340-030-1100 through 1200, 340-031-0520 through -031-0530**

DATE:	TIME:	LOCATION:
May 22, 1996	10:00 a.m.	Oregon Department of Environmental Quality Headquarters 811 SW Sixth Avenue, 3rd Floor (Room 3A) Portland (Question and answer session from 9:00 to 10:00)
May 22, 1996	7:00 p.m.	State Office Building, Room 140 800 NE Oregon Portland (Question and answer session from 6:00 to 7:00)
May 23, 1996	7:00 p.m.	City of Tigard Water Department Auditorium 8777 SW Burnham Street Tigard, Oregon (Question and answer session from 6:00 to 7:00)

HEARINGS OFFICER(s): A Professional Hearings Officer

STATUTORY AUTHORITY: or OTHER AUTHORITY: ORS 468.020, ORS 468A.035

STATUTES IMPLEMENTED: ORS 468.065, ORS 468A.310, ORS 468A.363, ORS 468.390, ORS 468A.405, ORS 468A.420

ADOPT: 340-030-0700 through -030-0750, 340-030-0800 through 1090, 340-030-1100 through 1200

AMEND: OAR 340-020-0047, OAR 340-018-0030, OAR 340-022-0460, OAR 340-24-0301, OAR 340-031-0520 through 340-031-0530

☑ This hearing notice is the initial notice given for this rulemaking action.

☑ Auxiliary aids for persons with disabilities are available upon advance request.

SUMMARY: The Department of Environmental Quality (DEQ) is proposing that the Environmental Quality Commission adopt plans to ensure that the Portland area

does not experience a recurrence of violations of the federal air quality standards for carbon monoxide and ozone. These plans and supporting rules, if adopted, will be submitted to the US Environmental Protection Agency (EPA) as revisions to the State Implementation Plan, which is a requirement of the Clean Air Act. If approved by EPA, the Portland area would be redesignated from a "nonattainment area" to an "attainment area" for carbon monoxide and ozone. The plans and supporting rules demonstrate how the Portland area will maintain compliance with the federal ambient air standards for carbon monoxide and ozone over the next ten years despite expected unprecedented growth in the area. Existing attainment plans for carbon monoxide and ozone, which will be replaced by these maintenance plans, are proposed to be repealed.

Both the carbon monoxide and ozone maintenance plans include an emission inventory, an enhanced motor vehicle inspection program, a revision to the motor vehicle inspection boundary, and transportation control measures to be implemented by Metro. Additionally, the carbon monoxide maintenance plan includes a parking management program for the Central City that will be implemented by the City of Portland. Comments are being solicited on options for continuing or repealing the current oxygenated fuel program under the carbon monoxide maintenance plan. The ozone maintenance plan includes an Employee Commute Options Program, a Voluntary Parking Ratio Program, an Industrial Emission Management Program, existing Rules for Auto Body Refinishing, Paints, and various Consumer Products, and existing Stage II Vapor Recovery Rules for gasoline service stations.

LAST DATE FOR COMMENT:	May 24, 1996, 5:00 p.m.
AGENCY RULES COORDINATOR:	Susan M. Greco, (503) 229-5213
AGENCY CONTACT FOR THIS PROPOSAL:	Andy Ginsburg (Ozone Maintenance Plan and related rules) (503) 229-5581 Howard Harris (CO Maintenance Plan and related rules) (503) 229-6086
ADDRESS:	811 SW Sixth Avenue Portland, Oregon 97204
TELEPHONE:	1-800-452-4011 (503) 229-5675 (FAX)

Interested persons may comment on the proposed rules orally or in writing at the hearing. Written comments will also be considered if received by the date indicated above.

Susan M. Greco — Signature

4/15/96 — Date

Attachment B2
State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
OZONE MAINTENANCE PLAN

Fiscal and Economic Impact Statement

Introduction

The Ozone Maintenance Plan is designed to maintain compliance with the federal ozone standard in the Portland Air Quality Maintenance Area (AQMA) for the next ten years. The federal Clean Air Act requires maintenance plans for areas seeking redesignation from nonattainment to attainment of national ambient air quality standards.

The ozone maintenance plan will have significant fiscal and economic impacts for the AQMA. The plan as a whole will provide significant economic benefits to the AQMA by protecting public health and welfare, preventing imposition of prescriptive federal emission control requirements, allowing the removal of Clean Air Act impediments to industrial growth, and reducing the potential for Clean Air Act sanctions on federal highway funds. The emission reduction strategies in the plan will result in both costs and savings to the public, business and government.

The maintenance plan and the component emission reduction strategies are proposed in several related rulemaking packages as shown in the following table. The fiscal and economic impacts of the plan are described in this document and in the fiscal and economic impact statements of the rulemaking proposals for the corresponding emission reduction strategies as shown in the table.

	Rulemaking proposal containing fiscal and economic impact				
New or Revised Emission Reduction Strategy	**Ozone Maintenance Plan**	**Motor Vehicle Inspection Boundary**	**Employee Commute Options**	**Maximum Parking Ratios**	**Industrial Emission Management**
Enhanced Vehicle Inspection	X				
Vehicle Inspection Boundary		X			
Metro TCMs	X				
Employee Commute Options			X		
Maximum Parking Ratios				X	
Unused PSEL Donation					X
Unused PSEL Management					X
New Source Review	X				
Education/Incentive Program	X				
Contingency Plan	X				

GENERAL PUBLIC

Some strategies in the ozone maintenance plan will affect the public directly (such as the new enhanced motor vehicle inspection), and other strategies may have little or no direct economic impact on the public. Generally, people can expect indirect benefits such as reduced health risks from air pollutants, a less restrictive regulatory climate to promote job growth, and less congestion and greater mobility than would otherwise occur in the AQMA.

- Enhanced Motor Vehicle Inspection

  The new rules would require enhanced testing beginning in 1997 for 12 model years of vehicles. This represents about 600,000 vehicles or 51 percent of the registered vehicles in the region. Approximately 30 percent of the registered vehicles will continue to be given the same basic test that has been used since 1975. The first two model years will continue to be exempt from any testing, as well as vehicles with model years older than 1975. The exempt vehicles represent 19 percent of region's vehicle population.

  Vehicles are currently tested every other year. This will be continued under the proposed rules. All tested vehicles will be assessed the same test fee, whether the test is a basic or enhanced test. This fee is estimated to range between $15 and $20. DEQ's current best estimate is $16 per test. The fee will be assessed for the first test. If the vehicle fails the first test, it will be given one free re-test if repairs are done by a shop where the technicians received emissions repair training. DEQ recognizes that some individuals are skilled in home motor vehicle maintenance, however advanced training and proper equipment are needed to ensure that vehicles are repaired correctly the first time. All subsequent tests on the vehicle during the current inspection period will be assessed the test fee. The current test fee of $10 per certificate is charged only at the time of passing the test.

  Individuals will also experience a significant increase in the cost of repairs. Due to the improved test, the failure rate is expected to increase from approximately 20% to 30% of tested vehicles. However, the failure rate will decline over time as vehicles are better maintained. The Federal Environmental Protection Agency (EPA) estimates that it costs an average of $75 to repair a vehicle to pass the current basic test, compared to a range of $100 to $150 to repair a vehicle to pass the enhanced test. It is also anticipated that some citizens who currently do their own vehicle repair may need to bring the vehicle to a shop for repairs because of the complexity of the repairs required for the new test.

  EPA estimates an average fuel economy improvement of 13 percent for vehicles that have been repaired to meet enhanced test standards. The average biennial fuel cost savings for vehicles repaired to pass the enhanced test is expected to approximately cover the average cost of these repairs.

- Metro Transportation Control Measures

  Transportation Control Measures (TCMs) adopted by Metro include the Region 2040 growth concept, significant transit system expansion and bicycle and pedestrian facility improvements. In general, the TCMs are designed to reduce transportation costs by encouraging more efficient land-use, increasing transit availability, and providing additional walking and bicycling opportunities through mixed-use development and improved facilities. These measures should reduce congestion and reduce transportation costs associated with automobile use. Land values within the Urban Growth Boundary will be positively affected by Metro's Region 2040 growth concept. Land values outside the Urban Growth Boundary could be positively or negatively affected, depending on location and other factors.

- New Source Review

  Changes in the major New Source Review program could result in additional employment by making it easier for industrial sources to locate and expand in the region.

- Public Education and Incentive Program

  The Public Education and Incentive Program is voluntary and will have no economic impact on the general public.

- Contingency Plan

  Contingency measures could include reformulated gasoline or congestion pricing, which would impose significant costs on the general public. These costs could include higher fuel prices or tolls. If the contingency plan is triggered, these measures would be evaluated for adoption by rule, and the fiscal and economic impacts of selected contingency measures would be thoroughly evaluated as part of that rulemaking.

SMALL BUSINESS

Small businesses are defined as businesses with 50 or fewer employees. Some of the ozone maintenance strategies, such as the Employee Commute Options program, do not apply to small businesses. Other strategies, such as the enhanced motor vehicle inspection program, will have economic impacts on small businesses. These impacts are described below and in the companion rulemaking proposals for the emission reduction strategies.

- Enhanced Motor Vehicle Inspection

  An estimated 95 percent of the garages that will repair vehicles to meet the more stringent test procedure are considered small businesses. Most repair garages, to be competitive in repairing vehicles for the enhanced test, will need additional emission repair training courses. Most of the training will be required at or before the start-up of the new program, which is proposed to start in July 1997. Continual training will be required as new emissions systems are unveiled by the auto manufacturers and as shops grow or experience turnover. Training will be available through ASE, community colleges and other training providers. The initial training costs are estimated at $500 per employee. Annual cost for ongoing training is estimated at $50 per employee per year. In a five person shop, it is estimated that two service people will be working on emissions repairs and require the training. In summary, the initial training cost of an average shop with five repair persons will be approximately $1,000 with an ongoing training cost of $100 per year.

  At the start of the program, vehicles with model years 1981 through 1992 will be given enhanced testing, and training will be required to achieve proper repairs. Some small shops may opt to specialize in repairing only the 30 percent of vehicles that will continue to receive the basic test and thereby bypass the new training and remain competitive.

  In addition to training, some shops may opt to purchase "repair grade" (RG) enhanced testing equipment, which will allow the shop to better insure the vehicle will pass the centralized DEQ enhanced test. Experience in enhanced testing in Colorado and Arizona indicate very few shops (approximately 5 percent, most of which are large) have found the purchase of this equipment to be necessary. Most shops have continued to rely on tuning the vehicle to manufacturer's specifications, and used their existing "BAR90" exhaust tester to estimate pass/fail of the vehicle. The cost for the repair grade equipment, which includes an inexpensive dynamometer to simulate vehicle load and a low cost exhaust analyzer, averages about $35,000 to $40,000.

  The enhanced test is expected to more than double the amount of emission repair work done by shops as the average cost for emissions repairs jumps from an average of $75 per vehicle to $125 (estimated) per vehicle, and at the same time, the percent of vehicles failed increases from the current 20 percent to the anticipated 30 percent.

- Metro Transportation Control Measures

  Transportation Control Measures (TCMs) adopted by Metro include the Region 2040 growth concept, significant transit system expansion and bicycle and pedestrian facility improvements. The TCMs should have a positive economic effect by improving customer and employee access and reducing delivery times. Because the transit growth rates are based on existing revenue sources, the transit system expansion identified in the

maintenance plan should not result in an increase in the business transit tax rate. Land values within the Urban Growth Boundary will be positively affected by Metro's Region 2040 growth concept. Land values outside the Urban Growth Boundary could be positively or negatively affected, depending on location and other factors. The land-use changes may also provide innovative siting opportunities such as mixed-use developments.

- New Source Review

  Some new or expanding small industrial companies, despite their small employee size, may be subject to Clean Air Act industrial growth sanctions. An EPA-approved maintenance plan will reduce costs for these businesses. See the large business section.

- Public Education and Incentive Program

  The Public Education and Incentive Program is designed to solicit voluntary private sector participation in developing programs that will educate the public about air quality issues and provide incentives for the public to use lower emitting products and services.

  Current proposed elements include:

  - Agreement with local paint manufacturers to voluntarily produce and sell lower VOC paint than is required by administrative rule beginning in 1996. The overall economic impact on participating businesses is expected to be positive due to increased market share for their low VOC paints. Business costs will include advertising, discounts and other promotions.

  - Agreement with local retailers to promote lower VOC consumer products at the point of sale. The estimated cost to participating businesses is $2,500 - $7,500 per year for discounts, rebates, in-store signs and advertising.

  - Agreement with local gasoline service stations to display signs suggesting simple things the public can do to keep the air clean. The estimated cost to participating businesses is $2,500 - $5,000 per year.

  - Agreement with local video stores to offer promotions to members who use alternatives to driving during ozone season.. The estimated cost to participating business is $2,500 - $4,000 per year for direct mail and in-store promotion.

  - Agreement with local electric utility and electric lawnmower manufacturers to develop a scrappage program to replace approximately 1,200 gasoline powered lawn mowers annually with push or electric mowers. The estimated cost for the first three years is $180,000 - $360,000 for promotions, rebates and administrative expenses.

- Agreements with smaller employers to institute voluntary trip reduction programs. The estimated cost to participating businesses could range from $20 to $100 per employee per year depending on the strategies chosen by the employer

- Agreement with local businesses to support air quality classroom (K-8) education programs, including teacher training, experiments, and evaluations. Estimated costs for in-kind services are $1,500 to $3,000 annually.

- Contingency Plan

  Contingency measures could include reformulated gasoline or congestion pricing which would impose significant costs on small businesses. Gasoline service stations could experience higher costs or reduced sales. Other small businesses could experience higher fuel prices or tolls. If the contingency plan is triggered, these measures would be evaluated for adoption by rule, and the fiscal and economic impacts of selected contingency measures would be thoroughly evaluated as part of that rulemaking. The contingency plan also includes reinstatement of current emission offset requirements for major new and modified emission sources.

LARGE BUSINESS

Large businesses will be affected by several of the control strategies in the ozone maintenance plan, including the Employee Commute Options program, the unused permitted emission donation and management programs, and changes to the New Source Review program. The economic impacts of these emission control strategies on large business are described below and in companion rulemaking proposal packages.

- Enhanced Motor Vehicle Inspection

  Auto dealerships and other large garages will incur similar training costs as the small business. The large shop with over 50 employees might have 5 employees trained for emissions repair. This training would incur an initial cost of $2,500 and an ongoing cost of $250 per year.

  The large shop may also be more inclined to spend the money for the RG testing equipment at a cost of $35,000 to $40,000 .

  Some large private companies with greater than 100 vehicles currently do their own vehicle testing. DEQ proposes allowing the shops to continue self-testing for the enhanced test as long as EPA specified "inspection grade" (IG) testing equipment is used. This equipment consists of a full transient load dynamometer with infra-red testing analyzers and a sophisticated exhaust handling system. The cost ranges from $50,000 to $55,000.

Some existing self-testing fleets will opt to begin using the state operated centralized test instead of purchasing new IG testing equipment.

The current costs to fleets for self-testing is $5 per vehicle for the certificate. The shop labor for the test is estimated at about $10 per test. Assuming a 100 vehicle fleet, the cost for equipment amortization and repair cost add an additional $25 per test (assuming 10 year equipment life). The estimated current cost per test would then be about $40 per test.

After the enhanced testing begins, the certificate fee for self-testing fleets is anticipated to raise to $8, and shop labor cost would likely double to $20 per test. However, equipment amortization and repairs would add large additional costs estimated at approximately $100 per test. The total estimated cost would be about $130 per test.

The shop cost to have DEQ perform the test includes an estimated hour of labor to bring the vehicle to DEQ at $20 per hour plus the cost of the test itself. For the current basic test the total would be about $30. For the enhanced test this cost would increase to about $40 per test.

Similar to the small garages, the large garages will experience a significant growth in the emission repair work.

- Metro Transportation Control Measures

  The economic impact of Metro's Transportation Control Measures on large business would be the same as the impact on small business.

- New Source Review

  Major new and modified industries in the region are expected to benefit from the ozone maintenance plan because EPA approval of the plan will allow DEQ to remove costly Clean Air Act sanctions on industrial growth. These sanctions include installation of Lowest Achievable Emission Rate (LAER) control technology and the purchase of emission offsets. LAER can cost over $10,000 per ton of emission reduced and emission offsets can cost from $2,000 to $10,000 per ton. Upon EPA approval of the maintenance plan, the LAER requirement will be replaced with Best Available Control Technology (BACT) which generally costs in the range of $5,000 to $10,000 per ton reduced. In addition, an industrial growth allowance will be provided, eliminating the cost of emission offsets. Offsets would need to be reinstated if the growth allowance were used up.

- Public Education and Incentive Program

  The economic impact of the Public Education and Incentive Program on participating large business would be the same as the impact on participating small business.

- Contingency Plan

  The economic impact of the contingency plan on large business would be the same as the impact on small business.

LOCAL GOVERNMENTS

The ozone maintenance plan complements the transportation and growth plans of local and regional governments by encouraging alternative, lower-cost, transportation options and maintaining clean air. The maintenance plan encourages economic development by allowing for the removal of Clean Air Act industrial growth sanctions as described under the large business section above.

Upon approval by EPA, the ozone maintenance plan will also help ensure that federal transportation funds for the region are not restricted due to conflicts between air quality and transportation planning. Because the transportation emission budgets in the maintenance plan are based on Metro's transportation emission forecasts, Metro will be able to show that the region's transportation plans conform to the maintenance plan.

Local governments in the region will be required to fund and implement major transportation control measures that have been committed to in the Regional Transportation Plan. In addition, local governments will be required to comply with some strategies in the ozone maintenance plan, such as the Employee Commute Options program and the Enhanced Vehicle Inspection Program. The economic impacts of these emission control strategies on local governments are described below and in companion rulemaking proposal packages.

- Enhanced Motor Vehicle Inspection

  Local government self-testing fleets will need to purchase equipment, as discussed under large business above, or bring their vehicles to DEQ for testing.

  Local government fleets which perform their own vehicle maintenance will need to obtain emissions systems repair training to assist in meeting the enhanced testing requirements. Whereas private shops will experience a benefit from the added emissions testing work, local governments will incur added expense.

- Metro Transportation Control Measures

  The maintenance plan identifies Transportation Control Measures (TCMs) that will reduce emissions from motor vehicle use. In addition to the ECO and Maximum Parking Ratio programs, the measures included in the plan are from the financially constrained transportation network adopted by Metro. Metro has determined that these projects can be funded based on committed sources of funding and the historical growth in revenue.

  With or without the ozone maintenance plan, Metro, Tri-Met and local governments intend to implement the TCMs. However, by including the TCMs in the maintenance plan, Metro, Tri-Met and local governments will be required to give them priority funding and implement them in a timely manner. This could mean that funding would not be available for other transportation projects if expected revenues are less than projected.

  The maintenance plan includes a TCM substitution provision. This allows Metro to change the TCMs that will be implemented if regional priorities change, provided that the substituted measures achieve the same emission reduction and meet the public notice provisions. Depending on the measures selected, TCM substitution could decrease or increase the cost to local governments.

- New Source Review

  Changes in the major New Source Review program could result in additional employment and tax base by making it easier for industrial sources to locate and expand in the region. These industries may also require utilities and services provided by local governments.

- Public Education and Incentive Program

  Local governments will not be significantly affected by the Public Education and Incentive program.

- Contingency Plan

  Contingency measures could include reformulated gasoline or congestion pricing, which would have significant economic impacts on the local governments. Costs could include higher fuel prices or tolls for local government fleets. These programs could also lead to significant reductions in fuel use, resulting in reduced gasoline tax revenues. Depending on how the program were structured, congestion pricing could result in substantial revenue for local government transportation programs. If the contingency plan is triggered, these measures would be evaluated for adoption by rule, and the fiscal and economic impacts of selected contingency measures would be thoroughly evaluated as part of that rulemaking.

STATE AGENCIES

The ozone maintenance plan and associated emission reduction strategies will also have fiscal impacts on DEQ and other state agencies as described below.

- Enhanced Motor Vehicle Inspection

DEQ

Eight new vehicle test centers will be constructed in the region to provide for enhanced testing operations. The leases on these new stations are expected to average $11,000/month each compared to the DEQ's existing stations which average $5,000/month. The new stations will be much larger to facilitate enhanced testing operations.

DEQ will be required to purchase enhanced testing equipment for 22 vehicle testing lanes. The estimated cost of the equipment and installation is anticipated to be approximately $3,000,000.

The Department anticipates that additional staff will be needed to operate the enhanced testing program. This includes new inspectors as well as customer service, maintenance, training and administrative personnel. In addition, temporary staff will be required during the first 2 to 4 years of the program for startup. The exact number of additional staff needed will depend on the final configuration of the enhanced testing program and will be identified in the Fiscal and Economic Impact Statement when the enhanced testing rules are proposed.

The vehicle inspection program is required by law to be self-sustaining using the testing fees obtained from the public. The test fee will be set to cover the cost of operating the program. This is expected to range from $15 to $20 depending on the eventual cost of labor, facilities, equipment and test configuration. A $16 fee is the best estimate of cost at this time. Revenues will be based on the testing of approximately 1,080,000 vehicles per biennium.

DEQ is evaluating the cost-effectiveness of privatizing the vehicle inspection program.

Other State Agencies

State agencies with self-testing vehicle fleets will need to purchase equipment as discussed under large business above or bring their vehicles to DEQ for testing. Also, fleets that do their own maintenance will need to consider additional training for mechanics. State

agency fleets that contract out vehicle repairs will likely incur higher vehicle emissions repair costs.

Whereas private shops will experience a benefit from the added emissions testing work, state agencies will incur added expense.

- Metro Transportation Control Measures

  DEQ

  The federal transportation conformity rule requires DEQ to conduct interagency consultation with Metro regarding transportation system emissions. DEQ's oversight role in the funding and implementation of TCMs will be included as part of the existing interagency consultation process. DEQ will be responsible for implementing the Employee Commute Options program and the voluntary Maximum Parking Ratio program. The fiscal impacts of these programs is described in the companion rulemaking proposals for these programs.

  Other State Agencies

  The Oregon Department of Transportation (ODOT), which funds and implements a number of major transportation programs in the region, will be significantly affected by inclusion of the TCMs in the maintenance plan. ODOT's project schedule could be delayed and costs could be increased if the region does not provide priority funding to TCMs and implement them in a timely fashion. ODOT could be required to increase funding for TCMs or substitute measures due to conformity requirements.

- New Source Review

  Changes in the New Source Review program will not significantly affect the workload of DEQ or other state agencies.

- Public Education and Incentive Program

  DEQ is the only state agency that will be significantly affected by the program.

  One permanent full-time staff will be required to implement the program during the life of the maintenance plan. An additional one to two temporary staff will be required during the first three years of the program. DEQ will apply for specific grants for discrete projects to be conducted as part of the Public Education and Incentive program. Example funding sources could include EPA's parking cash-out program and WESTAR's teacher training workshops.

DEQ has hired a market research firm to conduct statistically valid baseline and follow-up surveys to document the success of the Public Education and Incentive Program. The cost of these surveys will be $15,000 during the first 3 years of the program. In addition, the cost of materials for teacher training workshops is expected to range from $2,500 to $3,000 per year.

- Contingency Plan

  DEQ

  If the contingency plan is triggered, DEQ will evaluate emission and monitoring data to determine if additional emission reduction strategies are needed. This evaluation will be conducted using existing Department resources. Depending on the strategy selected, implementation costs for the Department could vary significantly. If additional contingency measures are recommended for adoption, the fiscal and economic impacts of selected measures would be thoroughly evaluated as part of that rulemaking.

  Other State Agencies

  Reformulated gasoline or congestion pricing could have significant effects on the costs and revenues of other state agencies. In particular, tax revenues for the Oregon Department of Transportation could be affected. These impacts will be thoroughly evaluated if such rules are proposed in the future.

Attachment B3

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Ozone Maintenance Plan

Land Use Evaluation Statement

1. Explain the purpose of the proposed rules.

The Ozone Maintenance Plan is designed to maintain compliance with the federal ozone standard in the Portland Air Quality Maintenance Area (AQMA) for the next ten years. The federal Clean Air Act requires maintenance plans for areas seeking redesignation from nonattainment to attainment of national ambient air quality standards.

The maintenance plan includes a number of emission reduction strategies, some of which affect land-use. The maintenance plan and the component emission reduction strategies are proposed in several related rulemaking packages as shown in the following table. The land use impacts of the plan are described in this document and in the land use evaluation statements of the rulemaking proposals for the corresponding emission reduction strategies as shown in the table.

New or Revised Emission Reduction Strategy	Rulemaking proposal containing the land use evaluation					DEQ Program Affects Land Use
	Ozone Maintenance Plan	Motor Vehicle Inspection Boundary	Employee Commute Options	Maximum Parking Ratios	Industrial Emission Management	
Enhanced Vehicle Inspection	X					
Vehicle Inspection Boundary		X				
Metro TCMs	X					
Employee Commute Options			X			X
Maximum Parking Ratios				X		
Unused PSEL Donation					X	X
Unused PSEL Management					X	X
New Source Review	X					X
Education/Incentive Program	X					
Contingency Plan	X					X

2. Assessment of land use impacts and procedures for statewide goal compliance and local plan compatibility

Enhanced Vehicle Inspection

As previously determined through the LCDC approved DEQ State Agency Coordination (SAC) agreement, the Vehicle Inspection and Maintenance Program is not a program that significantly affects land use. The proposed changes are to the type of inspection conducted under Vehicle Inspection and Maintenance program, and as such, are consistent with the current SAC determination.

Metro Transportation Control Measures (TCMs)

The ozone Maintenance Plan relies on emission reductions from Transportation Control Measures (TCMs) adopted by Metro, including the Region 2040 growth concept and improvements in transit, bicycle and pedestrian facilities identified in the Regional Transportation Plan. The TCMs affect goal 2 (land use planning), goal 6 (air, water and land resources quality), goal 11 (Public Facilities and Services) and goal 12 (Transportation). However, because Metro and local governments are primarily responsible for implementing the TCMs, they are not technically DEQ land use programs. Metro will ensure that the local comprehensive plans are compatible with the TCMs. DEQ, through the transportation conformity process, will ensure that Metro implements the TCMs or substitute measures that achieve equivalent emission reduction.

New Source Review

The maintenance plan will make changes to the major New Source Review program. Existing requirements for costly Lowest Achievable Emission Rate (LAER) technology and emission offsets will be replaced by less costly Best Available Control Technology (BACT) and a growth allowance. These changes will make it easier for major new industry to locate in the region and for existing industry to make major modifications to their facilities. The major New Source Review program is implemented through the Air Contaminant Discharge Permit (ACDP) program, which is an existing activity identified in the LCDC approved DEQ State Agency Coordination (SAC) agreement. The existing procedure for statewide goal compliance and local plan compatibility adequately covers the changes to the New Source Review program. Under this procedure, the Department requires applicants for an ACDP to obtain a land-use compatibility statement from the appropriate local jurisdiction prior to issuing an ACDP.

Public Education and Incentive Program

The Public Education and Incentive Program is not specifically referenced in the statewide planning goals, is not expected to have significant effects on resources, objectives or areas identified in the statewide planning goals, and is not expected to have significant effects on present or future land uses identified in acknowledged comprehensive plans. The program is voluntary, and is primarily designed to provide air quality information and to encourage consumers to select low-emitting products.

Contingency Plan

The contingency plan includes reinstatement of current New Source Review requirements for major new and modified emission sources. This affects an existing land use program as described above (under overall maintenance plan). Contingency measures could also include reformulated gasoline or congestion pricing. These measures could affect goal 2 (land use planning), goal 6 (Air, water and land resources quality), goal 11 (Public Facilities and Services) and goal 12 (Transportation). If the contingency plan is triggered, these measures would be evaluated for adoption by rule, and a land use evaluation of selected contingency measures would be included as part of that rulemaking.

Gregory A. Green — Division

Intergovernmental Coord.

7/8/96 — Date

Attachment B4

Questions to be Answered to Reveal
Potential Justification for Differing from Federal Requirements.

Ozone Maintenance Plan

1. Are there federal requirements that are applicable to this situation? If so, exactly what are they?

Yes, there are federal requirements applicable to this situation. The Clean Air Act requires areas that wish to be redesignated from "nonattainment" to "attainment" status to submit a plan that will ensure that air quality standards are not violated for 10 years after Environmental Protection Agency (EPA) approval of the plan. These plans are called Maintenance Plans.

2. Are the applicable federal requirements performance based, technology based, or both with the most stringent controlling?

The requirements are performance based. The Ozone Maintenance Plan must demonstrate that future emissions will not cause a violation of the ozone standard. As long as the Portland area stays in attainment with the federal ozone standard, the Clean Air Act allows states to identify the specific emission reduction strategies that will be used to maintain attainment. Selected emission reductions strategies are required to meet EPA enforceability requirements.

3. Do the applicable federal requirements specifically address the issues that are of concern in Oregon? Was data or information that would reasonably reflect Oregon's concern and situation considered in the federal process that established the federal requirements?

The applicable federal requirements do not specifically address issues that are of concern to Oregon. The federal requirements are specifically designed to give each state the flexibility to adopt emission reduction strategies that are best suited for that area.

4. Will the proposed requirement improve the ability of the regulated community to comply in a more cost effective way by clarifying confusing or potentially conflicting requirements (within or cross-media), increasing certainty, or preventing or reducing the need for costly retrofit to meet more stringent requirements later?

The emission reduction strategies included in the Maintenance Plan will ensure that air quality standards are maintained and will allow EPA to redesignate the Portland area to attainment for ozone. Once the area is redesignated, the existing stringent control requirements for major new and expanding industry will be replaced with less stringent and less expensive control requirements. In addition, the Portland area will be shielded from potential "bump-up" to a more stringent nonattainment classification. Such a bump-up would result in the imposition of prescriptive federal control requirements, including the costly retrofit of NO_x controls on existing industry.

5. Is there a timing issue which might justify changing the time frame for implementation of federal requirements?

There is no deadline in the Clean Air Act for submitting a maintenance plan. However, the Legislature directed DEQ to submit an approvable ozone maintenance plan to EPA as soon as possible so that the area can be redesignated to attainment and impediments to industrial growth imposed in the Clean Air Act can be removed.

6. Will the proposed requirement assist in establishing and maintaining a reasonable margin for accommodation of uncertainty and future growth?

The rate of ozone formation is dependent on temperature and other weather conditions. The maintenance plan is designed to address expected weather fluctuations over a 10-year period, but does not include surplus VOC emission reductions (there is a slight surplus NO_x emission reduction). The maintenance plan is also designed to accommodate projected growth. Emission forecasts are based on growth rates for all emission source categories, and a growth allowance is included for major new and modified industry. Further, the maintenance plan includes a contingency plan as required by the Clean Air Act to address unforeseen growth in emissions and other uncertainties..

7. Does the proposed requirement establish or maintain reasonable equity in the requirements for various sources? (level the playing field)

The proposed maintenance plan establishes greater equity because it includes requirements applicable to emissions from all major source categories. Historically, industry has been more heavily regulated than other source categories. The ozone maintenance plan contains requirements that will reduce emissions from all four major source categories (i.e. motor vehicles, nonroad engines, area sources and industry).

8. Would others face increased costs if a more stringent rule is not enacted?

If a maintenance plan is not adopted and a future violation of the ozone standard occurs, a new attainment plan will be required including prescriptive federal control requirements on existing industry and other sources. In addition, Metro could experience difficulty demonstrating conformity of their transportation plan with air quality plans. If conformity can not be demonstrated, Metro would not be eligible to receive federal transportation funds.

9. Does the proposed requirement include procedural requirements, reporting or monitoring requirements that are different from applicable federal requirements? If so, Why? What is the "compelling reason" for different procedural, reporting or monitoring requirements?

No. The procedural requirements in the maintenance plan are required to meet EPA enforceability requirements.

10. Is demonstrated technology available to comply with the proposed requirement?

Yes. Demonstrated technology exists to comply with all state emission reduction strategies in the maintenance plan.

11. Will the proposed requirement contribute to the prevention of pollution or address a potential problem and represent a more cost effective environmental gain?

The proposed maintenance plan is designed the prevent air pollution. In particular, motor vehicle trip reduction strategies (i.e. ECO, parking ratios, Metro's Region 2040 growth concept and the Public Education and Incentive Program) are cost-effective ways to prevent air pollution. These strategies generally increase the use of lower-cost transportation alternatives and reduce road congestion and maintenance costs. The maintenance plan will also reduce the cost of controls on new business that are interested in locating in the Portland area.

Attachment B5

State of Oregon
Department of Environmental Quality **Memorandum**

Date: April 17, 1996

To: Interested and Affected Public

Subject: Rulemaking Proposal and Rulemaking Statements - Ozone Maintenance Plan for the Portland AQMA

This memorandum contains information on a proposal by the Department of Environmental Quality (DEQ) to adopt rule amendments to the Federal Clean Air Act State Implementation Plan (SIP) to prevent the Portland Air Quality Maintenance Area (AQMA) from experiencing a recurrence of noncompliance with the federal ozone air quality standard. Pursuant to ORS 183.335, this memorandum also provides information about the Environmental Quality Commission's intended action to adopt a rule.

Ground level ozone, also known as smog, is an air pollutant formed in the atmosphere by a chemical reaction of volatile organic compounds (VOC) and oxides of nitrogen (NO_x). Ozone is a strong respiratory system irritant that aggravates respiratory illnesses, impairs athletic performance and can cause permanent respiratory system damage. Ozone can be especially harmful to older people and children, and can damage crops and other materials. In the past, motor vehicles and industrial operations have been the major sources of ozone precursors, but other sources such as household products, paints and lawn mowers are fast becoming major contributors due to rapid population growth.

The AQMA has violated the national ambient air quality standard for ground level ozone since monitoring began in the early 1970s. Levels have been as high as 50 percent over the federal standard which was established to protect public health and welfare. Ozone control strategies, including the federal new car program, the DEQ vehicle inspection program, industrial emission control programs, and other measures have been successful in bringing the AQMA into attainment with the ozone standard. To ensure continued compliance and keep healthful air quality, additional control measures are needed to combat the effects of a growing population and increased motor vehicle travel.

This proposal would allow DEQ to submit a plan to the U.S. Environmental Protection Agency (EPA) that provides for maintenance of the ground-level ozone standard for ten years. The plan is designed to protect public health by preventing violations of the ozone standard, and will allow EPA to redesignate the area from nonattainment to attainment status. An EPA approved maintenance plan will remove Clean Air Act impediments to industrial growth and will help shield the AQMA from Clean Air Act sanctions on federal transportation funds.

The Department has the statutory authority to address this issue under Oregon Revised Statutes (ORS) Chapter 468A, which gives the Commission the power to adopt plans and programs to achieve and maintain federal and state ambient air quality health standards. In particular, the elements of the ozone maintenance plan are specified in ORS 468A.363.

What's in this Package?

Attachments to this memorandum provide details on the proposal as follows:

Attachment A:	The official statement describing the fiscal and economic impact of the proposed rule. (required by ORS 183.335)
Attachment B:	A statement providing assurance that the proposed rules are consistent with statewide land use goals and compatible with local land use plans.
Attachment C:	Questions to be Answered to Reveal Potential Justification for Differing from Federal Requirements.
Attachment D:	A Table of Contents of the proposed maintenance plan, associated rule amendments, and Emission Inventories for 1990 and 1992.

Hearing Process Details

You are invited to review these materials and present written or oral comments. Three public hearings will be held, one during the day and the other two during evening hours as follows:

Date: Wednesday, May 22, 1996
Time: 10:00 a.m. (Question and answer session from 9:00 a.m. to 10:00 a.m.)
Place: Oregon Department of Environmental Quality Headquarters
811 SW 6th Ave., 3rd Floor (Room 3A), Portland, Oregon

Date: Wednesday, May 22, 1996
Time: 7:00 p.m. (Question and answer session from 6:00 p.m. to 7:00 p.m.)
Place: State Office Building, Room 140
800 NE Oregon, Portland, Oregon

Date: Thursday, May 23, 1996
Time: 7:00 p.m. (Question and answer session from 6:00 p.m. to 7:00 p.m.)
Place: City of Tigard Water Department Auditorium
8777 SW Burnham Street, Tigard, Oregon

Deadline for Receipt of Written Comments: May 24, 1996, 5:00 p.m.

In accordance with ORS 183.335(13), no comments from any party can be accepted after the deadline for receipt of comments has passed. Thus if you wish your comments to be considered by the Department in the development of these rules, your comments must be received before the close of the comment period. The Department recommends that comments be submitted as early as possible to allow adequate review and evaluation of the comments submitted.

Following close of the public comment period, the Presiding Officer will prepare a report which summarizes the oral testimony presented and identifies written comments submitted. The Environmental Quality Commission (EQC) will receive a copy of the Presiding Officer's report and all written comments submitted. The public hearing will be tape recorded, but the tape will not be transcribed.

If you wish to be kept advised of this proceeding and receive a copy of the recommendation that is presented to the EQC for adoption, you should request that your name be placed on the mailing list for this rulemaking proposal.

What Happens After the Public Comment Period Closes?

The EQC will consider the Department's recommendation for adoption of the maintenance plan during one of their regularly scheduled public meetings. The targeted meeting date for consideration of this rulemaking proposal is July 12, 1996. This date may be delayed if needed to provide additional time for evaluation and response to testimony received in the hearing process. You will be notified of the time and place for final EQC action if you present oral testimony at the hearing or submit written comment during the comment period or ask to be notified of the proposed final action on this rulemaking proposal.

The EQC expects testimony and comment on proposed rules to be presented **during** the hearing process so that full consideration by the Department may occur before a final recommendation is made. In accordance with ORS 183.335(13), no comments can be accepted by either the EQC or the Department after the public comment period has closed. Thus the EQC strongly encourages people with concerns regarding the proposed rule to communicate those concerns to the Department prior to the close of the public comment period so that an effort may be made to understand the issues and develop options for resolution where possible.

Background on Development of the Rulemaking Proposal

Why is there a need for the maintenance plan?

DEQ projections indicate that, without new emission reduction strategies, the AQMA will once again exceed the federal standard within the next few years because of unprecedented population growth and related increases in driving and other sources of emissions. Metro expects more than 300,000 new residents in the next ten years. During the same time, employment will increase by nearly 250,000 workers and driving in the area will increase by over 4.8 million miles per day. Without early implementation of new emission reduction measures, emission increases from this population growth and related driving would likely cause violations of the ozone standard to recur.

To redesignate the AQMA from nonattainment to attainment, EPA requires an enforceable plan that demonstrates how the area will continue to meet the ozone standard for a minimum of ten years. The ozone maintenance plan includes emission reduction strategies that are sufficient to ensure that attainment will be maintained for the next ten years. An EPA-approved ozone maintenance plan and redesignation to attainment will:

- Assure that public health will be protected from adverse impacts of ozone;
- Protect against possible Clean Air Act sanctions on federal transportation funds;
- Remove industrial growth impediments including costly Lowest Achievable Emission Rate (LAER) and emission offset requirements;
- Avoid federally-imposed prescriptive and more costly control strategies, such as retrofit NO_x controls on existing industries.

How was the maintenance plan developed?

An extensive public process covering a four year period was used to develop the Ozone Maintenance Plan. This process included the following steps:

- 1992 - Governor's Task Force recommended strategies to include in the Maintenance Plan;
- 1993 - The Oregon Legislature adopted House Bill 2214, which endorsed most of the recommendations of the Governor's Task Force but made some changes to the plan;
- 1994 - Several DEQ Advisory Committees were appointed and recommended specific details of Maintenance Plan strategies;

- 1995 - The Legislature passed a bill that would change some Maintenance Plan strategies, but the Governor vetoed the bill;
- December 1995 - DEQ proposed to revise some strategies to address concerns of the Legislature and Advisory Committees;
- February 1996 - Metro made recommendations on transportation elements of the plan;
- May 1996 - A final public comment/hearing process is scheduled; and
- July 1996 - The Environmental Quality Commission (EQC) is scheduled to take final action on the plan.

The Governor's Task Force on Motor Vehicle Emission Reduction in the Portland Area recommended forecasting assumptions and emission reduction strategies for the ozone maintenance plan after a series of public meetings during 1992. The Task Force based its recommendations on EPA guidance for maintenance plans as well as information presented by DEQ, Metro and a number of business, citizen, environmental and government organizations.

Significant changes were made to the maintenance plan since the Governor's Task Force made its recommendations.

- A motor vehicle emission fee recommended by the Governor's Task Force was eliminated by the 1993 Legislature. To make up the lost emission reduction credit, the Legislature directed DEQ to increase the stringency of the Employee Commute Options (ECO) program that was recommended by the Governor's Task Force and add a maximum parking ratio program to limit parking at new non-residential development.

- The Governor's Task Force recommended that DEQ adopt California standards for new lawn and garden gasoline engines. However, EPA adopted emission standards for new lawn and garden equipment and other non-road engines in 1994/1995, making state rules unnecessary.

- EPA delayed adoption of anticipated regulations for various area sources. The EQC adopted rules for paints and household products in 1995 because of a need for early emission reductions.

- Due to concerns expressed by the 1995 Legislature, advisory committees and businesses, DEQ proposes to reduce the stringency of ECO, change the parking ratio program to a voluntary program, and modify the vehicle inspection boundary expansion.

- To meet EPA requirements designed to ensure that increases in industrial emissions do not jeopardize maintenance of the ozone standard, a program has been added to manage the use of currently unused permitted industrial emissions.

Key documents relied upon in developing the maintenance plan include:

- EPA guidance documents:
    - "Procedures for Processing Requests to Redesignate Areas to Attainment," John Calcagni, 9/4/92
    - "Final Procedure and General Guidance for Redesignating Nonattainment Areas to Attainment in Region 10," George Lauderdale, 6/27/94
    - "Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone, Volume 1," EPA-450/4-91-016, May 1991
    - "Emission Inventory Requirements for Ozone State Implementation Plans," EPA-450/4-91-010, March 1991
    - "User's Guide to Mobile5a," EPA Office of Mobile Sources, May 1994
    - "Procedures for Preparing Emissions Projections," EPA Office of Air Quality Planning and Standards, July 1991
    - "Future Nonroad Emission Reduction Credits for Court-Ordered Nonroad Engine Standards," Philip Lorang, 11/28/94
    - "Procedures for Applying City Specific EKMA," EPA-450/4-89-012, July 1989
- Maintenance Plan-Related Reports
    - "Final Report," State Task Force on Motor Vehicle Emission Reductions in the Portland Area, 2/4/93
    - "Findings and Recommendations," House Special Task Force on Emissions, 3/31/93
    - "Ozone and CO Maintenance Plan Model Assumptions," Metro Travel Forecasting Section, November 1995
    - ORS 468A.363 (House Bill 2214)

Whom does the maintenance plan affect and how does it affect them?

The ozone maintenance plan will affect the general public, motorists, employers, developers, manufacturers of paints and household products, small businesses, major industries, and local governments. The plan includes the following emission reduction strategies:

- **On-road vehicle strategies**

  - Improvements to the Motor Vehicle Inspection and Maintenance Program

    Changes to the Motor Vehicle Inspection Program include improvements to the test method (enhanced testing), expansion of the inspection boundary, and elimination of the old vehicle exemption for 1975 and newer vehicles. The enhanced testing will require an increase in the testing fee. The existing fee of $10 will have to increase to a range of $15 to $20 per test to cover the cost of the program. DEQ's best estimate is that the fee will increase to $16 per test. Because of the improved test, the failure rate and average repair costs will increase, but this will be offset by savings from improved fuel economy. About 10 percent more vehicles from areas surrounding the airshed will be subject to testing due to the expanded boundary. Additional vehicles will be tested due to elimination of the old vehicle exemption. Fleet operators will have to upgrade their testing equipment or rely on DEQ testing. Repair mechanics may opt to take additional training and upgrade testing equipment.

  - Motor Vehicle Trip Reduction Measures

    An Employee Commute Options (ECO) program will require employers with more than 50 employees to provide alternatives to drive-alone commuting to work. A voluntary Parking Ratio program will provide incentives for developers to meet voluntary limits for the maximum number of parking spaces constructed for new non-residential development.

    Metro's new Region 2040 land use and transportation plan is included as a vehicle emission reduction strategy. It is designed to significantly improve the balance between motor vehicles and other less polluting forms of transportation. The Region 2040 plan and associated transportation control measures (TCMs) are referenced in the maintenance plan. These measures include the Region 2040 growth concept, significant transit system expansion and bicycle and pedestrian facility improvements. The TCMs affect developers, local governments and the general public and must receive priority funding by Metro.

- **Non-road engine strategies**

  Credit is included in the plan for recent EPA emission standards for new non-road engines such as lawn and garden equipment, motor boats and construction equipment. These standards affect the engine manufacturers, but compliance costs will likely be passed on to consumers.

- **Area source strategies**

  In 1995, EQC adopted rules which will reduce VOC emissions from motor vehicle refinishing, architectural coatings (such as house paints) and a variety of consumer products (such as aerosol sprays, air fresheners and windshield washer fluids). Product costs may increase or decrease depending on formulations chosen. The product manufacturers will be required to meet VOC content limits. Motor vehicle refinishing shops will be required to use lower-emitting equipment.

- **Industrial emission strategies**

  A number of industrial sources have agreed to reduce their permit limits to eliminate some of the unused permitted emissions they held. Further donations are being sought to ensure that emissions from existing industry do not increase above airshed capacity during the life of the plan. If and when sufficient donations are obtained, DEQ will drop a backup plan that includes requirements to purchase temporary emission offsets or implement other equivalent measures to keep emissions within acceptable levels. In addition, the maintenance plan will include a growth allowance for major new and expanding industries, which will eliminate the compliance costs of emission offsets. Offsets would need to be reinstated if the growth allowance were used up. Finally, the maintenance plan relies on emission reduction credit from installation of Reasonably Available Control Technology (RACT) or equivalent at existing major industrial VOC sources.

- **Public education and incentive program**

  A public education and incentive program is included to encourage the public to choose consumer products that emit fewer VOCs, reduce motor vehicle trips, use electric and hand gardening tools, and curtail polluting activities such as lawn mowing on high pollution days. Private sector partners will be asked to participate in advertising, discounts and other incentives.

- **Contingency plan**

  If the maintenance plan fails, a contingency plan will be implemented as required by the Clean Air Act. The contingency plan will affect new and expanding major industry by reinstating emission offset requirements. The contingency plan could also affect the general public, the petroleum industry and local governments by requiring reformulated gasoline, congestion pricing or an equivalent program. The specific contingency program would be adopted by rule if and when needed to prevent violations of the ozone standard.

How will the maintenance plan and associated rules be implemented?

The ozone maintenance plan will be implemented by DEQ through ongoing air quality monitoring, periodic emission inventory updates, and implementation of emission reduction strategies. The existing attainment plan will be repealed upon EPA approval of the maintenance plan. However, existing emission reduction strategies required by Oregon Administrative Rules will remain in effect except as specifically amended or repealed by the Environmental Quality Commission and approved by EPA as part of this maintenance plan. The emission reduction strategies will be implemented as follows:

- **On-road vehicle strategies**

  The Motor Vehicle Inspection and Maintenance Program improvements will be implemented through DEQ's existing Vehicle Inspection Program. Implementation of the expanded boundary has already begun. Additional test centers are being constructed to better serve the expanded boundary. DEQ will add equipment to conduct the enhanced test, which will begin phasing in by July 1997. An amendment to the expanded boundary rule is being proposed concurrent with this maintenance plan, and enhanced testing rules will be proposed in August, 1996 for adoption in November, 1996. DEQ is evaluating the cost-effectiveness of privatizing this program.

  The ECO program will be implemented by DEQ through a general letter permit that will establish trip reduction targets and compliance choices. Affected employers will conduct commute trip surveys and select from among compliance options. The deadlines for permit applications and baseline surveys will phase in from 11/1/96 to 8/1/97 and the initial compliance deadline will be three years later. The voluntary Parking Ratio program will also be implemented by DEQ through its indirect source permit program. ECO and Parking Ratio rules are being proposed concurrent with this maintenance plan.

Metro's Region 2040 land use and transportation plan will be implemented by Metro and local governments. The transportation conformity process required under the Clean Air Act will be used to ensure that Transportation Control Measures (TCMs) receive priority funding and are implemented in a timely manner. The conformity process will also be used to ensure that transportation emissions do not exceed the transportation emission budgets included in the maintenance plan.

- **Non-road engine strategies**

  EPA is implementing the non-road engine strategies. The heavy duty diesel engine standards phase in from 1/1/96 to 1/1/2000, the small spark ignition engine standards phase in beginning in 1996, and the marine engine standards phase in beginning in 1998.

- **Area source strategies**

  The EQC adopted the area source strategies in 1995 and DEQ is currently implementing them. Compliance deadlines for the rules range from 1/1/96 to 7/1/96.

- **Industrial emission strategies**

  The industrial emission strategies will be implemented through the existing Air Contaminant Discharge Permit (ACDP) program and the Oregon Title V Operating Permit Program. Rules regarding management of industrial emissions are proposed concurrently with this maintenance plan. Amendments to New Source Review requirements will be proposed in mid-1996 for adoption in late 1996 or early 1997. VOC RACT rules were updated in 1991, and DEQ is updating permits to include source-specific RACT requirements. In addition, the plan assumes emission reductions from RACT requirements for several industrial source categories including aerospace component coating operations and barge loading operations at gasoline terminals. A planned gasoline pipeline is now expected to provide emission reductions equivalent to barge loading RACT.

- **Public education and incentive program**

  The public education and incentive program will be implemented by DEQ in cooperation with private sector partners. The program will include advertising, discounts and other incentives. Surveys and sales records will be used to document emission reductions achieved. The public education and incentive program is included in the maintenance plan.

Are there time constraints?

There is no deadline in the Clean Air Act for submittal of a maintenance plan. However, the Legislature directed the Department to submit the ozone maintenance plan as soon as possible so that the AQMA can be redesignated to attainment and impediments to industrial growth can be removed. In addition, the plan includes sufficient emission reductions only through the year 2006. If the plan is not adopted before the summer of 1996, the plan may need to be extended to 2007 to meet EPA's required review time. Further, rapid population growth could lead to recurring violations of the ozone standard in the near future. If additional violations occur before redesignation, the AQMA will be automatically "bumped-up" to a more severe level of nonattainment. This will require submittal of a new attainment plan with more stringent requirements in a shorter time than proposed in this maintenance plan, including requirements for existing industry to install NO_x RACT.

Contact for more information

If you would like more information on this rulemaking proposal, obtain copies of the proposed rule language, or would like to be added to the mailing list, please contact:

Andy Ginsburg
Air Quality Division
Department of Environmental Quality
811 SW 6th Ave.
Portland, OR 97204

(503) 229-5581

Attachment C

State of Oregon

Department of Environmental Quality

Memorandum

Date: June 24, 1996

To: Environmental Quality Commission

From: Lawrence Smith, ALJ, Employment Department
Mike Grant, ALJ, Public Utility Commission

Subject: Presiding Officer's Report for Rulemaking Hearing, Attachment C

Hearings Date and Time: May 22, 1996, beginning at 10:00 am.
May 22, 1996, beginning at 7 pm.
May 23, 1996, beginning at 7 pm.

Hearings Location: Room 3A, DEQ Headquarters, 811 SW Sixth Avenue, Portland, OR
Room 140, State Office Building, 700 NE Oregon Avenue, Portland, OR
Auditorium, Tigard Water Bureau, 8777 SW Burnham Road, Tigard, OR

Titles of Proposals: Portland Area Ozone Maintenance Plan
Portland Area Carbon Monoxide Maintenance Plan
Employee Commute Options Program
Voluntary Parking Ratios Program
Expanded Vehicle Inspection Boundary
Industrial Emissions Management Program

Three rulemaking hearings were held on the above titled proposals. The hearings were convened at 10:00 am and 7:00 pm on May 22, 1996, and 7:00 pm May 23, 1996. All the proposals were open for comment at each hearing. People were asked to sign witness registration forms if they wished to present testimony. People were also advised that the hearings were being tape recorded and of the procedures to be followed.

The morning hearing on May 22, 1996, was conducted by Lawrence Smith, an Administrative Law Judge with the Employment Department. Forty-five people were in attendance, ten people signed up to give testimony.

Memo To: Environmental Quality Commission
June 24, 1996
Presiding Officer's Report on
May 22, 23, 1996, Rulemaking Hearing
Attachment C, Page 2

The evening hearings on May 22, and May 23, 1996, were conducted by Mike Grant, an Administrative Law Judge with the Public Utility Commission. Eleven people were in attendance the evening of May 22, and three people signed up to give testimony. Thirteen people were in attendance the evening of May 23, and three people signed up to give testimony.

Prior to receiving testimony, the Department provided informational tables and the opportunity for people to informally discuss any questions concerning the proposals with Department staff. Andy Ginsburg was available for questions concerning the Portland Area Ozone Maintenance Plan. Howard Harris was available for questions concerning the Portland Area Carbon Monoxide Maintenance Plan. Patti Seastrom was available for questions concerning the Employee Commute Options Program. Susan Turner was available for question concerning the Voluntary Parking Ration Program. David Collier was available for questions concerning the Expanded Vehicle Inspection Boundary. Brian Finneran was available for questions concerning the Industrial Emissions Management Program.

Summary of Oral Testimony

May 22, 1996, 10:00 am

1. Jim Craven, American Electronic Association.

Mr. Craven gave testimony concerning the Industrial Emissions Management Program. He read his comments into the record. He focused on the Unused PSEL Management Backup Program of OAR 340-030-0730. He stated that this program conflicted with the purpose of the Plant Site Emission Limits (PSEL) program. He stated that the proposed program could adversely affect the electronics industry.

Mr. Craven also submitted written comments which are summarized in the Department's Evaluations of Public Comments (Attachment D).

2. Bob Okren, Citizen.

Mr. Okren gave testimony concerning the Employee Commute Option Program (ECO). He stated that regulating employees lives is onerous, communistic, and unconstitutional since employers will suffer penalties if employees don't cooperate. He considered ECO is another challenge to doing business in Portland.

3. Francie Royce, City of Portland, Office of Transportation.

Ms. Royce gave testimony concerning the Carbon Monoxide (CO) and Ozone Maintenance Plans, and the Voluntary Parking Ratios Program. Ms. Royce stated that the City was pleased the DEQ has completed its work on the plans and were supportive of both. She noted the City's participation in the five-year process leading to this point and appreciated the long hours and hard work on the part of DEQ staff.

Ms. Royce highlighted some specific concerns regarding the CO maintenance plan. The Portland City Council has taken a position endorsing the retention of the oxygenated fuels program and supports the position adopted by the Metro Council and Joint Policy Advisory Committee on Transportation (JPACT) to continue the program for another two winters and reevaluate whether to continue the program. She stated the city is particularly at risk in the event the CO standard is violated in the downtown area, as the parking lid will be automatically reinstated, and for that reason the city would like see the oxygenated fuels continue.

Ms. Royce pointed out that the CO maintenance plan contains three transportation emissions budgets: a regional emissions budget, a budget for the Central City Transportation Management Plan (CCTMP) area, and a budget for 82nd Avenue. The city is concerned about the establishment of an emissions budget for such a small area as the 82nd Avenue area and believes it is unnecessary and could trigger an unwarranted conformity problem. The city believes the Environmental Quality Commission (EQC) should remove the 82nd Avenue emissions budget from the CO plan and rely on the 82nd Avenue monitor to track CO concentrations in the area.

Ms. Royce stated that various timelines have been projected for approval of the maintenance plans by EPA. She cited delays of up to 18 months for the agency to pass similar plans and urged the Commission and DEQ to persuade EPA to approve the submitted maintenance plans as soon as possible. She also indicated the city is willing and able to help effect a timely approval.

Ms. Royce stated that other comments dealing with the CO maintenance plan, the Ozone maintenance plan and voluntary parking ratio program would be submitted in writing. She stated that the other comments were mostly technical in nature and dealt with provisions of the CCTMP that are to be incorporated into the CO maintenance plan.

The City of Portland also submitted written comments which are summarized in the Department's Evaluations of Public Comments (Attachment D).

4. Adrian Albrecht, PED Manufacturing Inc.

Mr. Albrecht gave testimony concerning the ECO program. He stated that credit should be given for existing low auto trip rates even where an employer does not have an active program.

Mr. Albrecht also submitted written comments which are summarized in the Department's Evaluation of Public Comment (Attachment D).

5. Bill Smith, American Lung Association

Mr. Smith gave testimony in support of the Enhanced Vehicle Inspection Program. Mr. Smith supported the enhanced motor vehicle inspection program and expanded inspection boundary as a good investment in air quality. He stated that the problems reported in implementing enhanced inspection in other states have been due to poor public relations, not problems with the technology.

6. Darrell Fuller, Oregon Automobile Dealers Association.

Mr. Fuller gave testimony concerning the ECO program. He requested supporting data demonstrating need for ECO, as well as information on impact of programs in other states. He stated that the government requiring business to require employees to change commute habits presents problems, such as policing employees, carpooling liability, and employee backlash. He suggested that OAR 340-030-0820 be modified from "have the potential to" to "mandated", since that is what is intended. He also suggested that OAR 340-030-0850 be expanded to include disabled and field personnel "transporting goods and services" or "reasonably need to have vehicle".

Mr. Fuller also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

7. Melissa Sherlock, Western States Petroleum Association and 76 Products Company.

Ms. Sherlock is a fuels planning engineer for 76 Products Company. She gave testimony concerning the CO Maintenance Plan. She stated that WSPA is a trade association whose member companies account for the majority of petroleum produced, refined, transported and marketed in six western states, including Oregon. She congratulated the staff, residents and industries of the Portland area on attaining the National Ambient Air Quality Standards for carbon monoxide (CO) and ozone, making the Portland region a fine place to live and work.

Second, she expressed WSPA's belief that the winter oxygenated fuel program is not necessary in the Portland region and should be discontinued prior to the start of the 1996/97 winter season. She stated that WSPA's position is based on the following facts:

1) The Portland metropolitan area began attaining the standard in 1990, two full years before oxygenated gasoline was required in 1992.

2) DEQ's thorough and extremely conservative analysis demonstrates that oxygenated gasoline is not needed in order for CO levels in the region to remain well below the federal health standards in the winter of 1996/1997 and throughout the ten-year maintenance period.

3) Oxygenated fuel mandates are expensive; WSPA estimates that the program costs the region's consumers, businesses and taxpayers approximately $7.4 million for increased fuel costs and losses in fuel efficiency and potentially $7.7 million in lost revenue from the federal highway trust fund.

4) Continuing an oxygenated fuel mandate when it is not needed for attainment is inconsistent with the provisions of the federal Clean Air Act Amendments of 1990.

Ms. Sherlock cited the historical record of numerous violations (in excess of 100) throughout the late 60's and early 70's. However, by the late 70's and early 80's, the number of violations were reduced significantly, with only one violation since 1985.

Ms. Sherlock explained that the reason for that big improvement in CO air quality was based on two factors and neither one of those is oxygenated gasoline: 1) more stringent new motor vehicle emission standards which resulted in the increased technological sophistication of new motor vehicle emission control systems; and 2) the State's vehicle inspection and maintenance program, ensuring that the emission control systems maintain their effectiveness. Those programs started during the late 70's and early 80's, and oxygenated gasoline came in during the winter of 1992, well after the area's big improvement. She concluded that oxygenated gasoline did not play any role at all in the marked improvement in air quality.

Ms. Sherlock indicated that the Portland area has experienced only one violation of the CO standard in the last ten years and that violation occurred at the 82nd and Division monitor in December of 1989, immediately after the monitor's installation. The monitor has not measured a CO violation since, and all the other monitors in the Portland area show that the area has been attaining the standard since 1985, without the use of oxygenated gasoline.

Ms. Sherlock indicated that the DEQ analysis in the Plan shows compliance can be maintained without an oxygenated fuels program with a safety margin of ten percent, even in the winter of 1996/97. She stated that the analysis is based on a number of very conservative assumptions as follows: 1) worst case base year for meteorological conditions and measured concentrations; 2) extremely conservative background CO; 3) a worst case growth modeling analysis; 4) a calculated base year CO concentration that averages 40 percent higher than the actual measured concentrations during the base year; 5) a peak traffic period in the downtown area that is twice as long as the actual peak period; and 6) a traffic volume growth rate around the 82nd and Division monitor that is 75 percent higher than the traffic volume growth rate estimated by Metro.

These conservative assumptions indicate that the actual safety margin is most likely significantly greater than the ten percent that has been estimated. Ms. Sherlock concluded that an oxygenated fuel program is clearly not necessary for the Portland metropolitan area to stay well below the CO standard, beginning in the winter of 1996/97 and throughout the ten-year maintenance period. In summary, she stated that WSPA urges DEQ to discontinue the winter oxygenated fuel program prior to the start of the 1996/97 winter season.

Ms. Sherlock also submitted written testimony on behalf of WSPA and 76 Products Company. Those comments are summarized in the Department's Evaluation of Public Comments (Attachment D).

8. Joe Gilliam, National Federation of Independent Business.

Mr. Gilliam gave testimony concerning the CO maintenance plan. He stated that the National Federation of Independent Business was the largest small business group in the State, with over 17,000 employers. He indicated that his concerns were similar to those given by Ms. Sherlock for the Western States Petroleum Association, but from a slightly different angle. His organization is concerned over the size of government and overall regulation. He said that the oxygenated fuel program is unneeded, by the Department's own recommendation. The oxygenated fuel program does not make a difference between the Portland area being in attainment or nonattainment, with no significant benefit to the Metro area as far as the air shed is concerned. Mr. Gilliam also cited the costs for the Metro area, estimated at $7 million in fuel related costs and a potential of $7 million in lost transportation funds. He stated that his organization would like to see the DEQ take the action to repeal the program before the 1996/97 winter. He said that the National Federation of Independent Business cannot see a need to extend a program like oxygenated fuel and cost the region the kind of money cited. As a goodwill gesture, the DEQ should act immediately to repeal the program.

9. E. John Resha, Portland Community College and Westside Transportation Alliance.

Mr. Resha gave testimony concerning the ECO Program. He was supportive of the Ozone Maintenance Plan and the ECO Program. He stated that the definition of "Good Faith Effort" was not clear as to what was an acceptable effort. He also stated that there was a need to understand how the trip reduction goal of 10% helped to achieve and maintain the Ozone standard.

Mr. Resha also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

10. Linda Odekirk, Nike and Westside Transportation Alliance

Ms. Odekirk gave testimony concerning the ECO program. She stated that the baseline requirement should be changed from employer baseline to area baseline so that employers will be sure to get credit for work already done.

May 22, 1996, 7:00 pm

11. Peter Fry, Central Eastside Industrial Council

Mr. Fry gave testimony concerning the ECO program. He requested that the record stay open an additional 30 days to provide adequate time to review the ECO proposal. He stated that the Central City Transportation Management Plan (CCTMP) was already consistent with State law. He asked why additional requirements were needed for employers in the CCTMP area. He said that employers were under the impression that participation in the CCTMP would meet any additional rules. He wanted to know how DEQ would determine what parking is free or paid. He stated that Central Eastside parking costs were incorporated into the business, wage rates, and the way the business operated. Mr. Fry said that the Central Eastside had lost businesses because of ill-founded regulatory issues. He stated that the Central Eastside should be included in the definition of "Central Business District". He expressed the concern that the Central Eastside has been closed out of the process.

Mr. Fry also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

12. Kathleen Dotten, Oregon Metals Industry Council

Ms. Dotten gave testimony concerning the Expanded Vehicle Inspection Boundary, the ECO Program, the Ozone Maintenance Plan, and the Industrial Emission Management Program. She read her comments into the record.

Ms. Dotten stated that she did not support the removal of the Newberg, Dundee, Aurora and Marquam areas from the Expanded Vehicle Inspection Boundary. She also stated that the ECO Program shifted the burden of reducing vehicle miles traveled from the driver to the employer. She objected to that shift.

Ms. Dotten stated that the contingency plan should not focus on industry. She said that industry had already made significant emission reductions. She noted that the contingency plan called for further control of industry, even if the problem is caused by another source category. She stated that the maintenance plan should include an emissions allocation for each source category. She suggested that if one category exceeded the allocation, the contingency plan should require reductions from that category, rather than further reductions from industry. As an example, she suggested that congestion pricing could be required if auto emissions exceed their allocation.

Ms. Dotten's testimony concerning the Industrial Emissions Management Program focused on the growth allowance. She stated that the industrial growth allowance should be larger. She suggested that the industrial growth allowance should be at least 1000 tons per year as this would allow existing industry to expand and new industry to develop. She stated that the result would be more high wage jobs. She said that future emission reductions made by industry should be available for increases in industrial sources, not increases in mobile sources.

Ms. Dotten also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

13. David Stoller, Small Business Owner

Mr. Stoller gave testimony concerning the ECO Program. He was concerned that government was becoming larger with more regulations that small business must follow. He said that ECO placed an unfair burden on the small business owner. He suggested that ECO be replaced with a fuel tax to target all types of auto trips. He stated that ECO singled out the employer and was a drastic means to reduce emissions.

May 23, 1996, 7:00 pm

14. Mauri Scott, Iwasake Brothers, Inc.

Ms. Scott gave testimony concerning the ECO Program. She stated that the nature of her business, a nursery, was not taken into account. She explained that employees tending plants cannot telecommute or work a compressed work week, and truck drivers work a non-scheduled work week. She stated that the current auto trip rate was .48, but she couldn't take credit because no programs had been sponsored. She suggested that employers with lower auto trip rates should have lower goals. She also pointed out the need for the survey to be provided in other languages and in an alternate form for illiterate employees (e.g. pictograms). She suggested that the rules should allow for an easier method, such as counting cars in the parking lot.

Ms. Scott also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

15. John Williams , Citizen.

Mr. Williams gave testimony concerning the Ozone Maintenance Plan. He read his comments into the record.

He stated that DEQ should actively support the gasoline pipeline. He said the maintenance plan assumed emissions reductions from the future operation of a planned gasoline pipeline which would reduce emissions from barge loading. He said the plan, which was relatively detailed regarding the other elements of its control strategies, was silent about what steps the DEQ would take to insure that this planned pipeline would actually be constructed, and that the resulting emissions reductions would be achieved. Mr. Williams stated that this was a very important issue because of the large amount of emissions involved. He said that DEQ should consider taking some action to support the pipeline. He suggested that, for instance, DEQ could intervene or testify in the hearings and proceedings before the Washington Energy Siting Council regarding the Olympic pipeline.

Mr. Williams also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

16. Tom Tucker, Citizen

Mr. Tucker gave testimony concerning the Ozone Maintenance Plan. He read his comments into the record.

He stated that the selected strategies were not cost-effective. He said that the maintenance plan relied on tools at DEQ's disposal, rather than the most cost-effective solutions. He suggested that DEQ should explore options to control population growth as a means of reducing air pollution. His suggested alternatives included the deportation of illegal aliens, reducing teenage pregnancies, training workers locally, helping the unemployed find work outside of the state, voter approval prior to annexation, and voter initiatives to require future development to pay for all needed infrastructure.

Mr. Tucker also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

Written Testimony

The following people handed in written comments at the hearings, but did not present oral testimony:

17. Thomasina Gabriele, Gabriele Development Services for Institutional Facilities Coalition.
18. Joy Voline

There was no further testimony and the hearing was closed at 11:15 am, 7:30 pm, and 7:45 pm, respectively.

The public comment period closed at 5:00 pm on Friday, May 24, 1996. All comments received during the public comment are indexed in Attachment C1, which has been attached to this report. All oral and written comments are summarized in Attachment D, The Department's Evaluation of Public Comments.

Attachment C1
Index of Public Comments Received
Attachment to the Presiding Officer's Report for Rulemaking Hearing

State of Oregon
Department of Environmental Quality

	Name/Representing	Subject	Comment Type
1	Jim Craven, American Electronics Association	Industrial Emissions Management Program	Written/ Oral
2	Bob Okren	Employee Commute Options Program	Oral
3	Francie Royce, City of Portland	Ozone and CO Maintenance Plans, Voluntary Parking Ratio Program	Oral
4	Adrian Albrecht, PED Manufacturing Ltd.	Employee Commute Options Program	Written/ Oral
5	Bill Smith, American Lung Association	Ozone Maintenance Plan (Enhanced Vehicle Inspection)	Oral
6	Darrell Fuller, Oregon Automobile Dealers Association	Employee Commute Options Program	Written/ Oral
7	Melissa Sherlock, 76 Products Company, Western States Petroleum Association	Carbon Monoxide Maintenance Plan	Written/ Oral
8	Joe Gilliam	Carbon Monoxide Maintenance Plan	Oral
9	John Resha, Westside Transportation Alliance/ Portland Community College	Ozone Maintenance Plan, Employee Commute Options Program	Written/ Oral
10	Linda Odekirk, Westside Transportation Alliance/ Nike	Ozone Maintenance Plan, Employee Commute Options Program	Oral
11	Peter F. Fry, AICP, Central Eastside Industrial Council	Employee Commute Options Program	Written/ Oral
12	Kathleen Curtis Dotten, Oregon Metals Industry Council	Ozone Maintenance Plan (Enhanced Vehicle Inspection), Expanded Motor Vehicle Inspection Boundary, Industrial Emission Management Program, Employee Commute Optionss Program,	Written/ Oral
13	David Stoller	Employee Commute Options Program	Oral
14	Mairi J. Scott, Iwasake Brothers, Inc.	Employee Commute Options Program	Written/ Oral
15	John Williams	Ozone Maintenance Plan	Written/ Oral
16	Tom Tucker	Ozone Maintenance Plan	Written/ Oral
17	Thomasina Gabriele, Gabriele Development Services, (representing Institutional Facilities Coalition)	Employee Commute Options Program, Voluntary Parking Ratio Program	Written

	Name/Representing	Subject	Comment Type
18	Joy Voline	Employee Commute Options Program	Written
19	Gayle Evans, Standard Insurance Co.	Employee Commute Options Program	Written
20	Rick Gustafson, Shiels, Obletz, Johnsen (Representing Association for Portland Progress)	Employee Commute Options Program	Written
21	Bradford R. Tracy, Maletis Beverage	Employee Commute Options Program	Written
22	Doug Hayden, Columbia Distributing Co., Henny Hinsdale, Admiralty Beverage	Employee Commute Options Program	Written
23	Jerry Griffin, Swan Island Business Association	Employee Commute Options Program	Written
24	Juan Baez, Pacificorp	Employee Commute Options Program	Written
25	Steve Klein, Epson	Employee Commute Options Program	Written
26	Elizabeth Archer, Taylor Made Labels, Inc.	Employee Commute Options Program	Written
27	Elda Orr, Multnomah Athletic Club	Employee Commute Options Program	Written
28	Virginia W. Lang, USWest Communications	Employee Commute Options Program	Written
29	L. Guy Marshall, Columbia Steel Casting Co.	Employee Commute Options Program	Written
30	Susan Duley, Saks Fifth Avenue	Employee Commute Options Program	Written
31	Gary A. Benson, Pendleton Woolen Mills	Employee Commute Options Program	Written
32	Ralph Woll/Dari Buckner, Interstate Brands Corporation	Employee Commute Options Program	Written
33	John Bohlinger, Core-Mark International	Employee Commute Options Program	Written
34	Harriet Sherburne, Portland Center for the Performing Arts	Employee Commute Options Program	Written
35	Douglas Pratt, Jr., Fulton Provision Company	Employee Commute Options Program	Written
36	J. Mark Morford, Stoel, Rives	Employee Commute Options Program	Written
37	Katy Johnson, Pacific Metal Company	Employee Commute Options Program	Written
38	Mike McGee, Oregon Department of Corrections	Employee Commute Options Program	Written
39	Debi Wali, Bullseye Glass Company	Employee Commute Options Program	Written
40	Colin Lamb, Lamb's Thriftway	Employee Commute Options Program	Written
41	William R. Johnson, Valley Wine Company	Employee Commute Options Program	Written
42	Anne Mersereau, Portland Hilton	Employee Commute Options Program	Written
43	David M. Fogle, Pacific Coast Restaurants	Employee Commute Options Program	Written
44	Denice DePaepe, Sears, Roebuck and Company	Employee Commute Options Program	Written

	Name/Representing	Subject	Comment Type
45	Fred Loomis, Gaston Public Schools	Employee Commute Options Program	Written
46	Gordon Slatford, Travelodge Hotel	Employee Commute Options Program	Written
47	S. G. Gray, E.E. Schenck Company	Employee Commute Options Program	Written
48	Louis A. Ornelas, Oregon Health Sciences University	Employee Commute Options Program	Written
49	Michael J.P.C. Kane, UEI	Employee Commute Options Program	Written
50	Charlie Young	Employee Commute Options Program	Written
51	Dan E. Mercer, Mercer Industries, Inc.	Employee Commute Options Program	Written
52	John P. Buckinger, Miller Paint Company	Employee Commute Options Program	Written
53	Ray Alford, Tom Richardson, Doug Jarmer, Pete Szambelan, Oregon Association of Temporary and Staffing Services	Employee Commute Options Program	Written
54	David H. Cook, OSF International, Inc.	Employee Commute Options Program	Written
55	G. Kent Ballantyne, Oregon Association of Hospitals and Health Systems	Employee Commute Options Program	Written
56	Donna M. Marx, The Sweetbrier Inn	Employee Commute Options Program	Written
57	William M. Hedgebeth, USEPA	Carbon Monoxide (CO) Maintenance Plan	Written
58	Jinx Faulkner	CO Maintenance Plan (oxygenated fuels)	Written
59	Matt Rahpael	CO Maintenance Plan (oxygenated fuels)	Written
60	Tom Novick, NW Bio Products Coalition	CO Maintenance Plan (oxygenated fuels)	Written
61	Neil M. Koehler, Parallel Products	CO Maintenance Plan (oxygenated fuels)	Written
62	Del J. Fogelquist, Western States Petroleum Association	CO Maintenance Plan	Written
63	Jim Alan	CO Maintenance Plan (oxygenated fuels)	Written
64	Andrea Benson	CO Maintenance Plan (oxygenated fuels)	Written
65	Kari Easton	CO Maintenance Plan (oxygenated fuels)	Written
66	Todd Easton	CO Maintenance Plan (oxygenated fuels)	Written
67	Michael Madden	CO Maintenance Plan (oxygenated fuels)	Written
68	Steven Schlesser, Schlesser Company, Inc.	CO Maintenance Plan (oxygenated fuels)	Written
69	N. Blosser	CO Maintenance Plan (oxygenated fuels)	Written
70	Chris Beck	CO Maintenance Plan (oxygenated fuels)	Written
71	Harrison Pettit	CO Maintenance Plan (oxygenated fuels)	Written
72	Dave Bernard	CO Maintenance Plan (oxygenated fuels)	Written
73	Maura Hanlon	CO Maintenance Plan (oxygenated fuels)	Written
74	Robert von Borstel, MD	CO Maintenance Plan (oxygenated fuels)	Written
75	David E. Ortman, Friends of the Earth	CO Maintenance Plan (oxygenated fuels)	Written
76	John Fletcher, Container Recovery, Inc.	CO Maintenance Plan (oxygenated fuels)	Written
77	Kim B. Puzey, Port of Umatilla	CO Maintenance Plan (oxygenated fuels)	Written
78	Caroline Weitzer, Media Mania Group	CO Maintenance Plan (oxygenated fuels)	Written

	Name/Representing	Subject	Comment Type
79	John G. White, Oregon Department of Energy	CO Maintenance Plan (oxygenated fuels)	Written
80	Dennis W. Lamb, 76 Products Company	CO Maintenance Plan (oxygenated fuels)	Written
81	Moneeka Settles	CO Maintenance Plan (oxygenated fuels)	Written
82	Claudia Burnett	CO Maintenance Plan (oxygenated fuels)	Written
83	Michelle Gallon	CO Maintenance Plan (oxygenated fuels)	Written
84	Ilene S. Moss	CO Maintenance Plan (oxygenated fuels)	Written
85	Nic Warmenhoven	CO Maintenance Plan (oxygenated fuels)	Written
86	Kenneth Lein	CO Maintenance Plan (oxygenated fuels)	Written
87	Matthew Pennewell	CO Maintenance Plan (oxygenated fuels)	Written
88	Benjamin Basin	CO Maintenance Plan (oxygenated fuels)	Written
89	Karen Notzeo	CO Maintenance Plan (oxygenated fuels)	Written
90	Lucas M. Haley	CO Maintenance Plan (oxygenated fuels)	Written
91	Carr Grey	CO Maintenance Plan (oxygenated fuels)	Written
92	Tim Cowles	CO Maintenance Plan (oxygenated fuels)	Written
93	Abigail Marble	CO Maintenance Plan (oxygenated fuels)	Written
94	Paul Reineke	CO Maintenance Plan (oxygenated fuels)	Written
95	Cynthia Toy	CO Maintenance Plan (oxygenated fuels)	Written
96	Christian G. Sturm	CO Maintenance Plan (oxygenated fuels)	Written
97	Rod Monroe, Metro Councilor, District 6	CO Maintenance Plan (oxygenated fuels)	Written
98	Robert Palzer, Sierra Club	Ozone Maintenance Plan	Written
99	Richard Ledbetter, Metro, Senior Transportation Planner	Ozone Maintenance Plan	Written
100	Ralph Engel, Chemical Specialties Manufacturers Association	Ozone Maintenance Plan	Written
101	Ted Hughes, Pacific Northwest Paint Council	Ozone Maintenance Plan	Written
102	Robert D. Elliot, Southwest Air Pollution Control Authority (Vancouver, WA)	Ozone Maintenance Plan	Written
103	Gil Haselberger, USEPA	Ozone Maintenance Plan	Written
104	Stan R. Holm, Mobil	Industrial Emission Management Program	Written
105	Chris Davies, Texaco Refining and Marketing, Inc.	Industrial Emission Management Program	Written
106	Kirk J. Thomson, Boeing	Industrial Emission Management Program	Written
107	Joseph W. Angel, Oregon Resturant Association	Voluntary Parking Ratio Program	Written
108	Larry Lazar, The Westwind Group	Voluntary Parking Ratio Program	Written
109	Steve Alverdes	Expanded Motor Vehicle Inspection Boundary	Written
110	Rita M. Bernhard, Mayor, City of Scappose	Expanded Motor Vehicle Inspection Boundary	Written

	Name/Representing	Subject	Comment Type
111	John A. Charles, Oregon Environmental Council	Industrial Emisstion Management Program, Expanded Motor Vehicle Inspection Boundary, Voluntary Parking Ratio Program, Employee Commute Options Program, Ozone Maintenance Plan	Written
112	Stanely P. Richardson, Jr.	Ozone and CO Maintenance Plans (Enhanced Vehicle Inspection and oxygenated fuels)	Written
113	Jim Whitty, Associated Oregon Industries	Ozone and CO Maintenance Plans (Enhanced Vehicle Inspection and oxygenated fuels), Industrial Emissions Management Program, Employee Commute Options Program, Voluntary Parking Ratio Program	Written
114	David F. Bartz, Jr., Schwabe, Williamson & Wyatt (representing Simpson Timber Co.)	Industrial Emissions Management Program, Employee Commute Options Program, Ozone Maintenance Plan	Written
115	Felicia Trader, City of Portland	Ozone and CO Maintenance Plans, Voluntary Parking RatioProgram	Written
116	Kristin K. Nadermann, Reynolds Metals Co.	Ozone Maintenance Plan (Enhanced Vehicle Inspection), Industrial Emissions Managment Program, Employee Commute Options Program	Written
117	Randy Tucker, OSPIRG	CO Maintenance Plan (oxygenated fuel)	Written
118	C.L. (Lew) Blackwell, Chevron Products	CO Maintenance Plan (oxygenated fuel)	Written
119	Matt Klein, Lloyd District Transportation Management Association	Employee Commute Options Program	Written
120	Lisa Logie, Westside Transportation Alliance	Employee Commute Options Program	Written
121	Mike Salsgiver, Westside Transportation Alliance	Ozone Maintenance Plan, Employee Commute Options Program	Written
122	Bonnie Gariepy, Intel	Industrial Emission Management Program	Written
123	Gary Slabaugh, Safeway, Inc.	Employee Commute Options Program	Written

Attachment D

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Ozone Maintenance Plan

Department's Evaluation of Public Comment

[Note: commenter numbers refer to the list in Attachment C]

Comment 1: General support for the ozone maintenance plan. (Commenters: 3, 9, 10, 15, 58, 98, 102, 113, 115)

Several commenters expressed overall support for the maintenance plan, although some had concerns about specific elements of the plan. (These concerns are addressed in Agenda Items E through H for the July 12, 1996 EQC meeting related to the appropriate rulemaking proposal). Washington's Southwest Air Pollution Control Authority (SWAPCA) noted that the Portland/Vancouver interstate ozone nonattainment area can only be redesignated to attainment if both states submit acceptable maintenance plans to EPA. The Associated Oregon Industries urged DEQ to submit the maintenance plan to EPA as soon as possible.

Response: The Department believes that the maintenance plan represents the best possible balance of emission reduction strategies to address the various concerns of the community. The Department is working closely with EPA to ensure rapid approval of the plan following adoption by the Environmental Quality Commission.

Comment 2: Revisions are needed to meet EPA approvability criteria. (Commenter: 103)

EPA recommended the following:

a) **Public Education and Incentive Program.** Move up the schedule for quantification of program effectiveness by 6 months to allow time to adopt and implement the backup strategy if needed by 5/1/99 (when the plan starts taking credit for the program).

b) **Voluntary Parking Ratio Program.** Commit to quantification and a backup strategy if needed as was done for the Public Education and Incentive Program.

c) **Enhanced Vehicle Inspection.** Ensure that EPA Office of Mobile Sources approves the emission reduction credit and that the rules are submitted to Region 10 by November, 1996.

d) **On-Board Diagnostics Credit.** Commit to a backup strategy in the event that EPA ultimately provides less credit for OBD than claimed in the maintenance plan. This strategy should be adopted within 12 months after EPA makes such a determination.

e) **Federal Low Emission Vehicle (FedLEV) Credit.** Commit to a backup strategy to be adopted if the FedLEV is delayed beyond 2001. The schedule should provide sufficient time for SIP approval prior to 2001.

f) **Transportation Control Measure (TCM) Substitution.** Ensure that any issues regarding the TCM substitution procedures are worked out with EPA Region 10 and EPA Headquarters.

g) **TCM Implementation.** Describe how the funding-based measures are funded. Include a discussion of the requirements for priority funding and timely implementation of the identified TCMs.

h) **Future Industrial Growth Allowance Changes.** Revise the text describing the growth allowance to indicate that future surplus reductions must be federally enforceable in order to be used to increase the growth allowance without a SIP revision. Revise the commitment for periodic emission inventory updates to include a clear discussion and thorough accounting of any activity in the growth allowance program, including a discussion of how each increase in the growth allowance is based on a federally enforceable reduction.

i) **New Source Review/Prevention of Significant Deterioration (NSR/PSD) Program.** Any changes to the NSR/PSD program needed to support the maintenance plan must be adopted by November, 1996. The NSR/PSD requirements for maintenance areas must not exempt sources subject to the federal PSD program from PSD requirements. Likewise, the contingency plan requirements may not exempt sources subject to the federal PSD program from PSD requirements unless the area is redesignated to nonattainment.

j) **Periodic Emission Inventories (EI).** The initial timeline for preparing the periodic EI update should be revised from 23 months to 12 months after the end of the reporting year. The update should include a confirmation and/or adjustment of forecasting factors (emission factors, growth factors, rule penetration, etc.) and preparation of a new summary table. If there is possibility of exceeding the predicted emission levels, then discussion with appropriate EPA staff is needed to determine if additional studies, a more extensive periodic EI, and/or triggering of the contingency measures will be necessary. If a more extensive EI is required, it should be submitted within 23 months after the end of the reporting year.

Response: The Department believes the revisions requested by EPA are reasonable and will make the requested changes.

Comment 3: Support for enhanced vehicle inspection. (Commenters: 5, 58, 98, 116)

The commenters support the enhanced motor vehicle inspection program and expanded inspection boundary as a good investment in air quality. Problems reported in implementing enhanced inspection in other states have been due to poor public relations, not problems with the technology. The first focus should be getting people out of their cars, and the second focus should be making cars pollute as little as necessary. Responsibility for ozone-causing emissions should be placed on the largest source, individual drivers.

Response: The Department agrees with the commenters. The Department agrees that reducing growth in vehicle miles traveled (VMT) and reducing the emissions per mile are both important elements of the ozone maintenance plan. The mandatory ECO program, voluntary parking ratio program, and Metro's transportation control measures are all designed to reduce VMT. The enhanced vehicle inspection program and the expanded inspection boundary will significantly reduce emissions from in-use motor vehicles.

The Department has been able to learn from the experiences of other states and plans to make a number of improvements in the enhanced vehicle emissions testing program to avoid implementation problems. The test cycle has been fine tuned to minimize the test time and cost while maximizing the air quality benefit. A mechanic training program will be included to ensure that mechanics are comfortable with the program and that repairs are effective. Sufficient test lanes and inspectors will be available to ensure that waiting times do not increase significantly. Finally, a public information program will be included to provide motorists with full information about the enhanced test.

Comment 4: The need for enhanced vehicle inspection has not been demonstrated. (Commenter: 96)

The need for the enhanced vehicle inspection program has not been fully demonstrated. First, adjustments made to vehicles during the winter to improve driveability with oxygenated gasoline increase emissions when non-oxygenated gasoline is used in the summer. After one or two winters without oxygenated fuel, vehicles will adjusted for leaner fuel and the area may benefit from lower ozone levels. Second, the Department has not taken full advantage of computer upgrades to the current inspection program by communicating the test failure specifics and optimum emission readings for various classes of vehicles to vehicle owners and auto repair shops. This should reduce Portland's failure rates which are higher than failure rates in Seattle.

Third, enhanced testing of certain model years will have unintended consequences such as doctoring fuel, switching license plates, failure to register vehicles, theft, and increased popularity of older vehicles that are not subject to the enhanced test. Fourth, the test may not be politically acceptable because of its economic impacts, intrusiveness, and inability to fairly and accurately test the many models of vehicles built since 1981. Fifth, federally required extended warranty for emission control systems as well as the introduction of on-board diagnostics will reduce the effectiveness of inspection programs over time. Finally, the small number of vehicles with super high emissions can be identified through remote sensing.

Response: The Department believes that enhanced vehicle inspection is a very important, cost-effective, and practical emission reduction strategy for the ozone maintenance plan.

The Department does not believe that adjustments made to vehicles due to the wintertime oxygenated program will significantly affect summertime emissions. In many newer vehicles, the on-board computer systems are able to automatically enrich the fuel mixture to compensate for oxygenated fuel, making other adjustments unnecessary. In cases where a vehicle is tuned in the winter due to performance problems using oxygenated fuel, it is very likely that the vehicle will need to be re-tuned in the summer to avoid performance problems with non-oxygenated gasoline.

Computer upgrades to the Department's basic test were primarily made to meet EPA quality assurance requirements. The basic test only provides information about the concentration of pollutants in the tailpipe under idle conditions. This information, along with the pass criteria, is provided to individuals with vehicles that fail the test. In contrast, the enhanced test will provide a second-by-second printout of emissions in grams per mile under acceleration and deceleration. This information will help automotive technicians pinpoint the specific problem in the emission control system. The Department is in the process of developing a certification program to ensure that automotive technicians are prepared to properly utilize this information in making repairs. The Department notes that failure rates are lower in Seattle because of easier pass/fail criteria, not better maintenance. This means that the program in Seattle is not as effective in reducing emissions as it could be with more stringent pass/fail criteria.

The Department does not believe that addition of the enhanced test will increase the rate of unintended consequences identified by the commenter. Although only 1981 and newer vehicles will be subject to the enhanced test, all 1975 and newer vehicles will be subject to testing (either basic or enhanced). Oregon has an extremely high compliance rate (over 90%) with the vehicle inspection program. There is no evidence during the past 20 years of testing that the program has had a significant impact on registration fraud, vehicle theft or the age of the vehicle fleet.

The Department has taken a number of steps to ensure that the enhanced testing program will be politically and administratively feasible. The program was recommended by a broad-based task force appointed by the Governor. The 1993 Oregon Legislature directed the Department to include the program in the maintenance plan, and the 1995 Legislature reviewed and affirmed this decision. The Department has been operating a pilot enhanced test lane for a number of months, and has optimized the test procedure to minimize the test time and cost. One of the major advantages of the enhanced test is that it is much better able to fairly and accurately identify high emitting vehicles than the basic test. Also, EPA has indicated that improvements in fuel economy will offset the repair costs for vehicles that fail the enhanced test.

The extended emission control system warranties and on-board diagnostic (OBD) systems are an integral part of the enhanced testing program. The extended warranties ensure that owners of newer vehicles do not have to pay for repairs caused by defective emission control equipment. The Department will also be testing the OBD systems required to be installed on 1996 and newer vehicles. Initially, the enhanced test and OBD test will be conducted together to establish the effectiveness of OBD. Once OBD is proven, it may be possible to phase-out the enhanced test for vehicles equipped with OBD, thereby further reducing the cost.

While it is true that a small percentage of the fleet are high emitters, these vehicles account for a very small percentage of overall vehicle miles traveled. Most of the excess emissions come from gradual deterioration of emission control systems and improper maintenance of "middle-aged" vehicles. Remote sensing is not able to detect most of the emission control system failures that result in excess emissions, and is not an adequate substitute for a vehicle inspection program.

Comment 5: Enhanced vehicle inspection is unnecessary. (Commenter: 112)

The present vehicle inspection program has worked well. Why change? New automobiles have lower emissions, and there is no reason to believe that this will not continue in the future. With enhanced testing, the fee will increase, waiting times will increase and the dynamometer test will strain the vehicle, possibly shortening its life somewhat. If the need is for increased revenue, then test every vehicle in the state.

Response: The present inspection program has worked well and has resulted in significant emission reductions for the Portland area. The enhanced test is needed to provide additional emission reduction to offset growth in the area. Whereas the basic test reduced VOC emissions from motor vehicles by about 12 percent, the enhanced test will reduce VOC emissions by over 30 percent. Nitrogen Oxides, which are not included in the basic test, will be reduced by over 15 percent with the enhanced test. The enhanced test also provides significant reductions in carbon monoxide. It is true that new motor vehicles have lower emissions than older vehicles, and the maintenance plan relies on this continued improvement in emissions performance. The vehicle inspection program complements the new motor vehicle standards by ensuring that the vehicles are properly

maintained and meet the emission standards in actual use. The Department has optimized the enhanced test to minimize the cost and reduce the testing time. Sufficient additional test lanes are planned to prevent an increase in waiting times. There is no evidence that the enhanced test has any affect on vehicle life. Finally, the inspection fee is designed to cover the costs of the program. The changes in the inspection program are not intended to generate surplus revenue for the Department.

Comment 6: Old vehicle should be exempt from inspection. (Commenter: 98)

It is unlikely that many miles are traveled by vehicles more than 20 years old. These vehicles could be exempted from the inspection and maintenance program.

Response: While the mileage of these older vehicles is not great, the emissions per mile can be quite high because of deterioration and poor maintenance of emission control equipment. The maintenance plan relies on emission reductions from including these vehicles in the inspection program. The Department also notes that this strategy can not be eliminated by the Environmental Quality Commission. The 1993 legislature required inspection for 1975 and newer vehicles, and a statute change would be required to revise this requirement.

Comment 7: Selected strategies are not cost-effective. (Commenter: 16)

The maintenance plan relies on tools at DEQ's disposal, rather than the most cost-effective solutions. DEQ should explore options to control population growth as a means of reducing air pollution. Alternatives include deportation of illegal aliens, reducing teenage pregnancies, training workers locally, helping the unemployed find work outside of the state, voter approval prior to annexation, and voter initiatives to require future development to pay for all needed infrastructure.

Response. The strategies selected for the ozone maintenance plan were recommended by a broad-based Task Force appointed by the governor, and were approved by the Oregon Legislature. While the Task Force did not consider the population control strategies suggested by the commenter, the Task Force did consider a wide-range of strategies including the development impact fee suggested by the commenter. Cost-effectiveness was a major criterion used by the Task Force in making its recommendations. In addition to air quality benefits, the Task Force considered the impact of each strategy on congestion, energy consumption, land-use and the economy. Each strategy was also evaluated for technical feasibility, practicality of implementation, equity, and EPA approvability.

Comment 8: Transportation control measures are not enforceable. (Commenter: 111)

The Metro growth concept is not measurable, the specific elements are not enforceable, and therefore they are not permanent. The plan calls for increasing densities, yet developers build at lower densities than called for in local plans. The plan calls for completion of the South-North Light Rail, despite lack of funding for the Clark County portion. The plan predicts an average 1.5 percent per year increase in regional transit service, yet Tri-Met is struggling to maintain existing service.

Response: The Transportation Control Measures (TCMs) included in the maintenance plan meet the Clean Air Act requirements for measurable, enforceable and permanent reductions. First, the Metro Council will adopt the urban growth boundary and the interim implementation measures as binding requirements for local governments. The Metro Council has statutory authority to require local comprehensive plan amendments to be consistent with the interim measures and the regional framework plan. Second, the TCMs identified in the maintenance plan must receive priority funding and timely implementation or a conformity determination could not be made for Metro's transportation plans and federal funding would be withheld. Therefore, the region will need to work cooperatively to ensure that the TCMs are funded and implemented. Third, Metro will also be required to meet the emissions budgets in the maintenance plan that were developed assuming implementation of the TCMs. If the TCMs are not implemented or are not effective, the transportation plans will exceed the emissions budgets and regionally significant transportation projects will not be allowed to move forward. Finally, the TCMs in the plan are based on a financially constrained road and transit network. This network includes only projects that can be supported based on historical funding level trends.

Comment 9: Clarification is requested regarding the transportation emission budgets. (Commenter: 99)

The transportation emissions budgets include a post model adjustment based on assumed effectiveness of the voluntary parking ratio program. Can Metro make this same assumption for conformity purposes? Metro agrees with the assumption of 1.3%/year VMT growth for the emissions budgets beyond 2006. What procedures are available if the growth rate changes? The emissions budgets were developed using EPA's Mobile 5a model. What happens to the emissions budgets and conformity determinations when Mobile 6 becomes available?

Response: When conducting a conformity analysis, Metro may use a post model adjustment to account for the implementation of the ECO and the parking ratio programs. The assumptions regarding the effectiveness of these programs will be discussed and agreed to during interagency consultation. This assumption will be based on past experience as well as projected implementation rates in these programs. In the event that implementation rates are lower than assumed in developing the emissions budgets and

this results in a significant emissions impact (as agreed to in the course of interagency consultation), it will be necessary for the Department to take additional steps to increase the effectiveness of these strategies or to utilize the TCM substitution process.

If the emissions after 2006 are higher than the established emissions budgets, the appropriate course of action will be based on the reason for the higher emissions. If projected emissions are higher because of failure to implement transportation control measures (TCMs), these TCMs will have to be implemented in the first year of the next Transportation Improvement Program (TIP), or a replacement strategy will be required. If implementation of the TCMs reduce emissions equal to or below the budget, a conformity determination may be made for the plan and/or TIP. If projected emissions are higher due to demographic or socioeconomic factors, then the increase will need to be offset by implementation of additional emission reduction measures or a conformity determination can not be made for the plan and/or TIP until the emissions budgets are revised through an approved SIP revision.

The Department has been working with EPA and other national stakeholders to resolve how changes in the Mobile model will effect future conformity determinations. Under the present rules, a grace period of 3 to 24 months (depending on the nature and extent of the changes) will be provided before Metro would be required to use the new emission factors. Upon learning of EPA's proposal to revise the model, the Department will work with Metro to identify the impacts of the proposed changes and provide input to EPA on the appropriate length of the grace period. If changes in the mobile model result in conformity problems despite full implementation by Metro of all the TCMs, the Department and Metro can use the grace period to develop appropriate revisions to the emissions budgets. If it is necessary to revise the emissions budgets, it may be necessary to recalculate transportation emissions for the base year of the plan using the latest Mobile model. Other options will likely be proposed by EPA in the upcoming conformity rule revisions.

Comment 10: Focus on air quality and congestion. (Commenter: 121)

The maintenance plan needs to meet two joint goals: improving air quality and traffic congestion. One element must not succeed at the expense of the other. Providing exemptions from ECO for employers who reduce emissions in other ways could undermine the State's support for reductions in traffic congestion.

Response: While maintaining ozone air quality in the region is the primary goal of the maintenance plan, the Department has worked closely with Metro and local governments to ensure that the plan supports the transportation goals of the region as well. The ECO program will provide significant congestion-reduction benefits because it will primarily reduce peak-hour trips. The Department has proposed to exempt a small number of sources from ECO in exchange for significant reductions in permitted industrial emissions and the Department has proposed on-site emission reductions as an alternative compliance option

for ECO. However, these exemptions and alternatives will not significantly affect the congestion benefits of the program.

The maintenance plan includes a number of elements, in addition to ECO, that will help to reduce congestion and the growth in vehicle miles traveled in the region. The voluntary parking ratio program is designed to reduce trips from new development. Metro's Region 2040 growth concept and the urban growth boundary are designed to reduce urban sprawl and encourage new development to be less auto-dependent. The plan also includes commitments for significant expansions in transit, pedestrian and bicycle facilities, and a public education and incentive program to encourage the use of these alternatives.

Comment 11: Repeal the area source rules. (Commenters: 100, 101)

EPA has recently proposed a national consumer products rule and is pursuing additional area source rules including a national architectural and industrial maintenance (AIM) coatings rule. Oregon Administrative Rule (OAR) 340-22-1130 commits DEQ to review the need for its area source rules when a comparable national rule is adopted. Will DEQ repeal the state rules when the comparable national rules are adopted?

Response: The area source rules were adopted in May, 1995, as an element of the ozone maintenance plan. The state rules were adopted because early VOC reductions were needed and the federal rules were delayed. The Department fully intends to implement the review required by OAR 340-22-1130. If the final federal rules are at least as stringent as the Oregon rules, DEQ will recommend repeal of the Oregon rules to the Environmental Quality Commission. It may be necessary to retain the Oregon rules for a limited time period after adoption of the federal rules until the federal rules are fully implemented.

Comment 12: Support for public education and incentive program. (Commenter: 116)

The commenter strongly supports the public education and incentive program. The key to the success of the maintenance plan lies with the public, as the vast majority of the emissions are from public controlled sources, not industrial sources.

Response: The Department agrees that the public education and incentive program is extremely important, both in ensuring the effectiveness of the other emission reduction strategies and in achieving additional emission reduction needed for the maintenance plan.

Comment 13: DEQ should actively support the gasoline pipeline. (Commenter: 15)

The maintenance plan assumes emissions reductions from the future operation of a planned gasoline pipeline which would reduce emissions from barge loading. The plan, which is relatively detailed regarding the other elements of its control strategies, is silent about what steps the DEQ will take to insure that this planned pipeline will actually be constructed, and that the resulting emissions reductions will be achieved. This is a very important issue because of the large amount of emissions involved. DEQ should consider taking some action to support the pipeline. For instance, DEQ could intervene or testify in the hearings and proceedings before the Washington Energy Siting Council regarding the Olympic pipeline.

Response: The Department agrees that the maintenance plan relies on the gasoline pipeline to provide significant emission reductions. The Department will add a commitment in the maintenance plan to monitor progress in constructing the pipeline or other emission controls implemented by the gasoline terminals and barge operators. If the pipeline is not constructed and emission reductions have not been achieved by other measures not relied upon in the maintenance plan, the Department will propose alternate measures for adoption by the EQC and implementation prior to the 1999 ozone season.

Comment 14: The contingency plan should not focus on industry. (Commenter: 12)

Industry has already made significant emission reductions. The contingency plan calls for further control of industry, even if the problem is caused by another source category. The maintenance plan should include an emissions allocation for each source category. If one category exceeds the allocation, the contingency plan should require reductions from that category, rather than further reductions from industry. For example, congestion pricing could be required if auto emissions exceed their allocation.

Response: The Department believes that it would be inappropriate to trigger the contingency plan based on allocations made to individual source categories. This could result in implementing the contingency plan even if there is no threat to air quality. However, the Department believes that the concern expressed by the commenter is addressed in the existing contingency plan and transportation emission budgets.

The contingency plan has two phases. The goal of phase 1 is to prevent a violation of the ozone standard. Phase 1 is triggered if the total emissions from all source categories exceeds the maintenance emission level. In this case, the Department is to identify the reason for the excess emissions, and recommend additional emission reduction strategies if needed to prevent a violation of the ozone standard. The plan identifies reformulated gasoline and congestion pricing as among the possible candidate strategies. Further restrictions on industry would not necessarily be required under phase 1.

The goal of phase 2 is to prevent further violations of the ozone standard and to reduce the likelihood that EPA will redesignate the area back to nonattainment. Phase 2 of the contingency plan is only triggered if there is an actual violation of the ozone standard. In this case, nonattainment area control requirements for major new industry (i.e. LAER and offsets) would be reinstated, and the Department would propose adoption of reformulated gasoline, congestion pricing, or other effective measures. The nonattainment area requirements for major new industry could be lifted again under a new maintenance plan.

The Department also notes that the maintenance plan includes emissions budgets for on-road mobile sources as required by the Clean Air Act. Under the transportation conformity program, transportation plans that exceed these budgets can not receive federal funding. This process is designed to prevent excess auto emissions that could otherwise trigger the contingency plan or cause a violation of the ozone standard.

Comment 15: Corrections are needed in Appendix D1-4-3. (Commenter: 114)

In the emission forecast, Simpson Timber should be identified as a paper coater and resin manufacturer, not an organic chemical manufacturer. Donated unused Plant Site Emission Limit (PSEL) should not be identified as "unneeded."

Response: The industry description was based on the SIC code in the permit. The Department will make the correction, as requested, in Appendix D1-4-3 as well as the 1990 and 1992 emission inventories. The description of unused PSEL will also be revised as requested.

Comment 16: Industrial pollution fees should be used in the long term. (Commenter: 111)

In the long term, the most promising strategy for reducing industrial source pollution is likely to be tonnage-based pollution fees. These fees provide on-going incentives to prevent pollution and funding to compensate the public for pollution impacts. DEQ should study this concept for industrial sources as it did for vehicles in 1994.

Response: The existing Title V permit fees for major industrial sources are based on emissions. While these fees were set at levels needed to fund the Title V program, as opposed to levels needed to significantly reduce emissions, the program will provide some information about the effectiveness of this concept. At this time, the Department can not commit to a specific study of industrial emission fees due to funding and staff limitations. However, the Department will continue to explore this and other innovative control options in the future as the opportunity arises.

Comment 17: Additional controls should be added for existing industry.
(Commenter: 98)

Existing industrial sources should be subject to retrofit Nitrogen Oxides (NO_x) controls.

Response: The Department does not believe that additional NO_x reductions are needed for the ozone maintenance plan at this time. The Environmental Protection Agency has achieved significant NO_x reductions with its standards for new heavy-duty nonroad diesel engines. In addition, the enhanced motor vehicle inspection program will achieve substantial NO_x reductions from on-road motor vehicles. Nevertheless, the maintenance plan includes a study to further evaluate, among other things, the role of NO_x in ozone formation in the Portland/Vancouver area. This study will help determine if there is a need for further NO_x reductions in the next ozone maintenance plan. Finally, the Department notes that retrofit NO_x controls for existing industry would be required if the area violated the ozone standard again prior to redesignation to attainment.

Attachment E

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Ozone Maintenance Plan

Detailed Changes to the Original Rulemaking Proposal Made in Response to Public Comment

1. Unused PSEL Management Program

References to the backup regulatory program to manage the use of unused PSEL were eliminated in Sections 4.50.0.2.9, 4.50.3.2.3.4, the industrial emissions forecast in Appendix D1-4-3 and the PSEL management program description in Appendix D1-15. This program was eliminated because the PSEL donation program achieved its objectives.

2. Section 4.50.3.2.3.1, On-road Vehicle Strategies

. . .

Transportation Control Measures

Several significant Transportation Control Measures (TCMs) identified in Metro's Regional Transportation Plan (RTP) were included in motor vehicle emission forecasts prepared by Metro for the maintenance plan. Because these measures reduce motor vehicle emissions, the FCAA transportation conformity process requires DEQ to identify them in the maintenance plan to ensure that they are funded and implemented in a timely manner.

The TCMs identified in the maintenance plan fall into two categories: non-funding based TCMs and funding based TCMs. The non-funding based TCMs reduce transportation emissions through land-use requirements and regulatory programs. The funding based TCMs reduce transportation emissions by increasing the supply of transit, bicycle and pedestrian facilities. The funding based TCMs were established in the financially constrained transportation network of Metro' interim federal RTP, adopted July, 1995, in accordance with the requirements of the federal Intermodal Surface Transportation

Efficiency Act (ISTEA). This network includes only projects that can be financially supported based on historical trends.

The funding based TCMs must receive priority funding in Metro's transportation planning process and all TCMs identified in the maintenance plan must receive timely implementation. If the TCMs do not receive priority funding and timely implementation, a conformity determination can not be made for Metro's transportation plans and all regionally significant projects will be held up until a conformity determination can be made. These requirements are specified in the transportation conformity rules, OAR 340-020-0710 through 340-020-1080. In general, "priority funding" means that all state and local agencies with influence over approvals or funding of the TCMs are giving maximum priority to approval of funding of the TCMs over other projects within their control. "Timely implementation" means that the TCMs are being implemented consistent with the schedule established in the maintenance plan. The determination of whether priority funding and timely implementation have been achieved is made in the context of interagency consultation as specified in the transportation conformity rules.

Identified TCMs may be substituted in whole, or in part, with other TCMs providing equivalent emission reductions. Substitution occurs through consultation with Metro's Transportation Policy Alternatives Committee (TPAC) and Joint Policy Advisory Committee on Transportation (JPACT). Such substitution requires public notice, EQC approval and concurrence from EPA, but does not require a revision to the State Implementation Plan. See appendix D1-17 for the TCM substitution requirements.

The ~~[*improvements include*]~~TCMs included in the maintenance plan are:

. . .

~~[*TCM Substitution*~~

~~*TCMs identified may be substituted in whole, or in part, with other TCMs providing equivalent emission reductions. Substitution will occur through consultation with Metro's Transportation Policy Alternatives Committee (TPAC) and Joint Policy Advisory Committee on Transportation (JPACT). Such substitution will require EQC, but not EPA, approval. See appendix D1-17 for the TCM substitution requirements.*~~]

3. **4.50.3.2.3.4, Industrial Emission Strategies**

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Major New Source Review

. . .

During the life of the maintenance plan, DEQ will attempt to increase the growth allowance by utilizing new federally enforceable emission reductions or shutdown credits that were not relied upon in the maintenance demonstration. In particular, the growth allowance will be increased upon revision of the transportation emissions budgets to reflect emission reductions from EPA's gasoline detergent additive program (see Section 4.50.3.3.3). Any such increases in the growth allowance will be subject to approval by EPA Region 10. Federally enforceable emission reductions include requirements adopted by EPA, requirements adopted by EQC and approved by EPA as a revision to the Oregon SIP, and requirements established by a federally enforceable permit condition. DEQ may also temporarily or permanently reduce the growth allowance, if necessary, to prevent emissions from exceeding the maintenance emission level.

~~[*DEQ will track allocations and increases in the growth allowance, and include this information in attainment verification reports to EPA described in Section 4.50.4.2.*]~~DEQ will prepare a thorough accounting of any activity in the growth allowance program for each period identified in Table 4.50.3.4, including any allocations to sources and any increases in the growth allowance. This information will be reported to EPA within 12 months following the end of the reporting period. If there were any increases to the growth allowance since the last report, DEQ will include a clear discussion of how each increase to the growth allowance is based on a surplus and federally enforceable emission reduction. See also commitments in Section 4.50.4.3 "Maintenance Plan Commitments".

. . .

4. Section 4.50.3.3, Contingency Plan

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Phase 1: Risk of Violation

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Phase 2: Actual Violation

If a violation of the ozone NAAQS is recorded and validated by DEQ:

1. New Source Review requirements for p~~[*P*]~~roposed major sources and major modifications in the AQMA (and the area of significant air quality impact) will be ~~[*subject to New Source Review requirements applicable to marginal ozone nonattainment areas as provided in OAR 340-028-1930*]~~modified. The requirement to install Best Available Control Technology (BACT) in the AQMA will be replaced with a requirement to install Lowest Achievable Emission Rate (LAER) technology. In addition, t~~[*T*]~~he industrial growth allowance established

in Section 4.50.3.2.3.4 will be eliminated. These requirements will take effect upon validation of the violation. BACT and a growth allowance may be reinstated if provided for in a new maintenance plan adopted by the EQC and approved by EPA.

. . .

Rules to implement reformulated gasoline, congestion pricing or other measures identified to achieve equivalent emission reductions will be presented to the EQC for adoption within 12 months after the violation is recorded and validated. Where TCMs are identified as control strategies, they will be included in the Metro's TIP and RTP within 12 months after the violation is recorded and validated. Emission reduction measures will be implemented as soon as possible, and every attempt will be made to implement the measures no later than 12 months after adoption.

. . .

5. 4.50.4.1.2, Summary of SIP Revisions to Meet 1990 Clean Air Act Requirements

. . .

4. *New Source Review Rules (NSR) for "major sources."* On November 16, 1992, DEQ submitted revisions to the New Source Review permit program. These revisions include:

   a. A requirement that offsets come from contemporaneous, actual emission reductions under OAR 340-028-1970(5);

   b. A 1.1 to 1 offset ratio for emission reductions for new major sources or major modifications (i.e., a ten percent reduction) under OAR 340-028-1970(3)(c); and

   c. The elimination of remaining VOC growth allowance that existed before 1990.

   DEQ expects these NSR revisions to be approved by EPA before, or concurrent with, this redesignation request/maintenance plan, although approval is not required prior to redesignation according to EPA guidance. DEQ will also submit further revisions to establish NSR requirements for the Oregon portion of the AQMA effective upon redesignation (see Control Measures in Section 4.50.3.2.3, Maintenance Plan Commitments in Section 4.50.4.3, and New Source Review Program Changes in Appendix D1-16).

. . .

6. *Transportation Conformity Requirements.* Section 176(c) of the FCAA requires states to revise the SIPs to establish criteria and procedures for demonstrating transportation plan conformity to a SIP. On April 14, 1995, DEQ submitted to EPA a revision to the Oregon SIP establishing transportation conformity requirements for Oregon (OAR 340-020-0710 through 340-020-1080). In addition, general conformity requirements (OAR 340-020-1500 through 340-020-1600) were submitted on September 27, 1995. ~~[*DEQ expects these conformity rules to be approved by EPA before, or concurrent with, this redesignation request/maintenance plan.*]~~EPA approved the transportation conformity rules as a SIP revision on May 16, 1996.

6. 4.50.4.2, Continued Air Monitoring and Attainment Verification

Monitoring Network

. . .

If two exceedances of the ozone NAAQS are recorded and validated at the same permanent monitoring site within three years, DEQ will implement phase 1 of the contingency plan as specified in Section 4.50.3.3. If a violation of the ozone NAAQS is recorded and validated, DEQ will implement phase 2 of the contingency plan.

Attainment Verification

DEQ will analyze annually the ozone air quality monitoring data to verify continued attainment of the ozone standard in accordance with 40 CFR Part 50 and EPA's redesignation guidance. This data, along with data collected by SWAPCA for the Washington portion of the AQMA, will provide the necessary information for determining whether the AQMA continues to attain the NAAQS.

DEQ will also ~~[*update the ozone emission inventory for each year listed in Tables 4.50.3.1 through 4.50.3.3, compare it to the emission forecast and attainment inventory, and evaluate any changes that may have occurred. This updated emission inventory will be submitted to EPA as specified in Section 4.50.4.3.*]~~prepare an updated emission inventory summary for 1996, 1999, 2001, 2003 and 2006. These updates will be submitted to EPA Region 10 within 12 months following the end of the periodic emission inventory calendar year. In preparing the updates, DEQ will review the emission factors, growth factors, rule effectiveness and penetration factors, and other significant assumptions used to prepare the emission forecast. DEQ will confirm these factors and/or adjust them where more accurate information is available. Any new emission sources will be included in the update.

DEQ will compare the updated emission summary to the emission forecast and the attainment inventory in Tables 4.50.3.1 through 4.50.3.3, and evaluate any changes that have occurred. If there have been significant changes, DEQ will, in consultation with EPA Region 10, determine if a more extensive periodic emission inventory is necessary. If a more extensive inventory is necessary, it will be submitted to EPA within 23 months after the end of the reporting year.

If the emission inventory, in combination with the inventory for the Washington portion of the AQMA, exceeds the maintenance emission level, DEQ will implement phase 1 of the contingency plan as specified in Section 4.50.3.3.

See Commitments in Section 4.50.4.3 "Maintenance Plan Commitments".

7. **Section 4.50.4.3, Maintenance Plan Commitments**

. . .

- DEQ will coordinate with SWAPCA on a public education and incentive program and a voluntary lawn and garden equipment curtailment program. See Appendix D1-12 for a description of these programs. DEQ will submit documentation of the effectiveness of the public education and incentive program to EPA Region 10 and, if necessary, will implement the backup plan as specified in Appendix D1-12-1.

- DEQ will submit documentation of the effectiveness of the voluntary parking ratio program to EPA Region 10 and, if necessary, will implement the backup plan as specified in Appendix D1-14.

- DEQ will submit a backup emission reduction measure as a revision to the SIP in the event that EPA ultimately provides less emission reduction credit for on-board diagnostics than forecast in Appendix D1-4-3. The backup measure will be proposed for adoption by the EQC within 12 months after EPA makes such a determination.

- DEQ will submit a backup emission reduction measure as a revision to the SIP if the federal Low Emission Vehicle (fedLEV) is delayed beyond 2001. The measure will be proposed for adoption by the EQC by November 1, 1999.

- DEQ will monitor progress in constructing the cross-Cascades pipeline, which was assumed in the emissions forecast in Appendix D1-4-3 to significantly reduce VOC emissions from barge loading operations at bulk gasoline terminals by the

1999 ozone season. If the pipeline is not constructed and emission reductions have not been achieved by other measures that were not relied upon in the maintenance demonstration, DEQ will propose alternate measures for adoption by the EQC to be effective by May 1, 1999.

. . .

- DEQ will prepare periodic emission inventory updates for 1996, 1999, 2001, 2003 and 2006. The emission inventor[~~ies~~]y updates will be submitted to EPA within [~~23~~]12 months following the end of the periodic emission inventory calendar year as specified in Section 4.50.4.2.

- DEQ will prepare reports on activity in the industrial growth allowance program for the periods 1997-1999, 2000-2001, 2002-2003, and 2004-2006. These reports will be submitted to EPA within 12 months following the end of the period as specified in Section 4.50.3.2.3.4.

- DEQ will maintain documentation of approved TCM substitutions as specified in Appendix D1-17-2.

. . .

8. Appendix D1-3-4, Emission Forecast

Changes were made to source category labels in Exhibit D1-4-3-3 in response to comment.

9. Appendix D1-12-1, Public Education and Incentive Program

. . .

Backup Plan:

Credit for the public education and incentive program [~~*will be*~~]is relied upon in the ozone maintenance plan on and after the 1999 ozone season. The backup plan is designed to ensure adequate emission reductions for the maintenance plan if the public education and incentive program does not achieve VOC emission reductions at least equal to the target in the [~~*approved*~~]maintenance plan.

On [~~*December*~~]May 1, 1998, DEQ will submit initial documentation to EPA Region 10 demonstrating the emission reduction achieved by the program.[~~ *If DEQ believes that growth factors or the effectiveness of other strategies has changed significantly, DEQ may also submit a revision of the emission reduction target for the public education and incentive program based on an update to the maintenance demonstration in the plan.*~~] By

[*February*]July 1, 199[9]8, Region 10 will notify DEQ [*of the emission reduction credit and, if applicable, the emission reduction target that Region 10 intends to approve for the program*]if it does not concur with demonstration submitted by DEQ. The agencies will work together cooperatively to resolve any differences regarding the emission reduction credit achieved by the program[*or target*], [*including*]which could include the submission of additional data or analyses as needed.[*By March 1, 1999, Region 10 will notify DEQ of the final emission reduction credit and target approved.*] DEQ may submit supplemental information, if appropriate, to reflect the effectiveness of the program during the 1998 ozone season.

If the [*approved*]emission reduction credit for the public education and incentive program is less than the [*approved*]target in the maintenance plan, DEQ will [*implement the backup plan*]determine if the shortfall can be offset with existing federally-enforceable emission reduction measures that were not relied upon in the maintenance demonstration. If an existing measure is used to offset the shortfall, DEQ will submit information to EPA Region 10 documenting how the measure is surplus and federally enforceable.

If the shortfall can not be offset with existing measures, DEQ will convene an advisory committee by September 1, 1998, to recommend emission reduction measures sufficient to compensate for the shortfall in the public education and incentive program. Every attempt will be made to adopt and implement the selected back-up measures before the next ozone season. Measures will be submitted to the EQC for adoption no later than [*9 months following a final determination by Region 10 that the approved emission reduction credit is less than the approved target. The measures will have an effective date no later than May 1 following adoption.*]May 1, 1999. Within a month of adoption, these measures will be submitted to Region 10 as a revision to the SIP. DEQ may terminate the rulemaking with EPA's concurrence if supplemental information indicates that the emission reduction achieved by the public education and incentive program is equal to or greater than the target in the maintenance plan.

DEQ will submit evidence of ongoing implementation of the public education and incentive program concurrent with periodic emission inventory updates.[*Region 10 may request an update to the emission reduction quantification if there is evidence that it may have changed.*] DEQ will submit [*the*]an updated quantification to Region 10 within 6 months following request [*by Region 10*]if there is evidence of change.

10. Appendix D1-14, Voluntary Parking Ratio Program

. . .

Backup Plan:

The backup plan is designed to ensure adequate emission reductions for the maintenance plan if the voluntary maximum parking ratio program does not achieve VOC and NO_x emission reductions at least equal to the target in the maintenance plan.

On May 1, 1998, DEQ will submit initial documentation to EPA Region 10 demonstrating the emission reduction achieved by the program. By July 1, 1998, Region 10 will notify DEQ if it does not concur with demonstration submitted by DEQ. The agencies will work together cooperatively to resolve any differences regarding the emission reduction credit achieved by the program, which could include the submission of additional data or analyses as needed. DEQ may submit supplemental information, if appropriate, to reflect the effectiveness of the program during the 1998 ozone season.

If the emission reduction credit for the voluntary maximum parking ratio program is less than the target in the maintenance plan, DEQ will determine if the shortfall can be offset with existing federally-enforceable emission reduction measures that were not relied upon in the maintenance demonstration. If an existing measure is used to offset the shortfall, DEQ will submit information to EPA Region 10 documenting how the measure is surplus and federally enforceable.

If the shortfall can not be offset with existing measures, DEQ will convene an advisory committee by September 1, 1998, to recommend emission reduction measures sufficient to compensate for the shortfall in the voluntary maximum parking ratio program. Every attempt will be made to adopt and implement the selected back-up measures before the next ozone season. Measures will be submitted to the EQC for adoption no later than May 1, 1999. Within a month of adoption, these measures will be submitted to Region 10 as a revision to the SIP. DEQ may terminate the rulemaking with EPA's concurrence if supplemental information indicates that the emission reduction achieved by the voluntary maximum parking ratio program is equal to or greater than the target in the maintenance plan.

DEQ will submit evidence of ongoing implementation of the voluntary maximum parking ratio program concurrent with periodic emission inventory updates. DEQ will submit an updated quantification to Region 10 within 6 months following request if there is evidence of change.

11. Appendix D1-16, New Source Review Program Changes

. . .

DEQ plans to propose amendments to the NSR program to specifically establish NSR requirements for redesignated (maintenance) areas. These requirements will include:

- Best Available Control Technology (BACT);
- offsets
- growth allowance for use in lieu of offsets if provided for in the maintenance plan for the area; and
- an alternatives analysis.

For proposed major sources and major modifications with potential emissions of 250 tons per year or more (100 tons per year or more in certain source categories), the remaining PSD requirements will apply as well. The amendments will also ~~[*require sources in a redesignated area to comply with NSR requirements for nonattainment areas*]~~replace BACT with LAER and prohibit the use of a growth allowance to meet offset requirements ~~if~~ upon triggering of phase 2 of the contingency plan in the maintenance plan ~~has been triggered~~.

~~[*The NSR amendments will be included as part of a comprehensive update of the NSR and Plant Site Emission Limit (PSEL) rules.*]~~The rule adoption schedule is as follows:

- Public notice - 8/1/96 to 9/6/96
- EQC adoption - 11/15/96

12. Appendix D1-17-2, Substitution of Transportation Control Measures

In the event that a Transportation Control Measure (TCM) is not included in the Regional Transportation Plan (RTP) or Transportation Improvement Program (TIP) in the time frame contained for that measure in ~~[*a SIP*]~~this maintenance plan adopted by the EQC, the parties in the interagency consultation process established pursuant to OAR 340-020-0760 shall assess whether such measure continues to be appropriate. Where the Metro and the DEQ concur that a transportation control measure identified in the SIP is no longer appropriate, the agencies may initiate the process described in this Appendix to identify and adopt a substitute transportation control measure.

A substitute TCM must provide for equivalent or greater emissions reductions than the measure contained in the maintenance plan. In addition, a replacement measure must be implemented in the time frame established for the measure contained in this plan. Where such implementation date has already passed, measures selected pursuant to this Appendix that require funding must be included in the first year of the next TIP and long

range plan adopted by Metro. The substitute measures must be fully implemented within two years after the implementation date of the original measure in order to be a basis for a finding of timely implementation under OAR 340-020-0840. In order for the EQC to adopt substitute TCMs under this Appendix, there must be evidence of adequate personnel, funding, and authority under State or local law to implement and enforce the measures. Commitments to implement the substitute TCMs must be made by the agency with legal authority for implementation.

Metro will convene a committee (or working group) to identify and evaluate possible substitute measures. The committee shall include members from all affected jurisdictions, state and/or local air quality agencies and local transportation agencies. In addition, the working group shall consult with EPA. Consultation with EPA may be accomplished by sending copies of all draft and final documents, agendas and reports to EPA Region 10.

Metro~~[*and*]~~, DEQ and EPA Region 10 must concur ~~[*in*]~~with the appropriateness and equivalency of the substitute TCM. All substitute measures must be adopted by the EQC following the public comment period and EPA's 14-day concurrence period described below. The measure to be replaced shall stay in effect until the subtitute measure has been adopted.

The TCM to be replaced must be rescinded for the new TCM substituted pursuant to this Appendix to be effective. By adopting a substitution under this Appendix, the EQC formally rescinds the previously applicable TCM and adopts the substitute measures.

Prior to adopting a substitute measure under this Appendix, the substitute transportation control measure(s) must have been subject to a public hearing and comment process. This means there must be at least one public hearing on the substitution. The hearing can only be held after reasonable public notice, which will be considered to include, at least 30 days prior to the hearing:

- notice given to the public by prominent advertising in the area affected announcing the date time and place of the hearing;
- availability of each proposed plan or revision for public inspection in at least one location in each region to which it will apply;
- notification to interested parties in accordance with the Oregon Administrative Procedures Act;
- notification to the Administrator (through the Region 10 Office);

- notification to the Southwest Washington Air Pollution Control Agency and the Washington Department of Ecology; and

- notification of the chief executives of affected local governments, planning agencies, transportation agencies, environmental control agencies, and economic development agencies.

A description of the measure(s) and analysis supporting the proposal, including assumptions and methodology, must be made available to the public[~~and~~], DEQ and EPA Region 10 within a reasonable time before the public hearing, and at least 30 days prior to the close of the comment period. DEQ shall submit to EPA Region 10 a summary of comments received during the public comment period along with DEQ's responses following the close of the public comment period. EPA shall notify DEQ within 14 days if the Agency's concurrence with the substitution has changed as a result of the public comments. Where EPA fails to notify DEQ within 14 days, EPA is deemed to concur.

The analysis of substitute measures under this Appendix must be consistent with the methodology used for evaluating measures in the [~~*SIP*~~]maintenance plan. Where emissions models and/or transportation models have changed since those used for purposes of evaluating measures in the [~~*SIP*~~]maintenance plan, the [~~*original SIP*~~]TCM to be replaced and the substitute measure(s) shall be evaluated using the latest modeling techniques to demonstrate equivalent or greater emissions reductions will be achieved through implementation of the substitute measure(s).

~~[*DEQ shall submit the proposed methodology with an explanation of the discrepancies and their effect to the appropriate person in EPA Region 10. EPA shall approve or disapprove the proposed methodology by sending a written response to the Director of DEQ within 30 days. Where EPA fails to approve or disapprove within 30 days, EPA is deemed to approve.*]~~

Key methodologies and assumptions that must be consistent, and reconciled in the event of a discrepancy, are, for example:

- EPA approved regional and hot-spot (for CO and PM-10) emissions models;

- the area's transportation model; and

- population and employment growth projections[.].

DEQ will maintain documentation of approved TCM substitutions. The documentation will provide a description of the substitute and replaced TCMs, including the requirements and schedules. The documentation will also provide a description of the

substitution process including the committee or working group members, the public hearing and comment process, EPA's concurrence, and EQC adoption. The documentation will be submitted to EPA following adoption of the substitute measure by EQC, and made available to the public as an attachment to the maintenance plan. See Section 4.50.4.3, Maintenance Plan Commitments.

~~[*Any TCM replaced pursuant to this Appendix must provide for equivalent or greater emissions reductions than the measure contained in the SIP. In addition, a replacement measure must be implemented in the time frame established for the measure contained in this plan. Where such implementation date has already passed, transportation facility based measures selected pursuant to this Appendix must be included in the first year of the next TIP and long range plan adopted by Metro.*~~

~~*The TCMs in the previous SIP revision must be rescinded for the new TCMs substituted pursuant to this Appendix to be effective. By adopting a substitution under this Appendix, the EQC formally rescinds the previously applicable TCMs and adopts the measures presented in this document.*~~]

13. Miscellaneous changes

A number of typographical, gramatical and editorial changes were made throughout the ozone maintenance plan.

Attachment F

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Ozone Maintenance Plan

Advisory Committee Membership and Report

(See Appendix D1-7 of the Ozone Maintenance Plan, included in Attachment A of this report)

Attachment G

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Ozone Maintenance Plan

Rule Implementation Plan

Summary of the Proposed Rule

The Ozone Maintenance Plan is designed to maintain compliance with the federal ozone standard in the Portland Air Quality Maintenance Area (AQMA) for the next ten years. The federal Clean Air Act requires maintenance plans for areas seeking redesignation from nonattainment to attainment of national ambient air quality standards.

The maintenance plan includes a number of emission reduction strategies, including improvements to the motor vehicle inspection program (enhanced testing, expanded boundary, elimination of exemption for 20-year old vehicles), transportation control measures (ECO, voluntary parking ratios, and additional measures in Metro's Regional Transportation Plan), EPA's emission standards for new non-road engines, area sources rules (AIM coatings, consumer products, autobody refinishing), industrial emission management rules, and a public education and incentive program.

Proposed Effective Date of the Rule

Each of the emission reduction strategies in the maintenance plan has a specific effective date, specified in the applicable rules, and described in the maintenance plan. The maintenance plan as a whole will be state-enforceable upon adoption by the EQC and filing with the Secretary of State. The plan will be effective upon approval by EPA, anticipated prior to the 1997 ozone season.

Proposal for Notification of Affected Persons

Each emission reduction strategy in the maintenance plan includes a process for notifying affected persons. The notification process for Vehicle Inspection Boundary changes, ECO, Voluntary Parking Ratios, and Industrial Emission Management Rules are described in Agenda Items E through H for the July 12, 1996 meeting. Notification of Metro and local governments regarding the transportation control measures will be addressed through the interagency consultation process in the transportation conformity rules. Notification of persons affected by changes in the vehicle inspection program will be addressed through the existing notification process linked to vehicle

registration renewal. Notification of manufacturers affected by the non-road engine standards will be addressed by EPA. Persons affected by the area source rules have already been notified by the Department and trade associations. Private sector partners for the public education and incentive program are being contacted individually by the Department. The public will also be notified through advertising and other promotions.

Proposed Implementing Actions

Implementing actions have been identified for each emission reduction strategy in the maintenance plan. Implementing actions for Vehicle Inspection Boundary changes, ECO, Voluntary Parking Ratios, and Industrial Emission Management Rules are described in Agenda Items E through H for the July 12, 1996 meeting. Enhanced vehicle testing will be implemented through the existing vehicle inspection program by a change in the test procedure and pass/fail criteria. The transportation control measures will be implemented through the transportation conformity process including interagency consultation and the emissions budgets. The non-road engine rules will be implemented by EPA through emission standards for new non-road engines. The area source rules are currently being implemented by the Department through product registration, site inspections, and product sampling. The public education and incentive program will be implemented through information and incentives offered by DEQ and private sector partners, and will be quantified through surveys and sales records.

In addition, the Department will prepare emission inventory updates every 2 to 3 years to compare against emission forecasts in the maintenance plan. The updates will be used to verify the growth factors and control levels assumed in the plan. If the update indicates that emissions may exceed the maintenance emission level, the Department would, in consultation with EPA and SWAPCA, conduct a more thorough emissions inventory and/or implement phase 1 of the contingency plan. Under phase 1 of the contingency plan, the Department would determine if additional emission reduction strategies are needed to prevent a violation of the ozone standard, and, if so, propose these strategies for adoption by the EQC.

The Department will also continue to monitor ozone air quality. If there were a risk of violation of the ozone standard, the Department would implement phase 1 of the contingency plan. If there were an actual violation of the standard, the Department would implement phase 2 of the contingency plan. In this case, the industrial growth allowance would be eliminated and the Department would recommend reformulated gasoline or an equivalent measure for adoption by the EQC.

Proposed Training/Assistance Actions

The Air Quality Program Planning and Development Section will provide briefings for the Air Quality Program Operations Section and the Northwest Region, describing the new programs and changes to existing programs. Pertinent sections of the Air Quality Permitting Manual will be updated to describe New Source Review requirements for maintenance areas and procedures for tracking the industrial growth allowance.

Environmental Quality Commission

☒ Rule Adoption Item
☐ Action Item
☐ Information Item

Agenda Item E
July 12, 1996 Meeting

Title:

Revision to the Portland Area Motor Vehicle Inspection and Maintenance Program Boundary

Summary:

The 1994 vehicle inspection program boundary expansion added twenty-eight new census areas to the vehicle testing program. In 1995, some local governments, citizens and legislators expressed concern over including areas in the expanded boundary which have low commute rates into the Portland airshed. In light of these concerns, the Department has taken the initiative to reexamine the expanded vehicle inspection and maintenance boundary to determine if equity improvements could be made without jeopardizing the effectiveness of the ozone maintenance plan. The Department reviewed U.S. Census data on commute patterns in each of the twenty-eight census tracks originally included in the expanded vehicle testing boundary, and found four census areas (Newberg, Dundee, Aurora, Marquam) to have a significantly lower commute rate into the Portland airshed than other census areas in the expanded boundary. Based on that analysis, and the fact that lost emission credit can be made up by a slight reduction in the industrial growth cushion, the Department proposes to remove the Newberg, Dundee, Aurora, and Marquam census areas from the expanded vehicle inspection program boundary. Removing these areas will improve the equity and cost effectiveness of the vehicle testing program, and can be accomplished without jeopardizing the effectiveness of the ozone maintenance plan.

Department Recommendation:

The Department recommends that the Commission adopt the revision to the Portland Area Motor Vehicle Inspection Program Boundary as presented in Attachment A of this report, as an amendment to the federal Clean Air Act State Implementation Plan.

Report Author | Division Administrator | Director

Accommodations for disabilities are available upon request by contacting the Public Affairs Office at (503)229-5317(voice)/(503)229-6993(TDD).

State of Oregon
Department of Environmental Quality Memorandum

Date: June 24, 1996

To: Environmental Quality Commission

From: Langdon Marsh

Subject: Agenda Item E, July 12, 1996 EQC Meeting,

Revision to the Portland Area Motor Vehicle Inspection and Maintenance Program Boundary

Background

On April 4, 1996, the Director authorized the Air Quality Division to proceed to a rulemaking hearing on proposed rules which would revise the Motor Vehicle Inspection and Maintenance Boundary for the Portland area.

Pursuant to the authorization, hearing notice was published in the Secretary of State's Bulletin on May 1, 1996. The Hearing Notice and informational materials were mailed to the mailing list of those persons who have asked to be notified of rulemaking actions, and to a mailing list of persons known by the Department to be potentially affected by or interested in the proposed rulemaking action on April 17, 1996.

Public Hearings were held on May 22, 1996 and May 23, 1996 with Lawrence S. Smith and Mike Grant respectively serving as Presiding Officers. Written comment was received through May 24, 1996 at 5:00 p.m. The Presiding Officer's Report (Attachment C) summarizes the oral testimony presented at the hearing and lists all the written comments received. (A copy of the comments is available upon request.)

Department staff have evaluated the comments received (Attachment D). Based upon that evaluation, no modifications to the initial rulemaking proposal are being recommended by the Department. One change is being proposed to correctly reflect the Department's intent to exclude the City of Newberg from the testing boundary.

The following sections summarize the issue that this proposed rulemaking action is intended to address, the authority to address the issue, the process for development of the rulemaking proposal including alternatives considered, a summary of the rulemaking proposal presented for public hearing, a summary of the significant public comments and the changes proposed, if any, in response to those comments, a summary of how the rule will work and how it is proposed to be implemented, and a recommendation for Commission action.

Issue this Proposed Rulemaking Action is Intended to Address

The 1994 vehicle inspection program boundary expansion added twenty-eight new census areas to the vehicle testing program. In 1995, some local governments, citizens and legislators expressed concern over including areas in the expanded boundary which have low commute rates into the Portland airshed. The goal of this proposal is to be as responsive to these concerns as possible, without jeopardizing the effectiveness of the ozone maintenance plan. The Department has reviewed commute rate information from all twenty-eight census areas in the expanded boundary, and proposes revising the Inspection and Maintenance boundary to repeal the vehicle testing program in the four census tract areas of Newberg and Dundee in Yamhill County, Aurora in Marion County, and Marquam in Clackamas County. These four census areas have a significantly lower commute rate into the Portland airshed than other census areas in the expanded boundary.

Relationship to Federal and Adjacent State Rules

The Clean Air Act requires areas that wish to be redesignated from "nonattainment" to "attainment" status to submit a plan that will ensure that air quality standards are not violated for ten years after the Environmental Protection Agency's (EPA) approval of the plan. These plans are called Maintenance Plans.

The applicable federal requirements do not specifically address issues that are of concern to Oregon. The federal requirements are specifically designed to give each state the flexibility to adopt emission reduction strategies that are best suited for that area.

Authority to Address the Issue

The EQC has the authority to address this issue under ORS 468A.035; ORS 468A.390; ORS 468A.363; and ORS 468.035

Process for Development of the Rulemaking Proposal (including Advisory Committee and alternatives considered)

The 1994 vehicle inspection boundary expansion was designed to achieve a specific level of emission reduction as part of the overall Portland Air Quality Maintenance Area (AQMA) Ozone Maintenance Plan. The boundary expansion concept was one of several control strategies recommended by the 1992 State Task Force on Motor Vehicle Emission Reductions in the Portland AQMA, and endorsed by the 1993 legislature. The specific boundary selected by the EQC in 1994 included those portions of the surrounding urban areas that contributed a significant share of commute trips to the Portland AQMA airshed. Areas were selected by evaluating U.S. Census tract data showing commute trips into the Portland Air Quality Maintenance Area from the surrounding areas.

In light of concerns expressed in 1995 by some local governments, private citizens, and some legislators, the Department has taken the initiative to reexamine several ozone control strategies, including the expanded vehicle inspection and maintenance boundary, to determine if equity improvements could be made without jeopardizing the effectiveness of the ozone maintenance plan. The Department reviewed U.S. Census data on commute patterns in each of the twenty-eight census tracks originally included in the expanded vehicle testing boundary. The resulting commute rates (percent commuter contribution) reflect the percentage of work-related commute trips from each census area that contribute to the Portland AQMA airshed. Information on non-work trips into the Portland AQMA is not available for individual census tract areas. The distribution of commute rates for the twenty-eight census areas shows that a significant reduction in commute rate occurs at approximately the 40 percent level (Figure 1).

There are four census areas that fall below the 40 percent level, having significantly lower commute rates into the Portland airshed than the other expanded boundary areas. These areas are Newberg and Dundee in Yamhill County, Aurora in Marion County, and Marquam in Clackamas County. Figures 1 and 2 show commute rates into the Portland airshed for the twenty-eight expanded boundary census areas. Removing these four areas from the expanded vehicle inspection program boundary will improve the equity and cost effectiveness of the vehicle testing program, but will also result in a significant loss of emission reduction credit (73 tons/yr of Volatile Organic Compounds (VOC)). The emission reduction gained from the original expanded boundary is an important part of the overall ozone maintenance strategy. In order to maintain the integrity of the maintenance plan, the emission credit lost to the boundary revision must be replaced. After much deliberation, industry has reluctantly agreed to offset the emission reduction credit lost through the boundary revision by giving up an equivalent amount of VOC credit from the industrial growth cushion. This contribution from industry helps maintain the effectiveness of the ozone maintenance plan. Therefore, the Department proposes to repeal the expanded vehicle testing boundary in the census tract areas of Newberg, Dundee, Aurora, and Marquam.

While an advisory committee was used to develop the original expanded boundary, no specific advisory committee was used for this boundary reduction. Various Metro committees and the Metro Council support the boundary reduction as part of the overall ozone strategy. The key document relied upon for this proposal was the United States Census for 1990.

The alternative of no boundary revision was considered by the Department. However, this would fail to address the equity concerns expressed by some local governments, citizens, and legislators.

Figure 1: Percent Commuter Contribution by Census Tract Area

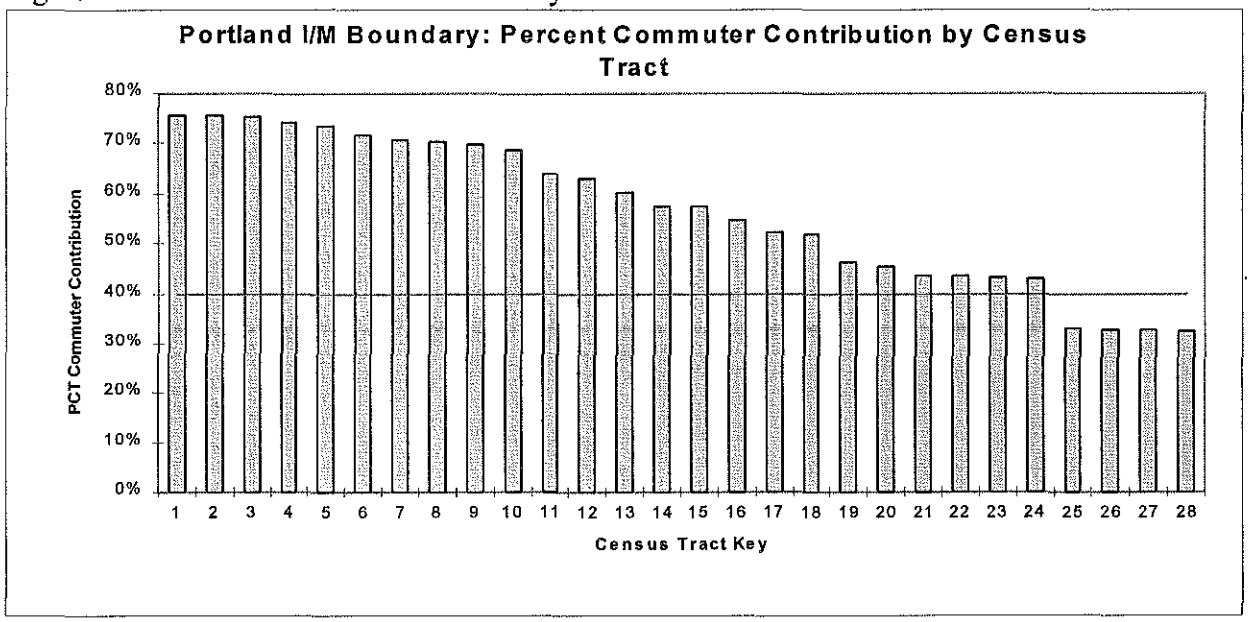

Figure 2: Census Tract Key For Expanded VIP Boundary

KEY	Census Tract Area	County	PCT of Employed Persons who work in the Portland AQMA	KEY	Census Tract Area	County	PCT of Employed Persons who work in the Portland AQMA
1	Cherry Grove	Washington	76%	15	North Plains	Washington	57%
2	Beavercreek	Clackamas	76%	16	Eagle Creek	Clackamas	55%
3	Redland	Clackamas	75%	17	Sandy	Clackamas	52%
4	Damascus	Clackamas	74%	18	Barlow	Clackamas	52%
5	Sauvie Island	Multnomah	74%	19	W. Scappoose	Columbia	46%
6	Gaston	Washington	72%	20	E. Scappoose	Columbia	45%
7	Manning	Washington	71%	21	Colton	Clackamas	44%
8	Boring	Clackamas	71%	22	Rex	Yamhill	43%
9	Mt. Home	Washington	70%	23	Canby	Clackamas	43%
10	Corbett	Multnomah	69%	24	Estacada	Clackamas	43%
11	Kelso	Clackamas	64%	25	Newberg	Yamhill	33%
12	Mulino	Clackamas	63%	26	Dundee	Yamhill	33%
13	Banks	Washington	60%	27	Aurora	Marion	33%
14	Highland	Clackamas	57%	28	Marquam	Clackamas	32%

Summary of Rulemaking Proposal Presented for Public Hearing and Discussion of Significant Issues Involved.

The proposal presented for public hearing would repeal the expanded vehicle testing boundary in the four census tract areas of Newberg and Dundee in Yamhill County, Aurora in Marion County, and Marquam in Clackamas County. Eliminating these areas results in a loss of 73 tons/yr VOC emission credit, or approximately 26 percent of the VOC emission credit from the expanded boundary. This lost emission credit is being made up by reducing the industrial growth cushion by 73 tons/yr VOC. The use of growth allowance for this purpose has been reluctantly accepted by industry.

The need for one technical change has been identified since the distribution of the initial proposal. The Department intended to exclude the City of Newberg in the proposed boundary revision based on a low commute rate into the Portland airshed, but the Newberg census area proposed for exclusion does not completely cover all of the Newberg City Limits. The Department is proposing to rectify this oversight. In addition, a small, sparsely populated group of census blocks adjacent to the city limits is also proposed for exclusion to prevent the creation of an artificial island and to maintain a contiguous boundary. The resulting loss of emission reduction credit will be negligible.

The corrected boundary description (OAR 340-024-0301) is included in this rulemaking as Attachment A and Attachment E-1.

Summary of Significant Public Comment and Changes Proposed in Response

1. Comment: **The Newberg, Dundee, Aurora, and Marquam census areas should not be removed from the expanded VIP boundary.** Several commenters opposed the removal of the Newberg, Dundee, Aurora, and Marquam census areas from the expanded vehicle Inspection and Maintenance boundary. These commenters believe that with autos contributing the major percentage of air emissions to the Portland airshed, more direct responsibility for air quality should be placed on the individual automobile owners.

Department Response: Looking at the ozone plan as a whole, even with the proposed boundary revision, motorists are still shouldering the largest share of the emission reduction strategy. Control strategies place the greatest emission reduction requirements on on-road vehicles, and this would not change with the proposed vehicle testing boundary reduction. Based on the Department's analysis, improvements in equity and cost effectiveness can be made to the program by eliminating the four proposed census areas, without jeopardizing the effectiveness of the Ozone Maintenance Plan. The proposed boundary revision will not significantly weaken the emphasis placed on motor vehicle control strategies in the maintenance plan.

2. Comment: **The actual impact of the number of vehicles entering the Portland AQMA should be considered in the boundary revision.** One commenter suggested using the actual impact of vehicles from each census areas (number of vehicles commuting into the Portland airshed) as the criteria for determining which area should be removed from the boundary, and not the percent commute rate from each census area as currently proposed by the Department.

Department Response: If the boundary adjustment was based solely on the actual number of vehicles contributing to the Portland airshed, some high population census areas with a low commuter contribution to the Portland airshed on a percentage basis would be added to the Inspection and Maintenance program. This would unnecessarily include a high number of motorists who do not contribute to the Portland airshed problem in the vehicle testing program, with little or no air quality benefit to the Portland airshed. Operating such a program would not be cost effective.

[A summary of all public testimony concerning the boundary revision and the Department's response can be found in the Department's Evaluation of Public Comment (Attachment D)].

After an evaluation of the public testimony presented, no modifications to the initial rulemaking proposal are being recommended by the Department. One change is being proposed to correctly reflect the Department's intent to exclude the City of Newberg from the testing boundary.

Summary of How the Proposed Rule Will Work and How it Will be Implemented

The expanded boundary as adopted by the EQC on July 22, 1994 has not yet been implemented in Columbia, Marion or Yamhill Counties. This proposal will be implemented by not expanding the Vehicle Inspection Program into the Newberg and Dundee census areas of Yamhill County and the Aurora census area of Marion County. Residents of the Marquam area in Clackamas County will be notified that they are no longer subject to the Vehicle Inspection Program. The Department expects to implement vehicle testing in the remaining portions of the expanded boundary in the fall of 1996.

Recommendation for Commission Action

The Department recommends that the Commission adopt the revision to the Portland Area Motor Vehicle Inspection Program Boundary as presented in Attachment A of this report, as an amendment to the federal Clean Air Act State Implementation Plan.

Attachments

A. Rule (Amendments) Proposed for Adoption
B. Supporting Procedural Documentation:
   1. Legal Notice of Hearing
   2. Fiscal and Economic Impact Statement
   3. Land Use Evaluation Statement
   4. Questions to be Answered to Reveal Potential Justification for Differing from Federal Requirements
   5. Cover Memorandum from Public Notice
C. Presiding Officer's Report on Public Hearing
D. Department's Evaluation of Public Comment
E. Detailed Changes to Original Rulemaking Proposal made in Response to Public Comment
F. Advisory Committee Membership and Report
G. Rule Implementation Plan

Reference Documents (available upon request)

Written Comments Received (listed in Attachment C)

Approved:

Section: John Kowalczyk

Division: John J. Russell for Larry Green

Report Prepared By: David L. Collier

Phone: (503) 229-5177

Date Prepared: June 18, 1996

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10/19/95

Division 24
Motor Vehicles
Motor Vehicle Emission Control Inspection
Test Criteria, Methods and Standards

Boundary Designations

340-024-0301

(1) In addition to the area specified in ORS 815.300, pursuant to ORS 468A.390, the following geographical areas, referred to as the Portland Vehicle Inspection Area and the Medford-Ashland AQMA, are designated as areas within which motor vehicles are subject to the requirement under ORS 815.300 to have a Certificate of Compliance issued pursuant to ORS 468A.380 to be registered or have the registration of the vehicle renewed.

(2) As used in this section, "Portland Vehicle Inspection Area" means the area of the state included within the following census tracts, block groups, and blocks as used in the 1990 Federal Census. In Multnomah County, the following tracts, block groups, and blocks are included: Tracts 1, 2, 3.01, 3.02, 4.01, 4.02, 5.01, 5.02, 6.01, 6.02, 7.01, 7.02, 8.01, 8.02, 9.01, 9.02, 10, 11.01, 11.02, 12.01, 12.02, 13.01, 13.02, 14, 15, 16.01, 16.02, 17.01, 17.02, 18.01, 18.02, 19, 20, 21, 22.01, 22.02, 23.01, 23.02, 24.01, 24.02, 25.01, 25.02, 26, 27.01, 27.02, 28.01, 28.02, 29.01, 29.02, 29.03, 30, 31, 32, 33.01, 33.02, 34.01, 34.02, 35.01, 35.02, 36.01, 36.02, 36.03, 37.01, 37.02, 38.01, 38.02, 38.03, 39.01, 39.02, 40.01, 40.02, 41.01, 41.02, 42, 43, 44, 45, 46.01, 46.02, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56 57, 58, 59, 60.01. 60.02, 61, 62, 63, 64.01, 64.02, 65.01, 65.02, 66.01, 66.02, 67.01, 67.02, 68.01, 68.02, 69, 70, 71, 72.01, 72.02, 73, 74, 75, 76, 77, 78, 79, 80.01, 80.02, 81, 82.01, 82.02, 83.01, 83.02, 84, 85, 86, 87, 88, 89, 90, 91, 92.01, 92.02, 93, 94, 95, 96.01, 96.02, 97.01, 97.02, 98.01, 98.02, 99.01, 99.02, 99.03, 100, 101, 102, 103.01, 103.02, 104.02, 104.04, 104. 05, 104.06, 104.07; Block Groups 1, 2 of Tract 105; Blocks 360, 361, 362 of Tract 105; that portion of Blocks 357, 399 of Tract 105 beginning at the intersection of thre Oregon-Washington State Line ("State Line") and the northeast corner of Block Group 1 of Tract 105, thence east along the State Line to the intersection of the State Line and the eastern edge of Section 26, Township 1 North, Range 4 East, thence south along the section line to the centerline of State Highway 100 to the intersection of State Highway 100 and the western edge of Block Group 2 of Tract 105. In Clackamas County, the following tracts, block groups, and blocks are included: Tracts 201, 202, 203.01, 203.02, 204.01, 204.02, 205.01, 205.02, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216.01, 216.02, 217, 218, 219, 220, 221.01, 221.02, 222.02, 223, 224, 225, 226, 227.01, 227.02, 228, 229, 230, 231, 232, 233, 234.01, 234.02, , 235, 236, 237, ~~238~~; Block Groups 1, 2 of Tract 241; Block Groups 1, 2, 3, 4 of Tract 242; Block Groups 1, 2 of Tract 243.02. ~~In Marion County, the following tracts, block groups, and blocks are included: Tract 102~~. In Yamhill County, the following tracts~~, block groups, and blocks are~~ is included: Tracts 301~~, 302; Block Groups 1, 2, 3, 4 of Tract 303; Blocks 1, 2B, 3B, 27B of Tract 303~~ , except those areas in Tract 301 that lie within the Newberg City Limits

defined as of July 12, 1996, and the following blocks within Tract 301: 102B, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121D, 122B, 122C, 123, 126, and 127B. In Washington County the following tracts, block groups, and blocks are included: Tracts 301, 302, 303, 304.01, 304.02, 305.01, 305.02, 306, 307, 308.01, 308.02, 309, 310.03, 310.04, 310.05, 310.06, 311, 312, 313, 314.01, 314.02, 315.01, 315.04, 315.05, 315.06, 315.07, 315.08, 316.03, 316.04, 316.05, 316.06, 316.07, 317.02, 317.03, 317.04, 318.01, 318.02, 318.03, 319.01, 319.03, 319.04, 320, 321.01, 321.02, 322, 323, 324.02, 324.03, 324.04, 325, 326.01, 326.02, 328, 329, 330, 331, 332, 333; Block Groups 1, 2 of Tract 327; Block Group 1 of Tract 334; Block Group 2 of Tract 335; Block Group 1 of Tract 336. In Columbia County the following tracts, block groups, and blocks are included: Tract 9710.98; Block Groups 2, 3 of Tract 9709.98; Blocks 146B, 148, 152 of Tract 9709.98.

(3) As used in this section, "Medford-Ashland Air Quality Maintenance Area" means the area of the state beginning at a point approximately one mile northeast of the town of Eagle Point, Jackson County, Oregon, at the northeast corner of section 36, T35S, R1W; thence south along the Willamette Meridian to the southeast corner of section 25, T37S, R1W; thence southeast along a line to the southeast corner of section 9, T39S, R2E; thence south-southeast to the southeast corner of section 22, T39S, R2E; thence south to the southeast corner of section 27, T39S, R2E; thence southwest to the southeast corner of section 33, T39S, R2E; thence west to the southwest corner of section 31, T39S, R2E; thence northwest to the northwest corner of section 36, T39S, R1E; thence west to the southwest corner of section 26, T39S, R1E; thence northwest along a line to the southeast corner of section 7, T39S, R1E; thence west to the southwest corner of section 12, T39S, R1W; thence northwest along a line to the southwest corner of section 20, T38S, R1W; thence west to the southwest corner of section 24, T38S, R2W; thence northwest along a line to the southwest corner of section 4, T38S, R2W; thence west to the southwest corner of section 5, T38S, R2W; thence northwest along a line to the southwest corner of section 31, T37S, R2W; thence north along a line to the Rogue River, thence north and east along the Rogue River to the north boundary of section 32, T35S, R1W; thence east along a line to the point of beginning.

[**NOTE:** This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-020-0047.]

Stat. Auth.: ORS Ch. 468 & 468A
Hist.: DEQ 11-1985, f. 9-30-85, ef. 1-1-86; DEQ 21-1988, f. & cert. ef. 9-12-88; DEQ 4-1993, f. & cert. ef. 3-10-93; DEQ 1-1995, f. & ef. 1-10-95

"State of Oregon Clean Air Act Implementation Plan"
340-020-0047

(1) This implementation plan, consisting of Volumes 2 and 3 of the State of Oregon Air Quality Control Program, contains control strategies, rules and standards prepared by the Department of Environmental Quality and is adopted as the state implementation plan (SIP) of the State of Oregon pursuant to the federal **Clean Air Act**, Public Law 88-206 as last amended by Public Law 101-549.

(2) Except as provided in section (3) of this rule, revisions to the SIP shall be made pursuant to the Commission's rule-making procedures in Division 11 of this Chapter and any other requirements contained in the SIP and shall be submitted to the United States Environmental Protection Agency for approval.

(3) Notwithstanding any other requirement contained in the SIP, the Department is authorized to submit to the Environmental Protection Agency any permit condition implementing a rule that is part of the federally-approved SIP as a source-specific SIP revision after the Department has complied with the public hearings provisions of 40 **CFR 51.102 (July 1, 1992)**.

[**NOTE:** Revisions to the State of Oregon Clean Air Act Implementation Plan become federally enforceable upon approval by the United States Environmental Protection Agency. If any provision of the federally approved Implementation Plan conflicts with any provision adopted by the Commission, the Department shall enforce the more stringent provision.]

[**Publications:** The publication(s) referred to or incorporated by reference in this rule are available from the office of the Department of Environmental Quality.]

Stat. Auth.: ORS Ch. 468 & 468A

Hist.: DEQ 35, f. 2-3-72, ef. 2-15-72; DEQ 54, f. 6-21-73, ef. 7-1-73; DEQ 19-1979, f. & ef. 6-25-79; DEQ 21-1979, f. & ef. 7-2-79; DEQ 22-1980, f. & ef. 9-26-80; DEQ 11-1981, f. & ef. 3-26-81; DEQ 14-1982, f. & ef. 7-21-82; DEQ 21-1982, f. & ef. 10-27-82; DEQ 1-1983, f. & ef. 1-21-83; DEQ 6-1983, f. & ef. 4-18-83; DEQ 18-1984, f. & ef. 10-16-84; DEQ 25-1984, f. & ef. 11-27-84; DEQ 3-1985, f. & ef. 2-1-85; DEQ 12-1985, f. & ef. 9-30-85; DEQ 5-1986, f. & ef. 2-21-86; DEQ 10-1986, f. & ef. 5-9-86; DEQ 20-1986, f. & ef. 11-7-86; DEQ 21-1986, f. & ef. 11-7-86; DEQ 4-1987, f. & ef. 3-2-87; DEQ 5-1987, f. & ef. 3-2-87; DEQ 8-1987, f. & ef. 4-23-87; DEQ 21-1987, f. & ef. 12-16-87; DEQ 31-1988, f. 12-20-88, cert. ef. 12-23-88; DEQ 2-1991, f. & cert. ef. 2-14-91; DEQ 19-1991, f. & cert. ef. 11-13-91; DEQ 20-1991, f. & cert. ef. 11-13-91; DEQ 21-1991, f. & cert. ef. 11-13-91; DEQ 22-1991, f. & cert. ef. 11-13-1991; DEQ 23-1991, f. & cert. ef. 11-13-91; DEQ 24-1991, f. & cert. ef. 11-13-91; DEQ 25-1991, f. & cert. ef. 11-13-91; DEQ 1-1992,f. & cert. ef. 2-4-92; DEQ 3-1992, f. & cert. ef. 2-4-92; DEQ 7-1992, f. & cert. ef. 3-30-92; DEQ 19-1992, f. & cert. ef. 8-11-92; DEQ 20-1992, f. & cert. ef. 8-11-92; DEQ 25-1992, f. 10-30-92, cert. ef. 11-1-92; DEQ 26-1992, f. & cert. ef. 11-2-92; DEQ 27-1992, f. & cert. ef. 11-12-92; DEQ 4-1993, f. & cert. ef. 3-10-93; DEQ 8-1993, f. & cert. ef. 5-11-93; DEQ 12-1993, f. & ef. 9-24-93; DEQ 13-1993, f. & cert. ef. 9-24-93; DEQ 15-1993, f. & cert. ef. 11-4-93; DEQ 16-1993, f. & cert. ef. 11-4-93; DEQ 19-1993, f. & cert. ef. 11-4-93; DEQ 1-1994, f. & cert. ef. 1-3-94; DEQ 5-1994, f. & ef. 3-21-94; DEQ 14-1994, f. & ef. 5-31-94; DEQ 15-1994, f. 6-8-94 & ef. 7-1-94; DEQ 22-1994, f. & ef. 10-14-94; DEQ 24-1994, f. & ef. 10-28-94; DEQ 25-1994, f. & ef. 11-2-94; DEQ 32-1994, f. & ef. 12-22-94; DEQ 1-1995, f. 1-10-95 & ef. 5-1-95; DEQ 4-1995, f. & ef. 2-17-95; DEQ 7-1995, f. & ef. 3-19-95; DEQ 9-1995, f. & ef. 5-1-95; DEQ 10-1995, f. & ef. 5-1-95; DEQ 12-1995, f. & ef. 5-25-95; DEQ 13-1995, f. & ef. 5-25-95; DEQ 14-1995, f. & ef. 5-25-95; DEQ 17-1995, f. & ef. 7-12-95; DEQ 22-1995, f. & ef. 10-6-95; DEQ 24-1995, f. & ef. 10-11-95

Portland Area Motor Vehicle Inspection Boundary

Attachment A

NOTICE OF PROPOSED RULEMAKING HEARING

Department of Environmental Quality

OAR Chapter: **340-020-0047, 340-018-0030, 340-022-0440, 340-024-0301, 340-030-0700 through -030-0750, 340-030-0800 through 1090, 340-030-1100 through 1200, 340-031-0520 through -031-0530**

DATE:	TIME:	LOCATION:
May 22, 1996	10:00 a.m.	Oregon Department of Environmental Quality Headquarters 811 SW Sixth Avenue, 3rd Floor (Room 3A) Portland (Question and answer session from 9:00 to 10:00)
May 22, 1996	7:00 p.m.	State Office Building, Room 140 800 NE Oregon Portland (Question and answer session from 6:00 to 7:00)
May 23, 1996	7:00 p.m.	City of Tigard Water Department Auditorium 8777 SW Burnham Street Tigard, Oregon (Question and answer session from 6:00 to 7:00)

HEARINGS OFFICER(s): A Professional Hearings Officer

STATUTORY AUTHORITY: or OTHER AUTHORITY: ORS 468.020, ORS 468A.035

STATUTES IMPLEMENTED: ORS 468.065, ORS 468A.310, ORS 468A.363, ORS 468.390, ORS 468A.405, ORS 468A.420

ADOPT: 340-030-0700 through -030-0750, 340-030-0800 through 1090, 340-030-1100 through 1200

AMEND: OAR 340-020-0047, OAR 340-018-0030, OAR 340-022-0460, OAR 340-24-0301, OAR 340-031-0520 through 340-031-0530

☑ This hearing notice is the initial notice given for this rulemaking action.

☑ Auxiliary aids for persons with disabilities are available upon advance request.

SUMMARY: The Department of Environmental Quality (DEQ) is proposing that the Environmental Quality Commission adopt plans to ensure that the Portland area

does not experience a recurrence of violations of the federal air quality standards for carbon monoxide and ozone. These plans and supporting rules, if adopted, will be submitted to the US Environmental Protection Agency (EPA) as revisions to the State Implementation Plan, which is a requirement of the Clean Air Act. If approved by EPA, the Portland area would be redesignated from a "nonattainment area" to an "attainment area" for carbon monoxide and ozone. The plans and supporting rules demonstrate how the Portland area will maintain compliance with the federal ambient air standards for carbon monoxide and ozone over the next ten years despite expected unprecedented growth in the area. Existing attainment plans for carbon monoxide and ozone, which will be replaced by these maintenance plans, are proposed to be repealed.

Both the carbon monoxide and ozone maintenance plans include an emission inventory, an enhanced motor vehicle inspection program, a revision to the motor vehicle inspection boundary, and transportation control measures to be implemented by Metro. Additionally, the carbon monoxide maintenance plan includes a parking management program for the Central City that will be implemented by the City of Portland. Comments are being solicited on options for continuing or repealing the current oxygenated fuel program under the carbon monoxide maintenance plan. The ozone maintenance plan includes an Employee Commute Options Program, a Voluntary Parking Ratio Program, an Industrial Emission Management Program, existing Rules for Auto Body Refinishing, Paints, and various Consumer Products, and existing Stage II Vapor Recovery Rules for gasoline service stations.

LAST DATE FOR COMMENT: May 24, 1996, 5:00 p.m.

AGENCY RULES COORDINATOR: Susan M. Greco, (503) 229-5213

AGENCY CONTACT FOR THIS PROPOSAL: Andy Ginsburg (Ozone Maintenance Plan and related rules) (503) 229-5581
Howard Harris (CO Maintenance Plan and related rules) (503) 229-6086

ADDRESS: 811 SW Sixth Avenue
Portland, Oregon 97204

TELEPHONE: 1-800-452-4011
(503) 229-5675 (FAX)

Interested persons may comment on the proposed rules orally or in writing at the hearing. Written comments will also be considered if received by the date indicated above.

Susan M. Greco
Signature

4/15/96
Date

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Revisions to the Portland Area Vehicle Inspection Program Boundary

Fiscal and Economic Impact Statement

Introduction

The proposed rule amendment removes the Newberg, Dundee, Aurora, and Marquam Census areas from the expanded Motor Vehicle Inspection Program boundary. As a result, approximately 10,560 vehicles annually (21,120 vehicles over two years*) will be removed from the vehicle testing requirements. These vehicle owners will no longer be subject to the Motor Vehicle Inspection Program and the $10 compliance fee.

General Public

There is no economic impact on the general public living outside the revised Motor Vehicle Inspection boundary. The expanded boundary was never implemented in the Newberg, Dundee, or Aurora Census areas, therefore there will be no economic impact on these residents. The vehicle testing program was briefly implemented in the Marquam Census area. These residents will no longer be subject to the testing program and will no longer have to pay the $10 compliance fee. Owners with vehicles that would have required repair in order to pass the test may save an average $75 per vehicle in tune-up costs every 2 years. It is expected that approximately 2,300 vehicles per year would have required repair in order to pass the test. Removing the four Census areas from the expanded boundary represents an approximate savings in repair costs of $172,500 per year (total of all vehicle owners required to conduct repairs) .

The average vehicle repaired to meet a Basic vehicle test standard is expected to improve its fuel economy by approximately 2 to 3 percent. These fuel savings may not materialize for vehicles outside the testing program. The average biennial fuel cost savings for vehicles repaired to pass the Basic emissions test is expected to cover approximately one half of the average cost of repairs.

* Each vehicle is required to be tested every two years.

Small Business

Small business vehicle fleets in the excluded Census areas will no longer be subject to the testing program or the $10 per vehicle compliance fee, and repairs will no longer be required in order to meet emission standards. The resulting decrease in engine maintenance may produce a cost savings for fleet owners. However, the average vehicle repaired to meet the Basic vehicle test standard is expected to improve its fuel economy by approximately 2 to 3 percent. These fuel savings may not materialize for vehicles outside the testing program. The average biennial fuel cost savings for vehicles repaired to pass the Basic emissions test is expected to cover approximately one half of the average cost of repairs.

Vehicle repair businesses should lose approximately $172,500 per year in potential business.

Large Business

Large business vehicle fleets in the excluded Census areas will no longer be subject to the testing program or the $10 per vehicle compliance fee, and repairs will no longer be required in order to meet emission standards. The resulting decrease in engine maintenance may produce a cost savings for fleet owners. However, the average vehicle repaired to meet a Basic vehicle test standard is expected to improve its fuel economy by approximately 2 to 3 percent. These fuel savings may not materialize for vehicles outside the testing program. The average biennial fuel cost savings for vehicles repaired to pass the Basic emissions test is expected to cover approximately one half of the average cost of repairs.

Local Governments

Local government fleet vehicles registered in the excluded areas will no longer be subject to the testing program or the $10 per vehicle compliance fee, and repairs will no longer be required in order to meet emission standards. The resulting decrease in engine maintenance may produce a cost savings for fleet owners. However, the average vehicle repaired to meet a Basic vehicle test standard is expected to improve its fuel economy by approximately 2 to 3 percent. These fuel savings may not materialize for vehicles outside the testing program. The average biennial fuel cost savings for vehicles repaired to pass the Basic emissions test is expected to cover approximately one half of the average cost of repairs.

State Agencies

- DEQ - The decrease in the boundary size will not affect the Department's need to build one or more testing stations to accommodate the increased testing load resulting from the expanded boundary.

- Other Agencies - The Department of Motor Vehicles currently issues notices of requirements for emission testing along with registration notices. Costs for this are covered under the current fee structure, and will be reduced by the proposed reduction in the expanded boundary.

Assumptions

There are approximately 35,180 people in the four Census areas removed from the expanded boundary. This represents approximately 21,135 vehicles out of a total 76,350 vehicles in the new portion of the expanded boundary. Fifty percent, or approximately 10,560 vehicles would have been tested each year. With an average failure rate of 22 percent, approximately 2,300 vehicles per year would require repairs at an average cost of $75* in order to meet the emissions test. Removing the four Census areas from the expanded boundary represents an approximate savings in repair costs of $172,500 per year (total cost to all vehicle owners required to conduct repairs) . The cost saving generated from the loss of a required maintenance program may be offset by a corresponding loss in improved fuel economy. EPA estimates an average fuel economy improvement of 2-3 percent for vehicles that have been repaired to meet the Basic vehicle test standards. The average biennial fuel cost savings for vehicles repaired to pass the Basic emissions test is expected to cover approximately one half of the average cost of repairs.

* Average Repair Costs of $75/vehicle, the $10/vehicle testing fee, and an average failure rate of approximately 22% are based on the Basic Vehicle Testing Program. Fuel savings of 2% - 3% are expected for vehicles meeting the Basic emissions test.

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Rulemaking Proposal
for
Revisions to the Portland Area Vehicle Inspection Program Boundary

Land Use Evaluation Statement

1. Explain the purpose of the proposed rules.

On July 24, 1994, the Environmental Quality Commission (EQC), under existing legislative authority, adopted an expanded Motor Vehicle Inspection Program boundary for the Portland Metropolitan Area. The boundary expansion is an important part of the overall Portland Ozone Maintenance Plan strategy. In reviewing the Ozone Maintenance Plan strategies, the 1995 Legislature concluded that the expanded boundary contained some inequities because some areas with a relatively low commuter contribution to the Portland airshed were to be subject to the vehicle testing program.

Even though 1995 legislation which would have reduced the boundary expansion by prohibiting expansion into Columbia, Marion, and Yamhill Counties was vetoed, the Department felt compelled to examine the equity issue and propose adjustments to the boundary as warranted. Additional emission reductions gained from other ozone strategies has allowed the Department both maintain the amount of emission reduction needed to demonstrate airshed maintenance and to improve the equity of the vehicle testing program by recommending a small decrease in the Inspection and Maintenance boundary. The Department proposes to repeal the boundary expansion in the census tract areas of Newberg and Dundee in Yamhill County, Aurora in Marion County, and Marquam in Clackamas County. Each of these areas have a significantly lower commute rate into the Portland area than other areas in the expanded boundary, which all have commuter vehicle rates in excess of 40%.

2. Do the proposed rules affect existing rules, programs or activities that are considered land use programs in the DEQ State Agency Coordination (SAC) Program?

Yes____ No_X_

a. If yes, identify existing program/rule/activity:

N/A

b. If yes, do the existing statewide goal compliance and local plan compatibility procedures adequately cover the proposed rules?

N/A

Yes____ No____ (if no, explain):

N/A

c. If no, apply the following criteria to the proposed rules.

N/A

In the space below, state if the proposed rules are considered programs affecting land use. State the criteria and reasons for the determination.

It has been previously determined through the LCDC approved State Agency Coordination (SAC) agreement that the Vehicle Inspection and Maintenance Program (VIP) is not a program that significantly affects land use. These proposed changes are to the VIP boundary, and as such, are consistent with the current SAC determination.

3. If the proposed rules have been determined a land use program under 2. above, but are not subject to existing land use compliance and compatibility procedures, explain the new procedures the Department will use to ensure compliance and compatibility.

N/A

Gregory A. Green — Division

Robert Young — Intergovernmental Coord.

4/8/96 — Date

Questions to be Answered to Reveal
Potential Justification for Differing from Federal Requirements.

1. Are there federal requirements that are applicable to this situation? If so, exactly what are they?

The federal Clean Air Act does not stipulate the geographic boundary of a motor vehicle emission testing program, therefore there are no federal requirements applicable to this proposal.

2. Are the applicable federal requirements performance based, technology based, or both with the most stringent controlling?

The requirements are performance based. The Ozone Maintenance Plan must demonstrate that future emissions will not cause a violation of the ozone standard. As long as the Portland area stays in attainment with the federal ozone standard, the Clean Air Act allows states to identify the specific emission reduction strategies that will be used to demonstrate attainment.

3. Do the applicable federal requirements specifically address the issues that are of concern in Oregon? Was data or information that would reasonably reflect Oregon's concern and situation considered in the federal process that established the federal requirements?

There were no applicable federal requirements governing this specific proposal. The federal requirements are specifically designed to give each state the flexibility to adopt emission reduction strategies that are best suited for that area.

4. Will the proposed requirement improve the ability of the regulated community to comply in a more cost effective way by clarifying confusing or potentially conflicting requirements (within or cross-media), increasing certainty, or preventing or reducing the need for costly retrofit to meet more stringent requirements later?

The proposal will improve the overall cost effectiveness of the Vehicle Testing Program by eliminating from the vehicle testing requirement those areas with a low commuter contribution to the Portland airshed.

5. Is there a timing issue which might justify changing the time frame for implementation of federal requirements?

There is no deadline in the Clean Air Act for submitting a maintenance plan. However, the Legislature directed DEQ to submit an approvable ozone maintenance plan to EPA as soon as possible so that the area can be redesignated to attainment and impediments to industrial growth imposed in the Clean Air Act can be removed.

6. Will the proposed requirement assist in establishing and maintaining a reasonable margin for accommodation of uncertainty and future growth?

By reducing the number of motor vehicles subject to emissions testing, this proposal decreases the margin for future emissions growth. A corresponding reduction in the industrial growth allowance is required to offset the loss of emission credit due to a retracted VIP boundary .

7. Does the proposed requirement establish or maintain reasonable equity in the requirements for various sources? (level the playing field)

Census areas with commuter contributions into the Portland airshed of greater than 30% were originally used to establish the expanded VIP boundary. This proposal removes those Census areas with commute rates less than 40% because they are not as significant a contributor to the Portland airshed and ozone maintenance problem as other areas in the expanded VIP boundary. Overall, the Portland Ozone Maintenance Plan includes a balanced approach for emission reduction strategies affecting all major categories of ozone precursors, including motor vehicles, non-road engines, area sources, and industry.

8. Would others face increased costs if a more stringent rule is not enacted?

Yes. If it were necessary to expand the VIP boundary into other areas, motorists in those areas would face new testing and repair requirements.

9. Does the proposed requirement include procedural requirements, reporting or monitoring requirements that are different from applicable federal requirements? If so, Why? What is the "compelling reason" for different procedural, reporting or monitoring requirements?

Not applicable .

10. Is demonstrated technology available to comply with the proposed requirement?

Not applicable.

11. Will the proposed requirement contribute to the prevention of pollution or address a potential problem and represent a more cost effective environmental gain?

Yes, the expanded Motor Vehicle Inspection Program will contribute to pollution prevention by encouraging better vehicle maintenance and therefore lower emissions. The VIP boundary revision will improve the overall cost effectiveness of the Vehicle Testing Program by eliminating from the vehicle testing requirement those areas with a low commuter contribution to the Portland airshed.

State of Oregon
Department of Environmental Quality **Memorandum**

Date: April 17, 1996

To: Interested and Affected Public

Subject: Rulemaking Proposal and Rulemaking Statements -- Revision to the Portland Area Vehicle Inspection Program Boundary

This memorandum contains information on a proposal by the Department of Environmental Quality (DEQ) to adopt new rules or rule amendments regarding revisions to the Portland area Vehicle Inspection Program (VIP) boundary. Pursuant to ORS 183.335, this memorandum also provides information about the Environmental Quality Commission's intended action to adopt a rule.

This proposal would remove four areas from the expanded Motor Vehicle Inspection Program boundary which was adopted by the Environmental Quality Commission (EQC) on July 22, 1994.

The Department has the statutory authority to address this issue under ORS 468A.035 and ORS 468A.390.

What's in this Package?

Attachments to this memorandum provide details on the proposal as follows:

Attachment A	The official statement describing the fiscal and economic impact of the proposed rule. (required by ORS 183.335)
Attachment B	A statement providing assurance that the proposed rules are consistent with statewide land use goals and compatible with local land use plans.
Attachment C	Questions to be Answered to Reveal Potential Justification for Differing from Federal Requirements.
Attachment D	OAR 340-024-0301. The actual language of the proposed rules.
Attachment E	A map of the revised Vehicle Inspection Program boundary and the census areas proposed to be removed from the expanded boundary.

Hearing Process Details
You are invited to review these materials and present written or oral comments. Three public hearings will be held, one during the day and the other two during evening hours as follows:

Daytime Hearing

Date: Wednesday, May 22, 1996
Time: 10:00 a.m. (Question and answer session from 9:00 am to 10:00 am)
Place: Oregon Dept. of Environmental Quality Headquarters
811 SW Sixth Avenue, Room 3A
Portland, Oregon

Evening Hearings

Date: Wednesday, May 22, 1996
Time: 7:00 p.m. (Question and answer session from 6:00 pm to 7:00 pm)
Place: State Office Building, Room 140
800 NE Oregon
Portland, Oregon

And

Date: Thursday, May 23, 1996
Time: 7:00 p.m. (Question and answer session from 6:00 pm to 7:00 pm)
Place: City of Tigard Water Department Auditorium
8777 SW Burnham Street
Tigard, Oregon

Deadline for receipt of Written Comments: May 24, 1996 (5:00 pm)

In accordance with ORS 183.335(13), no comments from any party can be accepted after the deadline for submission of comments has passed. Thus if you wish your comments to be considered by the Department in the development of these rules, your comments must be received before the close of the comment period. The Department recommends that comments be submitted as early as possible to allow adequate review and evaluation of the comments submitted.

Following close of the public comment period, the Presiding Officer will prepare a report that summarizes the oral testimony presented and identifies written comments submitted. The Environmental Quality Commission (EQC) will receive a copy of the Presiding Officer's report and all written comments submitted. The public hearing will be tape recorded, but the tape will not be transcribed.

If you wish to be kept advised of this proceeding and receive a copy of the recommendation that is presented to the EQC for adoption, you should request that your name be placed on the mailing list for this rulemaking proposal.

What Happens After the Public Comment Period Closes

The EQC will consider the Department's recommendation for rule adoption during one of their regularly scheduled public meetings. The targeted meeting date for consideration of this rulemaking proposal is July 12, 1996. This date may be delayed if needed to provide additional time for evaluation and response to testimony received in the hearing process. You will be notified of the time and place for final EQC action if you present oral testimony at the hearing or submit written comment during the comment period or ask to be notified of the proposed final action on this rulemaking proposal.

The EQC expects testimony and comment on proposed rules to be presented **during** the hearing process so that full consideration by the Department may occur before a final recommendation is made. In accordance with ORS 183.335(13), no comments can be accepted after the public comment period has closed by either the EQC or the Department. Thus the EQC strongly encourages people with concerns regarding the proposed rule to communicate those concerns to the Department prior to the close of the public comment period so that an effort may be made to understand the issues and develop options for resolution where possible.

Background on Development of the Rulemaking Proposal

Why is there a need for the rule?

On July 24, 1994, the Environmental Quality Commission (EQC), under existing legislative authority, adopted an expanded Motor Vehicle Inspection Program boundary for the Portland area. The boundary expansion is an important part of the overall Portland Air Quality Maintenance Area (AQMA) Ozone Maintenance Plan. The Plan contains several strategies for maintaining compliance with the national ozone standard, which is designed to protect human health and the environment.

In reviewing the Ozone Maintenance Plan strategies, the 1995 Legislature, some local officials, and some citizens, expressed concern that the expanded boundary contained some inequities because some areas with a relatively low commuter contribution to the Portland AQMA airshed were to be made subject to the motor vehicle testing program. New legislation in 1995 prohibited expansion of the Inspection & Maintenance boundary into Columbia, Marion, and Yamhill Counties. Even though this legislation was vetoed by the Governor, the Department felt compelled to reexamine the equity concerns of the Legislature, and to propose adjustments to the boundary as warranted. The Department has found that the overall equity of the boundary can be improved by eliminating four select areas from the testing program. Therefore, the Department proposes to repeal the boundary expansion in the census tract areas of Newberg and Dundee in Yamhill County, Aurora in Marion County, and Marquam in Clackamas County. Each of these areas has a significantly lower commute rate into the Portland AQMA airshed than other areas in the expanded boundary. The lost emission credit resulting from a reduced vehicle testing boundary can be accommodated within the ozone maintenance plan by slightly reducing the planned industrial growth allowance (73 Tons/yr VOC).

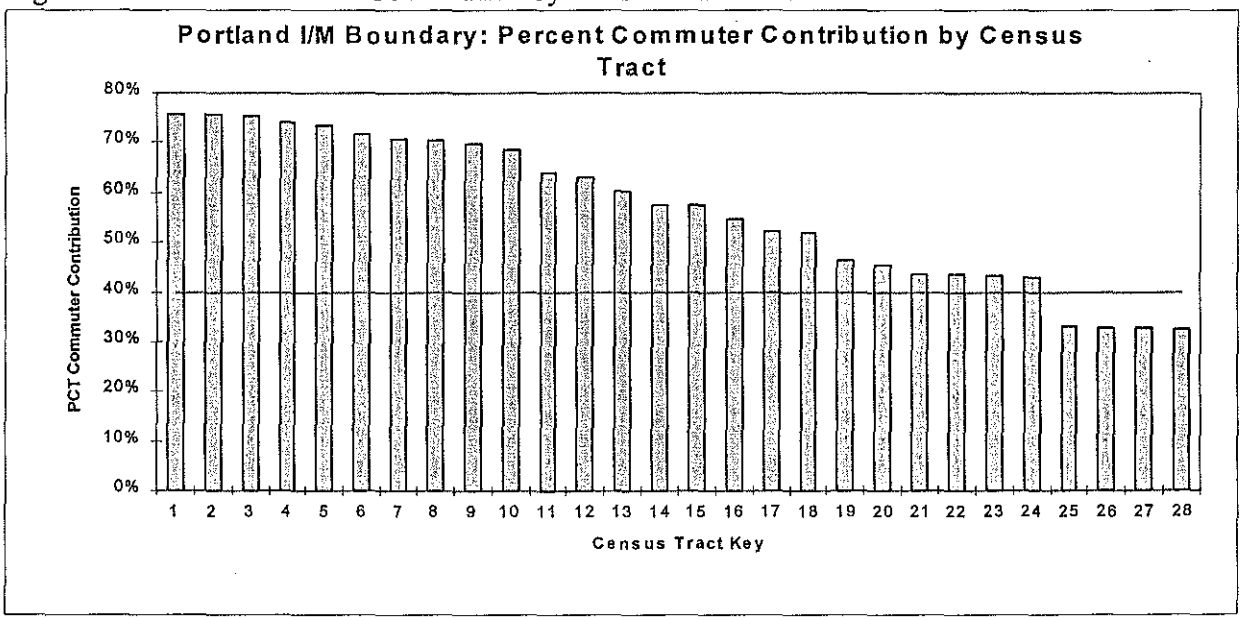
How was the rule developed?

The 1994 vehicle inspection boundary expansion was designed to achieve a specific level of emission reduction as part of the overall Portland Air Quality Maintenance Area (AQMA) Ozone Maintenance Plan. The boundary expansion concept was one of several control strategies recommended by the 1992 State Task Force on Motor Vehicle Emission Reductions in the Portland AQMA, and endorsed by the 1993 legislature. The specific boundary selected by the EQC in 1994 included those portions of the surrounding urban areas that contributed a significant share of commute trips to the Portland AQMA airshed. Areas were selected by evaluating U.S. Census tract data showing commute trips into the Portland Air Quality Maintenance Area from the surrounding areas.

In light of legislative concerns, the Department has reexamined several ozone control strategies, including the expanded vehicle inspection and maintenance boundary. The Department reviewed U.S. Census data on commute patterns in each of the twenty-eight census tracks originally included in the expanded vehicle testing boundary. The resulting commute rates (percent commuter contribution) reflects the percentage of work-related commute trips from each census area that contribute to the Portland AQMA airshed. Information on non-work trips into the Portland AQMA is not available for individual census tract areas. The distribution of commute rates for the twenty-eight census areas shows that a significant reduction commute rate occurs at approximately the 40 percent level (Figure 1).

There are four census areas that fall below the 40 percent level, having significantly lower commute rates than the other boundary areas (Figures 1 and 2 show the commuter rates of each census area). Removing these areas from the expanded Vehicle Inspection Program boundary would improve the equity of the vehicle testing program. Since the resulting loss of emission reduction credit can be offset by reductions from other strategies, the Department is proposing to repeal the expanded vehicle testing boundary in the four census tract areas of Newberg and Dundee in Yamhill County, Aurora in Marion County, and Marquam in Clackamas County.

Figure 1: Percent Commuter Contribution by Census Tract Area



While an advisory committee was used to develop the original expanded boundary, no specific advisory committee was used for this boundary reduction. Metro has supported the boundary reduction as part of the overall ozone strategy. The key document relied upon for this proposal was the United States Census for 1990.

Figure 2: Census Tract Key For Expanded VIP Boundary

KEY	Census Tract	County	PCT of Employed Persons who work in the Portland AQMA	KEY	Census Tract	County	PCT of Employed Persons who work in the Portland AQMA
1	Cherry Grove	Washington	76%	15	North Plains	Washington	57%
2	Beavercreek	Clackamas	76%	16	Eagle Creek	Clackamas	55%
3	Redland	Clackamas	75%	17	Sandy	Clackamas	52%
4	Damascus	Clackamas	74%	18	Barlow	Clackamas	52%
5	Sauvie Island	Multnomah	74%	19	W. Scappoose	Columbia	46%
6	Gaston	Washington	72%	20	E. Scappoose	Columbia	45%
7	Manning	Washington	71%	21	Colton	Clackamas	44%
8	Boring	Clackamas	71%	22	Rex Outside Newberg	Yamhill	43%
9	Mt. Home	Washington	70%	23	Canby	Clackamas	43%
10	Corbett	Multnomah	69%	24	Estacada	Clackamas	43%
11	Kelso	Clackamas	64%	25	Newberg	Yamhill	33%
12	Mulino	Clackamas	63%	26	Dundee	Yamhill	33%
13	Banks	Washington	60%	27	Aurora	Marion	33%
14	Highland	Clackamas	57%	28	Marquam	Clackamas	32%

Whom does this rule affect including the public, regulated community or other agencies, and how does it affect these groups?

This proposal will exclude members of the general public, as well as business and governments who register their motor vehicles in the Newberg and Dundee census tracts of Yamhill County, the Aurora census tract of Marion County, and the Marquam census tract of Clackamas County from the Vehicle Inspection Program. There are no significant effects on other agencies.

How will the rule be implemented?

The expanded boundary as adopted by the EQC on July 22, 1994 has not yet been implemented in Columbia, Marion or Yamhill Counties. This proposal will be implemented by not expanding the Vehicle Inspection Program into the Newberg and Dundee census areas of Yamhill County and the Aurora census area of Marion County. Residents of the Marquam area in Clackamas County will be notified that they are no longer subject to the Vehicle Inspection Program. The Department will implement vehicle testing in the remaining portions of the expanded boundary (West and East Scappoose in Columbia County and Rex outside Newberg in Yamhill County) on or about October 1, 1996.

Are there time constraints?

The Motor Vehicle Inspection Program is a key strategy in the Portland AQMA Ozone Maintenance Plan. Rule adoption is scheduled for EQC consideration on July 12, 1996. All component strategies of the Ozone Maintenance Plan, including the VIP boundary revision, are scheduled for simultaneous EQC adoption on July 12th. Failure to adopt any of the ozone maintenance plan strategies on this schedule could delay overall approval of the maintenance plan by EPA.

Contact for more information

If you would like more information on this rulemaking proposal, or would like to be added to the mailing list, please contact:

David Collier at (503) 229-5177
Oregon Department of Environmental Quality
Air Quality Division
811 S.W. Sixth Ave.
Portland, OR 97204

Attachment C

State of Oregon

Department of Environmental Quality

Memorandum

Date: June 24, 1996

To: Environmental Quality Commission

From: Lawrence Smith, ALJ, Employment Department
Mike Grant, ALJ, Public Utility Commission

Subject: Presiding Officer's Report for Rulemaking Hearing, Attachment C

Hearings Date and Time: May 22, 1996, beginning at 10:00 am.
May 22, 1996, beginning at 7 pm.
May 23, 1996, beginning at 7 pm.

Hearings Location: Room 3A, DEQ Headquarters, 811 SW Sixth Avenue, Portland, OR
Room 140, State Office Building, 700 NE Oregon Avenue, Portland, OR
Auditorium, Tigard Water Bureau, 8777 SW Burnham Road, Tigard, OR

Titles of Proposals: Portland Area Ozone Maintenance Plan
Portland Area Carbon Monoxide Maintenance Plan
Employee Commute Options Program
Voluntary Parking Ratios Program
Expanded Vehicle Inspection Boundary
Industrial Emissions Management Program

Three rulemaking hearings were held on the above titled proposals. The hearings were convened at 10:00 am and 7:00 pm on May 22, 1996, and 7:00 pm May 23, 1996. All the proposals were open for comment at each hearing. People were asked to sign witness registration forms if they wished to present testimony. People were also advised that the hearings were being tape recorded and of the procedures to be followed.

The morning hearing on May 22, 1996, was conducted by Lawrence Smith, an Administrative Law Judge with the Employment Department. Forty-five people were in attendance, ten people signed up to give testimony.

Memo To: Environmental Quality Commission
June 24, 1996
Presiding Officer's Report on
May 22, 23, 1996, Rulemaking Hearing
Attachment C, Page 2

The evening hearings on May 22, and May 23, 1996, were conducted by Mike Grant, an Administrative Law Judge with the Public Utility Commission. Eleven people were in attendance the evening of May 22, and three people signed up to give testimony. Thirteen people were in attendance the evening of May 23, and three people signed up to give testimony.

Prior to receiving testimony, the Department provided informational tables and the opportunity for people to informally discuss any questions concerning the proposals with Department staff. Andy Ginsburg was available for questions concerning the Portland Area Ozone Maintenance Plan. Howard Harris was available for questions concerning the Portland Area Carbon Monoxide Maintenance Plan. Patti Seastrom was available for questions concerning the Employee Commute Options Program. Susan Turner was available for question concerning the Voluntary Parking Ration Program. David Collier was available for questions concerning the Expanded Vehicle Inspection Boundary. Brian Finneran was available for questions concerning the Industrial Emissions Management Program.

Summary of Oral Testimony

May 22, 1996, 10:00 am

1. Jim Craven, American Electronic Association.

Mr. Craven gave testimony concerning the Industrial Emissions Management Program. He read his comments into the record. He focused on the Unused PSEL Management Backup Program of OAR 340-030-0730. He stated that this program conflicted with the purpose of the Plant Site Emission Limits (PSEL) program. He stated that the proposed program could adversely affect the electronics industry.

Mr. Craven also submitted written comments which are summarized in the Department's Evaluations of Public Comments (Attachment D).

2. Bob Okren, Citizen.

Mr. Okren gave testimony concerning the Employee Commute Option Program (ECO). He stated that regulating employees lives is onerous, communistic, and unconstitutional since employers will suffer penalties if employees don't cooperate. He considered ECO is another challenge to doing business in Portland.

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Presiding Officer's Report on
May 22, 23, 1996, Rulemaking Hearing
Attachment C, Page 3

3. Francie Royce, City of Portland, Office of Transportation.

Ms. Royce gave testimony concerning the Carbon Monoxide (CO) and Ozone Maintenance Plans, and the Voluntary Parking Ratios Program. Ms. Royce stated that the City was pleased the DEQ has completed its work on the plans and were supportive of both. She noted the City's participation in the five-year process leading to this point and appreciated the long hours and hard work on the part of DEQ staff.

Ms. Royce highlighted some specific concerns regarding the CO maintenance plan. The Portland City Council has taken a position endorsing the retention of the oxygenated fuels program and supports the position adopted by the Metro Council and Joint Policy Advisory Committee on Transportation (JPACT) to continue the program for another two winters and reevaluate whether to continue the program. She stated the city is particularly at risk in the event the CO standard is violated in the downtown area, as the parking lid will be automatically reinstated, and for that reason the city would like see the oxygenated fuels continue.

Ms. Royce pointed out that the CO maintenance plan contains three transportation emissions budgets: a regional emissions budget, a budget for the Central City Transportation Management Plan (CCTMP) area, and a budget for 82nd Avenue. The city is concerned about the establishment of an emissions budget for such a small area as the 82nd Avenue area and believes it is unnecessary and could trigger an unwarranted conformity problem. The city believes the Environmental Quality Commission (EQC) should remove the 82nd Avenue emissions budget from the CO plan and rely on the 82nd Avenue monitor to track CO concentrations in the area.

Ms. Royce stated that various timelines have been projected for approval of the maintenance plans by EPA. She cited delays of up to 18 months for the agency to pass similar plans and urged the Commission and DEQ to persuade EPA to approve the submitted maintenance plans as soon as possible. She also indicated the city is willing and able to help effect a timely approval.

Ms. Royce stated that other comments dealing with the CO maintenance plan, the Ozone maintenance plan and voluntary parking ratio program would be submitted in writing. She stated that the other comments were mostly technical in nature and dealt with provisions of the CCTMP that are to be incorporated into the CO maintenance plan.

The City of Portland also submitted written comments which are summarized in the Department's Evaluations of Public Comments (Attachment D).

4. Adrian Albrecht, PED Manufacturing Inc.

Mr. Albrecht gave testimony concerning the ECO program. He stated that credit should be given for existing low auto trip rates even where an employer does not have an active program.

Mr. Albrecht also submitted written comments which are summarized in the Department's Evaluation of Public Comment (Attachment D).

5. Bill Smith, American Lung Association

Mr. Smith gave testimony in support of the Enhanced Vehicle Inspection Program. Mr. Smith supported the enhanced motor vehicle inspection program and expanded inspection boundary as a good investment in air quality. He stated that the problems reported in implementing enhanced inspection in other states have been due to poor public relations, not problems with the technology.

6. Darrell Fuller, Oregon Automobile Dealers Association.

Mr. Fuller gave testimony concerning the ECO program. He requested supporting data demonstrating need for ECO, as well as information on impact of programs in other states. He stated that the government requiring business to require employees to change commute habits presents problems, such as policing employees, carpooling liability, and employee backlash. He suggested that OAR 340-030-0820 be modified from "have the potential to" to "mandated", since that is what is intended. He also suggested that OAR 340-030-0850 be expanded to include disabled and field personnel "transporting goods and services" or "reasonably need to have vehicle".

Mr. Fuller also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

7. Melissa Sherlock, Western States Petroleum Association and 76 Products Company.

Ms. Sherlock is a fuels planning engineer for 76 Products Company. She gave testimony concerning the CO Maintenance Plan. She stated that WSPA is a trade association whose member companies account for the majority of petroleum produced, refined, transported and marketed in six western states, including Oregon. She congratulated the staff, residents and industries of the Portland area on attaining the National Ambient Air Quality Standards for carbon monoxide (CO) and ozone, making the Portland region a fine place to live and work.

Second, she expressed WSPA's belief that the winter oxygenated fuel program is not necessary in the Portland region and should be discontinued prior to the start of the 1996/97 winter season. She stated that WSPA's position is based on the following facts:

1) The Portland metropolitan area began attaining the standard in 1990, two full years before oxygenated gasoline was required in 1992.

2) DEQ's thorough and extremely conservative analysis demonstrates that oxygenated gasoline is not needed in order for CO levels in the region to remain well below the federal health standards in the winter of 1996/1997 and throughout the ten-year maintenance period.

3) Oxygenated fuel mandates are expensive; WSPA estimates that the program costs the region's consumers, businesses and taxpayers approximately $7.4 million for increased fuel costs and losses in fuel efficiency and potentially $7.7 million in lost revenue from the federal highway trust fund.

4) Continuing an oxygenated fuel mandate when it is not needed for attainment is inconsistent with the provisions of the federal Clean Air Act Amendments of 1990.

Ms. Sherlock cited the historical record of numerous violations (in excess of 100) throughout the late 60's and early 70's. However, by the late 70's and early 80's, the number of violations were reduced significantly, with only one violation since 1985.

Ms. Sherlock explained that the reason for that big improvement in CO air quality was based on two factors and neither one of those is oxygenated gasoline: 1) more stringent new motor vehicle emission standards which resulted in the increased technological sophistication of new motor vehicle emission control systems; and 2) the State's vehicle inspection and maintenance program, ensuring that the emission control systems maintain their effectiveness. Those programs started during the late 70's and early 80's, and oxygenated gasoline came in during the winter of 1992, well after the area's big improvement. She concluded that oxygenated gasoline did not play any role at all in the marked improvement in air quality.

Ms. Sherlock indicated that the Portland area has experienced only one violation of the CO standard in the last ten years and that violation occurred at the 82nd and Division monitor in December of 1989, immediately after the monitor's installation. The monitor has not measured a CO violation since, and all the other monitors in the Portland area show that the area has been attaining the standard since 1985, without the use of oxygenated gasoline.

Ms. Sherlock indicated that the DEQ analysis in the Plan shows compliance can be maintained without an oxygenated fuels program with a safety margin of ten percent, even in the winter of 1996/97. She stated that the analysis is based on a number of very conservative assumptions as follows: 1) worst case base year for meteorological conditions and measured concentrations; 2) extremely conservative background CO; 3) a worst case growth modeling analysis; 4) a calculated base year CO concentration that averages 40 percent higher than the actual measured concentrations during the base year; 5) a peak traffic period in the downtown area that is twice as long as the actual peak period; and 6) a traffic volume growth rate around the 82nd and Division monitor that is 75 percent higher than the traffic volume growth rate estimated by Metro.

These conservative assumptions indicate that the actual safety margin is most likely significantly greater than the ten percent that has been estimated. Ms. Sherlock concluded that an oxygenated fuel program is clearly not necessary for the Portland metropolitan area to stay well below the CO standard, beginning in the winter of 1996/97 and throughout the ten-year maintenance period. In summary, she stated that WSPA urges DEQ to discontinue the winter oxygenated fuel program prior to the start of the 1996/97 winter season.

Ms. Sherlock also submitted written testimony on behalf of WSPA and 76 Products Company. Those comments are summarized in the Department's Evaluation of Public Comments (Attachment D).

8. Joe Gilliam, National Federation of Independent Business.

Mr. Gilliam gave testimony concerning the CO maintenance plan. He stated that the National Federation of Independent Business was the largest small business group in the State, with over 17,000 employers. He indicated that his concerns were similar to those given by Ms. Sherlock for the Western States Petroleum Association, but from a slightly different angle. His organization is concerned over the size of government and overall regulation. He said that the oxygenated fuel program is unneeded, by the Department's own recommendation. The oxygenated fuel program does not make a difference between the Portland area being in attainment or nonattainment, with no significant benefit to the Metro area as far as the air shed is concerned. Mr. Gilliam also cited the costs for the Metro area, estimated at $7 million in fuel related costs and a potential of $7 million in lost transportation funds. He stated that his organization would like to see the DEQ take the action to repeal the program before the 1996/97 winter. He said that the National Federation of Independent Business cannot see a need to extend a program like oxygenated fuel and cost the region the kind of money cited. As a goodwill gesture, the DEQ should act immediately to repeal the program.

9. E. John Resha, Portland Community College and Westside Transportation Alliance.

Mr. Resha gave testimony concerning the ECO Program. He was supportive of the Ozone Maintenance Plan and the ECO Program. He stated that the definition of "Good Faith Effort" was not clear as to what was an acceptable effort. He also stated that there was a need to understand how the trip reduction goal of 10% helped to achieve and maintain the Ozone standard.

Mr. Resha also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

10. Linda Odekirk, Nike and Westside Transportation Alliance

Ms. Odekirk gave testimony concerning the ECO program. She stated that the baseline requirement should be changed from employer baseline to area baseline so that employers will be sure to get credit for work already done.

May 22, 1996, 7:00 pm

11. Peter Fry, Central Eastside Industrial Council

Mr. Fry gave testimony concerning the ECO program. He requested that the record stay open an additional 30 days to provide adequate time to review the ECO proposal. He stated that the Central City Transportation Management Plan (CCTMP) was already consistent with State law. He asked why additional requirements were needed for employers in the CCTMP area. He said that employers were under the impression that participation in the CCTMP would meet any additional rules. He wanted to know how DEQ would determine what parking is free or paid. He stated that Central Eastside parking costs were incorporated into the business, wage rates, and the way the business operated. Mr. Fry said that the Central Eastside had lost businesses because of ill-founded regulatory issues. He stated that the Central Eastside should be included in the definition of "Central Business District". He expressed the concern that the Central Eastside has been closed out of the process.

Mr. Fry also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

12. Kathleen Dotten, Oregon Metals Industry Council

Ms. Dotten gave testimony concerning the Expanded Vehicle Inspection Boundary, the ECO Program, the Ozone Maintenance Plan, and the Industrial Emission Management Program. She read her comments into the record.

Ms. Dotten stated that she did not support the removal of the Newberg, Dundee, Aurora and Marquam areas from the Expanded Vehicle Inspection Boundary. She also stated that the ECO Program shifted the burden of reducing vehicle miles traveled from the driver to the employer. She objected to that shift.

Ms. Dotten stated that the contingency plan should not focus on industry. She said that industry had already made significant emission reductions. She noted that the contingency plan called for further control of industry, even if the problem is caused by another source category. She stated that the maintenance plan should include an emissions allocation for each source category. She suggested that if one category exceeded the allocation, the contingency plan should require reductions from that category, rather than further reductions from industry. As an example, she suggested that congestion pricing could be required if auto emissions exceed their allocation.

Ms. Dotten's testimony concerning the Industrial Emissions Management Program focused on the growth allowance. She stated that the industrial growth allowance should be larger. She suggested that the industrial growth allowance should be at least 1000 tons per year as this would allow existing industry to expand and new industry to develop. She stated that the result would be more high wage jobs. She said that future emission reductions made by industry should be available for increases in industrial sources, not increases in mobile sources.

Ms. Dotten also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

13. David Stoller, Small Business Owner

Mr. Stoller gave testimony concerning the ECO Program. He was concerned that government was becoming larger with more regulations that small business must follow. He said that ECO placed an unfair burden on the small business owner. He suggested that ECO be replaced with a fuel tax to target all types of auto trips. He stated that ECO singled out the employer and was a drastic means to reduce emissions.

May 23, 1996, 7:00 pm

14. Mauri Scott, Iwasake Brothers, Inc.

Ms. Scott gave testimony concerning the ECO Program. She stated that the nature of her business, a nursery, was not taken into account. She explained that employees tending plants cannot telecommute or work a compressed work week, and truck drivers work a non-scheduled work week. She stated that the current auto trip rate was .48, but she couldn't take credit because no programs had been sponsored. She suggested that employers with lower auto trip rates should have lower goals. She also pointed out the need for the survey to be provided in other languages and in an alternate form for illiterate employees (e.g. pictograms). She suggested that the rules should allow for an easier method, such as counting cars in the parking lot.

Ms. Scott also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

15. John Williams , Citizen.

Mr. Williams gave testimony concerning the Ozone Maintenance Plan. He read his comments into the record.

He stated that DEQ should actively support the gasoline pipeline. He said the maintenance plan assumed emissions reductions from the future operation of a planned gasoline pipeline which would reduce emissions from barge loading. He said the plan, which was relatively detailed regarding the other elements of its control strategies, was silent about what steps the DEQ would take to insure that this planned pipeline would actually be constructed, and that the resulting emissions reductions would be achieved. Mr. Williams stated that this was a very important issue because of the large amount of emissions involved. He said that DEQ should consider taking some action to support the pipeline. He suggested that, for instance, DEQ could intervene or testify in the hearings and proceedings before the Washington Energy Siting Council regarding the Olympic pipeline.

Mr. Williams also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

16. Tom Tucker, Citizen

Mr. Tucker gave testimony concerning the Ozone Maintenance Plan. He read his comments into the record.

He stated that the selected strategies were not cost-effective. He said that the maintenance plan relied on tools at DEQ's disposal, rather than the most cost-effective solutions. He suggested that DEQ should explore options to control population growth as a means of reducing air pollution. His suggested alternatives included the deportation of illegal aliens, reducing teenage pregnancies, training workers locally, helping the unemployed find work outside of the state, voter approval prior to annexation, and voter initiatives to require future development to pay for all needed infrastructure.

Mr. Tucker also submitted written comments which are summarized in the Department's Evaluation of Public Comments (Attachment D).

Written Testimony

The following people handed in written comments at the hearings, but did not present oral testimony:

17. Thomasina Gabriele, Gabriele Development Services for Institutional Facilities Coalition.
18. Joy Voline

There was no further testimony and the hearing was closed at 11:15 am, 7:30 pm, and 7:45 pm, respectively.

The public comment period closed at 5:00 pm on Friday, May 24, 1996. All comments received during the public comment are indexed in Attachment C1, which has been attached to this report. All oral and written comments are summarized in Attachment D, The Department's Evaluation of Public Comments.

Attachment C1
Index of Public Comments Received
Attachment to the Presiding Officer's Report for Rulemaking Hearing

State of Oregon
Department of Environmental Quality

	Name/Representing	Subject	Comment Type
1	Jim Craven, American Electronics Association	Industrial Emissions Management Program	Written/ Oral
2	Bob Okren	Employee Commute Options Program	Oral
3	Francie Royce, City of Portland	Ozone and CO Maintenance Plans, Voluntary Parking Ratio Program	Oral
4	Adrian Albrecht, PED Manufacturing Ltd.	Employee Commute Options Program	Written/ Oral
5	Bill Smith, American Lung Association	Ozone Maintenance Plan (Enhanced Vehicle Inspection)	Oral
6	Darrell Fuller, Oregon Automobile Dealers Association	Employee Commute Options Program	Written/ Oral
7	Melissa Sherlock, 76 Products Company, Western States Petroleum Association	Carbon Monoxide Maintenance Plan	Written/ Oral
8	Joe Gilliam	Carbon Monoxide Maintenance Plan	Oral
9	John Resha, Westside Transportation Alliance/ Portland Community College	Ozone Maintenance Plan, Employee Commute Options Program	Written/ Oral
10	Linda Odekirk, Westside Transportation Alliance/ Nike	Ozone Maintenance Plan, Employee Commute Options Program	Oral
11	Peter F. Fry, AICP, Central Eastside Industrial Council	Employee Commute Options Program	Written/ Oral
12	Kathleen Curtis Dotten, Oregon Metals Industry Council	Ozone Maintenance Plan (Enhanced Vehicle Inspection), Expanded Motor Vehicle Inspection Boundary, Industrial Emission Management Program, Employee Commute Optionss Program,	Written/ Oral
13	David Stoller	Employee Commute Options Program	Oral
14	Mairi J. Scott, Iwasake Brothers, Inc.	Employee Commute Options Program	Written/ Oral
15	John Williams	Ozone Maintenance Plan	Written/ Oral
16	Tom Tucker	Ozone Maintenance Plan	Written/ Oral
17	Thomasina Gabriele, Gabriele Development Services, (representing Institutional Facilities Coalition)	Employee Commute Options Program, Voluntary Parking Ratio Program	Written

	Name/Representing	Subject	Comment Type
18	Joy Voline	Employee Commute Options Program	Written
19	Gayle Evans, Standard Insurance Co.	Employee Commute Options Program	Written
20	Rick Gustafson, Shiels, Obletz, Johnsen (Representing Association for Portland Progress)	Employee Commute Options Program	Written
21	Bradford R. Tracy, Maletis Beverage	Employee Commute Options Program	Written
22	Doug Hayden, Columbia Distributing Co., Henny Hinsdale, Admiralty Beverage	Employee Commute Options Program	Written
23	Jerry Griffin, Swan Island Business Association	Employee Commute Options Program	Written
24	Juan Baez, Pacificorp	Employee Commute Options Program	Written
25	Steve Klein, Epson	Employee Commute Options Program	Written
26	Elizabeth Archer, Taylor Made Labels, Inc.	Employee Commute Options Program	Written
27	Elda Orr, Multnomah Athletic Club	Employee Commute Options Program	Written
28	Virginia W. Lang, USWest Communications	Employee Commute Options Program	Written
29	L. Guy Marshall, Columbia Steel Casting Co.	Employee Commute Options Program	Written
30	Susan Duley, Saks Fifth Avenue	Employee Commute Options Program	Written
31	Gary A. Benson, Pendleton Woolen Mills	Employee Commute Options Program	Written
32	Ralph Woll/Dari Buckner, Interstate Brands Corporation	Employee Commute Options Program	Written
33	John Bohlinger, Core-Mark International	Employee Commute Options Program	Written
34	Harriet Sherburne, Portland Center for the Performing Arts	Employee Commute Options Program	Written
35	Douglas Pratt, Jr., Fulton Provision Company	Employee Commute Options Program	Written
36	J. Mark Morford, Stoel, Rives	Employee Commute Options Program	Written
37	Katy Johnson, Pacific Metal Company	Employee Commute Options Program	Written
38	Mike McGee, Oregon Department of Corrections	Employee Commute Options Program	Written
39	Debi Wali, Bullseye Glass Company	Employee Commute Options Program	Written
40	Colin Lamb, Lamb's Thriftway	Employee Commute Options Program	Written
41	William R. Johnson, Valley Wine Company	Employee Commute Options Program	Written
42	Anne Mersereau, Portland Hilton	Employee Commute Options Program	Written
43	David M. Fogle, Pacific Coast Restaurants	Employee Commute Options Program	Written
44	Denice DePaepe, Sears, Roebuck and Company	Employee Commute Options Program	Written

	Name/Representing	Subject	Comment Type
45	Fred Loomis, Gaston Public Schools	Employee Commute Options Program	Written
46	Gordon Slatford, Travelodge Hotel	Employee Commute Options Program	Written
47	S. G. Gray, E.E. Schenck Company	Employee Commute Options Program	Written
48	Louis A. Ornelas, Oregon Health Sciences University	Employee Commute Options Program	Written
49	Michael J.P.C. Kane, UEI	Employee Commute Options Program	Written
50	Charlie Young	Employee Commute Options Program	Written
51	Dan E. Mercer, Mercer Industries, Inc.	Employee Commute Options Program	Written
52	John P. Buckinger, Miller Paint Company	Employee Commute Options Program	Written
53	Ray Alford, Tom Richardson, Doug Jarmer, Pete Szambelan, Oregon Association of Temporary and Staffing Services	Employee Commute Options Program	Written
54	David H. Cook, OSF International, Inc.	Employee Commute Options Program	Written
55	G. Kent Ballantyne, Oregon Association of Hospitals and Health Systems	Employee Commute Options Program	Written
56	Donna M. Marx, The Sweetbrier Inn	Employee Commute Options Program	Written
57	William M. Hedgebeth, USEPA	Carbon Monoxide (CO) Maintenance Plan	Written
58	Jinx Faulkner	CO Maintenance Plan (oxygenated fuels)	Written
59	Matt Rahpael	CO Maintenance Plan (oxygenated fuels)	Written
60	Tom Novick, NW Bio Products Coalition	CO Maintenance Plan (oxygenated fuels)	Written
61	Neil M. Koehler, Parallel Products	CO Maintenance Plan (oxygenated fuels)	Written
62	Del J. Fogelquist, Western States Petroleum Association	CO Maintenance Plan	Written
63	Jim Alan	CO Maintenance Plan (oxygenated fuels)	Written
64	Andrea Benson	CO Maintenance Plan (oxygenated fuels)	Written
65	Kari Easton	CO Maintenance Plan (oxygenated fuels)	Written
66	Todd Easton	CO Maintenance Plan (oxygenated fuels)	Written
67	Michael Madden	CO Maintenance Plan (oxygenated fuels)	Written
68	Steven Schlesser, Schlesser Company, Inc.	CO Maintenance Plan (oxygenated fuels)	Written
69	N. Blosser	CO Maintenance Plan (oxygenated fuels)	Written
70	Chris Beck	CO Maintenance Plan (oxygenated fuels)	Written
71	Harrison Pettit	CO Maintenance Plan (oxygenated fuels)	Written
72	Dave Bernard	CO Maintenance Plan (oxygenated fuels)	Written
73	Maura Hanlon	CO Maintenance Plan (oxygenated fuels)	Written
74	Robert von Borstel, MD	CO Maintenance Plan (oxygenated fuels)	Written
75	David E. Ortman, Friends of the Earth	CO Maintenance Plan (oxygenated fuels)	Written
76	John Fletcher, Container Recovery, Inc.	CO Maintenance Plan (oxygenated fuels)	Written
77	Kim B. Puzey, Port of Umatilla	CO Maintenance Plan (oxygenated fuels)	Written
78	Caroline Weitzer, Media Mania Group	CO Maintenance Plan (oxygenated fuels)	Written

	Name/Representing	Subject	Comment Type
79	John G. White, Oregon Department of Energy	CO Maintenance Plan (oxygenated fuels)	Written
80	Dennis W. Lamb, 76 Products Company	CO Maintenance Plan (oxygenated fuels)	Written
81	Moneeka Settles	CO Maintenance Plan (oxygenated fuels)	Written
82	Claudia Burnett	CO Maintenance Plan (oxygenated fuels)	Written
83	Michelle Gallon	CO Maintenance Plan (oxygenated fuels)	Written
84	Ilene S. Moss	CO Maintenance Plan (oxygenated fuels)	Written
85	Nic Warmenhoven	CO Maintenance Plan (oxygenated fuels)	Written
86	Kenneth Lein	CO Maintenance Plan (oxygenated fuels)	Written
87	Matthew Pennewell	CO Maintenance Plan (oxygenated fuels)	Written
88	Benjamin Basin	CO Maintenance Plan (oxygenated fuels)	Written
89	Karen Notzeo	CO Maintenance Plan (oxygenated fuels)	Written
90	Lucas M. Haley	CO Maintenance Plan (oxygenated fuels)	Written
91	Carr Grey	CO Maintenance Plan (oxygenated fuels)	Written
92	Tim Cowles	CO Maintenance Plan (oxygenated fuels)	Written
93	Abigail Marble	CO Maintenance Plan (oxygenated fuels)	Written
94	Paul Reineke	CO Maintenance Plan (oxygenated fuels)	Written
95	Cynthia Toy	CO Maintenance Plan (oxygenated fuels)	Written
96	Christian G. Sturm	CO Maintenance Plan (oxygenated fuels)	Written
97	Rod Monroe, Metro Councilor, District 6	CO Maintenance Plan (oxygenated fuels)	Written
98	Robert Palzer, Sierra Club	Ozone Maintenance Plan	Written
99	Richard Ledbetter, Metro, Senior Transportation Planner	Ozone Maintenance Plan	Written
100	Ralph Engel, Chemical Specialties Manufacturers Association	Ozone Maintenance Plan	Written
101	Ted Hughes, Pacific Northwest Paint Council	Ozone Maintenance Plan	Written
102	Robert D. Elliot, Southwest Air Pollution Control Authority (Vancouver, WA)	Ozone Maintenance Plan	Written
103	Gil Haselberger, USEPA	Ozone Maintenance Plan	Written
104	Stan R. Holm, Mobil	Industrial Emission Management Program	Written
105	Chris Davies, Texaco Refining and Marketing, Inc.	Industrial Emission Management Program	Written
106	Kirk J. Thomson, Boeing	Industrial Emission Management Program	Written
107	Joseph W. Angel, Oregon Resturant Association	Voluntary Parking Ratio Program	Written
108	Larry Lazar, The Westwind Group	Voluntary Parking Ratio Program	Written
109	Steve Alverdes	Expanded Motor Vehicle Inspection Boundary	Written
110	Rita M. Bernhard, Mayor, City of Scappose	Expanded Motor Vehicle Inspection Boundary	Written

	Name/Representing	Subject	Comment Type
111	John A. Charles, Oregon Environmental Council	Industrial Emisstion Management Program, Expanded Motor Vehicle Inspection Boundary, Voluntary Parking Ratio Program, Employee Commute Options Program, Ozone Maintenance Plan	Written
112	Stanely P. Richardson, Jr.	Ozone and CO Maintenance Plans (Enhanced Vehicle Inspection and oxygenated fuels)	Written
113	Jim Whitty, Associated Oregon Industries	Ozone and CO Maintenance Plans (Enhanced Vehicle Inspection and oxygenated fuels), Industrial Emissions Management Program, Employee Commute Options Program, Voluntary Parking Ratio Program	Written
114	David F. Bartz, Jr., Schwabe, Williamson & Wyatt (representing Simpson Timber Co.)	Industrial Emissions Management Program, Employee Commute Options Program, Ozone Maintenance Plan	Written
115	Felicia Trader, City of Portland	Ozone and CO Maintenance Plans, Voluntary Parking RatioProgram	Written
116	Kristin K. Nadermann, Reynolds Metals Co.	Ozone Maintenance Plan (Enhanced Vehicle Inspection), Industrial Emissions Managment Program, Employee Commute Options Program	Written
117	Randy Tucker, OSPIRG	CO Maintenance Plan (oxygenated fuel)	Written
118	C.L. (Lew) Blackwell, Chevron Products	CO Maintenance Plan (oxygenated fuel)	Written
119	Matt Klein, Lloyd District Transportation Management Association	Employee Commute Options Program	Written
120	Lisa Logie, Westside Transportation Alliance	Employee Commute Options Program	Written
121	Mike Salsgiver, Westside Transportation Alliance	Ozone Maintenance Plan, Employee Commute Options Program	Written
122	Bonnie Gariepy, Intel	Industrial Emission Management Program	Written
123	Gary Slabaugh, Safeway, Inc.	Employee Commute Options Program	Written

Attachment D

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY
Rule Making Proposal
for
Revisions to the Portland Area Motor Vehicle Inspection
and Maintenance Boundary

Department's Evaluation of Public Comment

[Note: Commenter numbers refer to the list in Attachment C]

Comment 1: The Newberg, Dundee, Aurora, and Marquam census areas should not be removed from the expanded VIP boundary. (Commenters: 1, 12, 58, 113, 116) Several commenters opposed removal of the Newberg, Dundee, Aurora, and Marquam census areas from the expanded vehicle Inspection and Maintenance boundary. These commenters believe that with autos contributing the major percentage of air emissions to the Portland airshed, more direct responsibility for air quality should be placed on the individual automobile owners.

Response: Looking at the ozone plan as a whole, even with the proposed boundary revision, motorists are still shouldering the largest share of the emission reduction strategy. In the design year of the maintenance plan (2006) all four major source categories (on-road engines, off-road engines, area sources, and industrial sources) contribute about the same VOC emissions; however, control strategies place the greatest emission reduction requirements on on-road vehicles. This would not change with the proposed vehicle testing boundary reduction. Based on the Department's analysis, improvements in equity and cost effectiveness can be made to the program by eliminating the four proposed census areas with the lowest percentage of commuters contributing to the Portland airshed. This boundary revision can be accomplished without jeopardizing the effectiveness of the Ozone Maintenance Plan, and will not weaken the emphasis placed on motor vehicle control strategies in the maintenance plan. Should the need arise to implement a contingency strategy, reinstatement of the vehicle testing boundary would likely be one of the first options considered.

Comment 2: The four census areas of Newberg, Dundee, Aurora, and Marquam should be removed from the expanded boundary. (Commenter 111) One commenter supported removal of the Newberg, Dundee, Aurora, and Marquam census areas from the expanded boundary.

Response: The Department agrees. The four census areas of Newberg, Dundee, Aurora, and Marquam each have a significantly lower commute rate into the Portland airshed than other census areas in the expanded boundary. Based on the Department's

analysis of commute rate data, and the fact that lost emission credit can be made up by a slight reduction in the industrial growth cushion, the Department believes that removal of the four census areas is warranted.

Comment 3: The actual impact of the number of vehicles entering the Portland AQMA should be considered in the boundary revision. (Commenter 110) One commenter suggested using the actual impact of vehicles from each census areas (number of vehicles commuting into the Portland airshed) as the criteria for determining which areas should be removed from the boundary, and not the percent commute rate from each census area as currently proposed by the Department.

Response: If the boundary adjustment was based solely on the actual number of vehicles contributing to the Portland airshed, some high population census areas with a low commuter contribution to the Portland airshed on a percentage basis would be added to the Inspection and Maintenance program. The resulting program would unnecessarily include a high number of motorists who do not contribute to the Portland airshed problem in the vehicle testing program, with little or no air quality benefit to the Portland airshed. Operating such a program would not be cost effective. Adjusting the Inspection and Maintenance boundary based on percent commuter contribution provides the most cost effective program.

Comment 4 : Do not include Scappoose or any part of Columbia County in the vehicle testing boundary. (Commenter 109) One commenter objected to Scappoose being included in the expanded Inspection and Maintenance Boundary.

Response: The Department maintains that retaining the Scappoose area in the expanded boundary is justified. In 1994, two Columbia County census areas which surround and include the City of Scappoose were included in the expanded Inspection and Maintenance program boundary. Data from the 1990 U.S. Census indicates that approximately 3,000 vehicles commute into the Portland airshed from these two census areas. These vehicles represent almost one half (46 percent) of all vehicles in these two census areas. The Department maintains that these vehicles are a significant contributor to VOC and NOx emissions in the Portland airshed, and that there is sufficient evidence to show that the operation of an inspection and maintenance program in these areas would be a cost effective emission control strategy.

Comment 5: The Department is being selective in their accommodation of legislative concerns. (Commenter 1) One commenter testified that the Department has revised the Inspection and Maintenance boundary, evidently in response to legislative concerns, but has ignored legislative concerns by proposing a backup strategy for the management of un-used PSEL in the emission management rule.

Response: In developing a maintenance plan that will be successful, the Department has endeavored to accommodate legislative concerns where possible. The Department has been successful in reaching the emission reduction goal from industry through the PSEL donation program, therefore the backup strategy for the management of un-used PSEL is no longer needed and has been eliminated.

Attachment E

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY
Rule Making Proposal
for
Revisions to the Portland Area Motor Vehicle Inspection
and Maintenance Boundary

Detailed Changes to Original Rulemaking Made in Response to Public Comment

(One Technical Correction Made by the Department)

The need for one technical change has been identified by the Department since the distribution of the initial rulemaking proposal. The Department intended to exclude the City of Newberg in the proposed boundary revision based on a low commute rate into the Portland airshed, but the Newberg census area proposed for exclusion in the initial proposal did not completely cover all of the Newberg City Limits. The Department proposes to rectify this oversight. In addition, a small, sparsely populated group of census blocks adjacent to the city limits is also proposed for exclusion to prevent the creation of an artificial island and to maintain a contiguous boundary. The resulting loss of emission reduction credit will be negligible. The corrected boundary description (OAR 340-024-0301), is included in this rulemaking as Attachment A and Attachment E-1.

Changes Made in Repose to Public Comment

(One Technical Correction Made by the Department)

Division 24
Motor Vehicles
Motor Vehicle Emission Control Inspection
Test Criteria, Methods and Standards

Boundary Designations

340-024-0301

(1) In addition to the area specified in ORS 815.300, pursuant to ORS 468A.390, the following geographical areas, referred to as the Portland Vehicle Inspection Area and the Medford-Ashland AQMA, are designated as areas within which motor vehicles are subject to the requirement under ORS 815.300 to have a Certificate of Compliance issued pursuant to ORS 468A.380 to be registered or have the registration of the vehicle renewed.

(2) As used in this section, "Portland Vehicle Inspection Area" means the area of the state included within the following census tracts, block groups, and blocks as used in the 1990 Federal Census. In Multnomah County, the following tracts, block groups, and blocks are included: Tracts 1, 2, 3.01, 3.02, 4.01, 4.02, 5.01, 5.02, 6.01, 6.02, 7.01, 7.02, 8.01, 8.02, 9.01, 9.02, 10, 11.01, 11.02, 12.01, 12.02, 13.01, 13.02, 14, 15, 16.01, 16.02, 17.01, 17.02, 18.01, 18.02, 19, 20, 21, 22.01, 22.02, 23.01, 23.02, 24.01, 24.02, 25.01, 25.02, 26, 27.01, 27.02, 28.01, 28.02, 29.01, 29.02, 29.03, 30, 31, 32, 33.01, 33.02, 34.01, 34.02, 35.01, 35.02, 36.01, 36.02, 36.03, 37.01, 37.02, 38.01, 38.02, 38.03, 39.01, 39.02, 40.01, 40.02, 41.01, 41.02, 42, 43, 44, 45, 46.01, 46.02, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56 57, 58, 59, 60.01. 60.02, 61, 62, 63, 64.01, 64.02, 65.01, 65.02, 66.01, 66.02, 67.01, 67.02, 68.01, 68.02, 69, 70, 71, 72.01, 72.02, 73, 74, 75, 76, 77, 78, 79, 80.01, 80.02, 81, 82.01, 82.02, 83.01, 83.02, 84, 85, 86, 87, 88, 89, 90, 91, 92.01, 92.02, 93, 94, 95, 96.01, 96.02, 97.01, 97.02, 98.01, 98.02, 99.01, 99.02, 99.03, 100, 101, 102, 103.01, 103.02, 104.02, 104.04, 104. 05, 104.06, 104.07; Block Groups 1, 2 of Tract 105; Blocks 360, 361, 362 of Tract 105; that portion of Blocks 357, 399 of Tract 105 beginning at the intersection of the Oregon-Washington State Line ("State Line") and the northeast corner of Block Group 1 of Tract 105, thence east along the State Line to the intersection of the State Line and the eastern edge of Section 26, Township 1 North, Range 4 East, thence south along the section line to the centerline of State Highway 100 to the intersection of State Highway 100 and the western edge of Block Group 2 of Tract 105. In Clackamas County, the following tracts, block groups, and blocks are included: Tracts 201, 202, 203.01, 203.02, 204.01, 204.02, 205.01, 205.02, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216.01, 216.02, 217, 218, 219, 220, 221.01, 221.02, 222.02, 223, 224, 225, 226, 227.01, 227.02, 228, 229, 230, 231, 232, 233, 234.01, 234.02, , 235, 236, 237; Block Groups 1, 2 of Tract 241; Block Groups 1, 2, 3, 4 of Tract 242; Block Groups 1, 2 of Tract 243.02. In Yamhill County, the following tract is included: Tract 301, except those areas in Tract 301 that lie within the Newberg City Limits defined as of July 12, 1996, and the

following blocks within Tract 301: 102B, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121D, 122B, 122C, 123, 126, and 127B. In Washington County the following tracts, block groups, and blocks are included: Tracts 301, 302, 303, 304.01, 304.02, 305.01, 305.02, 306, 307, 308.01, 308.02, 309, 310.03, 310.04, 310.05, 310.06, 311, 312, 313, 314.01, 314.02, 315.01, 315.04, 315.05, 315.06, 315.07, 315.08, 316.03, 316.04, 316.05, 316.06, 316.07, 317.02, 317.03, 317.04, 318.01, 318.02, 318.03, 319.01, 319.03, 319.04, 320, 321.01, 321.02, 322, 323, 324.02, 324.03, 324.04, 325, 326.01, 326.02, 328, 329, 330, 331, 332, 333; Block Groups 1, 2 of Tract 327; Block Group 1 of Tract 334; Block Group 2 of Tract 335; Block Group 1 of Tract 336. In Columbia County the following tracts, block groups, and blocks are included: Tract 9710.98; Block Groups 2, 3 of Tract 9709.98; Blocks 146B, 148, 152 of Tract 9709.98.

(3) As used in this section, "Medford-Ashland Air Quality Maintenance Area" means the area of the state beginning at a point approximately one mile northeast of the town of Eagle Point, Jackson County, Oregon, at the northeast corner of section 36, T35S, R1W; thence south along the Willamette Meridian to the southeast corner of section 25, T37S, R1W; thence southeast along a line to the southeast corner of section 9, T39S, R2E; thence south-southeast to the southeast corner of section 22, T39S, R2E; thence south to the southeast corner of section 27, T39S, R2E; thence southwest to the southeast corner of section 33, T39S, R2E; thence west to the southwest corner of section 31, T39S, R2E; thence northwest to the northwest corner of section 36, T39S, R1E; thence west to the southwest corner of section 26, T39S, R1E; thence northwest along a line to the southeast corner of section 7, T39S, R1E; thence west to the southwest corner of section 12, T39S, R1W; thence northwest along a line to the southwest corner of section 20, T38S, R1W; thence west to the southwest corner of section 24, T38S, R2W; thence northwest along a line to the southwest corner of section 4, T38S, R2W; thence west to the southwest corner of section 5, T38S, R2W; thence northwest along a line to the southwest corner of section 31, T37S, R2W; thence north along a line to the Rogue River, thence north and east along the Rogue River to the north boundary of section 32, T35S, R1W; thence east along a line to the point of beginning.

[**NOTE:** This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-020-0047.]

Stat. Auth.: ORS Ch. 468 & 468A
Hist.: DEQ 11-1985, f. 9-30-85, ef. 1-1-86; DEQ 21-1988, f. & cert. ef. 9-12-88; DEQ 4-1993, f. & cert. ef. 3-10-93; DEQ 1-1995, f. & ef. 1-10-95

Attachment F

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY
Rule Making Proposal
for
Revisions to the Portland Area Motor Vehicle Inspection
and Maintenance Boundary

Advisory Committee Membership and Report

While an advisory committee was used to develop the original expanded boundary, no specific advisory committee was used for this boundary reduction. Various Metro committees and the Metro Council support the boundary reduction as part of the overall ozone strategy.

Attachment G

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY
Rule Making Proposal
for
Revisions to the Portland Area Motor Vehicle Inspection
and Maintenance Boundary

Rule Implementation Plan

The expanded boundary as adopted by the EQC on July 22, 1994 has not yet been implemented in Columbia, Marion or Yamhill Counties. This proposal will be implemented by not expanding the Vehicle Inspection Program into the Newberg and Dundee census areas of Yamhill County and the Aurora census area of Marion County. Vehicle testing began in the Marquam area on October 1, 1995. Marquam residents will be notified that they are no longer subject to the Vehicle Inspection Program. The Department expects to implement vehicle testing in the remaining portions of the expanded boundary in the fall of 1996.

(applies to Agenda Item L) Public Forum - Hand out

Northwest Sanitation

P.O. Box 900 • Gresham, OR 97030-9998 • (503) 221-7755 • (206) 699-6350 • (503) 399-5487 • (503) 982-2407 • FAX (503) 221-6988

FAX COVER SHEET

DATE: July 10, 1996 **TIME:**

FROM: Cliff Porter

TO: Bruce (Cascade Phillips)
Bob (RonJohns)
Don (Roto Rooter)
Roy (Schultz-Clearwater)
Mike (Tuffy)
Terri (Clinkscales)
Scot (Bucks)
Homer (Best Pots)
Eric (Advanced Systems)
CB (C.B. Septic Tank Service)
David (Jefferson State Pumping)
Warren (McDonald Portable Toilets)
Donald (Thompson Septic & Rooter Service)
Craig(American Sani-Can)

SUBJECT: DEQ meeting, Friday, July 12th, 8:30 am at 811 SW 6th, Conference Room 3A

TRANSMITTING 4 **PAGES** (including this cover sheet)

For your information I plan to attend the above meeting and discuss the new rules. I would recommend that you attend this meeting if you have any concerns or questions regarding the new rules. Attached is the agenda for this upcoming meeting. It is my understanding per my discussion with the Director's office that a report is being submitted of approximately 20 pages in length by the DEQ staff on Item L. Please note, that the agenda indicates that Item L relating to on-site sewage system temporary rule adoption will not supposedly be open to public comment. However, there is an open public discussion session scheduled for 11:30 am, which I feel can be used to both challenge and address the implementation of the new licensing rules. I anticipate that the DEQ and the commission will tell us that we were told over a year ago about testing (see April 1, 1995 DEQ rule book page 71-118). I plan to draw exception to this for several reasons:

A) We were never informed of the fact that pumpers would be required to know all of the information regarding waste water treatment installation issues. I assumed as others that I have spoke with that we would only need to know the information in these chapters regarding pumping.

B) The rule says we can either take a test or take a DEQ approved training course. DEQ has indicated that there is no such course. As far as I am concerned this should not be my problem that they do not have their course ready for me to take. I do not feel qualified to take the test on the entire range of topics that DEQ intends to test us on (i.e., I also do not think it is relevant, but, that is besides the point). It would be unfair for them to insist that my licensing be based on my taking the test only.

C) I also think that it is unfair that we were informed about DEQ's plan to go forward on the testing with only 30 days notice prior to renewal of our licenses.

D) I also plan to complain about the continued lumping of pumpers with the septic installation. In my case, I deal only with temporary facilities (portable toilets, sinks and holding tanks). We need to be broken out into septic pumpers, portable toilet pumpers and septic installers. In addition, it is my feeling that the DEQ should accept the PSAI certification program as an alternative testing procedure for companies specializing in only portable toilets. Sherman Olsen is familiar with this test because he administered such a test in Portland a little over a year ago. The material in that test is significantly more relevant than what the DEQ is presently proposing. Concerns that DEQ may have about other information relating to Oregon rules that is not in the PSAI test can be addressed by the development of a short supplemental to the PSAI test. This was recently done in Minnesota. Thus, the PSAI can administer the Oregon version of the PSAI test and we as a group can have a say as to what our standards will be. I am tired of rules being written that show a lack of knowledge of our industry and the customer that we serve. We need to have a voice in this process. So that rules are written that are good for the industry and make sense.

E) Please note, that DEQ is quitely developing new rules on holding tanks (both temporary and permanent) that will have a dramatic impact on our industry. To the best of my knowledge they have made no significant attempts to discuss this issue with the users and providers of holding tanks in the development of these rules.

Please contact me or Bruce Phillips at Cascade-Phillips if you have any questions or concerns or you would like for me to try to express your feelings at the meeting if you cannot attend. If you can, please let me know if you can attend the meeting.

Regards.

AGENDA

Environmental Quality Commission Meeting
July 11 - 12, 1996

Notes:

Because of the uncertain length of time needed for each agenda item, the Commission may deal with any item at any time in the meeting. If a specific time is indicated for an agenda item, an effort will be made to consider that item as close to that time as possible. However, scheduled times may be modified if agreeable with participants. Anyone wishing to listen to the discussion on any item should arrive at the beginning of the meeting to avoid missing the item of interest.

Public Forum: The Commission will break the meeting at approximately **11:30 a.m.** for the Public Forum if there are people signed up to speak. The Public Forum is an opportunity for citizens to speak to the Commission on environmental issues and concerns not a part of the agenda for this meeting. **The public comment period has already closed for the Rule Adoption items and, in accordance with ORS 183.335(13), no comments can be presented to the Commission on those agenda items.** Individual presentations will be limited to 5 minutes. The Commission may discontinue this forum after a reasonable time if an exceptionally large number of speakers wish to appear.

July 11, 1996
811 SW Sixth, Conference Room 3A
1:00 - 5:00 pm
Work Session

1:00 - 2:00 pm:	Hazardous Waste Program Overview and Rule Amendment Background
2:00 - 3:00 pm: Risk	Umatilla Army Depot: DEQ/Ecology and Environmental Response to Assessment Issues
3:00 - 5:00 pm:	Umatilla Army Depot: US Army Response to EQC Questions Regarding Safety and Alternative Permitting Scenarios

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July 12, 1996
811 SW Sixth, Conference Room 3A
Regular Meeting Beginning at 8:30 am

A. Approval of Minutes

B. Approval of Tax Credits

C. †**Rule Adoption:** Portland Area Carbon Monoxide Maintenance Plan

D. **†Rule Adoption**: Portland Area Ozone Maintenance Plan

E. **†Rule Adoption**: Revisions to the Portland Area Motor Vehicle Inspection and Maintenance Boundary

F. **†Rule Adoption**: Employee Commute Options Program

G. **†Rule Adoption**: Voluntary Regional Maximum Parking Ratio Program

H. **†Rule Adoption**: Industrial Emission Management Rules for Portland Area Ozone Maintenance Plan

I. **†Rule Adoption**: Air Quality Industrial Rules (Crematory Incinerators, Excess Emissions, Title V Fee Assessment, Housekeeping)

J. **†Rule Adoption**: Proposed Rules for a Pollution Prevention Tax Credit Pilot Program

K. **†Rule Adoption**: Hazardous Waste Rule Amendments

L. **†Rule Adoption**: On-site Sewage System Temporary Rule

M. **Action Item**: EPA/DEQ Environmental Performance Partnership Agreement

N. Commissioners' Reports (Oral)

O. Director's Report (Oral)

Hearings have already been held on the Rule Adoption items and the public comment period has closed. In accordance with ORS 183.336(13), no comments can be presented by any party to either the Commission or the Department on these items at any time during this meeting.

The Commission has set aside August 22-23, 1996, for their next meeting. The location is the Hermiston Community Center, 415 Highway 395, Hermiston, Oregon 97838.

Copies of staff reports for individual agenda items are available by contacting the Director's Office of the Department of Environmental Quality, 811 S. W. Sixth Avenue, Portland, Oregon 97204, telephone 229-5395, or toll-free 1-800-452-4011. Please specify the agenda item letter when requesting.

If special physical, language or other accommodations are needed for this meeting, please advise the Director's Office, (503)229-5395 (voice)/(503)229-6993 (TTY) as soon as possible but at least 48 hours in advance of the meeting.

June 24, 1996

Post-it® Fax Note 7671	Date 7/9/96	# of pages ▶ 2
To CLIFF PORTER	From SHERMAN OLSON	
Co./Dept. NW SWD	Co. DEQ	
Phone # 221 7755	Phone # 229 6443	
Fax # 221 6988	Fax #	

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July 11, 1996

Northwest Sanitation
Cliff Porter
P O Box 900
Gresham OR 97030-9998

RE: D.E.Q. meeting, Friday, July 12, 1996

Thank you for the fax we received this morning concerning the meeting tomorrow. As you know this is a difficult time of year in our industry for any key people to be away. Especially with such short notice. We will not be able to attend but would like to express our complete agreement with the contents of your letter.

In addition to your views we are interested in knowing who/what initiated this action. We have been told it is an individual or organization. What interest do they have in promoting this ruling? What is the benefit, from D.E.Q.'s point of view, for their agency and our industry? What do they see as the purpose for this "On Site Sewage System Temporary Ruling". That title in itself would indicate that it is for those involved in "on site systems". What is their definition for system?

We feel that if anyone must be tested/trained it should be the owners and/or managers. They would, in turn, be responsible for training their employees.

We have always had a strong feeling that a statewide association is extremely important. This situation we now face is precisely why it is necessary. If we had a collective voice we would be more effective and have some impact. Within an association there could be an advisory committee that could work with agencies regulating our industry to make the most effective decisions for the agency and our industry.

Thank You for your time, energy and commitment.

Homer and Carol Rhodaback
Owners

ROTO-ROOTER SEWER-DRAIN SERVICE

455-1/2 RIVER AVENUE, EUGENE, OREGON 97404

COAST TO COAST

PHONE
(503) 689-1711
FAX
(503) 461-4626

Northwest Sanitation

P.O.Box 980

Gresham,OR 97030

July 11,1996

From: Don Sherwood

To; Cliff Porter

Thank you very much for your continuing hard work and committment to our portable toilet industry. I too am very concerned about what DEQ is trying to accomplish with the latest rulings in regards to testing and or taking of classes. In my opinion DEQ is definitely not looking out for the industries or the publics best interests.

Here at ROTO ROOTER we are currently preforming services such as: Drainfield installation, Drainfield restoration, Septic pumping/hauling, and servicing of portable toilets. These various services have very different job descriptions and requirements.

I also agree that it is unfair and unreasonable of DEQ to go ahead with the proposed changes without thorough notification of affected parties, and availability for providing appropriate training and testing throughout the state of Oregon in a timely manner.

ROTO ROOTER will join you and the other Portable Toilet Service Companies throughout the state of Oregon in the pursuit of a revision to DEQ's current laws.

Sincerely,

Don Sherwood
Branch Manager

THOMPSON SEPTIC & ROOTER SERVICE
P.O. BOX 636, SPRINGFIELD, OR 97477
541 746-4224

June 05, 1999

[redacted]
Fax: 503-221-6988

Dear Cliff:

I received your fax last evening regarding the DEQ testing. At this point I can be present at that the DEQ meeting however I do have other matters that need to be attended to. The question that I have is that they have us backed into a corner and I have yet to see a government agency that backed down based on a simple request of reasonableness. Can any good be achieved by attending?

If you could call or fax a reply I would appreciate it.

Sincerely

[redacted]

July 10, 1996

Attn: Cliff Porter - Northwest Sanitation:

I would very much like to attend this meeting on Friday, unfortunately I will be out of town. I to feel very strongly about the issues you brought up. I would appreciate it if you would use this letter as my voice on Friday.

To: D.E.Q.

I am challenging your requirement that I pass a written test in order to receive my license for 1996/97. According to your on site sewage disposal rules, you were to provide a department approved training session. To the best of my knoweledge this has not been done, nor, we are now informed, will it be done. We were also not informed that we would be expected to know the rules and regulations regarding other fields of work such as Septic Pumping and Septic Tank Installation. I feel that this is not only unfare but unreasonable. D.E.Q. needs to seperate Portable Toilet Pumpers, Septic Tank Pumpers and Septic Tank Installers. These are three completely different fields of work. We should not be required or expected to know the rules and regulations of another field of work. It is hard enough to keep up with the rules and regulations of our own areas of expertise. Would you expect a dentist to beable to pass a doctors exam? I think not. It is my hope that you will reconsider your certification/testing proposal and change it so that each field is tested only on the rules and regulations pertaining to it. I would further like to see D.E.Q. use the PSAI certification test as an alternative. Who is more qualified then our own industry to teach and test us in our field of work.

Sincerely,

Terry Shankle

Terry Shankle
Clinkscales Portable Toilets

event the penalty is recovered by a regional air quality control authority, it shall be paid into the county treasury of the county in which the violation occurred. [Formerly 449.973; 1989 c.706 §17; 1991 c.650 §6; 1991 c.734 §37]

468.140 Civil penalties for specified violations. (1) In addition to any other penalty provided by law, any person who violates any of the following shall incur a civil penalty for each day of violation in the amount prescribed by the schedule adopted under ORS 468.130:

(a) The terms or conditions of any permit required or authorized by law and issued by the department or a regional air quality control authority.

(b) Any provision of ORS 164.785, 448.305, 454.010 to 454.040, 454.205 to 454.255, 454.405, 454.425, 454.505 to 454.535, 454.605 to 454.745, ORS chapter 467 and ORS chapters 468, 468A and 468B.

(c) Any rule or standard or order of the commission adopted or issued pursuant to ORS 448.305, 454.010 to 454.040, 454.205 to 454.255, 454.405, 454.425, 454.505 to 454.535, 454.605 to 454.745, ORS chapter 467 and ORS chapters 468, 468A and 468B.

(d) Any term or condition of a variance granted by the commission or department pursuant to ORS 467.060.

(e) Any rule or standard or order of a regional authority adopted or issued under authority of ORS 468A.135.

(f) The financial assurance requirement under ORS 468B.480 and 468B.485 or any rule related to the financial assurance requirement under ORS 468B.480.

(2) Each day of violation under subsection (1) of this section constitutes a separate offense.

(3)(a) In addition to any other penalty provided by law, any person who intentionally or negligently causes or permits the discharge of oil into the waters of the state shall incur a civil penalty not to exceed the amount of $20,000 for each violation.

(b) In addition to any other penalty provided by law, the following persons shall incur a civil penalty not to exceed the amount of $10,000 for each day of violation:

(A) Any person who violates the terms or conditions of a permit authorizing waste discharge into the air or waters of the state.

(B) Any person who violates any law, rule, order or standard in ORS 448.305, 454.010 to 454.040, 454.205 to 454.255, 454.405, 454.425, 454.505 to 454.535, 454.605 to 454.745 and ORS chapters 468, 468A and 468B relating to air or water pollution.

(C) Any person who violates the provisions of a rule adopted or an order issued under ORS 459A.590.

(4) In addition to any other penalty provided by law, any person who violates the provisions of ORS 468B.130 shall incur a civil penalty not to exceed the amount of $500 for each day of violation.

(5) Subsection (1)(c) and (e) of this section do not apply to violations of motor vehicle emission standards which are not violations of standards for control of noise emissions.

(6) Notwithstanding the limits of ORS 468.130 (1) and in addition to any other penalty provided by law, any person who intentionally or negligently causes or permits open field burning contrary to the provisions of ORS 468A.555 to 468A.620 and 468A.992, 476.380 and 478.960 shall be assessed by the department a civil penalty of at least $20 but not more than $40 for each acre so burned. Any fines collected by the department pursuant to this subsection shall be deposited with the State Treasurer to the credit of the General Fund and shall be available for general governmental expense. [Formerly 449.993; 1975 c.559 §14; 1977 c.511 §5; 1979 c.353 §1; 1987 c.513 §1; 1989 c.268 §4; 1989 c.1042 §7; 1991 c.764 §6]

POLLUTION CONTROL FACILITIES TAX CREDIT

468.150 Field sanitation and straw utilization and disposal methods as "pollution control facilities." After alternative methods for field sanitation and straw utilization and disposal are approved by the committee and the department, "pollution control facility," as defined in ORS 468.155, shall include such approved alternative methods and persons purchasing and utilizing such methods shall be eligible for the benefits allowed by ORS 468.155 to 468.190. [1975 c.559 §15]

Note: 468.150 was enacted into law by the Legislative Assembly but was not added to or made a part of ORS chapter 468 or any series therein by legislative action. See Preface to Oregon Revised Statutes for further explanation.

468.155 Definitions for ORS 468.155 to 468.190. (1)(a) As used in ORS 468.155 to 468.190, unless the context requires otherwise, "pollution control facility" or "facility" means any land, structure, building, installation, excavation, machinery, equipment or device, or any addition to, reconstruction of or improvement of, land or an existing structure, building, installation, excavation, machinery, equipment or device reasonably used, erected, constructed or installed by any person if:

(A) The principal purpose of such use, erection, construction or installation is to

comply with a requirement imposed by the department, the federal Environmental Protection Agency or regional air pollution authority to prevent, control or reduce air, water or noise pollution or solid or hazardous waste or to recycle or provide for the appropriate disposal of used oil; or

(B) The sole purpose of such use, erection, construction or installation is to prevent, control or reduce a substantial quantity of air, water or noise pollution or solid or hazardous waste or to recycle or provide for the appropriate disposal of used oil.

(b) Such prevention, control or reduction required by this subsection shall be accomplished by:

(A) The disposal or elimination of or redesign to eliminate industrial waste and the use of treatment works for industrial waste as defined in ORS 468B.005;

(B) The disposal or elimination of or redesign to eliminate air contaminants or air pollution or air contamination sources and the use of air cleaning devices as defined in ORS 468A.005;

(C) The substantial reduction or elimination of or redesign to eliminate noise pollution or noise emission sources as defined by rule of the commission;

(D) The use of a material recovery process which obtains useful material from material that would otherwise be solid waste as defined in ORS 459.005, hazardous waste as defined in ORS 466.005, or used oil as defined in ORS 459A.555; or

(E) The treatment, substantial reduction or elimination of or redesign to treat, substantially reduce or eliminate hazardous waste as defined in ORS 466.005.

(2) "Pollution control facility" or "facility" does not include:

(a) Air conditioners;

(b) Septic tanks or other facilities for human waste;

(c) Property installed, constructed or used for moving sewage to the collecting facilities of a public or quasi-public sewerage system;

(d) Any distinct portion of a pollution control facility that makes an insignificant contribution to the principal or sole purpose of the facility including the following specific items:

(A) Office buildings and furnishings;

(B) Parking lots and road improvements;

(C) Landscaping;

(D) External lighting;

(E) Company or related signs; and

(F) Automobiles;

(e) Replacement or reconstruction of all or a part of any facility for which a pollution control facility certificate has previously been issued under ORS 468.170, except:

(A) If the cost to replace or reconstruct the facility is greater than the like-for-like replacement cost of the original facility due to a requirement imposed by the department, the federal Environmental Protection Agency or a regional air pollution authority, then the facility may be eligible for tax credit certification up to an amount equal to the difference between the cost of the new facility and the like-for-like replacement cost of the original facility; or

(B) If a facility is replaced or reconstructed before the end of its useful life then the facility may be eligible for the remainder of the tax credit certified to the original facility;

(f) Asbestos abatement; or

(g) Property installed, constructed or used for cleanup of emergency spills or unauthorized releases, as defined by the commission. [Formerly 449.605; 1975 c.496 §1; 1977 c.795 §1; 1979 c.802 §1; 1983 c.637 §1; 1987 c.596 §4; 1989 c.802 §4]

468.160 Policy. In the interest of the public peace, health and safety, it is the policy of the State of Oregon to assist in the prevention, control and reduction of air, water and noise pollution and solid waste, hazardous wastes and used oil in this state by providing tax relief with respect to Oregon facilities constructed to accomplish such prevention, control and reduction. [Formerly 449.615; 1975 c.496 §2; 1977 c.795 §2; 1979 c.802 §2]

468.165 Application for certification of pollution control facilities; fees. (1) Any person may apply to the Environmental Quality Commission for certification under ORS 468.170 of a pollution control facility or portion thereof erected, constructed or installed by the person in Oregon if:

(a) The air or water pollution control facility was erected, constructed or installed on or after January 1, 1967.

(b) The noise pollution control facility was erected, constructed or installed on or after January 1, 1977.

(c) The solid waste facility was under construction on or after January 1, 1973, the hazardous waste or used oil facility was under construction on or after October 3, 1979, and if:

(A) The facility's principal or sole purpose conforms to the requirements of ORS 468.155 (1);

(B) The facility will utilize material that would otherwise be solid waste as defined in

AIR POLLUTION CONTROL

468A.005 Definitions for air pollution control laws. As used in ORS chapters 468, 468A and 468B, unless the context requires otherwise:

(1) "Air-cleaning device" means any method, process or equipment which removes, reduces or renders less noxious air contaminants prior to their discharge in the atmosphere.

(2) "Air contaminant" means a dust, fume, gas, mist, odor, smoke, vapor, pollen, soot, carbon, acid or particulate matter or any combination thereof.

(3) "Air contamination" means the presence in the outdoor atmosphere of one or more air contaminants which contribute to a condition of air pollution.

(4) "Air contamination source" means any source at, from, or by reason of which there is emitted into the atmosphere any air contaminant, regardless of who the person may be who owns or operates the building, premises or other property in, at or on which such source is located, or the facility, equipment or other property by which the emission is caused or from which the emission comes.

(5) "Air pollution" means the presence in the outdoor atmosphere of one or more air contaminants, or any combination thereof, in sufficient quantities and of such characteristics and of a duration as are or are likely to be injurious to public welfare, to the health of human, plant or animal life or to property or to interfere unreasonably with enjoyment of life and property throughout such area of the state as shall be affected thereby.

(6) "Area of the state" means any city or county or portion thereof or other geographical area of the state as may be designated by the commission.

(7) "Woodstove" means a wood fired appliance with a closed fire chamber which maintains an air-to-fuel ratio of less than 30 during the burning of 90 percent or more of the fuel mass consumed in the low firing cycle. The low firing cycle means less than or equal to 25 percent of the maximum burn rate achieved with doors closed or the minimum burn achievable. [Formerly 468.275]

468A.010 Policy. (1) In the interest of the public health and welfare of the people, it is declared to be the public policy of the State of Oregon:

(a) To restore and maintain the quality of the air resources of the state in a condition as free from air pollution as is practicable, consistent with the overall public welfare of the state.

(b) To provide for a coordinated statewide program of air quality control and to allocate between the state and the units of local government responsibility for such control.

(c) To facilitate cooperation among units of local government in establishing and supporting air quality control programs.

(2) The program for the control of air pollution in this state shall be undertaken in a progressive manner, and each of its successive objectives shall be sought to be accomplished by cooperation and conciliation among all the parties concerned. [Formerly 449.765 and then 468.280]

468A.015 Purpose. It is the purpose of the air pollution laws contained in ORS 448.305, 454.010 to 454.040, 454.205 to 454.255, 454.405, 454.425, 454.505 to 454.535, 454.605 to 454.745 and ORS chapters 468, 468A and 468B to safeguard the air resources of the state by controlling, abating and preventing air pollution under a program which shall be consistent with the declaration of policy in this section and with ORS 468A.010. [Formerly 449.770 and then 468.285]

468A.020 Application of air pollution laws. Except as provided in this section and in ORS 476.380 and 478.960, the air pollution laws contained in ORS chapters 468, 468A and 468B do not apply to:

(1) Agricultural operations and the growing or harvesting of crops and the raising of fowls or animals, except field burning which shall be subject to regulation pursuant to ORS 468.140, 468.150, 468A.555 to 468A.620 and 468A.992 and this section;

(2) Use of equipment in agricultural operations in the growth of crops or the raising of fowls or animals, except field burning which shall be subject to regulation pursuant to ORS 468.140, 468.150, 468A.555 to 468A.620 and 468A.992 and this section;

(3) Barbecue equipment used in connection with any residence;

(4) Agricultural land clearing operations or land grading;

(5) Heating equipment in or used in connection with residences used exclusively as dwellings for not more than four families, except woodstoves which shall be subject to regulation under this section, ORS 468A.460 to 468A.480, 468A.490 and 468A.515;

(6) Fires set or permitted by any public agency when such fire is set or permitted in the performance of its official duty for the purpose of weed abatement, prevention or elimination of a fire hazard, or instruction of employees in the methods of fire fighting, which in the opinion of the agency is necessary;

THE HENRY L. STIMSON CENTER

Pragmatic Steps Toward Ideal Objectives

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Henry L. Stimson's distinguished career in defense and foreign policy spanned four decades in which the United States grew into its new role as a global power. As secretary of war under President Taft, Stimson concentrated on reforms to streamline the U.S. Army. At the age of forty-nine, he volunteered as an artillery officer in World War I and served on the front lines in France. As President Hoover's secretary of state in 1930, he negotiated the London Naval Treaty for the United States. In 1940, as President Roosevelt's secretary of war, Stimson managed the war effort and was involved with the development of the atomic bomb. His last preoccupation in office, and in the last few years of his life, was how this devastating weapon could be controlled.

We admire Henry L. Stimson's nonpartisan spirit, his sense of purpose, and his ability to steer a steady course toward clearly defined long-range national security goals. By establishing a research center in his name, we hope to call attention to the issues he cared about, as well as to his record of public service, and to propose, as Stimson did, pragmatic steps toward ideal objectives.

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The U.S. Chemical Weapons Destruction Program: Views, Analysis, and Recommendations

Amy E. Smithson
with the assistance of Maureen Lenihan

Report No. 13 September 1994

Pragmatic steps toward ideal objectives

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Executive Summary

For well over a decade, the U.S. Army has been assembling, testing, and refining a program to destroy the U.S. chemical weapons stockpile, which consists of some 30,000 tons of nerve and blister agents located at eight storage sites in the continental United States. The Army selected high-temperature incineration to do the job. When compared with other alternatives available at the time this decision was made, incineration ranked highest for effective and safe disposal, as well as the ability to complete the task under the deadlines stipulated by Congress to destroy these deteriorating munitions. Since that time, environmentalists have launched a campaign to halt incineration as a method of disposing of hazardous wastes. Therefore, on the eve of inaugurating operations at its first facility in the continental United States, the Army found itself facing strong opposition to its chemical weapons destruction program.

In addition to conducting pilot-scale tests of its incineration technology, known as the "baseline" system, the Army has completed a series of tests at a larger prototype baseline facility on Johnston Atoll in the Pacific Ocean, where a small percentage of the U.S. chemical arsenal is being destroyed. Conducted under the scrutiny of federal regulatory authorities, these tests show the Johnston Atoll baseline facility to have met or exceeded federal pollution control standards. Furthermore, the National Academy of Sciences convened panels of experts to review the Army's baseline program and the feasibility of alternative technologies. Reports from the National Research Council recommended several improvements to the baseline system as well as the pursuit of alternative technologies. The National Research Council advised going ahead with the baseline program based on the conclusion that the increased health and environmental risks of maintaining the stockpile over the extended period of time needed to develop alternative technologies far outweighed the risks of destruction via incineration. Meanwhile, officials from the Army, federal regulatory agencies, and the Council all acknowledge that there have been problems with the baseline system.

Incineration opponents have honed in on those problems, subjecting the Army's efforts to withering scrutiny. Depicting incinerators as "landfills in the sky," the opposition has emphasized its claim that the Army and federal regulatory authorities will allow chemical agents and other toxic by-products of incineration to emerge from the smokestacks of baseline facilities in quantities that will endanger the environment and the health of local populations. Several reports detail the opposition's accusations against incineration in general and the Army's program in particular. Circulation of these reports and other opposition charges have heightened resistance to the Army's program in communities near munitions storage sites.

The opposition has probed virtually every aspect of the baseline program, but the technical underpinnings of its accusations have not received the same degree of examination. Recent peer reviews of the science contained in some of the opposition's reports reveal it to be poor, biased, and lacking in the standards that normally discipline scientific research. In short, incineration opponents appear to be presenting a distorted picture of incineration and the baseline program.

The author recommends that citizens and legislators regard existing scientific claims against the baseline program compiled by advocacy groups with a healthy degree of skepticism. At the same time, citizens and legislators need to continue to press the Army to maintain the highest possible standards of public health and safety while carrying out the baseline program. The author also makes the following recommendations:

- The Army should initiate a more thorough and aggressive effort to state its case and to provide clear and concise information about the baseline system.
- The size and responsibilities of Citizens Advisory Commissions could be increased so that they become meaningful channels of communication between the Army and local communities.
- The Army might consider taking additional steps to enhance public confidence that baseline facilities in fact have only the low level of emissions advertised, including hiring a separate contractor to run the monitoring system at each destruction facility and making funds available to local Citizens Advisory Commissions to retain an independent emissions monitoring consultant.
- Outside of a decision by local communities to allow future uses of baseline facilities, responsible national officials should regularly reaffirm their commitment to destroy these facilities upon completion of their primary task.
- The Army must revitalize and properly administrate the Chemical Stockpile Emergency Preparedness Program to create the viable emergency response capability upon which the decision to destroy the stockpile *in situ* was predicated.

This report is intended to serve multiple purposes. Views of proponents and opponents to the baseline program are presented and an independent analysis of the situation is provided, along with references on the evolution of the destruction program and a bibliography for further reading. The report covers the confusion and controversies over the risk assessment supporting the Army's program; the emergency preparedness programs at the stockpile storage sites; the possible use of baseline facilities for purposes other than stockpile destruction; and the long–running, scientific and technical debate about the desirability of incineration as a method for destroying the stockpile.

While executing the baseline program is an enormously complicated and difficult task, the Army is making unprecedented efforts to build and operate these facilities safely, at considerable cost.

- Baseline incinerators are the only ones in the country to monitor continuously for particulate emissions, in this case for chemical agent emissions. The Army's monitoring levels for nerve agents are roughly 21,000 times stricter than what would be required federally and about 210 times stricter than the tougher emissions standards requested by some states. For mustard agent, the Army's monitoring levels are approximately 415 times stricter than the federal requirement and four times stricter than the more rigorous state emissions standard.
- Baseline incinerators have hundreds more operational checkpoints and safeguards than federal regulations require. A case in point is the Johnston Atoll facility's

deactivation furnace, which destroys explosives and propellants from munitions. The fourteen alarms that federal authorities require for cutting off the waste feed into the incinerator in the event of operational irregularities have been supplemented by another 186 alarms for the Army's own monitoring purposes. These extra alarms give the Army ample information about the incinerator's operation to enable appropriate adjustments to be made to maintain the highest possible level of combustion efficiency.

- Baseline incinerators have other unique features. For instance, after artillery shells and ton containers are processed through the metal parts furnace, they enter an airlock where the air is sampled twice for the presence of residual agent. If agent is detected, the item(s) concerned go back into the furnace for additional treatment. No other incinerator in the country possesses this post-treatment screening safeguard.

Thus, while the Army's baseline program shares some characteristics with other incinerators, it clearly has some uncommon attributes that set it apart from the common stereotype of incinerators.

Citizens and legislators should take this into consideration when making decisions about the chemical weapons destruction program. In addition, they need to give serious thought to the increased risk to local populations that would accrue from long-term storage of the stockpile and the possibility that alternative technologies may offer only marginal safety improvements over baseline. No method used to destroy the stockpile will be inherently risk-free, nor can any method be executed with an absolute guarantee of foolproof operations. Therefore, continuous local and national oversight for the Army's destruction program will be needed.

This report is a product of the Chemical Weapons Convention Implementation Project, which is funded by the Carnegie Corporation of New York. The project's objectives are to serve as an information clearinghouse about the Convention and issues associated with it, as a watchdog over national and international preparations to implement the Convention, and as an advocate for the strongest possible chemical weapons nonproliferation regime.

Preface and Acknowledgements

More than 155 nations, including the United States, have signed the Chemical Weapons Convention, which will prohibit the development, production, stockpiling, and use of chemical weapons. While entry into force of this treaty, which is expected sometime in 1995, would require the elimination of the U.S. chemical weapons stockpile, the U.S. Army has since the mid–1980s been under a congressional mandate to do the same. After studying various disposal options, the Army decided to destroy the stockpile using high–temperature incineration, a process known as the "baseline" system. This decision has sparked vigorous debate and the intense opposition of some national environmental organizations and local citizens in the eight U.S. communities where the stockpile is stored.

As the debate has progressed, local citizens and national legislators have been hit with a barrage of conflicting and confusing information from the baseline system's critics and advocates. This report attempts to clarify the issues surrounding the chemical weapons destruction program, thereby allowing for more informed decision–making.

This report is a product of the Henry L. Stimson Center's Chemical Weapons Convention Implementation Project, funded by the Carnegie Corporation of New York. The Convention is the most significant agreement to stem the proliferation of weapons of mass destruction since the 1968 Nuclear Nonproliferation Treaty. The Stimson Center established this project to monitor the preparations for implementing the treaty and to serve as a watchdog, information clearinghouse, and advocate for the most effective chemical weapons nonproliferation regime possible.

The author wishes to express appreciation to the many individuals who assisted with this study by granting interviews or providing documents. Interviews were conducted with officials of the U.S. Army Chemical Materiel Destruction Agency at the headquarters building at Aberdeen, Maryland, including the Agency's Commander and Director, General Walter L. Busbee; Charles Baronian, who recently retired but was the Program Manager for Chemical Demilitarization at the time of the interview; Public Affairs Chief Marilyn Tischbin; Mark Evans, Special Assistant to the Program Manager; and Edwin Muniz, Task Manager in the Agency's Environmental and Monitoring Division.

The Chairman of the National Research Council's Stockpile Review Committee, Dr. Carl Peterson, and Donald Siebenaler of the Council's staff spoke with the author in Washington. From the Environmental Protection Agency's Office of Solid Waste, the author interviewed Jim Michael and Sonya Sasseville of the Assistance Branch, Permits and State Programs Division. The former is the Chief of the Disposal Technology Section, the latter the Chief of the Alternative Technologies Section. Victoria van Roden, Chief of the Permit Policy and Review Section in the Permits Branch of the Office of Solid Waste was also interviewed in Crystal City, Virginia. A telephone interview was conducted with Y.J. Kim, National Incineration Expert, and Cathy Massimino, Senior Resource Conservation and Recovery Act/Superfund Technical Specialist. These two individuals have been integrally involved in the Environmental Protection Agency's

regulatory oversight of baseline operations at the Johnston Atoll facility. James Everett, Executive Director of Kentucky Disaster and Emergency Services, and DePaul University Law Professor Barry Kellman also granted interviews.

Sebia Hawkins, Greenpeace's Pacific Campaign Director, and Craig Williams, Founder and President of the Kentucky Environmental Foundation, were interviewed in Washington, D.C. Williams graciously extended the author an invitation to attend a meeting of the Chemical Weapons Working Group in Washington, D.C. Likewise, John Nunn, Chairman of the Aberdeen, Maryland, Citizens Advisory Commission invited the author to attend a meeting. Both of these experiences provided valuable insight into the concerns of local citizens. The author conducted telephone interviews with James Harmon of the Anniston, Alabama, Citizens Advisory Commission and The Families Concerned About Nerve Gas Incineration, as well as with Ross Vincent, Chairman of the Sierra Club's National Hazardous Materials Committee and member of the Pueblo, Colorado, Citizens Advisory Commission. The author wishes to thank all of these individuals for patiently sharing their time, views, and expertise.

Harvey Rogers of the Centers for Disease Control and Prevention, James Cudahy, President of Focus Environmental Inc., and Georgetown University Law Professor David A. Koplow all provided the author with early access to documents they were preparing. Tim Dixon, a contractor working for the Public Affairs Office of the Program Manager for Chemical Demilitarization, was extremely helpful in providing access to information and documents about the Army's program.

The author would also like to thank others who contributed to the preparation of this report. As always, Stimson Center President Michael Krepon provided key substantive guidance and a critical reviewer's eye. Vicky Plunkett of Congressman Glen Browder's (D–AL) staff and John Parachini, Executive Director of the Lawyers Alliance for World Security, reviewed two sections of the report, furnishing constructive suggestions. Maureen Lenihan supplied stalwart research assistance, stepping in when Keir Lieber, an equally able aide, concluded his tenure with the Stimson Center. Lenihan quickly grasped the subject matter and made tangible contributions that are reflected most prominently in the report's appendixes. Jane Dorsey joined the effort in its final stages, giving the document its final polish.

The Stimson Center is grateful to the Carnegie Corporation of New York, whose funding makes this work possible. We particularly wish to thank David Hamburg and David Speedie for their continued support.

Amy E. Smithson
Senior Associate

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List Of Abbreviations

ACAMS	Automatic Continuous Air Monitoring System
CAC	Citizens Advisory Commission
CAMDS	Chemical Agent Munitions Disposal System
CSEPP	Chemical Stockpile Emergency Preparedness Program
CDC	Centers for Disease Control and Prevention
CWC	Chemical Weapons Convention
DOD	Department of Defense
DRE	Destruction and Removal Efficiency
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GAO	General Accounting Office
HHS	Department of Health and Human Services
JACADS	Johnston Atoll Chemical Agent Disposal System
LIC	Liquid Incinerator
MPF	Metal Parts Furnace
NRC	National Research Council
OTA	Office of Technology Assessment
OVT	Operational Verification Test
PCB	Polychlorinated Biphenyls
PICs	Products of Incomplete Combustion
RCRA	Resource Conservation and Recovery Act
TEQ	Toxicity Equivalents

Introduction

How the United States is to destroy safely its Cold War cache of chemical weapons is now a subject of national and international importance. The U.S. Army presently plans to destroy these weapons irreversibly using high-temperature incineration, which is known as the "baseline" program. The Army tested, refined, and retested this technology in hopes of being able to implement the destruction program without strenuous public opposition at the eight different sites in the United States where the weapons are stored. Instead, it ran head-long into staunch opposition to incineration. Having opted to burn the weapons long before a reform-minded environmental movement gave incineration a bad name, the Army was caught off guard. Efforts to explain and defend the baseline program have floundered, and the Army has lost ground to an increasingly vocal opposition. From the onset of the baseline battle, citizens, legislators, and regulators have been caught in a conflicting barrage of information: Nary a statement can be made about the baseline program without challenge.

Two impulses appear to be on a collision course: the need to dispose of the deteriorating chemical weapons stockpile and the need to address concerns raised by those who fear incineration. While technical facts should be the basis for decisions made regarding the baseline program, these circumstances denote the probability that political and emotional elements will also influence decisions at a local and national level. As a staffer working for Senator Orrin Hatch (R-UT) acknowledged, although incineration may be safe, "There's a practical level to this and there's an emotional level. A lot of people react emotionally to incineration, and we have to be concerned with that."[1] As if these circumstances were not complicated enough, the congressional mandate to destroy the weapons may soon be reaffirmed by an international treaty commitment to do the same, putting new stiffness into a completion deadline that has slipped a decade thus far.[2] The potential for a clash between a national objective and local concerns clearly frames the debate over the chemical weapons destruction program.

As one analyst observed, these circumstances make a difficult environment for decision-making.

> This situation presents what might be a classic formula for making a poor social decision, as we have: 1) a clash of scientific

1. This staffer claimed, "There are no politics to this. The senator only wants to do what's right." These remarks were made when Hatch initiated an effort to try to block incineration at Utah's Tooele Army Depot in favor of using alternative technologies, such as electrochemical oxidation. "Senator Pushes Mandate for Army Review of Incineration Alternative," *Defense Environment Alert*, 27 July 1994, 16.

2. The treaty in question is the Chemical Weapons Convention, which is expected to enter into force in the later half of 1995. The Convention, which prohibits the development, production, stockpiling, and use of chemical weapons, carries a ten-year deadline for completing destruction of the chemical weapons stockpiles, but a five-year extension may be requested. The Convention is the culmination of a decades-long effort by the United States and other nations to take constructive steps to ban these weapons and stem their proliferation.

> experts, who disagree profoundly on the maturity and risks of incineration technology; 2) a dearth of tested data regarding the feasibility of alternative technologies; 3) powerful, mobilized, and indignant social groups pressing their separate agendas on both sides of the political spectrum; 4) not much time available to make a decision (given the lengthy lead times associated with testing, licensing, and constructing any demolition facilities); 5) international pressures to set a viable precedent for other countries to follow; and 6) elements of law (treaty and statute) weighing on both sides of the scale. Where uncertainty, urgency, and importance lurk together, there may be little elbow room for compromise or wisdom.[3]

This report has been written to promote more informed decision–making about the U.S. effort to destroy its chemical weapons stockpile.

Rationale and Structure of the Report

Most of those involved in the struggle to either affirm or redirect the course of the U.S. chemical weapons destruction program have a with–'em–or–agin–'em attitude. Since there is no middle ground, one runs the risk of being quickly labelled an incineration apologist and an advocate of having federal programs trample local rights or an opponent of incineration, arms control, or government programs in general.[4] Therefore, this report was designed to function on several levels—as an overview of the problem as perceived by those involved, as a reference document, and as a source of recommendations. These recommendations appear at the end of the report, in chapter three. Throughout the rest of the report, the cases mounted by the contending parties have been presented so that they can either stand or fall based on their own merits.

The second chapter of the report presents a discussion of the reasons for confusion about the chemical weapons destruction program: 1) the comparative risks in keeping the stockpile or in destroying it; 2) the timing and purposes of the Chemical Stockpile Emergency Preparedness Program; 3) the mixed signals from Washington regarding the possibility that baseline's incinerators will be used to destroy materials other than chemical weapons; and 4) the debates over destruction technology that pit experts against experts. The first appendix elaborates some of the issues raised in this chapter, as well as others. This appendix consists of a side–by–side presentation of the arguments made by opponents to the baseline program and the counter–arguments made by the Army, National Research Council, and the Environmental Protection Agency, which operate and oversee it.[5]

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3. David A. Koplow, "How Do We Get Rid of These Things?: Dismantling Excess Weapons Under Arms Control Treaties," forthcoming, *Northwestern University Journal of International Law*, 89 (1994).

4. "Combustion apologists" are described by the Sierra Club as "*always*" referring "to incineration as 'acceptable,' or 'effective,' or 'safe'—even as 'the best' method for dealing with virtually all combustible wastes." Ross Vincent, "The Sierra Club and the Combustion Strategy," *EI Digest Industrial and Hazardous Waste Management*, March 1994, 2.

5. The author is admittedly an advocate of the Chemical Weapons Convention, but has tried to present

The author's opinions are reserved for the third and concluding chapter, which contains observations about the evolution of the controversy, the science being used by incineration opponents to promote their arguments, the context for baseline emissions, and possible legal challenges to the baseline program. This chapter concludes with recommendations for addressing an impasse that may be in the making.

The second appendix presents a chronology of major events in the evolution of the U.S. chemical weapons destruction program. The third appendix is an annotated bibliography of sources, including both supportive and opposing points of view. The remainder of this chapter will be devoted to an overview of the U.S. chemical weapons stockpile and the baseline technology.

The U.S. Chemical Weapons Stockpile and the Baseline Technology

The U.S. chemical weapons stockpile consists of approximately 30,000 tons of nerve and blister agents. Nerve agents, which are particularly lethal, disrupt the nervous system. Exposure to the nerve agents GB or VX can cause a variety of symptoms including drooling, sweating, vomiting, loss of bladder control, headache, confusion, blindness, convulsions, coma, and death. Blister agents, such as mustard gas, attack the skin, respiratory system, and eyes, and cause blistering, blindness, and death.[6]

The stockpile is currently stored at eight continental U.S. sites, as well as at Johnston Atoll in the Pacific. The low-volume sites, or sites with 5 percent or less of the chemical weapons stockpile, are Lexington-Blue Grass Army Depot, Kentucky; Aberdeen Proving Ground, Maryland; Newport Army Ammunition Plant, Indiana; and Johnston Atoll. The sites that store between 5 and 12 percent of the stockpile include: Umatilla Army Depot, Oregon; Pueblo Army Depot, Colorado; Anniston Army Depot, Alabama; and Pine Bluff Arsenal, Arkansas. Tooele Army Depot in Utah is the largest storage site, housing 42 percent of the stockpile.[7] Figure 1 shows the location of the stockpile sites and the types of agents and munitions at each.

Approximately 60 percent of the chemical agents are kept in non-explosive bulk or ton containers. However, the remainder of the chemical agents are stored in projectiles, rockets, cartridges, bombs, mines, and spray tanks. Fully assembled M55 rockets are the most dangerous items in the stockpile due to the degradation of stabilizers that were incorporated into the rocket propellant to prevent auto-ignition.[8] The composition of the stockpile is not identical at each site. For instance, the Newport and Aberdeen sites

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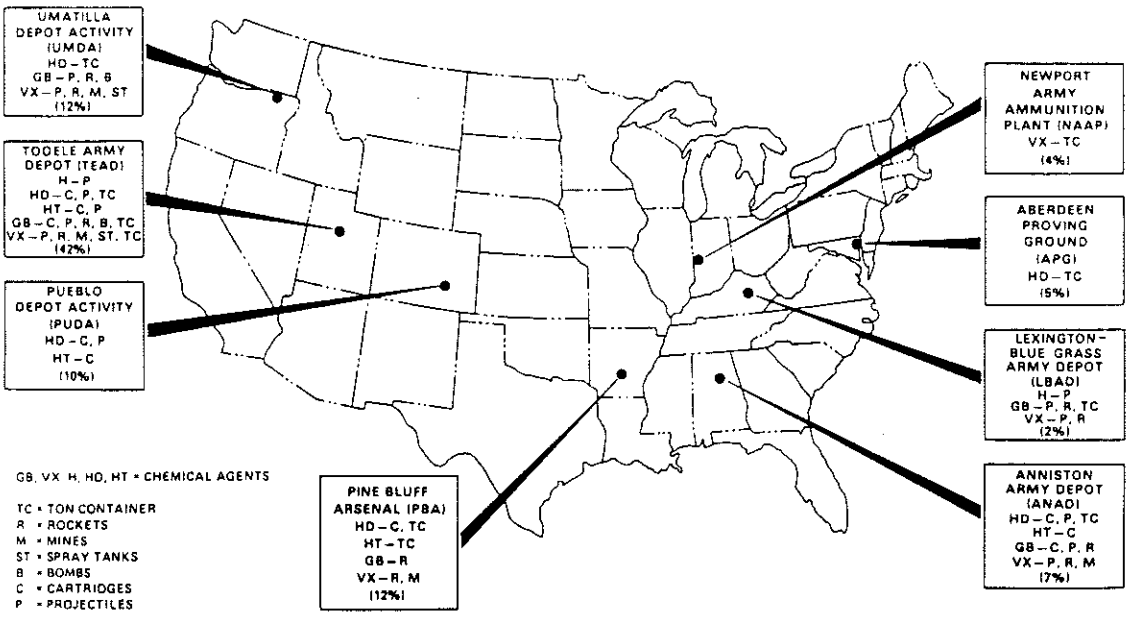
this material in an unbiased fashion. Two individuals who are well acquainted with the U.S. destruction program reviewed chapter two and appendix one for accuracy and absence of the author's bias. The author wishes to thank Vicky Plunkett of Congressman Glen Browder's (D-AL) staff and John Parachini, executive director of the Lawyers Alliance for World Security, for their assistance in this regard.

6. Rodney McElroy, *Briefing Book On Chemical Weapons* (Boston: Council For a Livable World Education Fund, 1989) 3-4.

7. "Chemical Weapons Fact Sheet No. 1" (Washington, D.C.: Committee for National Security, 1994) 2.

8. See pages 15-17 in chapter 2 for more on the M55 instability problem.

Figure 1: The U.S. Chemical Weapons Stockpile Storage Sites.



Source: Final Programmatic Environmental Impact Statement (Aberdeen Proving Ground, MD: Program Manager for Chemical Demilitarization, January 1988) p. A-5.

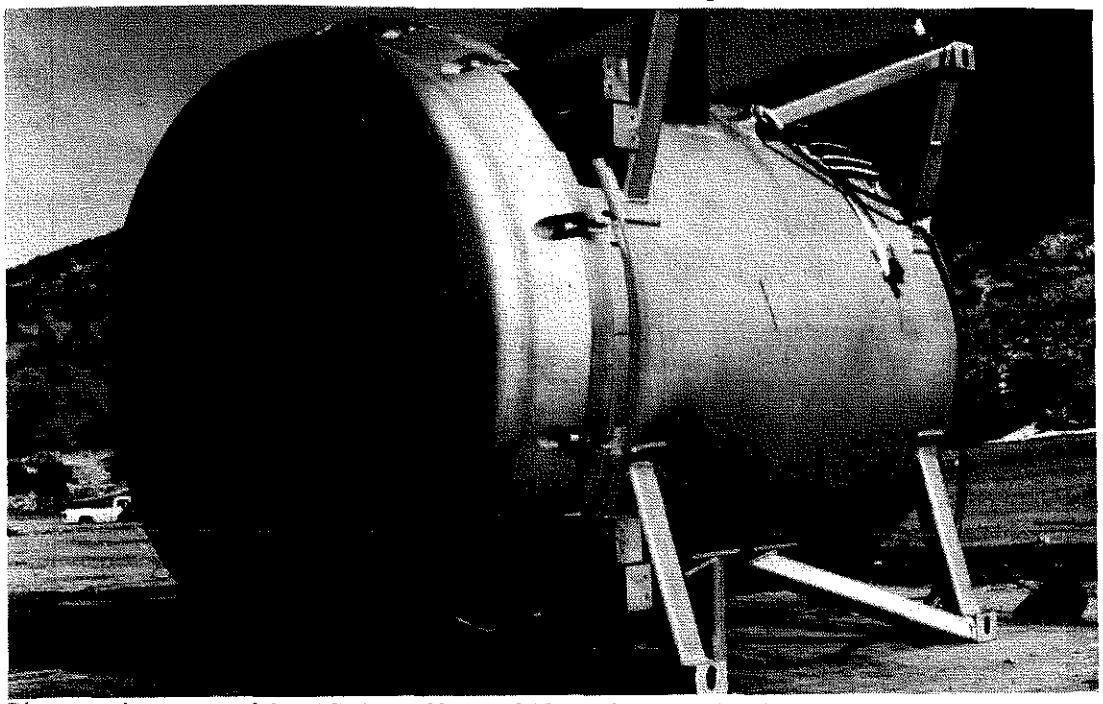
have only bulk containers of one chemical agent, but Tooele stores everything from bulk containers to M55 rockets. Accordingly, storage facility requirements differ from site to site.

The baseline incineration system irreversibly transforms chemical weapons into gases and solid residues through exposure to high temperatures. Unlike other disposal alternatives, incineration is capable of destroying an entire chemical weapon inclusive of the chemical agents, explosives, and metal parts. A baseline facility has been built at Tooele and is slated to be constructed at the seven other storage sites.[9]

The destruction process begins with the transportation of the chemical weapons from either storage sheds or earth-covered protective igloos to the baseline facility. The weapons are transported in special containers, which are huge multi-legged barrels. Figure 2 shows one of these transport containers, which are fire-proof, explosion-proof,

9. Descriptions of the baseline process can be found in numerous documents, for example *Johnston Atoll Chemical Agent Disposal System* (U.S. Army Chemical Materiel Destruction Agency, 3 September 1993); *Summary Evaluation of the Johnston Atoll Chemical Agent Disposal System: Operational Verification Testing*, MTR-930000036 (McLean, VA: Mitre, May 1993); *RCRA Trial Burn Report for HD Mustard Ton Containers, Metal Parts Furnace at the Johnston Atoll Chemical Agent Disposal System* (United Engineers and Constructors, 16 December 1990).

Figure 2: A Chemical Munitions Transport Container.



Photograph courtesy of the U.S. Army Chemical Materiel Destruction Agency.
Note: The transport container can hold a pallet of munitions. Wires are protruding from the rear portion of the container because the photo was taken during testing.

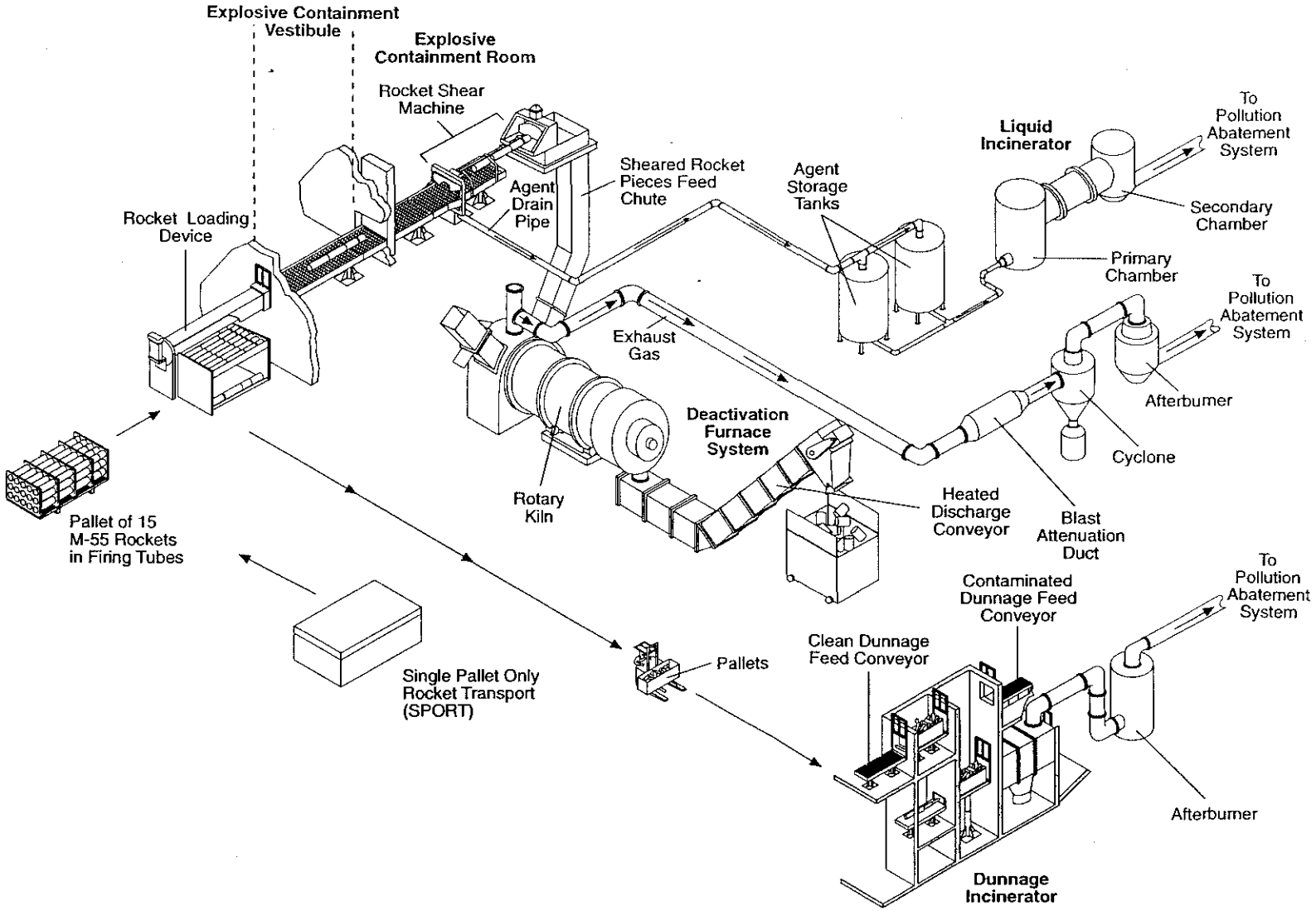
leak–proof, and resistant to force and pressure. In addition, the eight–legged structure ensures that the barrel will always remain standing.

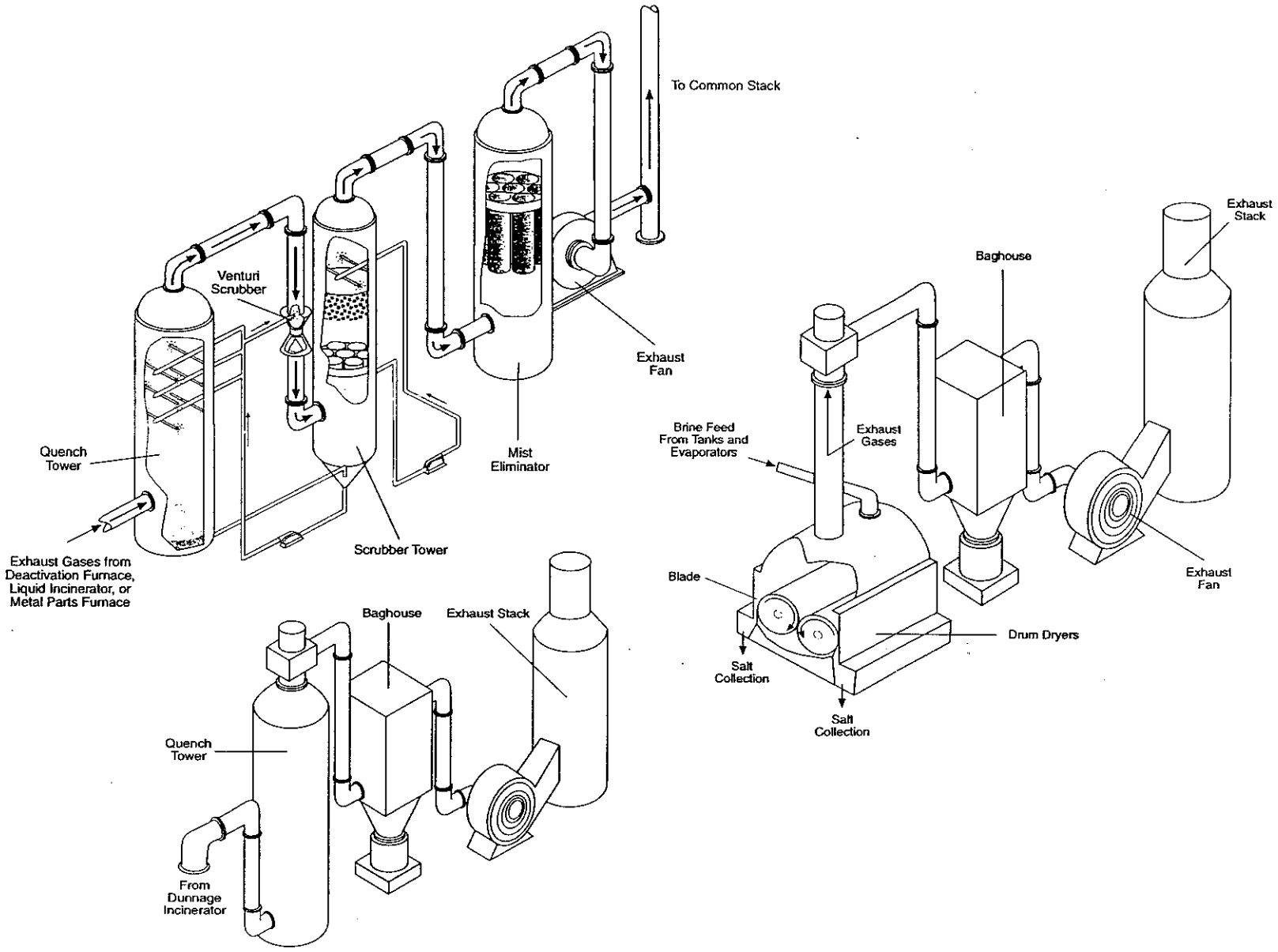
Upon arrival at the destruction facility, the weapons or bulk containers are stored in a holding area until they are ready to be unpacked. Figure 3 presents a diagram of how a pallet of M55 rockets would make its way through the destruction process at a baseline facility. First, if no leaking agent is detected upon unloading the weapons, they are carefully loaded onto a conveyor and sent to a special thick–walled room to be drained of chemical agent and disassembled in an automated process. Since disassembly of the munitions is considered to be an especially dangerous step in the overall destruction process, this room is specifically designed to contain an explosion. A rocket shear machine punches the weapon and drains the agent. The agent is then pumped into storage tanks, while the munition is cut into pieces. Drained agent, munitions pieces, explosives, and packing materials are then incinerated separately in four specialized incinerators.

The agent incinerator burns the drained chemical agent, as well as solutions used for decontamination at the facility. The agent is exposed to 2,700 degrees Fahrenheit in the first combustion chamber and the remaining gases are then sent to a second combustion chamber, known as an afterburner. Exhaust gases then pass through a pollution control system.

The deactivation furnace destroys solid materials such as explosives, rockets, mines and agent–contaminated material. These items are incinerated in a rotary kiln for six

Figure 3: A Schematic of the Baseline Disassembly and High-Temperature Incineration Process.





Source: Process Report for the Johnson Atoll Chemical Agent Disposal System (Aberdeen Proving Ground, MD: U.S. Army Chemical Materiel Destruction Agency, 3 September 1993) 7, 9.

minutes. Scrap metals and leftover residue receive additional treatment on a heated discharge conveyor belt. The residue from the conveyor belt is emptied into a residue bin, and the exhaust from the kiln goes through a cyclone chamber where any remaining large solid particles are removed. The gases are incinerated in an afterburner before going through the pollution control system.

The metal parts furnace decontaminates bulk containers and munition shells by burning away residual chemical agent. These items are first incinerated in the primary combustion chamber. The scrap metal then enters an airlock where it is tested for any remaining agent before being released for scrap handling. Gases pass through an afterburner before being processed through a pollution control system.

The waste or dunnage furnace destroys wooden pallets used in shipment and other miscellaneous solid wastes. These wastes are treated in the primary incineration chamber. The resulting scrap metal and residual ashes are discharged to an ash hopper. An afterburner processes gases from the primary chamber before they are sent to a pollution control system, where a quench tower cools the gases to 350 degrees Fahrenheit. These gases are then sent to the baghouse where solid particles are filtered through a dry fabric filter.

Exhaust gases for the agent, deactivation, and metal parts incinerators pass through a joint pollution control system. Gases are first cooled to approximately 180 degrees Fahrenheit by a quench tower before entering a venturi scrubber designed to remove 95 percent of all particles measuring larger than 0.5 micron. The gases are then neutralized in a packed bed scrubber and, finally, run through a mist eliminator. As recommended by the National Research Council, a bed of charcoal filters will also be added to the pollution control systems at baseline facilities at continental U.S. sites. The venturi scrubber produces brine, or salt in a water solution, which is removed to the brine reduction area. There, the water is evaporated by a steam heat exchanger and drum dryers, leaving only dried salt. The remaining salt is packed in containers and prepared for disposal at licensed hazardous waste disposal sites.

Sources of Confusion Regarding the U.S. Chemical Weapons Destruction Program

The complexity of the nation's chemical weapons destruction program can lead to confusion regarding one aspect or another of it. For example, those who are unfamiliar with the provisions of the Chemical Weapons Convention may be under the impression that this arms control treaty has dictated the timetable or the methods by which the U.S. stockpile must be destroyed. To the contrary, the Convention, which will ban the development, production, stockpiling, and use of chemical weapons, has yet to enter into force. When it does, all states that join will be required to destroy their chemical weapons stockpiles within a ten–year time frame.[1] A maximum five–year extension can be requested from international authorities if a state is unable to meet the original deadline.[2] If the treaty enters into force in the latter half of 1995, its time line for the destruction of the U.S. stockpile will coincide roughly with the deadline that Congress has already set for the Army to complete this task. In that case, the treaty deadline would actually fall after the congressional deadline of 31 December 2004.

In addition, the Convention's provisions do not stipulate the exact method of destruction that states must use. The Convention states only that whatever technology is chosen must result in "irreversible" destruction of the agent, be safe for the population, and protect the environment. To that end, the Convention prohibits ocean dumping, burial on land, or open pit burning as methods of destruction.[3] To date, therefore, the Convention has not been the driving force behind the time lines or the technologies of the U.S. chemical weapons destruction program.

Uncertainty over the implications of a new arms control treaty is just one of the factors generating confusion about the U.S. destruction program. The remainder of this chapter will address four principal sources of confusion. Several subsidiary issues are

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1. The Convention provides an international legal framework whereby chemical weapons will be destroyed and their production banned. States that do not possess chemical weapons will be required to report data and accept inspections that will allow international authorities to monitor whether a nation is trying to evade its treaty obligations. For basic information about the Convention, which has been signed by over 155 countries, see Amy E. Smithson, ed., *The Chemical Weapons Convention Handbook*, 2nd ed. (Washington, D.C.: The Henry L. Stimson Center, September 1993).

2. The impression that the Convention is an obstacle to safe disposal of the U.S. stockpile is not universally held. For instance, baseline critic James Harmon of Anniston, Alabama, noted that the United States can request this five–year extension to give the Army enough time to bring alternative technologies on–line to destroy the U.S. stockpile. Harmon is a member of the Anniston Citizens Advisory Commission and The Families Concerned About Nerve Gas Incineration. Telephone interview with author, 9 August 1994.

3. See *The Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction* (Washington, D.C.: U.S. Arms Control and Disarmament Agency, October 1993), Article IV and Part IV (A) of the Annex on Implementation and Verification. See also David A. Koplow, *Some Disassembly Required: Eliminating Chemical Weapons While Protecting the Environment* (Washington, D.C.: Lawyers Alliance for World Security, Committee for National Security, July 1994) 9.

touched upon under each subheading, but the intent of this chapter is to give the reader a feel for the overall issue rather than to provide an exhaustive discussion of all of the subsidiary issues. More detail about the issues broached in this chapter can be found in appendix one. Confusion stems from the discussion of: 1) the comparative risks of the Army's high-temperature "baseline" program versus other courses of action; 2) the emergency preparedness programs at the stockpile storage sites; 3) the potential future use of the baseline facilities; and 4) the long-running, scientific debate about the baseline program.

Comparative Risks of One Course of Action Versus Another

Countless Army reports and concurring National Research Council (NRC) assessments cite pending problems with the safety of the chemical weapons stockpile as a principal reason for proceeding with destruction as soon as possible. At the same time, the Army asserts that it can maintain the stockpile safely until destruction is completed, assuming the baseline program proceeds as planned. The general public also hears from opponents of the Army's baseline program that incineration carries significant risks. Thus, confusion arises as to whether the real risks lie in keeping the stockpile or in destroying it via incineration.

Non-experts have additional difficulties discerning the real level of risk because risks are discussed in terms of probabilities. Webster's defines probability as "the ratio of the number of outcomes in an exhaustive set of equally likely outcomes that produce a given event to the total number of possible outcomes." Those who calculate risks attach caveats, or ranges of uncertainty, to the resulting numbers to atone for unknown factors in the data or weaknesses in the analytical technique. Therefore, a risk calculation expressed numerically as 1:10 might actually be as small as 1:1 or as large as 1:100.[4]

On the topic of uncertainties, one of the Army's reports states: "Although the estimation of uncertainties, itself, is subject to uncertainty, attempts have been made to ensure that the uncertainties and potential for error are consistent and systematic throughout the analysis."[5] While this assertion does not strike scientists as unusual, it encourages misgivings among the general public. Furthermore, a risk assessment begins with a series of assumptions about the factors likely to cause risk, and since those assumptions are open to dispute, no risk assessment is inviolable.[6] For those who are

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4. Another way to think of this mathematic expression is that if the risk calculation were stated as a dime, it might actually be as great as a dollar or as small as a penny.

5. *Chemical Stockpile Disposal Program: Final Programmatic Environmental Impact Statement*, vol. 3 (Aberdeen Proving Ground, MD: Program Manager for Chemical Demilitarization, January 1988) p. M-14.

6. The Sierra Club, for instance, does not think highly of the risk assessment supporting the baseline program. Risk assessments "attempt with only limited success to estimate the probability of certain specific, clearly definable adverse outcomes—for example, deaths from acute exposure to chemical weapons agent as a result of a major accidental agent release, where some specific amount of agent is assumed to be released, as a result of some specific accident scenario, with the wind blowing in an assumed direction at an assumed speed. The estimates and the models that generate them are often controversial." "Sierra Club Analysis of Dr. Carl Peterson's Recommendations for the Disposal of Chemical Agents and Munitions" (Pueblo, CO: Sierra Club, 26 May 1994) 1.

uncomfortable with statistics or in search of hard facts as the basis for their decision about which course of action is best, risk assessments offer little refuge. Hard facts are elusive, while paradoxical statements abound.

Risk Assessments: The Army and the Opposition

The Army's risk assessment focused on the potential for major accidents to occur while keeping the stockpile, moving it to regional or national destruction centers, or destroying it in place with the baseline technology. The Army classifies risks in two main categories, the first of which is the acute risk of high–level exposure to a chemical agent resulting from an accident, whether during storage, transportation, or destruction operations. Such an accident could result from the explosion of an old rocket, an airplane crash into a storage depot, human error in handling the munitions, or another catastrophic event, such as an earthquake. Secondly, a chronic risk could result from long–term, low–level exposure to agent from routine storage or disposal operations. Also factored into this second category is the risk of exposure to the products of incomplete combustion from the incineration of the agents, munitions, propellants, and other items. The Army's studies conclude that the risk of simply continuing to store the stockpile exceeds the risk of all other alternatives, including destroying it on site with incineration.[7]

One thought that occurs to most people living near the stockpile sites is to move the weapons elsewhere to be destroyed. Many originally pin their hopes on shipping the weapons out of their neighborhoods because it is common knowledge that the Army has transported chemical weapons in the past without a major incident, most recently out of West Germany in July 1990.[8]

The Army considered several transport alternatives, including railroad shipment of all stocks to Tooele, Utah; rail shipment of eastern stocks to Anniston, Alabama, and western stocks to Tooele; and air shipment of the Lexington, Kentucky, and Aberdeen, Maryland, stocks to Tooele.[9] Although the destruction–on–site alternative consistently

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7. The risk of continuing to store the weapons significantly outweighed the risk of destroying them for all stockpile sites except Kentucky, where the risk of continued storage was greater than, but not statistically significant from, the risk of other alternatives considered. Those alternatives were: 1) disposal at a national destruction site (Tooele, Utah); 2) disposal at two regional sites (Tooele and Anniston, Alabama); 3) partial relocation (Lexington–Blue Grass, Kentucky, and Aberdeen, Maryland stocks to Tooele); 4) disposal at the site (risk assumed to come from handling, on–site transport, and plant operations); and 5) "no action" or continued storage for at least twenty–five years (risk from storage and low probability, catastrophic events).

8. *Chemical Warfare: DOD's Successful Effort to Remove U.S. Chemical Weapons From Germany*, GAO/NSIAD–91–105 [Washington, D.C.: General Accounting Office (GAO), February 1991]. For an idea of how local citizens express their concerns and views in this regard, see *Citizen Attitudes on the Destruction and Disposal of Chemical Weapons Stockpiles: A Report from a Series of Community Dialogue Forums on Chemical Weapons* (Washington D.C.: Lawyers Alliance for World Security, the Committee for National Security, July 1994).

9. Railroad shipment of all stocks to Tooele and Anniston would require between 730 to 1,800 miles of transit across five to eleven states. Moving all continental U.S. stocks to Tooele by rail would involve crossing as many as twenty states and along 730 to 2,670 miles of railroad tracks. Airlifting the Lexington and Aberdeen stocks to Tooele would require between 2,100 to 2,700 flights of over 1,500 to 2,060

ranked lower in risk than other options, aspects in the evaluation of human health effects and ecosystem and environmental impacts for the different transport and destruction–on–site options were a statistical wash, given the uncertainty factor of one hundred that was used. Therefore, the Army based its decision to destroy the stocks on site on its confidence that a more viable emergency response capability could be created at eight fixed sites rather than along the entire length of the transportation corridors that may have been used.[10]

During the course of its evaluation, the Army crunched numbers for several hundred scenarios depicting what could happen during the course of executing these different alternatives. For example, two scenarios evaluated were "forklift collision accident at storage area leads to detonation" and "a train accident involving a munitions rail car occurs and impact forces fail the agent containment."[11] To address the risks of major agent releases, the Army extrapolated data from laboratory tests with animals, as well as from human exposures during munitions production and on the battlefield. The Army did not conduct an in–depth study of the other risks of incineration, deciding instead to meet the federal and state standards set for operating incinerators.[12] The federal pollution control standards that safeguard public health and the environment, including the Resource Conservation and Recovery Act, the Clean Air Act, the Toxic Substances Control Act, and the Clean Water Act, are summarized in Table 1. This approach did not satisfy the Army's critics, who characterize the Army's risk assessment as fundamentally flawed.

Baseline opponents assert that a comprehensive risk assessment would compare the risks of incineration to other destruction methods. Furthermore, it would take into account the long–term effects of the stockpile's incineration on the environment and the human population through direct exposure or through such avenues as ingestion via the food chain. Such an assessment would address the impact of agent releases and the by–products of incineration.[13] According to the Sierra Club, "clearly the weapons are

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miles. See *Chemical Weapons Disposal: Alternative Technologies* [Washington, D.C.: Office of Technology Assessment (OTA), June 1992] 29.

10. Former Program Manager for Chemical Demilitarization Charles Baronian, interview with author, Aberdeen Proving Ground, 10 May 1994. See *Final Programmatic Environmental Impact Statement*, section 2, vol. 1, and appendices J and M, vol. 3; see also "Record of Decision: Chemical Stockpile Disposal Program," which states that for the national and regional destruction options, the munitions would have to be shipped through twenty and sixteen states, respectively. James R. Ambrose, Under Secretary of the Army, U.S. Department of the Army, 23 February 1988, 4–5; *Transportation of Chemical Agents and Munitions: A Concept Plan*, SAPEO–CDE–IS–87003 (Aberdeen Proving Ground, MD: Chemical Stockpile Disposal Program, 30 June 1987); *Chemical Weapons Movement History Compilation*, SAPEO–CDE–IS–870 (Aberdeen Proving Ground: Office of the Program Manager for Chemical Munitions, 12 June 1987).

11. See Program Manager for Chemical Demilitarization, *Final Programmatic Environmental Impact Statement*, table J.5, 120–126 of appendix J.

12. Ibid., 4–3, 1–18 to 1–21, appendices B and O.

13. This synopsis of the opposition viewpoint contains only a few of the main criticisms made of the Army's risk analysis. For more critiques, see appendix one of this report and "Some Flaws of Risk Assessment in the *Final Programmatic Environmental Impact Statement;*" separate critiques by Robert Menefee and Robert Tussey in *The Citizens' Viewpoint: Citizen Perspectives on The Army's Plan*

Table 1: Summary of Major Federal Environmental Laws Impacting the Chemical Stockpile Disposal Program.

Date	Law	Provisions
1980	Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. §§ 9601 et seq.)	Addresses hazardous substance releases into the soil, air, surface water and groundwater and regulates the cleanup of these releases.
1977	Clean Water Act (PL 95-217) Amended 1987	Governs potential sources of water pollution and specifically prohibits the discharge of any chemical agent into navigable waters of the U.S.
1976	Resource Conservation and Recovery Act (PL 94-580) Amended 1984; 1986	Regulates the treatment, storage, and disposal of hazardous waste. The chemical agents are either listed or characteristic hazardous wastes at each of the applicable sites.
1976	Toxic Substances Control Act (PL 94-469) Amended 1986; 1988	Regulates the incineration of polychlorinated biphenols (PCBs). The fiberglass matrices of some of the shipping and firing tubes for M55 rockets have been contaminated with PCBs. Toxic Substances Control.Act regulations apply during the disposal of these items.
1974	Hazardous Materials Transportation Act (PL 93-63)	Regulates the packaging, marking, loading, and transporting of hazardous materials by road or by rail.
1972	Marine Protection, Search, and Sanctuaries Act (PL 92-532)	Prohibits ocean dumping of chemical weapons.
1970	Clean Air Act (Public Law 91-604 and 95-95) Amended 1977	Governs potential sources of air pollutants and sets emission standards for various pollutants.
1969	National Environmental Policy Act	Requires environmental impact studies for proposed projects that could have a damaging effect on the environment.

Source: *Final Programmatic Environmental Impact Statement* (Aberdeen Proving Ground, MD: Program Manager for Chemical Demilitarization, January 1988) p. 1-15.

safer in their igloos than they are on the surface being handled, disassembled and burned."[14] The reason is that the process of burning any item—whether it be diesel fuel in a truck, wood in a fireplace, or a drained artillery shell in a baseline incinerator—forms new chemicals, known as "products of incomplete combustion," or PICs.[15] A report from the environmental watchdog group Greenpeace states that "incineration emissions contain many pollutants that are toxic, persistent, and bioaccumulative. Over months and years, even trace emissions of these substances can reach concentrations in local ecosystems that are acutely and/or chronically harmful to humans as well as many other species."[16] Governmental and nongovernmental experts alike have only positively identified about 100 PICs, but many more are believed to exist.[17]

However, enough is understood about the most well-known PICs, dioxins and furans, to make this a major issue of concern for U.S. Government regulators and independent observers and critics. Dioxins and furans can be produced when chlorinated organic compounds are burned. Dioxins and furans have been linked to cancer, birth defects, and other diseases. One incineration opponent calls the formation of dioxins and furans an "inevitable" result of baseline incineration because of the presence of chlorine or chlorinated compounds in mustard gas, decontamination solutions, and packaging materials.[18] Given the unavoidable presence of PICs, critics of the baseline program argue that the risks of incinerating the chemical weapons stockpile are so significant that other methods of destruction must be found. Baseline opponents suggest a number of candidate technologies that are in varying stages of development, but which they contend could be used to destroy the stockpile more safely.[19]

Mitigating the Risks in the Interim

The Army has pledged to try to maintain the safety of the stockpile while destruction is underway. The bedrock of the maintenance program is surveillance and monitoring of the weapons. Soldiers enter storage areas frequently to monitor for leaks and inspect the condition of munitions, containers, and facilities. Any "leakers" are placed in airtight containers. In some instances, soldiers will change mechanical components

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To Build A Nerve Agent Incinerator in Madison County, Kentucky (Berea, KY: Kentucky Environmental Foundation, Common Ground, and Concerned Citizens of Madison County, August 1991) 12–15.

14. Sierra Club, "Analysis of Dr. Carl Peterson's Recommendations," 3.

15. Causes of incomplete combustion include insufficient temperature, inadequate mixing of the materials, or failure to leave the materials in the incinerator long enough.

16. Pat Costner and Joe Thornton, *Playing With Fire: Hazardous Waste Incineration* (Washington, D.C.: Greenpeace, 1990) 35.

17. Sonya Sasseville of the Environmental Protection Agency (EPA) noted that there could indeed be hundreds or thousands of PICs. "We do not expect to really identify all of them," she says, just those that are present in the highest concentrations and are the most toxic. Sasseville is chief of the Alternative Technologies Section, Office of Solid Waste. Interview with author, Crystal City, VA, 10 August 1994.

18. Lenny Siegel, *Chemical Weapons Disposal: The Threat at Home* (Boston: National Toxics Campaign Fund, June 1991) 5–6.

19. For a discussion of alternatives to incinceration , see Alfred Picardi et al., *Alternative Technologies for the Detoxification of Chemical Weapons: An Information Document* (Washington, D.C.: Greenpeace International, 24 May 1991).

or other items to prevent further corrosion. They also test the rocket and projectile propellants.[20] With this effort, Army officials are confident they can keep the situation well in hand. Nonetheless, in the last decade the Army has had to contain over 1800 leaking munitions.[21] Figures 4 and 5 show typical storage conditions for the chemical weapons stockpile.

The Army stated in 1992 that all of the chemical agents stored in bulk containers, projectiles, cartridges, bombs, spray tanks, and mines were stable and could be safely stored for the next fifteen to twenty years.[22] A year later, the Army certified the stockpile's safety only until 2004.[23] Some people may be perturbed by these changing estimates, but the Army is trying to deal with what is, by most accounts, a deteriorating situation.

The main source of concern *within* the stockpile is the M55 rocket, which is stored at five of the eight sites—Lexington, Tooele, Anniston, Umatilla, and Pine Bluff. The M55, which is diagramed in Figure 6, is a fused weapon that contains a burster designed to disperse its ten-pound load of the nerve agents VX or sarin.[24] One of the elements in the M55 propellant, nitrocellulose, is unstable and can degrade to the extent that it ignites on its own. When the weapon was manufactured, a stabilizer was added to inhibit the decay of the propellant, but the amount of stabilizer will eventually decline, reviving the threat of auto-ignition. This pending problem is at the root of the entire stockpile disposal program, which began with the intent of destroying the M55s and expanded to incorporate the other munitions as well.[25] The M55, which accounts for 65 percent of stockpile leakers, is tested annually to determine the propellant's stability and degree of deterioration.[26] Estimates of just when the amount of stabilizer in the M55 will reach unsafe levels have ranged from 1986 to 2010. The Army's analysis points out that the stabilizer used in the M55s might not be as effective as presumed in some studies.[27]

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20. *Annual Status Report on the Disposal of the Lethal Chemical Stockpile* (U.S. Army Chemical Materiel Destruction Agency, Department of the Army, 15 December 1992) 20–23.

21. *Annual Status Report on the Disposal of the Lethal Chemical Stockpile* (U.S. Army Chemical Materiel Destruction Agency, 15 December 1993) 32.

22. U.S. Army Chemical Materiel Destruction Agency, *1992 Annual Status Report*, 23.

23. U.S. Army Chemical Materiel Destruction Agency, *1993 Annual Status Report*, 30.

24. Ten pounds may not sound like much, but a quart jar can hold one million lethal doses of nerve agent. Gordon M. Burck and Charles C. Flowerree, *International Handbook on Chemical Weapons Proliferation* (New York: Greenwood Press, 1991) 6. Thus, the explosion of an M55 round, while an event that the Army characterizes as extremely low probability, could have catastrophic consequences for unprotected civilians.

25. For more on the condition of the M55s, see OTA, *Alternative Technologies*, 7–8; and National Research Council (NRC), *Recommendations for the Disposal of Chemical Agents and Munitions* (Washington, D.C.: National Academy Press, 1994) 46–47.

26. U.S. Army Chemical Materiel Destruction Agency, *1993 Annual Status Report*, 32; *1992 Annual Status Report*, 23.

27. In addition to the Army, the OTA, Mitre, and Science Applications International Corporation have tried to estimate the status of the M55s. The NRC requested a new and more definitive study of the M55 rocket propellant problem. NRC, *Recommendations for the Disposal*, 48–51.

Figure 4: Chemical Weapons Storage Igloos.

Photograph courtesy of the U.S. Army Chemical Materiel Destruction Agency.

Figure 5: The Inside of a Chemical Weapons Storage Igloo.

Photograph courtesy of the U.S. Army Chemical Materiel Destruction Agency.

The M55 problem has led both the Army and the NRC to urge in their latest reports that there be no postponements in the destruction program. According to the NRC, "Delays in disposal operations can only increase the already much larger cumulative risk of accidental release from storage; they will extend the chronic risk from storage; and they can add to the risks of disposal as agents and munitions continue to deteriorate."[28] Oddly, the instability of the M55s and other problems associated with the stockpile's deterioration were not included in the Army's risk assessment, which concluded, nonetheless, that incinerating the stockpile was safer than keeping it.

Obstacles to the Public's Understanding of Risks

The Army has not really publicized the instability of the M55s. According to General Walter Busbee, commander and director of the U.S. Army Chemical Materiel Destruction Agency:

> That is a fine line and we have to walk it carefully. We do not want to scare the bejesus out of every community where these are located, yet we want to be frank and honest with them. Probably over the years, we have not really explained to them the fact that even though their friends and neighbors who work at the depots have not come home with exposure to agent and symptoms, that the potential is there. Every day that goes past that we do not begin reducing that hazard there is a hazard for possible exposure beyond the fence line. The hazard within the fence line is greater than we probably have admitted. The potential for exposure outside the fence line is greater. We have not wanted to go around like Chicken Little screaming, 'The sky is falling.'[29]

This strategy of understatement may well have been justified in the Army's view. The Army had a program under way to destroy the M55s and was also taking extra precautions to contain the problem in the interim.[30] One consequence of the Army's desire not to cause undue public concern, however, is a lack of public appreciation about the relative immediacy and possible catastrophic consequences of long-term storage of

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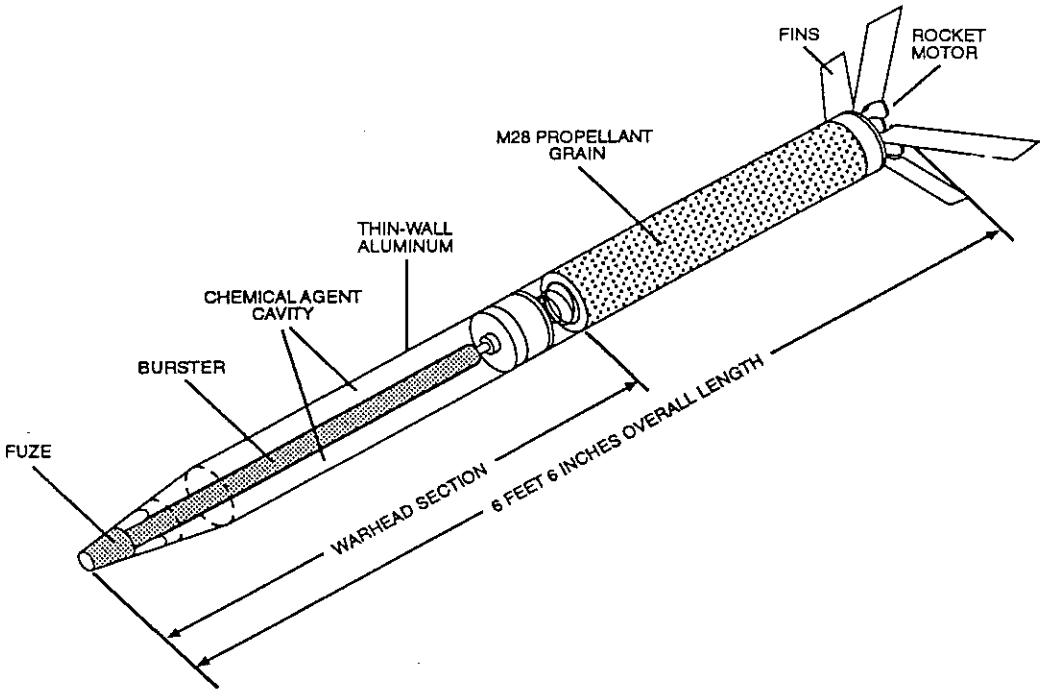
28. Ibid., 11; The Army concurred with the NRC's conclusion that "any reduction in disposal risk afforded by alternative technology will be more than offset by the larger cumulative risk from extended storage." *U.S. Army's Alternative Technology Report for Congress: Executive Summary* (Program Manager for Chemical Demilitarization, Department of the Army, 11 April 1994) 8.

29. Interview with author, Aberdeen Proving Ground, MD, 5 May 1994.

30. All M55 storage areas are air monitored on a weekly basis, and M55 production lots where more than one percent of the production lot have shown some sign of leaking are air monitored daily with extremely sensitive detectors. These monitors can detect agent in concentrations unharmful to an unmasked worker. U.S. Army Chemical Materiel Destruction Agency, *1992 Annual Status Report*, 21, 23. The Army recently announced an even more intensive surveillance program for the M55s and for ton containers containing mustard gas, which may develop more severe leakage problems in warm weather months. *U.S. Army Alternative Technology Report for Congress* (Program Manager for Chemical Demilitarization, 11 April 1994) 3–28.

Figure 6: A Diagram of the M55 Rocket.



Source: *Safety Report for the Johnston Atoll Chemical Agent Diposal System* (Aberdeen Proving Ground, MD: U.S. Army Chemical Materiel Destruction Agency, 3 September 1993) 5.

the M55s. Stockpile safety—along with concerns about the possible dangers of baseline incinerators and its alternatives—must be the key elements for citizens' decisions regarding the destruction program.

Furthermore, the NRC firmly agrees with the Army's assessment that the risk of indefinite storage—not counting the M55 problem—is forty–five times greater on a daily basis than the risks of incineration. Figures 7 and 8 depict the risk of stockpile storage versus incineration, as well as the additional risks that would accrue if disposal were delayed. On the other hand, the NRC, the nation's most esteemed scientific body, states: "There is certainly no clear indication of increased incidence of cancer, neurological disruptions, or other negative health effects that can be associated with low level, non–symptomatic exposure or long–term proximity to hazardous waste incinerators. Likewise, there is no unequivocal evidence that the risk can be ignored."[31] Such scientific assessments do not help clarify the risk picture for undecided citizens and legislators.

Despite controversies over incineration, baseline opponents and proponents mostly agree on the top risks associated with destroying the chemical weapons stockpile. For example, Craig Williams, founder and president of the Kentucky Environmental Foundation, gave the following ranking for risks associated with stockpile destruction:

31. NRC, *Recommendations for the Disposal*, 71–72.

1) movement of the munitions from storage igloos to any type of treatment facility;

2) continued storage of M55 rockets;

3) a major, uncontrollable event, such as from a tornado, even though such an event is unlikely;

4) low–level exposure to agent over time resulting from the incineration process;

5) "fugitive" emissions, or agent leaks that result from storage and handling, and other toxic PICs.[32]

The Army's studies show continued storage to be more risky than incineration. These studies also conclude that movement of the munitions from the storage areas to the destruction facility to be the most dangerous aspect of the destruction process. Opponents to the baseline program usually argue their case with such vigor as to give the impression that they believe the risks of incineration outweigh all other risks, when that does not appear to be the case. Evidently, baseline critics and advocates agree on the top two risks, neither of which has anything to do with incineration.

Figure 7: Risks of Stockpile Storage and Disposal.

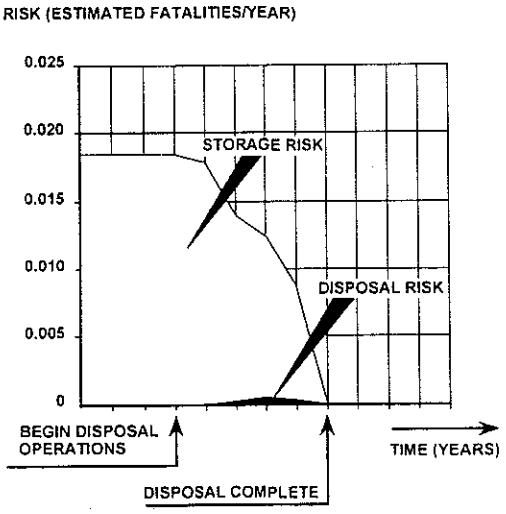
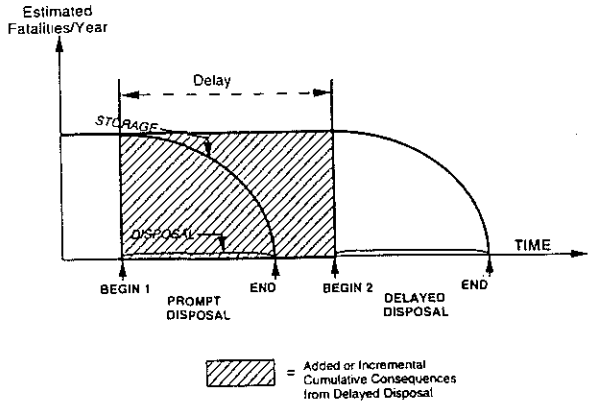


Figure 8: Potential Consequences of Delayed Disposal.



Source: Recommendations for the Disposal of Chemical Agents and Munitions (Washington, D.C.: NRC, 1994) 74, 76.

32. Interview with author, Washington, D.C., 19 May 1994.

However, as Greenpeace's Sebia Hawkins noted, local communities favor drilling and draining the munitions on site, which is a decidedly dangerous aspect of the entire operation. According to Hawkins, this situation reveals two things. First, local citizens do not understand the risks as portrayed in Army and NRC reports. Second, the Army does not understand which risks the local communities are willing to tolerate and which ones they will not countenance.[33]

Furthermore, answers to the questions posed by baseline opponents will be a long time in coming. First, it could take more than thirty years to complete an exhaustive, authoritative study of the long-term public health effects of a baseline-type incinerator.[34] The NRC asked for additional analysis of the latent risks of storage, handling, and disposal activities, but "is confident that site-specific risk analysis will confirm the wisdom of proceeding promptly" with the baseline program.[35] Second, the safety of baseline operations cannot be pitted against an unknown. Alternative technologies are not sufficiently mature for a comparative analysis of which would pose a greater health and safety risk.[36] The U.S. General Accounting Office (GAO) estimates that the suggested alternative technologies would not be available for full-scale operations until at least 2007.[37]

In the meantime, federal regulators, as well as state and local officials, are closely watching the Army's performance to see that its plans and operations conform to regulatory standards for human and environmental safety. To that effect, the Environmental Protection Agency (EPA) has publicly stated that the emissions from the Johnston Atoll agent incinerator are the cleanest of any U.S. incinerator.[38] The opposition, which tends to find fault with the oversight of the EPA, challenges whether the other three incinerators at each baseline facility can meet similar standards.

As this brief survey suggests, the complexity and competing claims about the chemical weapons destruction program have most citizens ill at ease with making an

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33. Hawkins is Greenpeace's Pacific campaign manager. Interview with author, Washington, D.C., 2 March 1994.

34. NRC, *Recommendations for the Disposal,* 69.

35. The NRC recommends that current plans not be delayed until these new risk assessments, which the Army has underway, are completed. NRC, *Recommendations for the Disposal,* 13. See also Program Manager for Chemical Demilitarization, *Executive Summary,* 11.

36. The NRC recommends that as research on alternative technologies progresses, such risk assessments should be made. NRC, *Recommendations for the Disposal, 13, 71.*

37. Moreover, more than one alternative technology may be needed to destroy or decontaminate the various items in the stockpile. *Chemical Weapons Destruction: Advantages and Disadvantages of Alternatives to Incineration,* GAO/NSIAD-94-123 (Washington, D.C.: GAO, March 1994) 5-8. The NRC estimated that nine to twelve years would be needed to develop and demonstrate alternative technologies. See NRC, *Alternative Technologies for the Destruction of Chemical Agents and Munitions* (Washington, D.C.: National Academy Press, 1993) 89-93.

38. The Chief of the EPA's Disposal Technology Section, Permits and State Programs Division of the Office of Solid Waste, Jim Michael, stated that the trial burns show that each of the Johnston Atoll incinerators have met and in most cases surpassed federal standards, achieving destruction removal efficiency ratings of 99.9999 to 99.9999999. Interview with author, Crystal City, VA, 10 August 1994. See also GAO, *Advantages and Disadvantages of Alternatives,* 9.

independent judgment about the course to pursue.[39] Intuitive judgments are therefore likely to be as important as any other factors, including the credibility of the experts put forth by the contending sides.

The Chemical Stockpile Emergency Preparedness Program

The Army's Chemical Stockpile Emergency Preparedness Program (CSEPP) is designed to enhance the ability of the Army and local communities to respond to a chemical emergency. Should an accident occur, it could affect the approximately 100,000 people that live or work within a six-mile radius of the stockpile sites.[40] Figure 9 shows the population concentrations near each storage site. The program would beef up local emergency response capabilities by setting in place plans and personnel tailored to handle the consequences of a chemical agent release. Stores of equipment—everything from communications gear to medical antidotes—would be situated at each site, and specialized training programs would be initiated.[41] CSEPP was envisioned as a prudent initiative to supplement the Army's program to monitor the stockpile closely and thereby contain any problems.

CSEPP was established in 1988 as an offshoot of the Army's Final Programmatic Environmental Impact Statement, a document that essentially explains and justifies the reasons for pursuing destruction at each storage site via the baseline method of high-temperature incineration.[42] As former Program Manager for Chemical Demilitarization Charles Baronian recalled,

> When we wrote the Environmental Impact Statement for this program, we studied the emergency response capabilities in existence at that time. The Army concluded that they were

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39. The toll that information barrage has taken on the general public is all too evident. After a Citizens Advisory Commission meeting in Lexington, two women approached Dr. Carl Peterson, chairman of the Stockpile Committee, to argue that they supported "anything but incineration, even if the alternative has more risk." This discussion was witnessed and described by Public Affairs Chief Marilyn Tischbin of the U.S. Army Chemical Materiel Destruction Agency. Interview with author, Aberdeen Proving Ground, MD, 21 July 1994.

40. *Chemical Weapon Stockpile: Army's Emergency Preparedness Program Has Been Slow to Achieve Results*, GAO/NSIAD-94-91 (Washington, D.C.: GAO, February 1994) 2.

41. A CSEPP brochure describes this "vigorous" program and lists its responsibilities as improving emergency preparedness and response plans; providing accurate risk information; educating the public about what to do in the event of a chemical accident; training emergency response personnel; upgrading public alert and warning systems; and conducting emergency exercises. Chemical Stockpile Emergency Preparedness Program, FEMA-211 (Washington, D.C.: Federal Emergency Management Agency, July 1991) 1, 7. See also S.A. Carnes, *Site-Specific Emergency Response Concept Plans for the Chemical Stockpile Disposal Program: A Comparative Summary*, ORNL/TM-11357 (Oak Ridge, TN: Oak Ridge National Laboratory, December 1989).

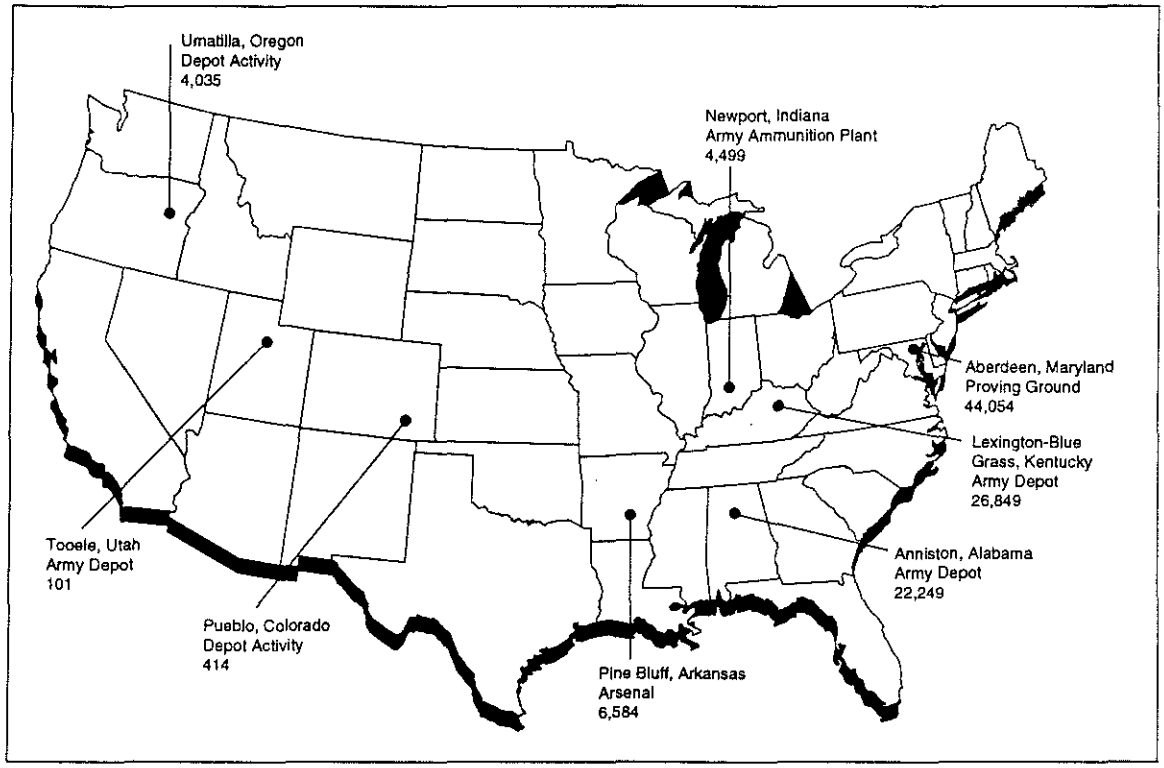
42. The GAO lists three reasons for CSEPP's creation: 1) to upgrade emergency preparedness to mitigate the potential environmental impacts of the destruction program, as required by the National Environmental Policy Act; 2) Congressional direction via Public Law 99-145 requires maximum protection for the public and the environment; and 3) public concerns about emergency preparedness. For an early history of CSEPP, see *Obstacles to the Army's Plan to Destroy the Obsolete U.S. Stockpile*, GAO/NSIAD-90-155 (Washington, D.C.: GAO, May 1990) 29-31.

> woefully inadequate. Therefore, the Army decided—not because we were going to incinerate, but because the stockpile existed—to do more and created an emergency response program that would mitigate injuries or fatalities in the event of a stockpile incident.[43]

Nonetheless, to skeptical local citizens not inclined to accept to the Army's explanations at face value, CSEPP looked like a quid pro quo—an emergency response program in exchange for their acceptance of baseline's incinerators.[44]

Lack of progress in achieving CSEPP's goals and high cost overruns have not burnished the program's image. The GAO has heavily criticized the program, which has

Figure 9: Storage Locations and Population within 6.2 miles of Incineration Plants.



Source: Chemical Weapon Stockpile: Army's Emergency Preparedness Program Has Been Slow to Achieve Results (Washington, D.C.: GAO, February 1994) 9.

Note: The 6.2 miles roughly corresponds to the area having less than one hour to respond to a chemical agent release. This area, called an immediate response zone, varies by site.

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43. Interview with author, 10 May 1994. See also Program Manager for Chemical Demiltiarization, *Final Programmatic Environmental Impact Statement*, appendix L, "Generic Emergency Response Concept Plan," L1–L29; U.S. Department of the Army, "Record of Decision," 6–7.

44. Several baseline opponents with whom the author has spoken have expressed this view, as well as their disappointment over the way the CSEPP program has been implemented.

been jointly administered by the Army and the Federal Emergency Management Agency (FEMA). Many of CSEPP's problems stem from this bifurcated management arrangement, according to the GAO. A 3 August 1988 agreement between the two organizations gave the Army the lead in developing integrated emergency response plans and FEMA responsibilities for administering CSEPP funds and working with the states and localities.

GAO criticized CSEPP for being poorly managed, both fiscally and otherwise. FEMA has administered 70 percent of CSEPP funds but according to a FEMA Inspector General report, the agency cannot account accurately for how these monies were spent. FEMA officials claim to "make no decisions in the program," yet CSEPP pays the salaries and benefits of forty–one FEMA oversight personnel.[45]

Costs for the program, which is due to finish in 2003, have risen from a 1988 estimate of $114 million to $696 million in 1994.[46] Another management failure is the tardiness of a key study intended to guide important decisions on emergency response guidance and equipment, causing deadlines for many other important tasks to slip.[47]

The result was that even though CSEPP had consumed about $200 million by February 1994, "communities near the eight chemical warfare agent storage sites are not yet prepared to respond to a chemical emergency."[48] Among the unfinished tasks were installation of adequate emergency notification systems, creation of a capacity to evacuate or shelter–in–place the residents in the immediate area, purchase of protective equipment for those responding to the emergency, and establishment of the medical capacity to handle and treat chemical casualties.[49] Citizens' awareness of the disarray within the CSEPP program may vary from site to site and house to house. However, those who study the situation carefully can paint a disturbing picture.

In the event of a chemical emergency at a stockpile site, local citizens would have to be notified and receive appropriate instructions. In nine counties that the GAO surveyed in Oregon, Washington, Arkansas, Utah, Colorado, and Alabama, sirens and tone alert radios had yet to be installed and tested as of March 1993.[50] Those living closest to the base will probably have to take shelter in their homes or work places because there will not be enough time to evacuate them. Yet, according to the GAO, the Army has spent comparatively little time working on the shelter–in–place requirements.[51] To the extent that those responding to the emergency are not appropriately protected and well–trained, the quality of the assistance that they can provide will

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45. *Chemical Weapons Storage: Communities Are Not Prepared to Respond to Emergencies*, GAO/T–NSIAD–93–18 (Washington, D.C.: GAO, 16 July 1993). Statement of David R. Warren, Testimony before the Subcommittee on Environment, Energy, and Natural Resources Committee on Government Operations of the House, 10.

46. GAO, *Slow to Achieve Results*, 2.

47. GAO, *Communities Not Prepared*, 2, 10.

48. GAO, *Slow to Achieve Results*, 2.

49. GAO, *Communities Not Prepared*, 2.

50. Ibid., 5.

51. Ibid., 6

degrade proportionately. Equipment purchases have been delayed and response procedures have not been completed due to the lack of guidance.[52] Finally, civilians exposed to agent would need antidotes, but during a full-scale exercise at Tooele, the depot's supply was found to be outdated and supplies at some other sites were inadequate for an accident of any consequence.[53]

In addition to national FEMA and Army managers, individuals from ten states and thirty-eight counties feed into the CSEPP decision-making process.[54] Bureaucratic top-heaviness and mismanagement at the national level may account for some of the program's woes, but attitudes and activities at the local levels may be the source of others. Most of the equipment—computers, sirens, medicine—needed to respond to a chemical emergency would be useful for grappling with other man-made or natural disasters. Therefore, according to one congressional staffer, CSEPP represented "a potential windfall for these communities." Local officials, this staffer noted, felt the "need to get as much as they can while the pickin's good."[55] While many of the requests from local officials have been predictable and reasonable, others have bordered on the outlandish. For example, the governor of one of the stockpile states reportedly requested a sixteen-wheel, hermetically sealed, mobile command post.[56]

This grim portrait does not apply to all locations, noted James Everett, an emergency disaster official from Kentucky. Had the GAO spoken with any Kentucky officials involved in CSEPP, Everett argued, they would have found a response plan that is tested annually. Nor would fiscal accountability have been a problem. As for another of the Achilles heels identified by the GAO—lack of medical preparedness—Kentucky has hired a CSEPP medical program director to oversee response planning, specialized training, and purchasing of supplies.[57]

While Kentucky may be well on the road to chemical emergency preparedness, the CSEPP program as a whole is undoubtedly in need of tighter managerial controls. However, despite a genesis that roughly coincided with the Army's baseline program, the suspicions that CSEPP is a bribe for accepting incineration are misguided. The Army funds both the CSEPP and baseline programs, but the former is not there to lobby for the latter, said Everett. "Madison County has to be prepared regardless of what destruction technology is used."[58] Baronian, formerly the top civilian official for the chemical demilitarization program, heartily concurred with this view. "If I were living in that community—whether incineration, neutralization, or sending it on a rocket to the sun was the method chosen—I would say that emergency preparedness was needed. The

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52. GAO, *Slow to Achieve Results, 14–16.*

53. GAO, *Communities Not Prepared, 8–9.*

54. GAO, *Slow to Achieve Results, 2.*

55. Interview with author, Washington, D.C., 26 May 1994.

56. Interview with author, Washington, D.C., 29 April 1994.

57. Everett is executive director of Kentucky's Disaster and Emergency Services. Telephone interview with author, 25 May 1994.

58. Ibid.

major risk to the community is from storage."[59] A congressional staffer also agreed. "Whether there is a destruction program or not, 95 percent of CSEPP should be in place because of the existence of the stockpile."[60]

Future Use of the Baseline Facilities

In 1985, Congress mandated that the Army develop a plan to destroy the nation's chemical weapons stockpile by 20 September 1994.[61] In 1986, when Congress approved the Army's recommendation that high-temperature incineration be used to do the job, it added a provision to the law that stipulates that baseline facilities be destroyed upon completion of this task.[62] This provision was incorporated into the law to reassure those living near these sites that the Army's facilities would be used to destroy *only* the chemical weapons stockpile.

However, with the price tag per facility estimated at $160 to $250 million, there is general skepticism that the baseline facilities will be torn down.[63] The Kentucky Environmental Foundation's Williams said, "It's very difficult for these people to understand, comprehend, or believe" the Army will tear down state-of-the-art, hardly used, multi-million dollar incinerators. Such an act would be fiscally "insane."[64] Ross Vincent, chairman of the Sierra Club's National Hazardous Materials Committee and a member of the Pueblo, Colorado, Citizens Advisory Commission, concurred that the

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59. Interview with the author, 10 May 1994.

60. Interview with author, 26 May 1994.

61. Public Law 99-145 dealt with so-called unitary chemical weapons—those that contain chemical agents that are highly toxic and lethal. Once the Chemical Weapons Convention enters into force, a second category of weapons, binaries, will also be destroyed because the treaty requires the destruction of the entire stockpile. As the term implies, binary weapons consist of two non-lethal chemicals that are separated to enable safer storage and handling. When mixed during the flight to its target, the two chemicals combine to make a highly toxic or lethal agent. The U.S. binary systems are the multiple launch rocket system, the bigeye bomb, and the M687 155 binary projectile. The Army is considering sending some binary chemicals to approved hazardous waste treatment facilities, selling some for industrial use, neutralizing some chemicals, and incinerating others. Final plans have not yet been articulated. See *Non-Stockpile Chemical Materiel Program: Interim Survey and Analysis Report* (Aberdeen Proving Ground, MD: Program Manager for Non-Stockpile Chemical Materiel, U.S. Army Chemical Materiel Destruction Agency, April 1993) 19-21.

62. Public Law 99-145, Title XIV, Part B, Section 1412 (50 USC 1521), (c)(2), 8 November 1985 (Department of Defense Authorization Act, 1986) states: "Facilities constructed to carry out this section may not be used for any purpose other than the destruction of lethal chemical weapons and munitions, and when no longer needed to carry out this section, such facilities shall be cleaned, dismantled, and disposed of in accordance with applicable laws and regulations."

63. After the issue of the health and environmental hazards posed by incineration, the future use of these facilities was the second most important issue for Greenpeace's Sebia Hawkins. Interview with author, 2 March 1994. Costs for the construction of baseline facilities were provided by Marilyn Tischbin of the U.S. Army Chemical Materiel Destruction Agency. Interview with author, 21 July 1994. Tischbin noted that construction costs vary from site to site.

64. Interview with author, 19 May 1994. The first several questions in a 31 March 1992 community discussion about the destruction program at Aberdeen Proving Ground pertained to citizens' worries about the future use of the baseline incinerators. See Lawyers Alliance for World Security, *Citizen Attitudes,* 4-5,7.

baseline program is the "back door" to permanent waste disposal facilities, adding that the notion that the nation's largest polluter, the Pentagon, would dismantle these facilities when the Defense Department has such need for them is "not credible."[65] James Harmon of Anniston observed that the baseline incinerators would be the equivalent of the Pentagon's infamous "$300 toilet seat" and predicted that the American public in general and Congress "will never allow these incinerators to be torn down."[66] When asked about future use by an Aberdeen resident, Marilyn Tischbin, speaking on behalf of the U.S. Army Chemical Materiel Destruction Agency, said, "Yes, the law could be changed, there is no doubt about that."[67] Local citizens therefore worry that the Army's chemical weapons destruction program could leave them with permanent hazardous waste disposal facilities, making their communities dumping grounds for other governmental or municipal wastes.

Congress breathed new life into these fears when it later ordered the Army to "investigate and report on the feasibility and desirability of using chemical weapons disposal facilities for other purposes" after the stockpile was destroyed. This November 1989 request came from the Conference Committee of the House and Senate Appropriations Committees, which was searching for ways to hold down federal spending.[68] Representative Mike Synar (D–OK) typifies the cost–effectiveness sentiment of a congressional overseer who does not have one of the stockpile sites in his home district. During one hearing, he asked, "If the incineration process which they are going to use is so environmentally benign, why would you have to destroy the plant after the weapons are destroyed? Isn't that an awful waste of money?"[69] Taxpayers outside of the eight stockpile sites are likely to applaud such congressional cost consciousness, but those fearing a permanent hazardous waste disposal facility as their neighbor react with alarm. Was this study of future uses, they wondered, the first step toward changing the law? This study and other suggestions by reviewers of the Army's program that future use would be efficient fuelled suspicions that Washington would go back on its word.[70]

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65. Vincent added that if alternative technology facilities are built and not torn down after the stockpile is destroyed, such facilities by their very nature are considerably safer than the incinerators and would be far less of a risk to the local communities over the long run. Telephone interview with author, 11 August 1994.

66. Telephone interview with author, 9 August 1994.

67. Lawyers Alliance for World Security, *Citizen Attitudes*, 5.

68. U.S. Congress, House, *1990 Defense Appropriations Conference Report,* 101st Congress, session 1, 101–345, Title VI, 128–129 states: "Under existing law, the Army is required to dismantle and destroy all of the facilities which will be built to destroy chemical weapons and to return the sites to their original condition. The Committee believes that it may be possible or desirable to continue to use these facilities for disposal of other wastes or conventional munitions...The Committee directs the Army to investigate and report on the feasibility and desirability of using chemical weapon disposal facilities for other purposes after the primary mission is completed."

69. *The Department of Defense's Chemical Weapons Destruction Program.* Hearing Before the Environment, Energy, and Natural Resources Subcommittee of the Committee on Government Operations, U.S. House of Representatives, 102nd Congress, 2nd Session, 16 June 1992 (Washington, D.C.: U.S. Government Printing Office, 1993) 28.

70. A 1984 NRC report noted the Defense Department's need to address its hazardous waste problems and suggested that the "life–cycle" of the baseline facilities could be extended if modified to handle these

An independent contractor, Mitre Corporation, was hired to conduct the requested evaluation of possible future use of baseline facilities. Factors considered in the study were the technical capability of the baseline facility to do proposed tasks and the desirability of using a baseline facility for such purposes. Several aspects were included in the desirability analysis: the military or public need for the activity; alternative methods of disposal; regulatory requirements; economic implications (e.g., efficiency, and capital, operating, maintenance, and permit costs); amount of potential feed material; transportation issues; public sentiment, for or against; and uncertainties associated with these elements of the analysis. An evaluation was done for each of the eight sites.

Mitre's January 1991 report concluded that, from a technical standpoint, baseline facilities could also dispose of or decontaminate other Defense Department items, namely the equipment, items, or buildings contaminated with chemical agent; non–stockpile chemical materiel; conventional munitions; contaminated soils; hazardous wastes from hospitals; and other military toxic wastes. Conventional municipal trash could also be processed.[71] However, the desirability analysis pointed toward contrary conclusions. For example, "while it is technically feasible to process most of the feedstocks considered in the demilitarization facilities, in a majority of cases, it is undesirable to do so." Furthermore, the study concluded that future use was "not economically attractive when compared with existing and potential alternative methods...due to the relatively small size of the [baseline] incinerators" and their specialized nature.[72]

Opponents to the baseline program seized this report, emphasizing the possibility that the desirability portion of Mitre's analysis would be overridden by the technical feasibility factors. The Mitre report, according to the Kentucky Environmental Foundation's Williams, is nothing more than a detailed map on how to bring about future use. He, like other baseline opponents, warned that "laws can be changed."[73] Similarly, Harmon of Anniston believed that "the reason for the baseline program is to build the incinerators, but not necessarily for them to destroy chemical weapons. It is to deal with the other military wastes that the Pentagon needs to get rid of." Having said that, Harmon reeled off a list of military bases near Anniston that are saddled with fifty years

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wastes. See NRC, *Recommendations for the Disposal,* 68. A 1990 GAO review also said that the baseline facilities "have greater potential uses than current legislation allows. Efficiency would dictate that this expanded use be encouraged" since the Army was planning to build other incinerators to destroy these other wastes. The GAO recommended that the Secretary of Defense seek modification of the legislation if studies proved that baseline facilities could safely and efficiently destroy other hazardous wastes. GAO, *Obstacles to the Army's Plan,* 35.

71. The items in the second category—non–stockpile chemical materiel—must also be disposed of, but are not located at the eight main stockpile sites. These items include buried chemical materiel, recovered chemical weapons, former chemical weapon production facilities, binary chemical weapons, and miscellaneous chemical warfare materiel. The Army documented the locations, types, and quantities of non–stockpile materiel in an April 1993 report. See Program Manager for Non–Stockpile Chemical Materiel, *Interim Survey and Analysis Report.*

72. A.S. Goldfarb et al., *Engineering Analysis for Future Use of Chemical Agent Demilitarization Plants: Feasibility and Desirability,* MTR–91W00010 (McLean, VA: The Mitre Corporation, January 1991) xlii, xlviii. See also Program Manager for Chemical Demilitarization, *Executive Summary,* xv–xlix.

73. Interview with author, 19 May 1994.

of the Cold War's wastes—Fort McClellan, Redstone Arsenal, Fort Benning, Maxwell Air Force Base. Destroying such materials at a baseline facility would be the easy solution, he observed.[74] Dr. Peter Montague of the Environmental Research Foundation observed that as of mid-June 1992 the Pentagon had identified 14,400 Superfund-type chemically-contaminated sites in need of clean-up operations.[75]

Apprehension that a chemical weapons destruction facility will turn into a permanent, unwanted neighbor was also evident in Canada. People living near the chemical weapons storage facility at Suffield, Alberta, were gravely concerned about the future-use factor. The regulations governing Canada's destruction program, known as Operation Swiftsure, stipulated removal of the incinerator that would be brought in to destroy portions of Canada's stockpile. Nonetheless, anxious members of the local citizens advisory committee requested and received additional written reassurance from Canada's Defence Minister that the incinerator would, indeed, be removed. The incinerator was sold to private industry and taken from the site in June 1992, approximately half a year after destruction was completed.[76]

Polar Views Concerning Baseline Incineration

Underlying the educational campaigns for and against the baseline program are expert views. When experts differ, decades can pass before the scientific community comes to consensus on some issues. For example, prominent scientific debates have recently taken place about ozone depletion, nuclear winter, the Acquired-Immune Deficiency Syndrome, and the greenhouse effect. When scientific debate goes outside a discipline's journals, citizens can be inundated with statistics and data to prove diametrically opposing points.

The Opposition's Viewpoint

Incineration opponents say that incineration worsens and perpetuates mankind's hazardous waste disposal problems. Incinerator operators, they say, are guided by a "dilute and disperse" philosophy.[77] Translated, this phrase means that incineration breaks down a solid or liquid hazardous waste material and spreads it over the country-

74. Telephone interview with author, 9 August 1994.

75. Lawyers Alliance for World Security, *Citizen Attitudes*, 16.

76. Canadian Department of National Defence, *Project Swiftsure: Citizens' Environmental Protection Committee Report* (Alberta, Canada: Canadian Department of National Defence, July 1992)3-4. Canada's stockpile—12 tons of mustard, 2.5 tons of lewisite, and 0.3 tons of nerve agents—was small in comparison to the U.S. stockpile. The nerve agent and lewisite were neutralized in 1989 and 1991, respectively. The mustard gas, waste from the nerve agent neutralization, and scrap products were incinerated by November 1991 with a transportable incinerator operated by Chem-Security Ltd., a hazardous waste disposal firm from Calgary. See John M. McAndless, "Project Swiftsure Destruction of Chemical Agent Waste at Defence Research Establishment Suffield," Technical Paper 92-74.01 (Presentation at the 85th Annual Meeting & Exhibition of the Air & Waste Management Association, Kansas City, MO, 21-26 June 1992). As for selling or using baseline incinerators for any purposes after the stockpile was destroyed, U.S. Army Chemical Materiel Destruction Agency spokesperson Tischbin noted that "before we, private industry, or anyone could operate a facility, they would have to obtain a permit from the state and go back through the environmental process." Lawyers Alliance for World Security, *Citizen Attitudes*, 7.

77. This phrase was used in Alfred Picardi, et al., *Alternative Technologies*, 1.

side via smokestack emissions.[78] Regarding the baseline program, a Greenpeace flier states that baseline incinerators "will release small but significant quantities" of chemical agents and that they "create and release highly toxic, persistent, and bioaccumulative by-products, including the ultra-toxic dioxins, furans, and PCBs. These and other organochlorines pose an even greater long-term environmental threat than the weapons themselves."[79] This stinging, sweeping indictment charges that the Army's program is less to eliminate a hazard than to create one.

The essential problem with incineration is that it is not a "closed-loop" system: one cannot "put a cork in the stack," said baseline opponent Williams.[80] The consequences, according to a Greenpeace report, are grave. "Cancer, birth defects, reproductive dysfunction, neurological damage, and other health effects are *known* to occur at very low exposures to many of the metals, organochlorines, and other pollutants released by waste-burning facilities."[81] In other words, the opposition identifies a link between dioxin exposure and significant health problems and points to smokestack emissions as a major source of these harmful pollutants.[82]

The regulatory measure for the completeness of the destruction process—how much of the hazardous waste is actually obliterated by incineration—is something called the Destruction and Removal Efficiency, or DRE. The common federal requirement for the destruction of most hazardous wastes—and the one that has been set for the chemical agents in the stockpile—is that incinerators must destroy at least 99.99 percent of the waste fed into them.[83]

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78. According to the Sierra Club, "incineration...converts relatively compact liquid and solid wastes into high volume gaseous wastes—some of them more toxic and more bioavailable than the original liquids and solids. It then distributes most of these newly generated gaseous wastes across the countryside—toxics, criteria pollutants, greenhouses gases and all." Vincent, "Combustion Strategy," 1.

79. "Chemical Weapons At Home" (Washington, D.C.: Greenpeace, undated) 1. PCBs stands for polychlorinated biphenyls.

80. Interview with author, 19 May 1994.

81. Emphasis added. Costner and Thornton, *Playing with Fire*, 2. See Idem., 35–43 for a more detailed presentation.

82. Although the EPA already places more than thirty different controls on dioxins, a new EPA study classifying dioxins as a probable cause of cancer and other diseases in humans is likely to result in even more restrictions, including restrictions on incinerator emissions. The EPA study states that thirty pounds of dioxins and furans are released annually in the United States. The combustion of wastes is believed to account for 95 percent of that amount, although more data are needed about specific sources of emissions. Gary Lee, "Dioxin Study Spurs Plea for Restrictions," *The Washington Post*, 14 September 1994, A8; and Gary Lee, "EPA Study Links Dioxin to Cancer," *The Washington Post*, 12 September 1994, A1.

83. If the waste is "dioxin-listed," 99.9999 percent must be destroyed. See "Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities," *Code of Federal Regulations*, part 266, section 104, Standards to Control Organic Emissions, 1 July 1992, 482–485. Federal regulations for the baseline facilities will therefore require that some of the materials processed meet the "six nines" standard. Moreover, since states have the right to set standards that are more rigorous, Kentucky, Utah, Indiana, and Maryland, have stipulated that one or more of the four incinerators will have to meet the more stringent "six nines" standard. Other states are likely to follow suit. For more on the Kentucky's conditions governing a future baseline facility, see OTA, *Alternative Technologies*, 4–5.

This standard allows a great deal of hazardous materials to be released into the air. According to the Sierra Club, "mere compliance with environmental regulations is better than non–compliance but cannot assure protection" of public health and the environment.[84] During initial operations of the Army's prototype baseline facility on Johnston Island, an opposition analyst charges that out of 75,000 pounds of the nerve agent GB put into the liquid incinerator, an estimated 0.008 pounds or over 3.5 grams emerged from the stack. Out of approximately 300,000 pounds of mustard gas incinerated, 3 pounds allegedly escaped.[85] Moreover, incineration opponents point to two instances when the Army has reported live agent emissions outside of the Johnston Atoll facility, which is shown in Figure 10. They also state concerns about agent emissions within the facility, which indicate carelessness and could have repercussions for the environment and the general population.[86] Moreover, they question what else might be going on that the Army is not reporting.

Incineration opponents also accuse the Army of not knowing or caring what PICs come out of its stacks. "The Army has lots they don't identify. It isn't that these PICs are not there, it's that they do not look for them."[87] According to an opposition coalition called the Chemical Weapons Working Group, "during the Army's metal parts trial burn, only dioxins, furans and 22 other chemicals were identified, although many others were certain to have been present."[88] Opponents also doubt that the data in the Johnston Atoll trial burn reports on PIC emissions tell the true tale.[89]

The EPA establishes whether an incinerator can meet a specified DRE standard by monitoring its performance during "trial burns." Instruments are placed in the emission stack and detailed chemical analyses are run when the incinerator is operating under worst case conditions, being pushed to its limits. As a result of these tests, the EPA stipulates the parameters under which the incinerator is permitted to operate, including

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84. Sierra Club, "Analysis of Dr. Carl Peterson's Recommendations," 2.

85. Pat Costner, *Chemical Weapons Demilitarization and Disposal: Johnston Atoll Chemical Disposal System, GB and VX Campaign* (Washington, D.C.: Greenpeace, 12 May 1993) 5.

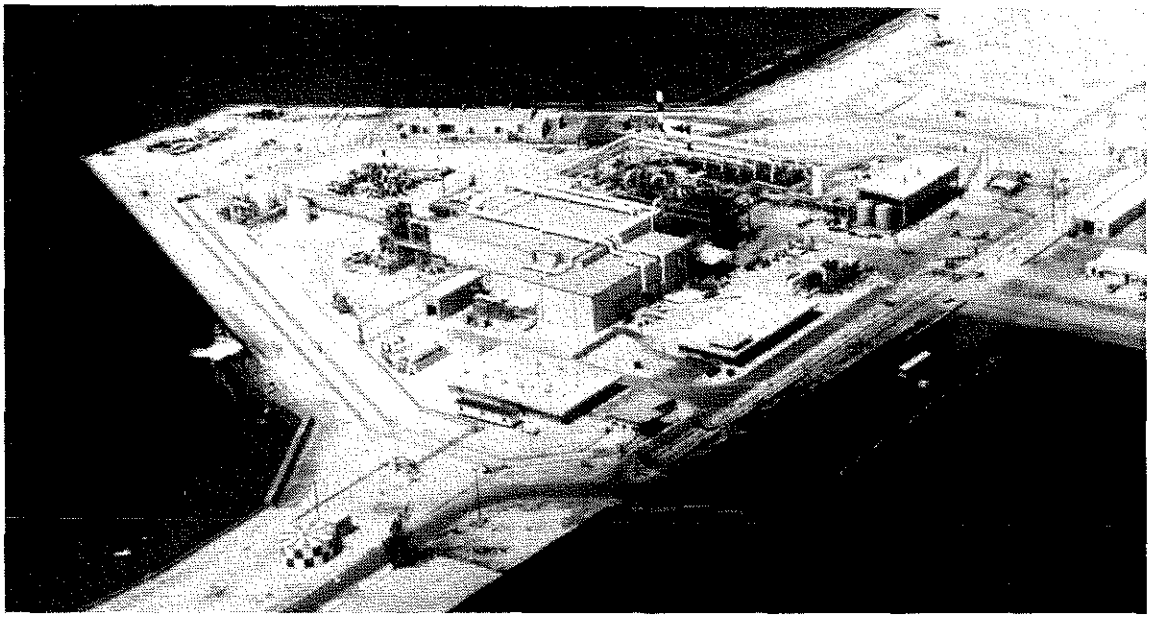
86. For example, Pat Costner cites thirty–two instances during the trial burn with GB where active agent was present in the facility's corridors and fifteen instances where agent was present in the life support air system. See Pat Costner, *Chemical Weapons Demilitarization and Disposal: The Army's Experience At Johnston Atoll Chemical Disposal System* (Washington, D.C.: Greenpeace, 11 April 1993) 2. The Sierra Club states that "there have been no releases of 'live' agent from storage, but there have been more than a dozen such releases" from the Johnston Atoll facility. Sierra Club, "Analysis of Dr. Carl Peterson's Recommendations," 3. Author's note: see page 14-15 for information on leak rates during storage.

87. Pat Costner (Presentation to a meeting of the Chemical Weapons Working Group, Washington, D.C., 19 March 1994). See also Pat Costner, *The Incineration of HD Agent at JACADS: MPF Trial Burn and LIC Demonstration Burn* (Washington, D.C.: Greenpeace, 17 March 1994) 18.

88. See "The Citizen's Solution," (Berea, Kentucky: Chemical Weapons Working Group, undated) 1.

89. "The nature of these data and the procedures followed during the Army's sampling and analysis of stack gases for PCDD/Fs suggest strongly, however, that these data do not accurately represent the actual PCDD/F emissions from the MPF during the trial burn." Costner, *Incineration of HD Agent,* 13. PCDD/Fs are a combination of two products of incomplete combustion, polychlorinated dibenzo–p–dioxins and dibensofurans. MPF stands for the metal parts furnace, one of a baseline facility's four incinerators.

Figure 10: An Aerial View of the Baseline Facility on Johnston Atoll.



Photograph courtesy of the U.S. Chemical Materiel Destruction Agency.

how much hazardous waste can be in the incinerator at any one time, how long the waste must reside in the incinerator, the combustion temperature and combustion gas velocity, allowable design and operating variations, and other operational requirements, as needed. If during routine operations any of these parameters are not being met, the Army must stop feeding materials into the incinerator.[90]

According to incineration opponents, "Incinerators rarely, if ever, operate optimally. The temperature of the combustion chamber, the amount of time the waste is in the chamber and the mix of air and waste are critical determinants of complete incineration. Disruption of any one of these factors causes incomplete combustion and can lead to the release of quantities of unburned waste and PICs."[91] The Sierra Club's Vincent agreed, describing incinerators as "very cantankerous critters, highly susceptible to design error or operator mistakes."[92] The operational record of the Johnston Atoll

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90."Hazardous wastes...must not be fed into the incinerator unless the incinerator is operating within the conditions of operation (temperature, air feed rate, etc.) specified in the permit." Guidelines are also set for the start–up and shut–down of operations. See *Code of Federal Regulations,* Operating Requirements for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities, section 264.345, 1 July 1992, 290–291. For a brief description of the trial burn process, see *Environmental Report for the Johnston Atoll Chemical Agent Disposal System: Operational Verification Tests 1 & 2* (U.S. Army Chemical Materiel Destruction Agency, 3 September 1993) 14.

91.Triana Silton, "Out of the Frying Pan...Chemical Weapons Incineration in the United States." *The Ecologist 23* (January/February 1993) 19; "During combustion upsets, which occur frequently, greater amounts will be released." See also Greenpeace, *"Chemical Weapons At Home,"* 1.

92.Vincent also stated that incinerators never perform as the designers intend. Telephone interview with author, 11 August 1994.

incinerator, opponents note, is a harbinger of things to come in continental baseline facilities. Alarms indicating agent releases have sounded frequently.[93] So often did the alarms sound, the opposition reasons, that the Army's reaction to them became lax, like neighbors failing to react to the boy who cried wolf. At the trial burns, purportedly when the Army was demonstrating its best capabilities for the EPA authorities, the opposition emphasizes that the baseline facility was inoperable more often than not. Reports from one trial burn show that the baseline system failed, on an average, about every six hours.[94] Baseline opponents point out that the GAO also documented the extensive downtime and maintenance required at Johnston Atoll.[95] The opposition contends that if the Army cannot get the incinerators to perform well during the limited operations required for these trial burns, the Army can hardly be expected to run baseline incinerators at several U.S. locations properly, simultaneously, year–round, and around–the–clock.

Moreover, baseline opponents question the independence of the "independent" experts brought in to review the Army's program. Many of the reports have been written by the Mitre Corporation and the NRC, but the Kentucky Environmental Foundation's Williams called the relationship between these organizations and the Army "insidious." These reviewers were paid by the Defense Department and therefore put the "best face on a bad situation." Nor did Williams have any confidence in the EPA or the Centers for Disease Control and Prevention, which performs much of the toxicological research underlying U.S. pollution control standards. "The EPA is in the business of permitting people to pollute things" and is responsible for such things as the Agent Orange cover–up and the oversight of an incinerator in Arkansas that opponents contend was "clearly out of regulation." Also, fully at issue "is the military record of environmental stewardship," said Williams.[96] That record, opponents believe, is badly tarnished.

In sum, baseline opponents argue that the Army lacks a credible record, a credible technology, and credible oversight. The opposition posits that the only rational solution is to develop alternative destruction technologies, some of which are briefly described in Table 2. More stable, closed–loop alternatives that pose no threat from dangerous emissions are available, the opposition claims.[97] The Army, they contend, is loathe to

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93. Costner, *GB and VX Campaigns*, 2.

94. Costner summarizes the operational record of the Johnston incinerator during the trial burn for GB agent as having 500 hours of operation versus 929 hours of cumulative down time. Ibid., 8–9.

95. The GAO noted that the main cause of downtime during the processing of VX rockets was an explosive detonating in the deactivation furnace, creating a hole that had to be repaired. The facility did not operate on thirty–two of the 105 days that it was scheduled to process VX rockets. See *Chemical Weapons Destruction: Issues Affecting Program Cost, Schedule, and Performance*, GAO/NSIAD–93–50 (Washington, D.C.: GAO, January 1993) 22–23.

96. Interview with the author, 19 May 1994. Dr. Peter Montague of the Environmental Research Foundation noted, "The Army has created, presumably inadvertently, thousands of chemically contaminated sites, at least 66 of these are at Aberdeen Proving Ground. Thus, the Army in general, and the Aberdeen staff in particular, have a notably poor record of handling chemicals." Lawyers Alliance for World Security, *Citizen Attitudes*, 16.

97. For more on alternative technologies, see Picardi, et al., *Alternative Technologies*. At a public forum at Aberdeen Proving Ground in August 1992, Greenpeace's Hawkins stated unequivocally that all of the

pursue alternative technologies, having sunk so much money and effort into the baseline process.[98] All that stands in the way between local citizens and the truly safe destruction of chemical weapons, they conclude, is the will and additional funding to develop alternative technologies. Baseline opponents have proposed a different approach that would, in their view, allow international treaty commitments to be kept. This approach consists of: 1) stopping incineration; 2) disassembling the weapons (separating agents from the munitions); 3) neutralizing the agent; 4) storing the separated components; and 5) developing of alternative, closed–loop technologies to enable final treatment of the neutralized agent and other components.[99]

Local citizens modify this general approach to address the particular characteristics of the stockpile in their midst. For example, in Anniston, local baseline opponent Harmon recommended building the front end of the baseline facility to disassemble the munitions. Harmon recalled that a high–level Army official had told him that by the time this portion of the facility would be built, the Army could be ready to neutralize the GB nerve agent in the M55s, drawing upon their experience from Rocky Mountain disposal operations. While this was being done, research could refine the neutralization approach needed for treating VX and later for mustard. By the time the VX is destroyed, 95 percent of the danger will have been addressed. Officials at Tooele depot have told him that components could be decontaminated with the same solution that is used on Johnston Atoll to clean tools, uniforms, and the facility. Metal parts could thus be decontaminated to the "3X" level and landfilled. The only reason to decontaminate to the "5X" level is to sell the scrap metal, and, Harmon argued, the few million dollars profit that could be gained is not worth the effort or the danger of treating these materials via incineration. Explosives and propellants, though, would probably still be best treated in an incinerator, Harmon said.[100]

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technologies that Greenpeace had reviewed would "definitely be better than incineration." Lawyers Alliance for World Security, *Citizen Attitudes*, 26.

98. The Sierra Club firmly supports the development and use of alternative technologies. See "Analysis of Dr. Carl Peterson's Recommendations" and "Chemical Weapons Resolution," (Pueblo, CO: Sierra Club, 10 September 1993.

99. Excerpted from a flier entitled "Urge Congress to Pursue the Safe Disposal of Chemical Weapons," disseminated by the Military Toxics Project on 21 April 1994 and compiled by the Chemical Weapons Working Group; and Craig Williams (Presentation to the Henry L. Stimson Center's Chemical Weapons Convention Implementation Project Luncheon in Washington, D.C., 21 June 1994). Greenpeace was perhaps the first to conceive of this strategy, which would enable the Convention's destruction deadlines to be met, by de–linking the demilitarization of the weapons and their final destruction via a variety of alternative closed–loop technologies. See Lawyers Alliance for World Security, *Citizen Attitudes*, 22. The Sierra Club concurs with this approach. "We believe that expedited implementation of safer options—in particular those involving reconfiguration of problem portions of the stockpile (such as the M55s) and neutralization of the agent from those weapons—would produce a dramatic reduction in the risk of continued storage and, ultimately, faster destruction of the stockpile than the Army's 'baseline' approach." Sierra Club, "Analysis of Dr. Carl Peterson's Recommendations," 3.

100. Telephone interview with author, 9 August 1994.

Table 2: Brief Description of Some Suggested Alternative Technologies.	
Molten Salt Oxidation	Combines chemical and thermal treatment. Wastes and oxygen are fed into a bath of molten caustic salt—usually sodium carbonate or a mixture of sodium and potassium carbonate. The wastes are oxidized, typically producing emissions of carbon dioxide, water, nitrogen, and oxygen; ash and soot are retained in the melt. Salt can later be removed for disposal or for processing and recycling.
Fluidized Bed Combustion	Uses fluidized, granular solid as heat transfer medium. For chemical agent destruction, solid of choice would be aluminum oxide or calcium oxide. The material is kept suspended by gas flow, which is primarily air.
Molten Metal Pyrolysis	Involves use of metals, such as copper, iron, or cobalt, at 3,000 degrees Fahrenheit, to decompose organic compounds like chemical agent.
Plasma Arc Pyrolysis	Involves passing an electric current through a low-pressure airstream to split chemical agent into its atomic elements in a thermal plasma field at a very high temperature (e.g., 10,000 degrees Fahrenheit).
Steam Gasification	Organic materials are treated with super-heated steam under reducing conditions to produce simple organic molecules. Also known as reformation.
Wet Air Oxidation	Based on the principle that organic compounds can be oxidized slowly at temperatures that are low compared with normal combustion temperatures (e.g., 572 degrees Fahrenheit versus 3,632 degrees Fahrenheit). The oxidation is carried out at high pressure (e.g., 1,000 per square inch in the presence of water).
Supercritical Water Oxidation	Involves mixing chemical agents with water that has been pressurized and heated to a point at which organic compounds become soluble (e.g., above 705 degrees Fahrenheit and at a pressure above 221 atmospheres, or 3,205 pounds per square inch). Solution is oxidized at an elevated temperature, producing carbon dioxide and inorganic acids and salts.
Chemical Neutralization	Involves mixing chemical agents with other substances to form less toxic compounds. An example of this process is hydrolysis—the breakdown of a chemical agent by water.
Biodegradation	Involves the use of enzymes or cellular systems to degrade nerve agents or reaction productions in dilute (approximately 10 percent) aqueous solutions.

Sources: Chemical Weapons: Issues Involving Destruction Technologies, GAO/T-NSIAD-94-159 (Washington, D.C.: GAO, 26 April 1994) 10-15; and *U.S. Army's Alternative Demilitarization Technology Report for Congress* (Aberdeen Proving Ground, MD: Program Manager for Chemical Demilitarization, 11 April 1994) table 2.3.2-1, 2-10.

The Army's Viewpoint

Army officials believe that the record of the chemical weapons destruction program, though not flawless, can stand on its own. First, the Army refutes the charge that significant quantities of agent are coming out of the smokestack on Johnston Atoll. Calculations showing over three grams of nerve agent and thirty pounds of mustard agent escaping the Johnston Atoll stacks are, according to the Army, quite misleading because they are based on simple reverse calculations of the DRE. Furthermore, the Army asserts that baseline incinerators destroy even closer to 100 percent of the waste.[101] A

101."In all cases, since no agent was detected in the stack gases during the trial burns, the actual DRE is

survey of other chemical agent incineration programs shows that the highest temperature previously used to destroy chemical agents was 2,192 degrees Fahrenheit.[102] Baseline's incinerators operate at or above the temperatures proven to obliterate agent. Furthermore, the Army keeps materials in the incinerators for a longer time than needed to achieve virtually total destruction of the agent.

Baseline's incinerators differ from regular commercial hazardous waste incinerators in how they treat solid and liquid wastes.[103] For example, the primary agent incinerator has a minimum operating temperature of 2,600 degrees Fahrenheit, but normally runs at 2,700 degrees Fahrenheit, which is hot enough to destroy agent in 0.42 seconds. The agent remains in the incinerator for one–half of a second and the exhaust gases move to the 2,000 degrees Fahrenheit afterburner for another 1.5 seconds. The total time and heat is enough to destroy the agent four times over. A commercial hazardous waste incinerator treating liquid wastes will usually treat the material for about the same amount of time, but at lesser temperatures. The agent incinerator's temperature is "on the order of about 500 or 600 degrees higher than any other hazardous waste liquid incinerator operating," and therefore, the trial burns show "an above the norm" performance in terms of DRE.[104] (Figure 3 in chapter 1 provides a schematic diagram of a baseline facility for reference purposes.)

The standards used for the metal parts and deactivation furnaces, both of which treat solid materials, also differ from those normally observed in the hazardous waste industry. One differentiating factor is the Army's internal rule for checking processed material to ensure that no agent remains. Another is the Army's practice of incinerating solid wastes that have passed through the primary chamber for at least an extra fifteen minutes of treatment time at 1,000 degrees Fahrenheit or above. As a result, both of these incinerators "are out–performing any of the incinerators we normally see."[105]

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better (i.e., higher) than the calculated DRE." Mitre, *Summary Evaluation of the Johnston Atoll Chemical Agent Disposal System: Operational Verification Testing*, 3–4.

102. The incinerators used in Canada's project Swiftsure, as well as Britain's and Germany's destruction of mustard agent, operated at this temperature with agent kept in the incinerator an average of two seconds. Another British agent incinerator operated at 1,112 degrees Fahrenheit. See NRC, *Alternative Technologies*, 64–72.

103. Descriptions of the baseline incinerators are available in various Army documents, such as *Process Report for the Johnston Atoll Chemical Agent Disposal System* (U.S. Chemical Materiel Destruction Agency, 3 September 1993). A 12 July 1994 interview at Aberdeen Proving Ground, MD, with Special Assistant to the Program Manger for Chemical Demilitarization Mark Evans also helped the author confirm information in the following paragraphs. Note that the dunnage incinerator operates at about 1,400 degrees Fahrenheit and the items put into it, mostly wooden pallets, are burned to ash. The dunnage incinerator has a 2,000 degree Fahrenheit afterburner to treat exhaust gases. The amount of time materials spend in these incinerators will vary depending upon the quantity of waste fed into them.

104. Most other commercial incinerators operate at around 2,000 to 2,100 degrees Fahrenheit. The first comment was made by the EPA's Y.J. Kim, national incineration expert, and the second by the EPA's Cathy Massimino, senior Resource Conservation and Recovery Act/Superfund technical specialist. Telephone interview with author, 23 August 1994.

105. Massimino, telephone interview with author, 23 August 1994. Kim, also of the EPA, concurred with this statement in the same interview.

Drained munitions and ton containers are handled in the metal parts furnace, which operates at over 1,400 degrees Fahrenheit. Items stay in the three incineration zones of this first chamber for about forty minutes. In contrast, most commercial incinerators treat items for fifteen to thirty minutes. Exhaust gases then go through a 2,000 degree Fahrenheit afterburner, while the projectiles or containers pass into an airlock, where the air is sampled twice to see if any agent is remaining on the items. If detectors register the presence of any agent, the part(s) that did not pass muster are sent back into the incinerator for further treatment. This post-incineration scanning is not used at any other incinerator in the country.[106]

In the deactivation furnace system, propellants and explosives remain in the first incinerator, which operates at 1,300 degrees Fahrenheit, for about six minutes. Exhaust gases then move into a 2,000 degree Fahrenheit afterburner, while the remaining material transfers to a heated conveyer for another fifteen to twenty minutes of treatment at 1,000 degrees Fahrenheit. That latter step is what sets the deactivation furnace system apart from commercial incinerators that treat similar wastes.[107]

The second reason that the Army is certain it is destroying more than the DRE is that it sets its detectors to monitor much lower than the DRE, which the Army believes is an inappropriate barometer by which to judge the completeness and safety of incineration. According to former Program Manager for Chemical Demilitarization Baronian,

> Efficiency of the combustion is not a good way to measure environmental safety. For example, if I put ten pounds of hazardous material into an incinerator and 90 percent destruction efficiency is desired, that allows me to put one pound of hazardous material up the stack. If I put a million pounds in for this hypothetical 90 percent destruction efficiency requirement, then I can put 100 pounds of hazardous material out the stack. With this approach, efficiency stays the same no matter how much you put in. The Army rejected this as an environmentally safe principle or way of going about this. The Army instead sets standards for the stack and monitors against them, regardless of whether one pound or 1,000 pounds goes into the incinerator. In the case of GB, we are measuring for agent at a parts per trillion level instead of for some magic efficiency number. Whether we are putting a pound in or ten thousand pounds in, we still have the same requirement for no agent to come out of the stack and that is what we monitor.[108]

106. Note that minimum treatment time in the first incinerator is at least thirty minutes. The EPA's Kim and Massimino, telephone interview with author, 23 August 1994.

107. Ibid.

108. Interview with author, 10 May 1994.

The microscopic amounts of agent for which the Army monitors are therefore not based upon the DRE, but upon much stricter standards that the Army, with its unique expertise in agent exposure, determined with the assistance and approval of the Department of Health and Human Services (HHS), notably with the Surgeon General's Office and the Centers for Disease Control's toxicology experts.

These standards are set to levels substantially below the amount that could cause adverse health problems for the general public, whether from acute or long-term, direct or indirect exposure.[109] These standards are expressed in two terms, the Allowable Stack Concentration and the General Population Limit.[110] The standards are set so rigorously so that if they are tripped, the Army has time to take corrective measures to prevent a release of real significance. Furthermore, the Army lowers the action levels even further by setting its agent monitors to go off if they detect twenty percent of the Allowable Stack Concentration.[111]

Columns two and three of Table 3 show where these agent detectors would have been set if the Army were monitoring just for DRE-level agent emissions. The Army's detection standard for nerve agents is roughly 21,000 times more stringent than the monitoring level needed to demonstrate the basic federal DRE and about 210 times stricter than the monitoring level for the 99.9999 percent removal standard. When monitoring for mustard agent emissions, the Army's monitors are approximately 416 times stricter than the federal DRE and four times stricter than the 99.9999 standard for mustard. Even with monitoring levels that are much more stringent than required, agent monitors tracking emissions on Johnston Atoll have detected *no agent coming out of the stack while the incinerators were operating.*[112]

The Army's agent detectors screen the air continuously, the bulk of them operating on sample cycles that vary from three to ten minutes. For U.S. facilities, the specific number of perimeter detectors will be determined based mostly upon a site's topography and prevailing winds. Because they are set to such a low level, other elements, known as "interferents," can trigger an alarm. This approach has led to a high number of alarms on Johnston Atoll. When further analysis reveals that agent was not present and that

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109. After public review and comment, the HHS announced these standards in the *Federal Register*, vol. 53, no. 50, 15 March 1988, 8504–8507.

110. The Allowable Stack Concentration refers to how much agent can be present in the emissions in the smokestack. The General Population Limit refers to how much agent could be present outside the facility, taking into account wind conditions. These extremely minute quantities are far below the exposure level that would cause harm. See Table 3.

111. According to the EPA's Kim and Massimino, no other incinerator in the United States has an Allowable Stack Concentration or this type of direct, continuous monitoring for emissions of concern. Other incinerators monitor for PICs by monitoring carbon monoxide and hydrocarbon emissions. Carbon monoxide monitoring is an indicator of "whether or not you are getting good combustion," said Massimino. If the carbon monoxide level is low, the combustion efficiency is high, and studies have shown that the relative concentration of PICs is also at a low level. Baseline incinerators also have carbon monoxide and hydrocarbon monitors. Telephone interview with author, 23 August 1994.

112. The Johnston Atoll facility has ninety-one monitors inside and twelve around the perimeter, placed according to prevailing wind patterns. See Mitre, *Summary Evaluation*, 3–4, 1–7.

something else caused the monitor to go off, these alarms are known as "false positives."[113]

When establishing its monitoring policy, Army officials observed matter-of-factly that they were in a catch-22 situation. The Army could have set the agent monitors to a higher level and gotten fewer alarms. Had they opted for this choice, the Army would have been open to charges that low-level, but still detectable emissions were taking place below this higher threshold. They chose instead to set the monitors to much lower detection thresholds, knowing that the number of false positives would be high.

The previously noted two agent releases on Johnston Atoll took place while the incinerators were *not* in operation. One incident occurred on 8 December 1990 when an incinerator was cooling after it was shut down; another on 24 March 1994 when the incinerator was shut down for routine maintenance. In both instances, agent was detected in the stack but not by the perimeter monitors. After investigation, the Army and federal regulators determined that these incidents did not result in a health risk. In addition, a number of procedures used in shutting down and maintaining the agent incinerator were changed to prevent similar incidents in the future.[114] The Army's reports also detail other occasions when agent was present *within* the facility. Designers understood that munitions would be handled and disassembled within this facility, so they instituted redundant containment mechanisms, including ventilation and filter systems that induce negative air flow, airlocks, explosive-containment walls, and special partitions that keep situations such as interior agent releases in check.[115]

The number of problems encountered on Johnston Atoll, however, should be placed in context. The Army's experience with this prototype baseline facility has been consistent with expectations. Other types of sophisticated industrial plants have similar problems in their initial operational phases. Research shows that in the first three

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113. Two different types of monitors, each with backups, are placed at each incinerator and in the common exhaust stack, according to Mark Evans, a civilian official with the chemical demilitarization program. One type of detector provides near-real time monitoring by sampling every three to ten minutes, while the other type of detector samples over a period of several hours. These monitors are tested frequently with live agent to ensure that they are working properly, Evans said. Common stack monitors are challenged with live agent every four hours. Evans and Edwin Muniz, task manager in the Environmental and Monitoring Division of the Chemical Materiel Destruction Agency, interviews with author, Aberdeen Proving Ground, MD, 21 July 1994.

114. The first incident entailed an agent release that was 22 percent of an allowable release concentration from the stack, while the second was found to be 0.032 percent of the limit for a release to the general population. Officials from the HHS and the EPA concurred that these incidents did not present a significant public health risk. See Mitre, *Summary Evaluation*, B-1; "Risk Assessment Survey News Release" (Aberdeen Proving Ground, MD: U.S. Army Chemical Materiel Destruction Agency, 25 March 1994); Gregory W. St. Pierre, *Johnston Atoll Chemical Agent Disposal System: Report of the 23 March 1994 Chemical Agent (GB) Release from the Common Stack* (Aberdeen Proving Ground, MD: U.S. Army Chemical Materiel Destruction Agency, March 1994).

115. See Program Manager for Chemical Demilitarization, *Final Programmatic Environmental Impact Statement*, "Demilitarization Plant Design," C-5 of appendix C. Many of the problems with the migration of agent within the Johnston facility were due to a plant design that did not incorporate the rooms in which the furnaces are housed within the facility's cascaded air filtration system. The design for U.S. facilities has been changed to minimize this problem. Evans, interview with author, 21 July 1994.

Table 3: Monitoring for Just the Destruction and Removal Efficiency versus the Army's Actual Monitoring Standard.

	Monitoring Level for 99.99% Destruction and Removal Efficiency[a]	Monitoring Level for 99.9999% Destruction and Removal Efficiency[a]	General Population Limit	Allowable Stack Concentration	Actual Stack Monitoring Levels
Nerve Agent GB	1.26mg/m^3	0.0126mg/m^3	0.000003mg/m^3	0.0003mg/m^3	0.00006mg/m^3
Nerve Agent VX	1.26mg/m^3	0.0126mg/m^3	0.000003mg/m^3	0.0003mg/m^3	0.00006mg/m^3
Mustard HD	2.5mg/m^3	0.025mg/m^3	0.0001mg/m^3	0.03mg/m^3	0.006mg/m^3

[a]The author asked the Army's assistance in calculating monitoring levels for columns two and three to enable a comparison. Edwin Muniz, task manager in the Environmental Monitoring Division of the U.S. Chemical Materiel Destruction Agency, calculated the DRE for nerve agents in the liquid incinerator based upon a feed rate of 700 pounds per hour, the average at the Johnston Atoll facility, and a volumetric flow rate of 14,800 actual cubic feet per minute of gases coming out of the stack. For mustard, he used a feed rate of 1,320 pounds per hour, the average at Johnston Atoll, and a volumetric flow rate of 13,820 actual cubic feet per minute of gases emerging from the stack.

Note: mg/m^3 means milligrams per cubic meter.

months of operation, production at similar plants averaged only about 40 percent of design expectations, while fully 50 percent of these pilot plants did not meet their production goals in the seven to twelve months after operations were initiated. Factors influencing this poor performance rate included the use of new technology or the scale of the technical innovations.[116] Both of these factors clearly contributed to down time in the Johnston Atoll facility.

The Army will never be able to provide incineration opponents with the type of *absolute* guarantees they seek for the operation of baseline facilities.[117] Any time humans interact with complex equipment, the possibility of error exists. To prevent any errors that might happen from having significant consequences for the public or the environment, the Army states that it has built numerous redundancies and safeguards into the baseline facility.[118] Furthermore, when the Army has had problems with the baseline

116. The types of plants studied were first–of–a–kind process plants from the chemical, oil, minerals, and design services industries. The report concludes that "poor plant performance...occurs when new technology is being introduced for the first time..., when waste handling difficulties are involved, and fairly consistently when the plant engages in solids processing." See Edward W. Merrow, Kenneth E. Phillips, and Christopher W. Myers, *Understanding Cost Growth and Performance Shortfalls in Pioneer Process Plants*, R–2569 DOE (Washington, D.C.: RAND, September 1981) vi, 65–83.

117. Nor, the Army states, are there any guarantees that an alternative technology will be safer. Or, as David Koplow points out, "there is no certainty that" an alternative technology "would be any more free of legal, technological, ecological, financial or other telling defects, or that it would attract unanimous political support from affected communities." Koplow, *Some Disassembly Required*, 12.

118. The Army's specialized operator training programs, at a mock facility and also on–the–job, also discipline baseline operators to take steps to minimize any errors that occur. Within seconds of any alarm detecting any agent emissions, corrective and additional containment measures are taken by control room operators and other personnel. For example, during the 23 March 1994 incident, control room operators

system, it has not ignored them. The Army has reacted constructively, investigating the causes and instituting remedial procedures, whether in refining equipment design or operator training.[119] Incineration opponents emphasize the Army's mistakes but give little, if any, credit for the corrective steps taken in their aftermath.

The Army uses a computer system to regulate the operational parameters of the incinerators.[120] Computer readouts on the various operational parameters of each incinerator, which are taken every nine seconds to ten minutes, are watched by several control room technicians.[121] If, for example, the readings for carbon dioxide, carbon monoxide, temperature, or agent are not within the stated parameters, the operators immediately stop feeding materials into the incinerator. In such situations, the fuel feed into the incinerator is increased to maintain the required temperature long enough to complete the destruction process. Moreover, each incinerator has an afterburner, a second incinerator, that serves as a backup and ensures that, at the very least, the required DRE is achieved. Emissions pass through a complex pollution control system, which, upon the recommendation of the NRC, will be augmented by a bed of charcoal filters as an extra precaution to preclude agent emissions in the event of upset operating conditions.[122] These charcoal filters will function like a sponge, soaking up the elements—whether agent or other combustion by-products—that manage to make it through the two incinerators and the first several steps of the pollution control system. The Army believes that adhering to operational guidelines, in combination with the safeguarding redundancies built throughout the baseline facility, thoroughly address the problem of upset operating conditions.

Finally, the Army is puzzled by the charge that they are not screening emissions for PICs. Federal standards actually would have required the Army to test just for a small number of heavy metals and particulates. The Army decided, however, to sample emissions in each trial burn for more than 130 PICs. When the Army informed the EPA

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seeing agent detection alarms go off at 10:51pm began that same minute to issue a series of commands to site personnel to evaluate and safely contain the situation. See St. Pierre, *23 March 1994 Chemical Agent (GB) Release*, 3-4.

119. Continental U.S. destruction sites will benefit from the improvements and the lessons learned from the Johnston Atoll experience. See Program Manager for Chemical Demilitarization, *Executive Summary*, 3.

120. The EPA requires that temperature, waste feed rate, combustion gas velocity, and other relevant controls be monitored continuously, checked at least every fifteen minutes. The incinerator, associated equipment, and alarms must receive at least daily inspection. See *Code of Federal Regulations*, "Operating Requirements for Owners of Hazardous Waste Treatment, Storage and Disposal Facilities," section 264.345, 1 July 1992, 422.

121. Thermocouples measure the incinerator's temperature every nine seconds, while the Automatic Continuous Air Monitoring System detectors are set on cycles of ten minute or less. During operations, the parameters for each incinerator are watched by one dedicated technician. In addition, a technician monitors utilities such as electricity and fuel. Others watch the processing of materials before they reach the incinerator (e.g., the rocket shear machine) and the pollution control system. Finally, a supervisor and superintendent are always on duty. As many as ten technicians may be in the control room during operations, depending on what type of munitions is being destroyed. Evans, interview with author, 21 July 1994.

122. NRC, *Alternative Technologies, 205.*

of its plans to test additionally for volatile and semi-volatile PICs and dioxins and furans, the EPA in turn made those tests a requirement for the permits on Johnston Atoll.[123] Table 4 details the type and number of PICs that the Army screened for in each trial burn. For example, in the third operational verification test, where mustard was incinerated in ton containers, screening for dioxin/furan isomers was more intensive because one of the largest components of mustard is chlorine, a likely producer of dioxins/furans when burned.

The Army notes that the majority of the PICs tested for were not detected. Any PICs detected were factored into analyses that concluded that the total chronic health effects were "well below the EPA level of concern." In particular, "Dioxins and furans in the common stack emissions were low, ranging from 0 to 0.16 ng/m^3. None of the dioxins found were the 2, 3, 7, 8 – tetrachlorodibenzo–p–dioxin (2, 3., 3, 8 TCDD) isomer, which is the most toxic form of dioxin. In comparison, municipal incinerators emit dioxins in the 50–7,000 ng/m^3 range."[124] For these reasons, the EPA has not imposed any additional pollution control requirements on the baseline program.[125] These facts, the Army argues, give credence to their assertions that baseline incinerators are superior to the incinerators to which they are being compared.

In sum, Army officials running the baseline program do not dispute that some incinerators, past or present, may have been polluters. They argue, however, that they have taken many precautions and set requirements far beyond other incineration efforts. They contend that a normal amount of operational problems in the start–up phases of this program should not indict it. The Army asks that the baseline program be evaluated on its own merits and against the risk of delaying destruction about a decade for the development of an alternative technology, which may or may not prove feasible or significantly safer than baseline. Even if alternative technologies are developed, the Army cautions, they will not be risk–free.

Information Synthesis and Informed Decision–Making

Much of what the Army has to say about the baseline program differs from popular perceptions about incineration. An additional hurdle that the public has to overcome when considering the baseline program is the Army's presentation style and documentation. Most Army documents, written for the program's federal overseers in the EPA

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123. The EPA required that the Army conduct a trial burn for each type of agent processed—mustard and the nerve agents VX and GB. These trial burns coincided roughly with the operational tests that the Army performed for each type of munitions or item to be processed—rockets, projectiles, ton containers. The EPA drew its conclusions about the trial burn performance from its own analysis of trial burn data. Muniz, interview with the author, 21 July 1994. For documentation, see "JACADS RCRA Permit Trial Burn Plan" (Program Manager for Chemical Demilitarization, 3 January 1990) and the "Sampling and Analytical Protocol for the Resource Conservation and Recovery Act Trial Burns and the Toxic Substances Control Act Demonstration Burn at JACADS" (Environmental and Monitoring Division, Program Manager for Chemical Demilitarization, 2 July 1991).

124. Note:ng/m^3 means nanograms per cubic meter. Mitre, *Summary Evaluation*, 3–4.

125. According to EPA official Jim Michael, the Army's baseline facility on Johnston Atoll is improving incineration technology and standards. "This facility is actually driving the technology," he said. Interview with author, 10 August 1994.

Table 4: Products of Incomplete Combustion Screened for in Army Sampling.			
	Trial Burn #1[a]	**Trial Burn #2[b]**	**Trial Burn #3[c]**
Volatiles	39	34	41
Semivolatiles	73	70	80
Metals	17	19	20
Dioxin/furan isomers	2	10	17
Total Products of Incomplete Combustion Screened	**131**	**133**	**158**

Sources: *Health Risk Assessment No. 42-21-M1BE-93: Inhalation Risk from Incinerator Combustion Products, Operational Verification Testing - Phase 1*; *Health Risk Assessment No. 42-21-MQ49-92: Inhalation Risk from Incinerator Combustion Products, Operational Verification Testing, Johnston Atoll Chemical Agent Disposal System*; and *Health Risk Assessment No. 42-21-M1X6-93: Inhalation Risk from Incinerator combustion Products, Operational Verification Testing - Phase 3* (Aberdeen Proving Grounod, MD: U.S. Army Environmental Hygiene Agency).

[a]Conducted in the agent incinerator with M55 rockets filled with the nerve agent GB.
[b]Conducted in the agent incinerator and deactivation furnace with M55 rockets filled with the nerve agent VX.
[c]Conducted in the metal parts furnace and agent incinerator with ton containers filled with mustard agent.

and elsewhere, are quite obscure. Furthermore, many of the Army officials sent to describe the program to local groups have spoken in very technical or bureaucratic language, using terms that are familiar in Washington but ring false to local ears. Many opponents of the baseline program also speak of the Army's condescension toward their questions and views.

Conversely, some opponents have adopted a strategy to debunk experts. One Arkansas woman, for example, notes that "In the past, 'experts' have assured her that industries polluting her surroundings would have no health impact, but her own experiences and knowledge of the community clearly indicate the contrary. She believes that incineration can only magnify existing health problems in the community, so she refuses to accept the advice of 'experts.'"[126] This woman's experiences have bred a healthy mistrust of incineration. Her concerns, like those of other local citizens, deserve to be heard and, to the extent possible, addressed.

In conclusion, people with strongly held views are not amenable to information that contradicts those views. The only way to judge the credibility of each side's experts, however, is to hear what both sides have to say. Informed decision–making requires open–minded consideration of the information put forward by both sides.

126. Silton, "Out of the Frying Pan," 21–22.

Observations and Recommendations

Introduction

While the destruction of chemical weapons is at its foundation a very technical matter, it is also a highly political process. One key political issue relates to federal priorities and the rights of the local communities and states. Another relates to the nation's environmental standards and hazardous waste disposal policies.

If this chapter has a theme, it would probably be "buyer beware." Seek basic information from all available sources. Compare what they say. Ask follow–up questions. See if the dots connect, so to speak. If not, ask more questions.

The opponents of baseline have done an impressive job of asking penetrating questions. Supporters of baseline have not done nearly as well in questioning the opposition. Several reasons exist for the lack of a critical assessment of opposition claims. Criticism of the opposition gives the appearance of being against public safety and environmental conservation or against the rights of local citizens to determine what happens in their communities. In other words, it is an invitation to be labelled an incineration apologist and/or an out–of–touch Washington policy wonk.

The author's natural sympathies lie with the opponents to the baseline program. However, the technical underpinnings of some of the arguments advanced by Greenpeace and some other incineration opponents apparently do not stand up well to closer scrutiny by scientific peers. The discussion that follows is meant to provoke thought, not to condemn the environmental movement or to curtail the voice of local communities in decision–making. To the contrary, the material presented below is meant to encourage concerned citizens to review information from all sources with a critical eye. Most of the recommendations below are designed specifically to help citizens cope with the dilemma that they and their communities face.

This chapter starts with a discussion of how animosity escalated between the Army and baseline opponents, then asks probing questions about the science of incineration opponents. The following sections broach the relative threat to health and the environment posed by baseline emissions as well as the threat of litigation that hangs over the baseline program. The chapter concludes with a series of recommendations.

How It Came To This

The absence of trust is the crux of many problems relating to the U.S. chemical weapons destruction program.[1] The roots of this mistrust can be traced to three main

1. For instance, one study concluded that "the current controversy over the disposal program stems more from the social and institutional problems of implementation than from purely technical considerations." Mark Brown, *Public Trust and Technology: Chemical Weapons Destruction in the United States. Consequences of Crucial Technology Colliding With Unyielding Political Difficulties* (Committee on National Security: Washington, D.C., 3 December 1992) 2.

sources: the Army's original relationship with each community, the influence of outside activists, and the lack of satisfactory citizen input mechanisms.

Each of the eight communities had a relationship with the Army that pre-dated the onset of the chemical weapons destruction program. This relationship is the foundation for the trust or lack thereof that currently exists between the parties. General Walter L. Busbee acknowledged that "We have had experiences at some of these locations in operations that did not even have to do with chemical munitions, but in other hazardous operations in which trust was not built up."[2] Some citizens in Lexington, Kentucky, are particularly bitter. "It is likely that friction began after local residents learned, ten years after the fact, of the Army's chemical weapon stockpiling activities in the 1950s. The community felt the Army had somehow 'sneaked' in these weapons without any regard for the health and safety of citizens."[3] Umatilla citizens, having been subjected to unannounced releases of radioactive material from the Hanford nuclear facilities during the height of the arms race, likewise have a healthy skepticism of military operations.[4] Some living near Colorado's Pueblo Depot believe the Army used an irresponsible method to dispose of missile boosters under another arms control agreement and think the same thing may happen with chemical weapons disposal.[5] In Maryland, citizens were outraged when officials who ran a chemical weapons development pilot plant at Aberdeen Proving Ground let the facility fall into disrepair. In 1985, at about the time when the Army was launching its destruction program, a trio of officials was convicted of violating pollution control standards. Aberdeen's neighbors have thus been extremely wary of the chemical weapons disposal program from the beginning.[6]

Even in communities where the Army has had a better relationship with its neighbors, such as in Tooele and Pine Bluff, incineration opponents have been planting and nurturing the seeds of discontent.[7] This campaign has been aggressive, persuasive, and successful. For example, Greenpeace, which has been crusading against incineration

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2. Busbee is commander and director of the U.S. Army Chemical Materiel Destruction Agency. Interview with author, 5 May 1994.

3. The Lexington-Blue Grass Depot is about a half a mile from an elementary school and within five miles of several other schools. Brown, *Public Trust and Technology*, 2.

4. Both Karyn and Susan Jones of Hermiston, Oregon, cited this as principal reasons for their involvement in opposition to the baseline program. Discussions with the author, Chemical Weapons Working Group meeting, Washington, D.C., 19 March 1994. The Citizens for Environmental Quality, a coalition of community groups and indigenous tribes opposed to waste incineration in the Pacific Northwest, oppose the proposed baseline facility at Umatilla Depot.

5. The incident in question concerned the elimination of missile stages under the 1987 Intermediate-Range Nuclear Forces Treaty. The task was done by static firing of the rockets, which some local citizens vehemently opposed as the destruction method. Ross Vincent, chairman of the Sierra Club's National Hazardous Materials Committee, and member of the Pueblo, Colorado, Citizens Advisory Commission. Telephone interview with author, 11 August 1994.

6. Marilyn Tischbin, public affairs chief for the U.S. Army Chemical Materiel Destruction Agency, interview with author, 14 October 1993.

7. Grassroots activism is normally a desirable activity, except in cases where materials being distributed contain false claims and inaccuracies. For an assessment of some of the materials being distributed in this instance, see the next section of this chapter.

for more than a decade, has organized rallies in communities where incinerators may be built, distributing anti–incineration literature and videos. Other national opposition organizations, such as the Sierra Club and the Military Toxics Campaign, have also been vocal.[8] Incineration opponents have suggested that the Army would deliberately execute a program that would be the equivalent of eight different chemical Chernobyls, with several federal oversight agencies actively colluding in that endeavor.[9]

In addition, the Kentucky Environmental Foundation has also made a concerted effort to reach other communities, generating grass roots opposition in congressional districts where there was none.[10] The Foundation has spun off an opposition network, the Chemical Weapons Working Group, which has members in each community.[11] The result of these organized activities is that the Army now faces opposition at every site, although this opposition is small in comparison to the overall local population.

The influence of the views expressed by the above named organizations is readily evident. Each new anti–incineration report or press statement they release ripples through opposition camps in local communities. Not long afterward, the Army and members of Congress receive a series of inquiries that repeat the arguments or issues cited in the original documents. When Army officials meet with local citizens, the issues highlighted by national organizations are prominent among those raised locally.[12] On the one hand, this phenomenon may indicate the strength of the arguments raised. On

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8. The Military Toxics Project, formerly with the National Toxics Campaign Fund, promotes the safe remediation of hazardous waste, increased control of toxic releases, and pollution prevention at Department of Defense installations. The Sierra Club champions the responsible use of the earth's ecosystems and a moratorium on incinerators. Greenpeace advocates a ban on incinerators and chlorine.

9. Other motives attributed to the Army are the intent to: 1) build incinerators to destroy other military wastes as well; 2) line the pockets of the Army's baseline contractors; and, 3) avoid the embarrassment of having the baseline program cancelled. Conversely, one can question whether it is possible to prohibit the future use of these facilities, whether other contractors would be funded if alternative technologies were used, and whether there are worse things in life than embarrassment.

10. Congressional staffers, interviews with author, Washington, D.C., 21 March 1994 and 18 April 1994. Another staffer, interviewed on 21 April 1994, described the Foundation's Craig Williams as "making a cottage industry out of people's fears."

11. The lion's share of the Foundation's funds go into the Chemical Weapons Working Group project. Williams, who preceded one comment with the disclaimer that "I'm no scientist, so I don't know, but this is what I understand," is typical of the incineration opposition: low on the scientific skills needed to evaluate data dispassionately and high on energy and conviction that incineration is wrong. He described the Foundation's mission as "to ensure safe disposal of chemical weapons and to disseminate information." He admitted, "We emphasize the problems with the current program," which he says is only fair because so many federal agencies and contractors are on board the incineration bandwagon. Williams stated that decisions about the destruction program should rest with local citizens. Williams is founder and president of the Kentucky Environmental Foundation. Interview with the author, 19 May 1994. Author's note: In lieu of forcing citizens to make such technically complex decisions on a routine basis, federal pollution control regulations are set to provide a standard that protects the health of citizens and the environment. Citizen participation in shaping those regulations is desirable but may be dangerous when lack of technical knowledge leads citizens to advocate positions that the scientific community deems inadvisable.

12. This trickle–down effect was noted by the author, attending first a Chemical Weapons Working Group meeting and later a meeting of the Maryland Citizens Advisory Commission. The author also observed this effect among congressional staffers and letters received by members of Congress.

the other, it may also suggest both the susceptibility of local communities to outside influence and the inadequacy of the Army's efforts to convey comprehensible information about the baseline program.[13]

Early on, the Army made the rounds in the local communities trying to explain its programs. Despite advertisement in local media outlets, turnouts for these meetings were typically low.[14] The Army funded citizens groups to provide technical assistance in evaluating the original Environmental Impact Statement and, afterwards, set up Intergovernmental Coordination and Consultation Boards in each state to help disseminate information about the program. The Arkansas board met once and declared the need for no further meetings. The Oregon board meets once annually, while the mechanism has waned in Utah, Indiana, and Maryland.[15] Given a general lack of public interest, the Army started to feel secure in its decision, equating low meeting turnouts with approval. Ironically, the Army thus unwittingly gave the local baseline opponents an assist. As one Washington, D.C., research institution observed, "By failing to *creatively* engage local community leaders and their constituents in the decision-making process, the Army has unintentionally increased the power of a small, but determined opposition."[16] At about this time, the environmental movement began targeting the baseline program.

In most communities, opposition activities have significantly raised both the profile of the destruction effort and concerns about it. Consequently, more citizens are looking for avenues to state their views about the program. Local citizens noticed that it was Congress, not the Army, that instituted a new formal citizen input mechanism in 1992 by establishing the Citizens Advisory Commissions (CACs).[17] At least twice a year, an Army representative is "to meet with each commission...to receive citizen and State concerns."[18] The CACs evaluated the February 1994 National Research Council (NRC) report and the Army's response to it. CAC members receive no pay or compensation for service rendered. All states now have CACs, with Arkansas being the last to form one.

The Kentucky Environmental Foundation's Craig Williams described the CACs as "too little, too late," arguing that the Pentagon is keeping the CACs at arm's length instead of working with them as partners in decision-making. "Here is the Pentagon,

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13. Although there has been some improvement of late, most of the Army's documents about baseline have been highly technical, turgid volumes that are extremely difficult for the lay reader to decipher.

14. Approximately 100 attended the first meeting in Aberdeen, whereas only about twenty-five turned out at the other sites, except in Lexington, where attendance at meetings has always been high. Tischbin described the Army's early outreach activities. Interview with the author, 14 October 1993.

15. Each site spent $100,000 on technical expertise, which according to Tischbin was not always of a suitable caliber. In one instance, a graduate student evaluated the risk assessment. As for the Consultation Boards, only those in Kentucky and Alabama have remained fairly active. Interview with author, 14 October 1993.

16. Lawyers Alliance for World Security, *Citizen Attitudes*, ii.

17. The Secretary of the Army was to start a CAC in Kentucky, Maryland, and Indiana, the so-called "low-volume" states. Governors in other states could also request the formation of CACs. Seven of the nine members of a CAC are to be local citizens, with the remaining two being state representatives who have jobs related to the destruction program. All members are appointed by the governor.

18. See Public Law 102-484, section 172, 23 October 1992.

they are going to tell us what role we have to play," Williams said. Describing an instance where an Army official refused to send him the information he had requested, he continued "They do not really know if we are supposed to be involved in *that* part of it, we are just supposed to be out here having public meetings and fra–la–la–la–la'ing. Why have they not asked us what role we think we should play?"[19] According to Williams, the advent of the CACs did not change the Army's attitudes; citizen participation is a canard.

Outside reviewers have also taken note of the shortcoming of the current CAC approach. One review said that the CACs "are an ill formed and late attempt to formalize citizen input into the decision making process. The weakness of the CACs is due to the people various Governors have felt obliged to appoint and the limited and vague mandate with which they were tasked."[20] Opponents believe that the governors have purposefully appointed individuals who would support the Army's program.[21]

Given this setting, when the Army comes to town to talk about the status of the program, the opposition turns out in impressive numbers. "Large public meetings [about the destruction program] often degenerate into opportunities for local citizens to berate the U.S. Army in an unconstructive fashion."[22] At times, statements made by individuals representing both camps take on decidedly nasty and personal overtones. "The people I have dealt with in the program have had selective memory, manipulated the facts, or outright lied to me and to the press," said Anniston baseline opponent James Harmon.[23] His sentiments reflect those of many others who distrust public officials and institutions. Similarly, baseline opponents tell of having overheard Army representatives making derogatory remarks about individuals opposing the program.[24] In this atmosphere, constructive discussion of the issues is extremely difficult.

A Word About Advocacy Science

Smokestacks have an odious reputation. One hallmark of the industrial age, they mar the skyline, venting emissions. According to experts, however, this stereotype is outmoded. Incineration opponents emphasize the impression that incinerators are the "landfills of the sky," claiming that no one really knows what is coming out of the stacks.[25] Government experts counter by stating that they know approximately 99 percent of what is emerging from a hazardous waste incinerator smokestack: most of these emissions are fairly innocuous compounds, such as nitrogen, oxygen, carbon

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19. Interview with author, 19 May 1994.

20. Lawyers Alliance for World Security, *Citizen Attitudes*, i.

21. This view was expressed by several participants in the Chemical Weapons Working Group meeting on 19 March 1994.

22. Lawyers Alliance for World Security, *Citizen Attitudes*, i.

23. Harmon is a member of the Anniston CAC and The Families Concerned About Nerve Gas Incineration. Telephone interview with author, 9 August 1994.

24. Personal interviews with the author, who in interactions with various Army officials, observed that at times they did not so much respect baseline opponents as wearily tolerate them.

25. For other critiques by incineration opponents,see chapter 2 and appendix A.

dioxide, and water vapor. They have also been able to pin down and regulate 40 percent of that remaining one percent of emissions, which are the so–called products of incomplete combustion, or PICs. Thus, the mystery all boils down to six–tenths of 1 percent of what is coming out of the stack—a far cry from what is portrayed by incineration opponents.[26]

Advocacy science is aimed primarily at the citizens in the eight stockpile communities. The studies used by incineration opponents are apparently not held in high regard by many others in the scientific community. Of particular concern is Greenpeace's *Playing With Fire*, written by Pat Costner and Joe Thornton. Several studies have critiqued *Playing With Fire*, finding the report replete with errors and misleading about incinerators.[27] Table 5 provides a list of reviewers' observations about this report. *Playing With Fire* appears to have been compiled and presented for the purpose of supporting previously established positions.[28]

These misleading practices can be illustrated by presenting one of the report's assertions about the health and environmental impacts of incineration and the peer review of it. *Playing With Fire* cites a Scottish study showing a higher or "dramatic increase" in the number of twins born to humans and dairy cattle living near a chemical waste incinerator. Costner and Thornton claim this study found a causal link between the incincerator's emissions and the increased incidence of human and bovine twins. According to an independent analysis of this case and *Playing With Fire*'s interpretation of it, Costner and Thornton

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26. Y.J. Kim, national incineration expert, and Cathy Massimino, senior Resource Conservation and Recovery Act/Superfund technical specialist, both of the EPA. Telephone interview with author, 23 August 1994. Note that another study concluded that for most incinerators, the most common PIC is methane gas, which can constitute from 22 to 64 percent of the one percent of emissions believed to be PICs. Paul Chrostowski and Sarah Foster, *Scientific Peer Review of Greenpeace's Position on Hazardous Waste Incinerator Impacts in Its 'Report on the Hazardous Waste Incineration Crisis' and 'Playing With Fire'* (Fairfax, VA: Clement International Corporation, 29 January 1992) E–5. Also, according to Dr. Carl Peterson of the NRC's Stockpile Committee and the Massachusetts Institute of Technology, "Incinerators can be hazardous and should be examined carefully—we do not argue that some incinerators are really bad. But, the fact that there are dirty incinerators in the world does not prove that there cannot be clean ones." With regard to the baseline system, he added that "the incinerators with the pollution abatement system that are involved here are believed by the committee to pose no health hazard." (Statement made at a meeting sponsored by the Henry L. Stimson Center, Washington, D.C., 21 June 1994). Note that the author does not intend to endorse incineration with this discussion, but to point out that not all incinerators are alike and that much of what comes out of the stack can indeed be identified.

27. For those who doubt that manipulation of data takes place, see Darrell Huff, *How to Lie With Statistics*, 1st ed. (New York: Norton, 1954).

28. Similarly with regard to the baseline program, Greenpeace's Sebia Hawkins flatly stated that the organization will oppose the addition of carbon filters to baseline facilities, but had yet to conduct a study to evaluate how these filters would work. Sebia Hawkins, Pacific campaign coordinator, interview with author, 2 March 1994.

Table 5: Scientific Peer Reviews of Greenpeace's *Playing With Fire.*	
Reviewers' Observations	**References**
• *Playing With Fire* does not appear to have been subjected to the standard peer review process that the scientific community uses to make sure that scientific information is reported in a truthful and accurate manner.	2, 3
• The report omitted a large amount of scientific data that contradicts the data it presents or the conclusions reached.	1, 2, 3, 4, 5
• The authors use data selectively and misinterpret it. The report contains technical errors (e.g., inaccurate rounding of numbers; use of data from pilot plants, which are not typically as efficient as full-scale incinerators, despite the existence of the latter category of data; citation of data points that are the worst out of hundreds of data points.	2, 3, 4
• The authors use outdated information.	2, 3, 5
• The authors use quotes out of context and incompletely, often giving an impression that is exactly opposite of what the original author intended.	1, 2, 3, 4
• The report frequently relies on single newspaper articles, activist newsletters, interviews with admittedly biased respondents, or anecdotal evidence, rather than scientific documentation to support points made.	1, 2, 3, 5
• A relatively small group of people appear to be consistently generating most of the allegations.	1(verbatim)
• The format of the allegations tends to be similar; often just the name of the facility changes.	1(verbatim)
• The same individuals tend to repeat the same allegations about the same facilities, even after the allegations have long been proven incorrect.	1(verbatim)

Sources: 1) Richard C. Pleus and Kathryn E. Kelly, *Health Effects of Hazardous Waste Incineration...More of the Rest of the Story* (Seattle, WA: Environmental Toxicology International, June 1994).

2) Paul Chrostowski and Sarah Foster, *Scientific Peer Review of Greenpeace's Position on Hazardous Waste Incinerator Impacts in Its 'Report on the Hazardous Waste Incineration Crisis' and 'Playing With Fire'*(Fairfax, VA: Clement International Corporation, 29 January 1992).

3) The EPA's Y.J. Kim, national incineration expert, and Cathy Massimino, senior Resource Conservation and Recovery Act/Superfund technical specialist, telephone interview with author, 23 August 1994.

4) James J. Cudahy, *The Rest of the Story: Literature Research and Technical Review of the Greenpeace Report Playing With Fire* (November 1992).

5) Joseph J. Santoleri, et al., "Facts or Myths: The Burning Issue of Incineration" (Paper presented at Air and Waste Management Association Meeting, Denver, CO) 13-18 June 1993.

Note: Sources number 4 and 5 in this table may reflect a pro–incineration bias because these authors are associated with the hazardous waste management industry.

> quote misleadingly from the initial report of twinning, and make no mention of the several other studies that essentially discredit the hypothesis linking the Rechem incinerator to twinning. No actual or estimated concentration data are provided to show a correlation between exposure to facility emissions and twinning in the populations, and the authors of the twinning report say it would be 'premature to attribute causality to this association between air pollution from incinerators and twinning.' At least three major government reports, as well as articles in the medical

> literature, have provided data which dispute the conclusions of the claims made by Costner and Thornton.[29]

Furthermore, a second study showed that "Greenpeace overestimated PIC emissions by factors ranging from two to approximately 45" and metal emissions by at least ten times.[30]

Costner, it should be noted, wrote a series of decidedly unflattering analyses of the trial burns on Johnston Atoll that have been at the center of the concerns raised by the baseline opponents.[31] At the very least, the above review of *Playing With Fire* raises concerns abut the objectivity of Costner's analysis of Johnston Atoll operations.[32] Furthermore, reports are beginning to emerge that seriously contradict Costner's interpretation of the trial burn data from Johnston Atoll.

A forthcoming study by an analyst from the Centers For Disease Control and Prevention juxtaposes data from the Johnston Atoll trial burns against criteria for safe emissions levels that are more rigorous than the Environmental Protection Agency's (EPA's) guidelines. In this comparison, the Johnston Atoll data were pitted against two emission monitoring standards. One is known as the "media evaluation guides," which are described as "somewhat more restrictive" than the EPA's guidelines. The other is the

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29. Richard C. Pleus and Kathryn E. Kelly, *Health Effects of Hazardous Waste Incineration...More of the Rest of the Story* (Seattle, WA: Environmental Toxicology International, Inc, June 1994) 5–6.

30. Chrostowski, *Scientific Peer Review*, E5–6. Another example, drawn from *Playing With Fire*'s description of how incinerators operate, is that the report "establishes a level [for metal emissions from incinerators] at least 650 times greater than found in report trial burns covering metal emissions testing." Joseph J. Santoleri, et al., "Facts or Myths: The Burning Issue of Incineration," (Paper presented at American Waste Management Association meeting in Denver, CO, 13–18 June 1993) 2. (Given the author's association with the hazardous waste management industry, this paper may reflect a pro–incineration bias.)

31. These documents are cited in chapter 2 and appendix A and listed in the bibliography.

32. Even with admittedly limited scientific capabilities, the author was able to spot errors in Costner's Johnston Atoll reviews. For example, Costner concludes that 9.5 pounds of waste were produced for each pound of agent burned during the incineration of VX from M55 rockets, but to arrive at this high amount she incorporates data that should not be factored into the calculations in the first place. Her calculation includes 497,250 pounds of wastes from the deactivation furnace, which treats explosives and propellants. Some of those materials were indeed probably contaminated with agent, so it is fair to attribute a small portion of the wastes from this incinerator to the waste per pound of agent burned. A reasonable calculation would include closer to 5 percent of the deactivation furnace wastes (24,862 pounds). Therefore, the correct figure is just over six pounds of waste per pound of agent (6.0391 pounds, to be exact) burned during this period of operations. For Costner's version, *GB and VX Campaigns*, 8. The tables with the original processing and waste data can be found in Scott Macrae et al., *Evaluation of the VX Rocket Test: Johnston Atoll Chemical Agent Disposal System Operation Verification Testing*, MTR–92W0000064 (McLean, VA: Mitre, November 1992) 2–23 and 2–29. Sonya Sasseville, chief of the EPA's Alternative Technology Section in the Office of Solid Waste, concurred with this characterization of Costner's work and opposition science in general. "They pick a lot of statements in isolation, but do not indicate what the overall report said. By doing so, they hit on important issue areas, but they do not give the full range of views." Interview with author, 10 August 1994. An NRC representative described the reports used by baseline opponents as using "a lot of very inaccurate information mixed with spin" that paints a very bad picture of the Army and the NRC. Interview with the author, Washington, D.C., 15 August 1994.

"ambient air level guides" developed by Dr. Edward Calabrese and his colleagues, which "can be as low as one–tenth of the EPA screening values."[33] This study concluded that the Johnston Atoll emissions

> still met all criteria for acceptability. Even at the location of maximum potential human exposure, the levels of organic species examined usually were several orders of magnitude below the most restrictive screening values. Emissions of metals were generally well below levels of health concern. The closest any metal came was about one tenth the Calabrese [measure] which translates into a cancer exposure risk of 1 excess death per 10 million exposed individuals...Health professionals generally consider any risk less than one excess death per 100 thousand to 1 million exposed individuals to be acceptable.[34]

Army rebuttals aside, such conclusions cast doubts about the reports baseline opponents are using as the basis of their criticism of baseline incinerators.[35]

In addition to questionable scientific practices, some incineration opponents are making exaggerated claims about the promise and availability of alternative technologies. According to Greenpeace's Sebia Hawkins, "all of the technologies Greenpeace reviewed would definitely be better than incineration."[36] A bit more cautious, Ross Vincent of the Sierra Club said that, "Whether alternative technologies are safer will depend on the technology, the facility design, and the operators. There are some alternative technologies that by their very nature under normal operating circumstances and even under upset conditions are almost certain to be safer because they do not involve the routine release of waste materials."[37]

Since data about how alternative technologies will work with chemical agents, much less with large quantities of agent, are not yet available, incineration opponents are articulating best–case scenarios as if stellar results were already in hand.[38] The

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33. The media evaluation guides are used by the Agency for Toxic Substances and Disease Registry. Harvey W. Rogers, *Incinerator Air Emissions: The Bigger Picture*, draft paper, submitted for publication (May 1994) 6–7.

34. Ibid., 7.

35. The Army, of course, disputes Costner's interpretation of the data about Johnston Atoll operations.

36. Lawyers Alliance for World Security, *Citizen Attitudes*, 26. Craig Williams made similar claims, stating that it does not matter if there are operational problems with "neutralization or any closed loop configuration process, where if you have upset conditions, you do not have releases into the community. You have it fail–safed so that you have control over your upsets." Interview with author, 19 May 1994.

37. Vincent conceded the possibility that some alternative technologies will also produce pollutants, but he said that these systems will either not release the pollutants or will release them in substantially smaller quantities. Telephone interview with author, 11 August 1994.

38. The exception to this data paucity is that extensive data are available on how neutralization works with chemical agents. Initial results indicate significant problems with neutralization, including flammability of chemicals used in the process and the reconstitution of the chemical agent. Additional work with neutralization is being pursued, but it is premature to draw conclusions about it. See appendix one.

opposition portrays "closing the loop" as an absolute guarantee of increased safety, but other experts say this is by no means likely. According to Cathy Massimino, senior Resource Conservation and Recovery Act/Superfund technical specialist with the EPA, "No matter what we do with the agent, there is going to be some risk involved, even with non-thermal treatments. For instance, waste materials from alternative technologies will have to be landfilled and that will involve risk. There is no zero risk alternative."[39]

Greenpeace's Hawkins and the Sierra Club's Vincent have confidently predicted that alternative technologies can be brought into service within a few years.[40] Such claims significantly contradict the conclusions drawn by the General Accounting Office (GAO) and the NRC, which state more than a decade will be required to develop alternative technologies.[41] As another study concluded: "Technical and political problems, and subsequent delays, may occur with any development program. Failure during required full-scale tests is always possible. Even after the best efforts to develop new technologies, it is still possible that the results may be no better, and may even be worse, than those of the current system."[42] Moreover, to the extent that development of alternative technologies necessitates continued storage of the stockpile, this alternative technology route may actually increase the risk to the communities.[43]

In sum, key assertions by incineration opponents distort data and make exaggerated claims—precisely the charges levelled by critics of the Army's program.[44] Moreover, the EPA and other regulatory authorities recognize that PICs pose a health and environmental hazard and that incinerators are a source of those pollutants. Therefore, they set regulatory standards for incinerators with the purpose of protecting both public health

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39. Kim concurred with this statement. Telephone interview with author, 23 August 1994. The NRC observes that the risks from storage, transportation, and munitions handling are greater than those posed by baseline incineration. These risks would still be present were an alternative technology to be used. Furthermore, other risks associated with using alternative technologies cannot be fully assessed because the feasibility of using these technologies has yet to be proven. See NRC, *Recommendations for the Disposal*, 78–80.

40. Hawkins claimed that biological remediation would require three or four years of applied research before it could be implemented. Interview with the author, 2 March 1994. Vincent stated that neutralization "could be operable within two or three years." Telephone interview with author, 11 August 1994.

41. The GAO estimates that alternative technologies could not be available for full-scale operations until 2007, while the NRC puts the time frame for developing and demonstrating alternative technologies at nine to twelve years. For more information, see NRC, *Alternative Technologies*, 89–93; and GAO, *Advantages and Disadvantages of Alternatives to Incineration*, 5–8.

42. Brown, *Public Trust and Technology*, 7.

43. Dr. Carl Peterson observed that, "Those who would extend storage to foster development of marginally better disposal technologies should do so in the knowledge that they will increase the total cumulative risk to the public and the environment." "Disposing of Chemical Warfare Agents And Munitions Stockpiles," *Arms Control Today* (June 1994) 13. The Army presently assures the safety of the stockpile only until 2004. U.S. Army Chemical Materiel Destruction Agency, *1993 Annual Status Report*, 30.

44. When asked to assess the data that supports that conclusion that incineration is an effective method of hazardous waste disposal, the Sierra Club responded: "We can't respond to unsubstantiated claims, based on data we haven't seen, leading to conclusions that are inconsistent with our experience. We suspect that we would find this 'large body of data' unimpressive and the claims of effectiveness to be based on an inadequate definition of 'effective." Vincent, "Combustion Strategy," 2.

and the environment. These standards are based upon extensive, peer–reviewed research that draws upon all of the data and studies that Greenpeace and other incineration opponents fail to cite, as well as upon data provided by opposition scientists. To date, federal regulators have clearly stated that the Army's program has met or exceeded these standards.[45]

Putting Baseline Emissions in Context

That baseline incinerators will release a certain amount of PICs or pollutants into the air is not a matter of dispute. However, trial burn data from Johnston Atoll indicate that the PICs released from a baseline incinerator will be far below the levels that the EPA and other federal organizations have identified as potentially causing harm to the population or the environment.[46]

Therefore, an essential question for citizens is whether baseline operations will noticeably increase the amounts of PICs already present on a daily basis at the eight stockpile storage communities. According to EPA experts, hazardous waste incinerators contribute a relatively small fraction of PICs compared to such sources as fossil fuel power plants, cement kilns, refineries, medical incinerators, automobiles, and diesel trucks.[47] One EPA specialist noted that at times the EPA has had difficulty sampling for PICs in other incineration trial burns because the gas coming out of the stack was cleaner than the surrounding atmosphere in the host communities.[48]

Trial burn results at Johnston Atoll indicate the same difficulty may be encountered with baseline incinerators at continental U.S. sites.[49] One study compared the maximum ground level concentrations of the Johnston Atoll stack emissions for fourteen inorganic and organic pollutants from the agent, metal parts, and deactivation furnaces with the ambient air concentrations of the same pollutants. The items surveyed were benzene, chloroform, styrene, xylenes, toluene, chlorobenzene, ethylbenzene, arsenic, chromium, lead, zinc, copper, manganese, and cadmium.[50] This comparison found that "for all but one substance (manganese)," the concentrations from the Johnston Atoll stacks "were generally well below" average urban air concentrations.[51]

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45. Two of the EPA regulators who have been very closely involved with monitoring the Johnston Atoll operations, Kim and Massimino, confirmed this in a telephone interview on 23 August 1994.

46. Furthermore, the Army's agent detection monitors on Johnston Atoll, which are set to extremely low levels, have not detected the release of any chemical agent while the incinerators were operating. See the discussion in chapter 2 on pp. 37–38.

47. The EPA's Kim and Massimino, telephone interview with author, 23 August 1994.

48. Sasseville of the EPA, interview with author, 10 August 1994. Another study also found that, "The ambient air impacts of modern hazardous waste incinerators are much lower than currently prevailing ambient air [dioxin/furan] levels in rural or industrialized areas." Chrostowski, *Scientific Peer Review*, E–6.

49. General Busbee stated that an Army background analysis for PICs at the Anniston site "shows that a baseline facility is almost not even a blip on the curve with respect to the ambient background concentration" of these kind of pollutants. Interview with author, 5 May 1994.

50. Rogers, *The Bigger Picture*, 11. The maximum ground level concentration is a technical term that essentially means the point on the ground at which the most intense exposure from stack emissions would take place. That point will vary, depending upon wind conditions.

51. This comparison involved data from three trial burns of the agent incinerator and one each of the

In addition, baseline emission levels have been compared with routine sources of dioxins. Chlorinated dioxins and furans are found in cigarette smoke and in automobile and diesel exhaust.[52] A study compared the toxicity equivalents, or the TEQs, for dioxins and furans "in terms of the 2,3,7,8 tetrachlorinated dibenso p' dioxin, the species believed to be the most toxic" carcinogen. This research showed that "a diesel truck travelling at an average speed of 40 miles per hour with an equal amount of uphill and downhill driving would emit...about 4 times as much dioxin TEQ" as the deactivation furnace.[53] The comparison to cigarettes showed that if an adult stayed at the maximum ground concentration level from the emission plume of the deactivation furnace and breathed in twenty–three cubic meters of that air each day *for an entire year*, it would be an equivalent dioxin toxicity exposure in the worse case of smoking one cigarette every three weeks. In the best case, it would be equal to smoking 1.7 cigarettes in a year.[54] In other words, while engaging in daily activities such as walking through their neighborhoods or sitting in local restaurants, citizens living near these eight stockpile sites may already be routinely exposed to levels of pollutants that exceed by a significant margin the expected emissions from a baseline incinerator. The crux of the matter is thus the comparative risk between a baseline facility's very low–level pollution and the risks associated with continuing to store the stockpile.[55]

Incineration opponents, it is worth noting, may not view this situation the same way that local citizens do. For the Sierra Club's Vincent, who readily acknowledged that coal power plants, automobiles, and trucks are bigger polluters, the amount of pollution contributed by baseline's incinerators or incinerators in general is immaterial. The point is that the disposal of these materials could be accomplished through other means and that the public need not be exposed to the risks of incineration. "That the EPA and the Congress have not had the courage to bite the bullet and do something about these other sources of PICs is no excuse," he said. Small source of pollution or large, the opposition

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deactivation furnace and metal parts incinerators. In seventeen instances, the trial burn screening did not detect or report the pollutants being screened. Ibid., 12.

52. For a study that points to heavy duty diesel trucks as a principal source of dioxin emissions, see Kay H. Jones, "Diesel Truck Emissions, an Unrecognized Source of PCDD/PCDF Exposure in the United States," *Risk Analysis*, vol. 13, no. 3 (1993) 245–252.

53. Rogers, *The Bigger Picture*, 13.

54. The range given for the cigarette toxicity equivalent is due not to any change in emissions from the incinerator, but to the difference between the low and high ends of the "mass TEQ range" for cigarette smoking. Ibid., 14.

55. Some critics deride the Army's original risk assessment because it was based upon such low probability events as airplane crashes, earthquakes, and tornadoes. However, since that assessment was completed in 1988, three airplanes have come down in the vicinity of stockpile storage sites. One aircraft crashed at the Anniston Depot's firing range; a second crashed on the opposite side of the base at Aberdeen Proving Ground from where the one–ton containers of mustard are stored. In a third incident, an aircraft made a forced landing at Pueblo Depot. Six of the eight sites are located within ten miles of airports and/or air traffic corridors. Three storage sites—Tooele, Umatilla, and Pine Bluff Arsenal—are located on or near earthquake fault lines. Tischbin, telephone interview with author, 23 August 1994. See also Program Manager for Chemical Demilitarization, *Final Programmatic Environmental Impact Statement*, appendix H. While the author did not ask the Army to tally near misses from tornadoes, one killer tornado set down in the same county as the Anniston Depot on Palm Sunday 1994.

is obligated "to go after them one by one by one because there is simply no excuse for allowing it to continue."[56] Furthermore, should the baseline program go forward, it could be taken as an indicator that incineration is indeed a safe method for disposing of the nation's other toxic wastes. On the other hand, if incineration opponents are successful in inspiring sufficient opposition to the baseline program, they may be able to bring enough political pressure to bear upon Congress to compel the Pentagon, the nation's biggest spender, to invest substantially in alternative technologies. Given the onset of the Army's $43 million research program in alternative technologies, one could say that incineration opponents are already making progress. Overturning the baseline program could also be the basis for a national referendum on incineration and the way America disposes of hazardous wastes.

Legal Storm Clouds on the Horizon

Some of baseline's opponents have expressed a willingness to enlist the judicial system in the battle against baseline. GAO reviewers preparing a May 1990 report were told that opponents in Kentucky were "prepared to do whatever it takes (including taking legal action) to halt on-site incineration plans."[57] Three years later, the GAO found that "safety concerns and opposition to chemical weapons incineration have led Kentucky, Indiana, Maryland, and Colorado to either enact or consider enactment of legislation that could delay or even prevent construction of chemical weapons incinerators."[58] The Office of Technology Assessment (OTA) observed "that political or legal delays could prevent implementation of current technology at some or several of the weapons storage sites for a number of years."[59] Furthermore, in a recent circular, the Sierra Club listed "controversy, litigation, delay" as "likely" for incineration.[60] The Kentucky Environmental Foundation's Williams depicted lawsuits as a virtual certainty, whether in Kentucky or elsewhere.[61] Similarly, the Sierra Club's Vincent stated that lawsuits to block the baseline program would probably be filed in Colorado, Alabama, Maryland, and Kentucky.[62]

In that event, the law may offer magistrates some leeway in hearing such cases.[63] The guiding principle of U.S. environmental law involves a partnership between the

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56. Telephone interview with author, 11 August 1994.

57. GAO, *Obstacles to the Army's Plan*, 25.

58. The GAO noted that the NRC's review of alternative technologies was intended to address the concerns of these communities. GAO, *Issues Affecting Program Cost, Schedule, and Performance*, 4. Author's note: The NRC's reports do not appear to have had their intended effect.

59. OTA, *Alternative Technologies*, 5. OTA analyst Mark Brown reached a similar conclusion in another study. Brown, *Public Trust and Technology*, 4.

60. These possibilities are listed as "unlikely" for neutralization. Sierra Club, "Analysis of Dr. Carl Peterson's Recommendations," 4.

61. Interview with author, 19 May 1994.

62. According to Vincent, local citizens at these sites have begun talking to lawyers about their legal options. Telephone interview with author, 11 August 1994.

63. The discussion in the following paragraphs draws heavily upon an interview with DePaul University Law Professor Barry Kellman, conducted in Lima, Peru, on 2 September 1994 and the analysis of

federal and state governments. States must adhere to federal pollution control standards, but may set more rigorous ones. If a state plan for involving stricter controls is approved by federal authorities, it then becomes binding upon the federal government and the military services. Kentucky, Colorado, Indiana, and Maryland have set environmental standards for the baseline program that are in some instances tougher than the federal plan. These state plans have not yet been approved by federal authorities, and the federal government can preempt them because federal objectives take precedence. According to Professor Barry Kellman, who teaches environmental law at DePaul University, "After all of the rhetoric about states' rights, this is a national government and it is entitled to govern."[64]

Since the Johnston Atoll trial burn results are a good indication that when the baseline program goes stateside it will be able to meet the more rigorous state environmental standards, a legal challenge to the baseline program may very well be predicated on some other basis. In Kentucky, a lawsuit could be built around the fact that the Army has not proven, as the 1992 Kentucky law requires, that *no* other alternative technology or disposal option, such as transportation elsewhere, "is likely to exist or could be developed...that creates less risk of release or harm to the public or the environment" than baseline incineration.[65] Authorities overseeing the baseline program may have a more difficult time running that type of legal gauntlet or other legal challenges posed by outside interest groups. Kellman anticipates that federal interests would nonetheless prevail in such situations, but that the legal process is likely to cause delay.[66]

Ironically, both sides may be able to take some refuge in the Chemical Weapons Convention, which, assuming U.S. ratification and implementation, is likely to be the law of the land at that point.[67] The Convention would be the superior legal document, and "When the United States is dealing with international relations and confronting foreign sovereigns, 'state lines disappear,' so the country can 'speak with one voice' in its international dealings."[68] Baseline opponents may also be able to find some legal shelter in the treaty's "numerous...passages [that] direct the parties to secure whatever permits are necessary, and to comply with all applicable local environmental protection standards."[69]

Georgetown University Law Professor David A. Koplow, who wrote *Some Disassembly Required*.

64. In this case, Kellman continued, the state law is not null and void, but the federal interest prevails. The preemption doctrine is intended to prevent the federal government from being hamstrung by the states. He noted that, if possible, the Army should comply with the state standards. Interview with author, 2 September 1994. Koplow states the government can "waive strict conformity with otherwise applicable environmental protections, where higher national goals are inextricably involved. But those escape clauses are neither easily exercised nor politically popular." Koplow, *Some Disassembly Required*, 10.

65. A synopsis of the Kentucky law can be found in OTA, *Alternative Technologies*, 4–5.

66. Interview with author, 2 September 1994.

67. Koplow points out that while treaties and statutes are "documents of equal dignity," the more recent legal document, in this case the treaty, would take precedence over an environmental statute. Koplow, *Some Disassembly Required*, 9.

68. Ibid., 10.

69. Article VII.3 directs treaty parties to "assign the highest priority to ensuring the safety of the people

Since the Tooele baseline facility, which is shown in Figure 11, is slated to begin operations in 1995, the first chapter of this legal drama may soon begin to unfold. Legal experts observe that such challenges would be deflated were Congress to enact a law over–riding state statutes.[70]

Recommendations

While the eventual winner in this contest for the hearts and minds of local citizens and national legislators is far from clear, it is evident that the road ahead will be a bumpy one. Crucial decisions will have to be made in each of the affected communities, as well as on a national level. That road will be smoothed somewhat if the issues can be discussed thoroughly, openly, and without the rancor that has come to characterize much of the debate. To that end, the following recommendations are offered.

One of the keys to the success of Canada's chemical weapons destruction program, Operation Swiftsure, was the early and earnest involvement of citizens in the decision–making process.[71] The mistakes made in the past vis–a–vis community relations cannot be undone, but perhaps some lessons could be learned from how the managers of Operation Swiftsure handled a situation with local citizens that closely resembles what the Army is encountering.

The Army and Public Outreach

Over the past several years, incineration opponents have charged the Army and the NRC with every conceivable form of malpractice, from negligence to incompetence to sinister intent. For the most part, the NRC and the Army, confident of their data and the steady improvement of the program, have tried to stay above the fray.[72] An NRC staffer said that the National Academy of Sciences was not inclined to rebut charges on a

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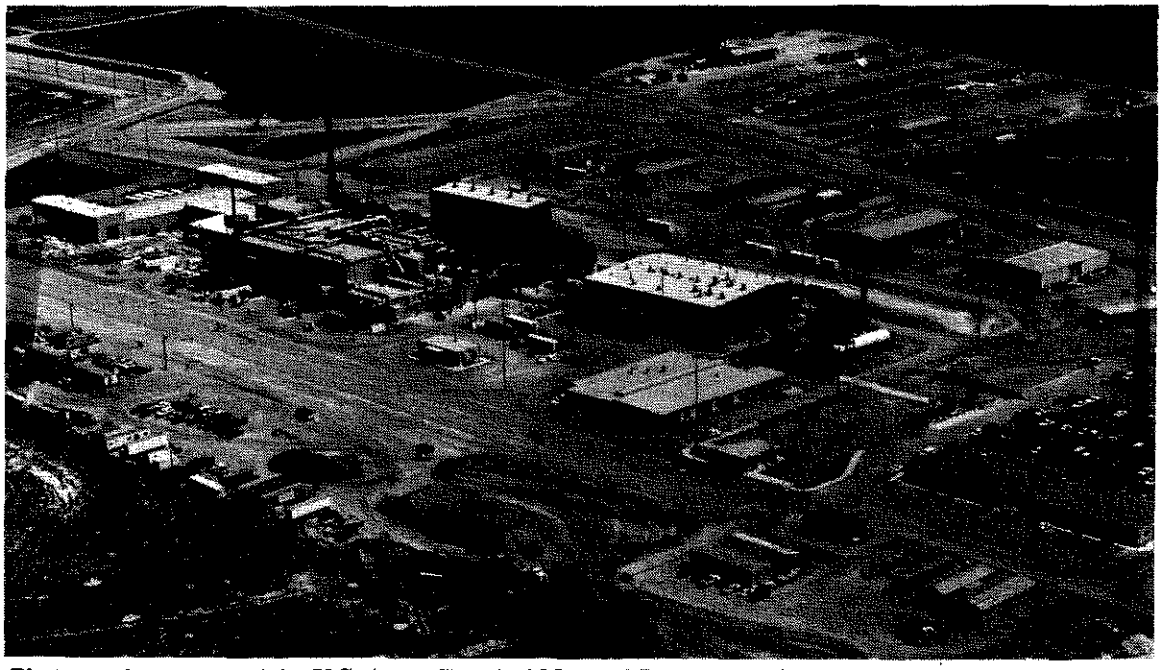
and to protecting the environment." Koplow also lists several other portions of the treaty that refer to obligations to abide by safety and environmental standards during treaty implementation activities. Ibid., 9.

70. Koplow notes that, "Congress would have plenary power to pass superseding legislation, pre–empting the field and overwhelming the inferior laws." (Ibid., 10.) Kellman agreed that initiation of a federal over–ride would likely be a congressional task. Such a law might say that nothing in the baseline program would be subject to state law. This course of action would be more efficient legally but it would more difficult to execute politically. Interview with author, 2 September 1994.

71. Canada's chemical weapons stockpile was destroyed at its storage facility in Suffield, Alberta. Compared to the 30,000–ton U.S. stockpile, destruction of Canada's twelve tons of mustard, 2.5 tons of lewisite, and 0.3 tons of nerve agents using neutralization and incineration was not a monumental effort. Operation Swiftsure took place from 1989 to 1991. Many of the following suggestions about improving citizen interaction are patterned after the approach taken by Operation Swiftsure, but altered and enhanced as appropriate for application in the United States. For the tale of Canada's experience, see Canadian Department of National Defence, *Citizens' Environmental Protection Committee Report.*

72. One recent report noted that the Army's approach "has been typically cautious and reactive, rather than creative and anticipatory." Lawyers Alliance for World Security, *Citizen Attitudes*, ii.

Figure 11: The Tooele Chemical Disposal Facility.



Photograph courtesy of the U.S. Army Chemical Materiel Destruction Agency.

point–by–point basis.[73] A fairly rare Army rebuttal document stated that "A 'point–by–point' rebuttal of the Greenpeace report would be lengthy and would lend undeserved credibility to their 'assessment.'"[74] To the extent that these charges are not quickly refuted, however, they gain credibility with the general public.

The Army might well reconsider this passive strategy. At first glance, few citizens know the difference between advocacy science and peer–reviewed, strictly disciplined science. The Army has an obligation to point out when information being circulated about its program is misleading or false. The Army cannot feign impartiality regarding baseline, but it can produce the documents and make the presentations that articulate the sound reasons why local citizens should support the baseline program. At the same time, the Army must continue to inform citizens about its research program to develop alternative technologies for possible application to stockpile destruction.

The Army may receive added criticism for taking a more aggressive approach in explaining its program or in issuing data and analyses that demonstrate how data have been misportrayed by incineration opponents. The Army's recent efforts to communicate

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73. Telephone interview with author, 15 August 1994.

74. "Memorandum on the Response to the Greenpeace Paper for Headquarters," Department of the Army, dated 28 May 1993, signed by Walter L. Busbee, Commander/Director of the U.S. Army Chemical Materiel Destruction Agency, 2. The paper in question was Pat Costner, *Chemical Weapons Demilitarization and Disposal: The Army's Experience at Johnston Atoll Chemical Disposal System* (Washington, D.C.: Greenpeace, 11 April 1990).

more effectively have already come under fire. Some baseline opponents say that these efforts are nothing more than a glossy public relations campaign meant to cover up the truth.[75] Yet, the opposition also complains that the Army does not release enough documentation and what information it does publish is full of errors and half-truths. Local citizens and legislators would do well to recognize such pincer tactics.

Rejuvenating the Citizens Advisory Commissions

The CACs, meant to facilitate citizen input to the destruction program, are apparently floundering. Were they to function better, the CACs could become a basis for a partnership between the Army and local communities in planning and implementing the destruction program at each site. CAC reform is definitely in order, and the experience of the citizens group that worked with Canada's Operation Swiftsure is a good model for how such mechanisms should work.[76]

The size of the CACs might be increased to ten or twelve members, allowing for more diversity and expertise to be represented on them. Half of the members could be appointed by the governor, as presently stipulated. The other half could be appointed by local community entities, such as the town council or the mayor's office, to ensure broad-based representation from the community. The governor's appointees should be individuals with the appropriate technical backgrounds, while the other CAC members might be citizens interested in taking an active oversight role and functioning as a liaison between the Army and the community at large.

Next, the earlier practice of funding a technical consultant to assist CACs in evaluating program documents and developments might be revived. Ground rules in terms of technical qualifications and job experience, preferably for a range of clients and not just special interest or government clients, could be established to avoid some of the problems encountered with such consultants in the past.

CAC responsibilities might be broadened so that these groups play a role throughout the life of the destruction program in their communities. For example, the CACs could evaluate and make recommendations concerning: 1) program milestones in the Army's alternative technology research effort; 2) the site specific risk assessments that are being prepared; 3) the status of the local Chemical Stockpile Emergency Preparedness Program; 4) budgetary documents; 5) engineering documents; 6) contract bids; 6) contractor selection and performance reviews; and 7) other appropriate areas of program planning and operations. Recommendations from the CACs could automatically be sent to the Army and congressional oversight committees. Within a reasonable time frame, the Army could report back on responses to the suggestions made.

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75. The Kentucky Environmental Foundation's Williams was particularly critical of the Army's efforts in this regard. Interview with author, 19 May 1994. Similarly, the Sierra Club's Vincent asserted that the Army was preparing for an escalation of its "public relations war on the local communities. This suggests that the Army still believes that what they have is a public relations problem, not a major public health and safety problem." Telephone interview with author, 11 August 1994.

76. Canadian department of National Defence, *Citizens' Environmental Protection Committee Report*, 3-5, 15, 18–19.

All documents applicable to the destruction program and its execution could be available to the CACs in their work. The Army might be required to give the CAC notification of major structural changes planned during the construction of the facility; the same could hold for significant operational changes. CAC members could have access to the facility at all stages of construction and operation. When on site, they could be able to use cameras and take notes. The CAC might also be able to request written confirmations on particularly sensitive matters from facility managers.

Finally, funds could be established to enable CAC members to perform their tasks without undue personal hardship. CAC members should continue to be unpaid, but those who take on this responsibility are performing a valuable community service and could be reimbursed for incidental expenses (e.g., materials needed to perform the job or travel to meetings). Coverage of expenses for other CAC activities, such as site visits to other baseline or hazardous waste disposal facilities or attendance at important review meetings with NRC officials, could also be included. A ceiling for such funds could be set to prompt CAC members to tap them conservatively. Appropriate guidelines should be set up to prevent misuse of these funds.

The Importance of Citizen Involvement

When asked why local citizens and the U.S. population at large should trust the Army to do a good, safe, cost-efficient job, former Program Manager for Chemical Demilitarization Charles Baronian quickly responded with a somewhat surprising reply. "Don't," he said.

> Do not make this an issue of trust in the Army. Insist—and the Army will support this—that the local state enforcement agencies participate in this program, including granting the permit only if they are comfortable that the Army can do what it says it is going to do. Insist that your local people are in the plant, doing the required oversight to make sure the Army will live by its word. I welcome that kind of procedure, but do not trust the Army.[77]

Local citizens might well heed this advice. No matter what type of destruction facility is eventually built at a site, they must be actively involved in making sure that the Army is operating it as promised.

General Busbee also welcomed citizen involvement. He said that he wanted to create mechanisms for "continuous public involvement in the oversight of the operation of these facilities." He spoke of "informed citizens who can participate, have the opportunity to review the results, visit the control room, sit in the control room twenty-four hours a day, if necessary." He noted the utility of having local citizens and state regulators "interview plant operators" and "be there when decisions are being made as to whether the plant is in conformance or not." Busbee wanted local citizens and state

77. Interview with author, 10 May 1994.

regulators to be "confident that we are following the prescribed rules or to blow the whistle if we are not."[78] Such involvement should not be limited to CAC members.

To facilitate broader citizen involvement, the Army could explore the possibility of having the data from the important operating parameters for baseline's incinerators available at a computer terminal in the local library or city hall. Some commercial hazardous waste destruction facilities have made this type of data available on a real–time basis via telemetry link so that local citizens can track facility operations without having to come to the facility itself.[79]

Hands–on citizen involvement was one of the keys to the success of the Canada's Operation Swiftsure, both from the perspective of local citizens and the officials implementing the destruction program.[80] The Kentucky Environmental Foundation's Williams observed that citizen oversight has made the baseline program safer. "Regardless of how this thing winds up," he said, "we feel that we have made this process many, many times safer than it would have been had we just said 'yes' when they first came in 1984."[81] Active citizen involvement has already proven its worth for the U.S. and Canadian destruction programs and it should be a goal of each stockpile site community throughout the operation of these destruction facilities.

Emission Monitoring

As long as the technical capability to monitor smokestack emissions continuously and conclusively for products of incomplete combustion is lacking, local citizens will always harbor concerns about what is coming out of the stack. Therefore, when it comes to monitoring incinerator emissions, it is useful to avoid even the appearance, if not the fact, of having the fox guard the henhouse. In this regard, two steps might be taken.

First, two different contractors could be hired to run each baseline facility: one to operate the incinerators and another to run the monitoring systems. This approach could counter the passivity that can accrue among employees during long–term operations and inspire heightened vigilance in both operators and monitors.

Second, local CACs could be given funds to hire an outside contractor to monitor emissions around the facility on a continuous or a spot–check basis, whichever the local community deems appropriate.[82] The CAC could task the contractor to do plume tracking or other specific monitoring tasks, as needed. This approach was used in the Swiftsure program and gave citizens throughout the community independent confirmation that emissions from the incinerator were indeed as portrayed by the authorities operating it.

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78. Interview with author, 5 May 1994.

79. See the remarks of Peter Daley, vice president for environmental technology at Waste Management International and member of the NRC's Alternatives Committee. NRC, *Alternative Technologies Forum*, (Washington, D.C.: National Academy of Sciences, 30 June 1993) 100.

80. Canadian Department of National Defence, *Citizens' Environmental Protection Committee Report*, 8–14.

81. Interview with the author, 19 May 1994.

82. Canadian Department of National Defence, *Citizens' Environmental Protection Committee Report* , 3 ,16–17.

This independent contractor would start sampling before baseline operations begin to obtain historical data for comparative purposes. The contractor could routinely report the results of its monitoring activities, including full data and analysis, simultaneously to the CAC and the Army. Any concerns arising out of those reports could be discussed in a regular CAC meeting or one called specifically for that purpose.

Giving Clear Signals: End-Use of Baseline Facilities

Whether intended or not, members of Congress who are watching the budgetary bottom line are sending mixed signals to the constituents of the eight stockpile sites. Contemplation of possible future uses of baseline's incinerators feeds tendencies to mistrust the Army on other aspects of the destruction program. U.S. taxpayers demand responsible management of government funds, but responsible behavior in this case requires that baseline facilities be used only for their primary purpose, as the law stipulates. Undoubtedly, Congress needs to pay closer attention to the implications of some of its actions regarding the stockpile destruction program. One indication of rising congressional sensitivity is a new law prohibiting the use of federal funds to study future uses of baseline incinerators.[83]

If communities themselves wish to change their minds about on-going incineration efforts, they necessarily have this right. Absent this expression from the localities involved, key officials, both in the administration and in Congress, should reiterate the commitment to destroy baseline facilities upon the completion of their principal task. At regular intervals, the Secretary of Defense and the Chairmen of the Senate and House Armed Services Committees should sign letters reconfirming this pledge to the local communities. This type of personal commitment on the part of key officials was crucial to easing the qualms of Canadian citizens regarding the end-use of Swiftsure's incinerator.[84]

Fulfilling an Obligation: Emergency Preparedness

The Army's principal argument for destroying the stockpile *in situ* was predicated upon the creation of a viable emergency response capability at the stockpile storage sites. According to scathing GAO reviews, the Chemical Stockpile Emergency Preparedness Program can hardly be called viable. Furthermore, the lackluster implementation of this program has heightened the suspicions of local citizens about its origins and utility in the event of a real chemical emergency.

The Chemical Stockpile Emergency Preparedness Program is in need of a major resuscitation effort. The Army *must* devote a concerted effort to administering this program promptly and completely. Local citizens deserve and should insist on nothing less.

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83. Public Law 103-139, section 8075A, 11 November 1993 (Department of Defense Appropriations Act, 1994) states: "None of the funds in this or any other Act shall be available for the preparation of studies on...the potential future uses of the nine chemical disposal facilities other than for the destruction of stockpile chemical munitions and as limited by section 1412(c)(2), Public Law 99-145." Future-use studies for the destruction test facility at Tooele are exempted under this law.

84. Canadian Department of National Defence, *Citizens' Environmental Protection Committee Report*, 3-4.

Appendix A: The Baseline Program and Opposition To It: An Overview of Charges and Responses

Amy E. Smithson

This appendix juxtaposes the concerns and arguments that opponents to the high-temperature baseline incineration program raise with the responses of officials responsible for operating, regulating, and reviewing the Army's chemical weapons destruction program. Some of the issues addressed in the following pages were touched upon in chapter 2, but they are dealt with more deliberately in this segment of the report. Other issues are also broached. For each separate issue, the viewpoint of the opposition to baseline is presented first and in italics. The response from officials from the Army, the Environmental Protection Agency (EPA), and the National Research Council (NRC) follows in regular print. Despite this more extensive treatment, this appendix still presents an overview rather than a comprehensive ledger of all of the issues that have been raised throughout the evolution of the chemical weapons destruction program.

Issues are grouped under general category headings, as follows:

Destruction Program Management and Ethics

The Army's Adherence to Regulations

Baseline opponents charge that the Army has been short-cutting regulations in several areas. Accordingly, Craig Williams, founder and president of the Kentucky Environmental Foundation, says, "The Army historically has the capability to get agencies like the EPA and the Centers for Disease Control and Prevention and all of these other agencies to sign off on this stuff. The Army has just muscled their way past...regulations."[1] *For example, Greenpeace asserts that the Army transported U.S. stocks from Germany to Johnston Atoll prior to issuing a final record of decision, and that the Army's Environmental Impact Statements on this transfer were incomplete.*[2] *Williams also points out that Army contractors began preparing the Anniston, Alabama, site for construction of a baseline facility before permits to build that facility were granted.*[3]

More recently, critics assert that the EPA looked the other way when operating records showed that incinerators on Johnston Atoll dipped below the specified limits for the oxygen level. Adequate quantities of oxygen are key to the combustion process, yet when the nerve agent GB was being incinerated, the oxygen levels were inadequate twenty-five times. Oxygen levels were insufficient another 496 times when munitions were not being processed. The EPA, says Pat Costner of Greenpeace, "offered the Army a novel interpretation of the law" by redefining these incidents as "exceedences" since the Army terminated feed into the incinerators after each incident. This interpretation was tantamount to saying that "if the waste feed was stopped after the violation took place, then the violation did not take place."[4] *Furthermore, Costner says, "This is not a credible process. It is no credit to the Army and certainly no credit to the EPA. This shows illegalities, lack of ethics, lack of integrity, and lack of credibility."*[5]

The Army is trying to meet congressional deadlines to complete the destruction program and the permitting process is widely recognized as a cumbersome one. On occasion, the Army has asked for their requests to be given expedited consideration, but that does not equate to skirting the regulations. Charles Baronian, formerly the Program Manager for Chemical Demilitarization, states that, "The EPA has given the Army waivers that allows it to put in a change that they feel comfortable with prior to going through the formal regulatory process for implementing those changes. These waivers were given primarily because the EPA felt that the waivers were scientifically sound. Rather than go through their normal procedures they agreed to allow us to implement

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1. Interview with author, 19 May 1994.

2. Alfred Picardi, *Greenpeace Review of Johnston Atoll Chemical Agent Disposal System Draft Final Second Supplemental Environmental Impact Statement For the Storage and Ultimate Disposal of the European Chemical Munition Stockpile* (Washington, D.C.: Greenpeace, 9 July 1990) 8–9.

3. Interview with author, 19 May 1994.

4. Costner, *The Army's Experience at Johnston Atoll Chemical Disposal System*, 9.

5. Pat Costner (Presentation at a Chemical Weapons Working Group meeting, Washington, D.C., 19 March 1994).

the changes while the request was being processed."[6] Had the Army not made such requests, the resulting schedule delays would have likewise been criticized.

As for the so–called exceedences, the EPA's incinerator permits stipulate that the operator automatically shut off the waste feed if any operating parameters are not being met, bring the operating parameters back to the specified range within several minutes, and if not, shut down the entire incinerator. According to Mark Evans, special assistant to the program manager, operational events can be categorized in several ways. First, the bounds of the permits do not apply to situations when no waste is being fed into the incinerator, such as when the incinerator is being started up with fuel oil. Thus, almost 500 of the alleged violations or exceedences did not involve any regulated activity. Second, when waste is being fed into the incinerator, and for instance, the oxygen level has dipped below specifications, the Army has shut off the feed as required. A third category of event would be where Army regulators reviewing operational reports later found that an operational parameter was not met and waste feed was not cut off at the time. If the Army duly reported such an event upon discovery, it would be deemed in noncompliance with the permit. Finally, if the EPA, which also reviews the operational reports, found that the Army had willfully evaded reporting a noncompliant event, the EPA would in all likelihood state that the Army violated the permit. All of the events on Johnston Atoll, Evans notes, have fallen within the first two categories and therefore have not been categorized as permit violations.[7]

Furthermore, the EPA's Y.J. Kim, national incineration expert, and Cathy Massimino, senior Resource Conservation and Recovery Act/Superfund technical specialist, note that most of the oxygen alarms on Johnston Atoll are due to the plugging of the probes in the incinerators that measure oxygen levels. This problem has since been addressed, but the probes were plugging because of the corrosive environment and the higher operating temperatures being used, not necessarily because there was not enough oxygen in the chamber. Kim points out that the Army is "maintaining a higher oxygen supply in the combustion chamber than most other operating incinerators." This excess oxygen in the combustion chamber and the Army's higher operating temperatures accelerate the thermal oxidation of the wastes. These two factors also enable a higher level of destruction of the agents and reduce the formation and emission of products of incomplete combustion, or PICs. Documentation of these alarms shows whether it was a probe malfunction and if the waste feed was cut off, in which case the EPA has no reason to issue a citation. The EPA's "enforcement is based on what type of environmental effect it has," Kim says, and these incidents had no environmental effect.[8]

Insinuations that the EPA is "in bed" with the Army are "totally false," says Jim Michael, chief of the Disposal Technology Section, Permits and State Programs Division of the EPA's Office of Solid Waste. "Nothing could be further from the truth. We treat them as a regulated industry. If anything," notes Michael, "we probably hold them to a

6. Interview with author, 10 May 1994.

7. Interview with author, 21 July 1994.

8. Massimino concurs with Kim's statements. Telephone interview with author, 23 August 1993.

higher standard" because of the controversy surrounding the baseline program. The decision to allow the Anniston site to be prepared for construction, which amounts to bulldozing dirt around, explains Michael, was made by an Alabama EPA official who had worked in a program that allowed site preparation in advance of permit approval.[9] The Army did not violate any regulation since this decision was consistent with regulations, a judgment that he documents with two 1992 letters.[10] Michael further notes that what baseline opponents term "exceedences" on Johnston Atoll are really temporary authorizations that the EPA grants either to "protect human health and the environment" or to "prevent disruption of ongoing waste management activities." Temporary authorizations are also well within the regulations governing hazardous waste disposal.[11] What the Army has done so far, Michael concludes, is consistent with regulations, and the trial burns have achieved destruction removal efficiencies beyond 99.9999 and even beyond 99.9999999. However, the EPA, he says, has given the Army "no special treatment whatsoever."[12]

Disposal of Wastes from Baseline Incinerators

The opposition states that the Army, whether purposefully or accidently, is engaging in ethnic ecocide. According to Greenpeace's Costner, the Army has purposefully arranged to have the solid hazardous wastes from Johnston Atoll shipped to a storage facility in Kettleman, California, a primarily Hispanic community. The liquid hazardous wastes are being sent to Corpus Christi, Texas, another mostly minority community. Yet, once the waste leaves the island, the contracts relieve the Army of liability for it.[13] *The ash from the proposed Anniston, Alabama, incinerator would purportedly be transported to Emelle, Alabama, where the largest hazardous waste landfill in the world is located. According to another baseline critic, fully one-third of this Alabama county's residents "live below the poverty line, and 90 percent of the residents near the landfill are African-American." Since minority communities are frequently the last resting place for hazardous and solid wastes, "the grassroots toxics movement is composed of predominantly African-American, Asian-American, Native American, Pacific Islander, Latino and poor white communities."*[14] *The Army's program is proving to be no exception to this rule.*

Former Program Manager Baronian hardily refutes these charges. "These wastes are sent to licensed hazardous storage areas or landfills. I doubt that the criteria for awarding the contracts in question included any type of analysis of the racial makeup of these communities. Kettleman Hills was selected competitively." Plant managers for baseline facilities, he explains, are responsible for contracting with certified hazardous waste handling facilities to deal with the wastes in question. "They contact the hazardous

9. Interview with author, 10 August 1994.

10. See Robert Hunter, letter to William Reilly, 24 July 1992; and Lisa Friedman, letter to Robert Hunter, 21 October 1992.

11. See Jeffrey Zelikson, letter to General Walter L. Busbee, 28 July 1994.

12. Interview with author, 10 August 1994.

13. Costner, remarks at 19 March 1994 meeting.

14. Silton, "Out of the Frying Pan," 22.

waste industry, ask for bids, and then select the winner from the proposals submitted. What is sent to a landfill is the same kind of hazardous waste that is being sent to that facility from other parts of the United States. There is not any ulterior motive here; these are transactions with legitimate, approved businesses." If these communities do not want to continue being in the hazardous waste disposal business, Baronian observes, they do not have to bid on these or any other contracts.[15]

Victoria van Roden, chief of the Permit Policy and Review Section in the Permit Branch of the EPA's Office of Solid Waste, states that the EPA grants permits for a landfill based on technical qualifications, not the ethnic or economic demographics of the surrounding communities. Kettleman Hills is one of the oldest landfills in the United States, and the demographics surrounding that facility have undoubtedly changed since it was built, just as all communities change over time. "The Army has to deal with the sites that are permitted and available to handle these wastes. They do not go out and get a list of who lives there," van Roden says. "People throw out this ethnic ecocide accusation because it is the latest buzzword." What baseline opponents are driving at with this accusation, she observes, "is a bigger social issue than the baseline program's wastes alone." Regardless of who lives near these facilities, van Roden concludes, the federal regulations governing them "are supposed to be supportive of human health and the environment for everybody."[16]

Baronian also notes that neutralization "will probably generate about twice as much material that will have to be stored at hazardous waste sites, in those same communities that the opposition is concerned about in this instance. This contradiction does not seem to bother baseline opponents."[17]

The Army and Its Contractors

Other citizens believe that the Army is trying to obscure the truth about the destruction program, perhaps at the behest of defense contractors feeding a perfidious cycle and motivating the Army to use incineration as opposed to other technologies. "Follow the money," says the Kentucky Environmental Foundation's Craig Williams, and the real reasons for the Army's decisions become apparent.[18] *"I know that there are defense contractors chomping at the bit to see the Army turn to other technologies," says Ross Vincent, chairman of the Sierra Club's National Hazardous Materials Committee, "but I suspect that there is an institutional interest in maintaining the flow of cash from Congress and the military and that this is part of the problem."*[19] *Another baseline opponent disagrees somewhat with this indictment of the defense contractors. "Defense contractors," says James Harmon, member of the Anniston, Alabama, Citizens Advisory*

15. Interview with author, 10 May 1994.

16. Interview with author, 10 August 1994.

17. Interview with author, 10 May 1994.

18. Interview with author, 19 May 1994.

19. Vincent is also a member of the Pueblo, Colorado, Citizens Advisory Commission. Telephone interview with author, 11 August 1994.

Commission, "cannot drive something that they Army does not want. Congress and the Army are the bigger villains in this."[20]

A sinister connection between defense contractors and the Army's baseline program, Baronian observes matter–of–factly, does not exist. A different set of contractors would be assisting the Army had another technology been chosen. Many contractors have proposed alternative technologies, perhaps in the process falsely inflating expectations because these technologies have been tested on a small scale only with simulants, not with large quantities of real chemical agents. In sum, the Army's decisions, past and present, were based upon the fact that baseline could do the job well, not because of the persuasiveness of defense contractors. Baronian adds that the contractors for this program are mostly engineering and construction firms, rather than the big defense contractors normally associated with the procurement of military weapons systems.[21]

The Legitimacy of the Army's Interaction with Local Communities

Many citizens believe that their concerns are not being taken seriously by the Army, which considers their opinions to be driven more by emotions than by technical facts. "The Army has a history of identifying its favorite waste disposal technologies and, from that point on, treating the effort to get it developed and used almost like a military campaign," says the Sierra Club's Vincent. "It does not matter who stands in the way. The Army views the communities to be effected like the next hill to be taken."[22] *Similar complaints about the Army's interaction with local citizens can be heard in every stockpile community.*

The public, observes former Program Manager Baronian, tends to confuse listening with heeding the advice given. "One of the things the public says is that 'we don't listen to them.' Well, what they really mean is that the Army does not *obey* them. The Army is listening and trying to react, but when it does not agree, it does not obey." Baronian lists several instances when the Army has tried to address specific recommendations from local communities. For example, the Army funded the Arthur D. Little study on demilitarizing the M55s because the people of Lexington requested it. "It cost us a couple of hundred thousand dollars, and if that is not listening, I do not know what listening is," says Baronian. Lexington citizens also requested that the Army look separately at the possibility of airlifting the stocks out of Kentucky, resulting in another study. Edgewood citizens made a similar request for a tailored shipment study for the Aberdeen Proving Ground stocks, which the Army did.[23]

General Walter L. Busbee, commander and director of the U.S. Army Chemical Materiel Destruction Agency, comments that, "Johnston Island is our prototype, 6,000 miles from here, and it is hard to convince people that we did not put it out there to hide it." In fact, with the exception of the stocks transferred from Germany in 1990, the

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20. Harmon is also a member of The Families Concerned About Nerve Gas Incineration. Telephone interview with author, 9 August 1994.

21. Interview with author, 10 May 1994.

22. Telephone interview with author, 11 August 1994.

23. Interview with author, 10 May 1994.

weapons had been on the island for decades. Johnston Atoll's sea environment encourages more rapid corrosion of the weapons than is occurring at U.S. storage sites, so the Army decided to destroy these stocks first. This portion of the destruction program was meant to be an open process, Busbee notes, grist for public dialogue. "We will have to demonstrate that same openness," says Busbee, "at Tooele and at the other sites in the United States."[24] Both Baronian and Busbee admit that the Army must do a better job of communicating with the public, of taking complicated information and presenting it in a way that the public can understand, without the "technical mumbo–jumbo that is now available."[25]

The Operation of the Johnston Atoll Baseline Facility

Combustion Efficiency and Incinerator Operating Conditions

Baseline opponents contend that the Army cannot really assure that the required destruction removal efficiency will occur at less than optimal operating conditions, such as when temperatures fall below the stipulated threshold, the rate at which material is fed into the incinerator is slower than normal, or when the agent concentration is comparatively low (e.g., on contaminated metal parts). According to Greenpeace's Costner, "Even if major upsets at incinerators could be avoided by flawless maintenance and consistent operating conditions, localized and short–term variations from ideal combustion would still occur constantly within the incinerators. These transient departures from ideal conditions can decrease an incinerator's destruction efficiency, increasing releases of both unburned wastes and PICs." During the VX trial burn, for example, about 25 percent of the process alarms were triggered when oxygen levels in the liquid incinerator dropped below permit standards. This trial burn involved just over 470 hours of processing, yet "some 3,691 major process alarms—more than 7 alarms per operating hour—occurred."[26] *A major process alarm requires shutting off feed to the incinerator.*

Another critic focuses on the Army's ability to maintain high standards once several baseline facilities are operating. "The serious question involving health effects and emissions from the proposed incinerators deals not with the optimal operation" during the trial burns on Johnston Atoll, but with "whether or not such 'up–to–the–mark' operation can be guaranteed at all times."[27] *Or, as Harmon of Anniston put it, whether the Lincoln Towncar or the Indianapolis 500 race car wins the race depends on whether the mechanic keeps it in good order and the driver knows what levers to push. Harmon believes that baseline's incinerators "are capable of operating much more efficiently" than they have on Johnston Atoll. The Johnston Atoll track record proves that the Army is both a bad mechanic and a bad driver.*[28]

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24. Interview with author, 5 May 1994.

25. Interviews with author, 5 May 1994 and 10 May 1994.

26. Costner, *GB and VX Campaigns*, 2, 10, 15.

27. Scott Mohr, "A Critique of Incineration Proposal For Destruction of Chemical Warfare Agents" (Boston, MA: Physicians for Social Responsibility, 18 March 1994) 1.

28. Telephone interview with author, 9 August 1994.

The EPA's permitting strategy, as summarized by General Busbee, is to push an incinerator to its design limits during instrumented trial burns to demonstrate that the system meets the pollution control standards. Each incinerator at each site will undergo a trial burn, supervised by the EPA, which will review the resulting data. If satisfied, the EPA will issue a permit for each incinerator that specifies the criteria and parameters at which a facility must operate at all times. For example, a feed rate ceiling that must not be exceeded is established. The Army will feed waste into the incinerators at or below the rate that has been successfully demonstrated to the EPA.[29] Combustion efficiency is determined by a "family of conditions," mainly by the relationship between temperature, waste feed, and oxygen, say the EPA's Kim and Massimino. When lesser quantities of waste are fed into the incinerator, additional fuel is added.[30] Oxygen levels, which are high to begin with, are also adjusted to maintain combustion efficiency. Therefore, variations in feed rates are not themselves problematic.[31]

As for the number of process alarms, Kim and Massimino state that the Army has set its own operational alarming system that goes beyond what the EPA requires. Other hazardous waste incinerators do this as well, but not nearly as extensively as the Army has done on baseline. For example, on the deactivation furnace there are fourteen alarms on operational parameters required by federal regulations, but the Army has added another 186 alarms for its own monitoring purposes. If one of those fourteen alarms goes off, the Army must shut off waste feed. An alarm from one of the other 186 would simply notify the Army of a need to make an adjustment to preclude a problem of actual significance. Similarly, the agent incinerator has twenty-nine federal "waste cutoff" alarms and seventy-one of the Army's own additional alarms. The metal parts furnace has ninety-five total alarms, only twenty-nine of which are federally required. In sum, Kim and Massimino say that the number of process alarms may be high, but the lion's share of them do not involve federally regulated activities.[32]

To illustrate the baseline facility's capabilities under less than optimal operating circumstances, Baronian describes a scenario where several contaminated artillery shells are in the metal parts furnace, which is used to decontaminate drained munitions and containers, when feed is stopped because an operational parameter is not being met. (Waste cutoff, he notes, is instantaneous in the case of the agent incinerator.) To begin with, Baronian explains there are two incinerators capable of destroying the agent: primary furnaces each have an afterburner. If the primary incinerator experiences problems, the afterburner would destroy any hazardous materials in the exhaust gases. Conversely, since the agent will be destroyed in the first incinerator, problems in the afterburner should not be a concern. Therefore, the only truly credible scenario for a failure of the system would be that both furnaces would not be operating at optimal

29. Interview with author, 5 May 1994.

30. Telephone interview with author, 23 August 1994. Former Program Manager Baronian concurs. Interview with author, 10 May 1994.

31. Telephone interview with author, 23 August 1994. See also Kim and Massimino's remarks about the causes and implications of oxygen alarms under the heading "Army Adherence to Regulations."

32. Telephone interview with author, 23 August 1994.

conditions simultaneously. Should that happen, he explains, residual heat in both chambers continues to destroy the agent. If necessary, however, the metal part can be removed from the furnace. "The Army cannot see a scenario whereby both furnaces are lost simultaneously, the item being processed cannot be removed, *and* it stays in so long that residual heat is also lost," says Baronian. "The redundancy in the system is such that under any scenario, we can take appropriate corrective action to prevent an agent release from the stack. If, however, the critics are right and all of these impossibilities occur at once," Baronian continues, "the Army is taking another safety step by adding the new charcoal filters that the NRC recommended to prevent the escape of agent during upset operating conditions. These charcoal filters will be used at Tooele and at all of the subsequent sites. Charcoal filters will also further eliminate semi–volatile and volatile organics, including dioxins and furans."[33]

The Scientific Standards of the Army's Operations

Baseline opponents assert that the procedures used during the trial burns and operational verification tests do not meet commonly accepted scientific standards. Greenpeace's Costner states that, "Numerous inconsistencies in the data collected during these burns attest to a broad array of shortcomings ranging from carelessness to apparent falsification of data. These problems are of sufficient magnitude to invalidate entirely the results" of trial burns for the agent and metal parts incinerators.[34] *More specifically, Costner charges that during the trial burn of mustard from ton containers, the Army did not know the extent to which the mustard had jelled or formed different compounds. To measure how much of this goo was left in the ton container before putting it into the incinerator, the Army used wooden dipsticks, which calls into question their ability to quantify the amount of agent remaining. This approach shows "either a total lack of integrity or absolute incompetence" and, according to Costner, it negated any ability to measure the true efficiency of the incinerator.*[35]

During tests with simulant–filled munitions before the trial burn, the Army determined that draining the ton containers and projectiles would be problematic because the contents in some cases may have thickened. General Busbee explains that the EPA was present throughout all of the trial burns. In this particular instance, the Army complied with the EPA's request to enable a worst–case evaluation of the incinerator's capabilities by artificially refilling a tray of projectiles and ton containers with the amount of jelled agent that would have been left over after draining. These items were then processed in the metal parts furnace. As part of the permit request, the Army presented the EPA with very detailed analyses of mustard agent, as well as the other agents in the stockpile. Despite the age of the agents and evidence of their decomposition noted at the time, the basic chemical composition of what was being incinerated—sulfur, chlorine, carbon, and hydrogen— was clear to those overseeing the trial burn. Next, by taking a dipstick measurement and using calculus, Army officials were able to quantify

33. Interview with author, 10 May 1994.

34. Costner, *Incineration of HD Agent,* ii.

35. Costner, remarks at 19 March 1994 meeting.

the amount of agent remaining in the containers. The practice derided by Greenpeace, according to Busbee, is an accepted scientific one involving proven mathematic principles.[36]

The EPA's Massimino and Kim note that the weight of empty munitions and containers is known and that these items are weighed after being drained and before they are processed. However, since measurements are not always exact, they rely upon a very conservative calculation that assumes that 5 percent of the contents of a munition or container will remain in these items when they are incinerated. High operating temperatures, lengthy treatment times, and the safeguard of a final airlock, where detectors sample processed items twice for the presence of agent, combine to destroy any residual agent in these munitions and containers. Massimino and Kim explain that if the agent monitors in the airlock go off, the items are returned to the incinerator until no detectable signs of agent remain.[37]

Moreover, observes Baronian, since the Army has set monitoring standards that are independent of and stricter than the destruction removal efficiency, the exact composition or quantity of agent really does not matter. The Army does not consider the destruction removal efficiency to be a suitable approach or standard, so it set its monitors to detect *any* agent coming out of the stack. No agent was detected during the trial burn of mustard agent from ton containers. In fact, no agent has been detected while the incinerators were running. "Regardless of the exact composition or quantity of what we are putting in, we still cannot detect agent emitting from the stack," says Baronian.[38]

The Caliber of the Army's Agent Monitors

Standard commercial monitors are not being used to detect agent and therefore are not reliable, according to the opposition. In the words of Greenpeace's Costner: "These systems have not been validated by the U.S. Environmental Protection Agency as suitable for monitoring stack emissions of agents. Consequently, no means were available for providing reliable estimates of stack emissions or fugitive emissions of active chemical agent nor were means available for adequate identification and quantification of other chemicals released from the stack....Given monitors of such obviously poor reliability and undisclosed accuracy, the placement of only one functioning monitor in the common stack seems more an attempt to avoid detecting stack releases of agent than an effort at detection."[39]

Vincent of the Sierra Club classifies the equipment used to monitor incinerators as typically "pretty primitive." The problem, he explains, is that the enormous quantities of air coming out of the stack mask the toxic pollutants. If the air flow was smaller, the monitors might be able to detect more.[40] *Anniston's Harmon believes that the Army "would be embarrassed" if it allowed its monitors to be independently tested. He recalls*

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36. Interview with author, 5 May 1994.

37. Telephone interview with author, 23 August 1994.

38. Interview with author, 10 May 1994.

39. Costner, *GB and VX Campaigns*, 2, 20.

40. Telephone interview with author, 11 August 1994.

reports that detectors provided by the Russians, Czechs, and West European military services performed, by some accounts, better than U.S. detection equipment during the Persian Gulf War. He also notes that the NRC reviewed the Army's monitoring systems and made several recommendations for improvements.[41]

Army officials state that the agent monitors were developed specifically for the baseline program, but gas chromatography, which is at the heart of the detection technology, is a standard laboratory and commercial technology. Baronian explains that the Army adapted this technology, primarily by adding a mechanism to allow detection of smaller concentrations. Special Assistant to the Program Manager Evans adds that similar detectors for commercial use are available.[42]

Two different types of agent monitors, each with backups, are placed at each incinerator and in the common exhaust stack, according to Evans. The near real–time detectors, called the Automatic Continuous Air Monitoring System (ACAMS), are placed in each furnace duct and in the smokestack. Key ACAMS placements operate around–the–clock, and they also have backups. Figure 12 shows an ACAMS detector. All monitors are tested at least every twenty–four hours to ensure that they are operating correctly. Monitors in the smokestack are tested every four hours. Evans states that this approach guards against a "false negative," where the alarms would not detect an agent release. The monitors used for more detailed analysis to confirm or disprove ACAMS readings, the Depot Area Air Monitoring System, collect samples over a period of hours, which are then analyzed using gas chromatography.[43]

False Alarm Rates of the Army's Agent Monitors

Throughout the trial burns on Johnston Atoll, opponents charge that agent detectors have gone off at an alarming rate. "The analytical systems used to detect unburned chemical agent in the incinerator stack, other on–site monitors and monitors at the perimeter of the facility had unacceptably high rates of malfunction during both the GB and VX campaign," claims Greenpeace's Costner. She asserts that during the GB trial burn, the reliability of these monitoring systems was, "at best, questionable." Costner categorizes a "sensitivity to interferents that accounts for 34 percent of" these alarms as "unacceptable."[44] *Harmon observes that baseline operators often could not tell when an alarm was a real or false one, perhaps because the sophisticated equipment employed was too much for the operators to handle. "The system does not seem to work," he said, because "the process seems to be too complex for the people operating it."*[45]

None of these alarms should be a cause for real concern, according to Baronian, formerly the destruction program's top civilian official. These alarms are investigated with in–depth chemical analyses, which in the large majority of instances proves them

41. Telephone interview with author, 9 August 1994.

42. Interviews with author, 10 May 1994 and 21 July 1994.

43. Interview with author, 21 July 1994.

44. Costner, *GB and VX Campaigns*, 2, 15, 20.

45. Telephone interview with author, 9 August 1994.

to be false alarms, or "false positives." Well below one–tenth of 1 percent (0.1%) of the readings taken by these detectors have involved alarms. On Johnston Atoll, the Army has nearly seventy alarms sampling on roughly five minute cycles. If one does the arithmetic, that works out to over 20,000 monitoring samples *daily*. This figure does not include the samples by the other, more sophisticated detectors, which test the air over a period of hours to prove or disprove false positives. Given the sheer magnitude of the samples taken, getting one false alarm out of approximately every 8,750 monitoring cycles is a very small percentage.[46]

Special Assistant to the Program Manager Evans also explains that calculations showing the average number of false alarms over a period of time can be misleading. The Mitre and NRC reports, for example, refer to an average of one alarm every fifty–two or 152 hours for different periods of operation. "False alarms do not occur in 'one's,' they happen in groups. A cluster of false alarms is usually tied to a single event, such that several will go off in succession," he says. Most calculations do not count these clusters as a single false alarm, which makes the overall false alarm rate appear to be higher than it actually is.[47]

One cause of the high false alarm rate is that the monitoring system being used is generic, as opposed to agent–specific. A preferable situation would be to have dedicated detectors for each type of agent being processed. Baronian adds, therefore, that the Army is weighing the use of passive infrared and mass spectrometer monitors that are being developed—both of which would be more specific to the agent. The Army's efforts to improve the monitoring system are in line with the NRC's recommendations.[48] According to the EPA's Massimino and Kim, while there is always room for improvement in a monitoring system, the Army has taken the initiative in improving its monitors without being asked. For example, they have reduced the sample cycling time from twelve minutes to three or four minutes.[49]

Another factor that makes the detectors vulnerable to interference is that their detection limits are set so low. The Army could have set the concentration that is measured high enough that interfering elements would not cause an alarm, or, alternatively, it could keep it as low as possible and shut down after an alarm. The Army erred on the side of safety, Baronian says, because the Army understands that it is better to have false alarms than to have an agent release that is not detected.[50] Massimino and Kim also note that "any" monitoring system would have problems with interferents causing false positives.[51]

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46. Interview with author, 10 May 1994.

47. Interview with author, 21 July 1994.

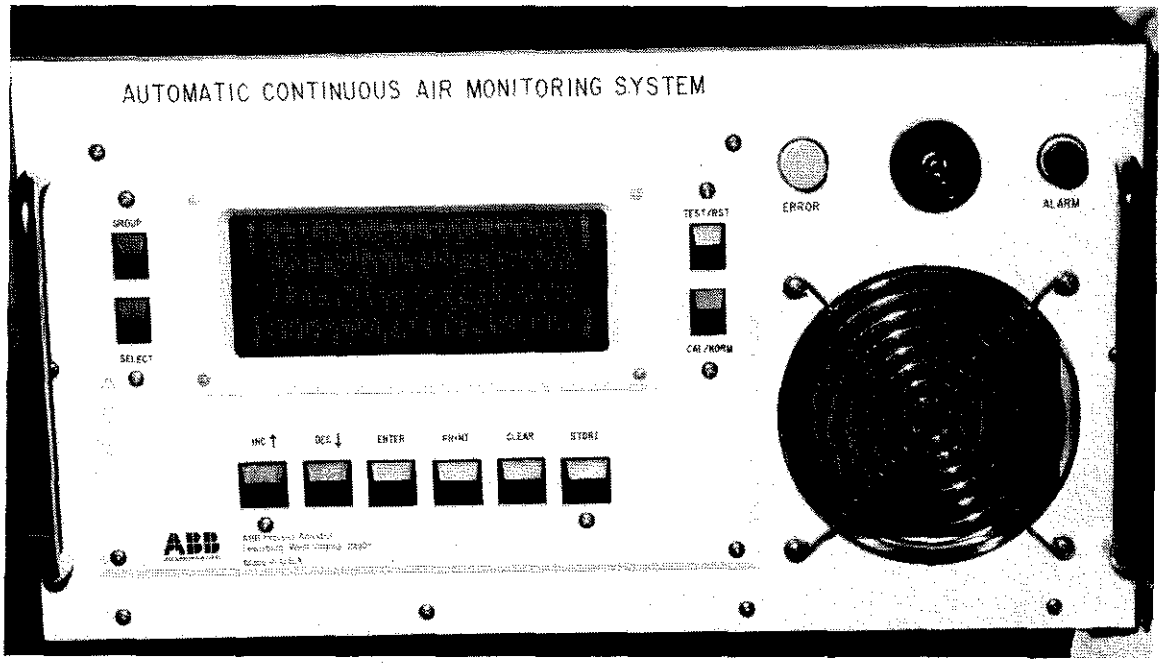
48. Interview with author, 10 May 1994. See also NRC, *Review of Monitoring Activities Within the Army Chemical Stockpile Program* (Washington, D.C.: National Academy Press, 1994) 33–41.

49. Telephone interview with author, 23 August 1994.

50. Interview with author, 10 May 1994.

51. Telephone interview with author, 23 August 1994.

Figure 12: The Automatic Continous Air Monitoring System.



Photograph courtesy of the U.S. Army Chemical Materiel Destruction Agency.

Army Screening for Products of Incomplete Combustion

Baseline critics often point out that the EPA says that incineration probably causes thousands of PICs. Moreover, the opposition says that the Army is not monitoring for PICs. According to Greenpeace's Costner, "No attempt was made to identify many of the other products of incomplete combustion (PICs) that were known or suspected to be present in stack emissions and residues. This lack is particularly problematic for those chemicals of greatest toxicological concern that are potentially created during the incineration of" mustard. [52] *Vincent of the Sierra Club gives a somewhat more charitable review. "The Army," he says, "has certainly done no worse and maybe even a little better than most commercial operations. Still, their effort falls far short of identifying all of the PICs."*[53]

Army officials state that during the trial burns on Johnston Atoll, stack gases were sampled using EPA-approved procedures and later analyzed by the EPA and the Army. "All of these PICs were measured for at the very, very lowest level that micro-quantitative chemistry allows," states General Busbee. However, Busbee recalls that dioxins and furans were detected only in the set of trial burns when aviation fuel oil, not chemical agent, was being incinerated. "While there were more detectable compounds in that instance, the related stack emissions were essentially the equivalent of a Boeing 747 jetliner in flight. The baseline incinerators met or exceeded all EPA standards for the

52. Costner, *The Incineration of HD Agent*, 2.

53. Telephone interview with author, 11 August 1994.

specified compounds. In the case of particulates, dioxins, and furans, the Johnston Atoll incinerators were on the order of a hundred to a thousand times better than the average hazardous waste incinerator operating in the United States." Busbee adds that trial burns at Tooele should show improvement over this record, since Tooele and all other U.S. facilities will have improved pollution control and monitoring systems.[54]

Incineration, notes former Program Manager Baronian, is not "alchemy or matter conversion." Incinerator emissions bear a resemblance to what is put into them and the products of incomplete combustion screened for on Johnston Atoll were carefully predicated upon the type of waste processed in each trial burn. "If you put carbon, hydrogen, oxygen, and nitrogen into the incinerator, those same elements have to come out of the stack," he says. The Johnston Atoll samples looked for the whole menu of possible PICs—heavy metals, volatiles, nonvolatiles, dioxins, furans, organics.[55] According to the EPA's Kim, during trial burns they did their "best to include all known compounds that would come of these agents." Though these tests did not search for all possible PICs, they included the PICs flagged by the EPA as of most concern.[56] The Army screened for more than 130 PICs in each trial burn with agent.[57]

Busbee points out that the EPA has not even established standards for all PICs.[58] Moreover, says Baronian, "the technology to look for one thousand possible compounds or to quantify 100 percent of the emission contents simply does not exist."[59] Nor, for that matter, does the technical capability to monitor continuously for PICs exist, adds Busbee. No hazardous waste incinerator in the United States monitors on a continual basis for PICs.[60] Therefore, an element of uncertainty will always remain as far as the nature and quantity of what is coming out of the smokestack. Baronian observes that baseline opponents do not assail the actual trial burn data, but seek instead to exploit that element of uncertainty by lodging an incredible all-purpose "what if" charge. This charge is impossible to address, he says, technically or otherwise.[61]

To put all of this in perspective, Busbee encourages a comparison of the Johnston Atoll trial burn results to background sources of PICs that would normally be encountered in various parts of the United States—the emissions from coal burning power plants, smelters, refineries, diesel trucks, and other combustion sources. The Army has done a

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54. Interview with author, 5 May 1994.

55. Interview with author, 10 May 1994.

56. Massimino, also of the EPA, concurs with this statement. Telephone interview with author, 23 August 1994.

57. For more information, see Table 4 on p. 42.

58. Interview with author, 5 May 1994.

59. Interview with author, 10 May 1994.

60. Interview with author, 5 May 1994. Kim and Massimino note that the baseline will have the only incinerators monitoring on a continual basis for any particulate emissions—in this case for agent emissions. Baseline incinerators will follow the standard practice of surrogate monitoring for PICs by continually tracking carbon monoxide and hydrocarbon emissions, which are good indicators of combustion efficiency and therefore PIC emissions. Telephone interview with author, 23 August 1994.

61. Interview with author, 10 May 1994.

background pollutants analysis for the Anniston site. According to Busbee, "it shows that a baseline facility is almost not even a blip on the curve with respect to the ambient background concentration" of these kind of pollutants.[62]

Comparative Wastes from Incineration and Neutralization

The operational verification tests on Johnston Atoll have produced more wastes than would have resulted under neutralization, according to baseline opponents. Costner calculates that 9.5 pounds of residues were created per pound of VX processed on Johnston Atoll.[63] *She asserts that these results invalidate one of the principal reasons why Army officials decided to discard neutralization as a destruction technology—that neutralization would produce far more wastes than incineration.*

Anniston's Harmon states that Johnston Atoll is now getting about four pounds of waste salts per pound of agent destroyed. He notes that if the newest approach to neutralization can achieve similar success with larger quantities of agent, then neutralization may produce about three pounds of waste per pound of agent. In that case, the waste question would be a "toss up" between which method was substantially more effective in waste reduction. However, Harmon observes, "In Anniston, whether we end up with 800,000 or one million pounds of waste should not be the determining factor" as to which type of technology is used.[64]

The Johnston Atoll facility, General Busbee reports, is actually getting about two pounds of salt per pound of agent destroyed.[65] Evans, special assistant to the Program Manager, explains that this higher yield of waste is due to a plant design flaw that has since been corrected. The Johnston Atoll facility has a large pipeline feeding pH into the pollution abatement system, which makes control over that feed less precise and has resulted in higher brine salt yields than predicted. Smaller pH feed pipes in the continental baseline facilities will enable the actual salts per pound of agent yield to come closer to the calculated quantities, which are 0.6 pounds for the nerve agent VX, 0.9 pounds for the nerve agent GB, and 1.2 pounds for mustard.[66]

Busbee also explains that other items that come out of the plant, including the decontaminated artillery shells and the protective suits worn by workers, are sometimes lumped into the figures cited for Johnston Atoll wastes, inflating the waste per pound of agent. Had neutralization been used, these other items would also be part of the total wastes from destruction. Neutralization involves diluting the material and then adding an oxidizing agent, a caustic solution like sodium hydroxide (lye). To obtain an irreversible degree of destruction and to get rid of the resulting neutralizing solution, the Army's best efforts in previous research yielded five to six pounds of brine salts for every

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62. Interview with author, 5 May 1994.

63. Costner, *GB and VX Campaigns*, 8.

64. Telephone interview with author, 9 August 1994.

65. Interview with author, 5 May 1994.

66. Interview with author, 21 July 1994.

pound of agent. The waste still contained trace amounts of heavy metals. This type of hazardous waste must be disposed of in an approved landfill.[67]

Neutralization may reduce air emissions, observes Baronian, but the by-products of destroying something must go somewhere. "I say, without fear of being wrong, that neutralization will generate, based on what we know today, at least twice as much waste as the incinerators do." Baronian concludes that, "Neutralization is certainly not the answer to reducing waste," but the Army is nonetheless sponsoring additional research in this area.[68]

The Risk Assessment Supporting the Army's Decisions

Completeness of the Army's Risk Assessment

According to baseline critics, the risk of exposure to dioxins and toxins is many times greater through the food chain than it is through direct inhalation. Greenpeace states that, "As with metals, both deposition of PICs onto the surfaces of edible vegetation and their uptake from soil and water play significant roles in human exposure." Greenpeace also reports that exposure to PICs can also occur via ingestion of milk, meat, and eggs. "In Europe and the U.S., ingestion of dairy products is considered a primary route of human exposure to [dioxins and furans], with daily doses approximately 12 times higher than those associated with inhalation."[69] A new EPA study on dioxin also focuses on exposure via the food chain.[70] Critics therefore argue that the Army's risk assessments have calculated the risk of relatively improbable things, such as airplane crashes and earthquakes, but have ignored the most important factors, like the long-term health risks to the population through the food chain.

In particular, baseline opponents emphasize that the Army's risk assessment does not evaluate the risk of incineration (e.g., actual smokestack emissions, food chain exposure) and the risk of using alternative technologies (e.g., demilitarizing the weapons followed by neutralization). Furthermore, a good risk assessment would address: 1) the destruction removal efficiency for incinerators processing items with low concentrations of contamination (e.g., the metal parts and dunnage incinerators); 2) operational upsets in the incinerator; 3) knowing violations of the law that Army officials or contractors may commit; and 4) persistence of health and environmental effects due to the agent/dioxins in the environment and the food chain. In short, a sound risk assessment would address what came out of the stack, who and what was exposed to it, and what happened as a result.[71]

Baronian firmly states that all of these factors have indeed been taken into account to the extent possible. The risk assessments supporting the Environmental Impact

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67. Interview with author, 5 May 1994.

68. Interview with author, 10 May 1994.

69. Costner and Thornton, *Playing With Fire*, 39–40.

70. Lee, "Dioxin Study Spurs Plea for Restrictions," A8.

71. Mick Harrison (Presentation at a Chemical Weapons Working Group Meeting, Washington, D.C., 1994).

Statement calculated the acute risks—the one-time events that may never happen but could have catastrophic consequences if they did. For the chronic risks, the Army went to the Centers for Disease Control and Prevention and the EPA, which have calculated with a great degree of safety factors the emissions that can be released from an incinerator without creating a long-term risk to the population or the environment. "The Army accepted their conclusions because they are the experts in this area. They are confident that they have established criteria that would adequately protect against chronic exposure," Baronian says. In short, latent health risks, while not calculated directly by the Army, have been addressed by the government authorities that regulate these matters.[72]

General Busbee adds that while the Army did not study the latent or long-term risks associated with PICs, it did study exposure to agent. Still, the Army does not claim that this research is comprehensive because its database on human exposures to agent simply does not support a definitive study. To address the concerns about the risk assessment done for the destruction program as a whole, Busbee reports, "We are doing the site-by-site programmatic risk assessments and site-specific environmental impact statements that will update earlier risk assessments and include indirect latent risk and health assessments." However, he observes that completion of these studies is not likely to resolve the controversy surrounding the risk assessment because the Army will still lack a database encompassing forty years of exposure data that would be related to this type of incineration operation. Nonetheless, the Army has understood from the beginning that agent emissions were unacceptable and therefore designed its facilities "to operate so that we never detect agent coming out of the incinerator," Busbee concludes. As a result, the PIC emissions from baseline incinerators are way below federal standards and what is normally associated with incineration operations.[73]

M55 Rocket Instability and the Risk Assessment

The Chemical Weapons Working Group asserts that the Army "grossly exaggerated" the risks of continuing to store the M55 rockets by saying that accidental detonation could take place within 17.7 years. Instead, this group believes that the results of a new study on the M55s show that the rockets should be safe for at least 120 years. These new figures undermine the Army's risk assessment, as well as the recommendations of the NRC that are built upon it. This opposition coalition also charges that recent safety improvements at the storage sites have reduced the risk from storage by over 90 percent from what they were when the 1988 risk assessment was compiled. This factor as well was not included in the NRC's recent recommendations. The bottom line, according to the Kentucky Environmental Foundation's Williams, is that, "The Army has tried to sell their incineration scheme based on fear, intimidation and outright lies."[74]

The whole decision-making process, states baseline opponent Harmon, has been distorted because everyone has been working under the impression that "my god, we have

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72. Interview with author, 10 May 1994.

73. Interview with author, 5 May 1994.

74. Press Release (Berea, KY: Chemical Weapons Working Group, 10 August 1994).

got to hurry. We cannot afford to wait because of the M55s." This impression is false, says Harmon.[75] *The Sierra Club agrees. "They now appear to be using the M55s as an excuse to discourage thoughtful analysis of better approaches and to urge 'panic' construction of controversial and unreliable 'baseline' incinerator complexes."*[76]

Initial results from a study being conducted in response to a request from Tooele, Umatilla, Pine Bluff, Anniston, and Blue Grass Army Depot citizens show that the M55 "may have a longer safe storage life than had previously been predicted." The NRC had also recommended that the stability of the M55s be reevaluated. The full study will be completed later this year, but the Army does not expect the results to effect the viability of the original risk assessment that supported the decision to destroy the stockpile on –site via high temperature incineration. The main reason is that this risk assessment did not factor in the M55 problem in the first place. Instead, it focused on the potential for stockpile accidents to result from such events as tornadoes, airplane crashes, and earthquakes. The Army will use the new M55 study to enhance its stockpile maintenance program until destruction is completed.[77]

The NRC's Stockpile Committee responds that, "The risk of detonation of M55 rockets from spontaneous ignition of M55 propellant was never the basis of the committee's recommendations for promptly proceeding with the disposal program. Consequently, the new information regarding propellant stability does not change the recommendations of the committee." Moreover, "the committee believes that the Army, during its ongoing briefings and presentations to the committee over the years, and in its recent presentation of this new information, has been honest and candid."[78]

As for the assertion that the risk of stockpile storage has been reduced by 90 percent since the 1988 risk assessment was done, the Army is unaware of any data that supports this contention. Furthermore, plans for mitigating the risks of stockpile storage had been laid at the time the original assessment was prepared and were factored into that evaluation. Updated and site specific risk assessments that include all of the latest data are now being done for Tooele and Anniston and will be prepared for the other sites as well.[79]

Alternatives to the Current Destruction Program

Capabilities and Availability of Alternative Technologies

Greenpeace advocates a destruction program that uses a number of "closed–loop" technologies. In a major 1991 report, Greenpeace described several alternative technologies categorized under the headings of biological methods, chemical processes, photochemical processes, electrochemical techniques, neutralization, chemical reprocessing,

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75. Telephone interview with author, 9 August 1994.

76. Sierra Club, "Analysis of Dr. Carl Peterson's Recommendations," 3.

77. U.S. Army Chemical Materiel Destruction Agency, Risk Assessment Survey, News Release (Aberdeen Proving Ground, MD: Chemical Materiel Destruction Agency, 8 August 1994).

78. "Statement of the Stockpile Committee" (Washington, D.C.: NRC, 15 August 1994).

79. U.S. Army Chemical Materiel Destruction Agency, Risk Assessment Survey, News Release.

and thermal processes. Since the publication of that report, baseline opponents have argued with increasing conviction that safer alternatives are both feasible and available. According to Pacific Campaign Coordinator Sebia Hawkins of Greenpeace, "All of the technologies Greenpeace reviewed would definitely be better than incineration."[80]

Baseline opponents also state these technologies could be available in sufficient time to meet international treaty commitments and to demilitarize the stockpile before the purported dangers of storing these weapons increase significantly. According to the Sierra Club's Vincent, the Army already has enough experience with neutralization to make a neutralization facility "operable within two or three years. The private sector could do it in that time-frame."[81] *Another example of a technology that opponents tout is the Defense Department's Advanced Research Projects Agency's supercritical water oxidation project, which, according to bench-scale tests on all chemical agents, can achieve a destruction and removal efficiency of six nines or better.*[82]

Other experts counter that well over a decade could be required to develop, test, and bring alternative technologies on line. The NRC, for example, concludes that it could take from five to twelve years to take an alternative technology through research, development, and pilot plant phases.[83] Building upon the NRC's work, the GAO estimates that alternative technologies could be available between the years 2007 and 2011. As Table 6 shows, the GAO also notes that several alternative technologies would need to be combined to treat the stockpile, since no technology except baseline can destroy or decontaminate the chemical agent, the explosives/propellants, the metal parts, and the dunnage.[84]

The main disadvantages to incineration are that its health effects are still unknown, and complex pollution control systems are needed. The GAO also lists the disadvantages of other technologies. For example, the by-products of neutralization are extremely variable and may cause problematic emissions. Moreover, the neutralized wastes must be treated again, oxidized to stabilize the waste for suitable disposal (e.g., landfilling). With fluidized bed combustion, the GAO notes that it is difficult to achieve the desired destruction and removal efficiency. Operating pressures used during wet air oxidation could result in dangerous leaks. The gas emissions from wet air oxidation will also contain appreciable concentrations of volatile organic compounds and will require additional treatment before release into the atmosphere. Use of molten metal pyrolysis would create gases that contained combustible organic materials and would be very dirty or sooty. A separate afterburner and purifier unit would therefore be needed to clean these gases.[85] In short, no single technology can be portrayed as risk-free or free of drawbacks.

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80. Lawyers Alliance for World Security, *Citizen Attitudes*, 26.

81. Telephone interview with author, 11 August 1994.

82. "Supercritical Water Oxidation Proven," *Environmental Protection* (29 June 1994) 123.

83. This estimate does not take permitting and construction timelines into account. NRC, *Alternative Technologies*, 90.

84. GAO, *Advantages and Disadvantages of Alternatives to Incineration*, 5–9.

85. GAO, *Chemical Weapons: Issues Involving Destruction Technologies*, GAO/T-NSIAD-94-159 (Washington, D.C.: GAO, 26 April 1994) 10–16.

Table 6: Destruction and Decontamination Capabilities and Availability of Alternative Technologies.					
Technology	Can the technology destroy/decontaminate... Chemical Agent?	Explosive Propellants?	Metal Parts?	Dunnage?	Estimated Year to Reach Full-Rate Operations
Baseline Incineration	Yes	Yes	Yes	Yes	Present
Molten Salt Oxidation	Yes	Yes	No	No	2007 to 2008
Fluidized Bed Oxidation	Yes	Yes	No	No	2007 to 2008
Molten Metal Pyrolysis	Yes	Yes	Yes	No	2007 to 2008
Plasma Arc Pyrolysis	Yes	No	No	No	2007 to 2011
Steam Gasification	Yes	No	No	No	2007 to 2011
Wet Air Oxidation	Yes	Yes	No	No	2007 to 2008
Supercritical Water Oxidation	Yes	Yes	No	No	2007 to 2008
Chemical Neutralization	Yes	No	No	No	2007 to 2008

Sources: Chemical Weapons Destruction: Advantages and Disadvantages of Alternatives to Incineration, (Washington, D.C.: GAO, March 1994) table 1 and table 3, pp. 5, 8.

Army Efforts to Develop Alternative Technologies

Many baseline opponents suspect or believe that the Army has never earnestly studied alternative technologies. "Since the 1970's, the Army has never seriously considered alternatives to incineration, even though the Army, in its various laboratories and at its many contractors, has the technical capability to develop other options," says the National Toxics Campaign Fund. Moreover, the Army tried to block a Defense Advanced Research Projects Agency research program that might have buttressed some of the opposition's positions.[86] *While that program was funded, opponents point to the comparative lack of funding for alternative technologies in the last several years as evidence of the Army's unwillingness to consider technologies other than baseline. The Sierra Club concludes that, "The Army has already spent a decade and several billion taxpayer dollars supporting incineration and has a history of resisting serious consideration of alternatives."*[87]

Harmon of Anniston observes that, "For the last two years the Army has had $25 million that Congress has directed them to spend on alternative technologies and they have not spent one damn dollar. The Army says that nobody has come to them and asked for it." This is nonsense, according to Harmon, who explains that the normal process is that the Army would solicit bids for developmental work on alternative technologies. The Army's present approach allows them to tell Congress that no firms are interested in developing alternative technologies, Harmon states. He does concede that the Army gave neutralization a "realistic look" earlier, but then discarded it because there was a question of whether "a toxic adventure might rise up out of a barrel." Incineration was chosen because at that time it gave the Army "less visible problems," says Harmon.[88] *Vincent*

86. Siegel, *The Threat at Home,* 16.

87. Sierra Club, "Analysis of Dr. Carl Peterson's Recommendations," 4.

88. Telephone interview with author, 9 August 1994.

comments that lately, however, the Army has not intently pursued an alternative technologies research program, despite the promise of several potential candidates, most notably a neutralization approach that could treat all agents. "If the Army were really serious about developing alternative technologies, they would have been doing it for years and we would have them by now," says Vincent.[89]

For more than seventy years, the Army has conducted research to devise means to protect its soldiers on the battlefield from chemical attacks. Efforts to devise a destruction program grew out of this research. According to General Busbee, "The Army did study a whole series of alternatives, including neutralization, going back to our pioneering programs in the 1970s, when we had to destroy aging weapons at Rocky Mountain Arsenal. On an industrial scale basis, we pursued destroying the nerve agent GB and mustard using two destruction technologies—neutralization and high-temperature incineration." In Busbee's narration of events, the next key milestone was when the Army presented all of its data from laboratory work and the experience with prospective destruction technologies to the NRC, which in 1984 endorsed incineration as the most direct and likely route applicable to all three agents in the stockpile. In 1985, when Congress mandated that the stockpile be destroyed within such a short time-frame—originally by 1994—there were still questions about neutralization's reversibility and disposal of the resulting hazardous wastes. The Army therefore went with the most efficient technology that could completely destroy the agent. Once this decision was made, unless significant problems or concerns of catastrophic failure arose, Busbee says the Army saw no reason to spend an extra $200 million on parallel research programs.[90]

Comparisons of the money spent on baseline versus alternative technologies are difficult, says former Program Manager Baronian, because baseline was developed before the current, more stringent regulatory requirements. The permitting process consumes a significant amount of time and effort. The baseline development program at the Tooele pilot facility cost about $22 million, whereas the Army is initiating a $45 million research and development program to investigate the feasibility of neutralization as a stand-alone technology or followed by biodegradation. If one must make funding comparisons, Baronian concludes that these two figures are roughly comparable.[91]

This new research program is built around a recent Army breakthrough with a modified neutralization technique. Laboratory tests using a few hundred grams of pure agent—not degraded or gelled agent that is more difficult to destroy—have shown that neutralization might produce three or four pounds of waste per pound of agent neutralized. The results of this "pioneering" laboratory work may not hold true on the larger scale that would be needed for neutralization to be used for stockpile destruction, Busbee warns, but this additional work is being pursued.[92]

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89. Telephone interview with author, 11 August 1994.

90. Interview with author, 5 May 1994.

91. Interview with author, 10 May 1994.

92. Interview with author, 5 May 1994.

Feasibility and Desirability of Disassembling the M55 Rockets

The opposition interprets the Arthur D. Little report as proof that chemical agent can be separated safely from munitions. The Chemical Weapons Working Group states that "The Arthur D. Little study of 1985 provides a blueprint for removing the agent from M55 rockets in a closed-looped system and decontaminating rocket parts to the 3X level," which is safe for personnel handling without protective equipment.[93] *Similarly, another baseline opponent states, "The Army can demilitarize its active CW munitions, decreasing the threat of accidental release of nerve gas or mustard gas. By separating the agent from explosive bursters and propellants, the risk that explosion will disperse the poison is virtually eliminated."*[94] *If the Army was really interested in mitigating risks to the community as soon as possible, concludes the Kentucky Environmental Foundation's Williams, they would not have let this demilitarization concept plan sit on the shelf for almost a decade.*[95] *Karyn Jones, who lives near the Umatilla site, says, "If safety is really the main issue here, I'd like to know why" the Army has not separated these dangerous munitions as diagrammed by this study. "It is very distressing," she notes, "that this technology has been available so long, and that it has not been done."*[96] *The Sierra Club agrees. "The Army has had in its archives a contractor-recommended approach to eliminating those excess risks for nearly a decade. They have done nothing about it.*[97]

According to General Busbee, the Army requested the Arthur D. Little study to see what could be done if the M55s presented an imminent danger before they could be eliminated. Since the baseline program was not encountering difficulties that would significantly delay its implementation, the Army saw no need develop this plan. This preliminary study examined a series of processes and presented suggestions to de-mate the rocket motor from the warhead. A follow-up study, due in October 1994, is being conducted, including a safety analysis of the multiple handling steps recommended in the original report. This analysis will enable a comparison of whether it is safer to get rid of the M55s in one step, as the baseline process does, or to disassemble them in the interim.[98]

Busbee cautions that the M55 hazard would not be eliminated by de-mating the rocket motor from the warhead. The 500,000 M55s at five continental U.S. locations would, if this approach were followed, generate at least one million hazardous components. The M55 warheads, he explains, are made of a thin-skinned aluminum, and their propensity to leak will depend upon the number of times a weapon was moved or shaken and the deterioration of the warhead. Other hazardous components will be burster tubes and shells contaminated with agent. Also undetermined is whether, once de-mated, any

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93. Chemical Weapons Working Group, "Citizen's Solution," 1.

94. Siegel, *The Threat at Home*, 14.

95. Interview with author, 19 May 1994.

96. *Umatilla Citizens Advisory Commission Meeting* (Hermiston, OR: Program Manager for Chemical Demilitarization, 14 March 1994) 49, 52.

97. Sierra Club, "Analysis of Dr. Carl Peterson's Recommendations"," 3.

98. Interview with author, 5 May 1994.

of these items could be shipped elsewhere for disposal. In short, while the Arthur D. Little report has been portrayed as a final game plan, it is, Busbee notes, only an exploratory study.[99]

Neutralization as a Satisfactory Method of Destruction

While the Chemical Weapons Convention does not stipulate the method that nations must use to destroy their chemical weapons, it does specify that the destruction method be "irreversible" as well as safe for humans and the environment. Opponents to baseline argue that enough evidence is already in hand to conclude that demilitarizing the weapons—separating the agent from the other weapon components—and neutralizing the agent would be a significant step toward destruction and should therefore satisfy treaty requirements. In its early efforts, the Army had difficulty determining whether neutralization was complete, Harmon recalls. Therefore, the Army kept adding more neutralizing solution to the mix when the problem was not that the agent had regenerated itself, but that the Army's test of the resulting wastes was inaccurate. Since more neutralizing solution was added than required, the amount of wastes that are normally cited for neutralization are higher than they should be.[100]

Independent assessments appear to support the assertion that demilitarization and neutralization could fulfill treaty obligations. Legal analyst David A. Koplow notes that were the munitions crushed, punctured, or cut in two and the agent neutralized, the weapons "would verifiably no longer be suitable for chemical weapons purposes."[101] *The NRC agrees, stating that "initial weapons disassembly and agent detoxification and partial oxidation could meet international treaty demilitarization requirements and eliminate the risk of catastrophic agent releases during continued storage."*[102]

From October 1973 to November 1976, the Army neutralized 8.2 million pounds of the nerve agent GB at Rocky Mountain Arsenal, Colorado. Another 181,950 pounds of GB were destroyed at Tooele from 1979 to 1982. The Army's experience showed that "neutralization caused some significant problems with respect to the ability to ensure that we had a completely irreversible reaction, that the agent would be destroyed for any further potential military purposes," says Busbee.[103] On 9 March 1982, the Army officially decided to abandon neutralization in favor of incineration, citing the following reasons:

1) The by–product of neutralizing mustard was hazardous and had to be disposed of by incineration anyway;

2) The chemical required to neutralize mustard has a high flashpoint and had caused a laboratory explosion;

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99. Ibid.

100. Telephone interview with author, August 9 1994.

101. Koplow, *Some Disassembly Required*, 13.

102. NRC, *Alternative Technologies*, 20:

103. Interview with author, 5 May 1994.

3) The neutralization reaction can be difficult to control, resulting in more waste product—from 2.6 to six lbs of salt per pound of GB neutralized;

4) The neutralization reaction could be very slow—only 50 percent of the agent was neutralized within twenty-four hours, while other batches took between five and sixteen days and one required forty-eight days of processing;

5) Neutralization can be reversed to reform the original chemical agent;

6) Neutralization is not applicable to all agents in the stockpile.[104]

Busbee notes that the reversibility of neutralization is still in question and is one of the aspects being studied in the current research program.[105] This research program is seeking to build upon the work of a group of Army scientists led by Dr. Yu-Chu Yang, whose research with several hundred grams of mustard agent in the laboratory has shown promise. The Army is pursuing development of neutralization as well as neutralization followed by biodegradation for the agents mustard and VX. These technologies may be applied, as the NRC recommended, to destroy the agents located at the two sites, Newport and Aberdeen Proving Ground, that have bulk storage containers, but no munitions. The cost of taking this research from the laboratory phase to what is known as the "bench" phase, which deals with larger quantities of agent to see if the same results can be achieved, is $45 million. If successful, a pilot plant will be constructed for one or both of the alternative technologies at a cost of $186 million.[106]

The EPA's Michael notes that any alternative involving separation of the munitions and subsequent treatment by another method would also have to go through a lengthy, and by no means automatic, permitting process. For instance, were the munitions to be drained and the agent neutralized, permits would have to be obtained for the agent neutralization process, for interim storage of the neutralized materials and of contaminated components not treated right away, for decontamination and destruction of the metal parts and explosives, and for the ultimate treatment of the wastes. In some cases, federal regulations prohibit storing hazardous materials for more than a year to dissuade postponement of treating hazardous materials. The "permit hurdles" would be just as significant, if not more so, for alternative treatment methods. Michael concludes that choosing alternative disposal options would certainly not buy any time.[107]

Destruction Methods for Stockpile and Non-Stockpile Munitions

The opposition has noticed that the Army is recommending neutralization for its non-stockpile weapons, but not for the stockpile itself. The Sierra Club's Vincent observes that the Army claims that neutralization is not a proven technology, but they have

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104. Kevin J. Flamm, *Chemical Agent and Munition Disposal; Summary of the U.S. Army's Experience*, SAPEO-CDE-IS-87005 (Aberdeen Proving Ground, MD: United States Army, 21 September 1987) pp. 3-75 to 3-80, 3-82.

105. Interview with author, 5 May 1994.

106. Program Manager for Chemical Demilitarization, *Alternative Demilitarization Technology Report for Congress*, pp. 3-30, 3-83.

107. Interview with author, 10 August 1994.

nonetheless issued a bid request for private contractors to develop portable neutralization equipment to treat non-stockpile weapons.[108] *According to the 1993 Annual Stockpile Status Report, "the U.S. Army is currently developing two mobile treatment systems utilizing chemical neutralization to convert the agents into conventional waste on site."*[109] *At a Chemical Weapons Working Group press conference held on 21 March 1994 on Capitol Hill, Aberdeen Citizens Advisory Commission Chairman John Nunn lofted a copy of the Army's non-stockpile report and also questioned why neutralization was the likely method of destruction for non-stockpile weapons, but not for the main stockpile sites. If an alternative method is suitable for non-stockpile weapons, he asserts that it should be appropriate for the stockpile sites as well.*[110]

Archival research indicates that the munitions that compose what are known as the non-stockpile weapons are located in various areas, usually in small caches—one to 100 munitions. Incineration may be used at some non-stockpile sites where there are many weapons. However, General Busbee says, "We do not think it is politically possible from a regulatory point of view to put an incinerator on a tractor trailer or railcars" so that it can be used to destroy three or four munitions at each site. Instead, neutralization can be used for small numbers of munitions or to treat soil that is contaminated by agent. The resulting hazardous wastes can then be moved to a government or commercial hazardous waste incinerator. The non-stockpile situation requires "an entirely different scale and scope of program." In contrast, baseline incinerators will be used at the main stockpile sites, where thousands upon thousands of munitions require destruction. These two situations really are not comparable, Busbee concludes.[111]

Feasibility of Transporting Chemical Weapons

Some baseline opponents believe that building eight separate destruction facilities is an unnecessary expense, especially when the job could be done just as effectively at a national disposal site or two regional ones. Transportation as an option has not been given serious consideration, especially given the fact that as recently as 1990, the Army safely transported weapons out of Germany. Although many opponents now agree that the destruction should be accomplished at the eight stockpile sites, others continue to argue that the Army can and should transport and consolidate these weapons for destruction at Tooele and perhaps at Anniston. "The idea of transporting the chemical agent out of the community to another site was raised at virtually every forum" hosted in 1992–1993 near Aberdeen Proving Ground by the Lawyers Alliance for World Security and the Committee for National Security.[112]

According to Baronian, the Army's risk assessments considered several transportation alternatives. Although destruction at each site proved to be somewhat safer than transporting the munitions, the deciding factor was that the Army concluded that a much

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108. Telephone interview with author, 11 August 1994.

109. U.S. Chemical Materiel Destruction Agency, *1993 Annual Status Report*, 2.

110. Author's notes from this press conference.

111. Interview with author, 5 May 1994.

112. Lawyers Alliance for World Security, *Citizen Attitudes*, iv.

more viable emergency response capability could be created at eight fixed sites rather than along the transportation corridors that would be needed for shipping these weapons to a regional or national destruction center. "The Army never said transportation was not safe, but the fact that weapons were shipped safely out of Germany demonstrates only that that particular move went safely, not that all such moves would turn out that way. The Germans took special precautions, such as closing highways, and we would probably do the same if a decision was made to move this stuff. We could probably move it safely, but the operative word is 'probably'." Baronian emphasizes that, "The problem with transportation is not technical: the problem with transportation is political. What governor is going to get re-elected after letting chemical weapons be shipped through his state? Why should the people in that state, who now have absolutely no exposure threat from the stockpile, allow these weapons to transit their state and incur the unspecified risk of transport?" In sum, it is politics, not the Army's capability to move these weapons with reasonable safety, that stands in the way of transportation options.[113]

The National Academy of Science's Role

Composition of the NRC's Committees

Baseline opponents assert that the NRC panels were imbalanced, stacked with combustion engineers that skewed the NRC's reports in favor of incineration. The panels lacked expertise in such key areas as the environmental sciences, toxicology, public health, and risk assessments, say the Kentucky Environmental Foundation's Williams and Greenpeace's Hawkins. Furthermore, candidates nominated by the opposition were not seated on the two oversight panels, the Stockpile Review Committee and the Alternative Technologies Committee.[114] *The Alternatives Committee was pretty well constituted and did a reasonably good job, according to both Vincent and Harmon, of Pueblo and Anniston, respectively. These two opponents criticize the Stockpile Committee, which, as Vincent recalls, was created to advise the Army on its incineration program, not on alternative technologies. He believes that the Stockpile Committee's membership continues to reflect this original bias. Since the committee does business by consensus, the "incineration advocates" on it have overwhelming influence. Vincent also questions whether the committee members went beyond the bounds of their expertise. "The Stockpile Committee," he states, "on any number of occasions drew conclusions about the safety of incineration as a method of disposal with literally no expertise in the medical, public health or other disciplines that are necessary to draw those conclusions." Harmon simply says, "I am really disappointed in them. I have a higher opinion of scientists than what I have seen come out of this group."*[115]

Such charges confound Dr. Carl Peterson, who chaired the Stockpile Review Committee. "A committee is by definition of a finite size," he says. "There will always

113. Interview with author, 10 May 1994.

114. Interviews with author, 19 May 1994 and 2 March 1994.

115. Ross Vincent, telephone interview with author, 11 August 1994; James Harmon, telephone interview with author, 9 August 1994.

be some expert that somebody can find that they think should be on the committee because they represent a specific point of view. To be effective, we do not need to have 'one of every kind' of expert on the committee." Instead, he explains, the panel holds meetings and talks with other specialists to tap additional expertise, which the panel is competent to evaluate. When the panels were formed, the NRC solicited nominations. One member of both the Alternatives and Stockpile panels, a biochemist, was nominated by Greenpeace, Peterson notes.[116] Figure 13 depicts the role that the NRC has played in evaluating alternative technologies and the Army's baseline destruction program.

Donald Siebenaler, a key staff assistant to both committees, explains that the committees are composed mostly of scientists that have a "broad depth in the hard sciences," such as chemists or chemical engineers, who can evaluate any type of destruction proposal. The Alternatives Committee consisted of five chemists or chemical engineers and seven specialists of other types, including experts in toxicology, risk assessment, and monitoring technologies. The Stockpile Committee had one chemist, eight members who were environmental, chemical, or biomechanical engineers, and eight specialists in other disciplines, including two risk assessment experts, a biochemist, and a biologist. Siebenaler states that the Stockpile Committee's composition was changed because alternative technologies were being weighed. Also, Dr. John Longwell, who chaired the Alternatives Committee and served on the Stockpile Committee, is a chemical engineer whose research at the Massachusetts Institute of Technology's Environmental Health Sciences Center focuses on the health effects of incineration. Nominees for these committees, Siebenaler explains, are reviewed by peers and can be ruled out for bias, insufficient expertise, or conflict of interest.[117]

Independence of the NRC's Oversight

According to some baseline opponents, the NRC has functioned as a sales force for incineration, bought and paid for by the Army. They claim that the so-called independent oversight of the NRC is seriously flawed. The Kentucky Environmental Foundation reviewed the NRC's latest report in the following way: "For an 'independent' scientific agency, the NRC reported little that was either independent or scientific. Their contradicting conclusions are based on past Army documentation, and the overall tone of the report rings with the Army's influence."[118] *The Sierra Club's Vincent agrees with this assessment, saying the NRC "even used the same rhetoric as the Army to explain their decisions. They failed to go outside of the Army-provided data to find data that would have been useful and instructive in drafting their ultimate recommendations. Their evaluation of the Army data was superficial and on the outside data it was all but nonexistent," he concludes.*[119]

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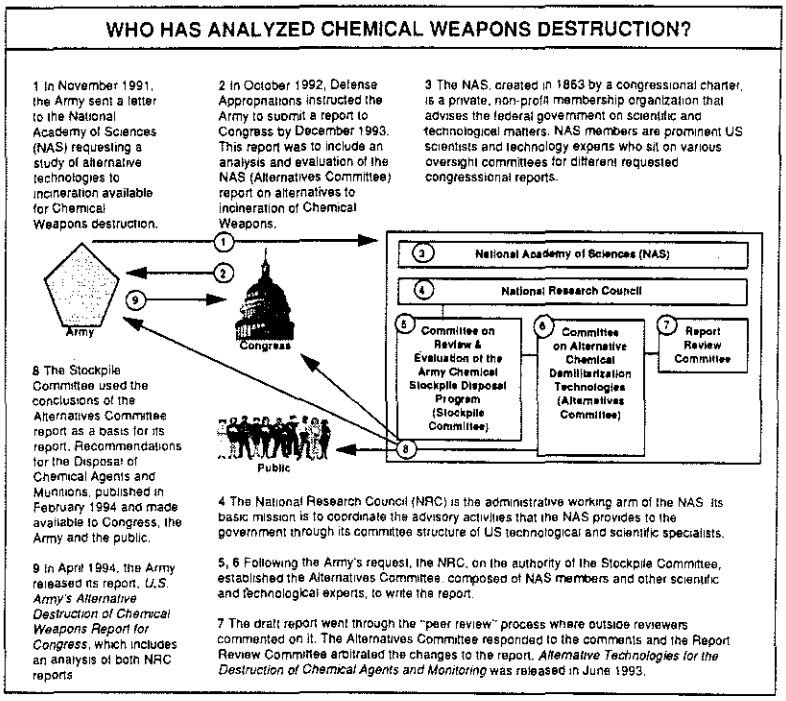
116. Interview with author, Washington, D.C., 21 June 1994.

117. Interview with author, Washington, D.C., 25 July 1994.

118. *Common Sense: A Newsletter of Common Ground* (Berea, KY: The Kentucky Environmental Foundation, March 1994) 1.

119. Telephone interview with author, 11 August 1994.

Figure 13: The Role of the National Academy of Sciences in Reviewing the Army's Program.



Source: "Chemical Weapons: Fact Sheet No. 1: Chemical Weapons Destruction and Disposal in the United States" (Committee for National Security, undated) 2.

The Chemical Weapons Working Group asserts that the NRC's lack of independence is further reflected in the fact that the NRC did not conduct its own risk assessment, nor did it take into account that the Army's stockpile maintenance programs have "reduced the storage risk by over 90 %." The coalition also charges that the Army purposely misled the NRC about these improvements.[120] *According to baseline opponent Harmon, the NRC, lacking information on the risks of incineration, erroneously assigned incineration a risk value of zero. Just as neutralization has risks, so does incineration, argues Harmon, who notes that, "There is risk getting on the interstate. If you do not have enough information, you should not make a recommendation." For these reasons, the NRC's report is invalid, he argues. Furthermore, Harmon asks that the NRC and the Army should reconsider alternative technologies in light of the reduced threat from stockpile storage.*[121]

"The NRC is not taking sides," says Peterson, who chaired the Stockpile Committee. "We do not have an ax to grind or a technology to sell. We were asked to evaluate the options, which we have done. We believe that the incinerators with the pollution abatement system that are involved here pose no health hazard. To discount what some people have said, committee members are unpaid." This factor should weigh in favor of

120. Chemical Weapons Working Group, press release (Berea, KY: 10 August 1994).

121. Telephone interview with author, 9 August 1994.

the NRC's impartiality, Peterson observes, if "one's integrity is inversely proportional to how much he is paid."[122] NRC staffer Siebenaler refutes the bought–and–paid–for insinuation by pointing out that committee members receive the barest of recompense—travel, hotel, and $34 a day for food. They donate their time and are "not paid a dime," says Siebenaler.[123]

When the NRC first began to review the Army's program, it endorsed incineration in 1984 because "we believed it would do the job safely," says Peterson. The starting point for evaluating any technology or system must be the data on its performance, which in this instance was provided by the Army.[124] Accordingly, says Peterson, "We based our opinion on the test burn results at Johnston Atoll, which show that the dioxins emitted from this facility are about a quarter of what a diesel truck going forty miles an hour would emit." When these incinerators are operating correctly, Peterson continues, "the pollution in the form of dioxins has to be considered negligible." In the event of upset conditions, the NRC recommended charcoal filters to handle any increase in PICs that might result.[125]

As for a separate risk assessment, that task is beyond the capacity of a committee of volunteers. A risk assessment, Peterson explains, is a major undertaking that requires a full staff. Although the committee did not conduct a new risk assessment, he stated that it "can evaluate the work of others and has done so in this instance with great care." Peterson stresses that the NRC's committees are "not incinerator salesmen. We have seriously recommended promising alternatives" to incineration, as well as improvements to the Army's baseline program.[126] On the subject of rumors about an Army–NRC cabal, former Program Manager for Chemical Demilitarization Baronian adds, "We have had several disagreements with the NRC. The NRC has criticized our programs and recommended improvements. I do not at all consider the Army and the NRC as one in the same."[127]

The Charcoal Filters Recommended by the NRC

The charcoal filters that the NRC has recommended are equivalent to putting a Band–Aid on a hemorrhage, according to some opponents. "I have been hearing a lot of horror stories about the carbon filters too," says Williams of the Kentucky Environmental Foundation. For instance, he says that the water used to quench extremely hot exhaust gases must be evaporated before the gases hit the filters or they will not operate correctly. Also, the addition of the charcoal filters could cause pressure to back up in the entire system, increasing the chances of fire and explosion.[128] *Anniston's Harmon believes that*

122. Interview with author, 21 June 1994.

123. Interview with author, 25 July 1994.

124. The NRC states that the Army has provided accurate and complete data for its evaluation. See the statement under the heading "M55 Rocket Instability and the Risk Assessment."

125. Interview with author, 21 July 1994.

126. Ibid.

127. Interview with author, 10 May 1994.

128. Interview with author, 19 May 1994.

expectations about what the charcoal filters can accomplish are being falsely inflated by the Army and the NRC. A filter is only effective when the volume of air that flows through it is carefully controlled to the absorption capacity of the filter bed; otherwise the filters will fail. Charcoal filters are "highly flammable," he notes, and have not been proven to work with agent.[129]

Likewise, the Sierra Club's Vincent is skeptical of carbon filters. He explains that carbon filters are like tiny magnets that attract particulates so that they stick to the surface. However, just as these particulates can be attracted, so can they be released. The Army will be "really lucky" in the first place if the filters attract all of the problem PICs because it is not known whether that will occur, says Vincent. He also adds that the Army plans to incinerate the filters themselves, essentially reincinerating whatever particulates they may have captured. "It is possible that the activated carbon filters are an improvement, but I need more information before I am ready to accept that," he notes.[130]

The NRC specified four problems that could be encountered in working with carbon filters, namely the need to cool and dehumidify gases; the loss of absorption capacity if water contacts the charcoal; poor removal efficiency due to leakage around or through the carbon beds; and the potential for fire hazard if temperatures are not monitored and controlled. Peterson says that the NRC stipulated these caveats to point out that a charcoal filter system has to be designed correctly to enable the filters to operate well. The charcoal beds are a complete downstream add–on to the existing pollution control system. Peterson is confident that the Army's engineers can adapt this technology, which is used routinely in industry, to the baseline system. More powerful induced draft fans will probably be added to help regulate pressures.[131] Figure 14 shows how charcoal filters are used to clean the air inside the baseline facility at Johnston Atoll. The Army already has some experience working with charcoal filters.

Peterson observes that, "The reduction in PICs brought about by the addition of charcoal filters is small because, to begin with, the quantities are small. The reduction in trace amounts of agent and in dioxins will be such that those things will be undetectable." Peterson notes that the two agent releases on Johnston Atoll that have occurred while the incinerators were not operating would have been captured by these charcoal filters. The NRC recommended them as an additional safeguard against upset operating conditions and human error.[132]

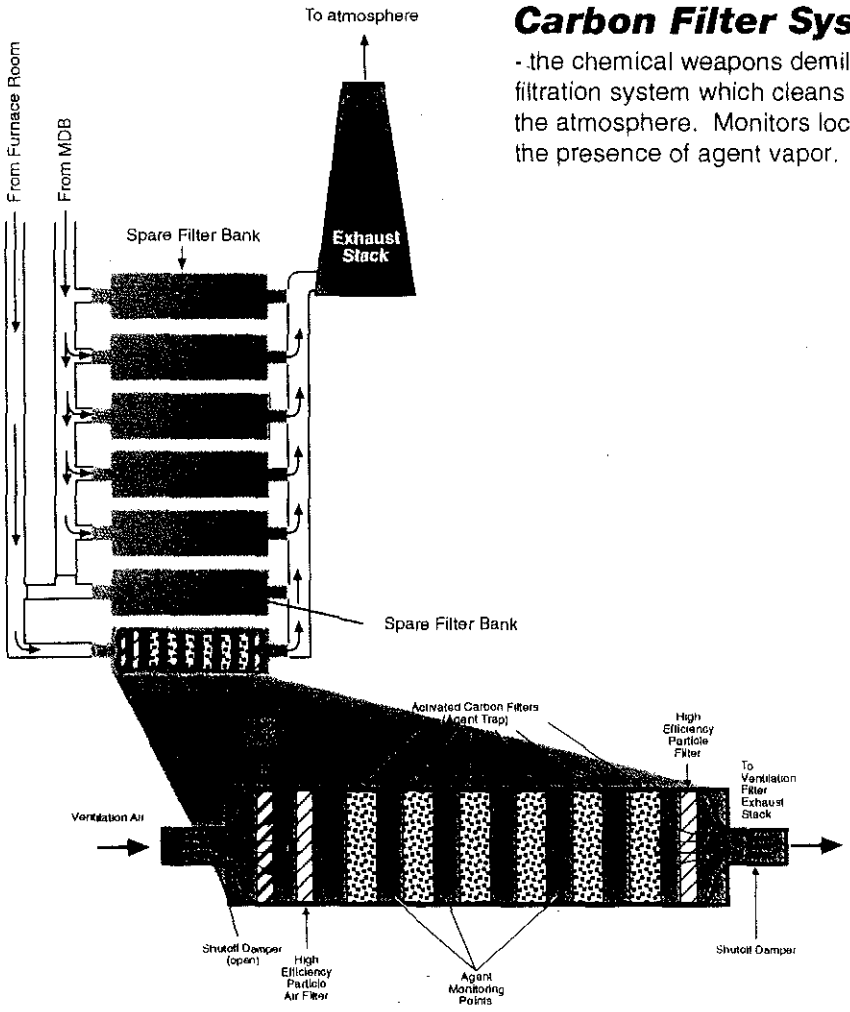
129. Telephone interview with author, 9 August 1994.

130. Telephone interview with author, 11 August 1994.

131. Interview with author, 21 June 1994.

132. Ibid.

Figure14: The Carbon Filter System for Ventilation at Johnston Atoll.



Source: Image courtesy of the U.S. Army Chemical Materiel Destruction Agency.

Appendix B:
U.S. Chemical Demilitarization Chronology

Compiled by Maureen Lenihan

1915–1969	The United States disposes of old chemical agents and munitions by open pit burning, atmospheric dilution, burial, and ocean dumping.
1960	The Ten—later Eighteen—Nation Disarmament Conference begins negotiations to ban chemical weapons and require the destruction of chemical weapon stockpiles. The United States participates in the negotiations.
June 1969	The National Research Council (NRC) recommends that ocean dumping of chemical munitions be discontinued. The NRC instead suggests incineration for the blister agents and neutralization for the nerve agent GB.
October 1970	The Armed Forces Appropriation Act requires detoxification of weapons prior to disposal, as well as a public health review of any disposal plans by the Department of Health and Human Services.
12 January 1971	The Foreign Military Sales Act prohibits the transportation of chemical weapons from Okinawa, Japan, to the continental United States.
1972	A senior advisory panel to the U.S. Army Materiel Command supports the use of incineration to destroy blister agents and neutralization to destroy nerve agents. However, the panel also recommends that the Army continue testing incineration to destroy nerve agents.
1972–1976	At Rocky Mountain Arsenal, near Denver, Colorado, the Army incinerates over 2,700 metric tons of the blister agent mustard in ton containers and chemically neutralizes over 3,700 metric tons of the nerve agent GB in ton containers.
1979	The Army constructs a new chemical agent disposal system at the Tooele Army Depot, Utah to test high-temperature incineration as well as neutralization. From 1979 to 1987, the Army destroys over eighty-three metric tons of chemical agent and nearly 38,000 munitions and containers by incineration at the Chemical Agent Munitions Disposal System (CAMDS) facility.
March 1980	Negotiations on the Chemical Weapons Convention continue under the auspices of the Conference on Disarmament's Ad Hoc Committee on Chemical Weapons. The number of nations participating rises to forty.

9 March 1982	After encountering significant difficulties with neutralization, the U.S. Army selects incineration as the method of destruction. These difficulties include: 1) a hazardous byproduct that still requires incineration; 2) a laboratory explosion; 3) a greater volume of waste product; 4) lengthy processing time; 5) potential for the chemical agents to reform; and 6) technique not applicable to all chemical agents.
April 1982	An Arthur D. Little Corporation study concludes that using incineration rather than neutralization to dispose of chemical weapons will produce a net cost reduction.
1 July 1983	The United States General Accounting Office (GAO) reports that the Army's annual chemical weapons storage costs, including security and safety expenses, are $181 million for all storage sites.
1984	The NRC Committee on Demilitarizing Chemical Munitions and Agents reviews a range of chemical weapons disposal technologies and endorses the Army's selection of incineration, the so-called "baseline" approach.
September 1985	Building upon the developmental experience of CAMDS, the U.S. Army begins construction of the Johnston Atoll Chemical Agent Disposal System (JACADS), a prototype full-scale baseline facility.
November 1985	Public Law 99-145 directs the Department of Defense (DOD) to destroy 90 percent of the total U.S. stockpile of unitary chemical agent and munitions by 30 September 1994. It also directs DOD to destroy the disposal facilities upon completion of the chemical weapons destruction. The Army estimates the total cost for the chemical weapons destruction program to be $1.7 billion.
14 March 1986	The Army provides Congress a concept plan for disposing of the chemical weapons stockpile. The plan has three options: 1) on-site destruction; 2) transportation to a national destruction center at Tooele; and 3) transportation to two regional destruction sites at Anniston, Alabama, and Tooele.
November 1986	The Defense Authorization Act for fiscal year 1987 prohibits the shipment of chemical weapons, components, or agents to the Blue Grass Army Depot, Kentucky for any purpose, including disposal.
January 1987	Operations at CAMDS at Tooele are suspended as the result of a low-level release of the nerve agent GB from the incinerator stack. No operations were ongoing at the time of the incident and no injuries were reported.

1987	The NRC's Committee on Review and Evaluation of the Army Chemical Stockpile Disposal Program (Stockpile Committee) is formed at the request of the Under Secretary of the Army to monitor the disposal program and to review and comment on relevant technical issues.
January 1988	The Army releases the *Programmatic Environmental Impact Statement* for the U.S. chemical weapons destruction program. It determines that on-site disposal poses the smallest environmental and health risks. The Army also determines that a chemical stockpile emergency preparedness plan is necessary to offset the risks of continuing to store the aging chemical weapons stockpile until destruction can be completed.
23 February 1988	The Under Secretary of the Army announces that chemical weapons will be incinerated at the eight stockpile storage sites. This alternative was selected over transportation options because a more credible emergency response program could be established at the storage sites rather than along transportation corridors.
15 March 1988	The Army submits a Chemical Stockpile Disposal Program implementation plan to Congress in which the deadline for destruction of the chemical weapons stockpile is extended until 30 April 1997 to permit more full-scale testing at the JACADS baseline facility. The total cost of chemical weapons destruction rises to $2.7 billion.
28 September 1988	In Public Law 100-456, Congress orders an operational evaluation period, known as Operational Verification Testing (OVT), for JACADS. This testing allows for the identification of potential problems in baseline facility operations.
October 1988	The first training session for health care professionals in the medical management of chemical exposures is held under the auspices of the Chemical Stockpile Emergency Preparedness Program.
September 1989	The Soviet Union and the United States sign the Wyoming Memorandum of Understanding, which provides for bilateral data exchanges and verification experiments. This agreement is intended to enhance cooperation between the two countries, as well as spur efforts to conclude the multilateral Chemical Weapons Convention.
September 1989	EG&G Incorporated is awarded a $212 million contract to build the first fully integrated, industrial size chemical disposal facility in the continental United States at Tooele.

13 November 1989	Congress directs the Army "to study the feasibility and desirability" of using the chemical weapons demilitarization facilities for other purposes.
15 February 1990	The Army releases the *Draft Environmental Impact Statement* for JACADS, which concludes that incineration will have minimal environmental impact on the island and surrounding ocean areas.
May 1990	Greenpeace publishes *Playing With Fire*, which highlights the dangers of hazardous waste incineration, including possible long-term environmental and health effects.
1 June 1990	The United States and the Soviet Union sign the Bilateral Destruction Agreement. The accord stipulates that destruction start by December 1992 and that all but 5,000 tons of each nation's stockpile be destroyed by 2002. Problems in the Russian destruction program cause deadlines to slip to a June 1997 start date and a June 2004 completion date. This agreement has yet to enter into force.
30 June 1990	The Army begins the first full-scale OVT on Johnston Atoll. A series of four OVTs are set to destroy M55 rockets containing nerve agent GB, VX-filled M55 rockets, ton containers of mustard, and mustard-filled 105 mm M60 projectiles.
26 July 1990	The United States begins removal and transport of its chemical weapons from West Germany to Johnston Atoll.
27 October 1990	President George Bush announces that chemical weapons from the continental United States will not be transported to Johnston Atoll for destruction.
8 December 1990	Trace amounts of nerve gas escape through the JACADS stack as the agent incinerator is being shut down. The nerve gas emission is only a fraction of the maximum amount allowable under the Surgeon General's standard to protect public health and safety.
January 1991	The Mitre Corporation releases a congressionally requested report about the end-use of baseline facilities. It concludes that while it may be technically possible to utilize the baseline facilities to dispose of contaminated soils or other military wastes, it is not economically feasible when compared to other alternative methods. Nor would such future use be desirable for other reasons.
27 February 1991	JACADS completes Phase I of the OVT, destroying over 7,500 rockets and 77,000 pounds of the nerve agent GB. However, problems such as the build-up of molten aluminum in the

	deactivation furnace required the Army to run this OVT longer than originally planned.
March 1991	The Army reports to Congress that the chemical weapons disposal program will cost at least $6.5 billion and will not be completed until June 1999 because of design changes and new estimates of processing rates, plant availability, and the number of personnel needed.
March 1991	The NRC's Stockpile Committee suggested, and the Army agreed, that a new study of alternatives to incineration be undertaken.
25 April 1991	Approximately 1,700 citizens turn out in Richmond, Kentucky, to protest the planned incineration facility nearby.
April 1991	Utah state officials announce that the state will no longer accept deliveries of chemical weapons to CAMDS.
April 1991	The construction of the Chemical Demilitarization Training Facility is completed at Aberdeen Proving Ground, Maryland, where personnel who will operate baseline facilities will be trained before being posted to an actual disposal plant.
13 May 1991	The Bush administration announces that the entire U.S. stockpile of chemical weapons, both binary and unitary weapons, will be destroyed upon entry into force of the Chemical Weapons Convention.
24 May 1991	Greenpeace International issues *Technologies for the Detoxification of Chemical Weapons: An Information Document*, which condemns incineration as a method for chemical weapons destruction and proposes alternative approaches including biological, chemical, photochemical, electrochemical, neutralization, and thermal processes.
May 1991	The National Defense Authorization Act for fiscal year 1992 prohibits the U.S. Government from transporting any more chemical agents to Johnston Atoll except for U.S. World War II munitions discovered in the Pacific region.
May 1991	The Army transports 109 World War II mustard–filled artillery projectiles from the Solomon Islands to Johnston Atoll for storage and destruction.
21 November 1991	An NRC panel concludes that the United States can not employ cryofracture quickly enough to meet the 2002 deadline of the Bilateral Destruction Agreement, but also concludes that cryofracture is technically feasible. With cryofracture, weapons are first frozen, then smashed, and finally incinerated.

November 1991	The Chemical Weapons Working Group convenes the first international citizens conference in Kentucky to formulate a united platform against chemical weapons incineration.
January 1992	The NRC Committee on Alternative Chemical Demilitarization Technologies (Alternatives Committee) is established to develop a comprehensive list of alternative technologies and to review their capabilities and potential as stockpile disposal technologies.
21 January 1992	On Johnston Atoll, a burster from an M55 rocket detonates and punches a hole in the inner lining of the deactivation furnace, which destroys the explosives and propellants from the weapons. No significant release of agent occurs.
31 March 1992	JACADS exceeds production goals when 13,889 VX-filled rockets are destroyed and 134,961 pounds of VX are incinerated during Phase II of OVT.
May 1992	The site for the proposed cryofracture plant is changed from Tooele to the Pueblo Depot in Colorado for cost efficiency.
3 June 1992	For the first time, the United States officially releases the total amount of its chemical weapons stockpile—31,400 agent tons.
16 June 1992	The Army tells Congress that the cost of chemical weapons destruction could reach $9 billion.
15 July 1992	A Kentucky law requires that the baseline facility planned for the Blue Grass Depot operate at 99.9999 percent destruction removal efficiency. The Army states that this requirement poses no major obstacle. The law also requires the Army to show that no safer alternative disposal technology exists, or is likely to exist.
26 August 1992	JACADS completes Phase III of OVT with test burns of M55 rockets containing GB and VX nerve agents and of one-ton containers of mustard. JACADS exceeded production goals during Phase III after sixty-seven ton containers and 113,031 pounds of mustard were destroyed.
1 October 1992	The U.S. Army Chemical Materiel Destruction Agency is established as the single office responsible for all Department of Defense chemical warfare destruction activities.
28 October 1992	The National Defense Authorization Act for fiscal year 1993 directs the Army to: (1) dispose of the entire unitary stockpile by 31 December 2004; (2) submit to Congress by 31 December 1993 a report on potential alternatives to the baseline system; (3) establish citizens commissions in Kentucky, Indiana, and

	Maryland. The bill prohibits the study of transporting chemical weapons and of the future use of baseline facilities. In addition, construction at Anniston is halted until the alternatives report is completed.
2 January 1993	JACADS shuts down after a fire breaks out in a containment area during OVT IV. No injuries occur. An investigation finds that the suspected cause of the fire is friction that was generated by a fuse booster cup becoming wedged against a moving conveyor belt, which contained explosive material.
6 January 1993	Buried chemical munitions were found in the Spring Valley section of Washington, D.C., at a former defense site. Once unearthed, they are sent to Pine Bluff, Arkansas, for storage and eventual disposal.
13 January 1993	The Chemical Weapons Convention opens for signature in Paris. The U.S. joins 129 other countries as original signatories of the treaty banning the development, production, stockpiling, acquisition, transfer, and use of chemical weapons.
14 January 1993	The NRC's evaluation of the Army's Chemical Stockpile Disposal Program concludes that efforts by the Army to assess the risks of destroying chemical weapons fall short of what is needed. The NRC recommends that the Army perform a site–specific, full–scope, scenario–based risk assessment for each of the planned facilities, instead of relying on its *Final Programmatic Environmental Impact Statement.*
January 1993	The Secretary of the Army requests that the governors of Kentucky, Indiana, and Maryland—the so called "low–volume" states—begin forming Citizens Advisory Commissions (CACs). Governors in other stockpile states may request formation of CACs.
13 February 1993	A commissioner of Tooele County, Utah, proposes that the entire U.S. chemical weapons stockpile be accepted for destruction at the Tooele baseline facility in return for a new $20 million county hospital.
23 February 1993	A GAO study raises new doubts about the Army's ability to meet its chemical demilitarization schedule. The report discusses the various problems, delays, and shutdowns on Johnston Atoll, as well as the problems with time requirements to obtain the requisite environmental permits for all of the destruction facilities.
6 March 1993	The fourth and final JACADS OVT ends, having destroyed 18,925 projectiles and 35,487 pounds of mustard.

10 June 1993	The NRC's Alternatives Committee releases *Alternative Technologies for the Destruction of Chemical Agents and Munitions*. The report discusses technologies that could replace the baseline system, such as neutralization, biodegradation, wet air oxidation, and plasma arc pyrolysis. Otherwise, the NRC supports enhancing the emissions safety of whatever technology is eventually selected for each destruction site, specifically recommending the addition of charcoal filter beds to the pollution control systems of baseline facilities.
30 June 1993	The NRC's Stockpile and Alternatives Committees hold a public forum to hear concerns with the planned disposal operations.
16 July 1993	The GAO testifies that local communities near the country's chemical weapons storage depots are unprepared to cope with an accidental release of poison gas, despite the $187 million already spent on the Chemical Stockpile Emergency Preparedness Program.
11 August 1993	The Army opens the $385 million Tooele baseline facility and soon begins to run tests of its equipment in preparation for trial burns to prove that the incinerators can meet stipulated pollution control standards.
25 August 1993	The Army certifies the safety of JACADS operations, clearing the way for the program to continue to receive congressional funds and allowing testing to begin at the Tooele facility.
August 1993	The Army submits a congressionally mandated report on the physical and chemical integrity of the chemical weapons stockpile, stating that the stockpile can be safely stored until the year 2004.
9 September 1993	A mustard leak of approximately 100 gallons from a one–ton container is discovered at Tooele Army Depot. No apparent exposures or casualties result, and the amount of agent released is well below Environmental Protection Agency (EPA) levels of concern.
26 November 1993	The Army estimates that it will cost $8.6 billion to destroy the U.S. chemical weapons stockpile.
30 November 1993	The Browder Amendment to the Defense Authorization Act requires that one other site must be scheduled for construction within a twelve–month period and that JACADS must comply with safety and environmental regulations for six months before construction can begin at the Anniston site.
4 February 1994	The NRC's Stockpile Committee issues recommendations on chemical demilitarization. The NRC concludes that the base-

	line incineration system has been demonstrated to be a safe and effective disposal process. Although supporting continued research on alternative technologies, the NRC states that the benefits of developing another successful technology are outweighed by the risk associated with the many additional years of storage needed to develop alternative technologies fully.
19–20 March 1994	The Chemical Weapons Working Group holds its third annual conference, developing a position paper on safe chemical weapons disposal alternatives to incineration, which is released shortly thereafter later at a press conference on Capitol Hill.
23 March 1994	The nerve agent GB is released from the common stack of the agent incinerator at JACADS. An investigation team concludes that operator error and improperly functioning gauges were the primary causes of the agent release. No injuries occur and the amount of agent released is well below EPA levels of concern.
8 August 1994	The Army announces that the propellant used in M55 rockets may have a longer safe storage life than previously predicted. However, the Army also notes that its risk assessment was based on low–probability, high–consequence events, such as tornadoes or an airplane crashes, that could cause catastrophic accidents during storage, transport, or disposal of the stockpile. The stability of the M55s and the degradation of the other stockpile munitions were not factored into the risk assessment.

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Annotated by Maureen Lenihan

Army, Contractor Documents About JACADS

Macrae, Scott R., et al. *Evaluation of the HD Projectile Test: Johnston Atoll Chemical Agent Disposal System Operation Verification Testing.* MTR–93W0000060. McLean, VA: Mitre, May 1993.
Describes the last of four operational verification tests at JACADS in which mustard agent was incinerated. Concludes that health and safety requirements were fulfilled, but production levels were below the optimal performance goals.

Macrae, Scott R., et al. *Evaluation of the HD Ton Container Test: Johnston Atoll Chemical Agent Disposal System Operational Verification Testing.* MTR–93W0000002. McLean, VA: Mitre, April 1993.
Determines that all health and safety regulations were fulfilled in the third operational verification test at JACADS in which mustard agent was incinerated.

Macrae, Scott R., et al. *Evaluation of the VX Rocket Test: Johnston Atoll Chemical Agent Disposal System Operation Verification Testing.* MTR–92W0000064. McLean, VA: Mitre, November 1992.
Describes the results of the second of four tests at JACADS in which M55 rockets containing the nerve agent VX were destroyed. Finds that the effort fulfilled both production goals and federal health and safety regulations.

Menke, John L., et al. *Evaluation of the GB Rocket Campaign: Johnston Atoll Chemical Agent Disposal System Operation Verification Testing.* MTR–91W00039. McLean VA: Mitre, June 1991.
Describes the first operational verification test at JACADS in which M55 rockets containing nerve agent GB were destroyed. States that the effort did not meet production goals and raises safety concerns.

The Mitre Corporation. *Summary Evaluation of the Johnston Atoll Chemical Agent Disposal System: Operational Verification Testing.* MTR–930000036. McLean, VA: Mitre, May 1993.
Concludes that although production goals were not fulfilled, JACADS satisfied all safety and environmental requirements during operational verification testing. Also recommends improvements for future baseline facilities.

The Mitre Corporation. *Transportation of Chemical Agents and Munitions: A Concept Plan.* SAPEO–CDE–IS–87003. McLean, VA: Mitre, 30 June 1987.
Examines issues surrounding the transportation of chemical munitions with specific attention toward three disposal alternatives: 1) destroy the agents and munitions at their current storage installations; 2) move the stockpile to regional destruction centers at Anniston and Tooele Depot; and 3) move the stockpile to a national destruction center at Tooele. Also offers a transportation concept plan for on-site and off-site movement of chemical munitions.

Southern Research Institute. *Results of the RCRA Trial Burn and TSCA Demonstration Burn of the Deactivation Furnace System With M55 VX Rockets At the Johnston Atoll Chemical Agent Disposal System.* Birmingham, AL: Southern Research Institute, 23 June 1992.
Presents the test procedures and results for the trial burn of rockets filled with VX in the deactivation furnace system at JACADS.

Southern Research Institute. *Results of the RCRA Trial Burn With VX Feed For the Liquid Incinerator At the Johnston Atoll Chemical Agent Disposal System.* Birmingham, AL: Southern Research Institute, 23 June 1992.
Summarizes the field activities, chemical analyses, and data analyses associated with the trial burns for incineration of the nerve agent VX in the agent incinerator at JACADS. Also states that these operations were within RCRA permit parameters.

St. Pierre, Gregory W. *Johnston Atoll Chemical Agent Disposal System: Chemical Agent Release From the Common Stack.* Aberdeen Proving Ground, MD: Department of the Army, March 1994.
Examines the release of nerve agent GB from the common stack during maintenance, not operation, of the agent incinerator at the Johnston Atoll baseline facility on 23 March 1994. Concludes that operator error and improperly functioning gauges were the primary causes of the agent release.

United Engineers and Constructors. *RCRA Trial Burn Report For HD - Mustard Ton Containers - Metal Parts Furnace At the Johnston Atoll Chemical Agent Disposal System.* United Engineers & Constructors, 16 December 1992.
Summarizes the procedures and results of the fourth in a series of trial burns at JACADS. This trial burn encompassed the destruction of mustard agent HD in the metal parts furnace, demonstrating that it could operate within the permit parameters of the Resource Conveservation and Recovery Act.

U.S. Army Chemical Materiel Destruction Agency. *Environmental Report For the Johnston Atoll Chemical Agent Disposal System: Operational Verification Tests 1 & 2.* U.S. Army Chemical Materiel Destruction Agency, 3 September 1993.
Describes JACADS and asserts that although the prototype facility did not meet production goals, it fulfilled environmental and safety requirements during operational verification testing.

U.S. Army Chemical Materiel Destruction Agency. *Johnston Atoll Chemical Agent Disposal System: Operational Verification Tests 1 & 2.* U.S. Army Chemical Materiel Destruction Agency, September 1993.
Describes the JACADS and two operational verification tests. It reports the success of the JACADS facility in meeting production goals while safeguarding workers, the public, and the environment.

U.S. Army Chemical Materiel Destruction Agency. *Process Report For the Johnston Atoll Chemical Agent Disposal System.* U.S. Army Chemical Materiel Destruction Agency, 3 September 1993.
Describes the chemical weapons incineration process at JACADS and determines that the JACADS operations met or exceeded all of the safety and environmental compliance criteria. Also notes the need for improvements.

U.S. Army Chemical Materiel Destruction Agency. *Safety Report For the Johnston Atoll Chemical Agent Disposal System.* U.S. Army Chemical Materiel Destruction Agency, 3 September 1993.
Discusses the U.S. Army's baseline facility at Johnston Atoll and the safety precautions incorporated into the incineration process.

U.S. Army Environmental Hygiene Agency. *Health Risk Assessment No. 42-21-M1BE-93: Inhalation Risk From Incinerator Combustion Products: Operational Verification Testing - Phase 1 Johnston Atoll Chemical Agent Disposal System.* Aberdeen Proving Ground, MD: United States Army Environmental Hygiene Agency, undated.
Evaluates the possible cancer and other health risks from operation of the agent incinerator for destruction of nerve agent GB at JACADS. Reports that human health effects from the incinerator are substantially below levels of concern set by U.S. Government medical and scientific experts.

U.S. Army Environmental Hygiene Agency. *Health Risk Assessment No. 42-21-MQ49-92: Inhalation Risk From Incinerator Combustion Products: Johnston Atoll Chemical Agent Disposal System.* Aberdeen Proving Ground, MD: United States Army Environmental Hygiene Agency, undated.
Assesses the possible cancer and other health risks from operation of the deactivation furnace system and agent incinerator at JACADS. Determines that the health risks from emissions of these two incinerators are below levels of concern set by U.S. Government medical and scientific experts.

U.S. Army Environmental Hygiene Agency. *Health Risk No. 42-21-M1X6-93: Inhalation Risk From Incinerator Combustion Products: Operational Verification Testing - Phase 3 Johnston Atoll Chemical Agent Disposal System.* Aberdeen Proving Ground, MD: United States Army Environmental Hygiene Agency, undated.
Assesses the possible cancer and other health risks from operation of the metal parts furnace and agent incinerator for destruction of mustard agent HD at the JACADS. Reports that cancer and other health effects from the emissions of these incinerators are substantially below levels of concern set by U.S. Government medical and scientific experts.

Zelikson, Jeffrey. Letter from the Director of the Hazardous Waste Management Division of the Environmental Protection Agency to Walter Busbee, Commander of the U.S. Army Chemical Materiel Destruction Agency and Temporary Authorization for Permit Modifications: Johnston Atoll Chemical Agent Disposal System, 28 July 1994.
States that the Army's temporary authorization request is approved because its objectives are to prevent the disruption of ongoing destruction activities and to facilitate changes to protect human health and the environment.

Other Army Documents

Ambrose, James R. "Record of Decision: Chemical Stockpile Disposal System." Washington, D.C.: Department of the Army, 23 February 1988.
Explains the Army's decision to proceed with on-site disposal at eight locations throughout the United States based on the risk of transporting chemical agents through populated areas. Also states: 1) incineration will be the disposal method; 2) the program will not be completed by 1994; and 3) the Army is committed to creating an emergency response system at each site chosen.

Brankowitz, William R.. *Chemical Stockpile Disposal Program: Chemical Weapons Movement History Compilation.* SAPEO–CDE–IS–87001. Aberdeen Proving Ground, MD: Office of the Program Manager for Chemical Munitions, 12 June 1987.
Provides the history of chemical weapons transport between 1946 and 1986.

Carnes, S.A. *Site-Specific Emergency Response Concept Plans For the Chemical Stockpile Disposal Program: A Comparative Summary.* Oak Ridge, TN: Oak Ridge National Laboratory, December 1989.
Summarizes the Chemical Stockpile Emergency Preparedness Program at each of the eight Army installations storing chemical weapons and examines: 1) the site-specific risk for each site; 2) the methodology used to identify the emergency planning zones; 3) the differences between recommended protective actions at each site; and 4) the need for comprehensive command and control systems to facilitate protective action effectiveness.

Federal Emergency Management Agency. *Chemical Stockpile Emergency Preparedness Program.* Washington, D.C.: Department of the Army, undated.
Describes the chemical weapons incineration program and the functions of the Chemical Stockpile Emergency Preparedness Program.

Flamm, Kevin J. *Chemical Agent and Munition Disposal; Summary of the U.S. Army's Experience.* SAPEO–CDE–IS–87005. Aberdeen Proving Ground, MD: United States Army, 21 September 1987.
Summarizes the history of the U.S. Army's chemical weapons destruction program. Also summarizes the results of tests performed at the Chemical Agents Munition Disposal Program in Tooele, Utah.

Fraize, Willard E., et al. *Risk Analysis Supporting the Chemical Stockpile Disposal Program.* SAPEO–CDE–IS–87014. Aberdeen Proving Ground, MD: Program Manager for Chemical Demilitarization, December 1987.
Summarizes the results of the Mitre corporation's chemical stockpile disposal program risk assessment, the purpose of which is to estimate the public's risk of chemical exposure throughout the disposal program. Options considered include: 1) national destruction sites, 2) regional destruction sites, 3) partial relocation, 4) on–site destruction, and 5) do nothing.

Harvey, Steven, et al. *Agent Neutralization: Hydrolysis of Sulfur Mustard.* Report to the Office of the Program Manager, Chemical Demilitarization. Aberdeen Proving Ground, MD: Geo–Centers, Inc., March 1994.
Details the results of a study on hydrolysis of mustard agent.

Krummel, J.R., et al. *Chemcial Stockpile Disposal Program: Review and Comment on the Phase I Environmental Report For the Anniston Army Depot, Anniston, Alabama.* Argonne, IL: Argonne National Laboratory, December 1989.
Examines site-specific data for Anniston, Alabama, and determines that on-site chemical weapons destruction is the best method of disposal.

Krummel, J.R., et al. *Chemical Stockpile Disposal Program : Review and Comment on the Phase I Environmental Report For the Umatilla Depot Activity, Hermiston, Oregon.* Argonne, IL: Argonne National Laboratory, October 1990.
Reviews site specific data for on-site chemical weapons disposal at the Umatilla Depot, Oregon, and determines that on-site disposal is the preferred method for destroying the chemical weapons stockpile.

Kuryk, B.A., et al. *M55 Rocket Separation Study.* Cambridge, MA: Arthur D. Little, Inc., 22 November 1985.
Provides a preliminary engineering design, cost estimates, risk assessment, and environmental analysis involved in separating the munition from the chemical agent in M55 rockets.

The Mitre Corporation. *Engineering Analysis For Future Use of Chemical Agent Demilitarization Plants: Feasibility and Desirability.* McLean, VA: Mitre, January 1991.
In response to a Congressional request, evaluates the desirability and feasibility of future uses for baseline facilities. Concludes that although some future uses are feasible, they are not necessarily desirable.

Program Manager for Chemical Demilitarization. *Non-Stockpile Chemical Materiel Program: Interim Survey and Analysis Report.* Aberdeen Proving Ground, MD: Program Manager for Chemical Demilitarization, April 1993.
Identifies the locations, types, and quantities of non-stockpile chemical material. Explains potential destruction options and discusses transportation alternatives.

Program Manager for Chemical Demilitarization. *Chemical Stockpile Disposal Program: Final Programmatic Environmental Impact Statement.* Aberdeen Proving Ground, MD: Program Manager for Chemical Demilitarization, January 1988.
Reviews the potential environmental impacts of destroying the U.S. chemical weapons stockpile. Also examines the options of on-site disposal, regional disposal, national disposal, partial relocation, and continued storage. Determines that on-site disposal involves the smallest environmental and health risks.

Program Manager for Chemical Demilitarization. *Disposal of Chemical Agents and Munitions Stored At Anniston Army Depot Anniston, Alabama: Final Phase I Environmental Report.* Aberdeen Proving Ground, MD: Program Manager for Chemical Demilitarization, July 1989.
Examines site-specific data for Anniston, Alabama, and determines that on-site chemical weapons destruction is the best method of disposal.

Program Manager for Chemical Demilitarization. *Disposal of Chemical Agents and Munitions Stored At Anniston Army Depot Anniston Alabama: Final Phase I Environmental Report Addendum.* Aberdeen Proving Ground, MD: Program Manager for Chemical Demilitarization, February 1990.
Documents population statistics and seismic activity information not included in the original Final Phase I Environmental Report.

Program Manager for Chemical Demilitarization. *Disposal of Chemical Agents and Munitions Stored At Tooele Army Depot Tooele, Utah: Final Impact Statement.* Aberdeen Proving Ground, MD: Program Manager for Chemical Demilitarization, July 1989.
Concludes that the Tooele stockpile can be safely incinerated in an environmentally sound manner and that continued storage would pose greater health and environmental risks than on-site disposal.

Program Manager for Chemical Demilitarization. *Disposal of Chemical Agents and Munitions Stored At Umatilla Depot Activity, Hermiston Oregon: Final Phase I Environmental Report.* Aberdeen Proving Ground, MD : Program Manager for Chemical Demilitarization, February 1990.
Examines new issues specific to on-site chemical weapons disposal at Umatilla, Oregon that were not considered in the U.S. Army's programmatic environmental impact statement. Concludes that on-site disposal remains a viable disposal method because population increases and a likely meteorological condition heighten the risks of continued storage and transportation.

Program Manager for Chemical Demilitarization. *U.S. Army's Alternative Demilitarization Technology Report For Congress.* Aberdeen Proving Ground, MD: Program Manager for Chemical Demilitarization, 11 April 1994.
Recommends: (1) continuing without delay with the baseline technology; (2) updating risk assessments; (3) evaluating and demonstrating carbon filtration; 4) contacting the governor of each stockpile state to identify a viable receiving site for neutralized products; (5) enhancing public outreach and involvement; (6) implementing and approving stockpile surveillance for M55 rockets; and (7) initiating a research and development program into two alternative technologies, neutralization followed by biodegradation, for potential use at bulk storage sites in parallel with the current program activities.

Sears, Mildred, et al. *Mitigation of Public Safety Risks of the Chemical Stockpile Disposal Program.* SAPEO-CDE-IS-87013. Aberdeen Proving Ground, MD: Program Manager for Chemical Demilitarization, November 1987.
Discusses accident scenarios and recommends mitigation measures to reduce public risk for five chemical weapons disposal alternatives including continued storage, on-site disposal, transportation to a national or regional center, and selected transportation.

U.S. Army Chemical Materiel Destruction Agency. Risk Assesment Survey News Release. Aberdeen Proving Ground, MD: U.S. Army Chemical Materiel Destruction Agency, 8 August 1994.
Announces that the preliminary results of the risk assessment with the M55 rockets indicate that the propellant used in M55s may have a longer storage life than previously thought. The stability of the M55 was not factored into the previous risk assessment supporting decisions about the stockpile destruction program.

U.S. Army Chemical Stockpile Disposal Program. *Safely Destroying America's Chemical Weapons*. Aberdeen Proving Ground, MD: U.S. Army Chemical Stockpile Disposal Program, undated.
Answers basic questions regarding the planned incineration of the U.S. chemical weapons stockpile.

Congressional Documents

U.S. Congress. *Public Law 102–484*. 102nd Congress, 23 October 1992. subtitle G, section 172, p. 2341.
Establishes Citizens Advisory Commissions for each state in which there is a low–volume chemical weapons stockpile site--Kentucky, Indiana, and Maryland.

U.S. General Accounting Office. *Chemical Warfare: DOD's Successful Effort to Remove U.S. Chemical Weapons From Germany*. GAO/NSIAD–91–105. Washington, D.C.: General Accounting Office, February 1991.
Reports that the Department of Defense transported chemical weapons from Germany to Johnston Atoll successfully and safely but at a higher cost than anticipated.

U.S. General Accounting Office. *Chemical Weapons Destruction: Advantages and Disadvantages of Alternatives to Incineration*. GAO/NSIAD–94–123. Washington, D.C.: General Accounting Office, March 1994.
Determines that the most promising alternative disposal technologies are still in the initial stages of development and could not be used to destroy the chemical weapons stockpile by the Congressionally mandated deadline of 31 December 2004. Also evaluates the advantages and disadvantages of the most promising disposal technologies.

U.S. General Accounting Office. *Chemical Weapons Destruction: Issues Affecting Program Cost, Schedule, and Performance*. GAO/NSIAD–93–50. Washington, D.C.: General Accounting Office, January 1993.
Reviews the results of the initial incineration tests at JACADS and the Department of Defense's efforts to obtain environmental permits. Determines: 1) the operation verification test results have improved, but the destruction rates are lower than anticipated; 2) public opposition to incineration is an obstacle to obtaining required permits; and 3) improvements are possible in the Army's efforts to handle the environmental permitting process.

U.S. General Accounting Office. *Chemical Weapons: Issues Involving Destruction Technologies*. GAO\T-NSIAD–94–159. Washington, D.C.: General Accounting Office, 26 April 1994.
Determines that although there have been production problems at JACADS, there are no obstacles to destroying chemical agents within federal requirements. Alternative technologies are over a decade away from maturity. Moreover, no alternative technology by itself disposes of the munition, chemical agent, explosives/propellants, and dunnage.

U.S. General Accounting Office. *Chemical Weapons: Obstacles to the Army's Plan to Destroy Obsolete U.S. Stockpile*. GAO/NSIAD–90–155. Washington, D.C.: General Accounting Office, May 1990.
Obstacles to the U.S. Army's chemical stockpile disposal program include cost overruns, public opposition, and production delays.

U.S. General Accounting Office. *Chemical Weapons Stockpile: Army's Emergency Preparedness Program Has Been Slow to Achieve Results*. GAO/NSIAD–94–91. Washington, D.C.: General Accounting Office, February 1994.
Finds that the Chemical Stockpile Emergency Preparedness Program has not achieved its goal of preparing local communities to respond to a chemical emergency because program guidance is insufficient, acquisition of equipment has been delayed, and program management is weak.

U.S. General Accounting Office. *Chemical Weapons: Stockpile Destruction Cost Growth and Schedule Slippages Are Likely to Continue*. GAO/NSIAD–92018. Washington, DC: General Accounting Office, November 1991.
Asserts that increased costs and time delays should be expected in the Army's chemical weapons disposal program based on additional program requirements, wage increases, and technical problems.

Walker, Robert M. Statement by Robert M. Walker, Chemical Demilitarization Program. Subcommittee on Nuclear Deterrence, Arms Control and Defense, Senate Armed Services Committee. Washington, D.C., 26 April 1994.
Reviews the U.S. Army's chemical stockpile disposal program including operations at JACADS, alternative disposal technologies, and public opinion.

Warren, David R. "Chemical Weapons Storage: Communities Are Not Prepared to Respond to Emergencies." Testimony before the U.S. Congress. Washington, DC: General Accounting Office, 16 July 1993.
Determines that despite the Chemical Stockpile Emergency Preparedness Plan, communities lack the essential capabilities to respond to chemical accidents. Recommends: 1) the establishment of an accountable management structure within the Department of the Army; 2) a reevaluation of the Federal Emergency Management Agency's role in the program; 3) the creation of program deadlines; and 4) the establishment of strict accountability for program funds.

Documents From Environmental Groups, Baseline Opponents, and Local Citizens' Groups

Blackwell, Oris, et al. *Report of the Kentucky Community Study Group.* Aberdeen Proving Ground, MD: United States Army, November 1987.
Addresses the concerns of the citizens living near the Lexington Bluegrass Army Depot and requests that the chemical stockpile at Lexington be airlifted to Tooele for destruction.

Chemical Weapons Working Group. "Army Lied to National Research Council, Congress and Communities Exaggerated Chemical Weapons Arsenal Risks to Sell Incineration; Study Confused Days With Weeks in Projecting Safety Period." Press Release. Berea, KY: Chemical Weapons Working Group, 10 August 1994.
Claims that the chemical weapons stockpile can be safely stored for more than 120 years and that the Army knowingly misled the National Research Council by stating that the stockpile could only be safely stored until 2004.

Chemical Weapons Working Group. "Citizens' Solution for Chemical Weapons Disposal." Berea, KY: Chemical Weapons Working Group, undated.
Critiques the Army's plan to destroy the U.S. chemical weapons stockpile through incineration. Recommends that the chemical agents be separated from the munitions and stored until a safer disposal technology is developed.

Costner, Pat. *The Army's Experience at Johnston Atoll Chemical Disposal System.* Washington, D.C.: Greenpeace, 11 April 1993.
Critically assesses the Army's chemical weapons incineration program on Johnston Island.

Costner, Pat. *Chemical Weapons Demilitarization and Disposal: Johnston Atoll Chemical Disposal System, GB and VX Campaigns.* Washington, D.C.: Greenpeace, 12 May 1993.
Cites a myriad of malfunctions and technical difficulties at JACADS including: 1) the impossibility of achieving an appropriate destruction and removal efficiency; 2) the high rate of malfunction in the analytical systems used to detect unburned chemical agents; and 3) the exposure of workers to dangerous chemical emissions.

Costner, Pat. *The Incineration of HD Agent At JACADS: MPF Trial Burn and LIC Demonstration Burn.* Washington, D.C.: Greenpeace, 17 March 1994.
Asserts that the metal parts furnace and the agent incinerator trial burn failed to meet Environmental Protection Agency regulations.

Costner, Pat, and Joe Thornton. *Playing With Fire: Hazardous Waste Incineration.* Washington, D.C.: Greenpeace, 1990.
Discusses the dangers of hazardous waste incineration, and recommends: 1) a moratorium on siting and permitting hazardous waste incinerators; 2) a ban on incineration of wastes containing metals, chlorine, or other halogens; and 3) the creation of a mandatory pollution prevention program.

EA Engineering, Science and Technology. *Chemical Stockpile Disposal Program.* Aberdeen Proving Ground, MD: United States Army, October 1987.
Written on behalf of the citizens in the area of Aberdeen Proving Ground, Maryland, this report adresses the health and environmental concerns related to incineration of chemical weapons and makes recommendations to maximize the safety of chemical weapons incineration at Aberdeen.

Hardy, John T. *Review of Department of the Army Global Commons Environmental Assessment.* Bellingham, WA: Huxley College of Environment Studies Institute of Environmental Toxicology and Chemistry, 4 September 1990.
Critiques the U.S. Army's decision to transport chemical weapons from Germany to the Johnston Atoll baseline facility by sea based on potential consequences for marine environment.

Heiser, B., et al. *Community Review Final Report: Dispoal of Ton Containers of VX.* Aberdeen Proving Ground, MD: United States Army, October 1987.
Addresses the concerns of citizens living near the Newport Army Ammunition Plant, Indiana, and makes recommendations to maximize the safety of chemical weapons incineration at Newport. The study group did not recommend incineration as the best method of disposal due to possible health and environmental effects.

Kentucky Chemical Demilitarization Citizen Advisory Response to the National Research Council Recommendations For the Disposal of Chemical Agents and Munitions. Kentucky Chemical Demilitarization Citizens Advisory Commission, 25 February 1991.
Critiques the research methods and findings of the NRC's report on the potential alternatives to incineration of chemical weapons. Criticizes the NRC for recommending the continuation of the incineration program in spite of the need for further research and development of alternative technologies.

Kentucky Chemical Demilitarization Citizens' Advisory Commission Report. Kentucky Chemical Demilitarization Citizens' Advisory Commission, 15 December 1993.
Describes the function and acitivities of the Kentucky Citizens' Advisory Commission, establishes criteria for evaluating disposal options, and makes recommendations for the chemical weapons disposal program including further study of alternative technologies and increased citizen participation.

The Kentucky Environmental Foundation. *The Citizen's Viewpoint: Citizen Perspectives on the Army's Plan to Build a Nerve Agent Incinerator in Madison County, Kentucky.* Berea, KY: The Kentucky Environmental Foundation, Common Ground, August 1991.
Presents statements taken from concerned citizens at an Army review meeting on 25 April 1991 regarding the proposed chemical weapons incineration site near Lexington, Kentucky.

Maryland Chemical Demilitarization Citizens Advisory Commission. *Comments on the Recommendations For the Disposal of Chemical Agents and Munitions.* Maryland Chemical Demilitarization Citizens Advisory Commission, 21 February 1994.
Supports the use of neutralization to dispose of the chemical weapons stockpile of one ton containers of mustard agent stored at Aberdeen Proving Ground. Finds incineration of mustard gas unacceptable, and since Aberdeen is the most densely populated disposal site, recommends a physical inspection of the stockpile to ascertain the true conditions of the stockpile.

Mohr, Scott C. *Critique of Incineration Proposal For Destruction of Chemical Warfare Agents.* Boston, MA: Physicians for Social Responsibility, 18 March 1994.
Critiques the proposed construction of eight chemical weapons incineration facilities due to the possible health effects of fugitive emmissions.

Picardi, Alfred. *Greenpeace Review of Johnston Atoll Chemical Agent Disposal System Draft Final Second Supplemental Environmental Impact Statement For the Storage and Ultimate Disposal of the European Chemical Munition Stockpile.* Washington, D.C.: Environmental Science and Assessment Services Inc., 9 July 1990.
Summarizes Greenpeace's objections to the destruction of chemical weapons at JACADS. Specifically notes: 1) incineration leads to dioxin exposure; 2) the U.S. Army has not comprehensively studied alternative destruction methods; and 3) the Army violated the National Environmental Policy Act process by transporting the chemical munitions through international waters.

Picardi, Alfred, et al. *Alternative Technologies For the Detoxification of Chemical Weapons: An Information Document.* Washington, D.C.: Greenpeace International, 24 May 1991.
States that incineration of chemical weapons will lead to fugitive emissions that are harmful to both humans and the environment. Presents a series of alternative technologies could be used to destroy the U.S. chemical weapons stockpile, including biological, chemical, photochemical, electrochemical, neutralization, and thermal processes.

Program Manager for Chemical Demilitarization. *Chemical Stockpile Disposal Program: Final Report on the DPEIS and Other Drafts*. Aberdeen Proving Ground, MD: Program Manager for Chemical Demilitarization, October 1987.
Concerned Arkansas citizens recommend consideration of the on-site disposal alternative with the dual technology evaluation program for the destruction of chemical weapons.

Program Manager for Chemical Weapons. *Chemical Stockpile Disposal Program Final Programmatic Environmental Impact Statement: Public Comments and Responses*. Aberdeen Proving Ground, MD: Program Manager for Chemical Demilitarization, January 1988.
Documents letters received from federal, state, and local agencies, nongovernmental organizations, and individuals regarding the Draft Programmic Environmental Impact Statement.

Siegel, Lenny. *Chemical Weapons Disposal: The Threat At Home*. Boston, MA: National Toxics Campaign Fund, June 1991.
Argues that the U.S. Army's plans to incinerate the chemical weapons stockpile are flawed because: 1) incineration poses environmental and health risks; 2) neutralization is a safer method of disposal; and 3) the chemical weapons stockpile can be safely stored while alternatives are studied by removing the chemical agents from the munitions.

Sierra Club. "Sierra Club Analysis of Dr. Carl Peterson's Recommendations for the Disposal of Chemical Agents and Munitions." Pueblo, CO: Sierra Club, 26 May 1994.
Critiques a presentation from Dr. Carl Peterson in which he recommended incineration of the chemical weapons stockpile.

Sierra Club Board of Directors. "Chemical Weapons Resolution." Chevy Chase, MD: Sierra Club, 10 September 1993.
Reaffirms the Sierra Club's opposition to chemical weapons incineration and urges Congress to prohibit funds and research for purposes related to incineration.

Silton, Triana. "Out of the Frying Pan...: Chemical Weapons Incineration in the United States." *The Ecologist*, (January 1993):18-24 .
Summarizes the U.S. Army's incineration plan and reports on grass–roots opposition to it.

Umatilla Citizen's Advisory Commission. *Umatilla Army Depot Activity, Hermiston, Oregon: Chemical Demilitarization Citizen's Advisory Commission*. Pendleton, OR: Bridges & Associates, 14 March 1993.
Exerpts questions and answers from the 14 March 1993 meeting of the Citizen's Advisory Commission regarding the use of neutralization versus incineration for the disposal of chemical weapons.

Umatilla Study Group. *Evaluation of the Draft Programmatic Environmental Impact Statement For the Destruction of Chemical Weapons At the Umatilla Army Depot and Other Army Facilities*. Aberdeen Proving Ground, MD: United States Army, October 1987.
Addresses the concerns of citizens living near the Umatilla Army Depot regarding the proposed chemical weapons incinerator and makes recommendations that would maximize the safety of chemical weapons incineration.

Vincent, Ross. "The Sierra Club and the Combustion Strategy: Incineration – A Fundamentally Primitive and Dangerous Technology." *EI Digest Industrial and Hazardous Waste Management*. Minneapolis, MN: Environmental Information Ltd, March 1994.
States that incineration must be replaced as a method of waste disposal.

Williams, Craig. Presentation to the Henry L. Stimson Center's Chemical Weapons Convention Implementation Project, Washington, D.C., 21 June 1994.
States: 1) citizens have not had enough input in the chemical weapons destruction program; 2) incineration is an unhealthy technology choice for both the environment and the public; and 3) the potential exists for the Army use the baseline incinerators after the chemical weapons destruction program is completed.

National Research Council Documents

National Research Council. *Alternative Technologies Forum*. Washington, D.C.: National Academy of Sciences, 30 June 1993.
Provides a transcript of the public meeting where the NRC's alternative technologies report was released and discussed.

National Research Council. *Alternative Technologies For the Destruction of Chemical Agents and Munitions.* Washington, D.C.: National Academy Press, 1993.
Examines various alternative destruction technologies. Recommends enhancing the emissions safety of whatever technology is eventually selected, specifically the addition of charcoal filters for baseline facilities.

National Research Council. *Evaluation of the Johnston Atoll Chemical Agent Disposal System Operational Verification Testing: Part I.* Washington, D.C.: National Academy Press, 16 July 1993.
Finds that incineration is capable of the safe disposal of the chemical weapons stockpile. States the U.S. Army should proceed toward operation at Tooele. Also recommends improvements for baseline facilities.

National Research Council. *Evaluation of the Johnston Atoll Chemical Agent Disposal System Operational Verification System.* Washington, D.C.: National Academy Press, 1994.
Reviews the performance of JACADS and determines that the baseline program is capable of safely disposing of the U.S. chemical weapons stockpile. However, finds that improvements including safety procedures and monitoring systems should take precedence over production schedules.

National Research Council. *Recommendations For the Disposal of Chemical Agents and Munitions.* Washington, D.C.: National Academy Press, 1994.
Concludes that the baseline incineration system has been demonstrated to be a safe and effective disposal process, but also recommends that carbon filters be added to the pollution control system. Finds that the benefits of developing another successful technology for agent destruction are outweighed by the risk of accidental agent release associated with the many additional years of storage needed for the development process. Nevertheless, also recommends that the Army examine the feasibility of using neutralization, the most promising technology, at Aberdeen and Newport where agents are stored in bulk containers, not munitions.

National Research Council. *Review of Monitoring Activities Within the Army Chemical Stockpile Program.* Washington, D.C.: National Research Council, 1994.
Finds that the system used to detect fugitive chemical emissions at Johnston Atoll should be improved prior to use at the continental U.S. sites.

Peterson, Carl R. "Disposing of Chemical Warfare Agents and Munitions Stockpiles." *Arms Control Today* (June 1994): 8-12.
States that at the present time there is no better method to chemical weapons disposal than incineration, and notes that continued storage of the chemical weapons stockpile poses greater health and environmental risks than incineration.

Peterson, Carl R. "Recommendations For the Disposal of Chemical Agents and Munitions." Statement Before the Subcommittee on Nuclear Deterrence, Arms Control and Defense Intelligence, Senate Armed Services Committee, United States Senate. Washington D.C., 26 April 1994.
Testifies regarding the NRC's recommendations for the U.S. chemical weapons destruction program. Reviews the potential methods of destroying chemical weapons and determines that incineration should continue simultaneously with research on alternative technologies.

Newsletters and Status Reports

The Henry L. Stimson Center. *The CWC Chronicle.* Washington, D.C.: The Henry L. Stimson Center.
A periodic newsletter about international and domestic events related to the implementation of the Chemical Weapons Convention.

Committee for National Security. "Chemical Weapons: Fact Sheet No. 1: Chemical Weapons Destruction and Disposal in the United States." Washington, D.C.: Committee for National Security, undated.

Committee for National Security. "Chemical Weapons: Fact Sheet No. 2: The Global Proliferation of Chemical Weapons." Washington, D.C.: Committee for National Security, undated.

Department of the Army. *Annual Status Report on the Disposal of the Lethal Chemical Stockpile.* Department of the Army, December 1985 to December 1993.
Describes the status and activities relating to the storage and destruction of the U.S. chemical weapons stockpile per order of Public Law 99-145.

The Kentucky Environmental Foundation. *Common Sense: A Newsletter of Common Ground.* Berea, KY: The Kenucky Environmental Foundation, March 1994.
Reports on baseline opponents' activities around the country.

U.S. Army Chemical Materiel Destruction Agency. *Chemical Demilitarization Update.* Aberdeen Proving Ground, MD: U.S. Army Chemical Materiel Destruction Agency, April 1994.
Provides information regarding the U.S. Army's chemical weapons destruction program.

Videos

America's Defense Monitor. *Ridding the World of Chemical Weapons?* Washington, D.C.: Center for Defense Information, 28 August 1994.
Discusses the advantages and disadvantages of the Chemical Weapons Convention, concluding that the former far outweigh the latter.

America's Defense Monitor. *Stopping the Spread of Chemical And Biological Arms.* Washington, D.C.: Center for Defense Information, August 1991.
States that the spread of chemical and biological weapons is a danger.

Greenpeace. *The Rush to Burn.* Washington, D.C.: Greenpeace, 1993.
Argues the need to find a safer method of waste disposal than incineration, and focuses on grassroots opposition to incineration.

Stop the Incinerator: The Other Story. Environmental Video & Film Workshop, 1991.
Presents a series of interviews with scientific authorities and others who dispute the charges of incineration opponents.

U.S. Army Chemical Materiel Destruction Agency. *Safely Destroying America's Chemical Weapons: Systemization of the Tooele Disposal Facility.* Aberdeen Proving Ground, MD: U.S. Army Chemical Materiel Destruction Agency, June 1994.
Illustrates how components of the Tooele Disposal Facility are tested to ensure the proper functioning of human and mechanical elements.

Miscellaneous Documents

Brown, Mark. *Public Trust and Technology: Chemical Weapons Destruction in the United States.* Washington, D.C.: The Committee for National Security, April 1993.
Examines the public's lack of trust in the U.S. Army's plan to incinerate chemical weapons and assesses the risks of delaying the chemical weapons incineration program in hopes of finding a better technology.

Chrostowski, Paul, et al. *Scientific Peer Review of Greenpeace's Position on Hazardous Waste Incineration Impacts In Its "Report on the Hazardous Waste Incineration Crisis" and "Playing With Fire."* Fairfax, VA: Clement Internatioal Corporation, 29 January 1992.
In a peer review of Greenpeace's *Playing With Fire*, determines that Greenpeace's analysis was not conducted according to established scientific methods.

Cudahy, James. *The Rest of the Story: Literature Research and Technical Review of the Greenpeace Report Playing With Fire.* November 1992.
Critiques the anti-incineration Greenpeace publication *Playing With Fire* and finds that the quotes and statistics used in the publication are inaccurate and misleading.

Department of National Defence. *Citizens' Environmental Protection Committee.* Alberta, Canada: Department of National Defence, July 1992.
Describes the operation of the Citizens' Environmental Protection Committee as a public review group for the Canadanian chemical weapons incineration project, Swiftsure.

Department of National Defence. *Excerpts From Project Swiftsure Final Report.* Alberta, Canada: Department of National Defence, undated.
Focuses on the public communications program that facilitated the completion of Project Swiftsure, the Canadian chemical weapons incineration program.

Ember, Lois R. "Chemical Weapons Disposal: Daunting Challenges Still Ahead." *C & EN* (13 August 1990): 9-19.
Reports that the U.S./Soviet agreement to dispose of their chemical weapons by the year 2002 faces technology problems, public opposition, and unrealistic schedules.

"Environmentalists Attack As Politicized Report Pushing Incineration." *Defense Environment Alert* (26 January 1994): 4-5.
Reports that environmentalists believe the recommendations of the NRC were politically biased towards incineration.

Friedman, Lisa. Letter from the Associate General Counsel of the Solid Waste and Emergency Response Division at the Environmental Protection Agency (EPA) to Robert Hunter, the Associate General Counsel at the U.S. General Accounting Office, 21 October 1992.
States: 1) the permit to construct a chemical disposal facility at Anniston must be issued by the EPA and the Alabama Department of Environmental Management (ADEM), and ADEM must determine if site preparation work may begin; 2) the EPA did not give the Army permission to carry out the site preparation work; and 3) the Army was not consistent with the Resource Conservation and Recovery Act (RCRA) regulations when it began site preparation work.

Hunter, Robert. Letter from the Associate General Counsel at the General Accounting Office to William K. Reilly, Administrator of the Environmental Protection Agency, 24 July 1992.
Requests information regarding 1): whether the EPA is the proper authority to issue permits for construction of the chemical stockpile disposal facility in Anniston and to allow site preparation work to commence without a permit; 2) whether the EPA gave the Army permission to do the site preparation work at Anniston; and 3) whether the Army's actions in undertaking the site preparation work without a permit were consistent with the RCRA and federal regulations.

Jones, Kay H. "Diesel Truck Emissions, an Unrecognized Source of PCDD/PCDF Exposure in the United States." *Risk Analysis* 13, no. 1 (1993): 245-252.
Reports that transportation sources, most notably diesel trucks, will be responsible for five times the waste emitted by incinerators by the year 2000.

Koplow, David A. "How Do We Get Rid of These Things?: Dismantling Excess Weapons Under Arms Control Treaties." To be printed in *Northwestern Law School Journal*. Volume 89, 1994.
Asserts that environmentalism and arms control have now begun to intersect with public policy and that these competing concerns can only be accomodated temporarily and uncomfortably. Also examines earlier arms control agreements, the implications of the 1969 National Environmental Policy Act for the disposal of the chemical weapons, and the shortcomings in the proposed incineration program.

Koplow, David A. *Some Disassembly Required: Eliminating Chemical Weapons While Protecting the Environment*. Washington, D.C.: Lawyers Alliance for World Security, Committee for National Security, July 1994.
Discusses the issue of U.S. destruction of its chemical weapons stockpile in conjuction with the potential environmental consequences.

Lawyer's Alliance for World Security and Committee for National Security. *Citizen Attitudes on the Destruction and Disposal of Chemical Weapons Stockpiles: A Report from a Series of Community Dialogue Forums on Chemical Weapons Demilitarization*. Washington, D.C.: Lawyers Alliance for World Security, Committee for National Security, July 1994.
Summarizes the comments of speakers and participants at a series of forums in Hartford Country, Alabama concerning the U.S. Army's plans to incinerate chemical weapons at the Anniston Army Depot.

McAndless, John. "Project Swiftsure Destruction of Chemical Agent Waste at Defence Research Establishment, Suffield." Paper Number 92–74.01. Presentation at the 85th Annual Meeting and Exhibition of the Air & Waste Management Association, Kansas City, MO, 21–26 June 1992.

Merrow, Edward, et al. *Understanding Cost Growth and Performance Shortfalls in Pioneer Process Plants*. R–2569–DOE. Santa Monica, CA: RAND, 1981.
Examines the reasons for inaccurate estimates of capital costs and performance difficulties for first–of–a–kind process plants.

Morrison, David C. "No Easy Out." *National Journal* (11 May 1991): 1100-1104.
Examines the advantages and disadvantages of the controversial U.S. Army plan to incinerate the chemical weapons stockpile.

Pleus, Richard C., et al. *Health Effects of Hazardous Waste Incineration...More of the Rest of the Story.* Seattle, WA: Environmental Toxicology International, June 1994.
Critiques the 1990 Greenpeace report Playing With Fire. States that Greenpeace has no scientific basis for its allegations against inicineration.

Rogers, Harvey W. "Incinerator Air Emissions: The Bigger Picture." Submitted for Publication, May 1994.
Asserts that the general public is not given adequate information to reach an informed opinion about incineration. Provides technical analysis that disputes some of the assertions made by incineration opponents about baseline incinerators.

Rouse, Lawrence E. "The Disposition of the Current Stockpile of Chemical Munitions and Agents." *Military Law Review* 121 (1988): 17-94.
States: 1) the original 1994 deadline for destruction of the United States chemical weaons stockpile was unrealistic; 2) incineration is safe and effective and more practical than trying to find alternative technologies; 3) and on-site disposal is more prudent than transporting chemical weapons through populated areas.

Santoleri, Joseph J., et al. "Facts Or Myths: The Burning Issue of Incineration." Presentation at Air and Waste Management Association Meeting, Denver, CO, 13–18 June 1993.
Critique's Greenpeace's 1990 report *Playing With Fire*, argues that the Greenpeace analysis was not conducted according to generally recognized scientific methods and therefore would not yield a credible opinion.

Yang, Yu–Chu, et al. "Decontamination of Chemical Warfare Agents." *Chemical Reviews*, volume 92, number 8, pg. 1729–1734.
Describes the chemical reactions of four major chemical warfare agents with existing field decontaminants and decontamination systems currently under investigation.

PORTLAND GENERAL ELECTRIC COMPANY
LEGAL DEPARTMENT
121 SW SALMON STREET, 1WTC-13
PORTLAND, OREGON 97204
TELEPHONE (503) 464-8850 FACSIMILE (503) 464-2200

July 12, 1996

Kathleen Lippitt
Oregon Department of Environmental Quality
811 S.W. Sixth Avenue
Portland, OR 97204-1390

Dear Kathleen:

Per your request, enclosed please find a copy of the handout submitted by Ed Miska during today's EQC meeting, pertaining to tax credit application #4473. I am also enclosing a second copy of the handout I provided relative to tax credit application #4461. Please do not hesitate to call me at 464-8863 if I can be of further assistance. Thank You.

Sincerely,

Barbara A. Skotte

Enclosures
cc: Ed Miska

BEFORE THE ENVIRONMENTAL QUALITY COMMISSION
July 12, 1996

Portland General Electric Company's tax relief application TC-4473

Disallowance of Overheads
DEQ staff has disallowed $20,815 of overhead costs allocated to this tax credit application, even though their own accounting audit contractor stated as follows:

"We reviewed the methods of allocating direct and indirect overhead costs to this facility and found them to be rational and properly applied."

The addition of overhead costs recognizes the contribution individuals and Departments make toward the completion of any constructed facility. PGE adds overheads proportionately to all jobs based on the amount of company direct labor charges, whether it is a capital, maintenance, or a operations job.

The overhead portion related to the " Generation and Transmission Engineering Department" is directly related to the engineering and specification development for each job, in as much as that department is responsible for these functions. The remaining overhead costs include such support functions as paying invoices, accounting for the job cost, management overall supervision, etc,. These costs are current costs to PGE and do not include any profit markup as would be expected if the job was contracted to an independent contractor. However, the total overheads added to this job amounted to only about 9% of direct cost. PGE contends that the indirect cost required to be capitalized by the Oregon Department of Revenue and accepted as proper capital costs by every one other than the Oregon Department of Environmental Quality should be included in the cost of pollution control equipment to reflect the actual cost of installing such equipment.

Disallowance of Capitalized taxes and Storeroom Material Loading
Capitalized Property taxes- Cost of pollution control equipment under construction as of July 1of each year is included in PGE's property tax market value and taxed. PGE adds these taxes to the cost of the pollution control equipment, since this is exactly what the Department of Revenue and the Assessor are taxing.
Storeroom Material Loading-PGE maintains a stock of items in inventory and adds to the cost of the items, upon issuance to a job, the average cost of operating the storerooms. This cost of handling the material is a valid cost of the job and should also be allowed as qualified cost of pollution control equipment.

The Capitalized Property taxes and the Storeroom Material Loading make up only a de minimis amount of the cost under this application. The percentage is approximately ½ of 1%.

A copy of the DEQ application report and the CPA contractor's report is attached.

Proposed additions to eligible costs as approved by DEQ

Approved cost as adjusted by DEQ ----------		$345,538
Additions:		
Generation and Transmission Engineering 0verhead	$ 9,014	
Corporate and Other overhead	11,801	
Capitalized Taxes	1,235	
Storeroom Materials Loading	133	
	----------	22,183
Total Alleged as qualified for Pollution Control Credit		$367,721

Application No. TC-4473

State of Oregon
Department of Environmental Quality

TAX RELIEF APPLICATION REVIEW REPORT

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1. Applicant

Portland General Electric Company
Boardman Plant
121 SW Salmon St., 1WTC-0402
Portland, OR 97204

The applicant owns and operates a coal fired electric power generating facility in Boardman, Oregon.

Application was made for tax credit for an air pollution control facility.

2. Description of Facility

The claimed facility controls sulfur dioxide and nitrogen oxides emissions. It consists of a Horiba SO_2 probe, model APSA-350E, a Horiba NO_x probe, model APNA-350E, a Horiba data acquisition system, model COMPUCEM DARS and a United Sciences UltraFlow 100 flow sensor.

Claimed Facility Cost: $337,321

A distinct portion of the claimed facility makes an insignificant contribution to the principal purpose of pollution control. The applicant claimed $1,235 for capitalized property taxes, $133 for materials loading on items that were purchased from PGE central stores, and $9,600 for a maintenance contract. The applicant also claimed $28,739.00 as construction overhead expenses of the facility. A distinct portion of these claimed expenses, $22,681 were allocated from corporate expenditure pools which were incurred from corporate activities removed from the facility site.

Ineligible Costs: $32,083

Adjusted Facility Cost: $345,538

Accountant's Certification was provided.

The applicant indicated the useful life of the facility is 15 years.

facility and the Excess Emissions Action Plan have been reviewed and certified by the United States Environmental Protection Agency.

b. Eligible Cost Findings

In determining the percent of the pollution control facility cost allocable to pollution control, the following factors from ORS 468.190 have been considered and analyzed as indicated:

1) The extent to which the facility is used to recover and convert waste products into a salable or usable commodity.

The facility does not recover or convert waste products into a salable or usable commodity.

2) The estimated annual percent return on the investment in the facility.

The applicant indicates in the application there is no income or savings from the facility, so there is no return on the investment.

3) The alternative methods, equipment and costs for achieving the same pollution control objective.

A fully automated control system could accomplish the same pollution control by using additional valves and actuators to make adjustments to the operation of the boiler.

4) Any related savings or increase in costs which occur or may occur as a result of the installation of the facility.

There is no savings or increase in costs as a result of the facility modification.

6. Director's Recommendation

Based upon these findings, it is recommended that a Pollution Control Facility Certificate bearing the cost of $345,538 with 100% allocated to pollution control, be issued for the facility claimed in Tax Credit Application No. TC-4473.

Dennis E. Cartier
SJO Consulting Engineers, Inc.
October 9, 1995
Brian Fields
Air Quality Division
June 7, 1996

MERINA McCOY GERRITZ, P.C.
CERTIFIED PUBLIC ACCOUNTANTS

PARTNERS
John W. Merina, CPA
Michael E. McCoy, CPA
Gerald V. Gerritz, Jr., CPA

CERTIFIED IN
Oregon
Washington

INDEPENDENT ACCOUNTANTS' REPORT ON APPLYING AGREED-UPON PROCEDURES

Oregon Department of
Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204

At your request, we have performed the procedures enumerated below, which were agreed to by the Oregon Department of Environmental Quality (DEQ), solely to assist the DEQ in evaluating Portland General Electric Company's (the Company) Pollution Control Tax Credit Application No. 4473 (the Application) regarding the Stack Continuous Emission Monitoring System (the Facility) in Boardman, Oregon. The claimed facility costs on the Application are $377,321. The agreed-upon procedures and related findings are:

1. We read the Application, the Oregon Revised Statutes on Pollution Control Facilities Tax Credits - Sections 469.150 - 468.190 (the Statutes) and the Oregon Administrative Rules on Pollution Control Tax Credits - Sections 340-16-050 (OARs).

2. We reviewed and discussed the Application, supporting documents, and Statutes with Charles Bianchi and Brian Fields of the Oregon Department of Environmental Quality (DEQ) and Dennis Carter of SJO Consulting Engineers, Inc.

3. We reviewed and discussed the Application, supporting documents, Statutes and OARs with Gary Young, Supervisor Operations Accounting, and Edward Miska, Corporate Tax Manager.

4. We inquired as to whether there were any direct or indirect company costs charged or allocated to the facility costs claimed in the Application.

   We were informed that engineering, materials and direct labor costs were included in the Application and that indirect company costs, captioned construction overhead, material loading costs and capitalized property taxes were included in the Application. The engineering and direct labor costs, which included payroll taxes and fringe benefits, were found to be supported, reasonable as to amount and properly included in the application. Indirect costs are presented in footnote 3 to item six for evaluation.

5. We reviewed the documents and workpapers of applicant's certified public accountants that related to the facility claim.

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SCHEDULE OF CONSTRUCTION OVERHEAD

	On Site	Off Site	Total
Direct allocations:			
Corporate overhead	$	$ 4,930	$ 4,930
Generation and transmission engineering		9,014	9,014
Generation operations supervision and engineering	7,924	2,274	10,198
Executive supplemental retirement plans		593	593
Floor space allocation		158	158
Total direct allocations	7,924	16,969	24,893
Indirect allocations:			
General and administrative fringe benefits	1,866	3,832	5,698
Storeroom material loading		14	14
Total indirect allocations	1,866	3,846	5,712
Total construction overhead	$ 9,790	$ 20,815	$ 30,605

We reviewed the methods of allocating direct and indirect overhead costs to this facility and found them to be rational and properly applied. Our review of the allocation methods did not include a judgement as to whether the overhead costs are allowable.

7. We concluded it was not necessary to visit the site and visually inspect the facility.

8. The Company has confirmed to us that no billings from related parties or affiliates of the Company have been included in the claimed costs.

9. We reviewed the calculations in Section 5 of the Application for Final Certification of Pollution Control Facility and found them to be correct.

PORTLAND GENERAL ELECTRIC COMPANY
COMPOSITION OF CONSTRUCTION OVERHEAD
ALLOCATED TO BOARDMAN COAL PLANT

DIRECT ALLOCATIONS			Page Ref
CORPORATE OVERHEAD	$148,027		Page 2
GENERATION TRANSMISSION AND ENGINEERING (GATE)	270,655		Page 3
GENERATION OPERATIONS SUPERVISION AND ENGINEERING (GOSE)	306,184		Page 4
EXECUTIVE SUPPLEMENTAL RETIREMENT PLANS	17,800		
FLOOR SPACE ALLOCATION	4,752		
TOTAL DIRECT ALLOCATIONS		$747,418	
INDIRECT ALLOCATIONS			
GENERAL & ADMINISTRATIVE PERSONNEL EXPENSES	$171,079		Page 5
STOREROOM MATERIAL LOADING	393		
TOTAL INDIRECT ALLOCATIONS		$171,472	
GRAND TOTAL OVERHEAD ALLOCATION TO BOARDMAN		$918,890	

The $918,890 of corporate overhead allocated to the Boardman Coal Plabt by the various methods described in the following pages is then allocated to the various construction projects at Boardman. This is done by using total construction labor as the allocation base. The allocation base includes straight time, overtime, permanent, temporary and contract labor. The 1994 computation is as follows:

$$\frac{\text{Corporate Overhead Allocated to Boardman}}{\text{Construction Labor at Boardman}} = \frac{\$918,890}{\$1,467,875} = 62.61\%$$

The amount allocated to the Stack Emission Monitoring system (TC 4473) is computed as follows:

	1994	1993	Total
PGE labor	$18,075	$15,325	$33,400
Contract labor	637	64,792	65,429
Total	18,712	80,117	98,829
Allocation factor	62.61%	23.58%	30.97%
Allocated overhead	$11,716	$18,889	$30,605

The increase in the overhead allocation factor from 1993 to 1994 results from capitalizing a portion of GATE overhead. Prior to 1994 all GATE overhead was expenses to operation and maintenance.

PORTLAND GENERAL ELECTRIC COMPANY
GENERATION TRANSMISSION AND ENGINEERING ALLOCATION

	Total	Allocation Factor	Allocation Amount
Labor	624,088	20.00%	124,818
Materials	771	20.00%	154
Outside Material Purchases	56,269	20.00%	11,254
Professional Services	1,800	20.00%	360
Other Outside Services	63,929	20.00%	12,786
Employee Expense	14,816	20.00%	2,963
Miscellaneous	32,175	20.00%	6,435
Service Provider Allocation (Computer Support)	559,429	20.00%	111,886
Totals	1,353,277	20.00%	270,655

PORTLAND GENERAL ELECTRIC COMPANY
GENERAL & ADMINISTRATIVE PERSONNEL EXPENSES

	Allocation Base	Factor	Amount
Vacation and Leave Time	360,205	16.28%	58,641
Employee Benefits	360,205	20.28%	73,050
Payroll Taxes	360,205	9.97%	36,326
Injury and Damages	360,205	0.85%	3,062
Total G&A Personnel Expenses	306,205	55.87%	171,079

The allocation base is the amount of straight time permanent executive, management and staff wages embedded in the Corporate, GATE and GOSE overheads. This is computed as follows:

Salaries and wages in:

Corporate Overhead	61,661
GATE Overhead	122,327
GOSE Overhead	176,217
Total	360,205

The allocation factor is the Boardman Coal Plant share of the Company wide G&A salaries. There are approximately 11 other plants which receive an allocation.

Section VII - Required Exhibits

The required exhibits are an essential part of the application and cannot be omitted.

1. (Exhibit A) - If a plot plan is not available, a sketch should be made which clearly indicates the location of the claimed facility relative to other plant facilities and identifiable landmarks in the area. The plot plan should be clearly marked to show the location of the claimed facility.

2. (Exhibit B) - Detailed plans which clearly document, describe and identify the claimed facility are absolutely essential. If as-built engineering plans are not available, drawings should be made which clearly and distinctly describe the claimed facility and identify the extent of the facility. Structural details are normally not necessary. Overall plan and profile drawings, cutaway section views and process schematic diagrams are often adequate to fully identify and describe the claimed facility. Photographs are helpful providing they are clearly marked to indicate exactly what portion of the facility shown in the photographs is part of the claimed facility. Photographs without clear marking to show what is claimed are of little value. Normally the plans and descriptive documents are adequate if an individual unfamiliar with the plant can locate the facility and identify exactly which components are part of the claimed facility and which are not.

3. (Exhibit C) - The information contained in this exhibit must be related closely to the plans required as Exhibit B. Materials expended in construction but not made a part of the permanent facility should not be included in the listing required in Exhibit C. Materials which lose their identity when incorporated in the facility should not be listed separately. Component parts which are removable or identifiable in themselves, such as motors, blowers, pumps, etc., should be clearly listed by make, model, serial number and other identifying information.

   Examples:

   a. For a concrete tank the itemized listing might be (1) excavation, (2) 10 ft. x 30 ft. x 6 ft. reinforced concrete open-topped tank including form work, reinforced steel, concrete and labor to install.

   b. For a pumping station the itemized listing might be (1) excavation, (2) structure consisting of reinforced concrete wet and dry well pumping station with above-ground control building, (3) two 30 HP vertical waste pumps, Brand Y, Model X, (4) discharge piping, (5) pumping control system.

   c. For a baghouse the itemized listing might be (1) Brand X baghouse, Model Y, (2) Brand A fan, Model B, with 30 HP motor Brand D, Serial No. 1234567, (3) Water Deluge System, Brand F, Type G, (4) ductwork, (5) structural steel and foundation, (6) electrical, (7) labor and engineering.

4. (Exhibit D) - The actual cost of the facility is the total of those costs directly related to the acquisition and installation of the claimed facility and may include engineering fees, legal fees, overhead and other costs directly attributable to the facility. Start-up and operation costs are not considered to be part of the actual cost of the facility. Tax credit fees are not part of the actual cost of the facility.

   In a case where the claimed facility is leased, the accountant's certification of cost normally will not be required. The documentation of the actual value of the facility will be provided by the notarized statement from the lessor, which was discussed under Section I, Item 3 of these instructions.

   Where the total actual cost of the claimed facility is less than $20,000 and the costs can be completely documented by copies of invoices, cancelled checks, etc., the Department of Environmental Quality may accept copies of such documentation in lieu of the accountant's certificate.

5. (Exhibit E)- Leave blank. No longer required.

6. (Exhibit F) - Leave blank. No longer required, except for reclaimed plastic product tax credits.

12. A facility will be certified as one of the following: air, noise, water (or water UST), solid waste, hazardous waste pollution control facility, or used oil recycling or resource recovery facility. It cannot be issued more than one certificate for the same equipment, as that would, potentially, result in double tax relief. Further, after the original certificate expires on the facility, typically 10 years, the facility cannot be certified again.

13. A facility that is certified by the Oregon Department of Energy as an Energy Conservation Facility cannot be certified as a Pollution Control Facility under ORS 316.097 or 317.116.

Section V - Allocation of Cost

The applicant will complete the information in Section V to provide a basis for determining the eligibility of costs and the percentage of the actual cost that is properly allocable to pollution control. Since each installation differs greatly, there is no single formula offered for determining such allocation. If assistance is required, contact the Department for guidance on acceptable methods for determining percent of allocable cost. The applicant must make a case through the information requested and through any additional information which the applicant may deem necessary to justify the percentage of the actual cost that is properly allocated to pollution control. Department representatives are available to answer questions and to help resolve issues that may arise during the application process.

1. a. The cost of the claimed facility, which is defined in law as the taxpayer's actual cash investment in the facility, must be supported and documented by the accountant's certification of cost required in "Exhibit D" (Section VI). If a facility is owned by more than one person, and the applicant wishes to have the portion they own certified separately, the actual cost of the total facility must be documented, as well as the cost of the portion claimed in the application.

   b. The salvage value is the value of the facility at the end of its useful life minus what it costs to remove it from service. Salvage value can never be less than zero. The facility cost is the actual cost minus the salvage cost of an existing facility to be replaced.

   c. The annual cash flow for each of the first 5 full years of operation is calculated by subtracting the annual operating expenses from the gross annual income for each year.

      Gross annual income is the total annual income derived from the claimed facility, including income from the sale or reuse of recovered materials or energy, operational savings, or any other means. Except for facilities that are integral to the operation of the applicant's business (see Section VI), it is not the total income from the overall company or business. Calculations made in determining the gross annual income figures for each of the first 5 years must be attached to the application. In some cases additional documentation will be required.

      Annual operating expenses are the estimated costs of operating the claimed facility including labor, utilities, property taxes, insurance, and other cash expenses, less any savings in expenses attributable to installation of the claimed facility. Depreciation, interest, and state and federal taxes may not be included as operating expenses. Calculations made in determining the annual operating expenses for each of the first 5 years must be included.

   d. Average annual cash flow means the average cash flow from the claimed facility for the first 5 full years of operation calculated by summing the five annual cash flows and dividing the total by five. Where the useful life of the claimed facility is less than 5 years, sum the annual cash flows for the useful life of the facility and divide by the number of years of useful life.

   e. Useful life means the number of years the claimed facility is capable of operating before replacement or disposal.

   f. The return on investment factor is determined by dividing the claimed facility cost by the average annual cash flow.

Cow Creek Band of Umpqua Tribe of Indians

July 11, 1996

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL # of pages ► 2

To Jan Renfroe	From Teena Reichgott
Dept./Agency OR DEQ	Phone # 206-553-1601
Fax # 503-229-5850	Fax #

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

Via Fax: 206-553-6647 & U.S. Mail

Kathleen S. Hill
Regional Tribal Policy Director
U.S. EPA/Region 10
1200 Sixth Ave.
Seattle, WA 98101

Re: Comments to EPA/DEQ FY 1997 Performance Partnership Agreement

Dear Ms. Hill;

Chairperson Shaffer asked that I respond to the draft FY 1997 Performance Partnership Agreement (the "Agreement") on behalf of the Tribe.

My initial observation and comment revolves around the amount of time that the Tribe has to review the Agreement and understand the process behind it. In the future, we would very much like to be able to respond and comment earlier in the process or, at a minimum, have a longer period of time to digest and comment upon any such agreements since we believe they have a strong potential impact on the Tribe.

Our main substantive comment to the Agreement involves the broad scope of the language regarding the responsibility of the Oregon DEQ for "implementing the state's ground water protection statutes" (pg. 5) and "efforts to ensure compliance and pursue enforcement when necessary" (pg. 12). The Tribe highly values it's direct government-to-government relationship with the EPA since, among other things, we believe that the EPA has some fundamental understanding of tribal sovereignty and tribal environmental concerns. Our relationship with the Oregon DEQ, however, has been marked by what we perceive as an attitude of finger pointing and conclusion jumping with negligible communications with the Tribe directly. While we understand and respect the good work that the Oregon DEQ is attempting to do, we believe that their inexperience in dealing with tribal issues and their inherent desire for State primacy in regulatory matters may be potentially detrimental to tribal interests. Therefore, we would very much like to see arrangements such as the Agreement include provisions reflecting the policy espoused by

both federal and state executive orders requiring or requesting Tribal consultation on matters potentially impacting Tribal lands and interests. We would also like the Agreement (and other similar arrangements) to include language clarifying that delegations of federal authority to states do not automatically impose state statutes and regulatory standards upon the Tribes. Tribes have a historically legitimate concern that federal delegations of authority to states, even in a limited context, are used by states as the "thin edge of the wedge" in order to begin asserting state regulatory jurisdiction over tribal land and interests in a manner not contemplated by the original delegation of authority. Our specific suggestion is the development of a general statement and guidelines to be included in any delegation of federal authority to states which recognizes the limited nature of state regulatory jurisdiction over tribal lands.

Thank you for the opportunity to comment on the Agreement. I hope that in the future there will be continued opportunity for Tribal input earlier in the process of developing arrangements such as the Agreement. Please contact myself or Chairperson Shaffer with any comments, requests for information or questions.

Sincerely,

Wayne A. Shaemel
Tribal General Counsel

cc: Chairperson Shaffer
Tribal Administrator
Janice M. Renfro
file

O2WA

Oregon On Site Wastewater Association

May 30, 1996

Martin Loring
Department of Environmental Quality
811 SW 6th Avenue
Portland, Oregon 97204-1390

Dear Martin:

Thank you for taking the time to meet with O²WA board members Mike Madson, Alex Mauck, Terry Bounds, and me on May 22nd. You indicated in your letter of May 24th that you understand O²WA's position: (1) we support the Department's proposal to change the rule requiring installer licensing for everyone working in the field so that it is required only of supervisors, and (2) we oppose the Department's intention to extend the installer certification deadline beyond July 1, 1996.

All of us who work in the wastewater field are under a lot of pressure to meet increasingly stringent rules for protecting the environment and the consumer. We take our responsibilities seriously and strive to do a good job. A project may have the very best in soil evaluation, the very best engineering and design, the very best equipment available, but if the installer of the system doesn't know his job then we're all in trouble.

Our full board of directors met May 25th and agrees unanimously that your rationale for delaying the installer certification deadline is without merit. DEQ took part in the making of the new rules; it has had 18 months to implement the installer licensing provisions. When it became apparent that DEQ was not proceeding in a timely manner with the testing process, O²WA members volunteered and contributed their time and talents to facilitate it . Oregon's community colleges are willingly assisting in the administration of the testing and even providing training sessions in preparation for testing. Now that it has started, the process should continue and the deadline should be met. Naturally, there must be flexibility. Installers who cannot take the test for reasons of health, logistics, or other problems should be given extensions on an individual basis.

As a businessman, I respect your concern for the business owners affected by this new requirement. I fear, at the same time, that the welfare of the general public is being overlooked. Responsible installers are not going to lose their livelihood. The certification test is not difficult. It covers only those state rules that installers are expected to know and required to follow, and it's actually an open-book test! Those unable to pass it should not be installing septic systems. But they won't be out of a job either; they'll simply put their back hoes and dump trucks to some other use, a use, one would hope, in which their ignorance is less likely to harm the environment, public health, or their customers' pocketbooks. The days of "Have rig—will dig" are over! If DEQ delays installer licensing in a specious effort to protect livelihoods, it's the public who will continue to pay the price!

We appreciate your volunteering to forward the agenda packet and information on when and where the Environmental Quality Commission will meet to consider the certification issue. We look forward to attending.

Sincerely,

Oregon Onsite Wastewater Association

Harold L. Ball

Harold L. Ball, P.E.
President

cc Langdon Marsh
Sherman Olson
Mike Downs
Steve Greenwood
Greg Farrell
Tom Bispham
Bob Baumgartner
Stephanie Hallock
Bob Baggett

event the penalty is recovered by a regional air quality control authority, it shall be paid into the county treasury of the county in which the violation occurred. [Formerly 449.973; 1989 c.706 §17; 1991 c.650 §6; 1991 c.734 §37]

468.140 Civil penalties for specified violations. (1) In addition to any other penalty provided by law, any person who violates any of the following shall incur a civil penalty for each day of violation in the amount prescribed by the schedule adopted under ORS 468.130:

(a) The terms or conditions of any permit required or authorized by law and issued by the department or a regional air quality control authority.

(b) Any provision of ORS 164.785, 448.305, 454.010 to 454.040, 454.205 to 454.255, 454.405, 454.425, 454.505 to 454.535, 454.605 to 454.745, ORS chapter 467 and ORS chapters 468, 468A and 468B.

(c) Any rule or standard or order of the commission adopted or issued pursuant to ORS 448.305, 454.010 to 454.040, 454.205 to 454.255, 454.405, 454.425, 454.505 to 454.535, 454.605 to 454.745, ORS chapter 467 and ORS chapters 468, 468A and 468B.

(d) Any term or condition of a variance granted by the commission or department pursuant to ORS 467.060.

(e) Any rule or standard or order of a regional authority adopted or issued under authority of ORS 468A.135.

(f) The financial assurance requirement under ORS 468B.480 and 468B.485 or any rule related to the financial assurance requirement under ORS 468B.480.

(2) Each day of violation under subsection (1) of this section constitutes a separate offense.

(3)(a) In addition to any other penalty provided by law, any person who intentionally or negligently causes or permits the discharge of oil into the waters of the state shall incur a civil penalty not to exceed the amount of $20,000 for each violation.

(b) In addition to any other penalty provided by law, the following persons shall incur a civil penalty not to exceed the amount of $10,000 for each day of violation:

(A) Any person who violates the terms or conditions of a permit authorizing waste discharge into the air or waters of the state.

(B) Any person who violates any law, rule, order or standard in ORS 448.305, 454.010 to 454.040, 454.205 to 454.255, 454.405, 454.425, 454.505 to 454.535, 454.605 to 454.745 and ORS chapters 468, 468A and 468B relating to air or water pollution.

(C) Any person who violates the provisions of a rule adopted or an order issued under ORS 459A.590.

(4) In addition to any other penalty provided by law, any person who violates the provisions of ORS 468B.130 shall incur a civil penalty not to exceed the amount of $500 for each day of violation.

(5) Subsection (1)(c) and (e) of this section do not apply to violations of motor vehicle emission standards which are not violations of standards for control of noise emissions.

(6) Notwithstanding the limits of ORS 468.130 (1) and in addition to any other penalty provided by law, any person who intentionally or negligently causes or permits open field burning contrary to the provisions of ORS 468A.555 to 468A.620 and 468A.992, 476.380 and 478.960 shall be assessed by the department a civil penalty of at least $20 but not more than $40 for each acre so burned. Any fines collected by the department pursuant to this subsection shall be deposited with the State Treasurer to the credit of the General Fund and shall be available for general governmental expense. [Formerly 449.993; 1975 c.559 §14; 1977 c.511 §5; 1979 c.353 §1; 1987 c.513 §1; 1989 c.268 §4; 1989 c.1042 §7; 1991 c.764 §6]

POLLUTION CONTROL FACILITIES TAX CREDIT

468.150 Field sanitation and straw utilization and disposal methods as "pollution control facilities." After alternative methods for field sanitation and straw utilization and disposal are approved by the committee and the department, "pollution control facility," as defined in ORS 468.155, shall include such approved alternative methods and persons purchasing and utilizing such methods shall be eligible for the benefits allowed by ORS 468.155 to 468.190. [1975 c.559 §15]

Note: 468.150 was enacted into law by the Legislative Assembly but was not added to or made a part of ORS chapter 468 or any series therein by legislative action. See Preface to Oregon Revised Statutes for further explanation.

468.155 Definitions for ORS 468.155 to 468.190. (1)(a) As used in ORS 468.155 to 468.190, unless the context requires otherwise, "pollution control facility" or "facility" means any land, structure, building, installation, excavation, machinery, equipment or device, or any addition to, reconstruction of or improvement of, land or an existing structure, building, installation, excavation, machinery, equipment or device reasonably used, erected, constructed or installed by any person if:

(A) The principal purpose of such use, erection, construction or installation is to

comply with a requirement imposed by the department, the federal Environmental Protection Agency or regional air pollution authority to prevent, control or reduce air, water or noise pollution or solid or hazardous waste or to recycle or provide for the appropriate disposal of used oil; or

(B) The sole purpose of such use, erection, construction or installation is to prevent, control or reduce a substantial quantity of air, water or noise pollution or solid or hazardous waste or to recycle or provide for the appropriate disposal of used oil.

(b) Such prevention, control or reduction required by this subsection shall be accomplished by:

(A) The disposal or elimination of or redesign to eliminate industrial waste and the use of treatment works for industrial waste as defined in ORS 468B.005;

(B) The disposal or elimination of or redesign to eliminate air contaminants or air pollution or air contamination sources and the use of air cleaning devices as defined in ORS 468A.005;

(C) The substantial reduction or elimination of or redesign to eliminate noise pollution or noise emission sources as defined by rule of the commission;

(D) The use of a material recovery process which obtains useful material from material that would otherwise be solid waste as defined in ORS 459.005, hazardous waste as defined in ORS 466.005, or used oil as defined in ORS 459A.555; or

(E) The treatment, substantial reduction or elimination of or redesign to treat, substantially reduce or eliminate hazardous waste as defined in ORS 466.005.

(2) "Pollution control facility" or "facility" does not include:

(a) Air conditioners;

(b) Septic tanks or other facilities for human waste;

(c) Property installed, constructed or used for moving sewage to the collecting facilities of a public or quasi-public sewerage system;

(d) Any distinct portion of a pollution control facility that makes an insignificant contribution to the principal or sole purpose of the facility including the following specific items:

(A) Office buildings and furnishings;

(B) Parking lots and road improvements;

(C) Landscaping;

(D) External lighting;

(E) Company or related signs; and

(F) Automobiles;

(e) Replacement or reconstruction of all or a part of any facility for which a pollution control facility certificate has previously been issued under ORS 468.170, except:

(A) If the cost to replace or reconstruct the facility is greater than the like-for-like replacement cost of the original facility due to a requirement imposed by the department, the federal Environmental Protection Agency or a regional air pollution authority, then the facility may be eligible for tax credit certification up to an amount equal to the difference between the cost of the new facility and the like-for-like replacement cost of the original facility; or

(B) If a facility is replaced or reconstructed before the end of its useful life then the facility may be eligible for the remainder of the tax credit certified to the original facility;

(f) Asbestos abatement; or

(g) Property installed, constructed or used for cleanup of emergency spills or unauthorized releases, as defined by the commission. [Formerly 449.605; 1975 c.496 §1; 1977 c.795 §1; 1979 c.802 §1; 1983 c.637 §1; 1987 c.596 §4; 1989 c.802 §4]

468.160 Policy. In the interest of the public peace, health and safety, it is the policy of the State of Oregon to assist in the prevention, control and reduction of air, water and noise pollution and solid waste, hazardous wastes and used oil in this state by providing tax relief with respect to Oregon facilities constructed to accomplish such prevention, control and reduction. [Formerly 449.615; 1975 c.496 §2; 1977 c.795 §2; 1979 c.802 §2]

468.165 Application for certification of pollution control facilities; fees. (1) Any person may apply to the Environmental Quality Commission for certification under ORS 468.170 of a pollution control facility or portion thereof erected, constructed or installed by the person in Oregon if:

(a) The air or water pollution control facility was erected, constructed or installed on or after January 1, 1967.

(b) The noise pollution control facility was erected, constructed or installed on or after January 1, 1977.

(c) The solid waste facility was under construction on or after January 1, 1973, the hazardous waste or used oil facility was under construction on or after October 3, 1979, and if:

(A) The facility's principal or sole purpose conforms to the requirements of ORS 468.155 (1);

(B) The facility will utilize material that would otherwise be solid waste as defined in

AIR POLLUTION CONTROL

468A.005 Definitions for air pollution control laws. As used in ORS chapters 468, 468A and 468B, unless the context requires otherwise:

(1) "Air-cleaning device" means any method, process or equipment which removes, reduces or renders less noxious air contaminants prior to their discharge in the atmosphere.

(2) "Air contaminant" means a dust, fume, gas, mist, odor, smoke, vapor, pollen, soot, carbon, acid or particulate matter or any combination thereof.

(3) "Air contamination" means the presence in the outdoor atmosphere of one or more air contaminants which contribute to a condition of air pollution.

(4) "Air contamination source" means any source at, from, or by reason of which there is emitted into the atmosphere any air contaminant, regardless of who the person may be who owns or operates the building, premises or other property in, at or on which such source is located, or the facility, equipment or other property by which the emission is caused or from which the emission comes.

(5) "Air pollution" means the presence in the outdoor atmosphere of one or more air contaminants, or any combination thereof, in sufficient quantities and of such characteristics and of a duration as are or are likely to be injurious to public welfare, to the health of human, plant or animal life or to property or to interfere unreasonably with enjoyment of life and property throughout such area of the state as shall be affected thereby.

(6) "Area of the state" means any city or county or portion thereof or other geographical area of the state as may be designated by the commission.

(7) "Woodstove" means a wood fired appliance with a closed fire chamber which maintains an air-to-fuel ratio of less than 30 during the burning of 90 percent or more of the fuel mass consumed in the low firing cycle. The low firing cycle means less than or equal to 25 percent of the maximum burn rate achieved with doors closed or the minimum burn achievable. [Formerly 468.275]

468A.010 Policy. (1) In the interest of the public health and welfare of the people, it is declared to be the public policy of the State of Oregon:

(a) To restore and maintain the quality of the air resources of the state in a condition as free from air pollution as is practicable, consistent with the overall public welfare of the state.

(b) To provide for a coordinated statewide program of air quality control and to allocate between the state and the units of local government responsibility for such control.

(c) To facilitate cooperation among units of local government in establishing and supporting air quality control programs.

(2) The program for the control of air pollution in this state shall be undertaken in a progressive manner, and each of its successive objectives shall be sought to be accomplished by cooperation and conciliation among all the parties concerned. [Formerly 449.765 and then 468.280]

468A.015 Purpose. It is the purpose of the air pollution laws contained in ORS 448.305, 454.010 to 454.040, 454.205 to 454.255, 454.405, 454.425, 454.505 to 454.535, 454.605 to 454.745 and ORS chapters 468, 468A and 468B to safeguard the air resources of the state by controlling, abating and preventing air pollution under a program which shall be consistent with the declaration of policy in this section and with ORS 468A.010. [Formerly 449.770 and then 468.285]

468A.020 Application of air pollution laws. Except as provided in this section and in ORS 476.380 and 478.960, the air pollution laws contained in ORS chapters 468, 468A and 468B do not apply to:

(1) Agricultural operations and the growing or harvesting of crops and the raising of fowls or animals, except field burning which shall be subject to regulation pursuant to ORS 468.140, 468.150, 468A.555 to 468A.620 and 468A.992 and this section;

(2) Use of equipment in agricultural operations in the growth of crops or the raising of fowls or animals, except field burning which shall be subject to regulation pursuant to ORS 468.140, 468.150, 468A.555 to 468A.620 and 468A.992 and this section;

(3) Barbecue equipment used in connection with any residence;

(4) Agricultural land clearing operations or land grading;

(5) Heating equipment in or used in connection with residences used exclusively as dwellings for not more than four families, except woodstoves which shall be subject to regulation under this section, ORS 468A.460 to 468A.480, 468A.490 and 468A.515;

(6) Fires set or permitted by any public agency when such fire is set or permitted in the performance of its official duty for the purpose of weed abatement, prevention or elimination of a fire hazard, or instruction of employees in the methods of fire fighting, which in the opinion of the agency is necessary;