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OREGON
ENVIRONMENTAL QUALITY
COMMISSION MEETING
MATERIALS 06/19/2008

State of Oregon
Department of Environmental Quality

Town Hall/Medford
6/19/08

Oregon Environmental Quality Commission

Public Forum
Request to Present Information

Agenda Item ____ or
Topic of Presentation Resources used to drill for a non-renewable

form of energy. /D
Name (Please ~~print clearly~~)

Megan
Address

None mountaingrl.85@hotmail.com 538-8227
Affiliation Email (optional) Phone (optional)

Town Hall
6/19/08

Oregon Environmental Quality Commission

Public Forum
Request to Present Information

Agenda Item ____ or
Topic of Presentation Pacific Connector Natural Gas Pipeline

Fred Fleetwood
Name (Please print clearly)

4261 Hwy 227 Trail, OR 97541
Address

None waterrate1@earthlink.net 541-878-~~3278~~ 3278
Affiliation Email (optional) Phone (optional)

Town hall
6/19/08

Oregon Environmental Quality Commission

Public Forum
Request to Present Information

Agenda Item ____ or
Topic of Presentation LNG

Bea Frederickson
Name (Please print clearly)

[redacted]7 Brophy Way #25
Address

resident Shady Cove OR 97539
Affiliation Email (optional) Phone (optional)

Town hall
6/19/08

Oregon Environmental Quality Commission

Public Forum
Request to Present Information

Agenda Item ____ or
Topic of Presentation LNG Terminals & Pipelines

Daniel Serres
Name (Please print clearly)

833 SE Main St. Portland, OR [illegible]
Address

Columbia Riverkeeper/F.L.O.W.
Affiliation Email (optional) Phone (optional)

6/19/08

Oregon Environmental Quality Commission

Public Forum
Request to Present Information

Agenda Item ____ or
Topic of Presentation LNG Compressor station

Richard Harrington
Name (Please print clearly)

PO Box 192, Butte Falls, OR 97522
Address

richard.w.harrington@worldnet.att.net
Affiliation Email (optional) Phone (optional)

Town Hall
6/19/08

Oregon Environmental Quality Commission

Public Forum
Request to Present Information

Agenda Item ____ or
Topic of Presentation Permits for LNG/Pipelines (CWA, CAA)

Olivia Schmidt
Name (Please print clearly)

5019 NE 14th Pl. Portland, OR 97211
Address

Columbia River Clean Energy Coalition
Affiliation Email (optional) Phone (optional)

Oregon Environmental Quality Commission Meeting

June 19 and 20, 2008

Banquet Room
Rogue Regency Inn
2300 Biddle Road
Medford, Oregon

Thursday, June 19—Regular meeting begins at 8:30 am

A. **Preliminary Commission Business: Adoption of Minutes of the April 24-25, 2008 Regular Meeting**
The Environmental Quality Commission will review, amend if necessary, and approve draft minutes of the April 24-25, 2008, regular EQC meeting.

B. **Action Item: Umatilla Chemical Agent Disposal Facility Post-Trial Burn Risk Assessment**
Two screening-level risk assessments (including both human health and ecological components) have been completed by the Department of Environmental Quality to evaluate the potential for emissions from the UMCDF to pose a threat to human health and the environment. The first screening-level risk assessment, the Pre-Trial Burn Risk Assessment (PreRA), was formally completed in February 1997, at which time the EQC issued hazardous waste and air permits to build and operate the UMCDF, based, in part, upon the results of the PreRA. The April EQC meeting included an informational item to provide the EQC with background on the recently completed Post-Trial Burn Risk Assessment (PostRA) of the UMCDF and a summary of the PostRA's estimates of risk and hazard posed to human health and the environment by UMCDF operations. DEQ held a public hearing May 29, 2008, on the results and interpretation of the PostRA. Based upon feedback from the public hearing, as well as a public comment period closing June 11, 2008, DEQ will present an action item to the EQC regarding the UMCDF's current use of the best available technology or BAT.
Joni Hammond, Rich Duval, and Bruce Hope, Department of Environmental Quality

C. **Action Item: Finding of Best Available Technology Determination for Secondary Wastes Originally Destined for Treatment in the Umatilla Chemical Agent Disposal Facility Dunnage Incinerator**
The final judgment in GASP, *et al*, v. Environmental Quality Commission, *et al*, Case No. 9708-06159 (GASP IV), remanded three issues to the EQC for findings on best available technology (BAT) and no major adverse impact. One of the remanded BAT determinations is the destruction of agent-contaminated secondary wastes originally intended for the dunnage incinerator at the UMCDF. DEQ recommends that the EQC find that incineration in the metal parts furnace and/or deactivation furnace system represents the best available technology for treatment of these wastes.
Joni Hammond and Rich Duval, Department of Environmental Quality

D. Informational Item: Inclusion of the Pollution Abatement System Carbon Filter System in the Umatilla Chemical Agent Disposal Facility Incineration Process as Best Available Technology

As remanded by the Court in the final judgment in GASP IV (see Item C), the EQC must determine whether the best available technology determination for the UMCDF incineration process should include and require operation of the Pollution Abatement System Carbon Filter System or PFS. This agenda item provides background on the development and use of the PFS at the UMCDF. While the PFS was not a demonstrated technology for the chemical demilitarization incineration process when the original operating permit for the UMCDF was issued, the EQC has since found the PFS to be a proven technology resulting in reduced risk to the public by providing for more expedient destruction of the munitions stockpile.

Joni Hammond and Rich Duval, Department of Environmental Quality

E. Informational Item: Best Available Technology Determination for Mustard Agent with Elevated Mercury Levels

As remanded by the Court in the final judgment in GASP IV (see Item C), the EQC must make a best available technology determination for the handling of mustard agent with elevated mercury levels at the UMCDF.

Joni Hammond and Rich Duval, Department of Environmental Quality

F. Action Item: Clean Diesel Incentives

Diesel exhaust ranks among the top air toxins in Oregon. It is linked to significant public health issues such as asthma, cardiovascular disease and cancer; and environmental concerns about regional haze and global warming. The EQC will consider adoption of proposed rules to initiate a clean diesel upgrade program through grants, loans and tax credits as provided in legislative House Bills 2172 and 3201 with the goal of reducing excess lifetime cancer risk from diesel exhaust exposure in Oregon to no more than one in a million by 2017. Participation in the grants, loan or tax credit programs is voluntary.

Andy Ginsburg and Kevin Downing, Department of Environmental Quality

G. Public Forum

The EQC will provide members of the public an opportunity to speak on environmental issues that are not part of the agenda for this meeting. Individuals wishing to speak to the EQC must sign a request form at the meeting and limit presentations to five minutes. The EQC may discontinue public forum after a reasonable time if a large number of speakers wish to appear. In accordance with ORS 183.335(13), no comments may be presented on rule adoption items for which public comment periods have closed.

Lunch Break

H. Informational Item: Director's Dialogue

Dick Pedersen, DEQ Acting Director, will discuss current events and issues involving DEQ.

I. **Informational Item: Tour of local site with Air Quality permit**
The EQC will observe the ongoing installation of two air pollution control systems at Timber Products Company in Medford, a bioremediation unit and a regenerative thermal oxidizer. This pollution equipment is necessary to meet the requirements for the control of hazardous air pollutants under the federal Maximum Achievable Control Technology, or MACT, program.

Thursday, June 19 – Town Hall Meeting 7:00 – 9:00 pm

The EQC will hold a town hall style meeting, a "Conversation with the Environmental Quality Commission," at the Banquet Room of the Rogue Regency Inn in Medford, Oregon. The public is invited to attend and share their perspectives and concerns on environmental issues with the EQC.

Friday, June 20 — Regular meeting begins at 9:00 am

The Commission will meet in executive session from 8:00 am to 9:00 am to consult with counsel concerning legal rights and duties regarding current or potential litigation against the DEQ. Only representatives of the media may attend and media representatives may not report on any deliberations during the session. [1]

J. **Action Item: Water Quality Permit Fee Increases**
The EQC will consider a proposal by DEQ to raise fees in order to provide additional revenue for administering DEQ's National Pollutant Discharge Elimination System and Water Pollution Control Facility permit programs. The proposed fee increases include a three percent annual increase to cover increased program costs, a five percent increase to add staff positions, and an 82 percent increase in the fees for stormwater permits to enhance the stormwater program, all of which were authorized by the Legislature. The three percent annual fee increase and the five percent fee increases were recommended by the Blue Ribbon Committee convened in 2002 by DEQ to recommend improvements to DEQ's water quality permit program. The proposal also includes a surcharge payment to address toxic pollutants in Oregon's waterways.
Neil Mullane and Melissa Aerne, Department of Environmental Quality

K. **Action Item: Onsite Fee Increases**
The EQC will consider a proposal by DEQ to increase the onsite application surcharge by $20 and make minor changes to onsite wastewater treatment system, or septic system, program rules. The surcharge would apply to approximately 13,900 onsite septic system applications per year, most of which are for single-family dwellings. In addition, the proposal would increase fees for Water Pollution Control Facility-Onsite permit holders by a total of eight percent, through a three percent annual fee increase to cover increased program costs and a five percent fee increase to add staff positions. DEQ administers approximately 700 WPCF-Onsite permits, most of which are held by small businesses. The three percent annual fee increase and the five percent fee increase for the WPCF-Onsite program were recommended by the Blue Ribbon Committee convened in 2002 by DEQ to recommend improvements to DEQ's water quality permit program.
Neil Mullane and Zach Loboy, Department of Environmental Quality

L. **Informational Item: Electronic Recycling Act**
DEQ staff will update the EQC on progress in implementing Oregon's Electronics Recycling Law. The new law creates and finances a statewide collection, transportation, and recycling system for desktop computers, portable computers, monitors, and televisions, referred to as covered electronic devices or CEDs. Manufacturers may manage their own statewide collection programs or participate in a state contractor program that DEQ will establish, and will either cover their own manufacturer-run program costs or pay a recycling fee to participate in the state contractor program. All programs must be in operation by January 1, 2009; the disposal of CEDs is prohibited in Oregon as of January 1, 2010. Beginning January 1, 2009, only registered brands are eligible for sale in or into Oregon. DEQ convened the Electronics Recycling Program Advisory Workgroup in October 2007, to develop procedures and guidelines to ensure the program is operational by January 1, 2009.
Wendy Wiles, Loretta Pickerell, and Kathy Kiwala, Department of Environmental Quality

M. **Informational Item: Recognition of Local Efforts**
DEQ staff will recognize local citizens and officials from the Medford area who have made significant voluntary efforts to improve the quality of the environment.
Dick Pedersen and John Becker, Department of Environmental Quality

N. **Informational Item: Draft 2009 Legislative Agenda**
DEQ and the EQC will discuss the prioritization of budget policy packages for the 2009 Legislative session. DEQ was required to submit draft legislative concepts to the Department of Administrative Services (DAS) on April 4, 2008, and will submit its Agency Request Budget by September 1, 2008 to DAS and the Governor's Office. The EQC chairperson must certify DEQ's Agency Budget Request at the August 2008 EQC meeting.
Greg Aldrich and Jim Roys, Department of Environmental Quality

O. **Informational Item: Commissioner Reports**

Adjourn

[1] This executive session will be held pursuant to ORS 192.660(2)(f), (h).

Future Environmental Quality Commission meeting dates include:

August 21 - 22, 2008 (Hermiston, Oregon)
October 23 - 24, 2008
December 11 - 12, 2008

Agenda Notes

Staff Reports: Staff reports for each item on this agenda can be viewed and printed from DEQ's Web site at http://www.deq.state.or.us/about/eqc/eqc.htm. To request a particular staff report be sent to you in the mail, contact the EQC Assistant, Department of Environmental Quality, Director's Office, 811 SW Sixth Avenue, Portland, Oregon 97204; telephone 503-229-5990, toll-free 1-800-452-4011 extension 5990, or 503-229-6993 (TTY). Please specify the agenda item letter when requesting reports. If special physical, language or other accommodations are needed for this meeting, please advise the EQC Assistant as soon as possible, but at least 48 hours in advance of the meeting.

Public Forum: The Commission will provide time in the meeting during the afternoon of Thursday, June 19, for members of the public to speak to the Commission. Individuals wishing to speak to the Commission must sign a request form at the meeting and limit presentations to five minutes. The Commission may discontinue the public forum after a reasonable time if a large number of speakers wish to appear. In accordance with ORS 183.335(13), no comments may be presented on Rule Adoption items for which public comment periods have closed.

Note: Because of the uncertain length of time needed for each agenda item, the Commission may hear any item at any time during 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 participants agree. Those wishing to hear discussion of an item should arrive at the beginning of the meeting to avoid missing the item.

The Environmental Quality Commission is a five-member, all volunteer, citizen panel appointed by the governor for four-year terms to serve as DEQ's policy and rule-making board. Members are eligible for reappointment but may not serve more than two consecutive terms.

Lynn Hampton, Chairwoman
Lynn Hampton recently retired as Tribal Prosecutor for the Confederated Tribes of the Umatilla Indian Reservation and previously was Deputy District Attorney for Umatilla County. She received her B.A. at University of Oregon and her J.D. at University of Oregon School of Law. Commissioner Hampton was appointed to the EQC in July 2003 and lives in Pendleton.

Ken Williamson, Commissioner
Ken Williamson is head of the School of Chemical, Biological and Environmental Engineering at Oregon State University in Corvallis. He received his B.S. and M.S. at Oregon State University and his Ph.D. at Stanford University. Commissioner Williamson was appointed to the EQC in February 2004 and reappointed in May, 2007. He lives in Portland. He represents the EQC on the Oregon Watershed Enhancement Board (OWEB).

Judy Uherbelau, Commissioner
Judy Uherbelau is a graduate of Ball State University with a B.S. in Economics/Political Science. She received a J.D. from UCLA School of Law and recently closed her law practice with Thomas C. Howser, PC in Ashland. Judy served in the Peace Corps and the Oregon House of Representatives as well as numerous

boards and commissions. Commissioner Uherbelau was appointed to the EQC in February 2005 and lives in Ashland.

Donalda Dodson, Commissioner
Donalda Dodson is currently Interim Executive Director of the Oregon Child Development Coalition. Previously, she served as Administrator of the Department of Human Services Office of Family Health and as Manager of the Maternal/Child Health Program at the Marion County Health Department. Donalda has a Bachelor of Science degree in nursing and a master's degree in public health. She has chaired or served on nearly a dozen public health committees and task forces and expresses a strong interest in bringing environmental issues into the public health arena. Commissioner Dodson was appointed to the EQC in August of 2005 and reappointed in July of 2007. She resides in Salem.

Bill Blosser, Vice Chairman
Bill Blosser is owner of William Blosser Consulting. He is employed by, and has held several positions with CH2M Hill in Portland. Bill served as Director of the Oregon Department of Land Conservation and Development from 2001-2002 and was formerly president of Sokol Blosser Winery in Dundee, Oregon. Bill has served on and chaired numerous commissions and task forces, including terms as chair of the Water Resources Commission, chair of the Land Conservation and Development Commission and chair of the Policy Advisory Committee on Water Quality to the EQC. Bill has a Bachelor of Arts degree in history and humanities from Stanford University and a master's degree in regional planning from the University of North Carolina, Chapel Hill. Commissioner Blosser was appointed to the EQC in January 2006 and lives in Portland.

Dick Pedersen, Acting Director
Department of Environmental Quality
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Wendy Simons, Assistant to the Commission
Telephone: (503) 229-5301

Approved ___
Approved with Corrections ___

Minutes are not final until approved by Commission.

Oregon Environmental Quality Commission
Minutes of the Three Hundred and Forty-third Meeting

April 24-25, 2008

Thursday, April 24 – Regular meeting began at 8:30 a.m.
DEQ Headquarters, 811 SW 6th Avenue, Room EQCA
Portland, Oregon 97204

Regular Meeting

The Environmental Quality Commission held a public meeting beginning at 8:30 a.m. on April 24, 2008, at the Department of Environmental Quality headquarters building, 811 SW 6th, Room EQCA, Portland, Oregon.

The following members of the EQC were present:

Lynn Hampton, Chairwoman
Bill Blosser, Vice Chairman
Kenneth Williamson, Member
Donalda Dodson, Member
Judy Uherbelau, Member

(Note: Some agenda items were taken out of order due to time considerations.)

A. Preliminary Commission Business: Adoption of Minutes of the February 21-22, 2008 Regular Meeting

The EQC reviewed and amended the draft minutes of the February 21-22, 2008, EQC meeting. Commissioner Dodson moved and Vice Chairman Blosser seconded that the minutes be adopted as amended. The motion carried unanimously.

B. Informational Item: Update on the Status of the Umatilla Chemical Agent Disposal Facility (UMCDF)

Joni Hammond, acting deputy director, and Rich Duval, administrator of DEQ's chemical demilitarization program, gave an update on the status of recent activities at the Umatilla Chemical Agent Disposal Facility (UMCDF). As of April 6, 2008, 79 percent of all Umatilla munitions and bulk containers and 32 percent of the original Umatilla stockpile (by agent weight) have been destroyed. In June 2008, the EQC will be asked to issue findings on the secondary wastes best available technology

(BAT) determination. In August 2008, the EQC will be asked to issue findings on the mustard gas container and pollution abatement carbon filter system BAT determinations.

C. Informational Item: Results of the Umatilla Chemical Agent Disposal Facility Post-Trial Burn Risk Assessment

Dr. Bruce Hope, toxicologist at DEQ, presented the findings of the recently completed Post-Trial Burn risk assessment, comparing it to a similar study recently completed by the Army, and answered EQC members' questions about the methodologies and results of the study. Using what Dr. Hope characterized as conservative assumptions, the risk assessment found a few locations in the study area where risk estimates exceeded target levels. Overall, based upon the risk assessment, DEQ has concluded that the probability of actual risk and hazard attributable to current operation of the UMCDF is exceptionally low, and that the probability of major adverse impacts from facility operations is similarly exceptionally low. EQC members' questions mainly concerned the approach used to estimate the impact of total organic emissions (TOE), which is the strongest driver of cancer risk in the study.

Chairwoman Hampton announced that the Confederated Tribes of the Umatilla Indian Reservation had requested the opportunity to speak to the EQC about the UMCDF risk assessment, and that she would be opening the Public Forum time early for their presentation. However, Dr. Rodney Skeen, representing the Tribes, became ill as he was driving from eastern Oregon and had to turn back. He sent Sue Oliver in his stead. To allow Ms. Oliver time to prepare her materials, the EQC took items D and F out of order.

D. Informational Item: Director's Dialogue

Dick Pedersen, acting DEQ director, discussed current events and issues involving DEQ and the state.

F. Action Item: Pollution Control Tax Credit Considerations

(Considered out of order) Maggie Vandehey from DEQ presented recommendations to the EQC on final certification of pollution control facilities. EQC certification entitles an Oregon taxpayer to subtract up to 35 percent of the facility's cost from its Oregon tax liability. Vice Chairman Blosser abstained from voting on any tax credit considerations for businesses in which he has an interest. Commissioner Williamson moved to approve final certification of facilities as recommended by staff. Vice Chairman Blosser seconded the motion. The motion passed unanimously.

E. Public Forum

At every regular public meeting, the EQC provides members of the public an opportunity to speak on environmental issues that are not part of the agenda for the meeting. The following people came forward:

- Sue Oliver, consultant working for the Confederated Tribes of the Umatilla Indian Reservation, representing Dr. Rodney Skeen, Department of Science and Engineering, CTUIR: The Tribes feel that the risk assessments are not yet complete, and would like more quality assurance work to be done. The Tribes do not feel that DEQ's risk assessment is protective of human health and the environment, nor do they believe that it is consistent with the work plan for conducting the risk assessment. Dr. Skeen believes that DEQ is overstating the conservative nature of its assessment. In particular, the Tribes feel that DEQ's study ignores the results submitted by DEQ's contractor in January, 2008, as well as the impact of the TOE. DEQ's contract with Environment and Ecology was allowed to expire after they submitted their data to DEQ, but before detailed analysis could take place. Dr. Skeen believes that DEQ has not adequately analyzed and evaluated E & E's data. Page ten of Dr. Skeen's handout describes the crux the Tribes' displeasure with DEQ's risk assessment: many results are multiples of EPA action levels. Dr. Skeen requests that the EQC not accept the current version of DEQ's risk assessment, but instead direct DEQ to work with the Tribes to resolve certain questions, in particular how to account for the impact of TOE. The Tribes also request the EQC to discuss mitigating the effects of past risks to which their members have been exposed. Dr. Skeen prepared a handout, given to the EQC, which summarized his evaluation of the Army's risk assessment. Commissioner Williamson asked for an explanation for the difference in results between DEQ and CTUIR, given that both are using the same input data and risk analysis software. Ms. Oliver said that she would convey that question to Dr. Skeen for his response. Dr. Hope pointed out that the difference results from differing treatment of TOE: DEQ used a geomean, while CTUIR used the detection limits.

Larry Knudsen, counsel to the EQC, Department of Justice, suggested that Sue Oliver's comments and the ensuing discussion be included as part of the public record for agenda Item C, rather than the Public Forum. Ms. Oliver agreed that the Tribes would prefer for it to be included under Item C. The remarks of Karyn Jones (below) are part of agenda Item E.

- Karyn Jones, representing herself, GASP, the Sierra Club, and Oregon Wildlife Federation: She was part of a committee on alternative technologies to incineration, i.e. neutralization and super-critical water oxidation. She would be happy to send a copy of the report to the EQC. The committee reported to Congress. The results were that the Pueblo and Bluegrass facilities used alternatives. A "speedy-neut" technology was proposed to the Governor and DEQ, but never brought to the EQC nor pursued by DEQ. Ms. Jones shared a number of comments on the DEQ risk assessment. She believes that the conservative nature of the study is overstated and that the study is not protective of public health. She was also upset that the study was not finished before January 31, 2008, and didn't take into account other local hazards. She in concerned about the potential increase in cancer in the Umatilla area.

Working Lunch: The Commission held an Executive Session from 12:30 to 1:35 pm to discuss recruitment efforts for a new DEQ director.

G. Informational Item: Presentation by Oregon Environmental Council on Recently Published Research Findings

Renee Hackenmiller-Paradis and Andrea Durbin of the Oregon Environmental Council (OEC) discussed OEC's recently published reports "Pollution in People" and "The Price of Pollution." The presentation was timed to coincide with a joint evening meeting between the EQC and OEC's board of directors (see below for notes on discussion.)

H. Public Hearing: Proposed Greenhouse Gas Reporting Rules

DEQ scheduled a public hearing before the EQC on the proposed greenhouse gas reporting rules to meet the requirements of Senate Bill 107 (2007) which allows Title V Operating Permit holders to request a hearing before the EQC on any proposed rule that goes beyond federal requirements. To begin the hearing, Marianne Fitzgerald of DEQ gave the EQC an overview of the process for developing the proposed rules. The following people came forward to testify:

- Kate McCutchen, Title V manager for Blue Heron Paper Company which is a large recycler of paper, testified that she attended all GHG reporting rules advisory committee meetings. She is concerned that transportation and other large emitting sectors are not covered by the proposed rules. It seems that reporting often leads to regulations, and she fears that those not reporting won't be regulated. Her company is in favor of reporting, but she doesn't speak for all of her industry. Blue Heron has noticed that the governor has asked for a market-based approach, not necessarily a cap and trade system. For her company cap and trade would be difficult since they can't pass the cost on to customers. Blue Heron wants the state to require a carbon emissions report, not a carbon footprint report, a concept discussed by The Climate Registry. She promised to provide written comments later on this proposed rule.

- Tom O'Connor, representing the Oregon Municipal Electric Utilities Association (comprised of 11 small electric utilities in Oregon who distribute power purchased from the Bonneville Power Authority), expressed his concern with language on page 5 of the proposed rules. The proposed rules refer to distribution losses, which has a different meaning in his industry. He thinks this language needs clarification to ensure the rule has the desired effect. He has talked to DEQ staff about his concerns. Mr. O'Connor also expressed the opinion that the transportation sector should be included, especially if there will be an emissions cap in the future. He noted that approximately 34 percent of emissions in Oregon come from transportation.

Vice Chairman Blosser inquired about the difficulty of including the mobile sector, and why its inclusion is delayed. Marianne Fitzgerald answered that it was easier to start with permitted sources, and that adding in airplanes, truck fleets, etc, would make the rules much more complex, requiring additional DEQ staff resources.

- Jim Edelson, representing Interfaith Power and Light, expressed his support for the proposed rule, although he is disappointed that fleets are not covered. He believes that Oregon cannot meet its emissions reduction goals without addressing transportation, but that it isn't possible to sort out the details for including transportation in the short time that the Governor gave them to write these rules. Washington State is starting to gather transportation sector information, and Oregon should move forward when the committee convenes this fall. He sees a need to measure the greenhouse gas content of fuel that is consumed (ethanol, liquefied coal, tar sands, etc.).

Thursday evening, joint meeting between EQC and Oregon Environmental Council board of directors, Eastside Hospitality room at the Northwest Natural Building, 220 NW Second Avenue, Portland, Oregon
The Oregon Environmental Council board of directors had requested an opportunity to meet with the EQC, and prepared three major topics of discussion for the meeting: toxics reduction, climate change, and stormwater management. (Note: Commissioner Dodson was not present for the evening meeting, due to a family medical emergency.)

Gary Oxman, OEC board member, led the discussion on toxics reduction. As DEQ and EPA have made significant progress toward reducing the major pollutants which was their founding charge, they are faced with new problems which seem to demand new solutions. Part of the problem is figuring out the respective roles of DEQ and the Department of Human Services, which has statutory authority in Oregon for regulating toxics in products. The group discussed current collaboration between DEQ and DHS, as well as prospects for the future. OEC board members believe that DHS leadership is very receptive to interagency cooperation on toxics, and that this is an opportune time in general to make progress on toxics reduction. OEC itself would like to work with the EQC and DEQ on this problem. Banning chemicals and products was not seen as a preferred avenue, as the number of potential candidates is too large and the process is time-consuming. The group discussed other models of action, including labeling, certification, and outreach, as well as putting emphasis on protecting children.

Bill Edmonds, OEC board member, led the discussion on climate change. The OEC board expressed its support for DEQ as the agency defines its role in greenhouse gas reduction, and believes that DEQ should play a large role in policy making. The group discussed prospects for the 2009 Legislative session, where climate change is expected to be a central theme. OEC is making transportation a priority, because of climate change and the desire to reduce diesel emissions. The group discussed what DEQ's role in transportation and climate change should be. The most obvious role for DEQ on transportation is related to tailpipe emissions, while there may be opportunities to collaborate with other agencies on issues like vehicle miles traveled.

Mary Wall, OEC board member, led the discussion on stormwater management. Cities in Oregon are improving their management of stormwater, but many are not yet doing a very good job. OEC would like DEQ to encourage cities to build more green infrastructure. A "best practices" manual and/or model stormwater ordinance sanctioned by DEQ, perhaps written with technical help from Oregon State University, would be helpful and would have a lot of credibility with cities.

Friday, February 22 – Regular meeting began at 9:50 am.
The Commission met in executive session from 8:00 am until 9:45 to consult with counsel concerning legal rights and duties regarding current or potential litigation against the DEQ.

M. Action Item: Possible approval of proposed settlement of lawsuit filed by Eugene Water and Electric Board
Larry Knudsen, counsel to the EQC, Department of Justice, recommended that the EQC agree to the proposed implementation order for the thermal allocation to the Eugene Water and Electric Board as part of the Total Maximum Daily Load process. Commissioner Uherbelau moved to authorize the EQC chairperson to sign the agreement and the director of DEQ to enter into a settlement agreement to end the litigation of this issue. The EQC unanimously approved the motion.

I. Action Item: Amend Recycled Water Use Rules
Judy Johndohl of DEQ summarized the major changes in the proposed rules and key issues from the advisory committee, including treatment to remedy turbidity, graywater, and discharge of recycled water to wetlands. The EQC had several questions about the reuse of water for recharging wetlands, an issue at the intersection of several regulatory bodies' authority. Several EQC members expressed the opinion that the proposed rules were a good first step, but urged DEQ to do more work to address graywater use and to make it as easy as possible for people to reuse water for wetlands projects to lower stream temperatures and improve fish habitat. Vice Chairman Blosser moved to approve the proposed rules. Commissioner Williamson seconded the motion. The motion carried four to one.

J. Informational Item: Commissioners' Reports
Commissioner Uherbelau commented that receiving the "DEQ in the News" summary is sufficient for her, and that she doesn't also need to receive individual press releases from DEQ. All of the Commissioners agreed that receiving the summary is sufficient.

Commissioner Dodson asked DEQ to ensure that the rest of the EQC receive the handouts from the recent Fish Consumption Workshop in Pendleton.

Commissioner Uherbelau has been fielding questions from her neighbors about a recent DEQ fine issued to the city of Ashland, and suggested that DEQ should inform EQC members if a substantial fine is imposed on an entity near where they live.

Vice Chairman Blosser reported that the director recruitment subcommittee is still taking applications, but expects to close the recruitment in the next week or two. The subcommittee expects to come back to the entire EQC for interviews before the next meeting, with a decision being made at either the next regular EQC meeting or an earlier special meeting.

K. **Informational Item: Budget and Legislative Agenda Development**
Dick Pedersen of DEQ presented the EQC with DEQ's preliminary prioritization of budget policy packages, and gave preliminary information on what DEQ's budget request will look like. The next step in budget development is refining the prioritization of packages in preparation for discussing the request with stakeholders.

L. **Recognition of Lynn Hampton's Service as EQC Chairwoman**
Dick Pedersen, acting director of DEQ, presented outgoing Chairwoman Hampton with a plaque commemorating her achievements as a member and chairwoman of the EQC, as well as gifts from the DEQ executive management team. Former director, Stephanie Hallock, and former EQC assistant, Helen Lottridge, also expressed their appreciation for Chairwoman Hampton's service. Hampton stressed how impressed she has been with DEQ employees' commitment, talent, and resiliency, and with their support for one another. She urged DEQ staff to articulate to the EQC their expectations for leadership and commitment to the mission.

Meeting adjourned at 1:00 pm.

State of Oregon
Department of Environmental Quality

Umatilla Chemical Demilitarization Program
Status Update
Environmental Quality Commission
June 19, 2008

(Provided for EQC members' reference – there will not be a separate agenda item for the routine UMCDF update at the June EQC meeting)

Agent Processing at the Umatilla Chemical Agent Disposal Facility (UMCDF)

Cumulative Operations:

As of May 28, 2008, 191,317 munitions have been destroyed which represents 87 percent of all Umatilla munitions and bulk containers and 34 percent of the original Umatilla stockpile (by agent weight).

VX Operations:

The 155 mm VX projectile campaign was begun March 20, 2008, with the receipt and start of the dismantling/draining operations, and the first VX projectile was processed through the metal parts furnace the following day (March 21, 2008). The UMCDF continues to process VX projectiles.

The chlorine emissions demonstration test required as a prerequisite to final approval of Class 3 Permit Modification Request UMCDF-07-006-DFS(3), "Minimum Temperature Limit Change on the DFS," was conducted on April 21, 2008.

On May 14, 2008, the first liquid incinerator (LIC1) experienced an upset condition resulting in significant damage to the furnace. The second Liquid Incinerator (LIC2) was undergoing planned maintenance at the time. Thus, because an incinerator was not available to process agent and/or spent decontamination solution, an emergency permit was issued to allow the UMCDF to establish temporary storage for the spent decontamination solution until the LIC2 maintenance could be completed, the furnace restarted, and spent decontamination solution processing could be resumed. The UMCDF resumed normal operations May 31, 2008, and a root cause analysis is being conducted.

VX munitions/bulk items comprise 7.7 percent of the total Umatilla stockpile (by agent weight). As of May 28, 2008, the UMCDF had destroyed 14,519 VX rockets and warheads, one VX ton container, 156 VX spray tanks, and 21,098 155 mm VX projectiles. This represents approximately:

- 100 percent of the VX rockets
- 100 percent of the VX spray tanks
- 100 percent of the VX ton containers

- 65 percent of the VX 155 mm projectiles
- 57 percent of the VX munitions
- 67 percent of the VX agent

GB Operations:

GB munitions/bulk items processing has been completed. GB munitions/bulk items comprised 21.4 percent of the total Umatilla stockpile (by agent weight). The UMCDF destroyed over 155,500 munitions and bulk containers filled with over 2 million pounds of GB nerve agent. This represented:

- 70.5 percent of all Umatilla munitions and bulk containers
- 21.4 percent of the original Umatilla stockpile (by agent weight)

The multiagent monitoring design changes specific to GB have been completed. This will allow resumption of treatment of the remaining GB-contaminated wastes currently in permitted storage.

Other UMCDF Chemical Demilitarization Program News

GASP I Judgment: The court remanded to the EQC three best available technology and no major adverse impact on public health and the environment determinations pertaining to operation of the UMCDF:

- treatment of secondary wastes originally intended for destruction in the dunnage incinerator;
- destruction of mustard ton containers containing significantly higher mercury levels than identified in the original application; and
- the role of the Pollution Abatement System Carbon Filter System (PFS).

These will be presented to the EQC as separate agenda items during the June 2008 meeting.

UMCDF PMR Activity (April 8, 2008, through May 30, 2008):

SUBMITTALS		
PMR#	**Title**	**Submitted**
UMCDF-08-018-MPF(2)	MPF DAL Low-Temperature Monitoring Changes *(resubmittal of PMR 07-014 withdrawn 02/20/08)*	5/13/2008
UMCDF-08-014-CONT(1N)	Annual Contingency Plan Update	5/28/2008
UMCDF-08-037-MISC(1N)	Annual Procedures Update *(resubmittal of PMR 08-037 withdrawn 05/15/08)*	5/29/2008
WITHDRAWALS		
PMR#	**Title**	**Submitted**
UMCDF-08-013-MISC(1N)	Annual Procedures Update	04/03/08

IN PROCESS: The following PMNs and PMRs are under Department review *(includes 08-014, 08-018, and 08-037, which were also submitted during this period).*				
PMR#	**Title**	**Received**	**Public Comment Period Close**	**Target Decision/ Review Date**
UMCDF-05-034-WAST(3)	Deletion of the DUN and Addition of the CMS	10/25/05	12/24/05[1]	TBD
UMCDF-07-005-MISC(2)	Condition II.M-Liability Insurance Requirement Changes	01/30/07	04/02/07	10/01/08
UMCDF-07-006-DFS(3TA)	Minimum Temperature Limit Change on the DFS	01/16/07	04/25/08[2]	06/30/08
UMCDF-08-008-WAP(2)	WAP Update for Spent Carbon Sampling and Analysis Requirements	03/11/08	05/12/08[1]	06/09/08
UMCDF-08-018-MPF(2)	MPF DAL Low-Temperature Monitoring Changes	5/13/2008	07/14/08[1]	8/11/2008
UMCDF-08-014-CONT(1N)	Annual Contingency Plan Update	5/28/2008	N/A	07/28/08
UMCDF-08-037-MISC(1N)	Annual Procedures Update	5/29/2008	N/A	07/28/08

[1] Initial (permittee) public comment period.
[2] Department (draft permit) public comment period.

UMCD PMR Activity (April 8, 2008, through May 30, 2008):

SUBMITTALS/IN PROCESS		
PMR#	**Title**	**Submitted**
UMCD-08-001-MON(1R)	SUOMP Igloo Monitoring	4/21/2008

Significant Events at Other Demilitarization Facilities

Anniston Chemical Agent Disposal Facility (ANCDF), Alabama

The ANCDF processed the last of its VX projectiles May 24, 2008, and has begun changeover activities to prepare for VX mine processing. The ANCDF has destroyed 100 percent of its GB munitions (142,428 GB munitions), 80 percent of its VX munitions (35,662 VX rockets and 139,581 VX projectiles), and a total of 48 percent of its entire stockpile.

Newport Chemical Agent Disposal Facility (NECDF), Indiana

The NECDF has neutralized approximately 2,352,339 pounds of chemical agent VX (approximately 278,722 gallons) or 93 percent of the Newport agent stockpile. The United States has received credit for destroying 2,104,277 pounds of the Newport stockpile under the Chemical Weapons Convention Treaty.

Pine Bluff Chemical Agent Disposal Facility (PBCDF), Arkansas

The PBCDF has completed processing VX rockets, and has commenced its VX mine campaign. To date, 5,529 VX landmines have been destroyed (59 percent of the VX landmine stockpile). The PBCDF has destroyed 15 percent of its total stockpile (by agent weight).

Tooele Chemical Agent Disposal Facility (TOCDF), Utah
The TOCDF has processed 39,858 projectiles and 2,271 ton containers containing HD mustard (blister) agent, which is over 36 percent of the HD munitions stored at the Deseret Chemical Depot. Processing continues to be limited to only those ton containers that show a concentration of 1 ppm or less of mercury contamination. Work continues on designing a carbon filtration system that will provide sufficient flue gas mercury removal to allow the processing of mustard that has been determined to have mercury concentrations in excess of 1 ppm.

HD ton container sampling also continues. Of the original 6,397 ton containers, 5,835 have been sampled.

The Deseret Chemical Depot has issued a draft finding of no significant impact and environmental assessment as it pertains to its proposal to install two autoclaves at the depot to provide another means (in addition to the metal parts furnace) to thermally treat (pressurized steam) some secondary wastes.

Pueblo Chemical Agent Destruction Pilot Plant (PCAPP), Colorado
Blue Grass Chemical Agent Destruction Pilot Plant (BGCAPP), Kentucky
Neutralization followed by biotreatment will be used to destroy the Pueblo 2,611-ton stockpile, while neutralization followed by supercritical water oxidation will be used to destroy the Blue Grass 523-ton stockpile.

The PCAPP basic site infrastructure (roads, fencing, access control, and lighting) and the foundation, shell, and underground utilities for the multipurpose building are complete. The basic site infrastructure for the BGCAPP is also complete, which will be the last destruction plant built in the United States. Chemical agent operations are slated to begin 2017 and to be completed by 2023.

Chemical Weapons Destruction Program
Glossary of Acronyms and Terms of Art

ABCDF – Aberdeen Chemical Agent Disposal Facility, located at the Aberdeen Proving Grounds in Maryland

ACAMS – Automatic Continuous Air Monitoring System – the chemical agent monitoring instruments used by the Army to provide low-level, near real time analysis of chemical agent levels in the air

ANCDF – Anniston Chemical Agent Disposal Facility, located at Anniston Army Depot in Alabama

ATB – agent trial burn – test burns on incinerators to demonstrate compliance with emission limits and other permit conditions

AWFCO instrument– Automatic Waste Feed Cutoff – an instrument that monitors key operating parameters of a high temperature incinerator and automatically shuts off waste feed to the incinerator if prescribed operating limits are exceeded

BGCA – Blue Grass Chemical Activity, located at the Blue Grass Army Depot in Kentucky

BGCAPP – Blue Grass Chemical Agent Destruction Pilot Plant, new designation for BGCA.

BRA – Brine Reduction Area – the hazardous waste treatment unit that uses steam evaporators and drum dryers to convert the salt solution (brine) generated from pollution abatement systems on the incinerators into a dry salt that is shipped off-site to a hazardous waste landfill for disposal

CAC – Chemical Demilitarization Citizens Advisory Commission – the nine member group appointed by the Governor to receive information and briefings and provide input and express concerns to the U.S. Army regarding the Army's ongoing program for disposal of chemical agents and munitions – each state with a chemical weapons storage facility has its own CAC – in Oregon the DEQ's Chemical Demilitarization Program Administrator and the Oregon CSEPP Manager serve on the CAC as non-voting members

CAMDS – Chemical Agent Munitions Disposal System – the former research and development facility for chemical weapons processing, located at the Deseret Chemical Depot in Utah

CDC – Centers for Disease Control and Prevention – a federal agency that provides oversight and technical assistance to the U.S. Army related to chemical agent monitoring, laboratory operations, and safety issues at chemical agent disposal facilities (Website: http://www.cdc.gov/nceh/demil/)

CMA – U.S. Army's Chemical Materials Agency, the agency responsible for chemical weapons destruction (website: http://www.cma.army.mil/)

CMP – comprehensive monitoring program – a program designed to conduct sampling of various environmental media (air, water, soil and biota) required by the EQC in 1997 to confirm the projections of the Pre-Trial Burn Health and Ecological Risk Assessment.

CMS – carbon micronization system – a new treatment system that is proposed to be used in conjunction with the deactivation furnace system to process spent carbon generated at UMCDF during facility operations – the CMS would pulverize the spent carbon and then inject the powder into the deactivation furnace system for thermal treatment to destroy residual chemical agent adsorbed onto the carbon

CSEPP – Chemical Stockpile Emergency Preparedness Program – the national program that provides resources for local officials (including emergency first responders) to provide protection to people living and working in proximity to chemical weapons storage facilities and to respond to emergencies in the event of an off-post release of chemical warfare agents (Website: http://csepp.net/)

CWC Treaty – Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction. Ratified by the U.S. Senate on April 24, 1997.

CWWG – Chemical Weapons Working Group, an international organization opposed to incineration as a technology for chemical weapons destruction and a proponent of alternative technologies, such as chemical neutralization (Website: http://www.cwwg.org/)

DAAMS – Depot Area Air Monitoring System – the system that is utilized for perimeter air monitoring at chemical weapons depots and to confirm or refute ACAMS readings at chemical agent disposal facilities – samples are collected in tubes of sorbent materials and taken to a laboratory for analysis by gas chromatography

DAL – discharge airlock – a chamber at the end of MPF used to monitor treated waste residues prior to release.

DCD – Deseret Chemical Depot – the chemical weapons depot located in Utah

DFS – deactivation furnace system – a high temperature incinerator (rotary kiln with afterburner) used to destroy rockets and conventional explosives (e.g., fuses and bursters) from chemical weapons

DPE – demilitarization protective ensemble – the fully-encapsulated personal protective suits with supplied air that are worn by workers in areas with high levels of agent contamination

DUN – dunnage incinerator – high temperature incinerator included in the original UMCDF design and intended to treat secondary process wastes generated from munitions destruction activities – this incinerator was never constructed at UMCDF

ECR – Explosive Containment Room – UMCDF has two ECRs used to process explosively configured munitions. ECRs are designed with reinforced walls, fire suppression systems, pressure sensors, and automatic fire dampers to detect and contain explosions and/or fire that might occur during munitions processing

EONC – Enhanced Onsite Container – Specialized vessel used for the transport of munitions and bulk items from UNCD to UMCDF and for the interim storage of those items in the UMCDF Container Handling Building until they are unpacked for processing

G.A.S.P. – a Hermiston-based anti-incineration environmental group that has filed multiple lawsuits in opposition to the use of incineration technology for the destruction of chemical weapons at the Umatilla Chemical Depot – G.A.S.P. is a member of the Chemical Weapons Working Group

GB – the nerve agent sarin

HD – the blister agent mustard

HVAC – heating, ventilation, and air conditioning

HW – hazardous waste

I-Block – the area of storage igloos where ton containers of mustard agent are stored at UMCD

IOD – integrated operations demonstration – part of the Operational Readiness Review process when UMCDF demonstrates the full functionality of equipment and operators prior to the start of a new agent or munition campaign.

JACADS – Johnston Atoll Chemical Agent Disposal System, the prototype chemical agent disposal facility located on the Johnston Atoll in the Pacific Ocean (now closed and dismantled)

J-Block – the area of storage igloos where secondary wastes generated from chemical weapons destruction are stored at UMCD

K-Block – the area of storage igloos where chemical weapons are stored at UMCD

LIC1 & LIC2 – liquid incinerators #1 & #2 – high temperature incinerators (liquid injection with afterburner) used to destroy liquid chemical agents

MDB – munitions demilitarization building – the building that houses all of the incinerators and chemical agent processing systems. The MDB has a cascaded air filtration system that keeps the building under a constant negative pressure to prevent the escape of agent vapor. All air from inside the MDB travels through a series of carbon filters to ensure it is clean before it is released to the atmosphere.

MPF – metal parts furnace – high temperature incinerator (roller hearth with afterburner) used to destroy secondary wastes and for final decontamination of metal parts and drained munitions bodies

NECDF – Newport Chemical Agent Disposal Facility, located at the Newport Chemical Depot in Indiana

NRC – National Research Council

ORR – operational readiness review – a formal documented review process by internal and external agencies to assess the overall readiness of UMCDF to begin a new agent or munitions processing campaign.

PBCDF – Pine Bluff Chemical Agent Disposal Facility, located at the Pine Bluff Arsenal in Arkansas

PCAPP – Pueblo Chemical Agent Destruction Pilot Plant, new designation for PUCDF.

PFS – the carbon filter system installed on the pollution abatement systems of the incinerators used for chemical agent destruction

PICs – products of incomplete combustion – by-product emissions generated from processing waste materials in an incinerator

PMR – permit modification request

PMN – permit modification notice

PUCDF – Pueblo Chemical Agent Disposal Facility, located at the Pueblo Chemical Depot in Colorado

SAP – sampling and analysis plan

SETH – simulated equipment test hardware – "dummy" munitions used by UMCDF to test processing systems and train operators before the processing of a new munitions type. SETH munitions are often filled with ethylene glycol to simulate the liquid chemical agent so that all components of the system, including the agent draining process, can be tested.

TAR – Temporary Authorization Request

TOCDF – the Tooele Chemical Agent Disposal Facility, located at the Deseret Chemical Depot in Utah

UMCD – Umatilla Chemical Depot

UMCDF – Umatilla Chemical Agent Disposal Facility

WAP – waste analysis plan –a plan required for every RCRA permit which describes the methodology that will be used to characterize wastes generated and/or managed at the facility.

WDC – Washington Demilitarization Company, LLC – the Systems Contractor for the U.S. Army at UMCDF.

VX – a nerve agent

State of Oregon
Department of Environmental Quality Memorandum

Date: June 19, 2008

To: Environmental Quality Commission

From: Dick Pedersen, Director

Subject: Agenda Item B, Action Item: Acceptance of the Umatilla Chemical Agent Disposal Facility Post-Trial Burn Risk Assessment
June 19-20, 2008 EQC Meeting

Why is this Important?

The Department of Environmental Quality has issued a permit to the Umatilla Chemical Agent Disposal Facility to regulate the type and amount of wastes that may be stored and treated. DEQ relied on risk assessments and UMCDF monitoring program results to find that it is exceptionally unlikely that UMCDF operations could have major adverse effects on human health or the environment. DEQ needs to have this finding affirmed to allow the U.S. Army to continue with elimination of chemical agents and associated munitions under the existing permit.

Department Recommendation

The DEQ recommends that the Environmental Quality Commission concur with DEQ's finding that the Post-Trial Burn Risk Assessment supports its determination that (a) the probability of major adverse effects on human health or the environment from currently permitted UMCDF operations is exceptionally low at the facility boundary and decreases rapidly beyond that point and (b) the terms and conditions of the existing permit are sufficient to protect human health and the environment from major adverse effects.

Background

The UMCDF is a hazardous waste storage and treatment facility that utilizes four incinerators to destroy the stockpile of chemical warfare agents stored at the Umatilla Chemical Depot since 1962. The chemical agent stockpile originally included about 3,717 tons of nerve agents ("GB" and "VX") and blister agent ("mustard" or "HD") in liquid form. The chemical agents are contained in munitions such as rockets, projectiles, and land mines and in bulk containers such as spray tanks, bombs, and "ton containers." All of the chemical warfare agents are highly toxic. The UMCDF is owned by the U.S. Army and operated by Washington Demilitarization Company. A hazardous waste storage and treatment permit for the UMCDF was issued by DEQ in February 1997.

A Pre-trial burn risk assessment (with both human health and ecological components) was prepared in 1997, prior to construction and operation of the UMCDF. In 2008, Post-RAs were prepared by Ecology & Environment, Inc. for DEQ, by the U.S. Army's Center for Health Promotion and Preventive Medicine, and by the Confederated Tribes of the Umatilla Indian Reservation. All of these risk assessments evaluated whether emissions from the UMCDF could have major adverse effects on human health or the environment.

DEQ accepted written comments on its Post-RA by mail, fax, and e-mail from stakeholders and the public between April 28 and June 11, 2008 and in writing and orally at a public hearing held in Hermiston on May 29, 2008. Public testimony was received from 7 individuals (a total of 47 individual comments), including Dr. Rod Skeen (for CTUIR) and Dr. Peter deFur (for G.A.S.P). DEQ also met with CTUIR Department of Science and Engineering technical representatives on May 12, 2008 and with U.S. Army and CTUIR/DOSE technical representatives on May 29, 2008, in both instances to discuss interpretation of Post-RA results. Written comments (a total of 77 individual comments) were received from Dr. Rod Skeen (for CTUIR), the U.S. Army, Dr. Peter deFur (for G.A.S.P), and a "Citizen for a Green Environment" (anonymous). After completion of the public comment period, DEQ reviewed and considered all comments received and made appropriate revisions to its interpretation of the results of the Post-RAs.

Key Issues

DEQ based it's recommendation on four factors:

(1) None of these risk assessments (in 1997 or 2008) estimated unacceptable levels of risk or hazard, if any, for all receptors throughout the entire assessment area;
(2) Each risk assessment embodied sensitive assumptions that collectively created an ample buffer between the hypothetical possibility of risk or hazard and any actual realization of that risk or hazard;
(3) Monitoring program results give no indication of estimated risk or hazard being realized (i.e., of major adverse effects actually occurring); and
(4) Risk or hazard associated with mercury in HD or with incineration of secondary waste is *de minimis*.

With respect to item (1), the 1997 Pre-Trial Burn Risk Assessment identified the potential for major adverse effects only within 100 m (328 ft) of the UMCDF stack. CHPPM's Post-RA found no unacceptable risk or hazard for any receptor, with the exception of a hypothetical Native American subsistence receptor off-site (at the fence line). DEQ's Post-RA estimated low levels of cancer risk and non-cancer hazard for some hypothetical human receptors both on- and off-site, for sage-steppe ecological receptors only on-site, and for freshwater ecological receptors only where their ecosystem is closest to the facility. The CTUIR Post-RA found unacceptable cancer risk only on-site but was otherwise in agreement with the CHPPM and DEQ assessments. There will, however, be a need to discuss issues related to future (post-closure) on-site risk and ecological hazard in general.

With respect to item (2), risk assessments can be very complex, with many input variables and assumptions. But usually only a few of these, often referred to as "sensitive" inputs or assumptions, have the greatest influence on risk and hazard estimates. DEQ considered how the plausibility, applicability, and reasonableness of six sensitive inputs or assumptions influenced estimates of risk and hazard, specifically: (1) Known or low toxicity of majority of total organic emissions, (2) Use of only maximum air concentrations and deposition rates, (3) Limited spatial extent of estimated risk or hazard, (4) Absence of unauthorized human receptors on-site, (5) Chemical agents never having been detected, and (6) An ample "margin of safety" in acceptable risk and hazard levels.

With respect to item (3), the UMCDF Comprehensive Monitoring Program (CMP) was implemented to provide information on the environmental impact of the UMCDF during the period of its construction, operation, and closure. Due to the presence of other sources for organic emissions in the vicinity of the UMCDF, changes in metal levels are thought to give the best indication of impacts to the environment possibly attributable to the UMCDF. At present, CMP results show no clear positive trends in metals levels. No unequivocally positive trends in monitoring data are evident that would indicate actual risk or hazard.

With respect to item (4), the hazard posed by the presence of mercury in mustard agent (HD) at "higher than anticipated" levels (≥ 1 ppm) was assessed and was estimated to be substantially below the acceptable level. The UMCDF conducted a separate trial burn for secondary waste and the results (emissions data) from that trial burn were included in the risk assessment. Emissions from incineration of secondary waste were estimated to present no risk or hazard above acceptable levels.

EQC Action Alternatives

If the EQC does not adopt DEQ's recommendations concerning the sufficiency of the Post-RA and the efficacy of the existing permit, it faces at least three alternatives:

(1) Continue disposal operations while the existing permit is revised subject to Court requirements in the GASP IV and GASP V litigation and guided by either BAT considerations, a more refined

risk assessment, or a combination of both;
(2) Halt disposal operations by revoking the existing permit until it can be revised given these same considerations;
(3) Halt disposal operations by revoking the existing permit until a practical alternative to incineration becomes available.

The second and third alternatives would leave residents in nearby communities exposed to risk or hazard associated with storage of chemicals weapons or from a catastrophic event, such as an explosion, both of which are much more "real" than any estimated by the Post-RA.

Attachments None

Available Upon Request

- E&E UMCDF Pre-Trial Burn Risk Assessment Report (1997)
- U.S. EPA Screen-Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities (1999)
- UMCDF Risk Assessment Work Plan (2004)
- Tetra Tech Project Plan for RAWP Implementation (2005)
- Tetra Tech Technical Memoranda for RAWP Implementation (2005)
- U.S. EPA Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (2005)
- E&E UMCDF Post-Trial Burn Risk Assessment Report (2008)
- CHPPM Final Health Risk Assessment for the UMCDF (2008)
- UMCDF Comprehensive Monitoring Program - Baseline Report (2003)
- UMCDF Comprehensive Monitoring Program - Annual Reports (2003-2007)
- UMCDF Comprehensive Monitoring Program - Quarterly Reports (2002-2007)
- Information Item: Results of the Umatilla Chemical Agent Disposal Facility Post-Trial Burn Risk Assessment (Agenda Item C at the April 24, 2008 EQC meeting)
- DEQ Information Session Presentation at the UMCDF Post-RA Public Hearing in Hermiston, Oregon, May 29, 2008
- Comments UMCDF Post Burn Risk Assessment, May 2008 prepared by Dr. Peter L. deFur, Environmental Stewardship Concepts.
- Estimated Human Health and Ecological Combustion Risk for the Umatilla Chemical Agent Disposal Facility, Hermiston, Oregon, Draft Report, June 11, 2008; Confederated Tribes of the Umatilla Indian Reservation.
- Umatilla Chemical Agent Disposal Facility (UMCDF) Hazardous Waste Permit (ORQ 000 009 431) - Permittees' Comments on the Results of the UMCDF Post-Trial Burn Risk Assessment, U.S. Army Chemical Materials Agency, U.S. Department of the Army
- Umatilla Chemical Agent Disposal Facility Post-Trail Burn Risk

Assessment, Public Comment, "Citizen for a Green Environment" (anonymous).

Approved:

Section: ____________________

Division: ____________________

Report Prepared By: Bruce Hope
Phone: 503-229-6251

Item B
presentation

Umatilla Chemical Agent Disposal Facility

Post-Trial Burn Risk Assessment

Environmental Quality Commission
Agenda Item B, Action Item
June 19, 2008 ~ Medford, Oregon

UMCDF Action Item

- DEQ issues permits to UMCDF to regulate type & amount of wastes being stored and treated
- QUESTION: Are UMCDF operations, as currently permitted, having major adverse effects on human health or the environment?
- DEQ considered risk assessment results, sensitive assumptions underlying these results, UMCDF monitoring program data, and public comments to reach a finding on this question

DEQ's Finding

- The probability of major adverse effects on human health or the environment from currently permitted UMCDF operations is exceptionally low at the facility boundary and decreases rapidly beyond that point
- DEQ is asking the EQC to concur (via an "Action Item") with this finding, so that the elimination of chemical weapons and associated munitions can continue

Basis for Finding

- (1) None of the risk assessments estimated high risk or hazard throughout the assessment area
- (2) Each risk assessment embodied assumptions that create an ample buffer between the hypothetical probability of risk or hazard and their actual realization
- (3) Monitoring results give no indication that estimated risk or hazard has been realized
- (4) Risk and hazard associated with Hg in HD or secondary waste incineration are acceptable

Risk Assessment History

- 1997: Pre-Trial Burn Risk Assessment
- 1999: Facility monitoring program begins
- 2004: Risk Assessment Work Plan (RAWP)
    - For Post-Trial Burn Risk Assessment
- 2005: RAWP implementation efforts
- 2006: CTUIR starts risk assessment
- U.S. Army CHPPM starts risk assessment
- 2007: DEQ starts assessment to audit CHPPM
- 2008: CHPPM, DEQ, and CTUIR assessments done
    - CTUIR ecological hazard estimates still outstanding

Risk Assessment Outreach

- April 28 - June 11, 2008: Public comment period
    - 4 sets of comments received; 77 individual comments
        - CTUIR, Army, Dr. deFur/G.A.S.P, "Citizen for a Green Environment"
        - All comments reviewed by E&E, DEQ's contractor
- May 12, 2008
    - Meeting between DEQ & CTUIR/DOSE
- May 29, 2008
    - Meeting between U.S. Army, DEQ, & CTUIR/DOSE
    - Public information session & hearing
        - Public testimony from 7 individuals (including CTUIR and Dr. deFur/G.A.S.P); 47 individual comments

4 Risk Assessments

- Pre-Trial Burn Risk Assessment (1997)
  - No unacceptable risk or hazard over 400’ from stack
- Post-Trial Burn Risk Assessments (2008)
  - U.S. Army - CHPPM
    - With 1 exception off-site, no unacceptable risk or hazard
  - DEQ/E&E
    - No unacceptable risk or hazard off-site or to workers on-site
    - Ecological hazard limited off-site; on-site only at incinerator
  - Confederated Tribes of the Umatilla Indian Reservation
    - Only on-site, chronic cancer risk; no other unacceptable human risk or hazard
    - Future work: TOE, residual contamination, ecological hazard

Dr. deFur/G.A.S.P Comments

- Risk assessment process itself is flawed:
  - Multiple exposures
  - Cumulative risk
  - Sensitive populations
  - Synergistic effects
  - Animal toxicological data
  - Re-volatilization of volatiles
  - Persistent chemicals
  - Toxicology of the stockpile
  - Effects of mixtures
- 2004 RAWP does address some of these with precautionary assumptions
- Specific assertions:
  - Upset conditions not addressed (false)
  - TOE not uniformly included (false)
  - Results indicate land will be unusable (no)
  - Stack emissions unpredictable (false)
  - Emissions of low doses over long periods harmful (10 yr?)
  - Keep post-closure inhalation exposure (why?)
  - Executive summary too complex (true)
- Process isn’t perfect, which is why a risk assessment can only inform, not decide

Mercury & Secondary Waste

- Would incineration of HD containing "higher than anticipated" (≥ 1 ppm) mercury pose a hazard?
  - No. Hazard estimated at Hg = 1 ppm is > 1000 times below acceptable level
- Would incineration of secondary waste pose a risk or hazard?
  - There was a separate trial burn for secondary waste
  - Emissions from this trial burn were included in the risk assessments & are not a source of risk or hazard

Monitoring Program

- UMCDF has conducted a "Comprehensive Monitoring Program" since 1999
  - Program provides information on UMCDF impacts during its construction, operation, and closure
- Metal levels may give best indication of any impacts attributable to UMCDF operations
  - No clear + trends in metals levels
  - No clear + trends in any other measurements either
- No clear positive trends or signals that would lend support to high estimates of risk or hazard

DEQ's Finding

- The probability of major adverse effects on human health or the environment from currently permitted UMCDF operations is exceptionally low at the facility boundary and decreases rapidly beyond that point
- DEQ is asking the EQC to concur (via an "Action Item") with this finding, so that the elimination of chemical weapons and associated munitions can continue

19 June 2008

08-0626

City of
Hermiston
Oregon
incorporated 1907

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STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY
RECEIVED

JUN 06 2008

HERMISTON OFFICE

June 5, 2008

Mr. Rich Duval
Chemical Demilitarization Program Administrator
256 E Hurlburt
Hermiston, OR 97838

Mr. Duval,

I have reviewed the Executive Summary of the Health Risk Assessment for the Umatilla Chemical Agent Disposal Facility and find no information that refutes my long-standing belief the project is safe for our environment and citizens.

I appreciate your efforts to review and refine the risk assessments associated with this project. Using actual data from plant emissions gives us greater reassurance that weapons disposal should continue to move forward expeditiously.

Further, I understand that issues relating to the potential impacts on Native Americans are being discussed among DEQ, Army and the Confederated Tribes. I'm confident that any concerns can be resolved, and I would appreciate being kept informed of how this progresses.

In summary, I encourage the Environmental Quality Commission to accept the DEQ's staff recommendations in support of the Health Risk Assessment.

Thank you for your continuing efforts to protect the citizens surrounding the Umatilla Chemical Depot.

Sincerely,

Bob Severson

Bob Severson, Mayor
City of Hermiston

08-0631

Umatilla County
Board of County Commissioners

Commissioners

Bill Hansell
541-278-6201

Larry Givens
541-278-6203

Dennis Doherty
541-278-6202

Executive Assistant
Connie Caplinger
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Director of
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Human Resources
James R. Barrow
541-278-6206

June 9, 2008

Richard C. Duval, Administrator
DEQ Chemical Demilitarization Program
256 E. Hurlburt Avenue
Hermiston, OR 97838

Re: Public Comment on Risk Assessment
for Umatilla Chemical Agent Disposal Facility

Dear Richard:

The Umatilla County Board of Commissioners appreciates the concerns that some people have for risks associated with the demilitarization mission at the Umatilla Chemical Depot; also, the long-running efforts that have gone into assessments of those risks.

We are satisfied with the process, findings and conclusions of the Umatilla Chemical Disposal Facility Risk Assessment.

We believe that the record is more than adequate to convince us that risks are remote and that the mission should proceed as planned.

We urge the Army, Tribes and State to move now from assessment to decision to completion of agent disposal. It is time to finish this job.

Sincerely,

Bill Hansell
Bill Hansell

Larry Givens
Larry Givens

Dennis D. Doherty
Dennis D. Doherty

BCC:ljh

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY
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JUN 09 2008

HERMISTON OFFICE

216 S.E. 4th Street • Pendleton, OR 97801 • Ph: 541-276-7111 • Fax: 541-278-5463

08-0632

STATE OF OREGON
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JUN 10 2008

HERMISTON OFFICE

June 4, 2008

Richard C. Duval, Administrator
DEQ Chemical Demilitarization Program
256 E. Hurlburt Avenue
Hermiston, OR 97838

Mr. Duval,

I support the recommendation to the Oregon Environmental Quality Commission to accept the results of the Post-Trial Burn Health Risk Assessment. As the Hermiston Herald put it, the study shows "no apparent health risks from the incineration of chemical weapons at the Umatilla Chemical Depot."

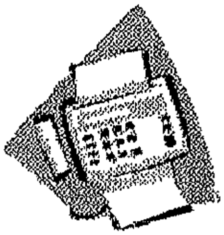
Ninety-five percent of the people I talk to want to get the job done without delay.

I am confident the Army will continue to destroy chemical weapons safely and the State of Oregon will continue to monitor the Depot on behalf of Hermiston citizens.

Thank you,

FRANK J. HARKENRIDER
935 South First Street
Hermiston, Oregon

08-0636



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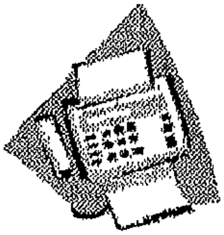

Subject: Umatilla Chemical Agent Disposal Facility Post-Trial Burn Risk Assessment, Public Comment

Date: 6/11/2008

To: Mr. Richard C. Duval, Administrator
Phone Number: (541) 567-8297
Fax Number: (541) 567-4741

From: Citizen for a Green Environment

Comments:

This fax is in reference to the results of the Umatilla Chemical Agent Disposal Facility (UMCDF) Post-Trial Burn Risk Assessment (Hazardous Waste Permit Number ORQ 000 009 431) and the request for public comments. A two page letter is attached to this cover sheet.

June 11, 2008

Mr. Richard C. Duval, Administrator
DEQ Chemical Demilitarization Program
256 E. Hurlburt Avenue
Hermiston, OR 97838

Subject: Umatilla Chemical Agent Disposal Facility Post-Trial Burn Risk Assessment, Public Comment

Dear Mr. Duval:

This letter is in reference to the results of the Umatilla Chemical Agent Disposal Facility (UMCDF) Post-Trial Burn Risk Assessment (Hazardous Waste Permit Number ORQ 000 009 431) and the request for public comments. I have reviewed the rather extensive document and the Department of Environmental Quality's tentative findings. Due to the complexity of the document and the need to clearly express the human health, environmental and economical concerns in understandable words let me start by asking a question. Does the post-trial risk assessment prove that it is safe to continue to burn VX (a nerve agent) and in the future the HD (mustard agent)? I am thinking that this is a fair question, but after reading the post-trial burn risk assessments it is very clear that the answer is no.

The post-trial risk assessment indicates that a cancer causing agent (dioxin) is emitted from the plant's stack, but the chemical is intelligent enough to stay on site. Based on this risk assessment assumptions, the laws of physic and chemistry do not apply pass the army's fence line. The many dust storms and chemical particles that can attach to the dust just don't happen in Umatilla. Also, the long term health impacts from exposures to the total organic emission from the stack was not taken into consideration or simply disregarded as over conservative. Based on the last emergency permit your office issued for the clogged up pipes containing deadly chemical nerve agent (VX) and the potential for chemical agent to be released from the stacks with combustion products into the environment, it is unlikely that the fence line is where these deadly agents are going to stop once accidentally released.

When I get into these types of situations I ask another question. Will the disposal of the chemical warfare agents (GB, VX and HD) hurt my children, family, animals and the environment? The post-trial burn risk assessment findings results indicated a clear answer of yes. I know that HD has mercury in it and this can cause children to have long term brain problems. With our current mercury body burdens from eating contaminated fish and the potential of getting even more mercury from the burning of these weapons, I don't think the fence line theory works for me when I know that mercury from many industrial stacks have been found to travel around the world. If you blindly **disregard all** of the total mercury emissions, organic chemical emissions, dioxin emissions, agent emissions (upset conditions will happen, because humans make mistakes), chemicals of potential concerns and increase the ecological screening quotient to 1 (which is cheating the environment) the answer is closer to yes it is ok to burn. I have over simplified this discussion because I want to express my concerns.

I understand the limitations of the post-trial risk assessment (theoretical modeling) and that your office is under tremendous pressures to continue to approve the burning of these agents. In fact, I have noticed that over the past few years many significant safeguards that would protect us during the burning of these chemical weapons of mass destruction have been relaxed. Interesting enough no hard scientific data from the burning of these agents outside the fence line (off-post) has been regularly collected to prove these decisions valid. While I support the destruction of these agents it is equally as important to me that absolutely nothing happen to our children, family, animals, crops and the environment. Perhaps the post-trial burn risk assessment falls short of the necessary assurance. A detailed list of questions and comments on the post-trial risk assessment is enclosed in this letter.

Sincerely,

Citizen for a Green Environment

Technical Questions

Umatilla Chemical Agent Disposal Facility Post-Trial Burn Risk Assessment (Public Comment)

1. Why is it nearly impossible to get more information, review pertinent documents and attachments on your web page? I have called the Portland State University Library and found it impossible to locate many of the Umatilla Chemical Agent Disposal Facility Department of Environmental Quality documents.

2. In your letter to the Environmental Quality Commission dated April 7, 2008, it is stated on page 1 under the topic of Purpose of Item, "Considering the extraordinarily precautionary design of the Post RA, the Department of Environmental Quality (DEQ) has concluded that the probability of actual risk and hazard attributable to current operation of the UMCDF is exceptionally low. The probability of major adverse impacts from facility operations is similarly exceptionally low."

Please tell me if the National Research Council, Occupational Safety and Health Administration, Oregon Department of Agriculture, Environmental Protection Agency, Confederated Tribes of Umatilla Indian Reservation, River Keepers, United States Fish and Wildlife Services, and the Department of Health are in agreement with the Umatilla Chemical Agent Disposal Facility Post-Trial Burn Risk Assessment as they were with the Pre-Trial Burn Assessment. I am assuming that all parties that have a potential stake in this assessment were contacted and not just those with special interest.

3. How statistically confident are you that the Umatilla Chemical Agent Disposal Facility Post-Trial Burn Risk Assessment is correct?

4. The number of "non-conservative" data sets in the Umatilla Chemical Agent Disposal Facility Post-Trial Burn Risk Assessment resulted in a mixed bag of potential risk to humans and the environment. Has Oregon DEQ ever used non-peer reviewed propriety Risk Assessment Software Models from the regulated industry and worked so closely to composite the data set?

5. Are there any hard numbers (off post sampling and monitoring data) that can prove the guesstimated Umatilla Chemical Agent Disposal Facility Post-Trial Burn Risk Assessment is accurate?

6. I don't understand how you can say that the Umatilla Chemical Agent Disposal Facility Post-Trial Burn Risk Assessment is precautionary or "extraordinarily precautionary" when the original 2004 Pre-Trial Burn risk assessment safe screening quotient of 0.25 was changed to 1.0. That is a 75% decrease in the safety of this assessment. I am look at the manipulated numbers and still the data indicates that humans and the environment are at an increased risk from the burning of these agents.

7. I noticed that the American Bold Eagle and the spotted sandpiper are predicted to be impacted from the burn. Has the appropriate individual and organizations been informed of this potential issue? If not, why not?

8. How did mercury get into HD and how will the burning of HD contaminate the Columbia River?

9. The Umatilla Chemical Agent Disposal Facility Post-Trial Burn Risk Assessment indicated an increase human and environment risk to the people on site. If the people on site come home contaminated with mercury or other chemicals will this impact their families' health?

08-0637

Estimated Human Health and Ecological Combustion Risk For the Umatilla Chemical Agent Disposal Facility Hermiston, Oregon

Draft Report

June 11, 2008

Prepared by:
Confederated Tribes of the Umatilla Indian Reservation
P.O. Box 638
Pendleton, Oregon 97801

Table of Contents

1 Executive Summary

The CTUIR has completed a human health and ecological risk assessment[1] for operations at the Umatilla Chemical Agent Disposal Facility (UMCDF) based on the 2004 RWAP (Risk Assessment Work Plan) (DEQ, 2004). The base model for the human health assessment was identical to the CHPPM/RAWP analysis described by Ecology and Environment (E&E) in their January 31, 2008 report to the Oregon Department of Environmental Quality (DEQ) with the exception that the acute inhalation exposure criteria values for the three unidentified TOE fractions were increased by a factor of 1000 in the CTUIR model. This increase was to correct an apparent error in the E&E report. The body of the E&E document reported the larger values while their modeling input files contained the smaller values. Evaluation of the data sources used to generate the TOE acute values indicate the larger values were correct.

Six additional risk scenarios were evaluated to better clarify the impacts of several base model assumptions on the predicted chronic risks. These special cases are as follows:

1. Case 1 – Area Average: Examined the effects of collocating the highest values for deposition rates and air concentrations for off-site analysis.
2. Case 2 – Single Point, Actual Data: The impacts of collocating the highest values for the air deposition rates and air concentrations for the off-site location were further evaluated using AERMOD calculated air parameters for the off-site location. This case corresponds to the EPA recommended evaluation method (EPA, 2005).
3. Case 3 – Updated COPC Emission Rates: Chemical agent concentration were modified to reflect DAAMS[2] stack data. In addition, the amount of carbon to be processed as secondary waste in the deactivation furnace system was reduced from base model estimates of 706,035 lbs to current estimates of 55,320 lbs. Finally, operation of the brine reduction area was assumed to be eliminated for HD processing.
4. Case 4 – Evaluating Dioxin and Furans at Detection Limits: Eleven dioxin and furan compounds which were monitored in the trial burns, but never detected, were moved from the non-volatile TOE fraction and placed on the emissions list for the common stack at their detection limits. The toxicity of the non-volatile TOE fraction was re-evaluated without these eleven compounds.
5. Case 5 – On-Site Risk After Incineration: The base model was modified by removing exposure pathways which only occur during operation of the incineration system. Pathways resulting from residual soil contamination were retained. The purpose of this analysis was to examine the on-site risks to future populations that might use the depot lands after closure.
6. Case 6 – Combined Special Cases 3, 4, and 5: Assumptions in Special Cases 3, 4 and 5 were combined.

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[1] Ecological results are not included in the June 11, 2008 of this report, but will be added in a future draft.

[2] DAAMS stands for Depot Area Agent Monitoring System.

Table ES-1 summarizes the results of the base model and the six special cases when compared to the action levels established by the DEQ in the 2004 RAWP. Table ES-2 provides a summary of the action levels described in the 2004 RAWP. A "Pass" in Table ES-1 implies that all exposure scenarios evaluated at the specified location were below DEQ action levels. A "No" value in Table ES-1 indicates that at least one exposure scenarios was above the action level at the specified evaluation point. It is evident from Table ES-1 that the base model resulted in chronic cancer and non-cancer risks above action levels at both the on-site and off-site locations. In contrast, the acute inhalation risks and the risks to infants from dioxin and furans in breast milk were below action levels. Special Case 6 resulted in the lowest risks with all but the on-site chronic cancer risk falling below the DEQ established action levels.

Table ES-1: Summary of Risk Results for All Models Tested

Model	On-Site Receptor				Off-Site Receptor			
	Chronic Cancer	Chronic Non-Cancer	Infant Dioxin/ Furan Dose	Acute	Chronic Cancer	Chronic Non-Cancer	Infant Dioxin/ Furan Dose	Acute
Base Model	No[a]	No	Pass[b]	Pass	No	No	Pass	Pass
Special Case 1	No	No	Pass	Pass	No	No	Pass	Pass
Special Case 2	No	No	Pass	Pass	No	No	Pass	Pass
Special Case 3	No	Pass	Pass	Pass	No	Pass	Pass	Pass
Special Case 4	No	No	Pass	Pass	Pass	No	Pass	Pass
Special Case 5	No	No	Pass	Pass	--	--	Pass	Pass
Special Case 6	No	Pass	Pass	Pass	Pass	Pass	Pass	Pass

[a] A "No" indicates that at least one exposure scenarios was above the action level for the indicated measurement of risk.

[b] A "Pass" implies that all exposure scenarios evaluated at the specified location were below DEQ action levels.

Table ES-2: Risk Action Levels Described 2004 RAWP

Risk Measurement	2004 RAWP Action Level
Chronic Cancer Risk	< 1.0E-05
Chronic Non-cancer Risk	< 0.25
Infant exposure to Dioxin and Furan in Breast Milk	< 0.25 pg-TEQ/kg-day
Acute Inhalation Risk	< 1.0 for individual compounds

Cancer risks in the base model resulted mostly from ingesting foods containing the measured, but unspeciated non-volatile TOE. The non-cancer risks were dominated by ingesting foods contaminated with chemical agent. It is evident from these results that two key assumptions are causing the cancer and non-cancer risks in the base model to exceed the predetermined action levels. First, the decision to assume emission of the chemical agents at the detection level of the continuous monitoring system (termed an ACAMS, or automatic continuous air monitoring system) drives the non-cancer chronic health risk. Second, the choice to quantitatively assign geometric mean toxicities to the unspeciated non-volatile TOE resulted in cancer risks that exceed the action levels.

Results from Special Cases 1 and 2 indicate that collating the highest air parameters resulted in an increase in the chronic cancer and non-cancer risks by an average of 30% to 40% over models that used either area average air parameters or a single location in the region of highest off-site deposition.

Special Case 3 modifications to the risk model had a dramatic effect on non-cancer chronic risks. For Special Case 3 there was an average reduction of 98.7% in non-cancer risks at both the on-site and off-site locations over the base model. All non-cancer risks (both on-site and off-site locations) were below the DEQ established action level for Special Case 3. Chronic cancer risks for Special Case 3 were an average of 43% below the base model, but all exposure scenarios which exceeded the action level for cancer risks in the base model also exceeded the action level for Special Case 3.

Special Case 4 was evaluated since chronic cancer risk in the base model is dominated by the geometric mean value for the oral cancer slope factor (CSFo) of the non-volatile TOE fraction, and this parameter is highly influenced by eleven dioxins and furans which were measured during all the trial burns, but never detected. Results from the Special Case 4 analysis indicated that only the on-site farmer and on-site Native American (adult and child in both cases) appear to have chronic cancer risks above the DEQ action level. The off-site farmer adult and Native American adult have cancer risks equal to the action level of 1×10^{-5}. Moving the eleven dioxins from the non-volatile TOE fraction to the COPC list also did not cause unacceptable levels of PCDDs and PCDFs in breast milk. For the on-site and off-site evaluation locations, the predicted infant dioxin and furan exposure was below the DEQ action level of 0.25 pg-TEQ/kg-day for all exposure scenarios.

For Special Case 5 the base model was modified to remove the exposure pathways that only occur during incineration operations. The exposure pathways removed were inhalation exposure, above ground produce exposure by direct deposition of particles, and air-to leaf transfer. Results from Special Case 5 reveal a reduction in on-site chronic risks (cancer and non-cancer) by between 60% and 70% over the base model. The resulting on-site non-cancer risks are below the DEQ action level, but the cancer risks are still more than an order of magnitude above the action level.

The assumptions included in Special Cases 3, 4, and 5 were combined in the Special Case 6 analysis. Special Case 6 represents site conditions that more closely reflect actual operations than those used in the base model. The Special Case 6 model predicts chronic off-site risks (both cancer and non-cancer) below the DEQ action levels. The infant average daily dose for dioxins and furans for Case 6 were also below their action levels for all evaluation locations and exposure scenarios. On-site chronic cancer risks are still more than an order of magnitude above action levels, but on-site non-cancer risks are below their action level.

From these results it is evident that the off-site risks (both chronic cancer and non-cancer risks) reported for the base model are reduced to values below action levels by including more accurate estimates of chemical agent and dioxin and furan emissions. These modified emission values are based on experimental measurements of stack emissions which were not included in the base model. Including this data creates emission rates that more accurately estimate the potential levels of these compounds being released by the UMCDF to the environment. On-site cancer risks are also reduced by these improved estimates, but still remain above action levels and so are still of concern to the CTUIR. In contrast, on-site non-cancer risks are below action levels with the improved data set represented by Special Case 6.

From the human health risk results it is evident that future risk management activities at the UMCDF should include an attempt to speciate the non-volatile TOE fraction and to determine its chemical composition and its true toxicity. In addition, site sampling should be conducted within the immediate region of the UMCDF to ensure residual contamination does not create unacceptable risks for those who will be using these lands after closure. Conclusions based on the ecological risk results will be presented in a later draft of this report.

2 Introduction

The Umatilla Chemical Depot (UMCD) is located in northeast Oregon. The northern boundary of the UMCD is 5 km south of the Columbia River, which forms the border between Washington State and Oregon State. The UMCD is comprised of 19,729 acres of which approximately 17,000 acres is government owned and the remainder is private lands which have restricted easements (U.S. Army 1996). During its now 60-year history, The UMCD has supported multiple war efforts, including the Korean Conflict, Vietnam, Grenada, Panama, Operation Desert Shield, and Operation Desert Storm. Besides its conventional ammunition and general supply missions, the depot received a new mission in 1962 – receiving and storing chemical ammunition. Between 1962 and 1969, the depot received various types of ammunition with the chemical nerve agents VX and GB, and the mustard blister agent HD (called mustard gas).

In the mid-1980s, Congress directed the Army to dispose of the nation's aging chemical weapons stockpile. In 1988 the UMCD was placed on the Department of Defense Base Realignment and Closure list to review the future of the facility. It was decided that the base would be realigned and remain open until the chemical stockpile at the facility was destroyed. On April 25, 1997, the United States Senate ratified the Chemical Weapons Convention, an international treaty mandating stockpile destruction. In June 1997, construction started on the Umatilla Chemical Agent Disposal Facility (UMCDF) – the facility that would destroy the chemical ammunition stored at the UMCD. Construction was substantially complete in August 2001 and weapons destruction began 2004. The mission to destroy the UMCD stockpile of chemical weapons is scheduled to be complete by late 2010. Subsequent decontamination, decommissioning, and closure will last till approximately 2013. The Department of Defense Base Realignment and Closure law of 2005 has the UMCD scheduled to be closed after the incineration facility has completed its mission.

The CTUIR have an ancient relationship with the lands and resources throughout the Columbia Plateau, including within the UMCD, as documented by the extensive archaeological record, traditional stories, and oral histories. Usual and accustomed fishing sites, villages and camps, religious, funerary and other spiritual sites, plant gathering areas, grazing, and other sites are known to exist on, or near in this area. For this reason, the resources on the UMCD must be protected and preserved in a manner that meets the United States (US) Trust responsibility to the CTUIR which was established in the Treaty of 1855. The US government must protect the interests of the CTUIR by ensuring that lands, water, soil, air, biological, and cultural resources are clean and safe to use. The US government must also ensure to the CTUIR that, after clean-up, human health is not adversely affected from chemical and physical impacts that are related to operations or management of the UMCD site. It is for the above mentioned reasons that the CTUIR has undertaken the risk assessment efforts outlined in this report.

3 Overview of UMCDF Point Sources

The Umatilla Chemical Agent Disposal Facility (UMCDF) is a multi-furnace processing plant designed to dispose of the chemical warfare agent stored at the Umatilla Chemical Depot (UMCD). The stockpile at the UMCD is comprised of two nerve agents (GB and VX) and one blister agent (HD) in a variety of weapons configurations. Weapons configurations stored at the UMCD included projectiles, bombs, rockets, mines, spray tanks, and ton containers.

Weapons disposal activities take place predominately within a highly contained building termed the Munitions Demilitarization Building (MDB). Within this structure individual weapons are disassembled, and their various components are treated to acceptable levels in one of four furnace systems. These systems are:

- Liquid Incinerator 1 (LIC1)
- Liquid Incinerator 2 (LIC2)
- Deactivation Furnace System (DFS)
- Metal Parts Furnace (MPF)

The off-gas from each of these furnaces are processed in separate wet pollution abatement systems, and are subsequently passed through carbon filters before being combined and released to the environment in the common stack (COMSTK). The liquid brine used in the pollution abatement systems is sent to storage tanks and ultimately dried in the Brine Reduction Area (BRA). The gases given off during the drying process are passed through a bag filter to remove particles and subsequently released to the atmosphere in the Brine Reduction Area stack (BRASTK).

The COMSTK and the BRASTK are two of the four point sources modeled in this UMCDF risk assessment. The remaining two point sources are the exhaust stack for the on-site laboratory where dilute chemical agents are handled (LABSTK), and the MDB ventilation stack (MDBSTK). Both the LABSTK and the MDBSTK emissions are passed through carbon filters before being released to the atmosphere. A summary of the characteristics of the four point sources are provided in Table 3-1. Figure 3-1 depicts the location and heights of the four point sources in relation to the UMCDF buildings. In this figure the point sources are indicated in red while the UMCDF Buildings are shown as shaded boxes and are to scale.

Table 3-1: Characteristics of the Four UMCDF Point Sources

Parameter	COMSTK	BRASTK	MDBSTK	LABSTK
UTM Eastling (m)	312042.7	311992.4	312077.4	311924.1
UTM Northing (m)	5079907	5079764	5080000	5079844
Elevation (m)	200	196	200	197
Stack Height (m)	30.5	19.8	36.6	12.2
Exit Temperature (K)	353.15	415	294	299
Exit Velocity (m/s)	3.5	14.7	12.7	21
Exit Diameter (m)	1.52	1.37	2.19	0.64
Exit Flow Rate (ACMM)	380	1301	2870	405

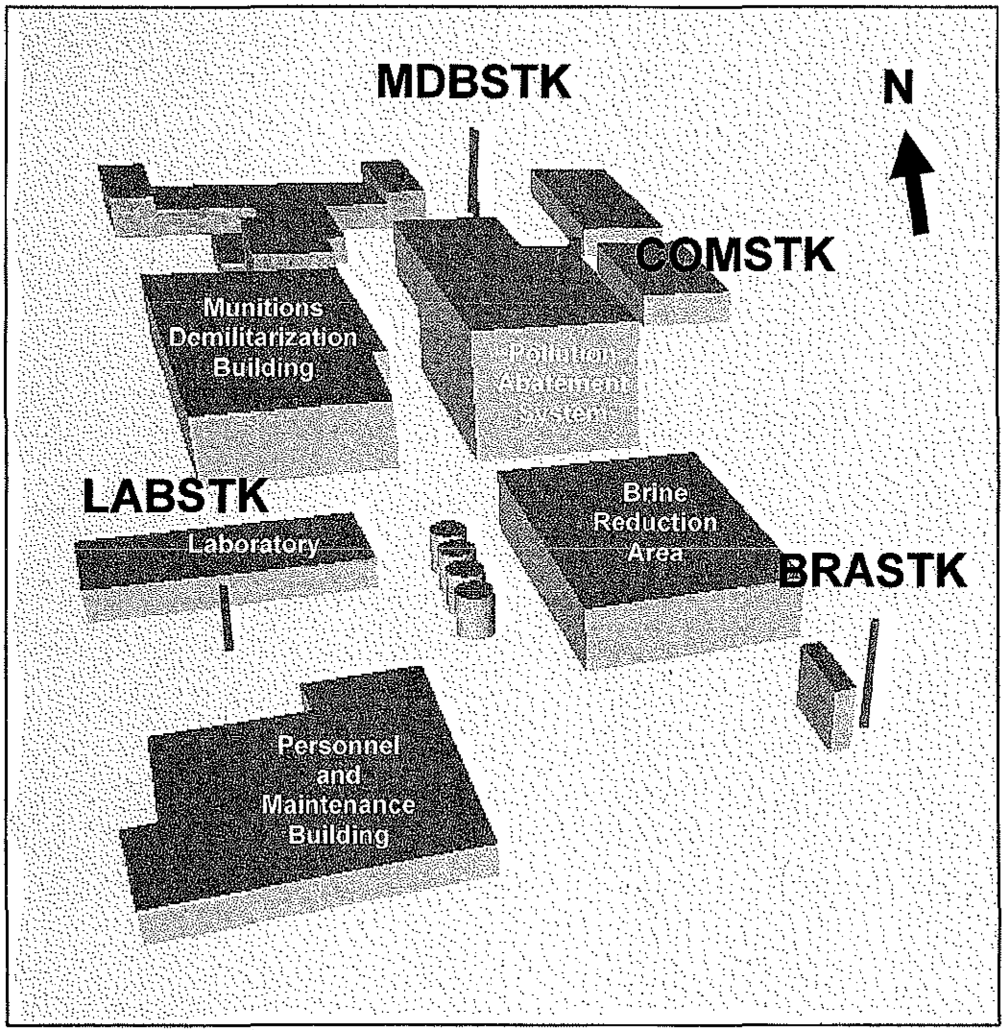

Figure 3-1: General site layout for the UMCDF (to scale). Red lines indicate the four point sources while the gray boxes indicate site buildings.

4 Air Dispersion Modeling and Emission Rate Estimates

Both the HHRA and ERA risk assessment processes for hazardous waste combustors require predicting the movement of emitted chemicals as a vapor and bound to particles. This prediction requires the use of air dispersion modeling software such as the EPA promulgated AERMOD model that was applied in this analysis (EPA, 2004). AERMOD is a steady-state plume model that uses Gaussian distribution for plume growth in the vertical and horizontal directions in the near surface stable boundary layer. The upper convective boundary layer is modeled using a Gaussian distributions in the horizontal direction and a bi-Gaussian probability density function in the vertical dimension. The basic types of information necessary to implement AERMOD to predict contaminant transport are depicted in Figure 4-1.

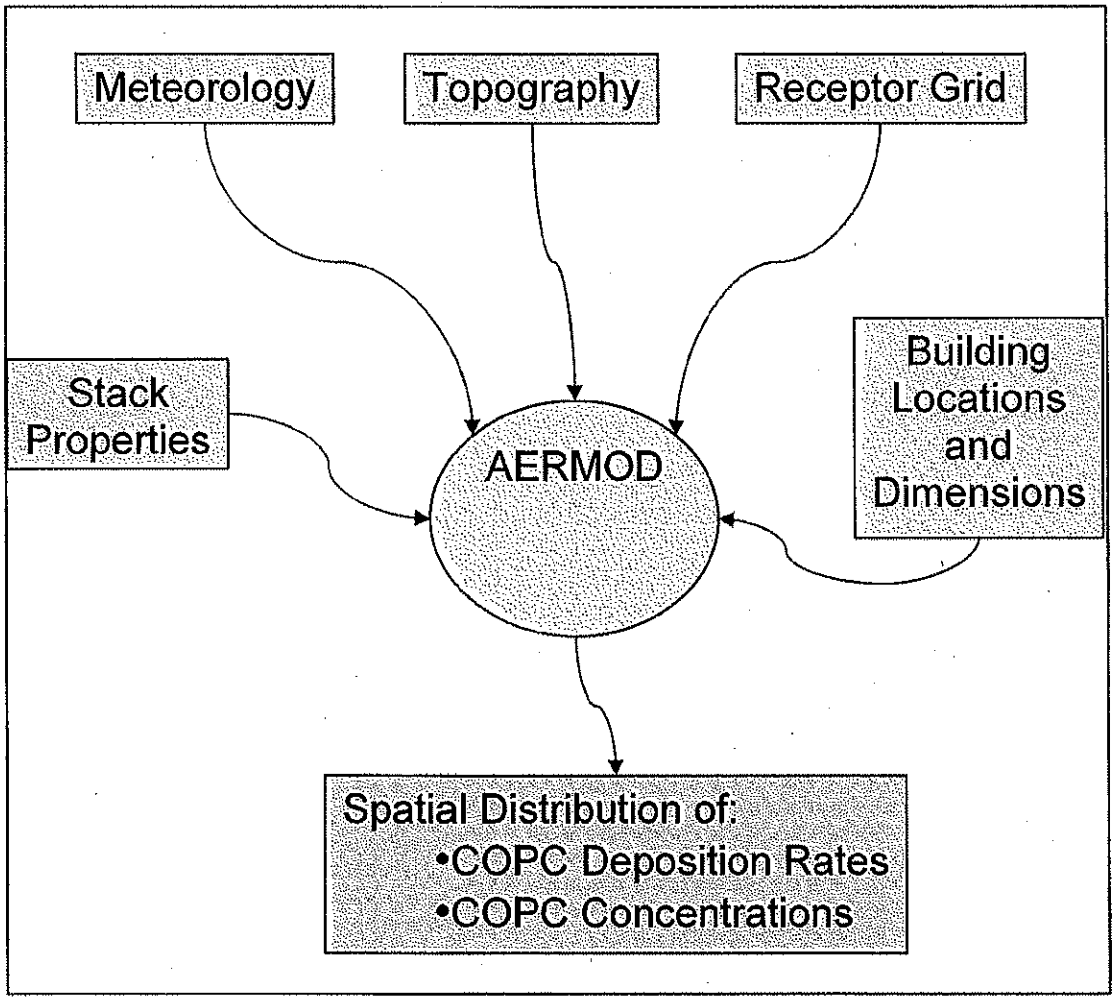

Figure 4-1: Depiction of data requirements for AERMOD analysis of hazardous waste combustors.

As indicated in Figure 4-1, the results of the modeling process are values for various deposition rates and air concentrations at spatial-distributed calculation points throughout the region of interest.

A total of 6841 calculation nodes were applied in this analysis and were placed as follows:

- From the stacks to a radial distance of 3 km nodes were evenly space 100 m apart.
- From a radial distance of 3 km to 10 km from the stacks nodes were spaced 500 m apart.
- From a radial distance between 10 km and 50 km from the stacks the nodes were spaced 2000 m apart.
- Nodes were placed with a spacing of 50 m along the UMCD fence line.
- 200 m spacing placed inside the easement area of the UMCD property where off-site deposition is highest.
- 100 m spacing within the UMCD administration area.

Figures 4-2 and 4-3 depict the spatial distribution of the calculation grid nodes.

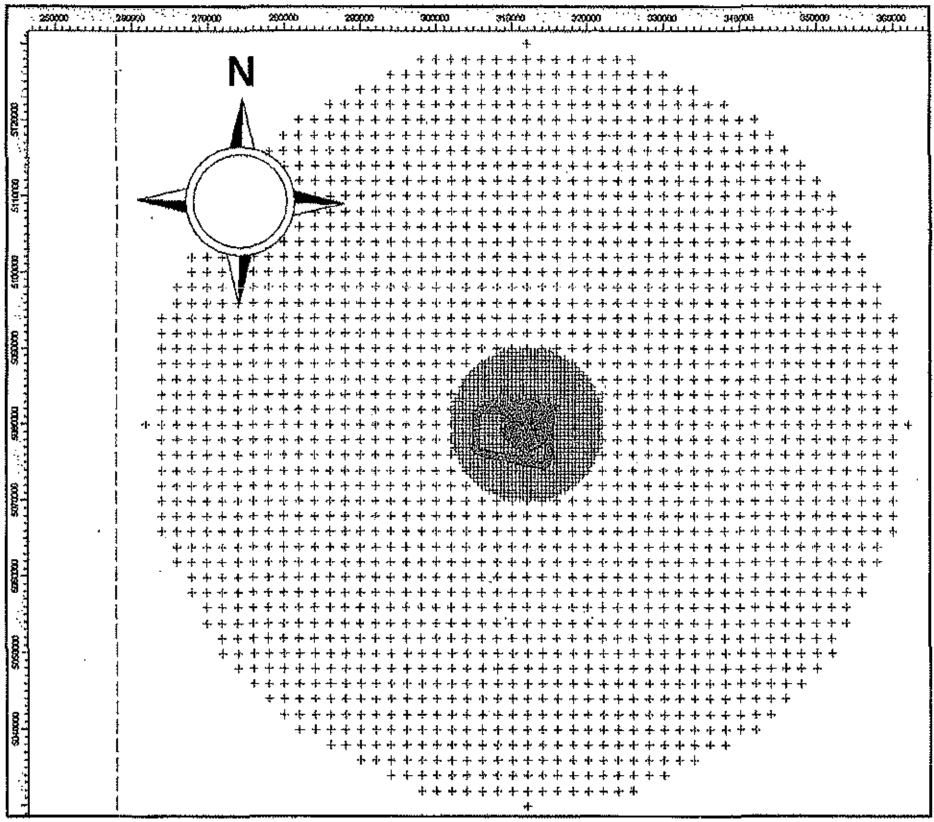

Figure 4-2: Calculation grid nodes over the 50 km analysis region.

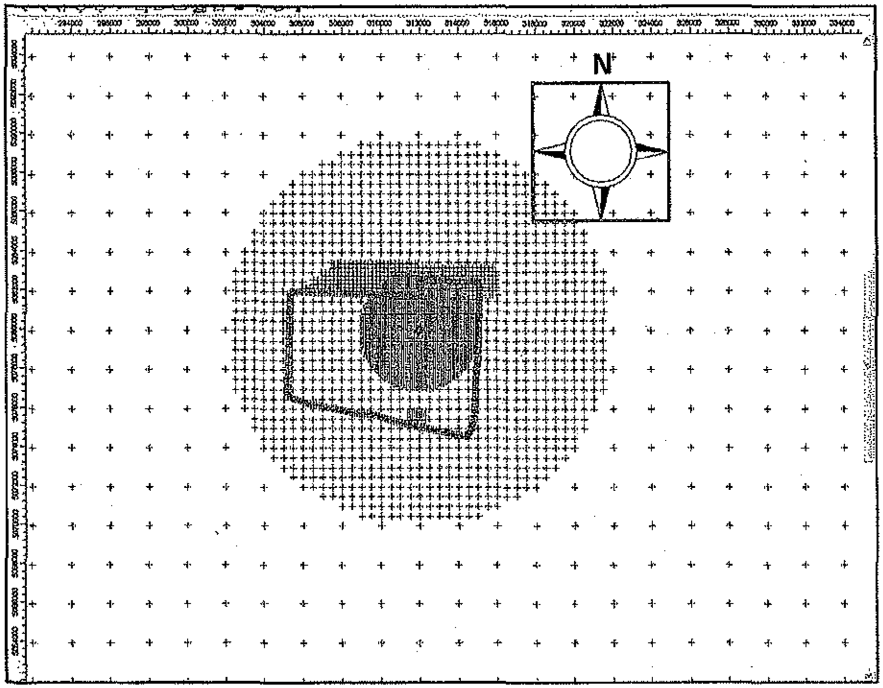

Figure 4-3: Expanded view of calculation grid near the UMCD.

A description of the parameters computed by AERMOD at each calculation point is provided in Table 4-1. The hourly maximum files indicated in Table 4-1 are applied to acute risk analysis while the average data sets are used in the long-term exposure risk calculations. As indicated in this table, there are four distinct phases (a vapor phase, a mercury vapor phase, a particle phase, and a particle bound-phase) necessary for the risk analysis. These four phases are modeled in separate AERMOD runs. The vapor phase results are used in the risk assessment process to describe the movement of highly volatile compounds which will remain in the gas phase at ambient conditions. The mercury vapor phase results are used to describe the emission and movement of the volatile mercury containing compounds. The particle phase results describe the movement and deposition of compounds with low volatility while the particle-bound phase is applied to compounds which have an intermediate volatility. The speciation of a particular chemical between these phases is conducted in the human health and ecological risk assessment calculations and not in the air transport computations.

Table 4-1: Deposition and Concentration Parameters Calculated by AERMOD

Description	Symbol	Unit
Unitized hourly maximum air concentration - particle phase	chp	ug-s/g-m^3
Unitized hourly maximum air concentration - particle bound	chp_pb	ug-s/g-m^3
Unitized hourly maximum air concentration - vapor phase	chv	ug-s/g-m^3
Unitized hourly maximum air concentration - vapor phase hg	chv_hg	ug-s/g-m^3
Unitized average air concentration - particle phase	cyp	ug-s/g-m^3
Unitized average air concentration - particle bound	cyp_pb	ug-s/g-m^3

Unitized average air concentration - vapor phase	cyv	ug-s/g-m^3
Unitized average air concentration - vapor phase hg	cyv_hg	ug-s/g-m^3
Unitized average dry deposition - particle phase	dydp	s/m^2 year
Unitized average dry deposition - particle bound	dydp_pb	s/m^2 year
Unitized average dry deposition - vapor phase	dydv	s/m^2 year
Unitized average dry deposition - vapor phase hg	dydv_hg	s/m^2 year
Unitized average wet deposition - particle phase	dywp	s/m^2 year
Unitized average wet deposition - particle bound	dywp_pb	s/m^2 year
Unitized average wet deposition - vapor phase	dywv	s/m^2 year
Unitized average wet deposition - vapor phase hg	dywv_hg	s/m^2 year

The unitized emission rates generated from AERMOD are converted to compound specific values by the multiplication of the individual results to the compound specific emission rate. Thus, for the ith COPC (Compound of Potential Concern) at the jth spatial note, the hourly air maximum air concentration for the particle phase would be calculated as:

$$chp_{j,i} = chp_j * ER_i$$

Where $chp_{i,j}$ is the particle phase hourly maximum air concentration for the ith contaminant at the jth node, chp_j is the particle phase unitized hourly maximum air concentration at the jth node, and ER_i is the emission rate for the ith contaminant for the point source in question. It is these COPC specific deposition rates and concentrations parameters that serve as the basis for computing site-specific human health and ecological risk.

The following two sections describe the methods used to compute UMCDF specific unitized concentrations and deposition rates and COPC emission rates for each of the four point sources included in this analysis.

4.1 Air Dispersion and Deposition Modeling

For consistency between USACHPPM (United States Army Center for Health Promotion and Preventative Medicine), the Oregon DEQ (Department of Environmental Quality), and the CTUIR modeling efforts, the CTUIR HHRA and ERA relied upon the AERMOD modeling results provided to the DEQ by EnviroMet, LLC in December 2007. A detailed report discussing the EnviroMet model is provided in Appendix A. The geographic distribution of vapor concentrations and wet and dry deposition rates are presented in Figures 4-4 to 4-19. Underlying data for these representations are presented in Appendix B.

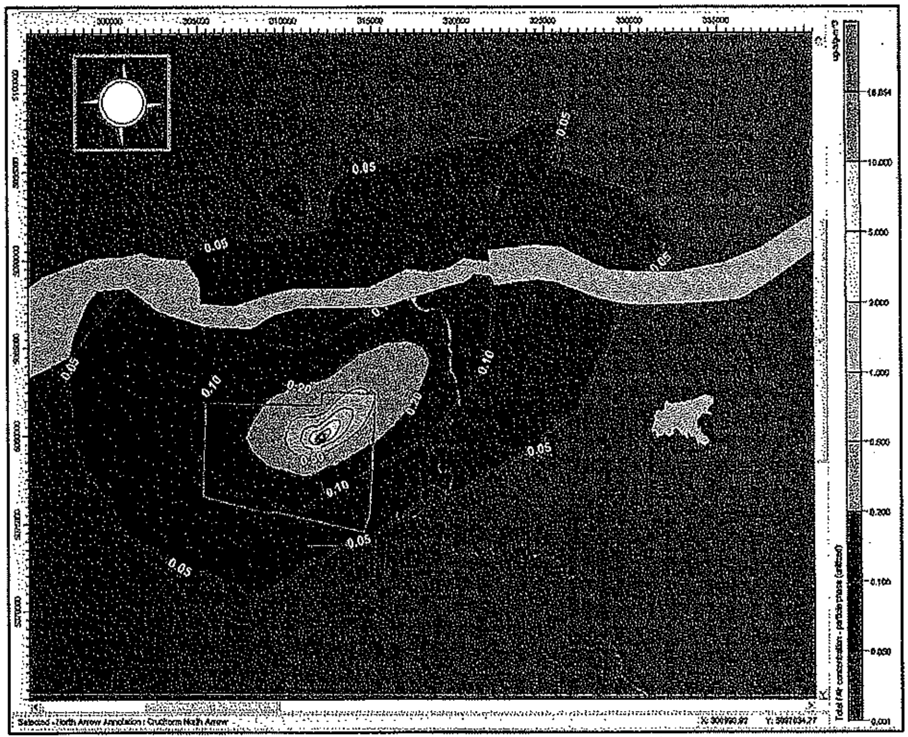

Figure 4-4: Isopleths for the particle phase average air concentration calculated from the six year composite meteorological data.

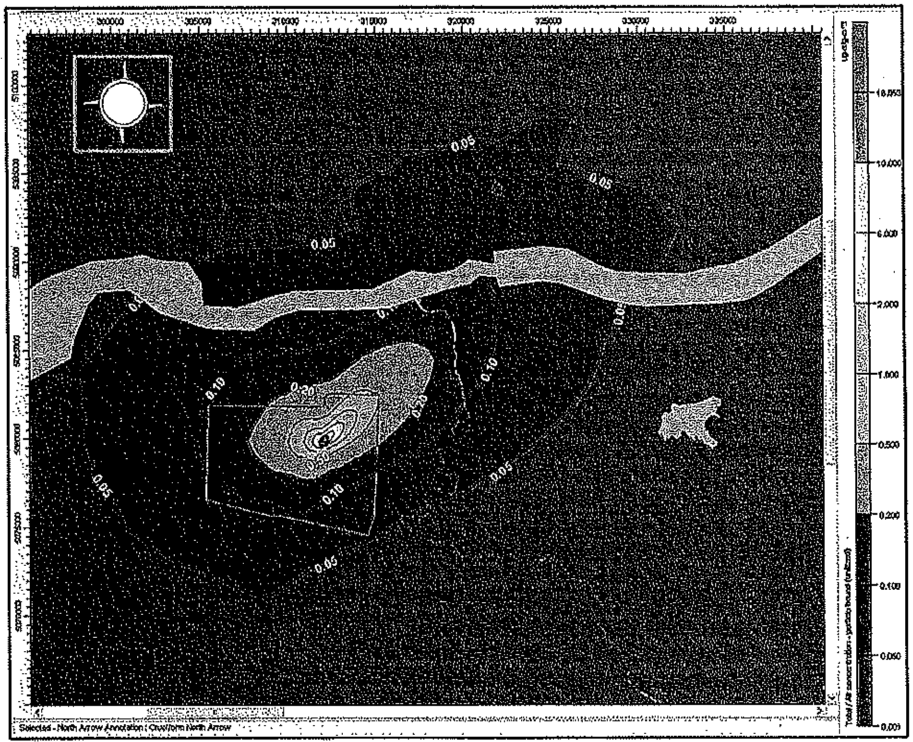

Figure 4-5: Isopleths for the particle-bound phase average air concentration calculated from the six year composite meteorological data.

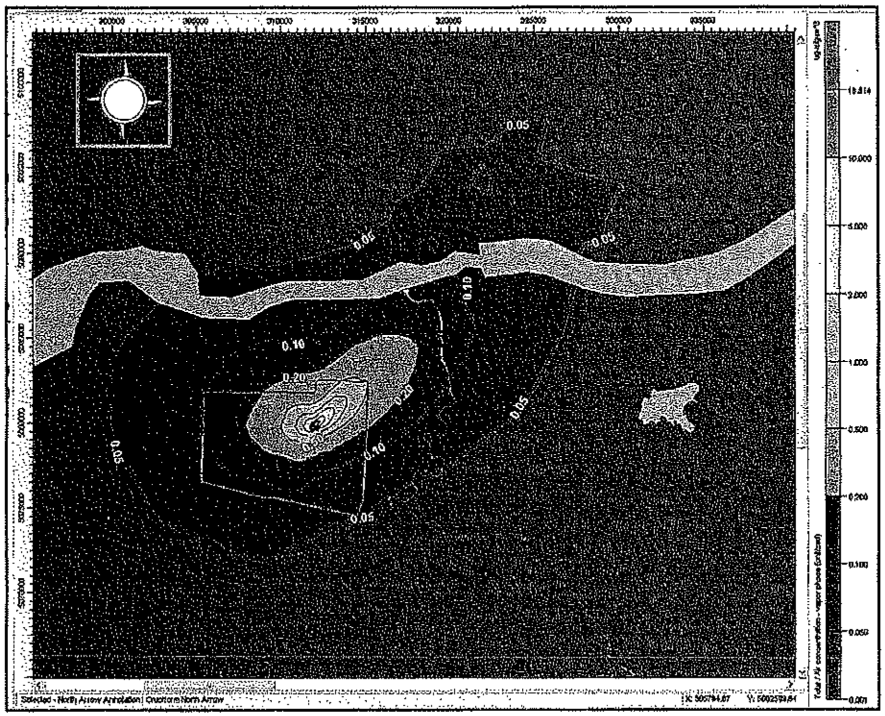

Figure 4-5: Isopleths for the vapor phase average air concentration calculated from the six year composite meteorological data.

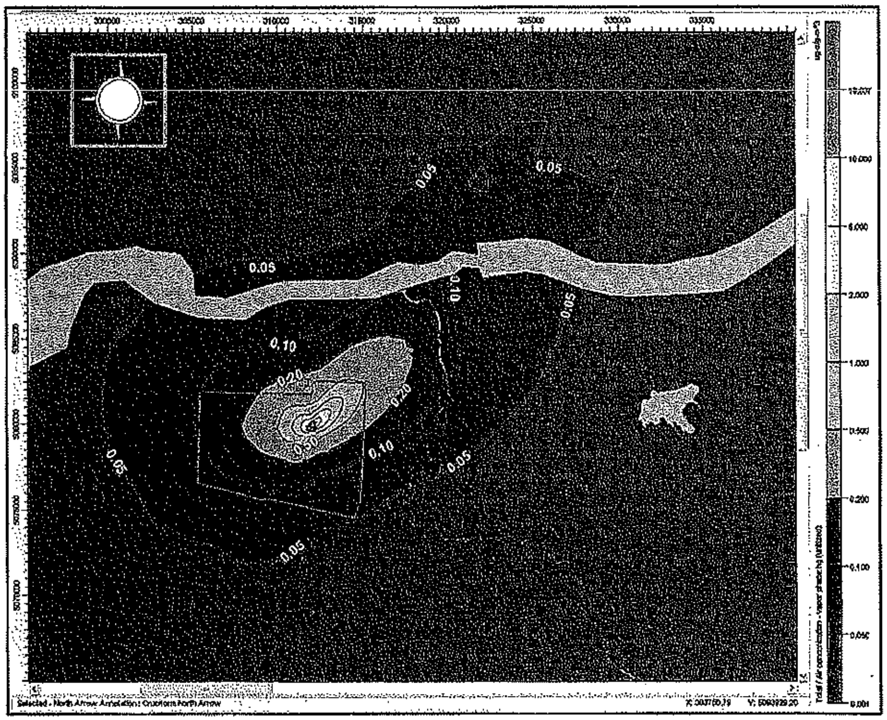

Figure 4-7: Isopleths for the vapor phase mercury average air concentration calculated from the six year composite meteorological data.

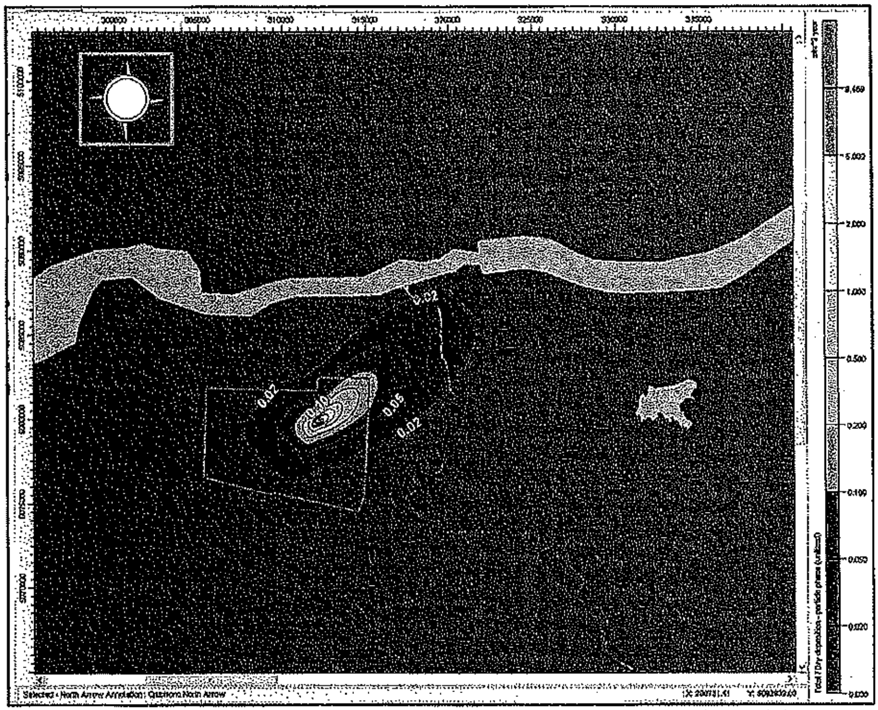

Figure 4-6: Isopleths for the particle phase average dry deposition rates calculated from the six year composite meteorological data.

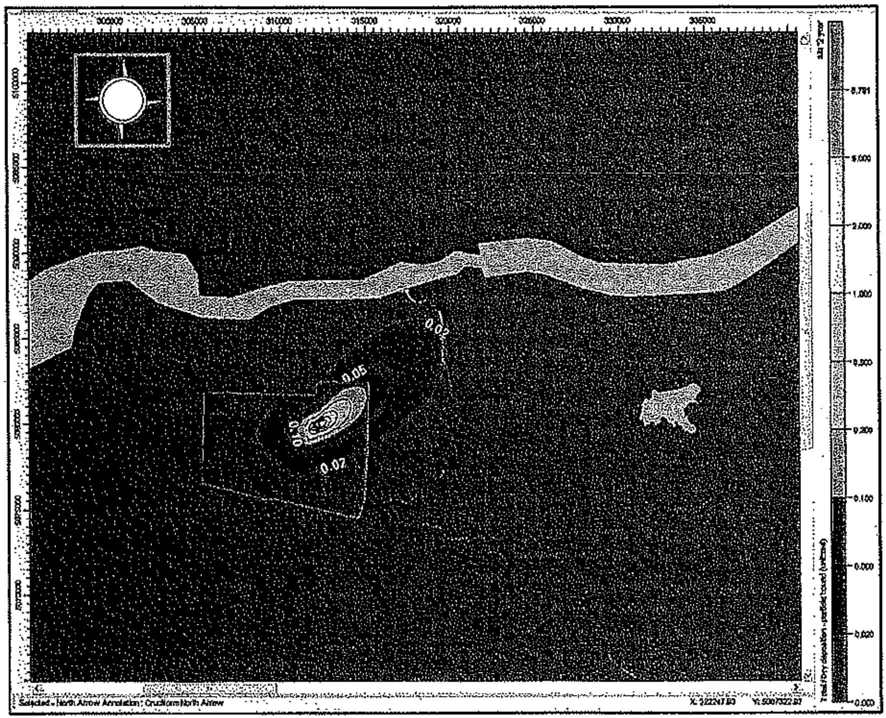

Figure 4-9: Isopleths for the particle-bound phase average dry deposition rates calculated from the six year composite meteorological data.

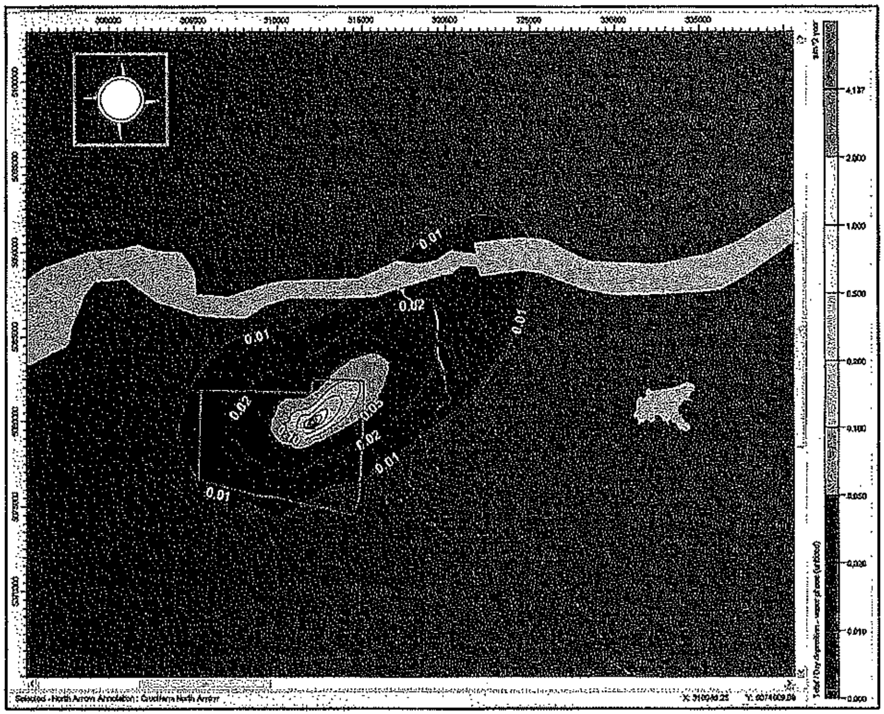

Figure 4-10: Isopleths for the vapor phase average dry deposition rates calculated from the six year composite meteorological data.

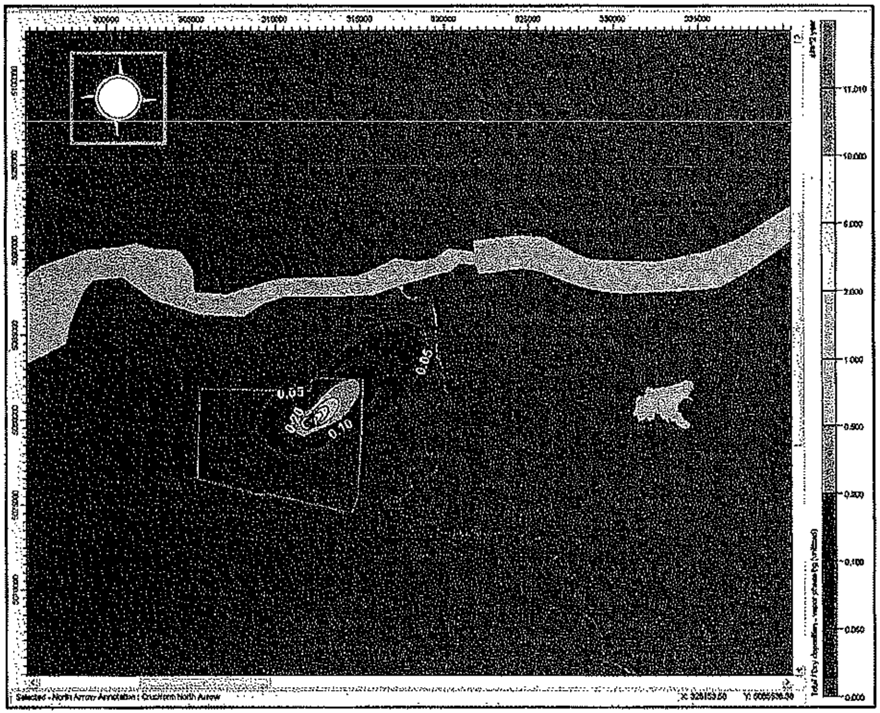

Figure 4-11: Isopleths for the vapor phase mercury average dry deposition rates calculated from the six year composite meteorological data.

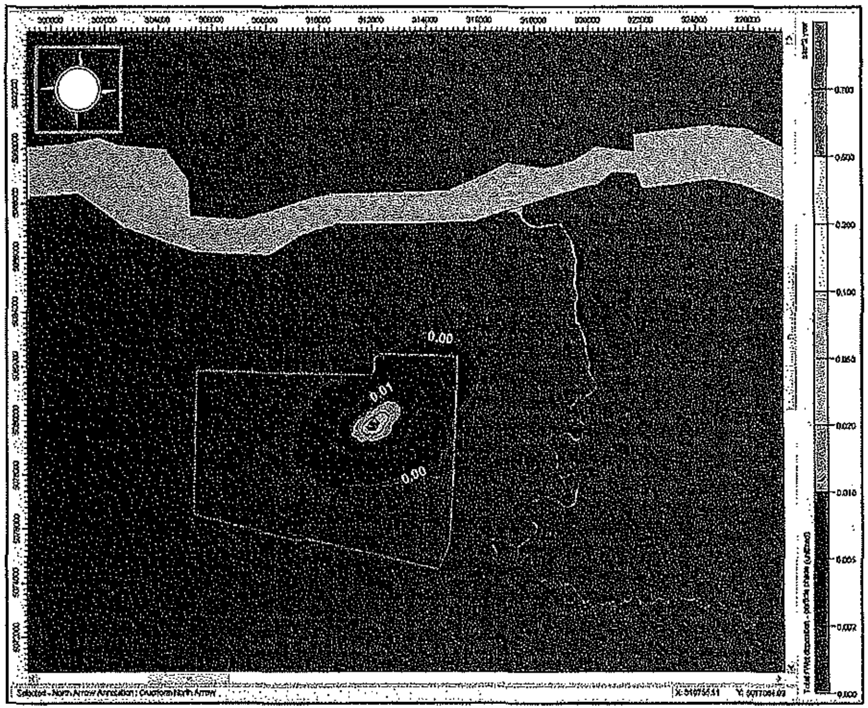

Figure 4-12: Isopleths for the particle phase average wet deposition rates calculated from the six year composite meteorological data.

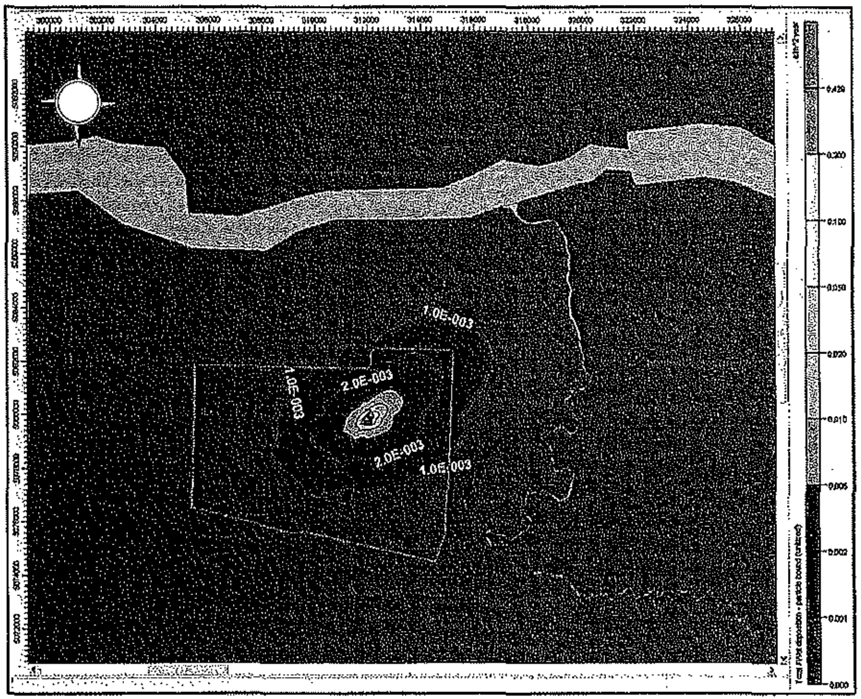

Figure 4-13: Isopleths for the particle-bound phase average wet deposition rates calculated from the six year composite meteorological data.

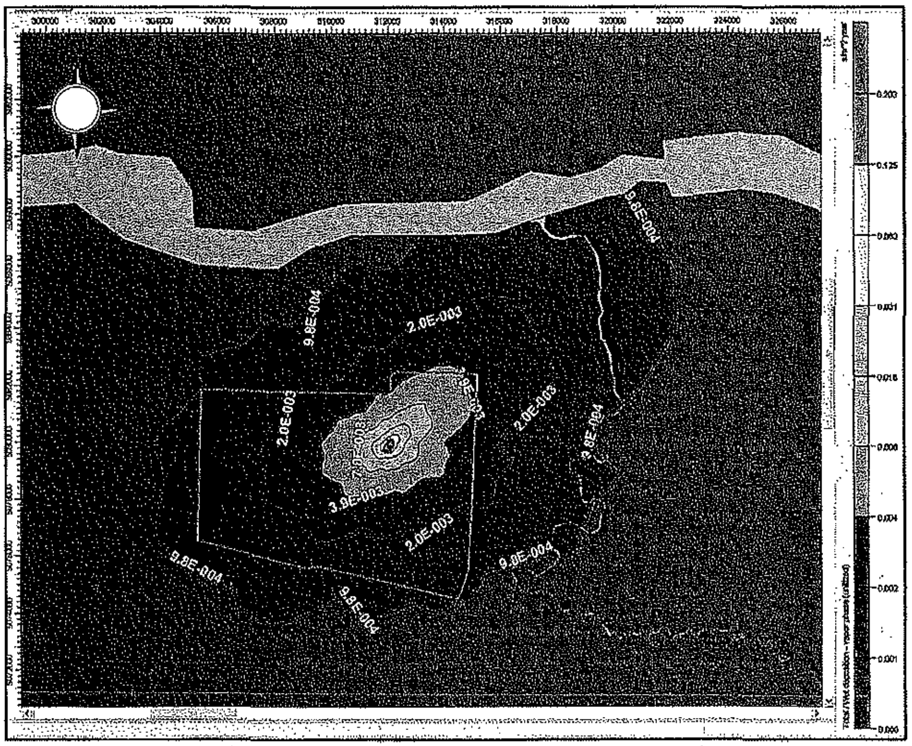

Figure 4-14: Isopleths for the vapor phase average wet deposition rates calculated from the six year composite meteorological data.

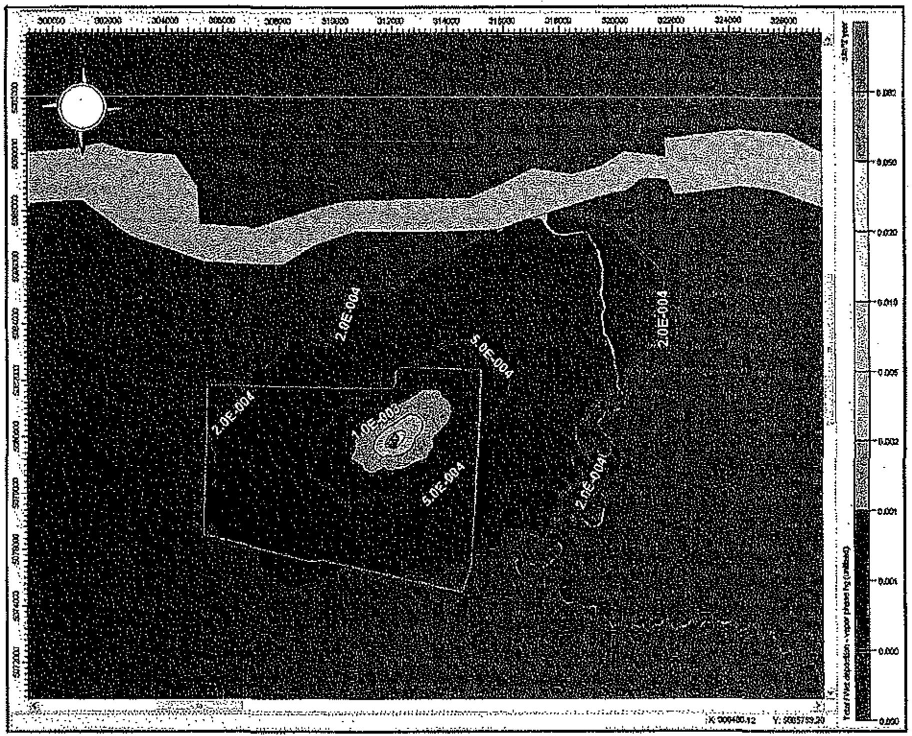

Figure 4-15: Isopleths for the vapor phase mercury average wet deposition rates calculated from the six year composite meteorological data.

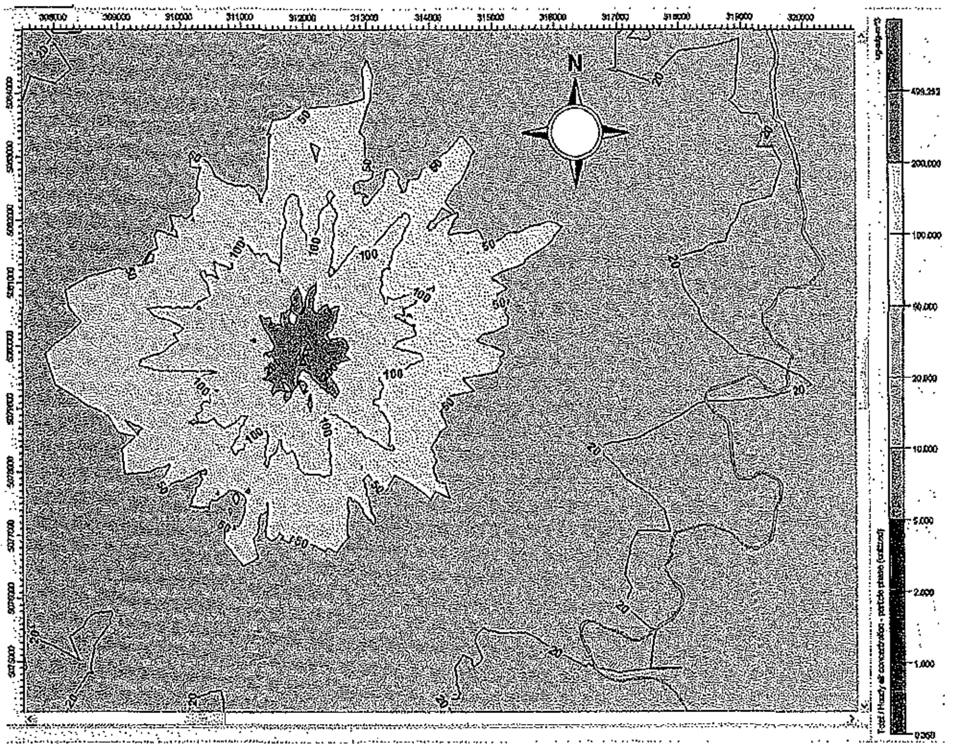

Figure 4-16: Isopleths for the particle phase 1-hr maximum air concentrations calculated for the six year composite meteorological data.

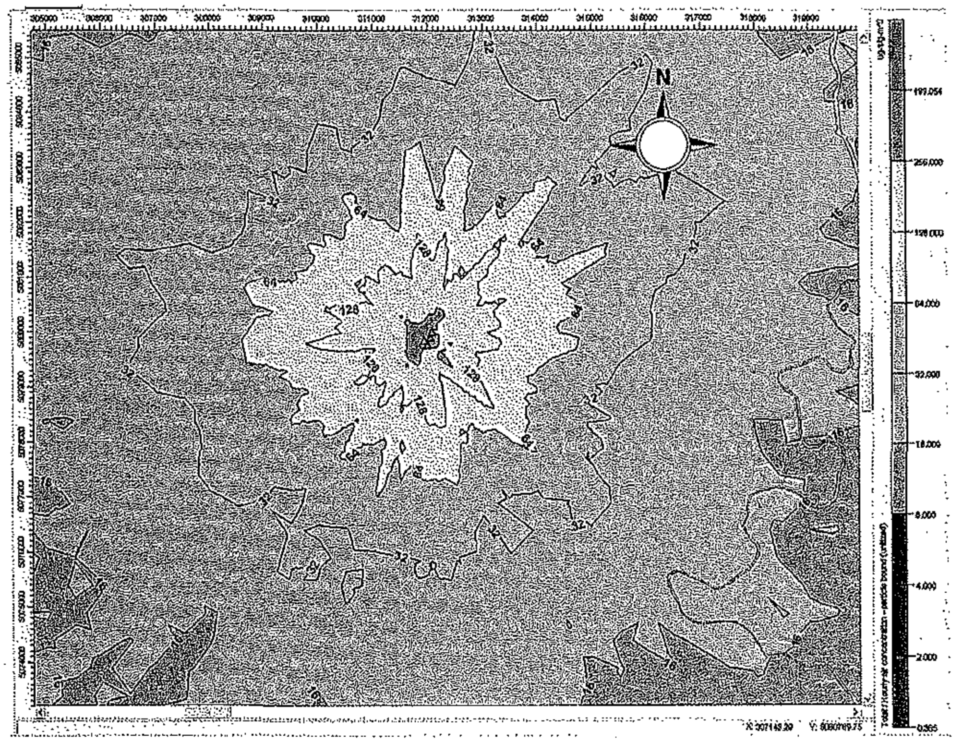

Figure 4-17: Isopleths for the particle-bound phase 1-hr maximum air concentrations calculated for the six year composite meteorological data.

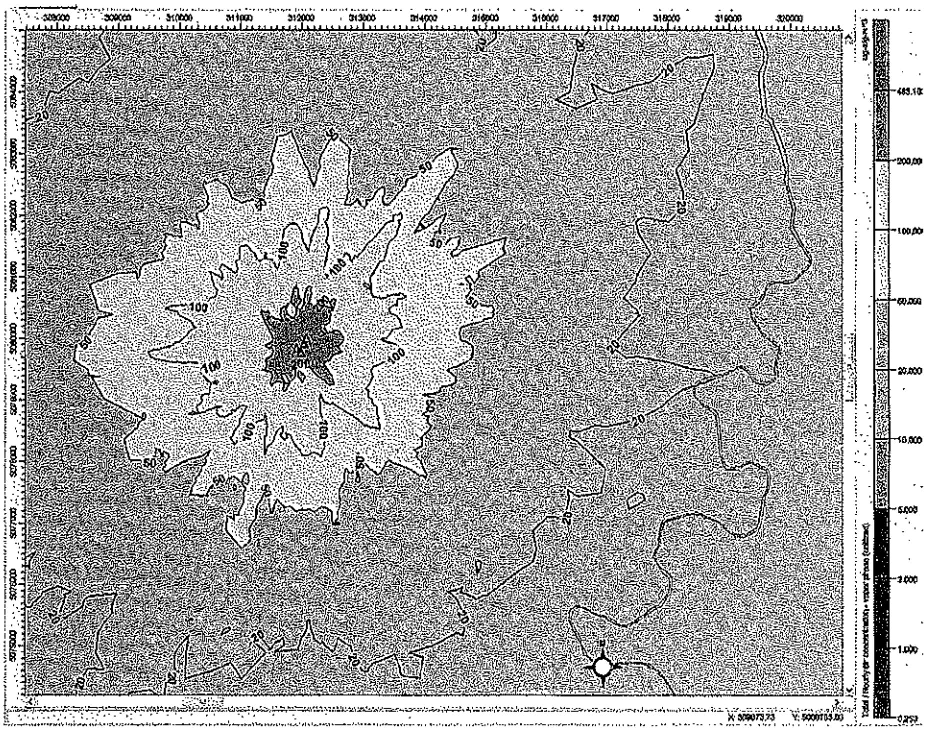

Figure 4-18: Isopleths for the vapor phase 1-hr maximum air concentrations calculated for the six year composite meteorological data.

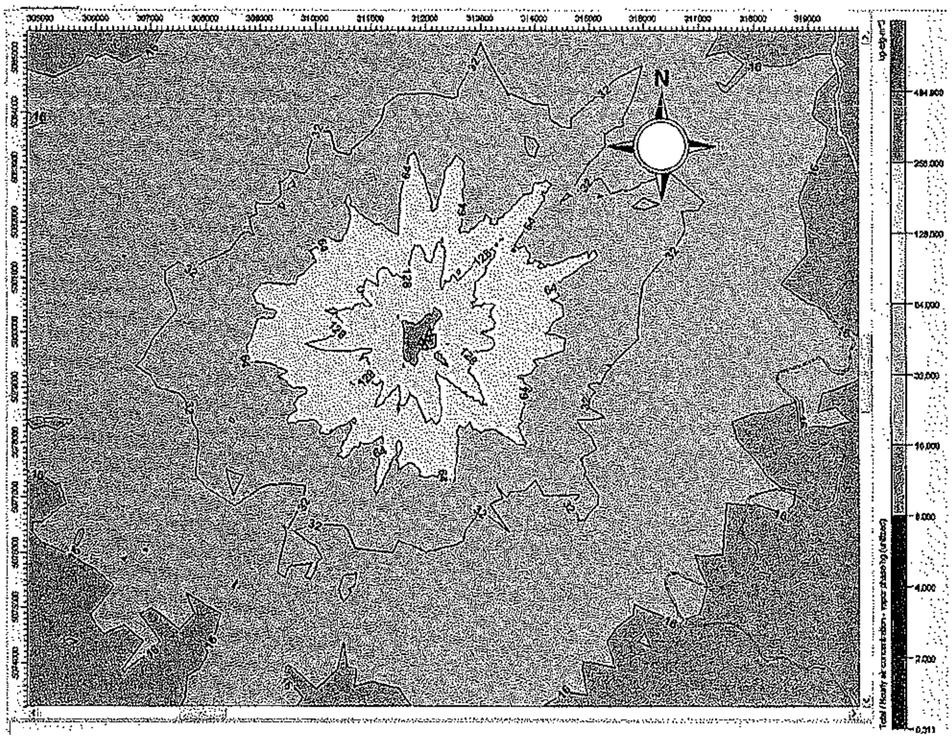

Figure 4-19: Isopleths for the vapor phase mercury 1-hr maximum air concentrations calculated for the six year composite meteorological data.

4.2 Estimation of Emission Rates

4.2.1 MDB and LAB Stacks

Emission rates for each of the four point sources were established in the CTUIR model using the same protocol applied in the USACHPPM and DEQ modeling efforts. For the LABSTK and the MDBSTK, chemical agents were assumed to be the only hazardous compounds released and the concentration of each agent was at the detection limits of the automatic continuous air monitor system (ACAMS) for the entire 10 years of assumed operation of the UMCDF. No upset factors were applied to LABSTK or MDBSTK emissions since the units are equipped with automatic shut-off systems if agent concentrations are detected above the detection limit. Table 4-2 lists the ACAMS detection limits for each agent and the resulting stack emission rates.

Table 4-2: LABSTK and MDBSTK
Chemical Agent Emission Rates for Risk Modeling

Agent	**ACAMS Detection Limit (mgm^3).**	**Emission Rate (g/s)**	
		LABSTK	**MDBSTK**
GB	6.0×10^{-5}	4.08×10^{-7}	2.89×10^{-6}
VX	6.0×10^{-5}	4.08×10^{-7}	2.89×10^{-6}
HD	6.0×10^{-4}	4.08×10^{-6}	2.89×10^{-5}

4.2.2 Brine Reduction Area Stack

Metals emission rates for the 20 species identified in Chapter 5 of the UMCDF Resources Conservation and Recovery Act (RCRA) Hazard Waste Permit were estimated using average brine metal concentrations and measured metal removal efficiencies for the UMCDF brine reduction area (BRA). Metals removal efficiencies were measured in the UMCDF BRA Performance Test (UMCDF, 2005). Table 4-3 details the average metal emission for each agent while Table 4-4 provides removal efficiency measured in the UMCDF BRA performance test.

Table 4-5 indicates resulting metals emission rates computed for the BRASTK and applied in the HHRA and ERA. The values listed in Table 4-5 were calculated as follows:

$$ER_i = Q_{brine} \cdot C_{brine,i} \cdot \rho_{brine} \cdot (1-\eta_i) \cdot CF$$

Where ER_i is the emission rate of the emission rate of the ith metal (g/s), Q_{brine} is the feed rate to the brine evaporators (assumed as 35.6 gpm for each of two evaporators), $C_{brine,i}$ is the brine concentration of the ith metal (mg/kg), ρ_{brine} is the density of the brine feed to the evaporator (assumed at 1.1 g/ml), η_i is the removal efficiency for the ith metal, and CF is the appropriate unit conversion factor (6.32×10^{-5} [ml-min–kg]/[gal-sec-mg]). Table 4-5 lists two estimated metals emissions rates. The first estimate applies the highest estimated concentration for each metal (indicated in bold in Table 4-3) through all campaigns (10 years total) while the second represents a time averaged value and is computed as:

$$ER_i = \frac{\theta_{GB} \cdot ER_{GB,i} + \theta_{VX} \cdot ER_{VX,i} + \theta_{HD} \cdot ER_{HD,i} + \theta_{SW} \cdot ER_{SW,i}}{\theta_{total}}$$

Where θ_{GB}, θ_{VX}, θ_{HD}, and θ_{SW} are the individual campaign durations (3.68 yr, 2.32 yr, 2 yr, and 2 yr for GB, VX, HD, SW, respectively), θ_{total} is the total operation time (10 years), and $ER_{GB,i}$, $ER_{VX,i}$, $ER_{HD,i}$, and $ER_{SW,i}$, are the campaign specific emission rates. If no data was available for a given campaign, then the average emission rate was computed by assuming the time of the campaign without data was equally distributed among the other campaigns. The higher of the two estimates (those based on campaign maximum values) were applied in this risk analysis. No upset multiplier was used for BRASTK metals emissions.

Table 4-3: Average Metals Concentration in PAS Brines for Various Processing Campaigns

Metal	Average Brine Concentration (mg/kg)			
	GB Campaign	VX Campaign	HD Campaign	Secondary Waste Campaign
Antimony	6.90E-01	2.25E-01	1.00E-01	**2.46E+00** [a]
Arsenic	3.85E-01	**2.09E+00** [a]	1.01E+02	6.43E-01
Barium	2.18E-01	1.18E-01	7.86E-02	**7.70E-01** [a]
Beryllium	ND	6.38E-03	ND	**1.20E-02** [a]
Boron	1.52E+00	1.43E+01	ND	**3.10E+01** [a]
Cadmium	4.41E-01	2.26E-01	1.62E+01	**3.67E+00** [a]
Chromium	8.66E+00	8.83E+00	2.20E+00	**1.81E+01** [a]
Cobalt	**8.11E-02** [a]	4.00E-02	3.61E-01	5.92E-02
Copper	6.85E-01	1.27E+00	**9.45E+00** [a]	6.44E+00
Lead	**3.66E+01** [a]	2.57E+00	1.02E+01	6.44E+00
Manganese	2.42E-01	3.11E-01	**4.95E+00** [a]	7.17E-01
Mercury	2.27E-03	**2.85E-03** [a]	1.95E-03	1.76E-03
Nickel	5.13E-01	1.24E-01	**2.20E+00** [a]	1.23E+00
Phosphorus	3.99E+03	4.96E+03	ND	2.26E+02
Selenium	**4.64E-01** [a]	2.67E-01	8.16E-02	3.04E-01
Silver	**2.73E-01** [a]	5.29E-02	ND	2.57E-01
Thallium	5.55E-03	2.68E-01	ND	**2.83E-01** [a]
Tin	1.90E-01	4.30E-01	2.91E-01	**2.34E+00** [a]
Vanadium	**1.49E-01** [a]	6.33E-02	ND	5.49E-02
Zinc	5.14E+00	2.77E+00	2.13E+01	**4.89E+01** [a]

[a] Bold values indicate the maximum brine concentration for a given metal.

Table 4-4: BRA Performance Test
Metal Removal Efficiencies

Metal	Removal Efficiency
Antimony	0.99984
Arsenic	0.99999
Barium	0.99823
Beryllium	0.99823
Boron	0.99648
Cadmium	0.99984
Chromium	0.99998
Cobalt	0.99823
Copper	0.99823
Lead	0.999999
Manganese	0.9944
Mercury	0.13653
Nickel	0.99823
Phosphorus	0.999995
Selenium	0.99693
Silver	0.99823
Thallium	0.99954
Tin	0.99823
Vanadium	0.99823
Zinc	0.99984

Table 4-5: Estimated Metals Emission Rates for the BRASTK

Metal	Emission Rate (g/s)	
	Based on Campaign Maximum	Based on Scaled by Campaign Duration
Antimony	1.94E-06	6.47E-07
Arsenic	4.99E-06	1.04E-06
Barium	6.74E-06	2.43E-06
Beryllium	1.05E-07	7.94E-08
Boron	5.39E-04	2.30E-04
Cadmium	1.28E-05	3.32E-06
Chromium	1.79E-06	9.19E-07
Cobalt	3.16E-06	1.08E-06
Copper	8.27E-05	3.26E-05
Lead	1.81E-07	8.59E-08
Manganese	1.37E-04	3.58E-05
Mercury	1.22E-05	9.56E-06
Nickel	1.93E-05	7.91E-06
Phosphorus	1.22E-04	8.09E-05
Selenium	7.03E-06	4.70E-06
Silver	2.39E-06	1.77E-06
Thallium	6.42E-07	3.59E-07
Tin	2.05E-05	6.10E-06
Vanadium	1.31E-06	8.61E-07
Zinc	3.87E-05	1.31E-05

BRASTK organic emissions included the three chemical agents (GB, VX, and HD), an agent-like by product of VX decontamination (S-2-Diisopropylaminoethyl methylphosphonothioic acid, EA2192), and o-cresol. As required by the RAWP, the chemical agents were assumed to be continually emitted for the full 10 years of operation at the maximum permitted level found in Module 5 of the UMCDF Resources RCRA Hazard Waste Permit. The permitted concentrations are 3.0×10^{-4} mg/m^3 for GB and VX and 3.0×10^{-2} mg/m^3 for HD and equate to the emission rates shown in Table 4-6. The maximum possible EA2192 emission rate from the BRASTK was estimated to be 3.58×10^{-13} g/s (Volume 2, Appendix G of USACHPPM, 2008). O-cresol (2-Methylphenol) was the only organic compound detected in the UMCDF BRA performance test and was included at the detected level.

Table 4-6: BRASTK Organic Emission Rates Used in the HHRA and ERA

COMPOUND	EMISSION RATE (G/S)
GB	6.5×10^{-6}
VX	6.5×10^{-6}
HD	6.5×10^{-4}
EA2192	3.58×10^{-13}
O-cresol	6.28×10^{-4}

4.2.3 Common Stack Emission Rates

4.2.3.1 Common Stack COPC List

The fits step in developing emission rates for the common stack was to identify what COPCs should be included in the analysis. Figure 4-20 provides a simplified depiction of the process used to arrive at the final list of 101 COPCs evaluated in the HHRA and ERA. Briefly, an initial list of 703[3] compounds were identified as possible feeds to the UMCDF incinerators; compounds identified, or tentatively identified (termed a TIC, or tentatively identified compound), in emissions from chemical demilitarization facilities; and compounds identified as potential products of incomplete combustion (PIC). This list of 703 compounds was subsequently reduced by eliminating compounds which had never been detected in a trial burn at any chemical demilitarization facility and also by eliminating composite compounds when their individual contributors were already included in the analysis (i.e. Polychlorinated biphenyls homologues since individual congeners were included). Several chemical species were retained even thought they have not been detected in trial burns because of their highly toxic nature. These compounds were the three chemical agents (GB, VX, and HD), EA2192, methyl mercury, and mercuric chloride.

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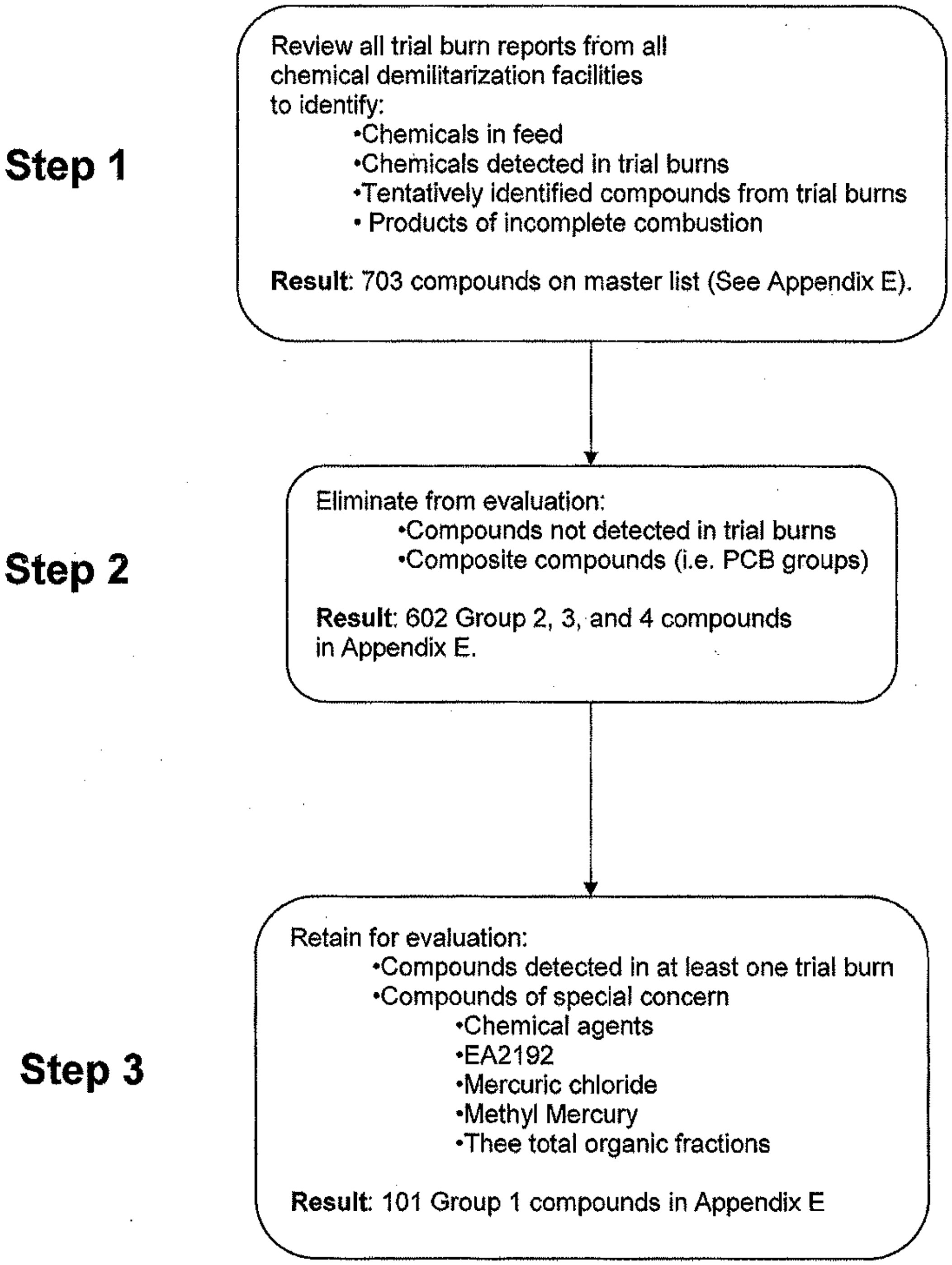
[3] This list is identical to that reported in DEQ January 2008 UMCDF risk assessment (Ecology and Environment, 2008) except that the duplicate entries for total volatile, semi-volatile, and non-volatile organics were removed from the Group 2 list since they are also included on the Group 1 list.



Step 1

Review all trial burn reports from all chemical demilitarization facilities to identify:

- Chemicals in feed
- Chemicals detected in trial burns
- Tentatively identified compounds from trial burns
- Products of incomplete combustion

Result: 703 compounds on master list (See Appendix E).

Step 2

Eliminate from evaluation:

- Compounds not detected in trial burns
- Composite compounds (i.e. PCB groups)

Result: 602 Group 2, 3, and 4 compounds in Appendix E.

Step 3

Retain for evaluation:

- Compounds detected in at least one trial burn
- Compounds of special concern
  - Chemical agents
  - EA2192
  - Mercuric chloride
  - Methyl Mercury
  - Thee total organic fractions

Result: 101 Group 1 compounds in Appendix E

Figure 4-60: Depiction of methodology used to generate the COPC list for the common stack.

The methodology applied in Figure 4-20 deviates from that specified in the 2004 RAWP which required that non-detected compounds, TICs, and PICs be included in the quantitative analysis with a concentration equal to its detection limit[4] (See Figure 2-1 of the 2004 RAWP). In addition, the RAWP specified the total organic measurements be used to uniformly adjust the COPC emission rates to bring the sum of the modeled emission rates up to the total measured amount of emitted organics. Thus, a total organic emissions (TOE) factor was to be computed for each organic fraction as:

$$F_{TOE}^{fraction} = \frac{TO_{Total}^{fraction}}{\sum_{i} Q_i^{fraction}}$$

Where F_{TOE} is the TOE factor for a specified organic fraction[5] (unit less), TO_{Total} is the total stack emission measured for a specified fraction (g/s), and Q_i is the emission rate for the ith compound within the specified fraction (g/s). The emission rates applied in the risk model were then to be corrected as follows:

$$Q_i^{corrected} = \left(F_{TOE}^{fraction}\right) \cdot Q_i^{fraction}$$

Since more organic material is measured in the bulk TOE measurements than can be accounted for is in the individual identified compounds, F_{TOE} is greater than 1.0 and the above computation results in increase the modeled emission rates. The effect is to distribute the unknown mass equally among the identified compounds within the same boiling point group. The assumption being applied is that the unknown material will have a distribution of risk similar to the known fraction.

It should be noted that the RAWP approach of retaining non-detected PICs and TICs at their detection limit and applying a scaling factor for measured, but unspeciated, TOE is consistent with the suggested EPA methodology (EPA, 2005). However, the EPA recommends evaluating the risk both with and without the TOE correction and discussing the difference as an uncertainty in the analysis while the RAWP included the TOE in the quantitative results. Non-detected PICs and TICs are included in the quantitative evaluation in both the EPA 2005 guidance and the 2004 RAWP.

It was collectively decided by the DEQ, CTUIR, and USACHPPM at a meeting in Hermiston on October 1, 2008 that it would be more consistent to divide the emissions into the two categories; the known emitted compounds (detected compounds) and an unknown fraction represented by the volatile, semi-volatile, and non-volatile TOE measurements. The known compounds would be evaluated at their measured emission rates (representing the known fraction of risk). The unidentified, but quantified component of the organic material would be represented using the measured emission

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[4] The detection limit was defined in the 2004 RAWP as the reliable detection limit (RDL).

[5] TOE fractions are determined by boiling point (BP) and are defined as volatile ($BP \leq 100$ °C), semi-volatile (100 °C $< BP \leq 300$ °C), and non-volatile ($BP > 300$ °C). Thus, three F_{TOE} values are calculated, one for each fraction.

rates for the three TOE fractions and surrogate transport and toxicity data calculated as the geometric mean of the non-detected PICs and TICs. Use of a geometric mean rather than a standard arithmetic mean was suggested since it is an applicable approach to finding the central tendency of a group of numbers that range over orders of magnitude.

It is important to note that the method used to describe the measured, but unspeciated organic material is a critical issue for the UMCDF risk assessment since only a small fraction of organic materials is actually identified in the individual trial burn tests. For example, for the UMCDF MPF GB agent trial burn, the total amount of identified organic compounds equated to an emission rate of 6.0×10^{-5} g/s while the sum of the three TOE fractions were emitted at a rate equal to 4.2×10^{-3} g/s. Hence, 98.6% of all emitted organics were unidentified in this trial burn. Table 4-7 summarizes the quantity of measured organic materials that were reported as identified compounds in several trial burns. The emission rates for speciated organics reported in Table 4-7 represent the sum of all fully quantified[6] values from the trial burn reports. Cleary, the only a small fraction of the emitted organic material is associated with known compounds and the remaining material is only accounted for in the TOE fractions.

Table 4-7: Amount of Speciated Organic Material Reported in Agent Trial Burns

Site, Furnace	Agent	Emission Rate (g/s)		Percent Speciated
		Speciated Organics	Total Organics	
UMCDF, DFS	GB	2.91×10^{-4}	9.1×10^{-3}	3.2%
UMCDF, LIC1	GB	0.0	2.4×10^{-3}	0.0%
UMCDF, LIC2	GB	7.12×10^{-5}	1.6×10^{-2}	0.4%
UMCDF, MPF	GB	6.0×10^{-5}	4.2×10^{-3}	1.4%
UMCDF, MPF	SW	2.97×10^{-5}	2.4×10^{-3}	1.2%
TOCDF[a], MPF	HD	0.0	5.1×10^{-3}	0.0%
ANCDF[b], LIC	VX	9.9×10^{-5}	3.2×10^{-3}	3.1%
ANCDF, DFS	VX	3.48×10^{-4}	1.1×10^{-2}	3.2%
ANCDF, MPF	VX	0.0	3.2×10^{-3}	0.0%

[a] TOCDF stands for Toole Chemical Agent Disposal Facility.
[b] ANCDF stands for the Anniston Chemical Agent Disposal Facility.

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[6] Data is reported in three ways in the trial burn reports. Compounds which were not detected in any portion of a sampling train are reported with a < and ND qualifier and represent the sum of the detection limits for the analysis of all aliquots from the sampling train. Compounds which were detected in at least one, but not all, portions of the sampling train are reported with a < qualifier. Values are then the sum of the measured value and the detection limits for the other portions of the sampling train. Compounds which were detected in all portions of the sampling train are reported with no qualifier. It is this third category of values that is represented in the speciated organics column of Table 4-7.

4.2.3.2 Common Stack COPC Emission Rates

The UMCDF common stack combines emissions from four furnace systems; liquid incinerators 1 and 2 (LIC1 and LIC2), the deactivation furnace system (DFS), and the metal parts furnace (MPF). The temporal characteristic of the emissions from the COMSTK is highly variable during operations since there are large differences in the chemical composition of the materials being processed and substantial variation in the types of furnaces used for processing different types of munitions. Unfortunately, current risk assessment software is not capable of incorporating temporal variability in emission rates. As such, it was necessary to estimate a single emission rate for each of the 101 COMSTK COPCs and apply this emission rate over the duration of the full operating period (10 years).

Appendix D provides a detailed description of the procedure used to develop a single, representative emission for each common stack COCP. In brief, individual furnace trial burn results for the various agents and munitions were combined though a weighting process that accounted for the number of each type of munitions to be processed, the furnaces necessary to process the components within the munitions, and the average feed rate required to process the munitions over the estimated campaign durations[7].

Application of the computations in Appendix D required the development of emission rate table for each furnace and each campaign. Trial burn data from all the chemical demilitarization facilities was reviewed and the highest detected value for a given COPC for a given furnace and agent campaign were selected to represent the emission rate for that condition. If a given COPC was never detected for a given furnace and agent, then the emission rate in the table would be 0.0. Chemical agents were assumed to be present at their detection limit during their individual campaigns. During closure it was assumed that all three agents would be present at their detection limits since multi-agent wastes will be processed during this campaign. The result of this analysis was a series of 15 tables (Appendix G) which were applied as indicated in Appendix D to create a single common stack composite emission rate for each COPC. Table 4-8 provides a description of these 15 tables while Table 4-9 shows how they were applied to the various processing campaigns. Table 4-10 provides a list of the composite COPC emission rates for the COMSTK. These values are also included in Appendix C. Values in Table 4-10 include a site specific upset factor of 1.01 for organics and 1.0 for metals. These upset factors were derived from analysis of site operating data as described in Appendix S.

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[7] The campaign durations used in this analysis (3.68 years for GB, 2.32 years for VX, 2 years for HD, and 2 years for closure) were derived from those reported in the 2004 RAWP by assuming a separate 2 year closure phase, but leaving the total plant life at 10 years. Hence, each of the agent campaign durations reported in the RAWP were multiplied by (8/10) and a 2 year closure campaign was added. This modification was necessary to model secondary waste processing during plant closure.

Table 4-8: List Emission Rate Tables

Table Number	Campaign	Furnace
1	GB	LIC 1
2	VX	LIC 1
3	HD	LIC 1
4	GB	LIC 2
5	VX	LIC 2
6	HD	LIC 2
7	GB	MPF (combustible and noncombustible materials)
8	VX	MPF (combustible and noncombustible materials)
9	HD	MPF (combustible and noncombustible materials)
10	GB	DFS
11	VX	DFS
12	Closure	MPF (combustible materials)
13	Closure	LIC 1
14	Closure	MPF (noncombustible materials)
15	Closure	DFS

Table 4-9: Application of Emission Rate Tables by Processing Campaign

Source	Table Numbers						
	GB Campaign		VX Campaign		HD Campaign		Closure Campaign
	Agent	SW	Agent	SW	Agent	SW	SW
LIC1	1	Max of 1 & 4	2	Max of 2 & 5	3	Max of 3 & 6	13
LIC2	4	NU [b]	5	NU [b]	6	NU [b]	NU [b]
MPF	7	7	8	8	9	9	12
MPFnc [a]	NU [b]	7	NU [b]	8	NU [b]	9	14
DFS	10	10	11	11	12	12	15

[a] MPFnc represents the processing of noncombustible secondary waste in the MPF.

[b] NU implies the furnace is assumed to not be used for the indicated campaign.

Table 4-10: COMSTK Emission Rates Applied in the HHRA and ERA Base Model

CAS Number	CAS Name	Emission Rate (g/s)
00-01-2	Aluminum compounds	2.722E-05
00-01-3	Antimony compounds	1.648E-06
00-01-4	Arsenic compounds	7.517E-07
00-01-5	Barium compounds	2.134E-06
00-01-6	Beryllium compounds	1.159E-08
00-01-7	Cadmium compounds	3.463E-07
00-01-8	Chromium compounds	4.000E-07
00-01-9	Copper compounds	6.080E-07
00-02-0	Lead compounds	1.853E-06
00-02-2	Manganese compounds	6.613E-06
00-02-3	Mercury compounds	0.000E+00
00-02-4	Nickel compounds	1.477E-06
00-02-5	Selenium compounds	5.244E-07
00-02-6	Silver compounds	1.997E-07
00-02-7	Thallium compounds	4.586E-07
00-02-8	Vanadium compounds	4.313E-08
00-02-9	Zinc compounds	7.565E-05
00-07-2	PCB Mixture (non-dioxin like, 5+ chlorines)	2.701E-07
00-15-3	Cobalt compounds	6.432E-08
00-15-5	m,p-Xylene	1.263E-05
00-16-3	Composite TOE - Volatile	4.636E-02
00-16-4	Composite TOE - Semivolatile	1.555E-03
00-16-5	Composite TOE - Nonvolatile	2.059E-03
00-16-6	Boron compounds	1.086E-05
00-16-9	Tin compounds	1.284E-06
56-23-5	Carbon tetrachloride	1.765E-06
65-85-0	Benzoic acid	2.595E-05
67-64-1	Acetone	2.807E-04
67-66-3	Chloroform	3.524E-06
71-43-2	Benzene	1.032E-05
74-83-9	Methyl bromide	1.202E-05
74-87-3	Methyl chloride	6.254E-06
74-88-4	Methyl iodide	8.803E-07
74-96-4	Bromoethane	1.165E-07
74-97-5	Bromochloromethane	1.564E-07
75-00-3	Ethyl chloride	7.181E-07
75-01-4	Vinyl chloride	6.778E-07
75-09-2	Dichloromethane	1.891E-05
75-15-0	Carbon disulfide	6.933E-06
75-25-2	Tribromomethane	2.592E-06
75-27-4	Bromodichloromethane	2.176E-06
75-35-4	1,1-Dichloroethylene	1.550E-07
75-69-4	Trichlorofluoromethane	2.291E-06

CAS Number	CAS Name	Emission Rate (g/s)
75-71-8	Dichlorodifluoromethane	9.355E-07
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	4.588E-08
78-93-3	Methyl ethyl ketone	1.209E-05
79-01-6	Trichloroethylene	4.630E-08
84-66-2	Diethyl phthalate	5.569E-06
84-74-2	Dibutyl phthalate	3.283E-06
91-20-3	Naphthalene	2.080E-06
91-57-6	2-Methylnaphthalene	1.646E-06
95-47-6	2-Xylene	3.706E-06
95-48-7	o-Cresol	0.000E+00
95-50-1	1,2-Dichlorobenzene	8.981E-07
100-41-4	Ethylbenzene	2.181E-06
100-42-5	Styrene	1.008E-06
100-51-6	Benzyl alcohol	2.082E-06
100-52-7	Benzaldehyde	3.470E-05
106-46-7	1,4-Dichlorobenzene	2.341E-06
107-44-8	GB	2.257E-07
108-05-4	Vinyl acetate	3.498E-07
108-10-1	Methyl isobutyl ketone	7.976E-06
108-88-3	Toluene	2.611E-06
108-90-7	Chlorobenzene	2.555E-07
110-54-3	n-Hexane	1.103E-06
117-81-7	Bis(2-ethylhexyl)phthalate	1.138E-04
118-96-7	2,4,6-Trinitrotoluene	1.061E-07
121-14-2	2,4-Dinitrotoluene	5.878E-08
124-48-1	Chlorodibromomethane	1.160E-06
131-11-3	Dimethylphthalate	4.555E-07
505-60-2	Sulfur mustard (or H/HD)	1.050E-05
1330-20-7	Xylene (mixed)	1.816E-06
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	8.320E-14
3268-87-9	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	1.355E-11
7439-97-6	Mercury	1.122E-09
7446-09-5	Sulfur dioxide	4.983E-05
7487-94-7	Mercuric Chloride	2.692E-07
7647-01-0	Hydrochloric acid	2.672E-04
7664-38-2	Phosphoric acid	7.682E-06
7664-39-3	Hydrofluoric acid	2.187E-05
7782-50-5	Chlorine	2.959E-04
10061-01-5	cis-1,3-Dichloropropene	1.028E-06
10061-02-6	trans-1,3-Dichloropropene	5.369E-07
10102-44-0	Nitrogen dioxide	1.734E-03
22967-92-6	Methyl Mercury	0.000E+00
31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	3.148E-10
32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	3.656E-10
32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	4.134E-10

CAS Number	CAS Name	Emission Rate (g/s)
38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	1.269E-10
39001-02-0	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	8.298E-12
39635-31-9	2,3,4,5,3',4',5'-Heptachlorobiphenyl	4.461E-13
50782-69-9	VX	1.369E-07
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	6.210E-11
52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	8.091E-11
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.512E-13
57465-28-8	3,4,5,3',4'-Pentachlorobiphenyl	3.750E-11
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.440E-12
69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	3.892E-11
70362-50-4	3,4,4',5-Tetrachlorobiphenyl	2.662E-11
73207-98-4	EA 2192	0.000E+00
74472-37-0	2,3,4,4'5-Pentachlorobiphenyl	1.828E-09

Figure 4-17 depicts the distribution of contaminant types in the composite COMSTK composite emission rates. The Speciated organics make up 1.14% of the total COPC emissions while the speciated inorganics make up 4.72%. The three unspeciated organic fractions compose the remaining 94.14% of the COMSTK emissions. While this value represents a large fraction of the emitted material, it is not without precedent. Others have reported TOE levels ranging from 50% to 97.5% of total emissions(EPA, 2001).

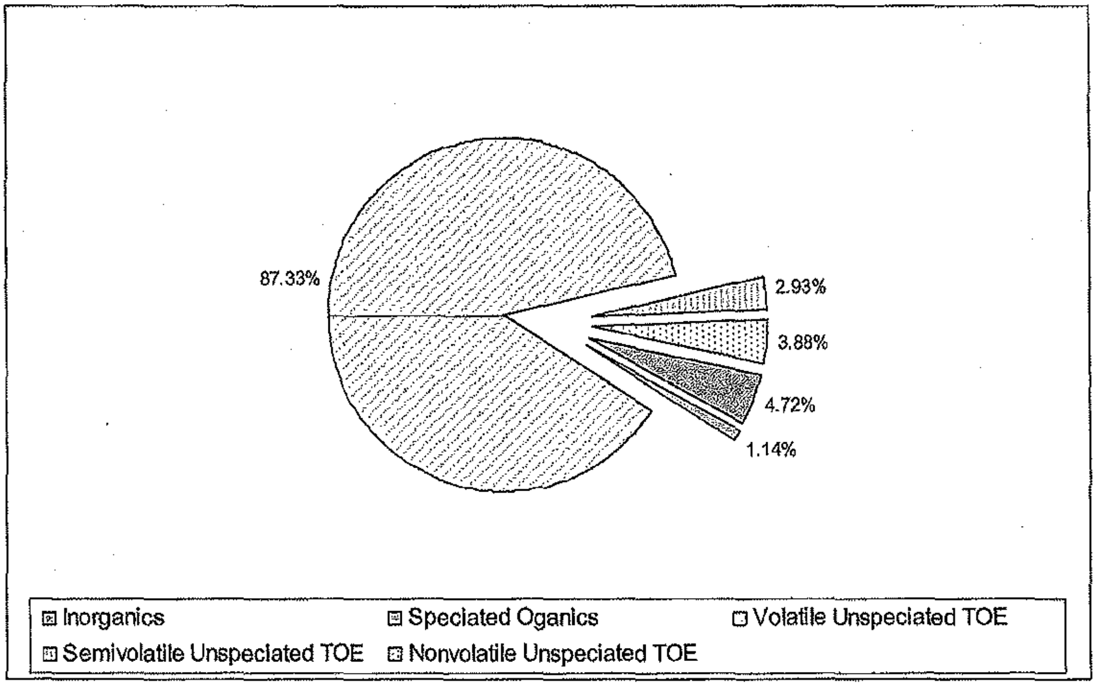

Figure 4-17: Distribution of types of emission rates for various types of contaminants.

4.2.4 Acute Inhalation Emission Rates

Emission rate for analysis of acute inhalation hazards were developed using the approached described in *Framework for Developing and Unitizing Emission Rates in the Umatilla Post-Trial Burn Health Risk Assessment* (CHPPM 2007). Emission rate estimates for the four sources were developed for nine potential upset conditions. These upset conditions are:

- Condition 1 – All furnaces and stacks operating under worst case conditions.
- Condition 2 – LIC1 in upset (10x worst case emissions) and all other furnaces and stacks operating with worst-case emissions.
- Condition 3 – LIC2 in upset (10x worst case emissions) and all other furnaces and stacks operating with worst-case emissions.
- Condition 4 – DFS in upset (10x worst case emissions) and all other furnaces and stacks operating with worst-case emissions.
- Condition 5 – MPF processing combustible materials is in upset (10x worst case emissions) and all other furnaces and stacks operating with worst-case emissions.
- Condition 6 – MPF processing noncombustible materials is in upset (10x worst case emissions) and all other furnaces and stacks operating with worst-case emissions.
- Condition 7 – BRA in upset (10x worst case emissions) and all other furnaces and stacks operating with worst-case emissions.
- Condition 8 – LAB in upset (10x worst case emissions) and all other furnaces and stacks operating with worst-case emissions.
- Condition 9 – MDB in upset (10x worst case emissions) and all other furnaces and stacks operating with worst-case emissions.

The worst case emissions data sets for each for each furnace correspond to an emission rate file containing the highest emission rate value for each COPC measured for any processing campaign. For example, for LIC1, the highest emission rate for each COPC found in Appendix G Tables 1, 2, 3, and 13 (see Table 4-9) was selected as the worst case value. Condition 1 emissions rate corresponded to the worst case emissions for all four sources. The COMSTK combined emission rate for each COPC was the sum of the furnace specific worst case emission rate, or:

$$ER_{i,total} = ER_{i,LIC1} + ER_{i,LIC2} + ER_{i,DFS} + ER_{i,MPF}^{\max}$$

Where $ER_{i,total}$ is the combined emission rate for the ith COPC, $ER_{i,LIC1}$ is the worst case emission rate for LIC1, $ER_{i,LIC2}$ is the worst case emission rate for LIC2, $ER_{i,DFS}$ is the worst case emission rate for the DFS, and $ER^{max}{}_{i,MPF}$ is the larger of the worst case emission rates for the MPF processing combustible or noncombustible materials. It should be noted that this methodology resulted in a base condition (Condition 1) with a total emission rate from the COMSTK of 2.26 g/s which is 43 times higher that the chronic COMSTK emission rate total of 0.053 g/s. Given the tight process controls on the UMCDF and the fact that the worst case emissions for individual COPCs are derived from processing strategies which cannot occur simultaneously[8], it is questionable whether this estimate of emission rate is realistic.

Common stack COPC emission for upset conditions 2 through 6 were estimated using 10 times the worst case emission rates for the furnace in question and works case emission rates for all other furnaces. The composite emission rate was then computed as the sum of the furnace specific emission rates. For example, for Condition 4 with the DFS in upset the common stack emission rate for the ith COPC would be expressed as:

$$ER_{i,total} = ER_{i,LIC1} + ER_{i,LIC2} + 10 \cdot ER_{i,DFS} + ER_{i,MPF}^{\max}$$

As indicated in Table 4-11, the total emission rates for the acute case are substantially higher than for the chronic analysis. The resulting upset emission rate files required by IRAP-h is provided in Appendix H.

Table 4-11: Total Emission Rate by stack for Upset Conditions

Condition	**Total Emission Rate (g/s)**			
	COMSTK	**BRASTK**	**LABSTK**	**MDBSTK**
Chronic Analysis	0.053	1.72×10^{-3}	4.90×10^{-6}	3.5×10^{-5}
Condition 1	2.26	1.72×10^{-3}	4.90×10^{-6}	3.5×10^{-5}
Condition 2	2.95	1.72×10^{-3}	4.90×10^{-6}	3.5×10^{-5}
Condition 3	2.94	1.72×10^{-3}	4.90×10^{-6}	3.5×10^{-5}
Condition 4	19.66	1.72×10^{-3}	4.90×10^{-6}	3.5×10^{-5}
Condition 5	3.32	1.72×10^{-3}	4.90×10^{-6}	3.5×10^{-5}
Condition 6	3.75	1.72×10^{-3}	4.90×10^{-6}	3.5×10^{-5}
Condition 7	2.26	1.73×10^{-2}	4.90×10^{-6}	3.5×10^{-5}
Condition 8	2.95	1.72×10^{-3}	4.90×10^{-5}	3.5×10^{-5}
Condition 9	2.94	1.72×10^{-3}	4.90×10^{-6}	3.5×10^{-4}

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[8] The various maximum values are a combination of values from multiple agent campaigns which occur sequentially in time and not simultaneously.

5 Human Health Results and Discussion

5.1 Human Health Risk Model

Figure 5-1 provides a simplified depiction of the information necessary to complete the UMCDF HHRA using the Umatilla specific version of the commercial software, IRAP-h (Lakes Environmental, 2008). The section within this document that discusses each of the input data sets and the human heath risk results are indicted in the figure. The Umatilla specific version of IRAP-h implements the 2005 EPA Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, but was modified to incorporate unique components of the 2004 RAWP. Appendix I provides a detailed description of the modifications made to IRAP-h for the Umatilla analysis. These modifications included the addition of five exposure scenarios. These scenarios are the Native American adult and child subsistence scenario, the Depot worker scenario, and the Depot military resident scenario. In addition, seven additional exposure pathways were added to account for local activities. These seven exposure pathways are:

1. Ingestion of surface water
2. Dermal contact with surface water
3. Consumption of goat meat
4. Inhalation exposure during sweat lodge use
5. Dermal contact during sweat lodge use
6. Dermal contact with surface soils
7. Addition of dioxin-like PCBs to breast milk pathway

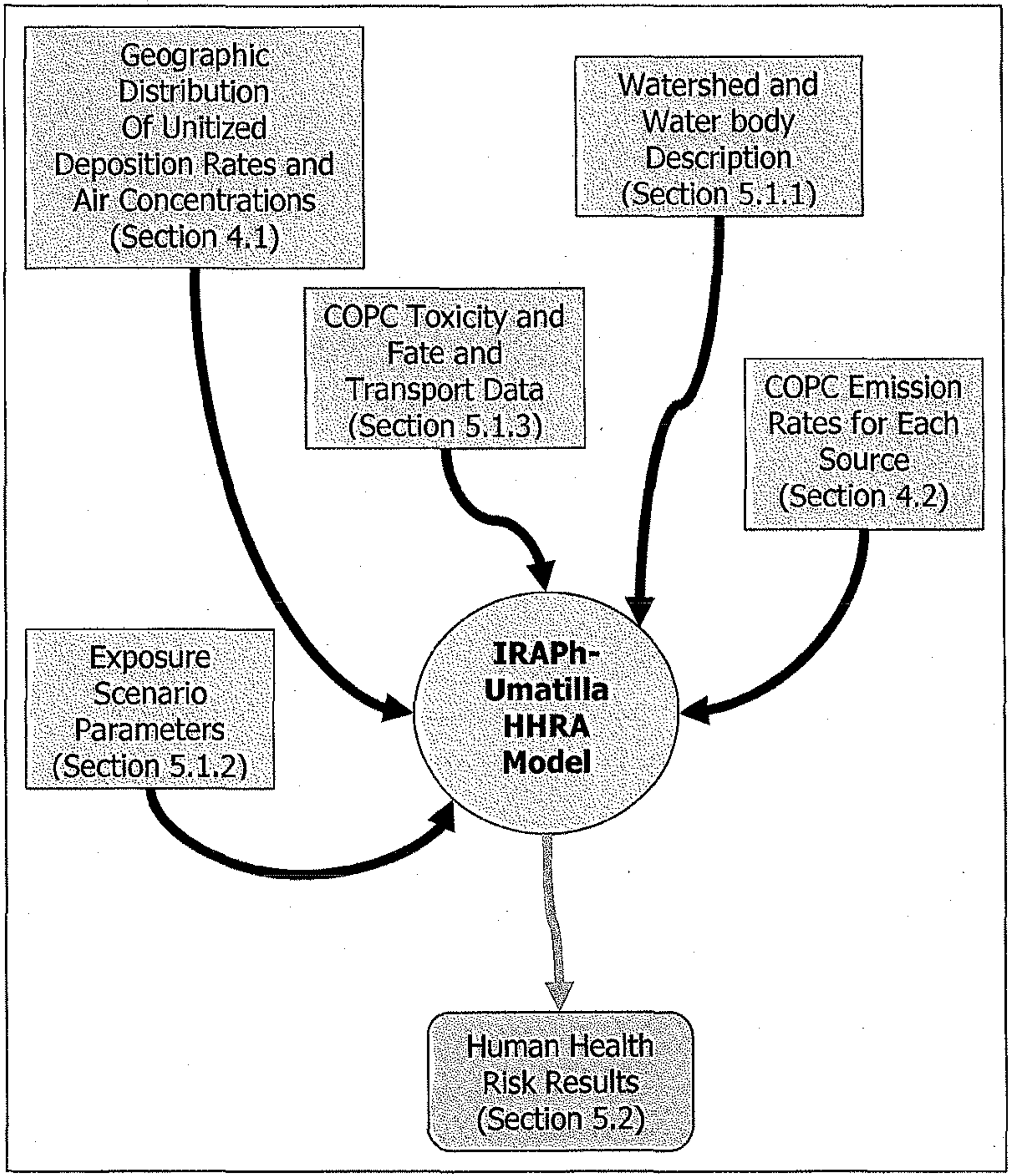

Figure 5-1: Information necessary to complete the Umatilla HHRA using the IRAP-h software developed (Lakes Environmental, 2008). Sections within this document that describe the details of the input data and results are indicated.

5.1.1 Water bodies and Watersheds

Figures 5-2 and 5-3 depict the portions of the Columbia and Umatilla River watersheds that lie within the 50 km analysis region. Average deposition rates and air concentrations were calculated using the same air dispersion model as described in Section 4, but with a uniform calculation grid pattern (1000 meter spacing) to ensure proper area averaging was accomplished within the IRAP-h software. Watershed properties used by IRAP-h are show in Table 5-1 and the average deposition rates for both the Columbia River watershed and the Umatilla River watershed are shown in Table 5-2 The values in these two tables are consistent with other UMDCF risk assessments (Ecology and Environment, 2008; USACHPPM, 2008).

Values for the water body parameters used by IRAP-h for the Columbia and Umatilla Rivers are provided in Table 5-3 while Table 5-4 provides the average deposition rates and air concentrations for these two water bodies. The average properties provided in Table 5-4 were calculated in a manner analogues to that used for the watersheds parameters (Table 5-2). The water body properties reported in Tables 5-3 and 5-4 are consistent with those reported in other UMDCF risk assessments (Ecology and Environment, 2008; USACHPPM, 2008).

Table 5-1: Watershed Properties Used in IRAP-h

Parameter	**Watershed**		**Units**
	Columbia River	**Umatilla River**	
Empirical Slope Coefficient	0.125	0.125	Unitless
USLE Cover Management Factor	0.1	0.1	Unitless
USLE Erodibility Factor	0.39	0.39	ton/acre
USLE Length-Slope Factor	1.5	1.5	Unitless
USLE Supporting Practice Factor	1	1	Unitless
USLE Rainfall (or Erosivity) Factor	20	20	yr^-1
Impervious Watershed Area Receiving Pollutant Deposition	3.11E+08	2.69E+07	m^2
Watershed Area Receiving Fallout	7.78E+09	2.69E+09	m^2

Table 5-2: Watershed Deposition Rates and Air Concentrations

Parameter	Unit	Stack	Watershed	
			Columbia River	Umatilla River
Average Air Conc'n - Vapor Phase	ug-s/g-m^3	BRASTK	3.30E-03	2.82E-03
Average Air Conc'n - Vapor Phase Hg	ug-s/g-m^3	BRASTK	3.03E-03	2.62E-03
Total Depos. - Particle Phase	s/m^2 year	BRASTK	1.73E-03	2.02E-03
Total Depos. - Particle Bound	s/m^2 year	BRASTK	1.08E-03	1.27E-03
Total Depos. - Vapor Phase	s/m^2 year	BRASTK	5.15E-04	4.81E-04
Total Depos. - Vapor Phase Hg	s/m^2 year	BRASTK	1.10E-03	1.18E-03
Average Wet Depos. - Vapor Phase	s/m^2 year	BRASTK	5.15E-05	4.33E-05
Average Wet Depos. - Vapor Phase Hg	s/m^2 year	BRASTK	2.25E-05	2.03E-05
Average Air Conc'n - Vapor Phase	ug-s/g-m^3	COMSTK	4.60E-03	3.72E-03
Average Air Conc'n - Vapor Phase Hg	ug-s/g-m^3	COMSTK	4.27E-03	3.47E-03
Total Depos. - Particle Phase	s/m^2 year	COMSTK	3.02E-04	2.86E-04
Total Depos. - Particle Bound	s/m^2 year	COMSTK	3.02E-04	2.86E-04
Total Depos. - Vapor Phase	s/m^2 year	COMSTK	6.59E-04	5.78E-04
Total Depos. - Vapor Phase Hg	s/m^2 year	COMSTK	1.40E-03	1.34E-03
Average Wet Depos. - Vapor Phase	s/m^2 year	COMSTK	4.86E-05	4.65E-05
Average Wet Depos. - Vapor Phase Hg	s/m^2 year	COMSTK	2.11E-05	2.08E-05
Average Air Conc'n - Vapor Phase	ug-s/g-m^3	LABSTK	6.84E-03	5.31E-03
Average Air Conc'n - Vapor Phase Hg	ug-s/g-m^3	LABSTK	6.84E-03	5.31E-03
Total Depos. - Particle Phase	s/m^2 year	LABSTK	3.62E-04	2.97E-04
Total Depos. - Particle Bound	s/m^2 year	LABSTK	3.62E-04	2.97E-04
Total Depos. - Vapor Phase	s/m^2 year	LABSTK	7.89E-04	6.64E-04
Total Depos. - Vapor Phase Hg	s/m^2 year	LABSTK	7.89E-04	6.64E-04
Average Wet Depos. - Vapor Phase	s/m^2 year	LABSTK	4.96E-05	4.59E-05
Average Wet Depos. - Vapor Phase Hg	s/m^2 year	LABSTK	4.96E-05	4.59E-05
Average Air Conc'n - Vapor Phase	ug-s/g-m^3	MDBSTK	3.56E-03	3.03E-03
Average Air Conc'n - Vapor Phase Hg	ug-s/g-m^3	MDBSTK	3.56E-03	3.03E-03
Total Depos. - Particle Phase	s/m^2 year	MDBSTK	2.50E-04	2.75E-04
Total Depos. - Particle Bound	s/m^2 year	MDBSTK	2.50E-04	2.75E-04
Total Depos. - Vapor Phase	s/m^2 year	MDBSTK	5.57E-04	5.19E-04
Total Depos. - Vapor Phase Hg	s/m^2 year	MDBSTK	5.57E-04	5.19E-04
Average Wet Depos. - Vapor Phase	s/m^2 year	MDBSTK	4.66E-05	4.50E-05
Average Wet Depos. - Vapor Phase Hg	s/m^2 year	MDBSTK	4.66E-05	4.50E-05

Table 5-3: Columbia and Umatilla River Properties Used in IRAP-h

Parameter	Units	Water Body	
		Columbia River	Umatilla River
Surface Area Of Affected Area	m^2	1	1
Bed Sediment Concentration	g/cm^3	1	1
Drag Coefficient	--	0.0011	0.0011
Depth Of Upper Benthic Layer	m	0.03	0.03
Depth Of Water Column	m	10	2
Dimensionless Viscous Sublayer Thickness	--	4	4
Von Karman's Constant	--	0.4	0.4
Fraction Of Mercury Speciated Into MeHg In Water	--	0.08	0.08
Fraction Of Runoff Hg Speciated Into MeHg		0.08	0.08
Current Velocity	m/s	0.58	0.35
Viscosity Of Water Corresponding To Water Temp.	g/cm-s	1.69E-02	1.69E-02
Fraction Organic Carbon In Bottom Sediment	--	0.04	0.04
Density Of Water Corresponding To Water Temp.	g/cm^3	1	1
Water Body Temperature	K	286	286
Bed Sediment Porosity	Lwater/Lsedim.	0.6	0.6
Total Suspended Solids Concentration	mg/L	10	10
Average Volumetric Flow Rate Through Water Body	m^3/yr	1.37E+11	3.93E+08
Water Body Surface Area	m^2	2.82E+08	2.91E+06

Table 5-4: Water body Deposition Rates and Air Concentrations

Parameter	Unit	Source	Water Body	
			Columbia River	**Umatilla River**
average air conc'n - vapor phase	ug-s/g-m^3	BRASTK	4.84E-03	2.18E-03
average air conc'n - vapor phase hg	ug-s/g-m^3	BRASTK	4.34E-03	2.09E-03
total depos. - particle phase	s/m^2 year	BRASTK	2.44E-03	3.10E-04
total depos. - particle bound	s/m^2 year	BRASTK	1.52E-03	2.00E-04
total depos. - vapor phase	s/m^2 year	BRASTK	7.52E-04	2.00E-04
total depos. - vapor phase hg	s/m^2 year	BRASTK	1.59E-03	3.00E-04
average air conc'n - vapor phase	ug-s/g-m^3	COMSTK	6.22E-03	1.98E-03
average air conc'n - vapor phase hg	ug-s/g-m^3	COMSTK	5.63E-03	1.87E-03
total depos. - particle phase	s/m^2 year	COMSTK	2.83E-04	1.10E-04
total depos. - particle bound	s/m^2 year	COMSTK	2.83E-04	1.10E-04
total depos. - vapor phase	s/m^2 year	COMSTK	8.56E-04	1.90E-04
total depos. - vapor phase hg	s/m^2 year	COMSTK	1.69E-03	2.90E-04
average air conc'n - vapor phase	ug-s/g-m^3	LABSTK	1.05E-02	1.43E-03
average air conc'n - vapor phase hg	ug-s/g-m^3	LABSTK	1.05E-02	1.43E-03
total depos. - particle phase	s/m^2 year	LABSTK	3.08E-04	1.10E-04
total depos. - particle bound	s/m^2 year	LABSTK	3.08E-04	1.10E-04
total depos. - vapor phase	s/m^2 year	LABSTK	1.03E-03	1.70E-04
total depos. - vapor phase hg	s/m^2 year	LABSTK	1.03E-03	1.70E-04
average air conc'n - vapor phase	ug-s/g-m^3	MDBSTK	5.21E-03	2.32E-03
average air conc'n - vapor phase hg	ug-s/g-m^3	MDBSTK	5.21E-03	2.32E-03
total depos. - particle phase	s/m^2 year	MDBSTK	2.75E-04	1.10E-04
total depos. - particle bound	s/m^2 year	MDBSTK	2.75E-04	1.10E-04
total depos. - vapor phase	s/m^2 year	MDBSTK	8.12E-04	2.00E-04
total depos. - vapor phase hg	s/m^2 year	MDBSTK	8.12E-04	2.00E-04

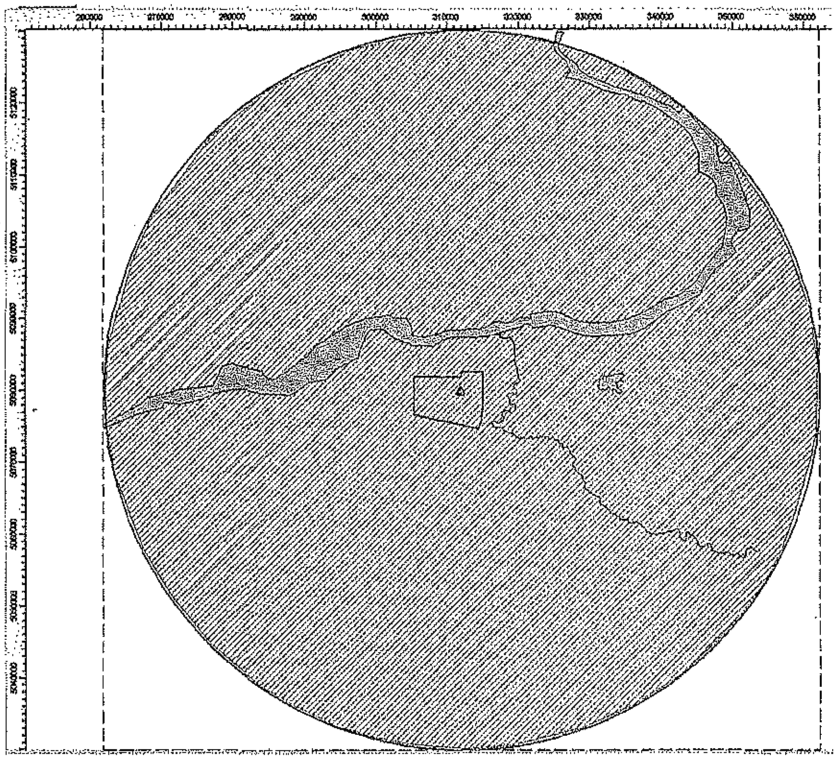

Figure 5-2: Columbia River watershed (green) within the 50 km evaluation area.

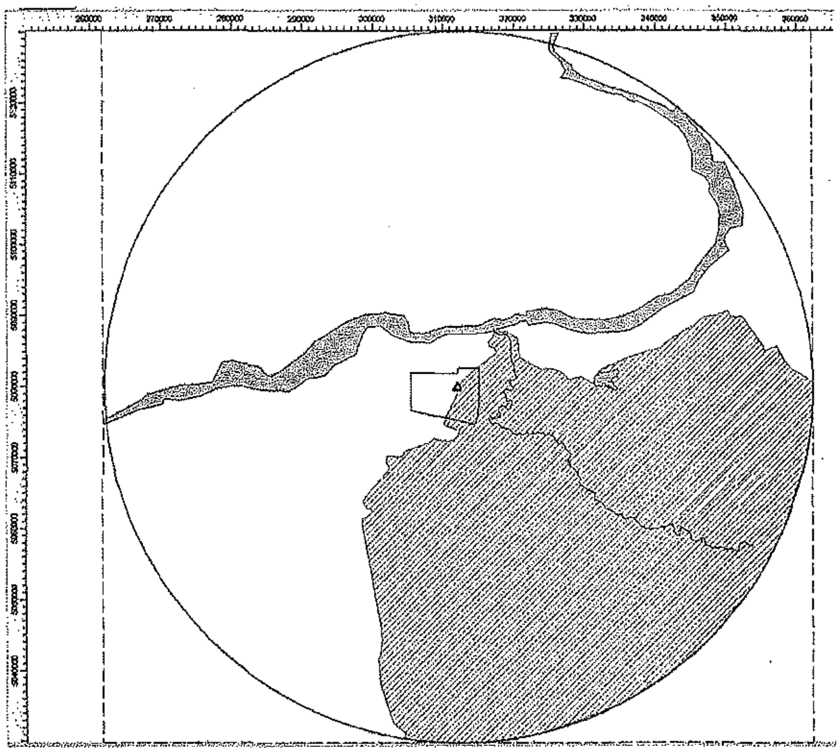

Figure 5-3: Umatilla River watershed (green) within the 50 km evaluation area.

5.1.2 Exposure Scenarios

As outlined in the 2004 RAWP, the following exposure scenarios were evaluated in this risk assessment:

- Suburban resident adult and child
- Depot worker adult
- Military resident adult
- Subsistence farmer adult and child
- Subsistence fisher adult and child
- Native American adult and child
- Breast-feeding infant
- Acute inhalation exposure

The pathways of exposure considered for each of these receptors are summarized in Table 5-5. Parameters describing each of these exposure scenarios are provided in Appendix J and were identical to those applied by others (Ecology and Environment, 2008). Table 5-6 indicates the locations where each exposure scenario was evaluated. The geographic locations of each receptor are shown in Figure 5-4. The deposition rates and air concentrations applied at each of the four evaluation points are listed in Tables 5-7 through 5-10. Each value in these tables corresponds to the maximum found within the geographic region represented by the exposure evaluation point. Thus, the values for the off-site evaluation point are the maximums found at any calculation node throughout the full 50 km evaluation area, excluding those nodes that fall within the UMCD fence line. Similarly, the on-site values correspond to the maximums found within the UMCD fence line. The deposition rate and air concentration values for the on-site and UMCDF evaluation points are identical since the maximum air parameters for the UMCD all occurred within the UMCDF boundary.

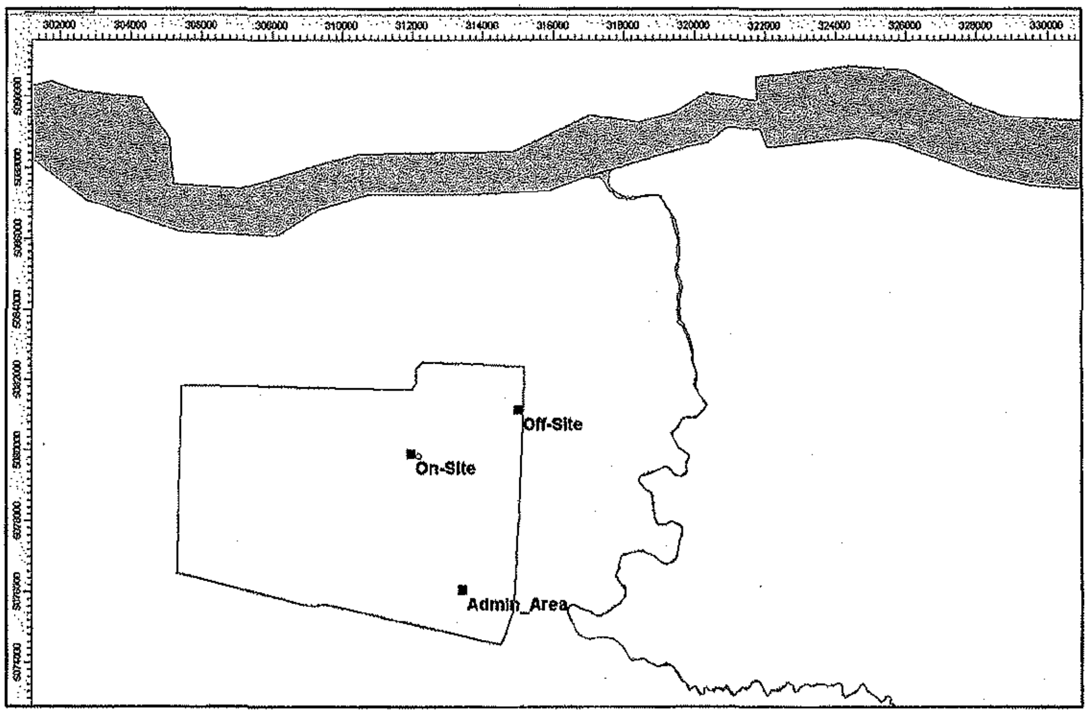

Figure 5-4: Locations for evaluating exposure scenarios.

Table 5-5: Exposure Pathways Evaluated for Each Receptor Type.

Exposure Pathway	**Subsistence Farmer Adult/Child**	**Resident Adult/Child**	**Subsistence Fisher Adult/Child**	**Native American Adult**	**Native American Child**	**On-Site Worker**	**Military Resident**	**Breast-Feeding Infant**	**Acute**
Inhalation of vapors and particles[a]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Ingestion of soil and dust	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Dermal contact with soil	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Ingestion of surface water	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Dermal contact with surface water	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Ingestion of local produce	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Ingestion of local animals	Yes	No	No	Yes	Yes	No	No	No	No
Ingestion of local fish	No	No	Yes	Yes	Yes	No	No	No	No
Inhalation and dermal adsorption during sweat lodge use	No	No	No	Yes	No	No	No	No	No
Ingestion of breast milk	No	No	No	No	No	No	No	Yes	No

[a] Assessed only for the operation period (10 years).

[b] Exposure as an infant to mothers milk containing dibenzo-p-dioxins and polychlorinated dibenzofurans and co-planar, dioxin-like polychlorinated biphenyls (PCBs) is included in the adult scenarios. The pathway is then evaluated separately.

Table 5-6: Exposure Scenario Evaluation Points

Exposure Scenario	Evaluation Point			
	UMCD Administration Area	**Off-Site**	**On-Site**	**UMCDF**
Subsistence Farmer	No	Yes	Yes	No
Subsistence Fisher	No	Yes	Yes	No
Native American	No	Yes	Yes	No
Suburban Resident	No	Yes	Yes	No
Depot Worker	No	Yes[b]	No	Yes[b]
Military Resident	Yes[a]	Yes[a]	No	No

[a] Military resident scenario modeled living 2 years in the administration area and 28 years at the off-site co-location point.

[b] The depot worker scenario assumed the individual was within the boundary of the UMCDF for 8 hours per day and at the off-site co-location point for 16 hours per day. While at the UMCDF industrial exposure parameters were applied and suburban resident parameters were applied while the individual was off-site.

Table 5-7: Deposition Rates and Air Concentrations for the UMCD Administration Area Evaluation Point

Parameter	Unit	Source			
		BRASTK	**COMSTK**	**LABSTK**	**MDBSTK**
Hourly air concentration - particle phase	ug-s/g-m^3	5.14894	9.54529	24.27305	3.78835
Hourly air concentration - particle bound	ug-s/g-m^3	3.57173	9.54529	24.27305	3.78835
Hourly air concentration - vapor phase	ug-s/g-m^3	3.39438	9.32372	14.9827	3.60946
Hourly air concentration - vapor phase hg	ug-s/g-m^3	3.28591	9.34786	20.64123	3.69995
Air concentration - particle phase	ug-s/g-m^3	0.01224	0.01876	0.04487	0.01426
Air concentration - particle bound	ug-s/g-m^3	0.01231	0.01876	0.04487	0.01426
Air concentration - vapor phase	ug-s/g-m^3	0.01209	0.0185	0.042	0.01416
Air concentration - vapor phase hg	ug-s/g-m^3	0.01165	0.01773	0.04383	0.01439
Dry deposition - particle phase	s/m^2 year	0.00822	0.00175	0.00196	0.00163
Dry deposition - particle bound	s/m^2 year	0.00498	0.00175	0.00196	0.00163
Dry deposition - vapor phase	s/m^2 year	0.00214	0.00287	0.00477	0.00247
Dry deposition - vapor phase hg	s/m^2 year	0.00537	0.00641	0.00303	0.00168
Wet deposition - particle phase	s/m^2 year	0.00092	0	0	0
Wet deposition - particle bound	s/m^2 year	0.00058	0	0	0
Wet deposition - vapor phase	s/m^2 year	0.00037	0.00039	0.00044	0.00035
Wet deposition - vapor phase hg	s/m^2 year	0.00012	0.00013	0	0

Table 5-8: Deposition Rates and Air Concentrations for the Off-Site Evaluation Point

Parameter	Unit	Source			
		BRASTK	COMSTK	LABSTK	MDBSTK
Hourly air concentration - particle phase	ug-s/g-m^3	9.76938	28.45582	106.07701	17.25841
Hourly air concentration - particle bound	ug-s/g-m^3	9.76101	28.45582	106.07701	17.25841
Hourly air concentration - vapor phase	ug-s/g-m^3	9.6899	27.87376	93.33623	16.96741
Hourly air concentration - vapor phase hg	ug-s/g-m^3	9.68811	27.97228	101.11759	17.02897
Air concentration - particle phase	ug-s/g-m^3	0.09216	0.1616	0.23908	0.13183
Air concentration - particle bound	ug-s/g-m^3	0.09844	0.1616	0.23908	0.13183
Air concentration - vapor phase	ug-s/g-m^3	0.10549	0.15776	0.22596	0.12946
Air concentration - vapor phase hg	ug-s/g-m^3	0.09776	0.14778	0.23112	0.13022
Dry deposition - particle phase	s/m^2 year	0.12702	0.00675	0.00828	0.00658
Dry deposition - particle bound	s/m^2 year	0.08228	0.00675	0.00828	0.00658
Dry deposition - vapor phase	s/m^2 year	0.0219	0.02896	0.03416	0.02697
Dry deposition - vapor phase hg	s/m^2 year	0.07485	0.08916	0.02661	0.02255
Wet deposition - particle phase	s/m^2 year	0.00328	0.00001	0.00001	0
Wet deposition - particle bound	s/m^2 year	0.00203	0.00001	0.00001	0
Wet deposition - vapor phase	s/m^2 year	0.00104	0.00126	0.00153	0.00121
Wet deposition - vapor phase hg	s/m^2 year	0.00035	0.0004	0	0

Table 5-9: Deposition Rates and Air Concentrations for the On-Site Evaluation Point

Parameter	Unit	Source			
		BRASTK	COMSTK	LABSTK	MDBSTK
Hourly air concentration - particle phase	ug-s/g-m^3	35.381	113.90891	362.88123	49.83113
Hourly air concentration - particle bound	ug-s/g-m^3	35.74179	113.90891	362.88123	49.83113
Hourly air concentration - vapor phase	ug-s/g-m^3	36.64132	113.9952	357.54584	50.5334
Hourly air concentration - vapor phase hg	ug-s/g-m^3	36.2132	113.90667	359.48102	50.60033
Air concentration - particle phase	ug-s/g-m^3	1.79771	8.0811	10.22897	0.97594
Air concentration - particle bound	ug-s/g-m^3	1.80457	8.0811	10.22897	0.97594
Air concentration - vapor phase	ug-s/g-m^3	1.82181	8.07924	10.19302	0.97586
Air concentration - vapor phase hg	ug-s/g-m^3	1.8102	8.06871	10.19799	0.9761
Dry deposition - particle phase	s/m^2 year	8.51274	0.64678	0.8874	0.17513
Dry deposition - particle bound	s/m^2 year	5.81454	0.64678	0.8874	0.17513
Dry deposition - vapor phase	s/m^2 year	0.45588	1.80483	2.20312	0.23072
Dry deposition - vapor phase hg	s/m^2 year	2.918	8.46816	2.02415	0.21953
Wet deposition - particle phase	s/m^2 year	0.70239	0.00014	0.00014	0.00018
Wet deposition - particle bound	s/m^2 year	0.42859	0.00014	0.00014	0.00018
Wet deposition - vapor phase	s/m^2 year	0.16381	0.03485	0.03854	0.04833
Wet deposition - vapor phase hg	s/m^2 year	0.05769	0.01203	0	0

Table 5-10: Deposition Rates and Air Concentrations for the UMCDF Evaluation Point

Parameter	Unit	Source			
		BRASTK	COMSTK	LABSTK	MDBSTK
Hourly air concentration - particle phase	ug-s/g-m^3	35.381	113.90891	362.88123	49.83113
Hourly air concentration - particle bound	ug-s/g-m^3	35.74179	113.90891	362.88123	49.83113
Hourly air concentration - vapor phase	ug-s/g-m^3	36.64132	113.9952	357.54584	50.5334
Hourly air concentration - vapor phase hg	ug-s/g-m^3	36.2132	113.90667	359.48102	50.60033
Air concentration - particle phase	ug-s/g-m^3	1.79771	8.0811	10.22897	0.97594
Air concentration - particle bound	ug-s/g-m^3	1.80457	8.0811	10.22897	0.97594
Air concentration - vapor phase	ug-s/g-m^3	1.82181	8.07924	10.19302	0.97586
Air concentration - vapor phase hg	ug-s/g-m^3	1.8102	8.06871	10.19799	0.9761
Dry deposition - particle phase	s/m^2 year	8.51274	0.64678	0.8874	0.17513
Dry deposition - particle bound	s/m^2 year	5.81454	0.64678	0.8874	0.17513
Dry deposition - vapor phase	s/m^2 year	0.45588	1.80483	2.20312	0.23072
Dry deposition - vapor phase hg	s/m^2 year	2.918	8.46816	2.02415	0.21953
Wet deposition - particle phase	s/m^2 year	0.70239	0.00014	0.00014	0.00018
Wet deposition - particle bound	s/m^2 year	0.42859	0.00014	0.00014	0.00018
Wet deposition - vapor phase	s/m^2 year	0.16381	0.03485	0.03854	0.04833
Wet deposition - vapor phase hg	s/m^2 year	0.05769	0.01203	0	0

5.1.3 COPC Toxicity and Fate and Transport Database

The COPC database containing the chemical and toxicological input parameters used by IRAP-h is provided in Appendix K. All values within this data set are identical to those used by others to evaluate UMCDF human health risk (Ecology and Environment, 2008).

Surrogate toxicity values for the three TOE fractions were developed by others[9] using the following methodology:

1. The remaining compounds from the original COPC list (The 591 Group 3 and 4 compounds in Appendix E) were screened to determine those with available toxicity data. The result was a list of 287 COPC.

2. These 287 compounds were subdivided by boiling point into three groups; 47 volatile chemicals (BP<100 °C), 163 semi-volatile chemicals (100 °C ≤ BP≤ 300 °C), and 77 non-volatile chemicals (BP> 300°C). Appendix L lists the compounds by group along with their associated and boiling points and other physical properties. Data in Appendix L was taken from others[10].

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[9] Ecology and Environment developed these parameters for their January 31, 2008 Risk Assessment report for the DEQ. Their methods, however, were not included in their report, but were subsequently provided to the CTUIR.

[10] Data was mainly obtained from USACHPPM and was contained in their database filed titled, "RAWP PIDS-F&E-UMDF (2007_08_29).mdb". A few additional data points were added by E&E from unknown sources.

3. A geometric mean for molecular weight, vapor pressure, boiling point, melting point, aqueous solubility, Octanol-water partition coefficient, and soil half-life was calculated for each boiling point group. These geometric mean values were then used to subsequently calculate pertinent fate and transport parameters required by the IRAP-h and EcoRisk software. Calculation methods are provided in Appendix M and were compiled by others (USACHPPM, 2007a). Table 5-11 summarizes the resulting average parameter for each of the three TOE fractions.

4. Human health Toxicity values for the three TOE fractions were computed as the geometric mean of the compounds in the corresponding boiling point group. Table 5-12 provides a summary of these values while Appendix N lists values for the individual compounds. The data contained in Appendix N was derived based on the August 27, 2007 Process Input Data (PIDS) (USACHPPM, 2007b).

Table 5-11: Estimated Physical Properties and Transport Properties For the Three TOE Fractions

Parameter	Units	Volatile TOE	Semi-volatile TOE	Non-volatile TOE
Molecular Weight	AMU	7.77E+01	1.47E+02	2.72E+02
Melting Point	K	1.59E+02	2.70E+02	3.77E+02
Boiling Point	K	3.11E+02	4.60E+02	6.70E+02
Aqueous Solubility	mg/L	9.43E+02	1.24E+02	1.82E-03
Vapor Pressure	atm	5.40E-01	1.52E-04	4.94E-10
Henry's Constant	(atm-m^3/mol)	4.45E-02	1.81E-04	7.39E-05
Vapor Fraction	(unitless)	1.00E+00	1.00E+00	8.34E-01
Diffusivity, Air	(cm^2/s)	1.04E-01	6.82E-02	4.53E-02
Diffusivity, Water	(cm^2/s)	1.21E-05	7.90E-06	5.24E-06
Octanol/Water Coefficient	(unitless)	1.34E+02	1.20E+03	1.47E+07
Soil Carbon/Water Coefficient	(ml-w/g-s)	9.93E+02	1.06E+03	1.11E+07
Soil/Water Coefficient	(cm^3/g)	9.93E+00	1.06E+01	1.11E+05
Sediment/Water Coefficient	(L/kg)	7.44E+01	7.99E+01	8.34E+05
Bed Sediment/Water Coefficient	(cm^3/g)	3.97E+01	4.26E+01	4.45E+05
Soil Degradation Coefficient	(1/yr)	5.25E+00	7.07E+00	3.78E-01
Root Concentration Factor	(µg/g-DW)/(µg/ml-water)	1.31E+00	7.10E+00	9.98E+03
Bioconcentration Factor, Root Vegetables	(µg/g-DW)/(µg /g-soil)	1.32E-01	6.67E-01	8.97E-02
Bioconcentration Factor, Aboveground Produce	(µg/g-DW)/(µg /g-soil)	2.29E+00	6.43E-01	2.79E-03
Bioconcentration Factor, Forage	(µg/g-DW)/(µg /g-soil)	2.29E+00	6.43E-01	2.79E-03
Bioconcentration Factor, Grain	(µg/g-DW)/(µg /g-soil)	2.29E+00	6.43E-01	2.79E-03
Biotransfer Factor, Aboveground Produce	(µg/g-DW)/(µg /g-air)	2.31E-04	5.87E-01	3.25E+04
Biotransfer Factor, Forage	(µg/g-DW)/(µg /g-air)	2.31E-04	5.87E-01	3.25E+04
Biotransfer Factor, Beef	(day/kg-FW)	3.57E-03	1.21E-02	2.04E-02
Biotransfer Factor, Milk	(day/kg-FW)	7.41E-04	2.50E-03	4.22E-03
Biotransfer Factor, Pork	(day/kg-FW)	4.26E-03	1.44E-02	2.43E-02
Biotransfer Factor, Chicken	(day/kg-FW)	2.59E-03	8.76E-03	1.48E-02
Biotransfer Factor, Eggs	(day/kg-FW)	1.48E-03	5.00E-03	8.44E-03
Biotransfer Factor, Mammal[a]	(day/kg FW tissue)	3.57E-03	1.21E-02	2.04E-02
Biotransfer Factor, Bird[a]	(day/kg FW tissue)	2.59E-03	8.76E-03	1.48E-02
Bioconcentration Factor, Game Fish	(L/kg-FW)	8.66E+00	4.69E+01	3.81E+04
Bioconcentration Factor, Tropic Level Fish	(L/kg-FW)	1.91E+01	1.08E+02	1.83E+05
Bioaccumulation Factor, Game Fish	(L/kg-FW)	0.00E+00	0.00E+00	9.26E+05
Soil-Skin Dermal Absorption Coefficient	(unitless)	0.00E+00	1.00E-01	1.00E-01
Fraction Absorbed, Dermal/Water Contact	(unitless)	1.00E+00	1.00E+00	6.00E-01
Dermal Water Permeability Coefficient	(cm/hr)	0.00E+00	0.00E+00	0.00E+00

[a] Value used exclusively by EcoRisk View.

Table 5-12: Estimated Human Health Toxicity for the Three TOE Fractions

Parameter	**Units**	**Volatile TOE**	**Semi-volatile TOE**	**Non-volatile TOE**
Oral CSF [a]	$(mg/kg\text{-}day)^{-1}$	6.70E-02	4.00E-01	2.50E+01
Inhalation UR [b]	(m^3/ug)	1.10E-05	1.20E-04	4.10E-04
Inhalation CSF	$(mg/kg\text{-}day)^{-1}$	3.70E-02	4.40E-01	5.50E+01
Oral RfD [c]	(mg/kg/day)	8.00E-01	3.00E-02	9.00E-02
RfC [d]	(ug/m^3)	2.00E+00	4.00E-01	1.00E-01
Inhalation RfD	(mg/kg/day)	5.00E-01	1.00E-01	4.00E-02
AIEC [e,f]	(mg/m^3)	1.00E+02	3.00E+01	2.00E-01

[a] CSF is an acronym for cancer slope factor

[b] UR is an acronym for unit risk

[c] RfD is an acronym for reference dose

[d] RfC is an acronym for reference concentration

[e] AIEC is an acronym for Acute Inhalation Exposure Criteria.

[f] Note that the E&E January 31, 2008 report had these values listed in their text, but their modeling files used values 1000 times lower. No explanation for this difference is given in the report.

5.2 HHRA Results

5.2.1 Base Model

5.2.1.1 Chronic Evaluation

Results for the estimated chronic cancer risks, hazard index, and infant average daily dose for PCDD and PCDFs (polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans, termed the ($ADD_{D/F}$) from the modeled UMCDF emissions are provided in Table 5-13. Values that exceed the HHRA established action levels of 1×10^{-5} (1E-05) for cancer risk, 0.25 for the hazard index, and 0.25 pg-TEQ/kg-day for the ADD are indicated by shaded entries. For the off-site evaluation point, the Native American and resident farmer adult and child exposure scenarios exceed both the cancer risk and hazard index action levels. The hazard index for the resident and fisher child are also slightly above the action level at the off-site location. All scenarios exceed the cancer risk and hazard index at the on-site evaluation point. In contrast no exposure scenario has an infant $ADD_{D/F}$ in excess of the DEQ established action level of 0.25 pg-TEQ/kg-day.

The relative contributions of each exposure pathway to the cancer risk and hazard index for those exposure scenarios which exceeded the action levels at the off-site evaluation point are indicated in Tables 5-14 and 5-15, respectively. Tables 5-16 and 5-17 detail the cancer and non-cancer risks by pathway for those exposure scenarios which exceeded the action levels at the on-site evaluation point. Bold values in each table indicate the major risk contributors. It is evident from these tables that both cancer and non-cancer risks are driven predominately by ingestion of locally grown foods. The only exception is the contribution of soil ingestion for the fisher adult and child residing at the on-site receptor.

Table 5-13: Summary of Base Model Chronic Health Impacts

Location	Scenario	Cancer Risk	Hazard Index	ADD$_{D/F}$[a] (pg-TEQ/kg-day)
Off Site	Farmer Adult	2.6E-04[b]	0.33	2.3E-03
Off Site	Farmer Child	3.0E-05	0.41	--
Off Site	Fisher Adult	2.1E-06	0.11	3.0E-05
Off Site	Fisher Child	1.4E-06	0.28	--
Off Site	Native Adult	3.0E-04	0.41	1.4E-03
Off Site	Native Child	2.3E-05	0.42	--
Off Site	Resident Adult	2.0E-06	0.11	2.6E-05
Off Site	Resident Child	1.4E-06	0.28	--
On Site	Farmer Adult	1.5E-02	7.80	1.2E-01
On Site	Farmer Child	1.6E-03	9.84	--
On Site	Fisher Adult	1.2E-04	2.73	1.6E-03
On Site	Fisher Child	8.0E-05	6.65	--
On Site	Native Adult	1.6E-02	9.83	7.6E-02
On Site	Native Child	1.3E-03	10.00	--
On Site /Off Site	Worker Adult	5.2E-06	0.15	1.5E-04
Admin Area/Off Site	Military Adult	2.0E-06	0.11	2.5E-05

[a] ADD$_{D/F}$ is an acronym for average daily dose and is expressed using the 2,3,7,8-tetrachlorodibenzodioxin toxicity equivalent (TEQ). TEQ values are included in the COPC data base in Appendix K.

[b] Shaded entries indicate values above DEQ action levels.

It should be noted that while no fisher, farmer, or Native American will reside on the UMCD during operations, these populations could use the land after the base has closed. Risk predictions provided in Table 5-13 are an overstatement for this second scenario since the only exposure routs from use of the land after closure are tied to residual soil contamination. Exposure routs from these soils will include dermal contact, soil ingestion, the ingestion of plants that have accumulated soil contaminants through their roots, and the ingestion of animals that have eaten contaminated plants. Section 5.2.2.5 details an analysis for the on-site receptor location that only includes the above soil contamination derived pathways. Results in Section 5.2.2.5 show an average reduction in the chronic cancer risk of 45% over those reported in Table 5-13. These reduced risks are still one to two orders of magnitude above the DEQ established action levels and so are of concern to the CTUIR.

The relative contribution of each point source to total cancer and non-cancer risks are indicated in Tables 5-18 through 5-21 for those exposure scenarios which exceeded the action levels. From these tables it is evident that the COMSTK is the significant contributor to cancer risk for both the on-site and off-site evaluation points. In contrast, non-cancer risks are a result of emission from the other sources (BRASTK, LABSTK, and MDBSTK).

The risk driving COPCs for exposure scenarios that exceeded action levels at the off-site evaluation point are provided in Tables 5-22 and 5-23. Each table lists the ten COPCs with the largest contribution to risk for each exposure scenario. The top three contributors for a given scenario are indicated with a numerical ranking while the remaining seven are simply indicated with an "x" designator. In all cases more than 99% of the risks are contained in these top three compounds with the top compound contributing at least 95% of the total risk. From these tables it is clear that cancer risk is dominated by the non-volatile TOE fraction while the three chemical agents are the dominant non-cancer risk driving COPCs.

The on-site evaluation point has similar risk driving COPCs. At this location, more than 99% of the cancer risk is contained in the non-volatile TOE fraction for all exposure scenarios. Non-cancer risks at this location are driven entirely by the assumed emissions of VX, GB, and HD at their detection limit. These three compounds contribute more than 99.5% of the HI for every exposure scenario. The agent VX provides the single greatest contribution to the HI, approximately 97% of the total, for every exposure scenario at the on-site evaluation point.

It is evident from these results that, at the off-site evaluation point, two key assumptions in the risk assessment process are causing the cancer and non-cancer risks to exceed the predetermined action levels. First, the decision to assume emission of the chemical agents at the detection level of the continuous monitoring system (termed an ACAMS, or automatic continuous air monitoring system) drives the non-cancer chronic health risk. Second, the choice to assign geometric mean toxicities to the unspeciated non-volatile TOE is creating cancer risks that exceed the action levels. Although both assumptions are technically reasonable, both are based on incomplete knowledge, and so add a large degree of uncertainty to the result.

Table 5-14: Contribution of Each Exposure Pathway to the Cancer Risk at the Off-Site Evaluation Point

Pathway	Cancer Risk (% of Total)			
	Native Adult	**Native Child**	**Farmer Adult**	**Farmer Child**
Inhalation	0.0%	0.1%	0.0%	0.1%
Produce Ingestion	2.4%	1.9%	1.5%	1.7%
Bathing Exposure	0.1%	0.2%	0.0%	0.1%
Beef/Game Ingestion	**56.8%** [a]	**34.0%**	**72.2%**	**49.3%**
Chicken Ingestion	0.0%	0.0%	0.1%	0.0%
Drinking Water	0.0%	0.0%	0.0%	0.0%
Egg Ingestion	0.0%	0.0%	0.0%	0.0%
Fish Ingestion	0.0%	0.0%	0.0%	0.0%
Goat Ingestion	0.0%	0.0%	1.6%	1.4%
Sweat Lodge Exposure	0.1%	0.0%	0.0%	0.0%
Milk Ingestion	**39.0%**	**59.0%**	**23.6%**	**43.8%**
Pork Ingestion	0.0%	0.0%	0.0%	0.0%
Soil Ingestion	1.7%	4.9%	1.0%	3.5%
Swimming Exposure	0.0%	0.0%	0.0%	0.0%
Total Cancer Risk	*2.96E-04*	*2.31E-05*	*2.64E-04*	*2.98E-05*

[a] Bold values indicate major contributors to risk

Table 5-15: Contribution of Each Exposure Pathway to the Hazard Index at the Off-Site Evaluation Point

Pathway	Hazard Index (% of Total)					
	Native Adult	**Native Child**	**Fisher Child**	**Resident Child**	**Farmer Adult**	**Farmer Child**
Inhalation	0.3%	1.7%	2.5%	2.5%	0.5%	1.7%
Produce Ingestion	**95.1%**	**93.3%**	**97.2%**	**97.2%**	**90.8%**	**92.0%**
Bathing Exposure	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Beef/Game Ingestion	2.4%	1.6%	0.0%	0.0%	6.1%	3.0%
Chicken Ingestion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Drinking Water	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Egg Ingestion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fish Ingestion	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%
Goat Ingestion	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%
Sweat Lodge Exposure	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Milk Ingestion	1.9%	3.1%	0.0%	0.0%	2.3%	3.0%
Pork Ingestion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Soil Ingestion	0.1%	0.2%	0.3%	0.3%	0.1%	0.2%
Swimming Exposure	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total Hazard Index	*0.41*	*0.42*	*0.28*	*0.28*	*0.33*	*0.41*

[a] Bold values indicate major contributors to risk

Table 5-16: Contribution of Each Exposure Pathway to the Cancer Risk at the On-Site Evaluation Point

Pathway	**Cancer Risk (% of Total)**					
	Farmer Adult	**Farmer Child**	**Fisher Adult**	**Fisher Child**	**Native Adult**	**Native Child**
Inhalation	0.0%	0.1%	1.4%	1.3%	0.0%	0.1%
Produce Ingestion	1.5%	1.8%	**36.8%**	**19.6%**	2.4%	2.0%
Bathing Exposure	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
Beef/Game Ingestion	**72.2%**	**49.2%**	0.0%	0.0%	**56.8%**	**33.8%**
Chicken Ingestion	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Drinking Water	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Egg Ingestion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fish Ingestion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Goat Ingestion	1.6%	1.4%	0.0%	0.0%	0.0%	0.0%
Sweat Lodge Exposure	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Milk Ingestion	**23.5%**	**43.6%**	0.0%	0.0%	**38.9%**	**58.6%**
Pork Ingestion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Soil Ingestion	1.1%	3.9%	**61.6%**	**79.1%**	1.9%	5.5%
Swimming Exposure	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total Cancer Risk	1.5E-02	1.6E-03	1.2E-04	8.0E-05	1.6E-02	1.3E-03

[a] Bold values indicate major contributors to risk

Table 5-17: Contribution of Each Exposure Pathway to the Hazard Index at the On-Site Evaluation Point

Pathway	Hazard Index (% of Total)					
	Farmer Adult	**Farmer Child**	**Fisher Adult**	**Fisher Child**	**Native Adult**	**Native Child**
Inhalation	0.4%	1.3%	1.6%	2.0%	0.2%	1.4%
Produce Ingestion	**90.7%**	**92.2%**	**98.2%**	**97.7%**	**95.3%**	**93.7%**
Bathing Exposure	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Beef/Game Ingestion	6.2%	3.0%	0.0%	0.0%	2.4%	1.6%
Chicken Ingestion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Drinking Water	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Egg Ingestion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fish Ingestion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Goat Ingestion	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%
Sweat Lodge Exposure	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Milk Ingestion	2.3%	3.1%	0.0%	0.0%	1.9%	3.2%
Pork Ingestion	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Soil Ingestion	0.1%	0.2%	0.2%	0.3%	0.1%	0.2%
Swimming Exposure	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total Hazard Index	7.8	9.8	2.7	6.7	9.8	10.0

[a] Bold values indicate major contributors to risk

Table 5-18: Relative Contribution of Each Point Source to Off-Site Cancer Risk

Stack	Cancer Risk (% of Total)			
	Native Adult	**Native Child**	**Farmer Adult**	**Farmer Child**
BRASTK	0.0%	0.0%	0.0%	0.0%
COMSTK	100.0%	100.0%	100.0%	100.0%
LABSTK	0.0%	0.0%	0.0%	0.0%
MDBSTK	0.0%	0.0%	0.0%	0.0%
Total CR	*3.0E-04*	*2.3E-05*	*2.6E-04*	*3.0E-05*

Table 5-19: Relative Contribution of Each Point Source to Off-Site Non-Cancer Risk

Stack	Hazard Index (% of Total)					
	Native Adult	**Native Child**	**Fisher Child**	**Farmer Adult**	**Farmer Child**	**Resident Child**
BRASTK	59.4%	59.6%	59.7%	59.4%	59.5%	59.7%
COMSTK	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%
LABSTK	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%
MDBSTK	32.9%	32.7%	32.6%	32.9%	32.7%	32.6%
Total HI	*0.41*	*0.42*	*0.28*	*0.33*	*0.41*	*0.28*

Table 5-20: Relative Contribution of Each Point Source to On-Site Cancer Risk

Stack	Cancer Risk (% of Total)					
	Farmer Adult	**Farmer Child**	**Fisher Adult**	**Fisher Child**	**Native Adult**	**Native Child**
BRASTK	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
COMSTK	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LABSTK	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
MDBSTK	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total CR	*1.5E-02*	*1.6E-03*	*1.2E-04*	*8.0E-05*	*1.6E-02*	*1.2E-03*

Table 5-21: Relative Contribution of Each Point Source to On-Site Non-Cancer Risk

Stack	Hazard Index (% of Total)					
	Farmer Adult	**Farmer Child**	**Fisher Adult**	**Fisher Child**	**Native Adult**	**Native Child**
BRASTK	66.6%	66.6%	66.7%	66.7%	66.6%	66.7%
COMSTK	4.6%	4.6%	4.5%	4.6%	4.4%	4.6%
LABSTK	15.4%	15.3%	15.3%	15.3%	15.4%	15.3%
MDBSTK	13.5%	13.4%	13.4%	13.4%	13.5%	13.4%
Total HI	*7.8*	*9.8*	*2.7*	*6.6*	*9.8*	*10.0*

Table 5-22: Top Ten Contributors to Cancer Risk at the Off-Site Evaluation Point

COPC	Farmer Adult	Farmer Child	Native Adult	Native Child
Composite TOE - Nonvolatile	1	1	1	1
3,4,5,3',4'-Pentachlorobiphenyl	2	x	2	x
2,3,7,8-Tetrachlorodibenzofuran	3	x	3	x
Composite TOE - Volatile	x	2	x	2
Composite TOE - Semivolatile	x	3	x	3
Arsenic compounds	x	x	x	x
Sulfur mustard (or H/HD)	x	x	x	x
Bis(2-ethylhexyl)phthalate	x	x	x	x
PCB Mixture	x	x	x	x
2,3,7,8-Tetrachlorodibenzo-p-dioxin	x		x	
Cadmium compounds		x		x

Table 5-23: Top Ten Contributors to Non-Cancer Risk at the Off-Site Evaluation Point

COPC	Farmer Adult	Farmer Child	Fisher Child	Native Adult	Native Child	Resident Child
VX	1	1	1	1	1	1
GB	2	2	2	2	2	2
Sulfur mustard (or H/HD)	3	3	3	x	3	3
Composite TOE - Nonvolatile	x	x		x	x	x
Thallium compounds	x	x		x	x	
Chlorine	x	x	x	x	x	x
Mercuric chloride	x	x	x	x	x	x
Manganese compounds	x	x	x		x	x
PCB Mixture	x			x	x	
Silver compounds	x	x		x		
Cadmium compounds		x	x			x
Arsenic compounds			x			x
Methyl mercury			x	3	x	
Nickel compounds			x			x

5.2.1.2 Acute Evaluation

Results for the nine acute inhalation conditions described in Section 4.2.4 are listed in Table 5-24. Only a single set of results is reported at each of the evaluation points since acute inhalation results are independent of the exposure scenario. Hence, the on-site results reported in Table 5-24 apply to all the adult and child scenarios evaluated at this location. Similarly, the off-site results apply to all the adult and child scenarios evaluated at the off-site location. The fact that the acute inhalation hazard index is independent of the exposure scenarios can be clearly seen in the following equation which represents the combined information provided in Tables B-6-1 and C-4-1 of Volume 2 of the 2005 EPA hazardous waste risk combustor guidance (EPA, 2005).

Table 5-24: Acute Inhalation Hazard Index Results

Descriptor	Furnace in Upset	Off Site HI	On-Site HI	Off-Site/Admin. Area[a]	Off-Site/On-Site[b]
Condition 1	Base Acute Emissions	0.03	0.12	0.03	0.04
Condition 2	LIC1	0.05	0.19	0.05	0.06
Condition 3	LIC2	0.05	0.19	0.04	0.06
Condition 4	DFS	0.15	0.62	0.14	0.19
Condition 5	MPF Processing Combustible Materials	0.11	0.44	0.10	0.13
Condition 6	MPF Processing Non-combustible Materials	0.11	0.46	0.11	0.14
Condition 7	BRA	0.05	0.21	0.05	0.07
Condition 8	LAB	0.05	0.20	0.05	0.06
Condition 9	MDB	0.05	0.20	0.05	0.06

[a] Off-Site/Administration Area combined location depicts results for the military worker scenario.
[b] Off-Site/On-Site combined location depicts results for the plant worker scenario.

$$AHQ_i = \frac{(0.001)\cdot\left(Q_i \cdot \left[F_{v,i} \cdot Chv_i + (1.0 - F_{v,i}) \cdot Chp_i\right]\right)}{AIEC_i}$$

Where AHQ_i is the acute hazard quotient for inhalation of the ith COPC (unitless), $AIEC_i$ is the acute inhalation exposure criteria for the ith COPC (mg/m^3), Q_i is emission rate for the ith COPC (g/s), $F_{v,i}$ is the fraction of the ith COPC in the vapor phase, Chv_i is the unitized hourly air concentration from the vapor phase(µg-s/g-m^3), and Chp_i is the unitized hourly air concentration from the particle phase (µg-s/g-m^3). The total hazard index for a given evaluation location is calculated as the sum of the individual hazard quotients from each of the four sources. AIEC values used in this analysis are provided in Appendix Q.

From the results presented in Table 5-24 it can be observed that all locations predict an acute hazard index below the DEQ action level of 1.0. It should be noted that the values reported in Table 5-24 are substantially below those reported by others (Ecology and Environment, 2008. Values have been reproduced in Table 5-25). A review of the model input files used in the earlier work indicated that the acute reference values for the three TOE fractions were 1000 times lower that those reported in the main body of the report (see Table 3-4 of Ecology and Environment, 2008). A review of the data sets used to generate these values indicated that the larger values were correct and were subsequently used in this analysis

Table 5-25: Acute Inhalation Hazard Index Results Reported by Ecology and Environment in 2008

Descriptor	**Furnace in Upset**	**Off Site HI**	**On-Site HI**	**Off-Site/Admin. Area**[a]	**Off-Site/On-Site**[b]
Condition 1	Base Acute Emissions	12	50	12	15
Condition 2	LIC1	16	64	15	19
Condition 3	LIC2	16	64	15	19
Condition 4	DFS	105	429	101	130
Condition 5	MPF Processing Combustible Materials	23	94	22	29
Condition 6	MPF Processing Non-combustible Materials	23	95	22	29
Condition 7	BRA	12	50	12	15
Condition 8	LAB	16	64	15	19
Condition 9	MDB	16	64	15	19

[a] Off-Site/Administration Area combined location depicts results for the military worker scenario.

[b] Off-Site/On-Site combined location depicts results for the plant worker scenario.

5.2.2 Special Cases

Six additional risk scenarios were evaluated to better clarify the impacts of certain base model assumptions on the predicted chronic risks. These special cases are as follows:

- Case 1 – Area Average: Examined the effects of collocating the highest values for deposition rates and air concentrations for off-site analysis.
- Case 2 – Single Point, Actual Data: The impacts of collocating the highest values for the air deposition rates and air concentrations for the off-site location were further evaluated using AERMOD calculated air parameters for the off-site location. This case corresponds to the EPA recommended evaluation method (EPA, 2005).
- Case 3 – Updated COPC Emission Rates: Chemical agent concentration were modified to reflect DAAMS[11] stack data. In addition, the amount of carbon to be processed as secondary waste in the deactivation furnace system was reduced from base model estimates of 706,035 lbs to current estimates of 55,320 lbs. Finally, operation of the brine reduction area was assumed to be eliminated for HD processing.
- Case 4 – Evaluating Dioxin and Furans at Detection Limits: Eleven dioxin and furan compounds which were monitored in the trial burns, but never detected, were moved from the non-volatile TOE fraction and placed on the emissions list for the common stack at their detection limits. The toxicity of the non-volatile TOE fraction was re-evaluated without these eleven compounds.
- Case 5 – On-Site Risk After Incineration: The base model was modified by removing exposure pathways which only occur during operation of the incineration system. Pathways resulting from residual soil contamination were retained. The purpose of this analysis was to examine the on-site risks to future populations that might use the depot lands after closure.
- Case 6 – Combined Special Cases 3, 4, and 5: Assumptions in Special Cases 3, 4 and 5 were combined.

5.2.2.1 Special Case 1 – Area Average

Figure 5-5 depicts the region used to generate average deposition rates and air concentrations. This region has an approximate area of 3.6 km^2 and is located off the NE corner of the UMCDF, the direction of the predominate winds (See Figures 4-4 through 4-15). Averaged air parameters were calculated from parameter values at 30 evenly spaced grid nods throughout this region. The location of these grid nodes is indicated as black squares in Figure 5-6. Table 5-27 details the averaged air parameters calculated from these 30 node locations. All other IRAP-h model inputs were identical to the base model.

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[11] DAAMS stands for Depot Area Agent Monitoring System.

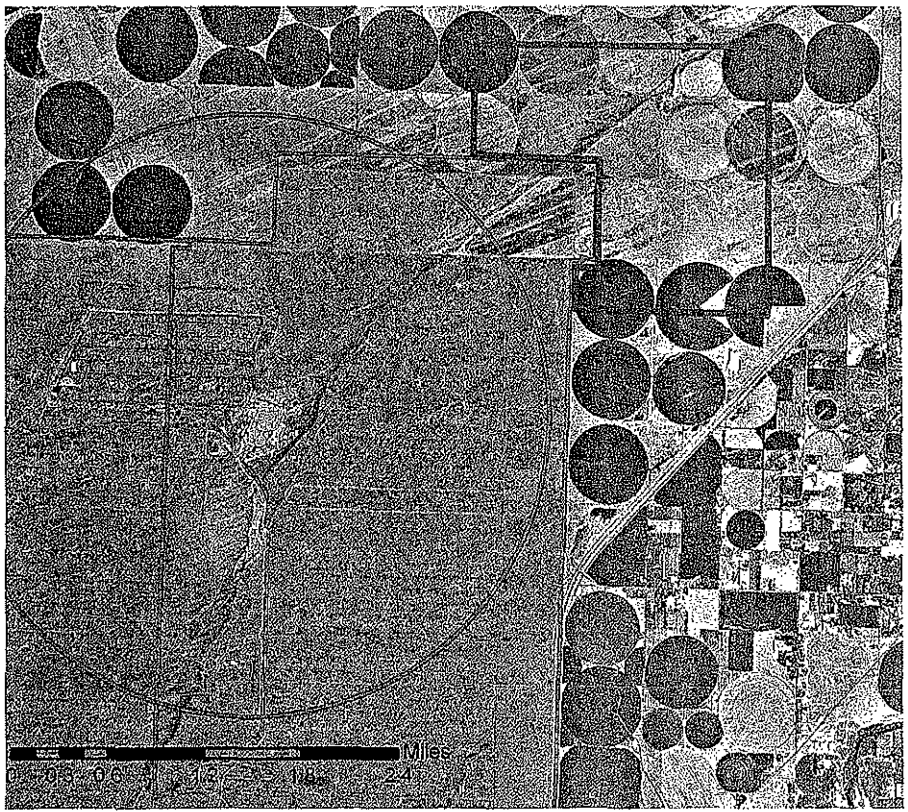

Figure 5-5: Aerial photograph of the region used in the area average analysis.

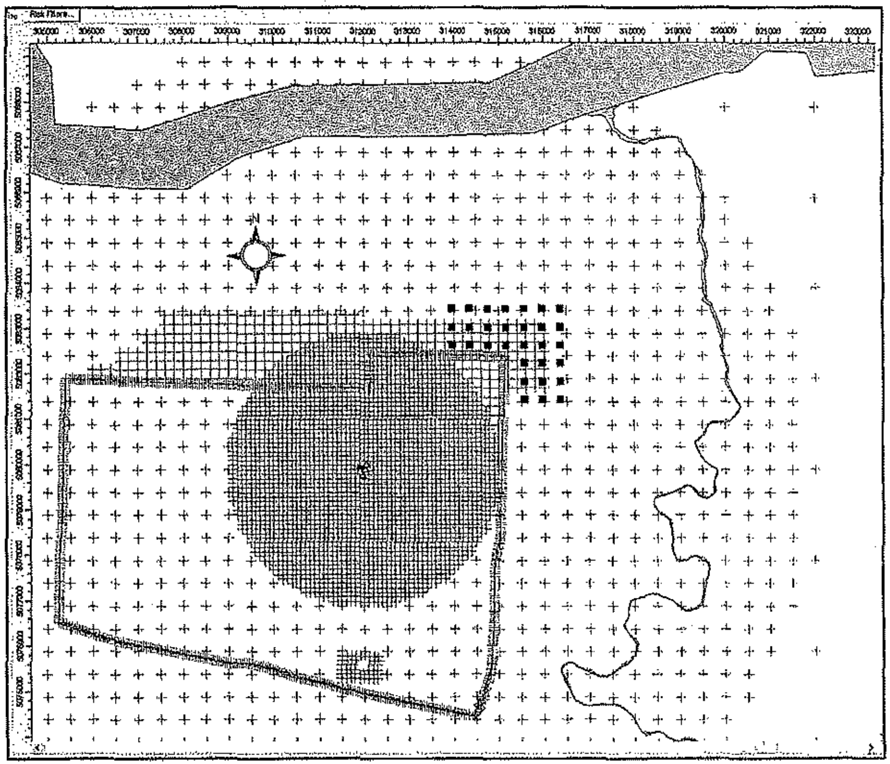

Figure 5-6: Location of nodes used in the area average calculations.

Table 5-27: Average Air Parameters Calculated from Nodes in Figure 5-6

Parameter	Unit	Source			
		BRASTK	COMSTK	LABSTK	MDBSTK
Hourly air concentration - particle phase	ug-s/g-m^3	3.810626	6.38775	22.62913	7.137747
Hourly air concentration - particle bound	ug-s/g-m^3	3.65096	6.368823	22.23979	7.105437
Hourly air concentration - vapor phase	ug-s/g-m^3	3.401366	6.228343	18.53001	6.722492
Hourly air concentration - vapor phase hg	ug-s/g-m^3	3.106791	5.639304	18.9102	6.381234
Air concentration - particle phase	ug-s/g-m^3	0.057891	0.091651	0.139782	0.077229
Air concentration - particle bound	ug-s/g-m^3	0.06157	0.091462	0.139181	0.077117
Air concentration - vapor phase	ug-s/g-m^3	0.064504	0.088233	0.131054	0.075368
Air concentration - vapor phase hg	ug-s/g-m^3	0.061268	0.075715	0.125507	0.071194
Dry deposition - particle phase	s/m^2 year	0.065572	0.004311	0.004515	0.004192
Dry deposition - particle bound	s/m^2 year	0.039986	0.005134	0.00547	0.004912
Dry deposition - vapor phase	s/m^2 year	0.015609	0.018833	0.018261	0.014967
Dry deposition - vapor phase hg	s/m^2 year	0.039565	0.044954	0.013487	0.011595
Wet deposition - particle phase	s/m^2 year	0.001813	0	0	0
Wet deposition - particle bound	s/m^2 year	0.001132	5.63E-05	5.87E-05	5.33E-05
Wet deposition - vapor phase	s/m^2 year	0.000653	0.000739	0.000741	0.000692
Wet deposition - vapor phase hg	s/m^2 year	0.6176	1.570541	0.572106	0.274182

Chronic cancer and hazard risks for the area average model are provided in Table 5-28. Shaded entries correspond to those which exceed the DEQ action level of 1.0E-5 for chronic cancer risk and 0.25 for the chronic hazard index. Comparison of values in Table 5-28 with the base model results (see Table 5-13) reveals an average reduction of approximately 35% for both parameters in the area average data set. The highest HI value under the area average condition is only 0.27 which is very close to the action cut-off of 2.5. However, the cancer risks are still more than ten times the action level. The distribution of risks by source, COPC, and exposure pathway in the area average model are similar to that of the base model.

Table 5-28: Summary of The Area Average Case Chronic Health Impacts

Location	Scenario	Cancer Risk	Hazard Index
Off Site	Farmer Adult	1.6E-04[a]	2.1E-01
Off Site	Farmer Child	1.7E-05	2.6E-01
Off Site	Fisher Adult	1.4E-06	7.4E-02
Off Site	Fisher Child	8.9E-07	1.8E-01
Off Site	Native Adult	1.8E-04	2.6E-01
Off Site	Native Child	1.4E-05	2.7E-01
Off Site	Resident Adult	1.4E-06	7.4E-02
Off Site	Resident Child	8.9E-07	1.8E-01

[a] Shaded entries indicate values above DEQ action levels.

5.2.2.2 Case 2 – Single Point, Actual Data

Table 5-29 details the air parameters calculated by AERMOD at the off-site evaluation point. All other risk model inputs were identical to the base model. Risk results for the single point, actual data case are provided in Table 5-30. Values that exceed the DEQ action level are indicated by shaded entries in this table.

Table 5-29: Air Parameters for the Single Point, Actual Data Case

Parameter	Unit	Source			
		BRASTK	COMSTK	LABSTK	MDBSTK
Hourly air concentration - particle phase	ug-s/g-m^3	4.91481	12.55885	21.99511	10.52989
Hourly air concentration - particle bound	ug-s/g-m^3	4.84544	12.55885	21.99511	10.52989
Hourly air concentration - vapor phase	ug-s/g-m^3	4.60318	12.33877	16.8776	10.01171
Hourly air concentration - vapor phase hg	ug-s/g-m^3	4.42141	12.38521	20.05543	10.2556
Air concentration - particle phase	ug-s/g-m^3	0.06463	0.11045	0.16679	0.07847
Air concentration - particle bound	ug-s/g-m^3	0.06859	0.11045	0.16679	0.07847
Air concentration - vapor phase	ug-s/g-m^3	0.074	0.10816	0.1584	0.07737
Air concentration - vapor phase hg	ug-s/g-m^3	0.06858	0.10135	0.16228	0.07788
Dry deposition - particle phase	s/m^2 year	0.10839	0.00631	0.00665	0.006
Dry deposition - particle bound	s/m^2 year	0.07169	0.00631	0.00665	0.006
Dry deposition - vapor phase	s/m^2 year	0.01546	0.01881	0.02264	0.01606
Dry deposition - vapor phase hg	s/m^2 year	0.0611	0.06563	0.01811	0.01387
Wet deposition - particle phase	s/m^2 year	0.00272	0	0	0
Wet deposition - particle bound	s/m^2 year	0.00169	0	0	0
Wet deposition - vapor phase	s/m^2 year	0.00091	0.00098	0.001	0.00092
Wet deposition - vapor phase hg	s/m^2 year	0.00033	0.00034	0	0

Table 5-30: Summary of the Chronic Health Impacts for
The Single Point, Actual Data Case

Location	Scenario	Cancer Risk	Hazard Index
Off Site	Farmer Adult	1.8E-04[a]	2.2E-01
Off Site	Farmer Child	2.0E-05	2.8E-01
Off Site	Fisher Adult	1.4E-06	7.7E-02
Off Site	Fisher Child	9.2E-07	1.9E-01
Off Site	Native Adult	2.0E-04	2.8E-01
Off Site	Native Child	1.6E-05	2.8E-01
Off Site	Resident Adult	1.4E-06	7.7E-02
Off Site	Resident Child	9.2E-07	1.9E-01

[a] Shaded entries indicate values above DEQ action levels.

Comparison of values in Table 5-30 with the base model results (see Table 5-13) reveals an average reduction of approximately 32% for both parameters in the. The highest HI value for Special Case 2 is only 0.28 which is very close to the action level of 0.25.

However, the cancer risks are still more than ten times the action level. The distribution of risks by source, COPC, and exposure pathway in Special Case 2 are similar to that of the base model.

5.2.2.3 Special Case 3 – Updated COPC Emission Rates

Several changes have occurred in the operating procedures at the UMCDF since the development of the 2004 RAWP (see Appendix P for details). To include these changes in the risk assessment process, three modifications were made to procedures used to calculate the base model emission rates. First, since the amount of agent-contaminated carbon that is currently projected to be processed on-site has been reduced from the 706,035 lbs used in the base model to 55,320 lbs. This change corresponds to a reduction in the fraction of time the DFS will spend processing this material during closure from 0.0733 to 0.00574. Second, the operating time for the brine reduction area was set to zero for HD processing since it is unlikely that this system will operate during this campaign. HD brines may contain unacceptable levels of mercury and off-site shipment of agent-free brine does not pose a substantial risk to the public (CTUIR, 2008). Third, chemical agent levels from the four sources were reduced to reflect all site monitoring data, not just the ACAMS units. This adjustment was based on a review of the data from the Depot Area Agent Monitoring Systems (DAAMS) that are installed on the four stacks. While the DAAMS do not provide continuous, on-line monitoring of chemical agent like the ACAMS, they are continuously collected samples, though are only analyzed periodically. The DAAMS units have a much lower detection limit since they rely on a composite sample collected over many hours. Including the sensitivity of the DAAMS units in the analysis results the following changes:

- Common stack, BRA stack GB and VX emissions reduced by a factor of 300
- Common stack, BRA stack HD emissions reduced by a factor of 55
- MDB HVC and LAB HVC GB and VX emissions reduced by a factor of 60
- MDB HVC and LAB HVC HD emissions reduced by a factor of 1.1

The composite chemical agent emission rates that result from these three modifications are provided in Table 5-31. Appendix C, Table C-2, lists the emission rates for all COPCs from the four sources for this model run. All other model input parameters were identical to the base model.

Table 5-31: Chemical Agent Emission Rates for the Base Model and Updated COPC Emission Rate Model

Source	CAS Number	Chemical Agent	Base Model Emission Rate (g/s)	Special Case 3 Model Emission Rate (g/s)
COMSTK	107-44-8	GB	2.26E-07	6.49E-10
COMSTK	505-60-2	HD	1.05E-05	1.35E-07
COMSTK	50782-69-9	VX	1.37E-07	3.52E-10
BRASTK	107-44-8	GB	6.50E-06	3.85E-08
BRASTK	505-60-2	HD	6.50E-04	2.12E-05
BRASTK	50782-69-9	VX	6.50E-06	3.85E-08
LABSTK	107-44-8	GB	4.08E-07	6.80E-09
LABSTK	505-60-2	HD	4.08E-06	3.74E-06
LABSTK	50782-69-9	VX	4.08E-07	6.80E-09
MDBSTK	107-44-8	GB	2.89E-06	4.81E-08
MDBSTK	505-60-2	HD	2.89E-05	2.65E-05
MDBSTK	50782-69-9	VX	2.89E-06	4.81E-08

A summary of the risk results for this modified model are provided in Table 5-32 for each exposure scenario and each evaluation location. Shaded entries indicate values above the DEQ established action levels of 1.0E-5 (chronic cancer risk) and 0.25 (chronic non-cancer risk). Comparison of Table 5-32 with Table 5-13 (base model) reveals that the HI values, which were driven by chemical agent emissions in the base model, have been dramatically reduced to below the action level. Again, it should be noted that the modification in chemical agent emissions is based on measured site data.

Chronic cancer risks are also reduced in the updated model. The average reduction for both the adult and child populations is by a factor of 1.8. The highest off-site risk for Case 3, 1.6E-04, is for the Native American adult while the resident farmer adult has a similar risk of 1.5E-5. As with the base model, the remaining chronic cancer risk is dominated by the non-volatile TOE fraction in the COMSTK. In every case, the cancer risk represented in the non-volatile TOE is 99.997% of the total cancer risk while the top five COPCs represent greater than 99.998% of total cancer risk. This result can be seen in Tables 5-33 and 5-34 which show the breakdown of cancer risk by source and COPC for the Native American adult exposure scenario. Similar results are obtained for other exposure scenarios. The last column in each table indicates the contribution of that table entry to the reduction in risk. For example, 99.9987% of the reduction in chronic cancer risk to the Native American adult at the off-site location was created by changes in the COMSTK emissions. This suggests that not processing HD brines has little impact on the overall cancer risk while the reducing the amount of carbon processed in the DFS resulted in substantial risk reduction.

Table 5-32: Summary of Chronic Health Impacts for Updated COPC Emission Rate Model

Location	**Scenario**	**Cancer Risk**	**Hazard Index**
Off Site	Farmer Adult	1.5E-04	0.0038
Off Site	Farmer Child	1.7E-05	0.0051
Off Site	Fisher Adult	1.2E-06	0.0016
Off Site	Fisher Child	7.7E-07	0.0035
Off Site	Native Adult	1.6E-04	0.0050
Off Site	Native Child	1.3E-05	0.0055
Off Site	Resident Adult	1.1E-06	0.0013
Off Site	Resident Child	7.7E-07	0.0035
On Site	Farmer Adult	8.1E-03 [a]	0.0988
On Site	Farmer Child	8.9E-04	0.1284
On Site	Fisher Adult	6.6E-05	0.0323
On Site	Fisher Child	4.5E-05	0.0816
On Site	Native Adult	9.0E-03	0.1088
On Site	Native Child	6.9E-04	0.1270
On Site /Off Site	Worker Adult	4.0E-06	0.0031
Admin Area/Off Site	Military Adult	1.1E-06	0.0013

[a] Shaded entries indicate values above DEQ action levels.

Table 5-33: Native American Chronic Cancer Risks for Base Model and Updated COPC Emission Rate Model

Off-Site Location Cancer Risks			
Stack	**Base Model**	**Updated COPC ER Model**	**% Total Reduction**
BRASTK	4.44E-09	2.78E-09	0.0013%
COMSTK	2.96E-04	1.64E-04	99.9987%
LABSTK	7.98E-12	7.31E-12	0.0000%
MDBSTK	5.26E-11	4.83E-11	0.0000%
Total	*2.96E-04*	*1.64E-04*	--
On-Site Location Cancer Risks			
BRASTK	2.37E-07	1.80E-07	0.0008%
COMSTK	1.63E-02	9.04E-03	99.9992%
LABSTK	3.26E-10	2.99E-10	0.0000%
MDBSTK	3.03E-10	2.78E-10	0.0000%
Total	*1.63E-02*	9.04E-03	--

Table 5-34: Contribution of Individual COPCs to Native American Cancer Risks for COMSTK emissions in the Base Model and Updated COPC Emission Rate Model

Compound	**Updated COPC ER Model**	**Base Model**	**% Total Reduction**
Off-Site Location Cancer Risks			
TOE - Nonvolatile	1.6E-04	3.0E-04	99.99673%
TOE - Volatile	9.4E-09	1.2E-08	0.00180%
TOE – Semi-volatile	7.4E-09	9.3E-09	0.00147%
3,4,5,3',4'-Pentachlorobiphenyl	3.8E-08	3.8E-08	0.00000%
2,3,7,8-Tetrachlorodibenzofuran	1.3E-08	1.3E-08	0.00000%
Total	1.6E-04	*3.0E-04*	--
On-Site Location Cancer Risks			
TOE - Nonvolatile	9.0E-03	1.6E-02	99.99688%
3,4,5,3',4'-Pentachlorobiphenyl	3.7E-06	3.7E-06	0.00000%
TOE - Volatile	4.8E-07	6.0E-07	0.00166%
TOE – Semi-volatile	4.0E-07	5.1E-07	0.00147%
2,3,7,8-Tetrachlorodibenzofuran	7.1E-07	7.1E-07	0.00000%
Total	9.0E-03	*1.6E-02*	--

5.2.2.4 Case 4 – Evaluating Dioxin and Furans at Detection Limit

Chronic cancer risk in the base model is dominated by the geometric mean value for the oral cancer slope factor (CSFo) of the non-volatile TOE fraction. Examination of the data used to generate this value indicates that the data falls into two distinct groups with eleven dioxin and furan compounds and one polychlorinated biphenyl (PCB) having CSFo values greater than an order of magnitude above the other compound within this class. Figure 5-7 shows the CSFo data for the non-volatile compounds used to represent the TOE fraction. The geometric mean value is represented in the figure by a dashed, pink line while the individual CSFo values are shown by the blue points. Table 5-35 provides a list of the eleven dioxin and furans and one PCB compounds indicted within the red circle on the Figure. Excluding these twelve compounds from the data set reduces the geometric mean value of the CSFo from 25 to 0.8 (kg-day/mg) which subsequently reduces the off-site chronic cancer risks to below the action level as indicated in Table 5-36. On-site chronic cancer risks for the farmer and Native American adult and child are still above the DEQ established action levels as indicated by the shaded entries in Table 5-36.

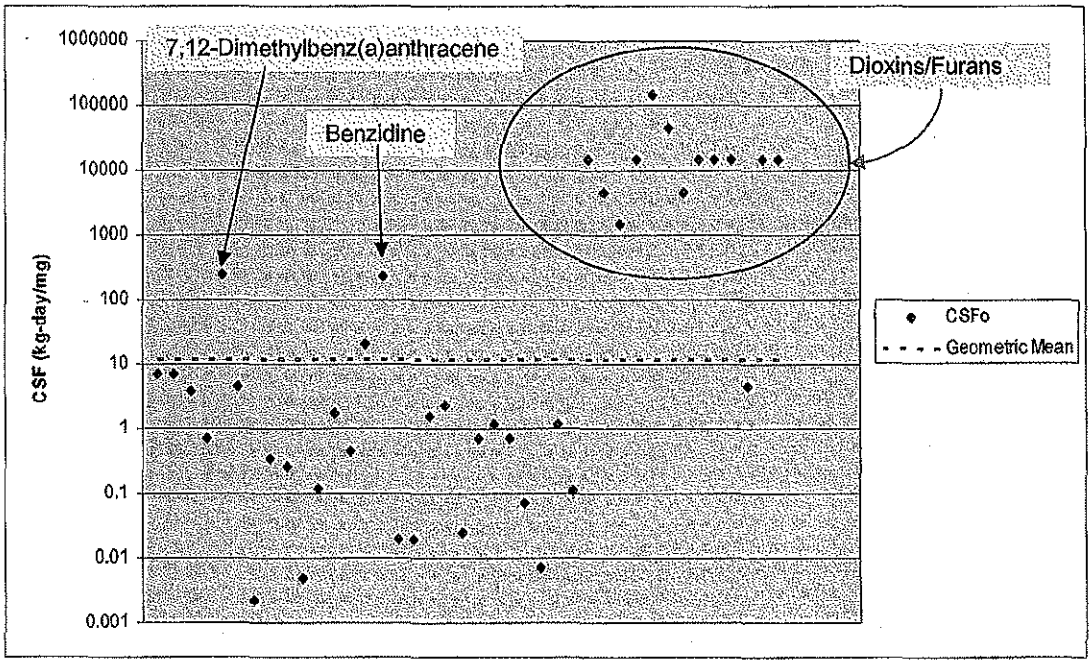

Figure 5-7: Cancer slope factor data for non-volatile TOE fraction.

Table 5-35: Dioxin and Furan Compounds Indicated in Figure 5-7.

CAS Number	Name	CSFo (kg-day/mg)
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	150000
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	15000
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	15000
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	15000
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1500
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	4500
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	45000
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	15000
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	15000
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	15000
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	15000
32774-16-6	3,3',4,4',5,5'-Hexachlorobiphenyl	4500

Table 5-36: Summary of Chronic Health Impacts for Base Model with Non-volatile TOE CSF of 0.8 (kg-day/mg)

Location	**Scenario**	**Cancer Risk**
Off Site	Farmer Adult	9E-06
Off Site	Farmer Child	1E-06
Off Site	Fisher Adult	1E-07
Off Site	Fisher Child	7E-08
Off Site	Native Adult	1E-05
Off Site	Native Child	8E-07
Off Site	Resident Adult	1E-07
Off Site	Resident Child	1E-07
On Site	Farmer Adult	5E-04[a]
On Site	Farmer Child	5E-05
On Site	Fisher Adult	6E-06
On Site	Fisher Child	4E-06
On Site	Native Adult	5E-04
On Site	Native Child	4E-05
On Site /Off Site	Worker Adult	4E-07
Admin Area/Off Site	Military Adult	1E-07

[a] Shaded entries indicate values above DEQ action levels.

An additional model run was conducted to evaluate the decision in the base model to include the dioxins and furans listed in Table 5-35 with the non-volatile TOE fraction rather than leaving them on the COPCs emissions list at their detection limit. This analysis was conducted since the dioxin and furans listed in Table 5-35 were measured during all the trial burns and were never detected. Detection limits for these compounds in the various trial burn tests were on the order of 10^{-10} to 10^{-12} g/s which is substantially below the base model emission rate of the non-volatile TOE fraction (0.002 g/s). Appendix C, Table C-3 lists the COPC emission rate file used in this model run. The detection limit values used to generate the COMSTK COPC emission rate are provided in Appendix R. Toxicity and fate and transport data for the eleven dioxin and furans is provided in Appendix K, Table K-8 through K-14. The CSFo for the non-volatile TOE fraction was recalculated to be 1.2 (kg-day/mg) with the eleven dioxins and furans removed from the data set. This value was used in the subsequent analysis. All other IRAP-h input data were identical to the base model.

Summary cancer risk results are provided in Table 5-37 for the model run which included the eleven dioxin and furans in the COPC emissions along with a recalculated non-volatile TOE CSFo (1.2 kg-day/mg). Under these conditions, only the on-site Farmer and on-site Native American (adult and child in both cases) appear to have chronic cancer risks above the DEQ action level. The off-site farmer adult and Native American adult have cancer risks equal to the action level of 1×10^{-5} when rounded to one significant figure (EPA, 2005).

Cancer risk for both the on-site and off-site farmer and Native American scenarios are dominated by food intake pathways. Beef (farmer scenario), wild game (Native American scenario) and milk (both scenarios) ingestion represent more than 90% of the total risk in all cases.

Table 5-37: Summary of Chronic Cancer Risk for the Base Model with Dioxins and Furans Moved to the COMSTK COPC List

Location	**Scenario**	**Cancer Risk**
Off Site	Farmer Adult	1.3E-05
Off Site	Farmer Child	1.5E-06
Off Site	Fisher Adult	1.4E-07
Off Site	Fisher Child	8.7E-08
Off Site	Native Adult	1.4E-05
Off Site	Native Child	1.1E-06
Off Site	Resident Adult	1.3E-07
Off Site	Resident Child	8.7E-08
On Site	Farmer Adult	7.0E-04[a]
On Site	Farmer Child	7.9E-05
On Site	Fisher Adult	7.4E-06
On Site	Fisher Child	4.9E-06
On Site	Native Adult	7.9E-04
On Site	Native Child	6.2E-05
On Site /Off Site	Worker Adult	4.7E-07
Admin Area/Off Site	Military Adult	1.3E-07

[a] Shaded entries indicate values above DEQ action levels.

Cancer risks by COPC for the off-site and on-site exposure scenarios that are equal to, or exceed, the DEQ action levels are shown in Tables 5-38 and 5-39. The five COPCs with the highest cancer risks are shown for each condition. In all cases more than 99.9% of the risk is represented in these compounds. Non-volatile TOE still is the largest contributor to risk in each case and the other two TOE fractions also are among the top five potential cancer causing COPCs for all scenarios.

It should also be noted that moving the eleven dioxins from the non-volatile TOE fraction to the COPC list does not cause unacceptable predicted levels of PCDDs and PCDFs in breast milk. For both the on-site and off-site evaluation location the predicted infant $ADD_{D/F}$ is below the DEQ action level of 0.25 pg-TEQ/kg-day for all exposure scenarios. The $ADD_{D/F}$ results for Special Case 4 are provided in Table 5-40.

Table 5-38: Off-Site Chronic Cancer Risks by COPC for the Base Model with Dioxins and Furans Moved to the COMSTK COPC List

Exposure Scenario	COPC	CR	CR (% total)
Farmer Adult	Composite TOE - Nonvolatile	1.27E-05	99.47%
Farmer Adult	3,4,5,3',4'-Pentachlorobiphenyl	2.65E-08	0.21%
Farmer Adult	2,3,7,8-Tetrachlorodibenzofuran	1.23E-08	0.10%
Farmer Adult	Composite TOE - Volatile	1.12E-08	0.09%
Farmer Adult	Composite TOE - Semi-volatile	8.22E-09	0.06%
Native Adult	Composite TOE - Nonvolatile	1.4E-05	99.41%
Native Adult	3,4,5,3',4'-Pentachlorobiphenyl	3.8E-08	0.27%
Native Adult	2,3,7,8-Tetrachlorodibenzofuran	1.3E-08	0.09%
Native Adult	Composite TOE - Volatile	1.2E-08	0.08%
Native Adult	Composite TOE - Semi-volatile	9.3E-09	0.07%

Table 5-39: On-Site Chronic Cancer Risks by COPC for the Base Model with Dioxins and Furans Moved to COMSTK COPC List

Exposure Scenario	COPC	CR	CR (% total)
Farmer Adult	Composite TOE - Nonvolatile	7.0E-04	99.32%
Farmer Adult	3,4,5,3',4'-Pentachlorobiphenyl	2.5E-06	0.36%
Farmer Adult	2,3,7,8-Tetrachlorodibenzofuran	6.6E-07	0.09%
Farmer Adult	Composite TOE - Volatile	5.7E-07	0.08%
Farmer Adult	Composite TOE – Semi-volatile	4.6E-07	0.07%
Farmer Child	Composite TOE - Nonvolatile	7.8E-05	98.36%
Farmer Child	3,4,5,3',4'-Pentachlorobiphenyl	4.8E-07	0.61%
Farmer Child	Composite TOE - Volatile	3.4E-07	0.44%
Farmer Child	Composite TOE - Semi-volatile	3.0E-07	0.38%
Farmer Child	2,3,7,8-Tetrachlorodibenzofuran	8.7E-08	0.11%
Native Adult	Composite TOE - Nonvolatile	7.9E-04	99.23%
Native Adult	3,4,5,3',4'-Pentachlorobiphenyl	3.7E-06	0.46%
Native Adult	2,3,7,8-Tetrachlorodibenzofuran	7.1E-07	0.09%
Native Adult	Composite TOE - Volatile	6.0E-07	0.08%
Native Adult	Composite TOE - Semi-volatile	5.1E-07	0.06%
Native Child	Composite TOE - Nonvolatile	6.0E-05	97.96%
Native Child	3,4,5,3',4'-Pentachlorobiphenyl	4.5E-07	0.73%
Native Child	Composite TOE - Volatile	3.6E-07	0.58%
Native Child	Composite TOE - Semi-volatile	3.1E-07	0.50%
Native Child	2,3,7,8-Tetrachlorodibenzofuran	6.8E-08	0.11%

Table 5-40: Summary of Average Daily Dose of PCDDs and PCDFs for the Base Model with Dioxins and Furans Moved to the COMSTK COPC List

Location	**Scenario**	**$ADD_{D/F}$ (pg-TEQ/kg-day)**
Off Site	Farmer Adult	3.8E-03
Off Site	Farmer Child	--
Off Site	Fisher Adult	4.8E-05
Off Site	Fisher Child	--
Off Site	Native Adult	2.4E-03
Off Site	Native Child	--
Off Site	Resident Adult	3.9E-05
Off Site	Resident Child	--
On Site	Farmer Adult	2.2E-01
On Site	Farmer Child	--
On Site	Fisher Adult	2.6E-03
On Site	Fisher Child	--
On Site	Native Adult	1.3E-01
On Site	Native Child	--
On Site /Off Site	Worker Adult	8.4E-03
Admin Area/Off Site	Military Adult	3.6E-05

5.2.2.5 Special Case 5 – On-Site Risk after Incineration

The base model was modified to remove the exposure pathways that only occur during incineration operations. These exposure pathways are inhalation exposure, above ground produce exposure by direct deposition of particles, and air-to leaf transfer. The intent of this model run was to estimate the risks from the reuse of the UMCDF lands after site closure. These three modifications were accomplished by setting to zero the following three IRAP-h parameters, inhalation exposure time ($ED_{inhalation}$), length of plant exposure to deposition per harvest of edible portions of plant (t_p), and the COPC specific air-to-leaf biotransfer factor (Bv_{leaf}). All other parameters were equal to those of the base model. In IRAP-h the parameter, $ED_{inhalation}$, is specific to each exposure scenario and is found under the Scenario Parameter tab of the IRAP-h Risk Receptor Parameter pop-up menu. The t_p values (for forage, silage, and human consumed plants) are specific to the receptor evaluation location and are found in IRAP-h under the Site Parameters tab of the Risk Receptor Parameter pop-up menu. Bv_{leaf} for human consumed plants, forage, and silage are located in the user defined COPC database.

Table 5-41 lists the on-site chronic cancer risks for the future use scenario along with the base model risks from Table 5-13 and the percentage reduction represented between the two data sets. Although the future use scenario represents less predicted risk than the base model, the results are still well above the DEQ action level of 1×10^{-5} for all on-site scenarios. The highest on-site risk for the future use scenario is 7.4×10^{-3} for the Native American adult; a value that is 740 times above the DEQ action level.

Table 5-41: Chronic Cancer Risks for Use of the UMCDF Lands after Closure (Special Case 5)

Location	Scenario	Future Use Model Cancer Risk	Base Model Cancer Risks	% Reduction in Cancer Risk
On Site	Farmer Adult	6.4×10^{-3}	1.5×10^{-2}	57%
On Site	Farmer Child	5.4×10^{-4}	1.6×10^{-3}	66%
On Site	Fisher Adult	1.0×10^{-4}	1.2×10^{-4}	17%
On Site	Fisher Child	7.2×10^{-5}	8.0×10^{-5}	10%
On Site	Native Adult	7.4×10^{-3}	1.6×10^{-2}	54%
On Site	Native Child	4.3×10^{-4}	1.3×10^{-3}	67%

5.2.2.6 Case 6 – Combined Special Cases 3, 4, and 5

The modifications in Special Cases 3, 4, and 5 were combined to determine their collective impacts on risk. The COPC emission rate file for this analysis is provided in Table C-4 in Appendix C. This combined analysis was completed since both Cases 3 and 4 are based on updating the emission rate files using additional stack emission measurements that were not included in the base model (agent DAAMS data for Case 3 and trial burn dioxin and furan data for Case 4). In addition, the carbon processing estimates in Case 3 are a more current prediction of what will actually be processed at the facility. Finally, the exposure pathway adjustments of Case 5 more accurately reflect the future use of UMCD lands. Hence, this combined case represents site conditions that more closely reflect actual conditions than those used in the base model.

A summary of the results for the chronic cancer and non-cancer risks are presented in Table 5-42. It is evident from this table that combining the Special Case 3 and Case 4 refinements results in chronic off-site risks (both cancer and non-cancer) below the DEQ action levels. On-site chronic cancer risks are still more than an order of magnitude action levels, but on-site non-cancer risks are below their action level. The infant average daily dose for dioxins and furans for Special Case 6 are also below their action levels for all locations and exposure scenarios (Table 5-43).

From these results it is evident that the off-site risks reported for the base model are reduced to values below the action levels by accounting for more accurate estimates of chemical agent and dioxin and furan emissions. These modified emission values are based on experimental measurements of stack emissions which were not included in the base model. Including this new data creates emission rates that more accurately estimate of the potential levels of these compounds being released to the environment. On-sites risks are also reduced, but still remain above action levels and so are still of concern to the CTUIR. Future risk management activities should include an attempt to speciate the non-volatile TOE fraction and to determine the true toxicity of these compounds. In addition, site sampling should be conducted within the immediate region of the UMCDF to ensure residual contamination does not create unacceptable risks for those who will be using these lands after closure.

Table 5-42: Summary of Chronic Cancer and Non-cancer Risks for Special Case 6

Location	Scenario	Cancer Risk	Hazard Index
Off Site	Farmer Adult	7.1E-06	0.003
Off Site	Farmer Child	8.2E-07	0.004
Off Site	Fisher Adult	7.9E-08	0.001
Off Site	Fisher Child	5.1E-08	0.003
Off Site	Native Adult	8.0E-06	0.005
Off Site	Native Child	6.4E-07	0.005
Off Site	Resident Adult	7.4E-08	0.001
Off Site	Resident Child	5.1E-08	0.003
On Site	Farmer Adult	1.7E-04[a]	0.065
On Site	Farmer Child	1.5E-05	0.079
On Site	Fisher Adult	2.8E-06	0.021
On Site	Fisher Child	2.0E-06	0.050
On Site	Native Adult	2.0E-04	0.079
On Site	Native Child	1.2E-05	0.080
On Site /Off Site	Worker Adult	2.8E-07	0.003
Admin Area/Off Site	Military Adult	7.4E-08	0.001

[a] Shaded entries indicate values above DEQ action levels.

Table 5-43: Summary of Average Daily Dose of PCDDs and PCDFs for Special Case 6

Location	**Scenario**	**$ADD_{D/F}$ (pg-TEQ/kg-day)**
Off Site	Farmer Adult	3.6E-03
Off Site	Farmer Child	--
Off Site	Fisher Adult	4.6E-05
Off Site	Fisher Child	--
Off Site	Native Adult	2.2E-03
Off Site	Native Child	--
Off Site	Resident Adult	3.7E-05
Off Site	Resident Child	--
On Site	Farmer Adult	2.0E-01
On Site	Farmer Child	--
On Site	Fisher Adult	2.5E-03
On Site	Fisher Child	--
On Site	Native Adult	1.2E-01
On Site	Native Child	--
On Site /Off Site	Worker Adult	8.0E-03
Admin Area/Off Site	Military Adult	3.5E-05

6 Ecological Risk Results and Discussion

The CTUIR will be adding Ecological Results in the next draft of this report.

7 Conclusions

The CTUIR has completed a human health and ecological risk assessment[12] for operations at the Umatilla Chemical Agent Disposal Facility (UMCDF) based on the 2004 RWAP (Risk Assessment Work Plan) (DEQ, 2004). The base model for the human health assessment was identical to the CHPPM/RAWP analysis described by Ecology and Environment (E&E) in their January 31, 2008 report to the Oregon Department of Environmental Quality (DEQ) with the exception that the acute inhalation exposure criteria values for the three unidentified TOE fractions were increased by a factor of 1000 in the CTUIR model. This increase was to correct an apparent error in the E&E report. The body of the E&E document reported the larger values while their modeling input files contained the smaller values. Evaluation of the data sources used to generate the TOE acute values indicate the larger values were correct.

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[12] Ecological results are not included in the June 11, 2008 of this report, but will be added in a future draft.

Six additional risk scenarios were evaluated to better clarify the impacts of several base model assumptions on the predicted chronic risks. These special cases are as follows:

- Case 1 – Area Average: Examined the effects of collocating the highest values for deposition rates and air concentrations for off-site analysis.
- Case 2 – Single Point, Actual Data: The impacts of collocating the highest values for the air deposition rates and air concentrations for the off-site location were further evaluated using AERMOD calculated air parameters for the off-site location. This case corresponds to the EPA recommended evaluation method (EPA, 2005).
- Case 3 – Updated COPC Emission Rates: Chemical agent concentration were modified to reflect DAAMS[13] stack data. In addition, the amount of carbon to be processed as secondary waste in the deactivation furnace system was reduced from base model estimates of 706,035 lbs to current estimates of 55,320 lbs. Finally, operation of the brine reduction area was assumed to be eliminated for HD processing.
- Case 4 – Evaluating Dioxin and Furans at Detection Limits: Eleven dioxin and furan compounds which were monitored in the trial burns, but never detected, were moved from the non-volatile TOE fraction and placed on the emissions list for the common stack at their detection limits. The toxicity of the non-volatile TOE fraction was re-evaluated without these eleven compounds.
- Case 5 – On-Site Risk After Incineration: The base model was modified by removing exposure pathways which only occur during operation of the incineration system. Pathways resulting from residual soil contamination were retained. The purpose of this analysis was to examine the on-site risks to future populations that might use the depot lands after closure.
- Case 6 – Combined Special Cases 3, 4, and 5: Assumptions in Special Cases 3, 4 and 5 were combined.

Table 7-1 summarizes the results of the base model and the six special cases when compared to the action levels established by the DEQ in the 2004 RAWP. A "Pass" in Table 7-1 implies that all exposure scenarios evaluated at the specified location were below DEQ action levels. A "No" value in Table 7-1 indicates that at least one exposure scenarios was above the action level at the specified evaluation point. It is evident from Table 7-1 that the base model resulted in chronic cancer and non-cancer risks above action levels at both the on-site and off-site locations. In contrast, the acute inhalation risks and the risks to infants from dioxin and furans in breast milk were below action levels. Special Case 6 resulted in the lowest risks with all but the on-site chronic cancer risk falling below the DEQ established action levels.

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[13] DAAMS stands for Depot Area Agent Monitoring System.

Table 7-1: Summary of Risk Results for All Models Tested

Model	On-Site Receptor				Off-Site Receptor			
	Chronic Cancer	Chronic Non-Cancer	Infant Dioxin/ Furan Dose	Acute	Chronic Cancer	Chronic Non-Cancer	Infant Dioxin/ Furan Dose	Acute
Base Model	No[a]	No	Pass[b]	Pass	No	No	Pass	Pass
Special Case 1	No	No	Pass	Pass	No	No	Pass	Pass
Special Case 2	No	No	Pass	Pass	No	No	Pass	Pass
Special Case 3	No	Pass	Pass	Pass	No	Pass	Pass	Pass
Special Case 4	No	No	Pass	Pass	Pass	No	Pass	Pass
Special Case 5	No	No	Pass	Pass	--	--	Pass	Pass
Special Case 6	No	Pass	Pass	Pass	Pass	Pass	Pass	Pass

[a] A "No" indicates that at least one exposure scenarios was above the action level for the indicated measurement of risk.

[b] A "Pass" implies that all exposure scenarios evaluated at the specified location were below DEQ action levels.

Cancer risks in the base model resulted mostly from ingesting foods containing the measured, but unspeciated non-volatile TOE. The non-cancer risks were dominated by ingesting foods contaminated with chemical agent. It is evident from these results that two key assumptions are causing the cancer and non-cancer risks in the base model to exceed the predetermined action levels. First, the decision to assume emission of the chemical agents at the detection level of the continuous monitoring system (termed an ACAMS, or automatic continuous air monitoring system) drives the non-cancer chronic health risk. Second, the choice to quantitatively assign geometric mean toxicities to the unspeciated non-volatile TOE resulted in cancer risks that exceed the action levels.

Results from Special Cases 1 and 2 indicate that collating the highest air parameters resulted in an increase in the chronic cancer and non-cancer risks by an average of 30% to 40% over models that used either area average air parameters or a single location in the region of highest off-site deposition.

Special Case 3 modifications to the risk model had a dramatic effect on non-cancer chronic risks. For Special Case 3 there was an average reduction of 98.7% in non-cancer risks at both the on-site and off-site locations over the base model. All non-cancer risks (both on-site and off-site locations) were below the DEQ established action level for Special Case 3. Chronic cancer risks for Special Case 3 were an average of 43% below the base model, but all exposure scenarios which exceeded the action level for cancer risks in the base model also exceeded the action level for Special Case 3.

Special Case 4 was evaluated since chronic cancer risk in the base model is dominated by the geometric mean value for the oral cancer slope factor (CSFo) of the non-volatile TOE fraction, and this parameter is highly influenced by eleven dioxins and furans which were measured during all the trial burns, but never detected. Results from the Special Case 4 analysis indicated that only the on-site farmer and on-site Native American (adult and child in both cases) appear to have chronic cancer risks above the DEQ action level. The off-site farmer adult and Native American adult have cancer risks equal to the action level of 1×10^{-5}. Moving the eleven dioxins from the non-volatile TOE fraction to the COPC list also did not cause unacceptable levels of PCDDs and PCDFs in breast milk. For the on-site and off-site evaluation locations, the predicted infant dioxin and furan exposure was below the DEQ action level of 0.25 pg-TEQ/kg-day for all exposure scenarios.

For Special Case 5 the base model was modified to remove the exposure pathways that only occur during incineration operations. The exposure pathways removed were inhalation exposure, above ground produce exposure by direct deposition of particles, and air-to leaf transfer. Results from Special Case 5 reveal a reduction in on-site chronic risks (cancer and non-cancer) by between 60% and 70% over the base model. The resulting on-site non-cancer risks are below the DEQ action level, but the cancer risks are still more than an order of magnitude above the action level.

The assumptions included in Special Cases 3, 4, and 5 were combined in the Special Case 6 analysis. Special Case 6 represents site conditions that more closely reflect actual operations than those used in the base model. The Special Case 6 model predicts chronic off-site risks (both cancer and non-cancer) below the DEQ action levels. The infant average daily dose for dioxins and furans for Case 6 were also below their action levels for all evaluation locations and exposure scenarios. On-site chronic cancer risks are still more than an order of magnitude above action levels, but on-site non-cancer risks are below their action level.

From these results it is evident that the off-site risks (both chronic cancer and non-cancer risks) reported for the base model are reduced to values below action levels by including more accurate estimates of chemical agent and dioxin and furan emissions. These modified emission values are based on experimental measurements of stack emissions which were not included in the base model. Including this data creates emission rates that more accurately estimate the potential levels of these compounds being released by the UMCDF to the environment. On-site cancer risks are also reduced by these improved estimates, but still remain above action levels and so are still of concern to the CTUIR. In contrast, on-site non-cancer risks are below action levels with the improved data set represented by Special Case 6.

From the human health risk results it is evident that future risk management activities at the UMCDF should include an attempt to speciate the non-volatile TOE fraction and to determine its chemical composition and its true toxicity. In addition, site sampling should be conducted within the immediate region of the UMCDF to ensure residual contamination does not create unacceptable risks for those who will be using these lands after closure. Conclusions based on the ecological risk results will be presented in a later draft of this report.

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A Appendix A – EnviroMet Air Dispersion and Deposition Modeling Report

DRAFT - Revision 0 | September 27, 2007

DRAFT

Documentation of Air Dispersion and Deposition Modeling

UMCDF Post-Trial Burn Risk Assessment

Prepared by EnviroMet, LLC
Cherry Hill, NJ

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1.0 INTRODUCTION

The United States Army Center for Health Promotion and Preventative Medicine (USACHPPM) is conducting the Post-Trial Burn Risk Assessment (PostRA) for the Umatilla Chemical Agent Disposal Facility (UMCDF) at the Umatilla Chemical Depot (UMCD) near Hermiston, Oregon. USACHPPM is utilizing the methodology listed in the PostRA Risk Assessment Work Plan (RAWP) developed in 2004 (Reference 1-1) by the Oregon Department of Environmental Quality (DEQ) as well as EPA's September 2005 *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities* (HHRAP) guidance (Reference 1-2).

This report documents the air dispersion and deposition modeling conducted by EnviroMet to support USACHPPM in developing the UMCDF PostRA. This type of modeling is critical to any risk assessment, since it provides estimates of airborne air pollutant concentration and estimates of air pollutant deposition rates (both on-site and off-site) from the incineration sources and other equipment at the UMCDF. These ambient air concentration and deposition rate data are used by USACHPPM to estimate media concentrations of the various Compounds of Potential Concern (COPCs) under analysis in the PostRA. These media concentrations are then used to estimate risks under relevant exposure scenarios.

The following sections of this report document the data and methodology used to provide the necessary UMCDF PostRA concentration and deposition data. The report includes a description of the facility structure and emissions points, the facility's operation, local terrain and land use surrounding the facility, and a detailed description of the regulatory model and meteorological data input to the model for calculation of the concentration and deposition of pollutants from this facility. A final section will document any deviations from the methodology detailed in the RAWP.

2.0 FACILITY

The UMCD facility, operated by the Department of the Army since 1940, consists of two parts: the UMCD, acting as the storage facility for chemical weapons, and the UMCDF which is a multi-furnace incineration facility designed to dispose of the stockpile of chemical warfare munitions stored at the UMCD. The UMCDF is located near the center of the approximately 19,700 acre UMCD site, with a base elevation of 635 feet above mean sea level. The UMCD is located in northeastern Oregon and encompasses parts of Umatilla and Morrow Counties. The northern boundary of the UMCD is approximately 5 kilometers south of the Columbia River, which forms the border with the state of Washington. The location of this facility with respect to Hermiston, Oregon and the Columbia River is illustrated in Figure 2-1.

The PostRA air dispersion and deposition modeling focuses on the four emission points at the UMCDF which are directly associated with the disposal of chemical weapons. These four emission points are:

1. Common Stack – This 100' stack is designed to handle the combined exhaust gases from the Pollution Abatement System (PAS) of each of the four incinerators at the UMCDF. These four incinerators include 2 Liquid Incinerators (LICs), a Metal Parts Furnace (MPF) and a Deactivation Furnace System (DFS).

2. Brine Reduction Area Pollution Abatement System (BRAPAS) Stack – This 65' stack is designed to handle exhaust from the baghouse associated with the Brine Reduction Area (BRA). The function of the BRA is to process brine from the water treatment system and brine solutions collected in the PAS scrubber tower sumps.

3. Munitions Demilitarization Building (MDB) Stack – This 120' stack is designed to handle exhaust from the heating, venting and cooling (HVC) system that maintains negative pressure to the MDB building. All air from within the MDB is directed through a filter system to remove chemical agent. Once the air has been filtered through the HVC carbon filter, it is then vented to the MDB stack.

4. Laboratory Ventilation (LAB) Stack – This 40' stack is designed to filter exhaust from the HVC system of the Laboratory building, similar to the HVC system of the MDB..

Figure 2-2 is a drawing depicting the general arrangement of the UMCDF including the relative locations of all stacks and buildings specific to the UMCDF site. The information in Figure 2-2 is presented in more detail for the discussion of aerodynamic downwash in Section 8.

Figure 2-1

Location of UMCD and Surroundings (to 10 km)

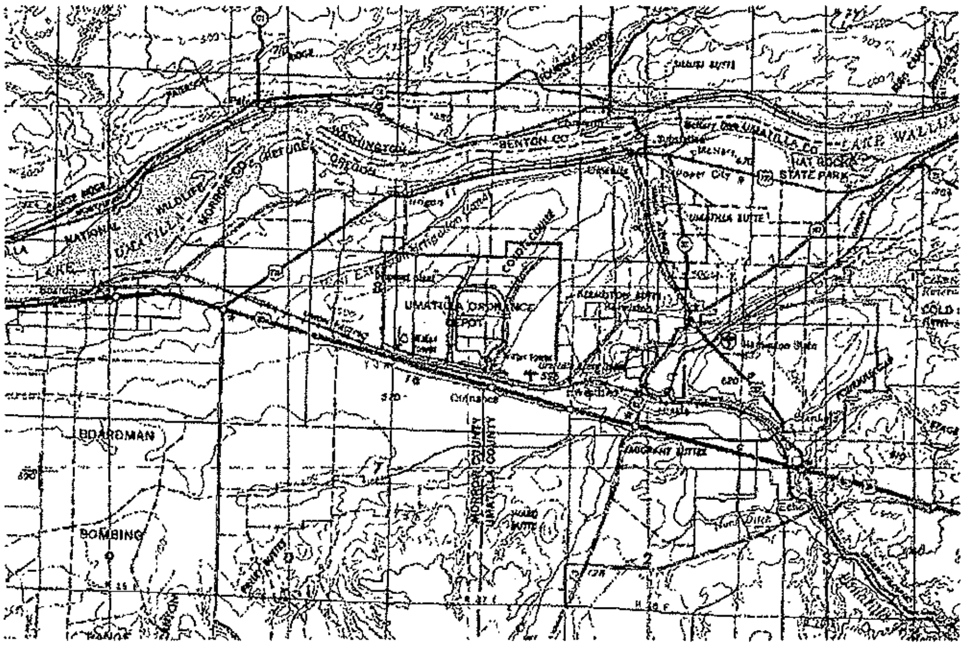
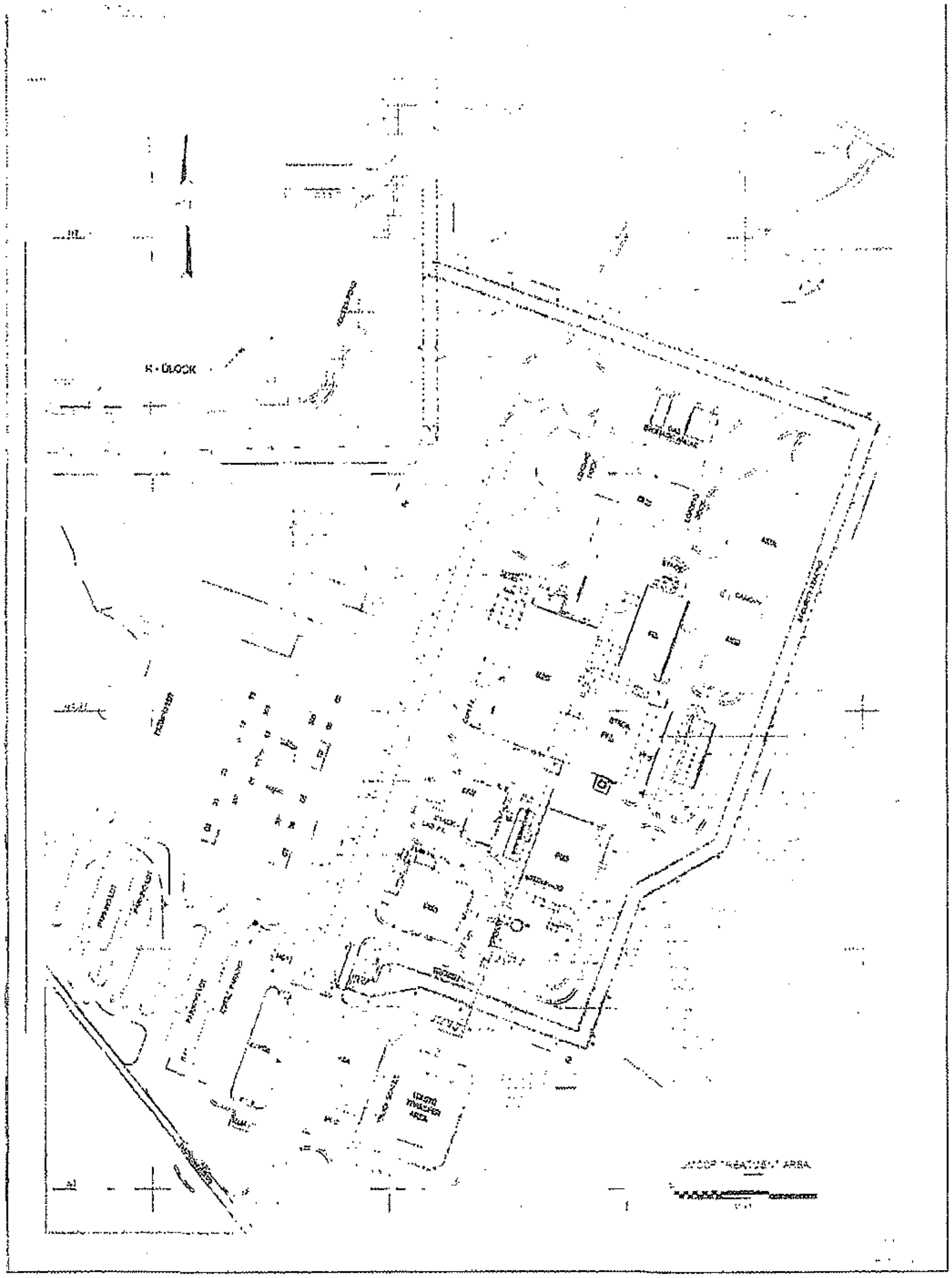


Figure 2-2

Site Plan for the UMCDF



3.0 EMISSIONS AND STACK DATA

For purposes of emissions, it is not practical to individually model each of the hundreds of COPCs that are included on the UMCDF PostRA COPC list. For this analysis, unit emission rates (i.e., 1.0 g/s emission rates) are used in order to determine the unitized emissions and deposition impacts such that these unit emission rate results can be input into risk evaluation software (e.g., RisKit, IRAP-h View, etc) for final determination of overall risk through several pathways. For this reason, each of the three COPC phases (particle, vapor, particle-bound) were modeled using a 1.0 g/s emission rate.

Stack parameters for each of the four emission points at the UMCDF are shown in Table 3-1. These stack parameters are based on initial parameters developed by Tetra Tech, Inc, as reported in their Technical Memorandum #6 (Reference 3-1). Many of these preliminary stack parameters have undergone revision since Tetra Tech's initial modeling effort. These revised stack parameters involve updates to the Common Stack flow characteristics (Reference 3-2), as well as revisions to the flow characteristics of the BRA, LAB, and MDB stacks (Reference 3-3). These revisions were a result of extensive discussion between several parties including the DEQ, the site Field Office, Washington Demilitarization Company (WDC), USACHPPM, the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), and EnviroMet. All of these revisions have been approved by the DEQ.

Table 3-1

Stack Parameters for UMCDF Sources

Parameter	Common Stack	BRAPAS Stack	MDB Stack	LAB Stack
UTM Easting (m)	312042.7	311992.4	312077.4	311924.1
UTM Northing (m)	5079907.0	5079763.5	5079999.5	5079843.5
Stack Base Elevation				
(m)	200	196	200	197
(ft)	656	643	656	646
Stack Height				
(m)	30.5	19.8	36.6	12.2
(ft)	100.0	65.0	120.0	40.0
Stack Exit Temp.				
(°F)	176.0	287.3	69.5	78.5
(K)	353.2	415.0	294.0	299.0
Exit Diameter				
(m)	1.52	1.37	2.19	0.64
(ft)	5.00	4.50	7.19	2.10
Exit Velocity				
(m/sec)	3.5	14.7	12.7	21.0
(ft/sec)	11.5	48.2	41.7	68.9
Exit Flow Rate				
(ACFM)	13,434	45,916	101,364	14,314
(ACMM)	380	1,301	2,870	405

4.0 MODEL SELECTION

The AERMOD modeling system was established as a preferred model for air dispersion and deposition modeling through promulgation of a revised Appendix W to 40 CFR 51 on November 9, 2005 (Reference 4-1). AERMOD is designed primarily for regulatory use and was developed through a collaborative effort between the US EPA and the American Meteorological Society, which formed a working group titled AERMIC (AMS/EPA Regulatory Model Improvement Committee). AERMOD represents a significant step beyond its predecessor, ISC, because it incorporates an improved representation of the physical processes of the lower atmosphere and generally produces predicted concentrations more in agreement with observations. The PostRA air dispersion and deposition modeling analysis uses the latest version the AERMOD modeling system (Version 07026) which has also incorporated algorithms for deposition which have similarly been approved for use by EPA. The AERMOD modeling system contains three discrete modules, AERMOD, AERMET and AERMAP. A brief description of each is found below.

AERMAP is the terrain pre-processor for the AERMOD modeling suite. This module takes the USGS DEM data and extracts receptor elevations, as well as calculating a "hill height" based upon local terrain for later use in AERMOD for determination of terrain-forced plume splitting.

AERMET is the meteorological data pre-processor for the AERMOD modeling suite. This module assimilates the input of data from both surface and upper air observations, as well as land use parameters to develop location-specific dispersion characteristics and atmospheric profile data for a given site.

AERMOD is the dispersion model code itself. This module uses the site-specific AERMET input, coupled with the terrain and hill height data from AERMAP to conduct receptor-by-receptor dispersion modeling and deposition calculations on an hour-by-hour basis.

For specific descriptions of the inputs to the AERMAP and AERMET modules, please refer to Sections 5 through 7, while a detailed description of the specific AERMOD model options are detailed in Section 9.

5.0 METEOROLOGICAL DATA

EnviroMet developed the AERMET meteorological data files for use in AERMOD. These files were provided to the DEQ in December 2006 (Reference 5-1). This sections describes the development of those data files.

For use in the AERMET meteorological pre-processor, input data are necessary for three separate types of data; (1) hourly surface observations, (2) twice-daily upper-air data, and (3) land use data for the 3-km area surrounding the surface observation station. While the land use data will be discussed in Section 7, the surface and upper-air data are described below.

Surface Data

As required by the DEQ, the UMCDF installed and operated an onsite 30-meter meteorological tower to gather the required surface data for use in dispersion modeling. This tower, operational from 1995 – 2000, recorded the following parameters:

- Ambient Temperature – recorded at 2, 10, and 30 meters in height.
- Temperature Difference – from 2 to 10 meters, and 2 to 30 meters.
- Wind Direction – recorded at 10 and 30 meters in height.
- Wind Speed – recorded at 10 and 30 meters in height.
- Standard Deviation of Wind Direction – recorded at 10 and 30 meters in height.
- Precipitation – measured at near-surface.
- Barometric Pressure – measured at 1.5 meters.
- Solar Radiation – measured at 1.5 meters.

With this hourly surface observation dataset, the AERMET pre-processor has all the data necessary to properly calculate a vertical profile for the site for use in the AERMOD code. While this tower was quite reliable, as with most meteorological datasets of this length, data recovery was less than 100%. Table 5-1 shows the number of hours per year of incomplete data records from the tower. This table also shows that on an annual basis the tower easily maintains a greater than 90% condition for applicable meteorological datasets as outlined in the Meteorological Monitoring Guidance for Regulatory Modeling Applications (Reference 5-2). Such data quality extends down to the monthly level, as well, with July 1995 having the lowest complete data record at 90.05% (74 partial data records out of 744 hours).

To complete the meteorological database it was necessary to utilize meteorological data from a nearby National Weather Service (NWS) station to fill in the missing data for the few hours of missing tower data. The station used to fill in any missing data was Pendleton, Oregon (KPDT – WBAN #24155). This station is located approximately 44 kilometers to the east-southeast, is an NWS first-order station, and utilizes the Automated Surface Observing System (ASOS) data gathering system, with an anemometer height equal to that of the lowest level of the UMCDF tower (10 meters). As a backup for the missing tower data, the Pendleton site was able to provide for all missing hourly data from the UMCDF tower. Including this data, Figures 5-1 and 5-2 depict the 6-year cumulative wind frequency for the two wind data levels (10 meters and 30 meters respectively) at the UMCDF tower. Due to potential over-estimation by AERMOD due to very low wind speeds, any wind speed less than 0.4 m/s was assumed to be calm.

Upper-Air Data

For the purpose of creating vertical profile data for dispersion, AERMET requires upper-air data on at least a twice-daily frequency. For this facility, there are two options, the Hanford wind profiler, and the nearest NWS Radiosonde data station at Spokane, Washington. While the Hanford wind profiler is somewhat nearer to the site than is the Spokane station, there are several concerns regarding the quality of the data at Hanford, such that this site was ruled out. Such issues include missing data, a very simplistic algorithm for inferring mixing height based on profiled wind speed, and extremely low mixing height reports (10 meters) which would give false hourly concentrations of zero from all sources.

For these reasons, the NWS Radiosonde data site at Spokane, Washington (WBAN – 04106) was used for upper-air data. This site provides twice-daily upper-air soundings, with all data having undergone proper quality-assurance by the National Climactic Data Center (NCDC). The 6-year dataset for this modeling includes years 1995 – 2000.

Table 5-1

Data Completeness of the UMCDF Meteorological Tower

Data Year	# of Incomplete Hours	Total Hours	Data Completeness
1995	120	8760	98.63%
1996	58	8784	99.35%
1997	73	8760	99.17%
1998	83	8760	99.05%
1999	21	8760	99.76%
2000	25	8784	99.72%

Figure 5-1

Wind Distribution Rose for 1995-2000

UMCDF 10m Tower Data

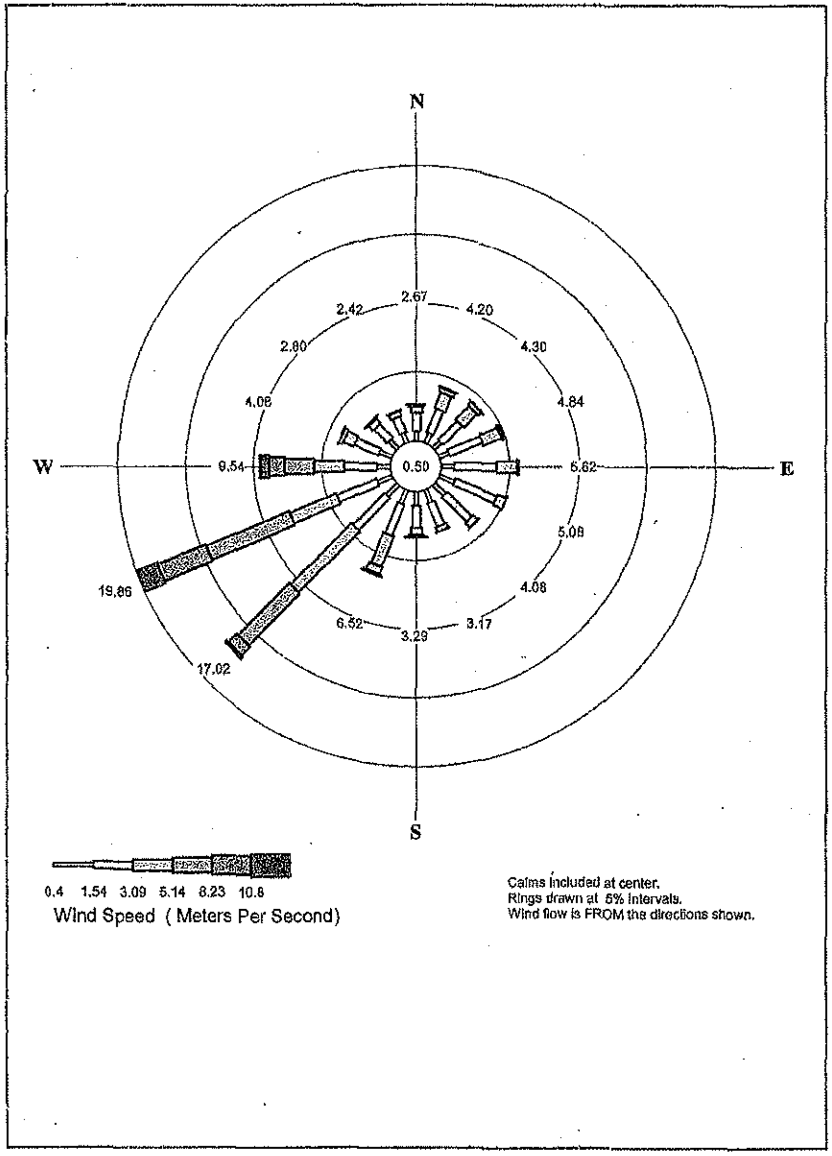
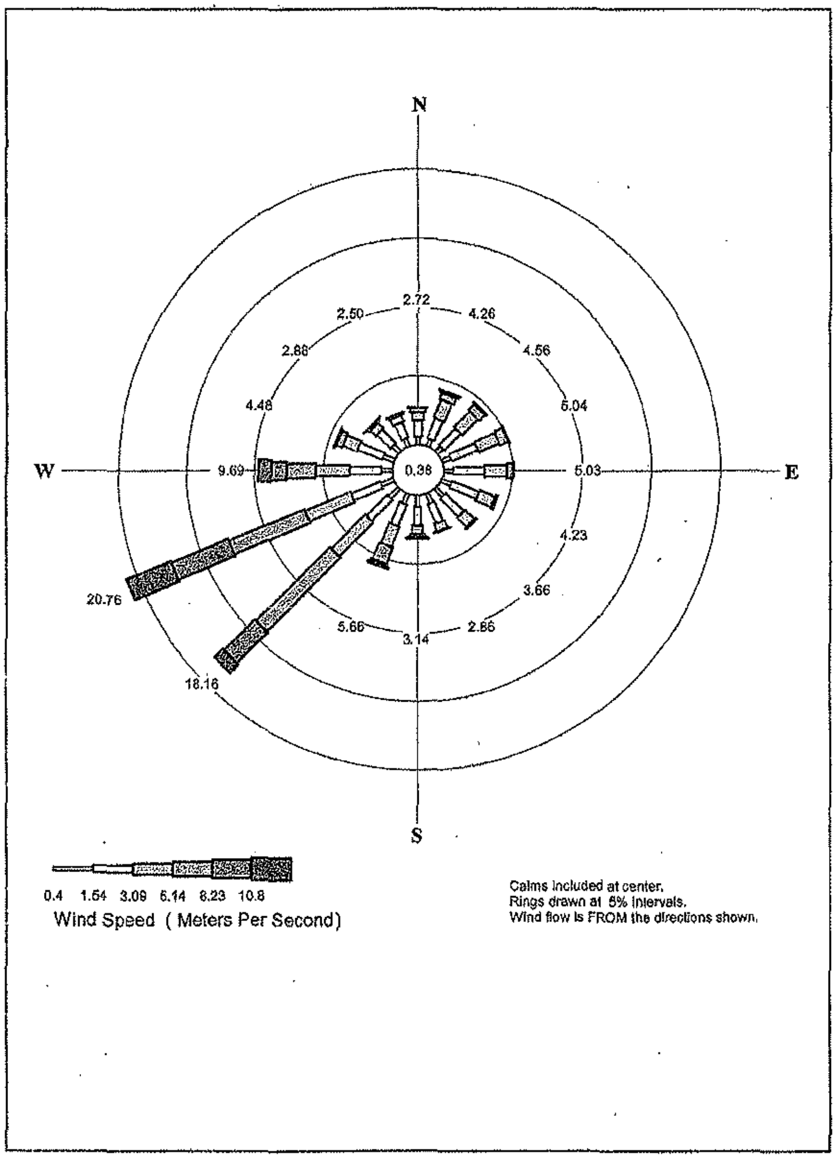


Figure 5-2

Wind Distribution Rose for 1995-2000

UMCDF 30m Tower Data



Calms included at center.
Rings drawn at 5% intervals.
Wind flow is FROM the directions shown.

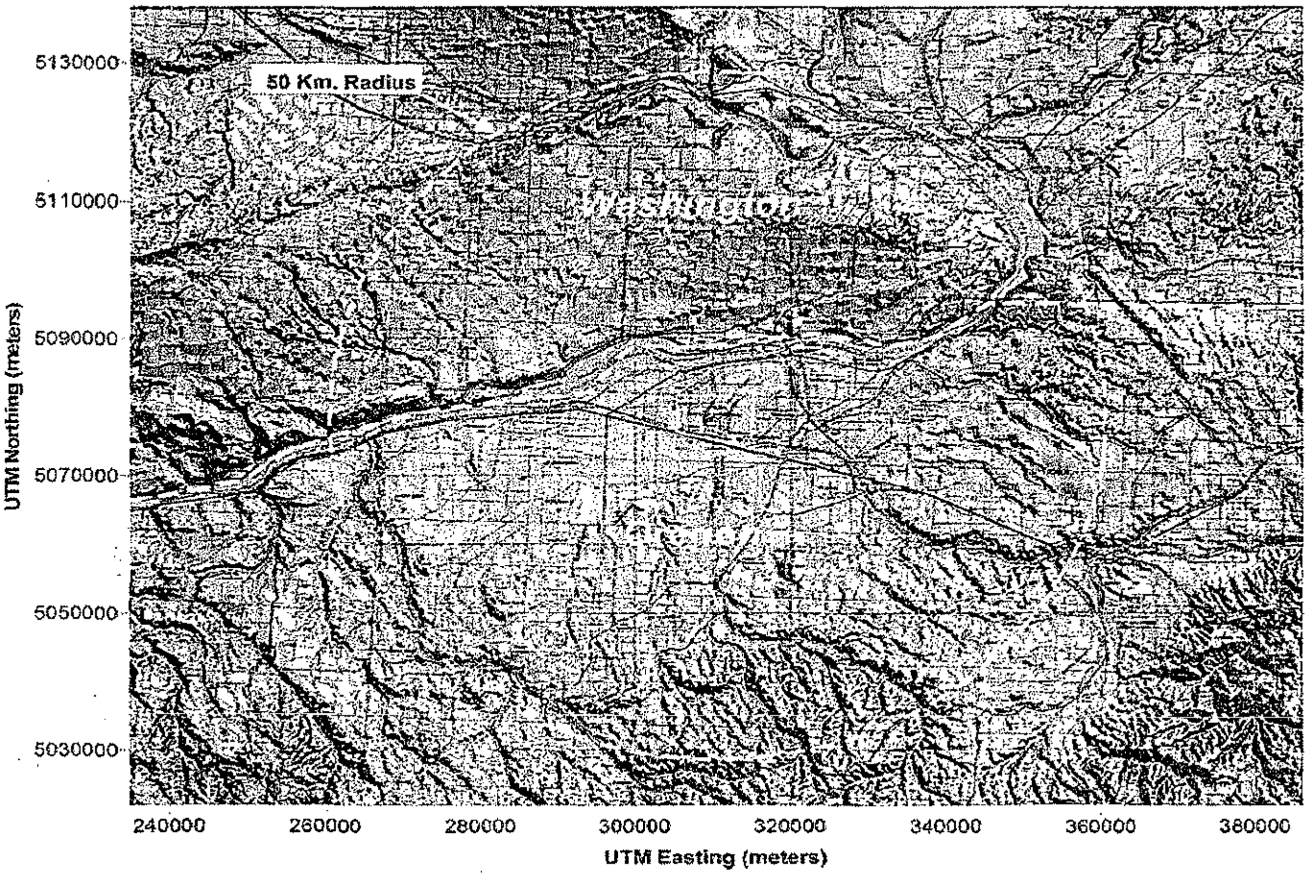
6.0 TOPOGRAPHY

The UMCDF is located on the border between Morrow and Umatilla Counties in northern Oregon, approximately 5 km south of the Columbia River. It is also located approximately 6 km west of Hermiston, OR, and just north of I-84. The UMCDF sources are located at a base elevation of 635 feet above mean sea level (msl). Terrain in the immediate vicinity of the facility is comprised of gently rolling hills with a sloping trend from south to north towards the Columbia River. Within the 50-kilometer region, however, terrain reaches over 1640 feet msl towards the north (Horse Heaven Hills), and east (Blue Mountain foothills), with elevations to the south reaching to approximately 3300 feet above msl (Franklin Hill). Toward the west, terrain is generally more gently sloping as it follows the Columbia River toward the Pacific Ocean. Figure 6-1 provides topographic information for the area surrounding the site.

From a modeling perspective, the AERMOD pre-processor AERMAP uses data from the United States Geological Service (USGS) to determine elevations at all receptors within the modeling domain, and account for this topography. AERMAP also incorporates a "hill height" calculation for determination of plume/terrain interaction. A further description of this data and AERMAP can be found in Section 9.

Figure 6-1

Terrain within the 50-km Modeling Domain of the UMCDF



7.0 LAND USE

In addition to the meteorological data outlined in Section 5, the meteorological pre-processor for AERMOD, called AERMET, requires the development of three micro-meteorological parameters for dispersion calculations: albedo; surface roughness; and, Bowen ratio. These parameters differ based on the land use present for a given analysis. For the UMCDF, these land use characteristics were based upon visual inspection of the site, out to a distance of 3 kilometers from the UMCDF stack center point. The UMCDF site is located in an area which receives less than 10" of precipitation per year (the climatological definition of a desert), and the surrounding terrain within the UMCD fenceline (and therefore within 3-km) is dominated by low shrubs and uniform desert-like ground cover. For this reason, the dispersion characteristics for the UMCDF site were seasonally adjusted based on 1 single sector of desert shrubland. The values for albedo, Bowen ratio, and surface roughness were assigned based upon the values listed in the AERMET User's Guide (Reference 7-1). These specific values, as shown in Table 7-1, were then input to AERMET. Since the classification is of "desert" already, it was determined that conditions could only be considered "wet" or "dry" if the seasonal average (over the 6-year period) showed a significant trend. During this 6-year period of 1995-2000, the winter months were classified as "wet" with approximately 35% of the annual moisture, spring was average (~ 26%), with summer and autumn classified as "dry" (each with approximately 19.5% of annual precipitation).

As would be expected in this particular case, with the exception of the immediate vicinity of the UMCDF, the area surrounding the project is completely rural, dominated by low shrubs and desert-like ground cover. The land use shows up as "Industrial" due to the UMCD storage bunkers, however these bunkers are earthen covered. For dispersion modeling sake, it is necessary to classify the ground cover, not the zoning. For this reason, no sources were designated as "urban" sources in the modeling analysis to assess impacts from the UMCDF.

While it is only necessary for dispersion modeling to analyze land use to a 3-kilometer distance for input to the AERMET, for deposition calculations, it is also necessary to analyze the regional (50-km) dominant land use characteristics in 10-degree sectors for input into AERMOD. For such a large area, visual inspection is impossible. For this analysis, it was necessary to use USGS Land Use/Land Classification (LULC) gridded data. These data products characterize the dominant land use at 90-meter resolution for 1-degree latitude-longitude quadrangles. Using the GIS software package ArcView, it is possible to determine the dominant land use characteristic for each of the 36 discrete 10-degree wedges of land use within 50 km of the UMCDF (shown in Figure 7-1). Table 7-2 reports the dominant land use for each of these 10-degree wedges, as input to AERMOD, as well as the land use codes used by AERMOD.

Table 7-1

Characteristic Values for Seasonal Desert Shrubland Sectoring of AERMET Dispersion Parameters at UMDF

Season	Parameter	Value
Winter	Bowen Ratio	6.0
	Surface Roughness	0.15 m
	Albedo	0.45
Spring	Bowen Ratio	3.0
	Surface Roughness	0.30 m
	Albedo	0.30
Summer	Bowen Ratio	4.0
	Surface Roughness	0.30 m
	Albedo	0.28
Autumn	Bowen Ratio	10.0
	Surface Roughness	0.30 m
	Albedo	0.28

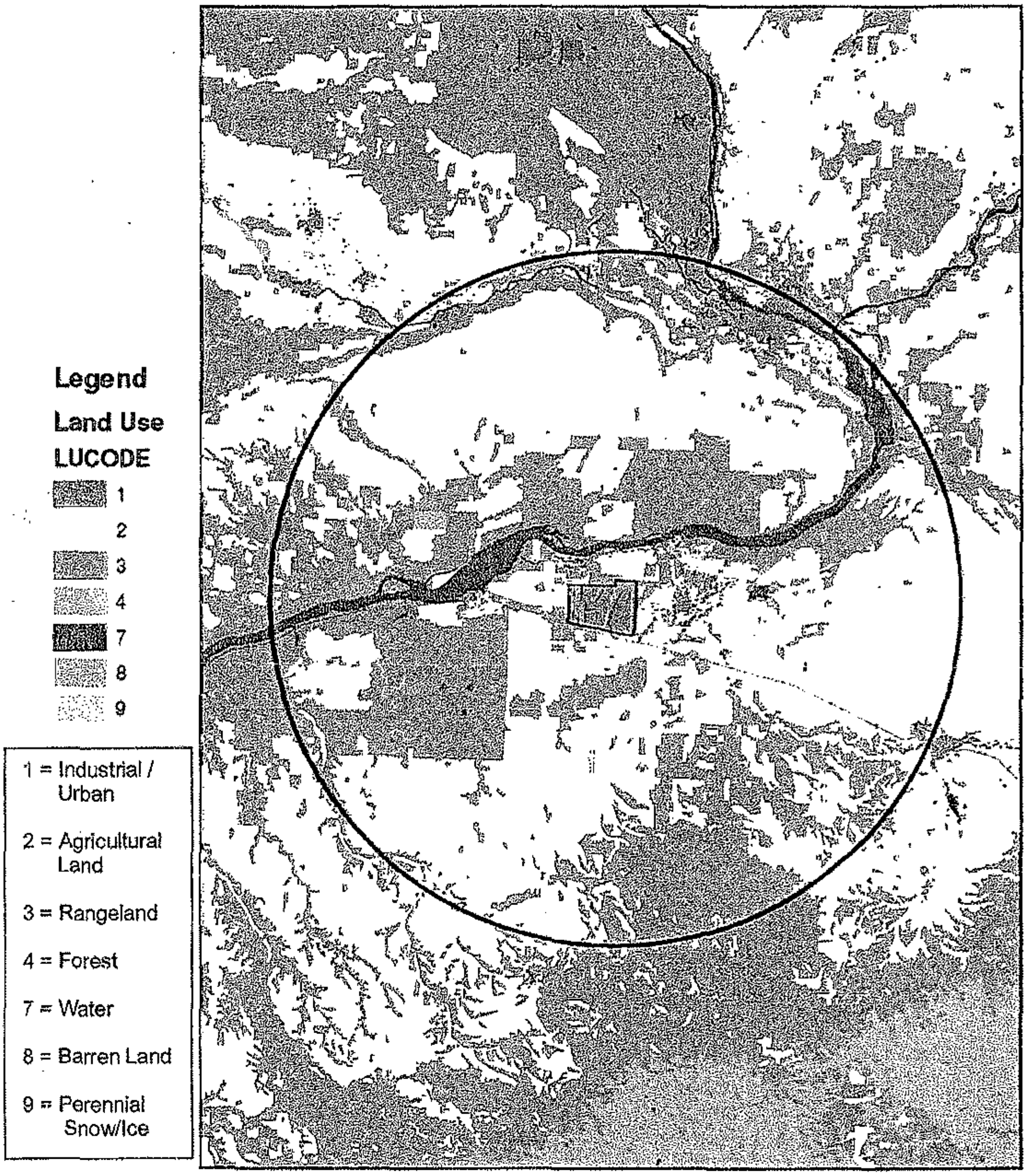
Table 7-2

Land Use Codes and Dominant Land Use for the 36 Discrete 10-Degree AERMOD Wedges for Deposition Calculation at UMCDF

Downwind Direction (degrees)	Dominant Land Use Category
0-10	2
10-20	3
20-30	2
30-40	2
40-50	2
50-60	3
60-70	3
70-80	3
80-90	2
90-100	2
100-110	2
110-120	2
120-130	2
130-140	2
140-150	2
150-160	3
160-170	3
170-180	3
180-190	2
190-200	2
200-210	2
210-220	2
220-230	2
230-240	3
240-250	3
250-260	3
260-270	3
270-280	3
280-290	3
290-300	2
300-310	2
310-320	2
320-330	2
330-340	2
340-350	2
350-360	2

Figure 7-1

LULC Raw Land Use Data Within 50 Kilometers of the UMCDF



8.0 GOOD ENGINEERING PRACTICE STACK ANALYSIS

The federal Clean Air Act mandates that stack heights greater than the "Good Engineering Practice" (GEP) height cannot be used in dispersion modeling studies unless the stack height was in existence prior to December 31, 1970. The GEP height is the height necessary to avoid excessive ground level concentrations in the vicinity of a stack due to atmospheric aerodynamic downwash processes. This height is a minimum of 65 meters and may be based on a mathematical formula taking account nearby facility structure dimensions or it may be determined through fluid (wind tunnel) modeling.

Since the stack heights for the UMCDF sources vary from 12.20 meters to 36.58 meters, they all fall below the 65 meter criterion for the Clean Air Act, and will be modeled at their respective heights. The location and height of the stacks is such that certain structures of significant size could cause aerodynamic downwash effects on emissions from the boiler stacks. A plot plan showing the four stacks and all significant structures in the vicinity is provided in Figure 8-1.

These structures have the potential for causing aerodynamic downwash of emissions from the stacks. Dimensional information for these structures was employed in order to calculate the formula GEP stack height.

Formula GEP stack height is calculated as follows:

$$GEP = BH + 1.5L$$

where:

BH: is the height of the structure.
L: is the lesser of the Maximum Projected Width or height of the structure.

A direction-specific downwash analysis has been conducted employing the EPA's Building Profile Input Program (BPIP-PRIME) as contained in Bowman Environmental's BEE-Line software, BEEST for Windows (Reference 8-1). The BPIP (Version 95086) program was used to determine the area of influence for direction-dependent building downwash and to generate the direction-specific building dimensions for input into AERMOD for this analysis. Table 8-1 provides UTM coordinates and structure heights of all structures used as input to the BPIP-PRIME analysis in a tabular form. Table 8-2 provides the direction-dependent building downwash parameters for the Common Stack at the UMCDF. Tables 8-3 through 8-5 provide similar information for the BRA, MDB, and LAB stacks respectively, as calculated by the BPIP-PRIME for use in the modeling analysis.

A stack calculated to be below the GEP formula stack height is subjected to aerodynamic downwash. This potentially increases the predicted impacts, especially in the vicinity of the GEP formula structure. For all stacks at the UMCDF, the controlling structure is the PAS building (BH = 28 meters, L = 28 meters, GEP = 70 meters). This formula GEP is greater than the height of any of the stacks at the UMCDF, such that all are subject to downwash.

Table 8-1

UTM Coordinates and Structure Heights for UMCDF Facility Buildings

Structure	BPIP-PRIME Structure Name	Height (m)	# of Corners	UTM Easting (m)	UTM Northing (m)
Container Handling Building	CHB	7.05	12	312006.9	5080010
				312029.8	5080002
				312036.6	5080019
				312045.8	5080016
				312056.5	5080046
				312073.2	5080040
				312081.6	5080063
				312022.2	5080085
				312013.8	5080062
				312038.2	5080053
				312029.9	5080030
				312016.1	5080034
Carbon Filter System Building	FIL	6.1	4	312051.9	5080001
				312032.1	5079948
				312059.5	5079938
				312078.6	5079992
Munitions Demilitarization Building	MDB	14.6	6	311977.2	5079988
				311948.3	5079904
				311984.8	5079891
				311995.5	5079917
				311998.5	5079916
				312018.4	5079972
Pollution Abatement Systems	PAS	28	4	312019.1	5079936
				312000.1	5079885
				312033.6	5079873
				312053.4	5079923
Laboratory	LAB	6.1	4	311916.2	5079883
				311910.2	5079865
				311954.3	5079849
				311960.4	5079867
Process and Utilities Building	PUB	11.95	4	311985.6	5079856
				311966.5	5079804
				312003.9	5079791
				312022.9	5079842

Table 8-1 (cont)

UTM Coordinates and Structure Heights for UMCDF Facility Buildings

Structure	BPIP-PRIME Structure Name	Height (m)	# of Corners	UTM Easting (m)	UTM Northing (m)
Personnel and Maintenance Building	PMB	5.4	8	311899.5	5079818
				311891.9	5079798
				311887.3	5079800
				311882	5079783
				311923.9	5079767
				311940.6	5079812
				311923.1	5079818
				311920.8	5079810
South End Container Handling Bldg.	CHBSOUTH	18.3	4	312012.3	5080008
				312000.8	5079979
				312018.4	5079972
				312029.8	5080002
West End Container Handling Bldg.	CHBWEST	10.5	4	312003.1	5080066
				312013.8	5080062
				312026	5080095
				312014.5	5080099
East End Container Handling Bldg.	CHBEAST	10.5	4	312073.2	5080040
				312083.9	5080036
				312096.1	5080070
				312084.6	5080073
Brine Reduction Area PAS	BRAPAS	11.43	4	311987.6	5079774
				311982.1	5079761
				311985.4	5079760
				311990.9	5079773

Table 8-2

BPIP-PRIME Output for Common Stack

Parameter	Dimension (meters)					
BUILDHGT	28.00	28.00	28.00	28.00	28.00	28.00
BUILDHGT	28.00	28.00	28.00	28.00	28.00	28.00
BUILDHGT	28.00	28.00	28.00	28.00	28.00	28.00
BUILDHGT	28.00	28.00	28.00	28.00	28.00	28.00
BUILDHGT	28.00	28.00	28.00	28.00	28.00	28.00
BUILDHGT	28.00	28.00	28.00	28.00	28.00	28.00
BUILDWID	45.91	37.09	44.16	51.74	57.75	62.01
BUILDWID	64.38	64.79	63.24	59.76	54.49	59.67
BUILDWID	63.47	65.35	65.24	63.15	59.15	53.34
BUILDWID	45.91	37.09	44.16	51.74	57.75	62.01
BUILDWID	64.38	64.79	63.24	59.76	54.49	59.67
BUILDWID	63.47	65.35	65.24	63.15	59.15	53.34
BUILDLEN	59.76	54.49	59.67	63.47	65.35	65.24
BUILDLEN	63.15	59.15	53.34	45.91	37.09	44.16
BUILDLEN	51.74	57.75	62.01	64.38	64.79	63.24
BUILDLEN	59.76	54.49	59.67	63.47	65.35	65.24
BUILDLEN	63.15	59.15	53.34	45.91	37.09	44.16
BUILDLEN	51.74	57.75	62.01	64.38	64.79	63.24
XBADJ	-35.14	-35.15	-40.28	-44.18	-46.74	-47.88
XBADJ	-47.57	-45.81	-42.66	-38.21	-32.60	-35.03
XBADJ	-36.84	-37.52	-37.07	-35.49	-32.83	-29.17
XBADJ	-24.63	-19.34	-19.39	-19.29	-18.61	-17.36
XBADJ	-15.58	-13.33	-10.68	-7.70	-4.49	-9.13
XBADJ	-14.91	-20.23	-24.94	-28.89	-31.97	-34.07
YBADJ	15.26	14.06	12.95	10.97	8.65	6.06
YBADJ	3.30	0.43	-2.45	-5.26	-7.91	-10.45
YBADJ	-12.45	-14.07	-15.26	-15.99	-16.24	-15.99
YBADJ	-15.26	-14.06	-12.95	-10.97	-8.65	-6.06
YBADJ	-3.30	-0.43	2.45	5.26	7.91	10.45
YBADJ	12.45	14.07	15.26	15.99	16.24	15.99

Table 8-3

BPIP-PRIME Output for BRA Stack

Parameter	Dimension (meters)					
BUILDHGT	11.43	0.00	11.95	11.43	11.43	11.43
BUILDHGT	11.43	11.43	11.43	11.43	11.43	11.43
BUILDHGT	11.43	11.95	11.95	11.95	11.95	28.00
BUILDHGT	28.00	28.00	11.95	11.43	11.43	11.43
BUILDHGT	11.43	11.43	11.43	11.43	11.43	11.43
BUILDHGT	11.43	11.95	11.95	11.95	11.43	11.43
BUILDWID	6.59	0.00	48.60	7.76	9.83	11.60
BUILDWID	13.02	14.04	14.63	14.78	14.48	14.98
BUILDWID	15.02	68.18	68.27	66.28	62.28	53.34
BUILDWID	45.91	37.09	48.60	7.76	9.83	11.60
BUILDWID	13.02	14.04	14.63	14.78	14.48	14.98
BUILDWID	15.02	68.18	68.27	66.28	10.82	8.84
BUILDLEN	14.78	0.00	61.85	15.02	14.61	13.75
BUILDLEN	12.48	10.82	8.84	6.59	4.14	5.46
BUILDLEN	7.76	61.96	65.90	67.83	67.71	63.24
BUILDLEN	59.76	54.49	61.85	15.02	14.61	13.75
BUILDLEN	12.48	10.82	8.84	6.59	4.14	5.46
BUILDLEN	7.76	61.96	65.90	67.83	14.04	14.63
XBADJ	-4.81	0.00	21.76	-8.52	-9.50	-10.19
XBADJ	-10.57	-10.62	-10.36	-9.78	-8.90	-9.71
XBADJ	-10.79	-75.39	-83.68	-89.42	-92.44	-172.67
XBADJ	-174.68	-171.38	-83.61	-6.50	-5.11	-3.56
XBADJ	-1.91	-0.20	1.52	3.19	4.77	4.25
XBADJ	3.02	13.44	17.78	21.58	-2.38	-3.65
YBADJ	6.49	0.00	27.97	6.91	6.63	6.14
YBADJ	5.48	4.64	3.67	2.58	1.41	0.20
YBADJ	-1.01	40.01	31.74	22.50	12.59	34.29
YBADJ	9.34	-15.89	-27.97	-6.91	-6.63	-6.14
YBADJ	-5.48	-4.64	-3.67	-2.58	-1.41	-0.20
YBADJ	1.01	-40.01	-31.74	-22.50	5.21	5.94

Table 8-4

BPIP-PRIME Output for MDB Stack

Parameter	Dimension (meters)					
BUILDHGT	28.00	28.00	28.00	28.00	28.00	18.30
BUILDHGT	18.30	18.30	18.30	18.30	0.00	0.00
BUILDHGT	0.00	0.00	6.10	6.10	10.50	10.50
BUILDHGT	10.50	14.60	14.60	14.60	6.10	6.10
BUILDHGT	6.10	6.10	14.60	14.60	0.00	0.00
BUILDHGT	0.00	0.00	6.10	6.10	6.10	6.10
BUILDWID	45.91	37.09	44.16	51.74	57.75	34.22
BUILDWID	35.93	36.54	36.04	34.45	0.00	0.00
BUILDWID	0.00	0.00	62.35	58.79	27.67	22.86
BUILDWID	17.35	93.76	106.37	68.04	52.76	57.92
BUILDWID	61.32	62.85	135.10	129.36	0.00	0.00
BUILDWID	0.00	0.00	62.35	58.79	53.45	46.48
BUILDLEN	59.76	54.49	59.67	63.47	65.35	36.61
BUILDLEN	35.13	32.57	29.03	24.61	0.00	0.00
BUILDLEN	0.00	0.00	57.92	61.32	36.63	37.33
BUILDLEN	36.89	119.72	125.24	127.13	64.02	62.35
BUILDLEN	58.79	53.45	105.15	100.24	0.00	0.00
BUILDLEN	0.00	0.00	57.92	61.32	62.85	62.48
XBADJ	-132.26	-133.94	-137.73	-137.34	-132.78	-76.75
XBADJ	-79.13	-79.10	-76.66	-71.90	0.00	0.00
XBADJ	0.00	0.00	-14.01	-10.08	-71.45	-73.83
XBADJ	-73.96	14.21	21.90	28.92	4.08	2.86
XBADJ	1.56	0.21	24.01	10.40	0.00	0.00
XBADJ	0.00	0.00	-43.91	-51.23	-57.00	-61.04
YBADJ	33.36	15.02	-3.26	-21.92	-39.92	22.82
YBADJ	12.31	1.43	-9.49	-20.12	0.00	0.00
YBADJ	0.00	0.00	-34.04	-30.96	16.70	7.23
YBADJ	-2.46	-43.35	-27.85	-35.35	8.87	14.95
YBADJ	20.57	25.58	59.02	67.58	0.00	0.00
YBADJ	0.00	0.00	34.04	30.96	26.94	22.10

GDSEASON) apart from that done in Section 5 for AERMET. For AERMOD purposes of dry gas deposition, the five seasonal categories are:

Seasonal Category 1: Midsummer with lush vegetation
Seasonal Category 2: Autumn with unharvested cropland
Seasonal Category 3: Late autumn after frost and harvest, or winter with no snow
Seasonal Category 4: Winter with snow on ground
Seasonal Category 5: Transitional spring with partial green coverage or short annuals

The monthly distribution of these seasonal categories can be found in Table 9-1.

The final input necessary for the characterization of vapor deposition are the four gas deposition variables of diffusivity in air (D_a), diffusivity in water (D_w), cuticular resistance term (R_c), and the Henry's Law coefficient (H). These parameters are COPC-specific, however due to the need to model hundreds of COPCs, modeling of each of these compounds individually is unrealistic. For this reason, each vapor phase COPC was analyzed for these four parameters, and the most conservative value was selected as representative for all. For conservatism, the highest diffusivity in air (atmospheric diffusion), highest diffusivity in water (greatest deposition on water surfaces), lowest cuticular resistance (high plant deposition), and smallest Henry's Law coefficient (greater affinity towards deposition of vapor to surface water) were selected to maximize deposition impacts. These values are:

Diffusivity in air: 0.203 cm^2/s
Diffusivity in water: 7.06×10^{-6} cm^2/s
Cuticular resistance: 0.256 s/cm
Henry's Law coefficient: 0.00938 $Pa\text{-}m^3/mol$

These gas deposition variables can be found in the Deposition Parameterizations for the Industrial Source Complex (ISC3) Model (Reference 9-3).

Particle and Particle-Bound Phase

For modeling deposition in these two phases with AERMOD, information must be known regarding the particle size distribution from the particular sources in order for the model to calculate deposition velocities. The AERMOD model includes two methods for handling dry deposition of particulate emissions. Method 1 is used when a significant fraction (greater than about 10 percent) of the total particulate mass has a diameter of 10 µm or larger. The particle size distribution must be known reasonably well in order to use Method 1. Method 2 is used when the particle size distribution is not well known and when a small fraction (less than 10 percent of the mass) is in particles with a diameter of 10 µm or larger. The model also must have scavenging coefficients for liquid and frozen precipitation in order to model these deposition pathways.

Since three of the stacks (the LAB, Common, and MDB stacks) are equipped with high-efficiency particulate air (HEPA) filtration systems, these three sources were modeled using Method 2 within AERMOD, conservatively chosen with an average particle size of 0.1 microns. Using these values, the liquid scavenging coefficient can be derived using the User's Guide for the Industrial Source Complex (ISC3) Dispersion Models – Volume II (Reference 9-4). Figure 1-11

(p. 1-85), shows the wet scavenging rate (liquid) for particles based upon particle size. For frozen precipitation, the 2005 EPA HHRAP states that the value for the scavenging coefficient of ice should be taken as one-third the value of the wet scavenging. For the Method 2 sources, the liquid scavenging coefficient was determined by the ISC3 manual to be 1.7×10^{-4} hr/s-mm, and the frozen scavenging coefficient was calculated to be 5.7×10^{-5} hr/s-mm.

For the BRA stack, however, the brine reduction process leaves larger particulate matter in the exhaust stream such that this source deposition is modeled using Method 1. In order to use this method, BRA Performance Test data were used (shown in Table 9-2). These data show the mass fraction of the emitted particulate using seven size "bins" of particles. For the particle phase, the mass fraction column is the proper breakdown, however for the particle-bound phase it is the weighted surface area of the particles to which these particular COPCs can affix themselves that is the important factor.

While the effective mass fractions of the emitted particles are different for these two phases, the scavenging coefficients are the same, since this is based on average particle diameter. Using the data in Table 9-2, coupled with the ISC3 User's Guide – Volume II (Reference 9-4), the liquid and frozen scavenging coefficients for input to AERMOD for the particle and particle-bound phases were 4.5×10^{-5} hr/s-mm, and 1.5×10^{-5} hr/s-mm, respectively.

One final option used in this analysis was the keyword WDROTATE. This keyword was used to resolve the difference in model-calculated true north, versus DEM north for the quadrangles used in AERMAP. This difference in registration of the north direction (direction 0 degrees) between these two sources was calculated to be 1.75 degrees. A wind rotation of exactly +1.75 degrees (clockwise) was input into the AERMOD modeling files to account for this subtle difference.

9.4 Difference in Methodology

Several of the methodologies outlined in this document deviate from the RAWP (Reference 1-1). These differences include:

- Use of Land Use to 50 km distance for AERMOD keyword GDLANUSE
- Revision of the Upper-Air station, using Spokane, WA instead of Hanford profiler for AERMET input.
- Revision of deposition modeling, using AERMOD in place of ISCST3 due to an approved version being released by EPA.
- Revision of particle size distribution and subsequent scavenging coefficients.
- Use of a revised receptor grid, and updated version of AERMAP for terrain data, and use of 30- and 90-meter DEM data.
- Use of WDROTATE to correct model bias of true north with DEM north.
- Revised the gas deposition parameters to reflect proper values based upon the COPCs for which this analysis was designed.
- Revised meteorological database using 0.4 m/s threshold wind speed, and Pendleton NWS station as backup for any missing data.

These updates to the risk assessment methodologies are all done in order to improve the model performance and accuracy of predictions for risk assessment using the AERMOD model.

Table 9-1

Dry Gas Deposition Seasonal Categories by Month for UMCDF

Calendar Month	Deposition Category
January	4
February	3
March	5
April	5
May	5
June	1
July	1
August	1
September	2
October	2
November	3
December	4

Table 9-2

BRA Stack Test Particle Size Distribution

Mean Particle Diameter (microns)	Mass Fraction	Surface Area Fraction
0.34	0.15%	3.10%
0.78	0.45%	4.06%
1.85	4.95%	18.75%
3.88	11.75%	21.22%
6.33	8.75%	9.69%
8.81	9.20%	7.32%
12.66	64.75%	35.85%

Figure 9-1

Receptors Inside and Nearby the UMCD Facility

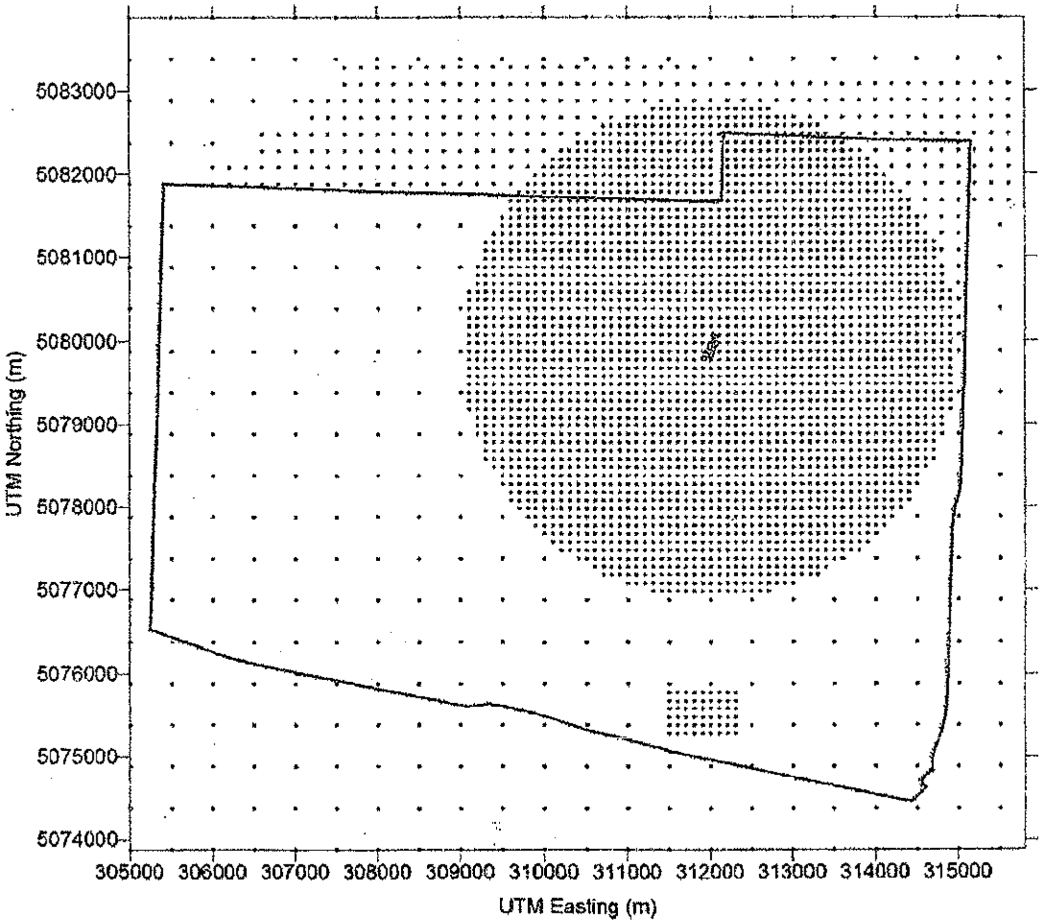
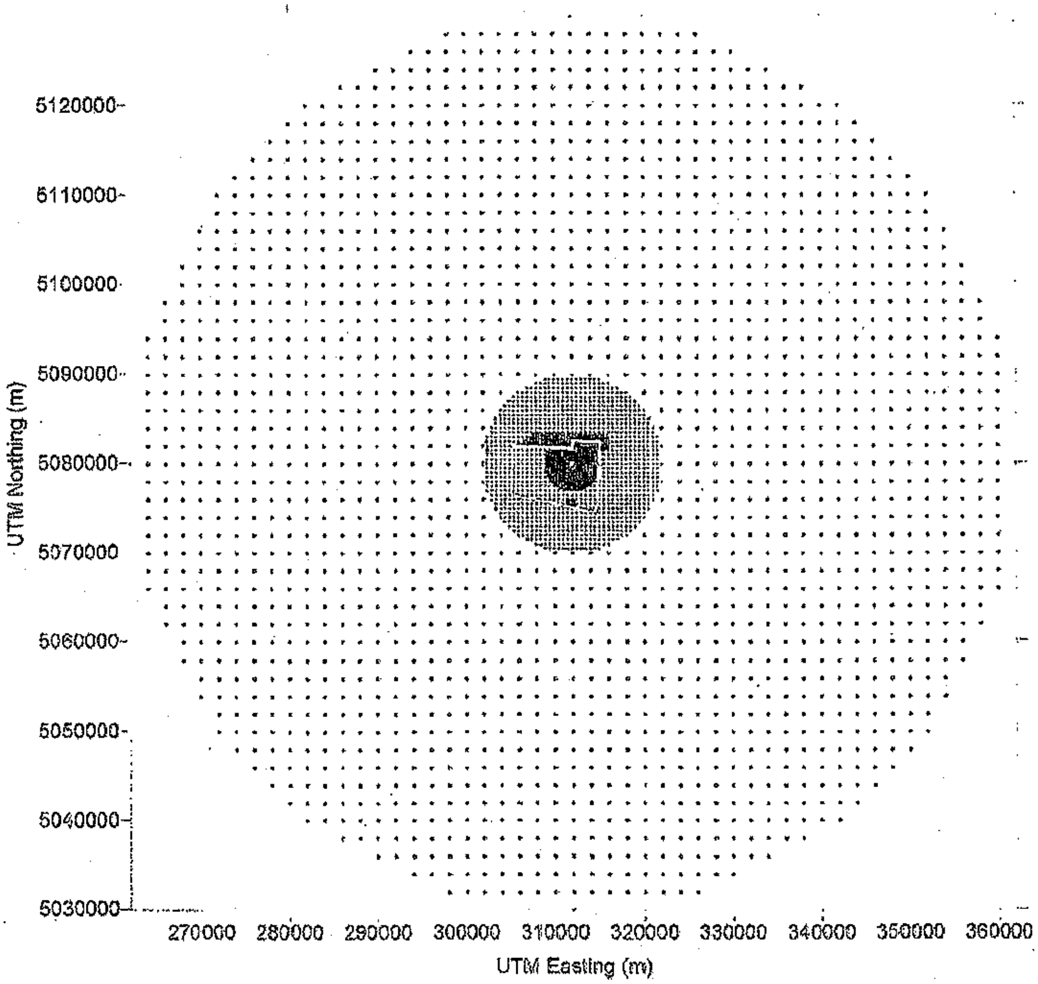


Figure 9-2

Receptor Locations For All 6,841 UMCDF Receptors



10.0 RESULTS

This section provides a review of select impact results for the concentration and deposition modeling files supplied to USACHPPM for conducting the PostRA. The plots in this Section were selected to show the basic impact trends found within this modeling, not as a comprehensive examination of results. Representative impact plots selected were from two sources (Common and BRA stack) for 1-hour and 6-year average vapor concentration, as well as wet and dry deposition for the particle phase. The particle-bound phase impacts were not shown at this time, however the data show that the impact patterns were very similar to that of the particle phase. All modeling results were provided to the DEQ on February 26, 2007 (Reference 10-1).

This section will display results from the BRA and Common stacks for maximum predicted impacts in three general areas; inside the UCMD fenceline, outside the fenceline, and within the residential area on-site at the UMCD. It should be noted that these results are from unitized emission rates, such that they can only identify pollution impact trends and locations of maximum predicted impacts, but not the absolute magnitude of these impacts.

Figures 10-1 through 10-4 show results for the Common stack. Figures 10-1 and 10-2 show the 1-hour maximum and 6-year average vapor concentration impact, while Figures 10-3 and 10-4 show the dry deposition and wet deposition 6-year average impact pattern for the particle phase. These figures show that the maximum impacts inside the fenceline occur very near to the Common stack itself, and decrease markedly before reaching the fenceline. Further, these plots also show a predominant trend for pollutants to be transported toward the northeast quadrant of the plots. The impacts are much less at the residential/administration area within the UMCD than for many locations outside the UMCD property, due to the direction of this area with respect to the Common Stack. For the 1-hour maximum, onsite impacts are more than 5 times that of off-site or fenceline impacts, but for the 6-year averages, the pattern is for onsite maximum impacts to be more than 50 times higher than off site.

Figures 10-5 through 10-8 show results for the Brine Reduction Area (BRA) stack. Figures 10-5 and 10-6 show the 1-hour maximum and 6-year average vapor concentration impact, while figures 10-7 and 10-8 show the dry deposition and wet deposition 6-year average pattern for the particle phase. These figures show very similar impact patters to those of the Common stack. The maximum impacts inside the fenceline occur very near to the BRA stack, and also decrease markedly before reaching the fenceline. The BRA stack plots also show a predominant trend for pollutants to be transported toward the northeast quadrant of the plots. Again, the impacts are much less at the residential/administration area as compared to many locations outside the UMCD property. For the 1-hour maximum, onsite impacts are almost 4 times that of off-site or fenceline impacts, but for the 6-year averages, the pattern again is for onsite maximum impacts to be more than 20 times higher than off site for concentration, and over 50 times higher for deposition. Also of note is the fact that the maximum impacts for vapor concentration are higher for the Common Stack than the BRA stack, but the reverse pattern is true for deposition.

Figure 10-1

Contour Plot of AERMOD-Predicted 1-Hour Maximum Concentration Values for the Vapor Phase from the Common Stack (in $\mu g/m^3$)

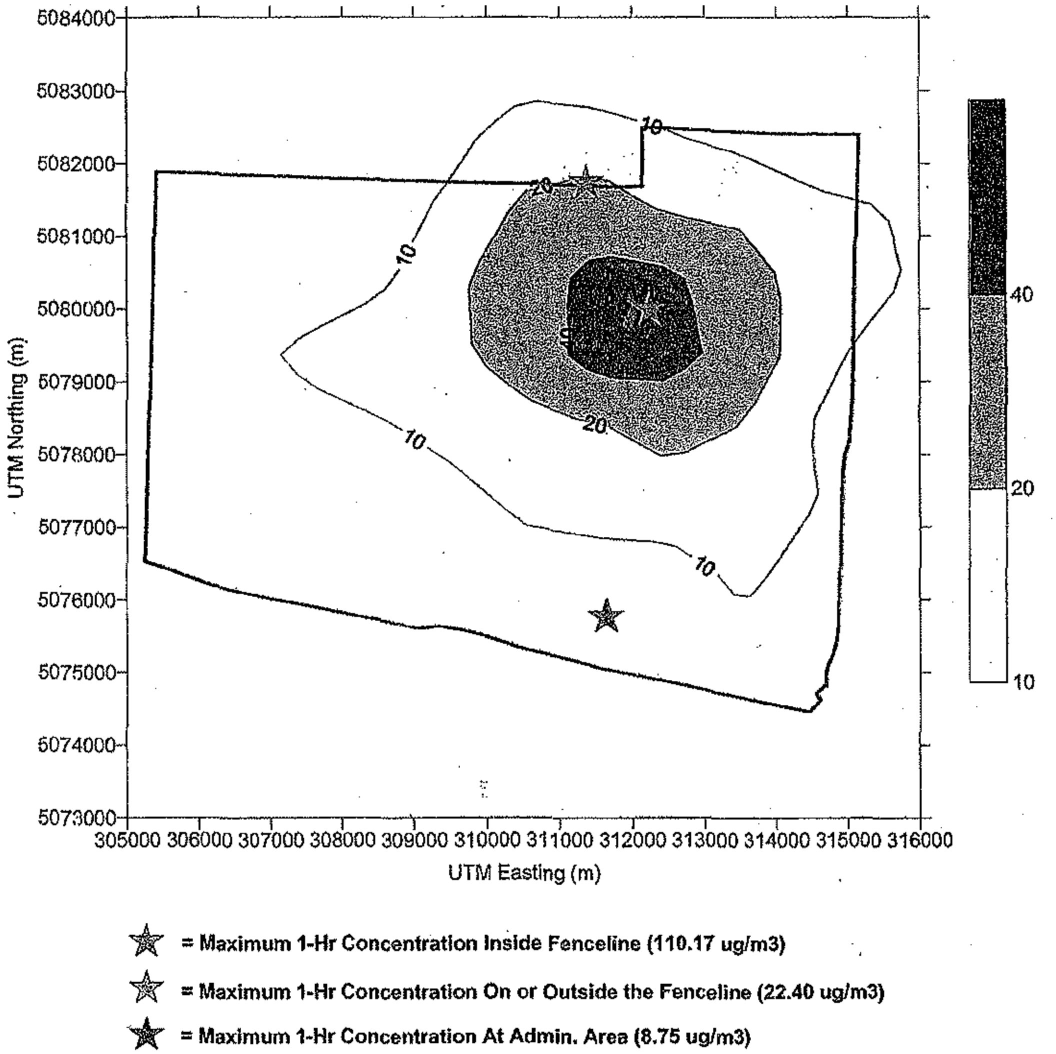
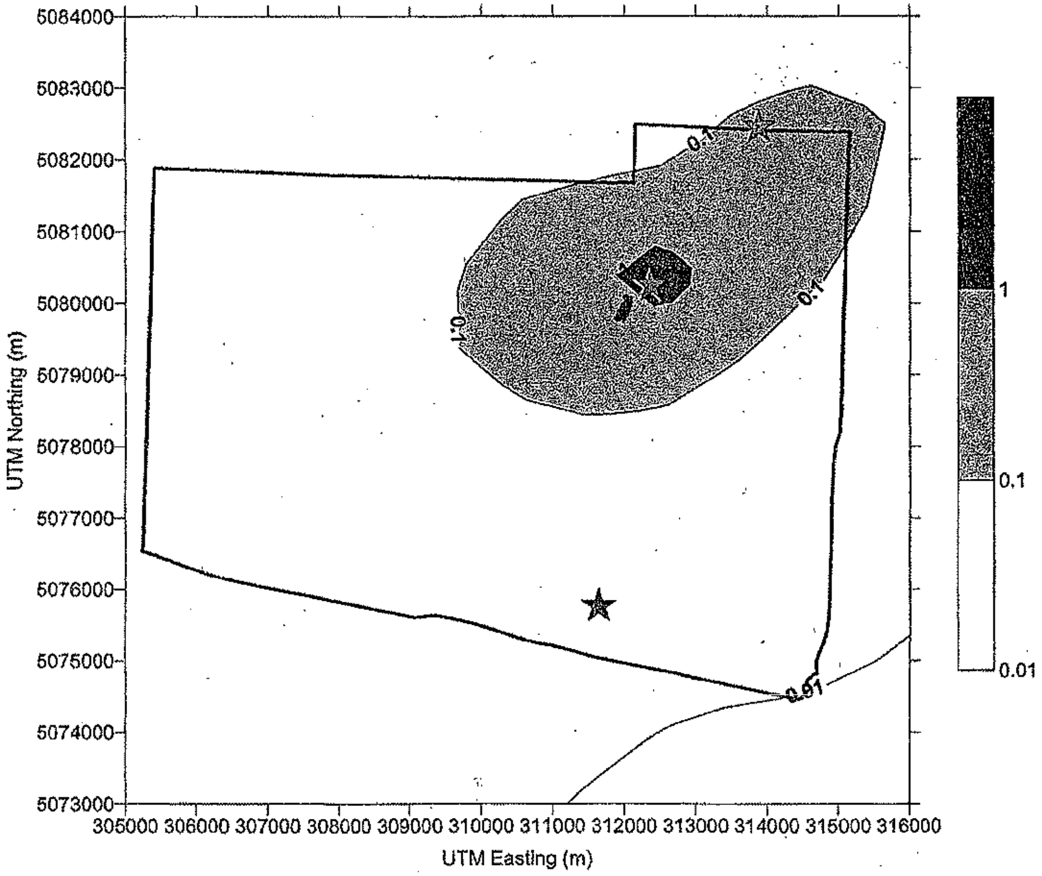


Figure 10-2

Contour Plot of AERMOD-Predicted 6-Year Average Concentration Values for the Vapor Phase from the Common Stack (in $\mu g/m^3$)



☆ = Maximum 6-Yr Average Concentration Inside Fenceline (7.55 ug/m3)

☆ = Maximum 6-Yr Average Concentration On or Outside the Fenceline (0.14 ug/m3)

★ = Maximum 6-Yr Average Concentration At Admin. Area (0.018 ug/m3)

Figure 10-3

Contour Plot of AERMOD-Predicted 6-Year Average Dry Deposition Values for the Particle Phase from the Common Stack (in g/m²/year)

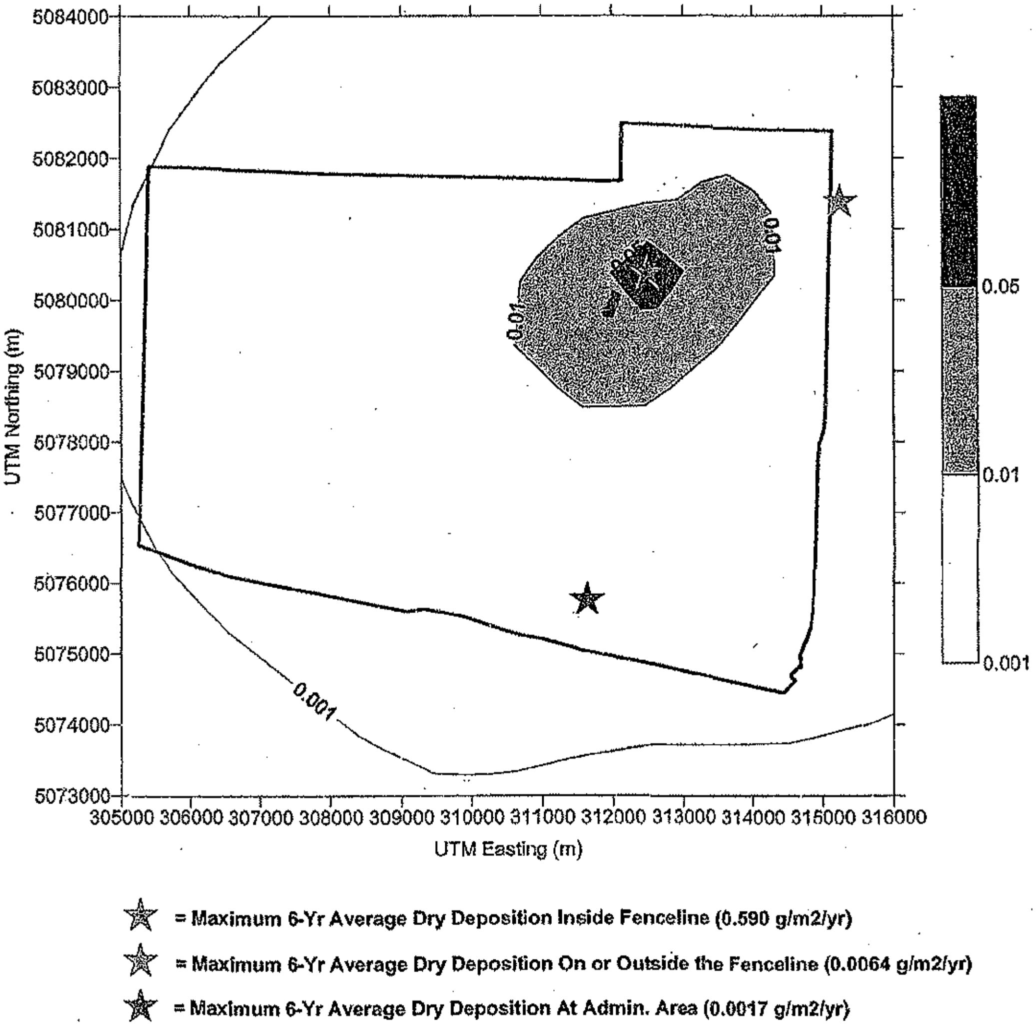
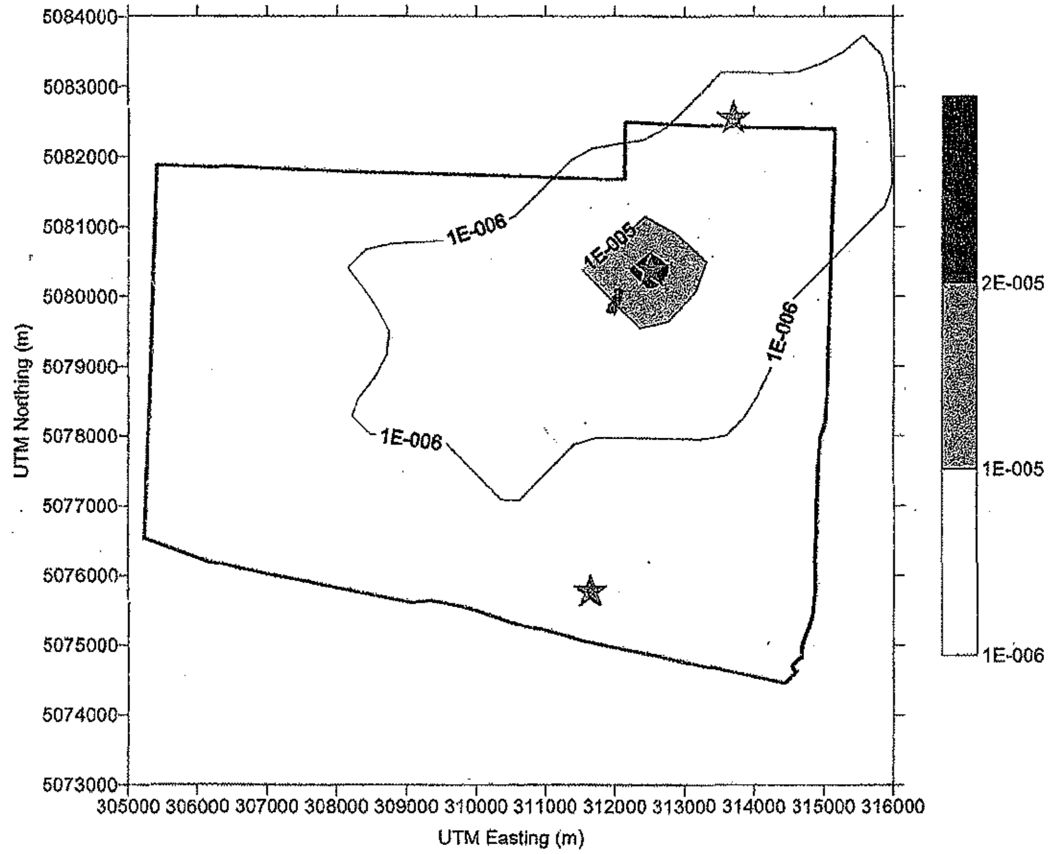


Figure 10-4

Contour Plot of AERMOD-Predicted 6-Year Average Wet Deposition Values for the Particle Phase from the Common Stack (in g/m^2/year)



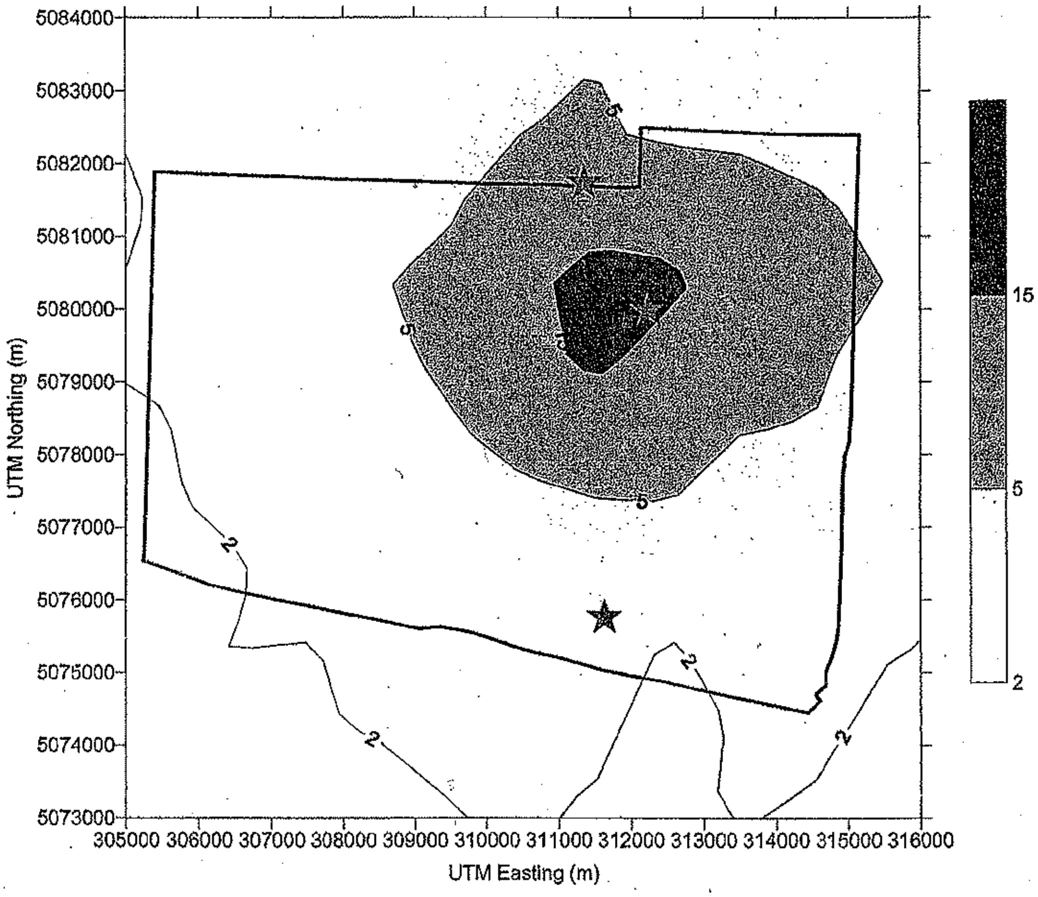
★ = Maximum 6-Yr Average Wet Deposition Inside Fenceline (0.00014 g/m2/yr)

★ = Maximum 6-Yr Average Wet Deposition On or Outside the Fenceline (0.00001 g/m2/yr)

★ = Maximum 6-Yr Average Wet Deposition At Admin. Area (Not detectible)

Figure 10-5

Contour Plot of AERMOD-Predicted 1-Hour Maximum Concentration Values for the Vapor Phase from the BRA Stack (in $\mu g/m^3$)



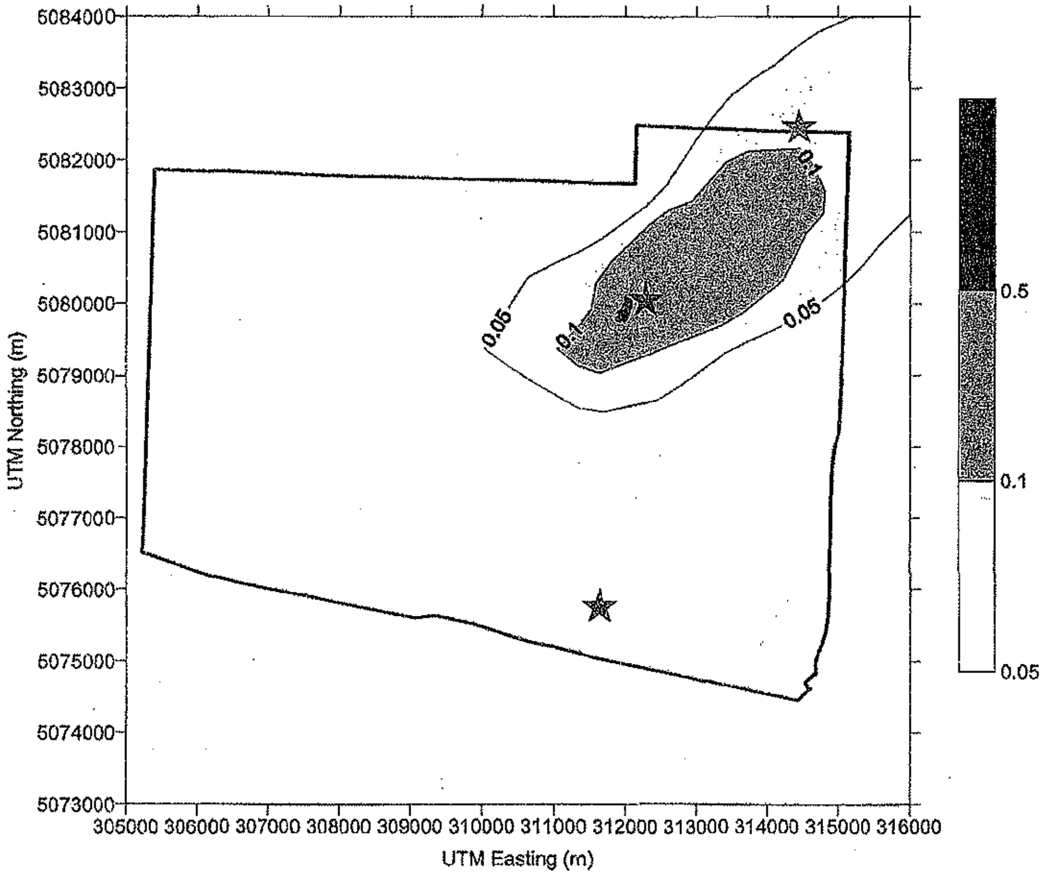
☆ = Maximum 1-Hr Concentration Inside Fenceline (36.63 ug/m3)

☆ = Maximum 1-Hr Concentration On or Outside the Fenceline (9.59 ug/m3)

★ = Maximum 1-Hr Concentration At Admin. Area (3.33 ug/m3)

Figure 10-6

Contour Plot of AERMOD-Predicted 6-Year Average Concentration Values for the Vapor Phase from the BRA Stack (in μg/m^3)



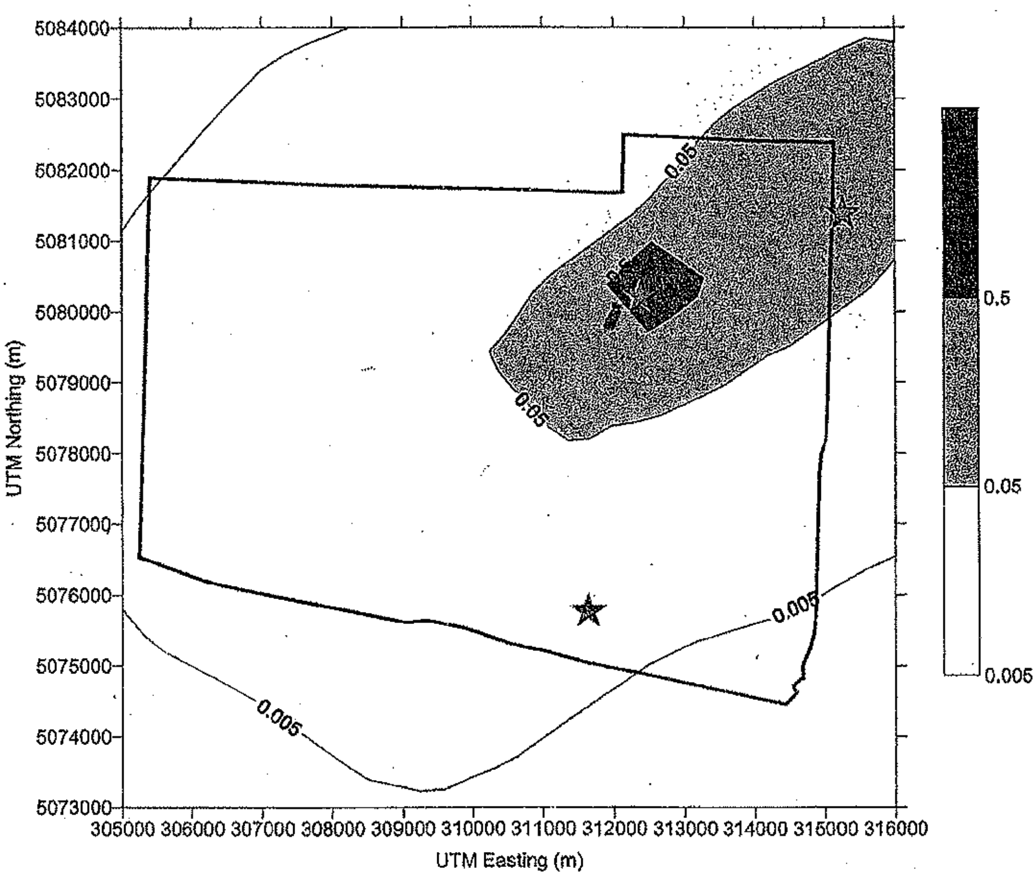
☆ = Maximum 6-Yr Average Concentration Inside Fenceline (1.72 ug/m3)

☆ = Maximum 6-Yr Average Concentration On or Outside the Fenceline (0.098 ug/m3)

★ = Maximum 6-Yr Average Concentration At Admin. Area (0.012 ug/m3)

Figure 10-7

Contour Plot of AERMOD-Predicted 6-Year Average Dry Deposition Values for the Particle Phase from the BRA Stack (in g/m^2/year)



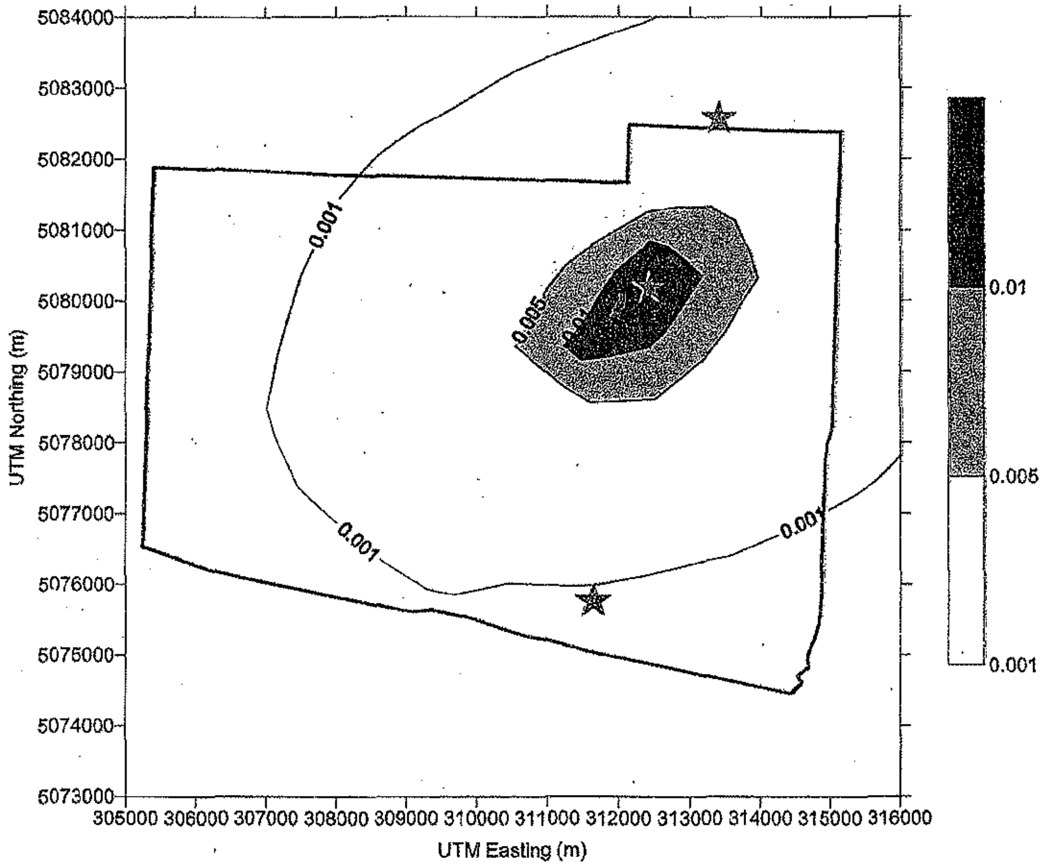
☆ = Maximum 6-Yr Average Dry Deposition Inside Fenceline (8.03 g/m2/yr)

☆ = Maximum 6-Yr Average Dry Deposition On or Outside the Fenceline (0.1177 g/m2/yr)

★ = Maximum 6-Yr Average Dry Deposition At Admin. Area (0.0082 g/m2/yr)

Figure 10-8

Contour Plot of AERMOD-Predicted 6-Year Average Wet Deposition Values for the Particle Phase from the Common Stack (in g/m^2/year)



★ = Maximum 6-Yr Average Wet Deposition Inside Fenceline (0.7024 g/m2/yr)

★ = Maximum 6-Yr Average Wet Deposition On or Outside the Fenceline (0.00280 g/m2/yr)

★ = Maximum 6-Yr Average Wet Deposition At Admin. Area (0.00092 g/m2/yr)

11.0 REFERENCES

Number	Reference
1-1	Final Post-Trial Burn Risk Assessment Work Plan for the Umatilla Chemical Agent Disposal Facility Hermiston, Oregon, Prepared for Oregon Department of Environmental Quality by Ecology and Environment, Inc, 8/2004.
1-2	Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities US Environmental Protection Agency (USEPA) Office of Solid Waste and Emergency Response, EPA530-R-05-006, September, 2005.
3-1	Technical Memorandum #6, Prepared for Oregon Department of Environmental Quality by Tetra Tech EM, Inc, 10/19/2005.
3-2	Estimating Common Stack Emission Rates for the UMCDF for the Human Health and Ecological Risk Assessment, Version 1.1, 26 February 2007, email from Rod Skeen (Confederated Tribes of the Umatilla Indian Reservation) to Sue Oliver (DEQ) dated February 26, 2007.
3-3	Readahead - Remaining UMCDF PostRA Air Modeling Issues, UMCDF PostRA Status Meeting, 11 December 2006, dated December 6, 2006.
4-1	Federal Register / Vol. 70, No. 216 / Wednesday, November 9, 2005 / Rules and Regulations, page 68218.
5-1	Final 01 December 2006 UMCD AERMET Files, email from Gary Napp (EnviroMet) to Sue Oliver (DEQ) et. al. dated December 1, 2006.
5-2	Meteorological Monitoring Guidance for Regulatory Modeling Applications, US Environmental Protection Agency (USEPA) – OAQPS Standards, Research Triangle Park, NC, EPA-454/R-99-005, February 2000.
7-1	User's Guide for the AERMOD Meteorological Preprocessor (AERMET), USEPA-OAQPS, Research Triangle Park, NC, November 1998.
8-1	BEEST for Windows (Version 9.51b), BEE-Line Software, Bowman Environmental, Inc., Asheville, NC.
9-1	Revised Draft User's Guide For The AERMOD Terrain Preprocessor (AERMAP), USEPA - OAQPS, Research Triangle Park, NC, Revised Draft April 24, 2003.
9-2	Readahead For 22 January 2007 Call - UMCDF PostRA Modeling Grid, provided in an email from Gary Napp (EnviroMet) to Sue Oliver (DEQ) dated January 19, 2007.

B Appendix B - EnvirometＰLT Files from Air Modeling

Plot files are available on the compact disk provided with this report under the directory titled "Appendix B". Table B-1 provides a description of the data files found in Appendix B.

Table B-1: Summary of Air Modeling Data Files

File Name	**Source**	**Phase**	**Annual or 1-Hr Maximum**	**Grid Pattern**
BRAHgv01_c.PLT	BRASTK	Hg Vapor	1-Hr	Constant
BRAHgvAN_c.PLT	BRASTK	Hg Vapor	Annual	Constant
BRApb01_c.PLT	BRASTK	Particle Bound	1-Hr	Constant
BRApbAN_c.PLT	BRASTK	Particle Bound	Annual	Constant
BRApt01_c.PLT	BRASTK	Particle	1-Hr	Constant
BRAptAN_c.PLT	BRASTK	Particle	Annual	Constant
BRAv01_c.PLT	BRASTK	Vapor	1-Hr	Constant
BRAvAN_c.PLT	BRASTK	Vapor	Annual	Constant
COMHgv01_c.PLT	COMSTK	Hg Vapor	1-Hr	Constant
COMHgvAN_c.PLT	COMSTK	Hg Vapor	Annual	Constant
COMpb01_c.PLT	COMSTK	Particle Bound	1-Hr	Constant
COMpbAN_c.PLT	COMSTK	Particle Bound	Annual	Constant
COMpt01_c.PLT	COMSTK	Particle	1-Hr	Constant
COMptAN_c.PLT	COMSTK	Particle	Annual	Constant
COMv01_c.PLT	COMSTK	Vapor	1-Hr	Constant
COMvAN_c.PLT	COMSTK	Vapor	Annual	Constant
LABpb01_c.PLT	LABSTK	Particle Bound	1-Hr	Constant
LABpbAN_c.PLT	LABSTK	Particle Bound	Annual	Constant
LABpt01_c.PLT	LABSTK	Particle	1-Hr	Constant
LABptAN_c.PLT	LABSTK	Particle	Annual	Constant
LABv01_c.PLT	LABSTK	Vapor	1-Hr	Constant
LABvAN_c.PLT	LABSTK	Vapor	Annual	Constant
MDBpb01_c.PLT	MDBSTK	Particle Bound	1-Hr	Constant
MDBpbAN_c.PLT	MDBSTK	Particle Bound	Annual	Constant
MDBpt01_c.PLT	MDBSTK	Particle	1-Hr	Constant
MDBptAN_c.PLT	MDBSTK	Particle	Annual	Constant
MDBv01_c.PLT	MDBSTK	Vapor	1-Hr	Constant
MDBvAN_c.PLT	MDBSTK	Vapor	Annual	Constant
BRAHgv01_m.PLT	BRASTK	Hg Vapor	1-Hr	Variable
BRAHgvAN_m.PLT	BRASTK	Hg Vapor	Annual	Variable
BRApb01_m.PLT	BRASTK	Particle Bound	1-Hr	Variable
BRApbAN_m.PLT	BRASTK	Particle Bound	Annual	Variable
BRApt01_m.PLT	BRASTK	Particle	1-Hr	Variable
BRAptAN_m.PLT	BRASTK	Particle	Annual	Variable
BRAv01_m.PLT	BRASTK	Vapor	1-Hr	Variable
BRAvAN_m.PLT	BRASTK	Vapor	Annual	Variable
COMHgv01_m.PLT	COMSTK	Hg Vapor	1-Hr	Variable

File Name	Source	Phase	Annual or 1-Hr Maximum	Grid Pattern
COMHgvAN_m.PLT	COMSTK	Hg Vapor	Annual	Variable
COMpb01_m.PLT	COMSTK	Particle Bound	1-Hr	Variable
COMpbAN_m.PLT	COMSTK	Particle Bound	Annual	Variable
COMpt01_m.PLT	COMSTK	Particle	1-Hr	Variable
COMptAN_m.PLT	COMSTK	Particle	Annual	Variable
COMv01_m.PLT	COMSTK	Vapor	1-Hr	Variable
COMvAN_m.PLT	COMSTK	Vapor	Annual	Variable
LABpb01_m.PLT	LABSTK	Particle Bound	1-Hr	Variable
LABpbAN_m.PLT	LABSTK	Particle Bound	Annual	Variable
LABpt01_m.PLT	LABSTK	Particle	1-Hr	Variable
LABptAN_m.PLT	LABSTK	Particle	Annual	Variable
LABv01_m.PLT	LABSTK	Vapor	1-Hr	Variable
LABvAN_m.PLT	LABSTK	Vapor	Annual	Variable
MDBpb01_m.PLT	MDBSTK	Particle Bound	1-Hr	Variable
MDBpbAN_m.PLT	MDBSTK	Particle Bound	Annual	Variable
MDBpt01_m.PLT	MDBSTK	Particle	1-Hr	Variable
MDBptAN_m.PLT	MDBSTK	Particle	Annual	Variable
MDBv01_m.PLT	MDBSTK	Vapor	1-Hr	Variable
MDBvAN_m.PLT	MDBSTK	Vapor	Annual	Variable

C Appendix C – Emission Rate Data Files

Table C-1: Base Model Emission Rates

Source	CAS Number	Name	Emission Rate (g/s)
COMSTK	00-01-2	Aluminum compounds	2.72E-05
COMSTK	00-01-3	Antimony compounds	1.65E-06
COMSTK	00-01-4	Arsenic compounds	7.52E-07
COMSTK	00-01-5	Barium compounds	2.13E-06
COMSTK	00-01-6	Beryllium compounds	1.16E-08
COMSTK	00-01-7	Cadmium compounds	3.46E-07
COMSTK	00-01-8	Chromium compounds	4.00E-07
COMSTK	00-01-9	Copper compounds	6.08E-07
COMSTK	00-02-0	Lead compounds	1.85E-06
COMSTK	00-02-2	Manganese compounds	6.61E-06
COMSTK	00-02-4	Nickel compounds	1.48E-06
COMSTK	00-02-5	Selenium compounds	5.24E-07
COMSTK	00-02-6	Silver compounds	2.00E-07
COMSTK	00-02-7	Thallium compounds	4.59E-07
COMSTK	00-02-8	Vanadium compounds	4.31E-08
COMSTK	00-02-9	Zinc compounds	7.57E-05
COMSTK	00-07-2	PCB Mixture (non-dioxin like, 5+ chlorines)	2.70E-07
COMSTK	00-15-3	Cobalt compounds	6.43E-08
COMSTK	00-15-5	m,p-Xylene	1.26E-05
COMSTK	00-16-3	Composite TOE - Volatile	4.64E-02
COMSTK	00-16-4	Composirte TOE - Semivolatile	1.56E-03
COMSTK	00-16-5	Composirte TOE - Nonvolatile	2.06E-03
COMSTK	00-16-6	Boron compounds	1.09E-05
COMSTK	00-16-9	Tin compounds	1.28E-06
COMSTK	56-23-5	Carbon tetrachloride	1.77E-06
COMSTK	65-85-0	Benzoic acid	2.60E-05
COMSTK	67-64-1	Acetone	2.81E-04
COMSTK	67-66-3	Chloroform	3.52E-06
COMSTK	71-43-2	Benzene	1.03E-05
COMSTK	74-83-9	Methyl bromide	1.20E-05
COMSTK	74-87-3	Methyl chloride	6.25E-06
COMSTK	74-88-4	Methyl iodide	8.80E-07
COMSTK	74-96-4	Bromoethane	1.17E-07
COMSTK	74-97-5	Bromochloromethane	1.56E-07
COMSTK	75-00-3	Ethyl chloride	7.18E-07
COMSTK	75-01-4	Vinyl chloride	6.78E-07
COMSTK	75-09-2	Dichloromethane	1.89E-05
COMSTK	75-15-0	Carbon disulfide	6.93E-06
COMSTK	75-25-2	Tribromomethane	2.59E-06
COMSTK	75-27-4	Bromodichloromethane	2.18E-06
COMSTK	75-35-4	1,1-Dichloroethylene	1.55E-07

Source	CAS Number	Name	Emission Rate (g/s)
COMSTK	75-69-4	Trichlorofluoromethane	2.29E-06
COMSTK	75-71-8	Dichlorodifluoromethane	9.36E-07
COMSTK	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	4.59E-08
COMSTK	78-93-3	Methyl ethyl ketone	1.21E-05
COMSTK	79-01-6	Trichloroethylene	4.63E-08
COMSTK	84-66-2	Diethyl phthalate	5.57E-06
COMSTK	84-74-2	Dibutyl phthalate	3.28E-06
COMSTK	91-20-3	Naphthalene	2.08E-06
COMSTK	91-57-6	2-Methylnaphthalene	1.65E-06
COMSTK	95-47-6	2-Xylene	3.71E-06
COMSTK	95-50-1	1,2-Dichlorobenzene	8.98E-07
COMSTK	100-41-4	Ethylbenzene	2.18E-06
COMSTK	100-42-5	Styrene	1.01E-06
COMSTK	100-51-6	Benzyl alcohol	2.08E-06
COMSTK	100-52-7	Benzaldehyde	3.47E-05
COMSTK	106-46-7	1,4-Dichlorobenzene	2.34E-06
COMSTK	107-44-8	GB	2.26E-07
COMSTK	108-05-4	Vinyl acetate	3.50E-07
COMSTK	108-10-1	Methyl isobutyl ketone	7.98E-06
COMSTK	108-88-3	Toluene	2.61E-06
COMSTK	108-90-7	Chlorobenzene	2.56E-07
COMSTK	110-54-3	n-Hexane	1.10E-06
COMSTK	117-81-7	Bis(2-ethylhexyl)phthalate	1.14E-04
COMSTK	118-96-7	2,4,6-Trinitrotoluene	1.06E-07
COMSTK	121-14-2	2,4-Dinitrotoluene	5.88E-08
COMSTK	124-48-1	Chlorodibromomethane	1.16E-06
COMSTK	131-11-3	Dimethylphthalate	4.56E-07
COMSTK	505-60-2	Sulfur mustard (or H/HD)	1.05E-05
COMSTK	1330-20-7	Xylene (mixed)	1.82E-06
COMSTK	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	8.32E-14
COMSTK	3268-87-9	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	1.36E-11
COMSTK	7439-97-6	Mercury	1.12E-09
COMSTK	7446-09-5	Sulfur dioxide	4.98E-05
COMSTK	7487-94-7	Mercuric Chloride	2.69E-07
COMSTK	7647-01-0	Hydrochloric acid	2.67E-04
COMSTK	7664-38-2	Phosphoric acid	7.68E-06
COMSTK	7664-39-3	Hydrofluoric acid	2.19E-05
COMSTK	7782-50-5	Chlorine	2.96E-04
COMSTK	10061-01-5	cis-1,3-Dichloropropene	1.03E-06
COMSTK	10061-02-6	trans-1,3-Dichloropropene	5.37E-07
COMSTK	10102-44-0	Nitrogen dioxide	1.73E-03
COMSTK	31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	3.15E-10
COMSTK	32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	3.66E-10
COMSTK	32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	4.13E-10
COMSTK	38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	1.27E-10

Source	CAS Number	Name	Emission Rate (g/s)
COMSTK	39001-02-0	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	8.30E-12
COMSTK	39635-31-9	2,3,4,5,3',4',5'-Heptachlorobiphenyl	4.46E-13
COMSTK	50782-69-9	VX	1.37E-07
COMSTK	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	6.21E-11
COMSTK	52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	8.09E-11
COMSTK	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.51E-13
COMSTK	57465-28-8	3,4,5,3',4'-Pentachlorobiphenyl	3.75E-11
COMSTK	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.44E-12
COMSTK	69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	3.89E-11
COMSTK	70362-50-4	3,4,4',5-Tetrachlorobiphenyl	2.66E-11
COMSTK	74472-37-0	2,3,4,4'5-Pentachlorobiphenyl	1.83E-09
BRASTK	00-01-3	Antimony compounds	6.47E-07
BRASTK	00-01-4	Arsenic compounds	1.04E-06
BRASTK	00-01-5	Barium compounds	2.43E-06
BRASTK	00-01-6	Beryllium compounds	7.94E-08
BRASTK	00-01-7	Cadmium compounds	3.32E-06
BRASTK	00-01-8	Chromium compounds	9.19E-07
BRASTK	00-01-9	Copper compounds	3.26E-05
BRASTK	00-02-0	Lead compounds	8.59E-08
BRASTK	00-02-2	Manganese compounds	3.58E-05
BRASTK	00-02-4	Nickel compounds	7.91E-06
BRASTK	00-02-5	Selenium compounds	4.70E-06
BRASTK	00-02-6	Silver compounds	1.77E-06
BRASTK	00-02-7	Thallium compounds	3.59E-07
BRASTK	00-02-8	Vanadium compounds	8.61E-07
BRASTK	00-02-9	Zinc compounds	1.31E-05
BRASTK	00-15-3	Cobalt compounds	1.08E-06
BRASTK	00-16-6	Boron compounds	2.30E-04
BRASTK	00-16-9	Tin compounds	6.10E-06
BRASTK	95-48-7	o-Cresol	6.28E-04
BRASTK	107-44-8	GB	6.50E-06
BRASTK	505-60-2	Sulfur mustard (or H/HD)	6.50E-04
BRASTK	7439-97-6	Mercury	1.91E-08
BRASTK	7487-94-7	Mercuric Chloride	4.59E-06
BRASTK	7664-38-2	Phosphoric acid	8.09E-05
BRASTK	50782-69-9	VX	6.50E-06
BRASTK	73207-98-4	EA 2192	3.58E-13
LABSTK	107-44-8	GB	4.08E-07
LABSTK	505-60-2	Sulfur mustard (or H/HD)	4.08E-06
LABSTK	50782-69-9	VX	4.08E-07
MDBSTK	107-44-8	GB	2.89E-06
MDBSTK	505-60-2	Sulfur mustard (or H/HD)	2.89E-05
MDBSTK	50782-69-9	VX	2.89E-06

Table C-2: Emission Rates for "Updated COPC Emission Rates" Model

Source	CAS Number	Name	Emission Rate (g/s)
COMSTK	00-01-2	Aluminum compounds	2.72E-05
COMSTK	00-01-3	Antimony compounds	1.65E-06
COMSTK	00-01-4	Arsenic compounds	7.49E-07
COMSTK	00-01-5	Barium compounds	1.98E-06
COMSTK	00-01-6	Beryllium compounds	1.16E-08
COMSTK	00-01-7	Cadmium compounds	3.12E-07
COMSTK	00-01-8	Chromium compounds	3.71E-07
COMSTK	00-01-9	Copper compounds	6.07E-07
COMSTK	00-02-0	Lead compounds	1.64E-06
COMSTK	00-02-2	Manganese compounds	6.59E-06
COMSTK	00-02-4	Nickel compounds	1.38E-06
COMSTK	00-02-5	Selenium compounds	5.13E-07
COMSTK	00-02-6	Silver compounds	2.00E-07
COMSTK	00-02-7	Thallium compounds	4.57E-07
COMSTK	00-02-8	Vanadium compounds	4.31E-08
COMSTK	00-02-9	Zinc compounds	7.56E-05
COMSTK	00-07-2	PCB Mixture (non-dioxin like, 5+ chlorines)	2.70E-07
COMSTK	00-15-3	Cobalt compounds	6.43E-08
COMSTK	00-15-5	m,p-Xylene	1.26E-05
COMSTK	00-16-3	Composite TOE - Volatile	3.70E-02
COMSTK	00-16-4	Composirte TOE - Semivolatile	1.23E-03
COMSTK	00-16-5	Composirte TOE - Nonvolatile	1.14E-03
COMSTK	00-16-6	Boron compounds	1.08E-05
COMSTK	00-16-9	Tin compounds	1.28E-06
COMSTK	56-23-5	Carbon tetrachloride	1.77E-06
COMSTK	65-85-0	Benzoic acid	2.59E-05
COMSTK	67-64-1	Acetone	2.81E-04
COMSTK	67-66-3	Chloroform	3.52E-06
COMSTK	71-43-2	Benzene	1.03E-05
COMSTK	74-83-9	Methyl bromide	1.20E-05
COMSTK	74-87-3	Methyl chloride	6.25E-06
COMSTK	74-88-4	Methyl iodide	8.80E-07
COMSTK	74-96-4	Bromoethane	1.16E-07
COMSTK	74-97-5	Bromochloromethane	1.56E-07
COMSTK	75-00-3	Ethyl chloride	7.18E-07
COMSTK	75-01-4	Vinyl chloride	6.78E-07
COMSTK	75-09-2	Dichloromethane	1.89E-05
COMSTK	75-15-0	Carbon disulfide	6.93E-06
COMSTK	75-25-2	Tribromomethane	2.59E-06
COMSTK	75-27-4	Bromodichloromethane	2.18E-06
COMSTK	75-35-4	1,1-Dichloroethylene	1.55E-07
COMSTK	75-69-4	Trichlorofluoromethane	2.29E-06
COMSTK	75-71-8	Dichlorodifluoromethane	9.35E-07
COMSTK	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	4.59E-08

Source	CAS Number	Name	Emission Rate (g/s)
COMSTK	78-93-3	Methyl ethyl ketone	1.21E-05
COMSTK	79-01-6	Trichloroethylene	4.63E-08
COMSTK	84-66-2	Diethyl phthalate	5.57E-06
COMSTK	84-74-2	Dibutyl phthalate	3.28E-06
COMSTK	91-20-3	Naphthalene	2.08E-06
COMSTK	91-57-6	2-Methylnaphthalene	1.65E-06
COMSTK	95-47-6	2-Xylene	3.71E-06
COMSTK	95-50-1	1,2-Dichlorobenzene	8.98E-07
COMSTK	100-41-4	Ethylbenzene	2.18E-06
COMSTK	100-42-5	Styrene	1.01E-06
COMSTK	100-51-6	Benzyl alcohol	2.08E-06
COMSTK	100-52-7	Benzaldehyde	3.47E-05
COMSTK	106-46-7	1,4-Dichlorobenzene	2.34E-06
COMSTK	107-44-8	GB	6.49E-10
COMSTK	108-05-4	Vinyl acetate	3.50E-07
COMSTK	108-10-1	Methyl isobutyl ketone	7.98E-06
COMSTK	108-88-3	Toluene	2.61E-06
COMSTK	108-90-7	Chlorobenzene	2.56E-07
COMSTK	110-54-3	n-Hexane	1.10E-06
COMSTK	117-81-7	Bis(2-ethylhexyl)phthalate	1.14E-04
COMSTK	118-96-7	2,4,6-Trinitrotoluene	1.06E-07
COMSTK	121-14-2	2,4-Dinitrotoluene	5.88E-08
COMSTK	124-48-1	Chlorodibromomethane	1.16E-06
COMSTK	131-11-3	Dimethylphthalate	4.56E-07
COMSTK	505-60-2	Sulfur mustard (or H/HD)	1.35E-07
COMSTK	1330-20-7	Xylene (mixed)	1.82E-06
COMSTK	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	8.32E-14
COMSTK	3268-87-9	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	1.36E-11
COMSTK	7439-97-6	Mercury	1.09E-09
COMSTK	7446-09-5	Sulfur dioxide	4.98E-05
COMSTK	7487-94-7	Mercuric Chloride	2.62E-07
COMSTK	7647-01-0	Hydrochloric acid	2.44E-04
COMSTK	7664-38-2	Phosphoric acid	6.82E-06
COMSTK	7664-39-3	Hydrofluoric acid	2.19E-05
COMSTK	7782-50-5	Chlorine	2.69E-04
COMSTK	10061-01-5	cis-1,3-Dichloropropene	1.03E-06
COMSTK	10061-02-6	trans-1,3-Dichloropropene	5.37E-07
COMSTK	10102-44-0	Nitrogen dioxide	1.73E-03
COMSTK	31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	3.15E-10
COMSTK	32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	3.66E-10
COMSTK	32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	4.13E-10
COMSTK	38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	1.27E-10
COMSTK	39001-02-0	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	8.30E-12
COMSTK	39635-31-9	2,3,4,5,3',4',5'-Heptachlorobiphenyl	4.46E-13
COMSTK	50782-69-9	VX	3.52E-10

Source	CAS Number	Name	Emission Rate (g/s)
COMSTK	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	6.21E-11
COMSTK	52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	8.09E-11
COMSTK	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.51E-13
COMSTK	57465-28-8	3,4,5,3',4'-Pentachlorobiphenyl	3.75E-11
COMSTK	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.44E-12
COMSTK	69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	3.89E-11
COMSTK	70362-50-4	3,4,4',5-Tetrachlorobiphenyl	2.66E-11
COMSTK	74472-37-0	2,3,4,4'5-Pentachlorobiphenyl	1.83E-09
BRASTK	00-01-3	Antimony compounds	5.18E-07
BRASTK	00-01-4	Arsenic compounds	8.32E-07
BRASTK	00-01-5	Barium compounds	1.94E-06
BRASTK	00-01-6	Beryllium compounds	6.35E-08
BRASTK	00-01-7	Cadmium compounds	2.66E-06
BRASTK	00-01-8	Chromium compounds	7.35E-07
BRASTK	00-01-9	Copper compounds	2.61E-05
BRASTK	00-02-0	Lead compounds	6.87E-08
BRASTK	00-02-2	Manganese compounds	2.86E-05
BRASTK	00-02-4	Nickel compounds	6.33E-06
BRASTK	00-02-5	Selenium compounds	3.76E-06
BRASTK	00-02-6	Silver compounds	1.42E-06
BRASTK	00-02-7	Thallium compounds	2.87E-07
BRASTK	00-02-8	Vanadium compounds	6.89E-07
BRASTK	00-02-9	Zinc compounds	1.05E-05
BRASTK	00-15-3	Cobalt compounds	8.64E-07
BRASTK	00-16-6	Boron compounds	1.84E-04
BRASTK	00-16-9	Tin compounds	4.88E-06
BRASTK	95-48-7	o-Cresol	5.02E-04
BRASTK	107-44-8	GB	3.85E-08
BRASTK	505-60-2	Sulfur mustard (or H/HD)	2.12E-05
BRASTK	7439-97-6	Mercury	1.53E-08
BRASTK	7487-94-7	Mercuric Chloride	3.67E-06
BRASTK	7664-38-2	Phosphoric acid	6.47E-05
BRASTK	50782-69-9	VX	3.85E-08
BRASTK	73207-98-4	EA 2192	2.86E-13
LABSTK	107-44-8	GB	6.80E-09
LABSTK	505-60-2	Sulfur mustard (or H/HD)	3.74E-06
LABSTK	50782-69-9	VX	6.80E-09
MDBSTK	107-44-8	GB	4.81E-08
MDBSTK	505-60-2	Sulfur mustard (or H/HD)	2.65E-05
MDBSTK	50782-69-9	VX	4.81E-08

Table C-3: Emission Rates for Model Run With Dioxin and Furans

Source	CAS Number	Name	Emission Rate (g/s)
COMSTK	00-01-2	Aluminum compounds	2.722E-05
COMSTK	00-01-3	Antimony compounds	1.648E-06
COMSTK	00-01-4	Arsenic compounds	7.517E-07
COMSTK	00-01-5	Barium compounds	2.134E-06
COMSTK	00-01-6	Beryllium compounds	1.159E-08
COMSTK	00-01-7	Cadmium compounds	3.463E-07
COMSTK	00-01-8	Chromium compounds	4.000E-07
COMSTK	00-01-9	Copper compounds	6.080E-07
COMSTK	00-02-0	Lead compounds	1.853E-06
COMSTK	00-02-2	Manganese compounds	6.613E-06
COMSTK	00-02-4	Nickel compounds	1.477E-06
COMSTK	00-02-5	Selenium compounds	5.244E-07
COMSTK	00-02-6	Silver compounds	1.997E-07
COMSTK	00-02-7	Thallium compounds	4.586E-07
COMSTK	00-02-8	Vanadium compounds	4.313E-08
COMSTK	00-02-9	Zinc compounds	7.565E-05
COMSTK	00-07-2	PCB Mixture (non-dioxin like, 5+ chlorines)	2.701E-07
COMSTK	00-15-3	Cobalt compounds	6.432E-08
COMSTK	00-15-5	m,p-Xylene	1.263E-05
COMSTK	00-16-3	Composite TOE - Volatile	4.636E-02
COMSTK	00-16-4	Composirte TOE - Semivolatile	1.555E-03
COMSTK	00-16-5	Composirte TOE - Nonvolatile	2.059E-03
COMSTK	00-16-6	Boron compounds	1.086E-05
COMSTK	00-16-9	Tin compounds	1.284E-06
COMSTK	56-23-5	Carbon tetrachloride	1.765E-06
COMSTK	65-85-0	Benzoic acid	2.595E-05
COMSTK	67-64-1	Acetone	2.807E-04
COMSTK	67-66-3	Chloroform	3.524E-06
COMSTK	71-43-2	Benzene	1.032E-05
COMSTK	74-83-9	Methyl bromide	1.202E-05
COMSTK	74-87-3	Methyl chloride	6.254E-06
COMSTK	74-88-4	Methyl iodide	8.803E-07
COMSTK	74-96-4	Bromoethane	1.165E-07
COMSTK	74-97-5	Bromochloromethane	1.564E-07
COMSTK	75-00-3	Ethyl chloride	7.181E-07
COMSTK	75-01-4	Vinyl chloride	6.778E-07
COMSTK	75-09-2	Dichloromethane	1.891E-05
COMSTK	75-15-0	Carbon disulfide	6.933E-06
COMSTK	75-25-2	Tribromomethane	2.592E-06
COMSTK	75-27-4	Bromodichloromethane	2.176E-06
COMSTK	75-35-4	1,1-Dichloroethylene	1.550E-07
COMSTK	75-69-4	Trichlorofluoromethane	2.291E-06
COMSTK	75-71-8	Dichlorodifluoromethane	9.355E-07
COMSTK	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	4.588E-08

Source	CAS Number	Name	Emission Rate (g/s)
COMSTK	78-93-3	Methyl ethyl ketone	1.209E-05
COMSTK	79-01-6	Trichloroethylene	4.630E-08
COMSTK	84-66-2	Diethyl phthalate	5.569E-06
COMSTK	84-74-2	Dibutyl phthalate	3.283E-06
COMSTK	91-20-3	Naphthalene	2.080E-06
COMSTK	91-57-6	2-Methylnaphthalene	1.646E-06
COMSTK	95-47-6	2-Xylene	3.706E-06
COMSTK	95-50-1	1,2-Dichlorobenzene	8.981E-07
COMSTK	100-41-4	Ethylbenzene	2.181E-06
COMSTK	100-42-5	Styrene	1.008E-06
COMSTK	100-51-6	Benzyl alcohol	2.082E-06
COMSTK	100-52-7	Benzaldehyde	3.470E-05
COMSTK	106-46-7	1,4-Dichlorobenzene	2.341E-06
COMSTK	107-44-8	GB	2.257E-07
COMSTK	108-05-4	Vinyl acetate	3.498E-07
COMSTK	108-10-1	Methyl isobutyl ketone	7.976E-06
COMSTK	108-88-3	Toluene	2.611E-06
COMSTK	108-90-7	Chlorobenzene	2.555E-07
COMSTK	110-54-3	n-Hexane	1.103E-06
COMSTK	117-81-7	Bis(2-ethylhexyl)phthalate	1.138E-04
COMSTK	118-96-7	2,4,6-Trinitrotoluene	1.061E-07
COMSTK	121-14-2	2,4-Dinitrotoluene	5.878E-08
COMSTK	124-48-1	Chlorodibromomethane	1.160E-06
COMSTK	131-11-3	Dimethylphthalate	4.555E-07
COMSTK	505-60-2	Sulfur mustard (or H/HD)	1.050E-05
COMSTK	1330-20-7	Xylene (mixed)	1.816E-06
COMSTK	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	8.320E-14
COMSTK	3268-87-9	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	1.355E-11
COMSTK	7439-97-6	Mercury	1.122E-09
COMSTK	7446-09-5	Sulfur dioxide	4.983E-05
COMSTK	7487-94-7	Mercuric Chloride	2.692E-07
COMSTK	7647-01-0	Hydrochloric acid	2.672E-04
COMSTK	7664-38-2	Phosphoric acid	7.682E-06
COMSTK	7664-39-3	Hydrofluoric acid	2.187E-05
COMSTK	7782-50-5	Chlorine	2.959E-04
COMSTK	10061-01-5	cis-1,3-Dichloropropene	1.028E-06
COMSTK	10061-02-6	trans-1,3-Dichloropropene	5.369E-07
COMSTK	10102-44-0	Nitrogen dioxide	1.734E-03
COMSTK	31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	3.148E-10
COMSTK	32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	3.656E-10
COMSTK	32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	4.134E-10
COMSTK	38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	1.269E-10
COMSTK	39001-02-0	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	8.298E-12
COMSTK	39635-31-9	2,3,4,5,3',4',5'-Heptachlorobiphenyl	4.461E-13
COMSTK	50782-69-9	VX	1.369E-07

Source	CAS Number	Name	Emission Rate (g/s)
COMSTK	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	6.210E-11
COMSTK	52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	8.091E-11
COMSTK	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.512E-13
COMSTK	57465-28-8	3,4,5,3',4'-Pentachlorobiphenyl	3.750E-11
COMSTK	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.440E-12
COMSTK	69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	3.892E-11
COMSTK	70362-50-4	3,4,4',5-Tetrachlorobiphenyl	2.662E-11
COMSTK	74472-37-0	2,3,4,4'5-Pentachlorobiphenyl	1.828E-09
COMSTK	35822-46-9	HeptaCDD, 1,2,3,4,6,7,8-	4.184E-12
COMSTK	39227-28-6	HexaCDD, 1,2,3,4,7,8-	3.651E-12
COMSTK	57653-85-7	HexaCDD, 1,2,3,6,7,8-	3.166E-12
COMSTK	19408-74-3	HexaCDD, 1,2,3,7,8,9-	3.314E-12
COMSTK	70648-26-9	HexaCDF, 1,2,3,4,7,8-	2.427E-12
COMSTK	57117-44-9	HexaCDF, 1,2,3,6,7,8-	2.127E-12
COMSTK	72918-21-9	HexaCDF, 1,2,3,7,8,9-	2.551E-12
COMSTK	60851-34-5	HexaCDF, 2,3,4,6,7,8-	2.331E-12
COMSTK	40321-76-4	PentaCDD, 1,2,3,7,8-	4.837E-12
COMSTK	57117-41-6	PentaCDF, 1,2,3,7,8-	2.679E-12
COMSTK	57117-31-4	PentaCDF, 2,3,4,7,8-	2.694E-12
BRASTK	00-01-3	Antimony compounds	6.470E-07
BRASTK	00-01-4	Arsenic compounds	1.040E-06
BRASTK	00-01-5	Barium compounds	2.430E-06
BRASTK	00-01-6	Beryllium compounds	7.940E-08
BRASTK	00-01-7	Cadmium compounds	3.320E-06
BRASTK	00-01-8	Chromium compounds	9.190E-07
BRASTK	00-01-9	Copper compounds	3.260E-05
BRASTK	00-02-0	Lead compounds	8.590E-08
BRASTK	00-02-2	Manganese compounds	3.580E-05
BRASTK	00-02-3	Mercury compounds	9.560E-06
BRASTK	00-02-4	Nickel compounds	7.910E-06
BRASTK	00-02-5	Selenium compounds	4.700E-06
BRASTK	00-02-6	Silver compounds	1.770E-06
BRASTK	00-02-7	Thallium compounds	3.590E-07
BRASTK	00-02-8	Vanadium compounds	8.610E-07
BRASTK	00-02-9	Zinc compounds	1.310E-05
BRASTK	00-15-3	Cobalt compounds	1.080E-06
BRASTK	00-16-6	Boron compounds	2.300E-04
BRASTK	00-16-9	Tin compounds	6.100E-06
BRASTK	95-48-7	o-Cresol	6.280E-04
BRASTK	107-44-8	GB	6.500E-06
BRASTK	505-60-2	Sulfur mustard (or H/HD)	6.500E-04
BRASTK	7439-97-6	Mercury	1.912E-08
BRASTK	7487-94-7	Mercuric Chloride	4.589E-06
BRASTK	7664-38-2	Phosphoric acid	8.090E-05
BRASTK	50782-69-9	VX	6.500E-06

Source	CAS Number	Name	Emission Rate (g/s)
BRASTK	73207-98-4	EA 2192	3.580E-13
LABSTK	107-44-8	GB	4.080E-07
LABSTK	505-60-2	Sulfur mustard (or H/HD)	4.080E-06
LABSTK	50782-69-9	VX	4.080E-07
MDBSTK	107-44-8	GB	2.890E-06
MDBSTK	505-60-2	Sulfur mustard (or H/HD)	2.890E-05
MDBSTK	50782-69-9	VX	2.890E-06

Table C-4: Emission Rates for Special Case 5

Source	CAS Number	COPC Name	Emission Rate (g/s)
COMSTK	00-01-2	Aluminum compounds	2.72E-05
COMSTK	00-01-3	Antimony compounds	1.65E-06
COMSTK	00-01-4	Arsenic compounds	7.49E-07
COMSTK	00-01-5	Barium compounds	1.98E-06
COMSTK	00-01-6	Beryllium compounds	1.16E-08
COMSTK	00-01-7	Cadmium compounds	3.12E-07
COMSTK	00-01-8	Chromium compounds	3.71E-07
COMSTK	00-01-9	Copper compounds	6.07E-07
COMSTK	00-02-0	Lead compounds	1.64E-06
COMSTK	00-02-2	Manganese compounds	6.59E-06
COMSTK	00-02-4	Nickel compounds	1.38E-06
COMSTK	00-02-5	Selenium compounds	5.13E-07
COMSTK	00-02-6	Silver compounds	2.00E-07
COMSTK	00-02-7	Thallium compounds	4.57E-07
COMSTK	00-02-8	Vanadium compounds	4.31E-08
COMSTK	00-02-9	Zinc compounds	7.56E-05
COMSTK	00-07-2	PCB Mixture (non-dioxin like, 5+ chlorines)	2.70E-07
COMSTK	00-15-3	Cobalt compounds	6.43E-08
COMSTK	00-15-5	m,p-Xylene	1.26E-05
COMSTK	00-16-3	Composite TOE - Volatile	0.036991
COMSTK	00-16-4	Composirte TOE - Semivolatile	0.001232
COMSTK	00-16-5	Composirte TOE - Nonvolatile	0.001142
COMSTK	00-16-6	Boron compounds	1.08E-05
COMSTK	00-16-9	Tin compounds	1.28E-06
COMSTK	56-23-5	Carbon tetrachloride	1.77E-06
COMSTK	65-85-0	Benzoic acid	2.59E-05
COMSTK	67-64-1	Acetone	0.000281
COMSTK	67-66-3	Chloroform	3.52E-06
COMSTK	71-43-2	Benzene	1.03E-05
COMSTK	74-83-9	Methyl bromide	1.20E-05
COMSTK	74-87-3	Methyl chloride	6.25E-06
COMSTK	74-88-4	Methyl iodide	8.80E-07
COMSTK	74-96-4	Bromoethane	1.16E-07
COMSTK	74-97-5	Bromochloromethane	1.56E-07
COMSTK	75-00-3	Ethyl chloride	7.18E-07
COMSTK	75-01-4	Vinyl chloride	6.78E-07
COMSTK	75-09-2	Dichloromethane	1.89E-05
COMSTK	75-15-0	Carbon disulfide	6.93E-06
COMSTK	75-25-2	Tribromomethane	2.59E-06
COMSTK	75-27-4	Bromodichloromethane	2.18E-06
COMSTK	75-35-4	1,1-Dichloroethylene	1.55E-07
COMSTK	75-69-4	Trichlorofluoromethane	2.29E-06
COMSTK	75-71-8	Dichlorodifluoromethane	9.35E-07
COMSTK	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	4.59E-08

Source	CAS Number	COPC Name	Emission Rate (g/s)
COMSTK	78-93-3	Methyl ethyl ketone	1.21E-05
COMSTK	79-01-6	Trichloroethylene	4.63E-08
COMSTK	84-66-2	Diethyl phthalate	5.57E-06
COMSTK	84-74-2	Dibutyl phthalate	3.28E-06
COMSTK	91-20-3	Naphthalene	2.08E-06
COMSTK	91-57-6	2-Methylnaphthalene	1.65E-06
COMSTK	95-47-6	2-Xylene	3.71E-06
COMSTK	95-50-1	1,2-Dichlorobenzene	8.98E-07
COMSTK	100-41-4	Ethylbenzene	2.18E-06
COMSTK	100-42-5	Styrene	1.01E-06
COMSTK	100-51-6	Benzyl alcohol	2.08E-06
COMSTK	100-52-7	Benzaldehyde	3.47E-05
COMSTK	106-46-7	1,4-Dichlorobenzene	2.34E-06
COMSTK	107-44-8	GB	6.49E-10
COMSTK	108-05-4	Vinyl acetate	3.50E-07
COMSTK	108-10-1	Methyl isobutyl ketone	7.98E-06
COMSTK	108-88-3	Toluene	2.61E-06
COMSTK	108-90-7	Chlorobenzene	2.56E-07
COMSTK	110-54-3	n-Hexane	1.10E-06
COMSTK	117-81-7	Bis(2-ethylhexyl)phthalate	0.000114
COMSTK	118-96-7	2,4,6-Trinitrotoluene	1.06E-07
COMSTK	121-14-2	2,4-Dinitrotoluene	5.88E-08
COMSTK	124-48-1	Chlorodibromomethane	1.16E-06
COMSTK	131-11-3	Dimethylphthalate	4.56E-07
COMSTK	505-60-2	Sulfur mustard (or H/HD)	1.35E-07
COMSTK	1330-20-7	Xylene (mixed)	1.82E-06
COMSTK	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	8.32E-14
COMSTK	3268-87-9	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	1.36E-11
COMSTK	7439-97-6	Mercury	1.09E-09
COMSTK	7446-09-5	Sulfur dioxide	4.98E-05
COMSTK	7487-94-7	Mercuric Chloride	2.62E-07
COMSTK	7647-01-0	Hydrochloric acid	0.000244
COMSTK	7664-38-2	Phosphoric acid	6.82E-06
COMSTK	7664-39-3	Hydrofluoric acid	2.19E-05
COMSTK	7782-50-5	Chlorine	0.000269
COMSTK	10061-01-5	cis-1,3-Dichloropropene	1.03E-06
COMSTK	10061-02-6	trans-1,3-Dichloropropene	5.37E-07
COMSTK	10102-44-0	Nitrogen dioxide	0.001734
COMSTK	31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	3.15E-10
COMSTK	32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	3.66E-10
COMSTK	32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	4.13E-10
COMSTK	38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	1.27E-10
COMSTK	39001-02-0	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	8.30E-12
COMSTK	39635-31-9	2,3,4,5,3',4',5'-Heptachlorobiphenyl	4.46E-13
COMSTK	50782-69-9	VX	3.51E-10

Source	CAS Number	COPC Name	Emission Rate (g/s)
COMSTK	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	6.21E-11
COMSTK	52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	8.09E-11
COMSTK	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.51E-13
COMSTK	57465-28-8	3,4,5,3',4'-Pentachlorobiphenyl	3.75E-11
COMSTK	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.44E-12
COMSTK	69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	3.89E-11
COMSTK	70362-50-4	3,4,4',5-Tetrachlorobiphenyl	2.66E-11
COMSTK	74472-37-0	2,3,4,4'5-Pentachlorobiphenyl	1.83E-09
COMSTK	35822-46-9	HeptaCDD, 1,2,3,4,6,7,8-	3.70E-12
COMSTK	39227-28-6	HexaCDD, 1,2,3,4,7,8-	3.20E-12
COMSTK	57653-85-7	HexaCDD, 1,2,3,6,7,8-	2.79E-12
COMSTK	19408-74-3	HexaCDD, 1,2,3,7,8,9-	2.91E-12
COMSTK	70648-26-9	HexaCDF, 1,2,3,4,7,8-	2.16E-12
COMSTK	57117-44-9	HexaCDF, 1,2,3,6,7,8-	1.90E-12
COMSTK	72918-21-9	HexaCDF, 1,2,3,7,8,9-	2.26E-12
COMSTK	60851-34-5	HexaCDF, 2,3,4,6,7,8-	2.08E-12
COMSTK	40321-76-4	PentaCDD, 1,2,3,7,8-	4.22E-12
COMSTK	57117-41-6	PentaCDF, 1,2,3,7,8-	2.37E-12
COMSTK	57117-31-4	PentaCDF, 2,3,4,7,8-	2.39E-12
BRASTK	00-01-3	Antimony compounds	6.47E-07
BRASTK	00-01-4	Arsenic compounds	1.04E-06
BRASTK	00-01-5	Barium compounds	2.43E-06
BRASTK	00-01-6	Beryllium compounds	7.94E-08
BRASTK	00-01-7	Cadmium compounds	3.32E-06
BRASTK	00-01-8	Chromium compounds	9.19E-07
BRASTK	00-01-9	Copper compounds	3.26E-05
BRASTK	00-02-0	Lead compounds	8.59E-08
BRASTK	00-02-2	Manganese compounds	3.58E-05
BRASTK	00-02-3	Mercury compounds	9.56E-06
BRASTK	00-02-4	Nickel compounds	7.91E-06
BRASTK	00-02-5	Selenium compounds	4.7E-06
BRASTK	00-02-6	Silver compounds	1.77E-06
BRASTK	00-02-7	Thallium compounds	3.59E-07
BRASTK	00-02-8	Vanadium compounds	8.61E-07
BRASTK	00-02-9	Zinc compounds	1.31E-05
BRASTK	00-15-3	Cobalt compounds	1.08E-06
BRASTK	00-16-6	Boron compounds	0.00023
BRASTK	00-16-9	Tin compounds	6.1E-06
BRASTK	95-48-7	o-Cresol	0.000628
BRASTK	107-44-8	GB	2.17E-08
BRASTK	505-60-2	Sulfur mustard (or H/HD)	1.19E-05
BRASTK	7439-97-6	Mercury	1.91E-08
BRASTK	7487-94-7	Mercuric Chloride	4.59E-06
BRASTK	7664-38-2	Phosphoric acid	8.09E-05
BRASTK	50782-69-9	VX	2.17E-08

Source	**CAS Number**	**COPC Name**	**Emission Rate (g/s)**
BRASTK	73207-98-4	EA 2192	3.58E-13
LABSTK	107-44-8	GB	6.80E-09
LABSTK	505-60-2	Sulfur mustard (or H/HD)	3.74E-06
LABSTK	50782-69-9	VX	6.80E-09
MDBSTK	107-44-8	GB	4.81E-08
MDBSTK	505-60-2	Sulfur mustard (or H/HD)	2.65E-05
MDBSTK	50782-69-9	VX	4.81E-08

D Appendix D - Scaling Methodology for Common Stack

Estimating Common Stack Emission Rates for the UMCDF for the Human Health and Ecological Risk Assessment

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The Umatilla Chemical Agent Disposal Facility (UMCDF) common stack combines emissions from four furnace systems: liquid incinerators 1 and 2 (LIC1 and LIC2), the deactivation furnace system (DFS), and the metal parts furnace (MPF). To estimate annual emissions for the purpose of evaluating chronic and acute health impacts it is necessary to evaluate the individual contributions from each source and then sum these components to derive the total release rate for individual compound of potential concern (COPC). The following is a description of the approach used to derive this combined emission rate. Secondary waste processing will be initially ignored to simplify the discussion, but is incorporated in the final sections of this document.

Derivation of Average Common Stack Emission Rates

Let $ER^{max}_{i,k,j}$ represent the emission rate (g/s) for the ith COPC from the jth furnace (LIC1, LIC2, DFS, MPF) during kth campaign (GB, VX, and HD) measured at the maximum permitted feed rate. These values correspond to the emission rates measured during trial burns.

Using the assumption that emission rates are proportional to feed rates (prescribed by the UMCDF PostRA Risk Assessment Work Plan [Umatilla RAWP] (p. 2-53)) allows the following relationship to be written:

$$ER_{i,k,j} = ER^{\max}_{i,k,j} \cdot \left(\frac{Q_{k,j}}{Q^{\max}_{k,j}} \right) \tag{1}$$

Where:

$ER^{\max}_{i,k,j}$ = Emission rate for the ith COPC in the kth campaign while the jth furnace is being feed at the maximum rate (g/s) measured in trial burns.

$ER_{i,k,j}$ = Emission rate for the ith COPC in the kth campaign while the jth furnace is fed at a rate of $Q_{k,j}$ (g/s).

$Q^{\max}_{k,j}$ = Maximum feed rate for the jth furnace in the kth campaign (units vary by munition sub-component, but typically lb/hr or item/hr). Set by trial burns.

$Q_{k,j}$ = Feed rate for the jth furnace in the kth campaign (units vary by munition sub-component, but typically lb/hr or item/hr).

Recognizing that, in a given agent campaign the feed to an individual furnace will be a compilation of feeds from multiple types of munition sub-components, then the time weighted average emission rate can be described from the individual feeds as follows:

$$ER_{i,k,j} = \frac{\sum_{l} (ER_{i,k,j}^{\max})_l \cdot \left(\frac{Q_{k,j}}{Q_{k,j}^{\max}} \right)_l \cdot (\theta_{k,j})_l}{\left(\theta_k^{Total}\right)} \tag{2}$$

With $(\theta_{k,j})_l$ representing the time to process the feed from the l^{th} sub-component (at a rate equal to $[Q_{k,j}]_l$) in the j^{th} furnace and k^{th} campaign. The term $\left(\theta_k^{Total}\right)$ represents the total duration of the k^{th} campaign. Table 2-4 of the Umatilla RAWP lists the duration of the GB, VX, and HD campaigns as 3.68 yr, 2.32 yr, 2 yr, respectively. A secondary waste (SW) campaign is also listed in Table 2-4 and a duration of 2 years is reported. It is assumed for this analysis that post agent campaign SW waste processing will occur during closure and these final two years of processing will be included in that phase.

It should be noted that the numerator in the above equation represents the total mass of the i^{th} material emitted while the denominator represents the total time over which the material is emitted. The choice to average over the duration of the campaign rather than the sum of the use time on the indicated furnace is necessary to be consistent with the how the air modeling software (AERMOD) computes concentrations and deposition rates. AERMOD assumes a constant, continuous release over the full duration of the period being modeled.

Table 1 provides a list of the munition sub-components which are processed in each agent campaign at the UMCDF. An example of the proper application of the information in Table 1 to Equation 2 is shown in Equation 3 which describes the time-weighted average emission rate for the i^{th} COPC from the DFS during the GB agent campaign

$$ER_{i,GB,DFS} = \left[\begin{array}{l} \left[\dfrac{(ER_{i,GB,DFS}^{\max})_{M55} \cdot \left(\dfrac{Q_{k,j}}{Q_{k,j}^{\max}} \right)_{M55} (\theta_{k,j})_{M55} + (ER_{i,GB,DFS}^{\max})_{M121} \cdot \left(\dfrac{Q_{k,j}}{Q_{k,j}^{\max}} \right)_{M121} (\theta_{k,j})_{M121}}{\left(\theta_{GB}^{Total}\right)} \right] + \\ \left[\dfrac{(ER_{i,GB,DFS}^{\max})_{M426} \cdot \left(\dfrac{Q_{k,j}}{Q_{k,j}^{\max}} \right)_{M426} (\theta_{k,j})_{M426}}{\left(\theta_{GB}^{Total}\right)} \right] \end{array} \right] \tag{3}$$

Table 1: Furnace Feeds by Munition and Agent Campaign.

Munition	Agent Campaign	LIC 1 and 2 Feed	DFS Feed	MPF Feed
M55 Rocket	GB	GB Agent	Rocket Pieces	None
M121/A1 Projectiles	GB	GB Agent	Explosives	Projectile Body
M426 Projectiles	GB	GB Agent	Explosives	Projectile Body
MK-94 Bomb	GB	GB Agent	None	Bomb Shell
MC-1 Bomb	GB	GB Agent	None	Bomb Shell
M55 Rocket	VX	VX Agent	Rocket Pieces	None
M23 Mines	VX	VX Agent	Explosives	Drum
M121/A1 Projectiles	VX	VX Agent	Explosives	Projectile Body
M426 Projectiles	VX	VX Agent	Explosives	Projectile Body
Spray Tank	VX	VX Agent	None	Spray Tank
Ton Containers	HD	HD Agent	None	Container

Feed rate values $(Q_{k,j})_l$ will vary unpredictably during a processing campaign. However, an average feed rate can be estimated as the total quantity of material to be processed divided by the total time taken to process the material. This relationship can be written as:

$$(Q_{k,j})_l = \frac{N_l \cdot (m_j)_l}{(\theta_{k,j})_l} \qquad (4)$$

Where N_l is the total number of munitions containing the l^{th} subcomponent to be processed in the j^{th} furnace in the k^{th} campaign. The term $m_{j,l}$ represents the amount of the l^{th} subcomponent in a single munition. The following table provides values for both N_l and $m_{j,l}$ for all munitions stored at the UMCDF (UMCDF RCRA Permit Application, Volume I, Attachment C-1).

Table 2: Quantities of munitions and Subcomponents.

Munition Type	**Number for Processing (N_l)**	**LIC Feed per Munition ($m_{LIC,l}$)[c,e]**	**DFS Feed per Munition ($m_{DFS,l}$)**	**MPF Feed per Munition ($m_{MPF,l}$)[d]**
GB M55 Rocket	91442	10.70	1[a]	0
GB MK-94 Bombs	27	108.00	0	1
GB MC-1 Bombs	2418	220.00	0	1
GB M426 Projectiles	14246	14.50	7.3[b]	1
GB M121A1 Projectiles	47406	6.50	2.75[b]	1
VX M55 Rockets	14519	10.00	1[a]	0
VX Spray Tanks	156	1356.00	0b	1
VX M121A1 Projectiles	32313	6.00	2.75[b]	1
VX M426 Projectiles	3752	14.50	7.3[b]	1
VX M23 Mines	11685	10.50	0.8[b]	1/3
HD Ton Containers	2635	1700.00	0	1

[a] Units for M55 rockets are rockets/munition since the whole rocket is fed to the DFS after shearing.

[b] Units for DFS feed for all but M55 rockets are lb-explosives/munition.

[c] Units for $m_{LIC,l}$ are lb-agent/munition.

[d] Units for $m_{MPF,l}$ are casing/munition or drum/munition.

[e] Assumes 100% of agent in munitions is processed in the LIC

Table 3: Maximum Permitted Feed Rates (UMCDF RCRA Permit, Section VII).

Munition Type	**LIC Maximum Permitted Feed Rate (lb/hr)[a]**	**DFS Maximum Permitted Feed Rate[b]**	**MPF Minimum Permitted Tray Interval (minutes)**	**MPF Munitions per Tray**	**MPF Maximum Permitted Feed Rate[d] (munitions/hour)**
GB M55 Rocket	2,060	36.6	NA[c]	NA[c]	NA[c]
GB MK-94 Bombs	2,060	NA	35.5	2	3.38
GB MC-1 Bombs	2,060	NA	35.5	2	3.38
GB M426 Projectiles	2,060	113.6	35.5	27	45.63
GB M121A1 Projectiles	2,060	113.6	35.5	48	81.13
VX M55 Rockets	1,360	36.6	NA[c]	NA[c]	NA[c]
VX Spray Tanks	1,360	NA	60	1	1.00
VX M121A1 Projectiles	1,360	113.6	35.5	48	81.13
VX M426 Projectiles	1,360	113.6	35.5	27	45.63
VX M23 Mines	1,360	113.6	35.5	8	13.52
HD Ton Containers	2,610	NA	35.5	1	1.69

[a] Values represent the sum of LIC1 and LIC2 maximums.

[b] Units for DFS feed for M55 rockets is rockets/hour. Units for all others are lb-explosives/hour.

[c] NA implies not an applicable value

[d] Value calculated from the minimum tray interval and number of munitions per tray.

Combining Equations (2) and (4) yield:

$$ER_{i,k,j} = \frac{\sum_{l}(ER^{\max}_{i,k,j})_l \cdot \left(\frac{N_l \cdot m_{j,l}}{Q^{\max}_{k,j}}\right)_l}{\left(\theta_k^{Total}\right)} \tag{5}$$

This can also be written as:

$$ER_{i,k,j} = \sum_{l}(ER^{\max}_{i,k,j})_l \cdot \left(\frac{N_l \cdot m_{j,l}}{Q^{\max}_{k,j} \cdot \left(\theta_k^{Total}\right)}\right)_l \tag{6}$$

With the second term on the right-hand side of the equation equaling the ratio between the time-averaged processing rate and the maximum processing rate. Table 4 provides values for the aforementioned ratio by furnace and agent campaign. These values were calculated from using the data provided Tables 2 and 3. In Table 4 the LIC1 and LIC2 have been assigned a separate value equal to half the total LIC requirement.

Table 4: Estimated Average Furnace Use Expressed as a Percentage of the Maximum Permitted Feed Rate.

Munition Type	**LIC 1 Average Use (% Max)**	**LIC 2 Average Use (% Max)**	**DFS Average Use (% Max)**	**MPF Average Use (% Max)**
GB Campaign				
GB M55 Rocket	0.74%	0.74%	7.75%	0.00%
GB MK-94 Bombs	0.002%	0.002%	0.00%	0.02%
GB MC-1 Bombs	0.40%	0.40%	0.00%	2.22%
GB M426 Projectiles	0.16%	0.16%	2.84%	0.97%
GB M121A1 Projectiles	0.23%	0.23%	3.56%	1.81%
GB Campaign Total	**1.53%**	**1.53%**	**14.15%**	**5.02%**
VX Campaign				
VX M55 Rockets	0.26%	0.26%	1.95%	0.00%
VX Spray Tanks	0.38%	0.38%	0.00%	0.77%
VX M121A1 Projectiles	0.35%	0.35%	3.85%	1.96%
VX M426 Projectiles	0.10%	0.10%	1.19%	0.41%
VX M23 Mines	0.22%	0.22%	0.40%	4.25%
VX Campaign Total	**1.32%**	**1.32%**	**7.39%**	**7.38%**
HD Campaign				
HD Ton Containers	4.90%	4.90%	0.00%	8.90%
HD Campaign Total	**4.90%**	**4.90%**	**0.00%**	**8.90%**

Computation of the individual furnace emission rates for each COPC can be accomplished using Equation (6) to combine the trial burn results for jth furnace and the kth campaign along with the values in Table 4. The average common stack emission rate for the kth campaign is then the sum of the individual furnace emission rates, as shown in Equation (7).

$$ER_{i,k} = ER_{i,k,LIC1} + ER_{i,k,LIC2} + ER_{i,k,DFS} + ER_{i,k,MPF} \tag{7}$$

The average the emission rate for the ith COPC over all campaigns can now be estimated as the time-weighted average for the three agent campaigns:

$$\overline{ER_i} = \frac{ER_{i,GB} \cdot \left(\theta_{GB}^{Total}\right) + ER_{i,VX} \cdot \left(\theta_{VX}^{Total}\right) + ER_{i,HD} \cdot \left(\theta_{HD}^{Total}\right)}{\theta_{GB}^{Total} + \theta_{VX}^{Total} + \theta_{HD}^{Total}} \tag{8}$$

Incorporating Secondary Waste Processing

Secondary waste will be generated during agent processing and during site closure. To accelerate the closure process it is the desire of site management to process as much agent campaign waste as possible during the campaign in which it is generated. To estimate the quantity of secondary waste that can be processed in each agent campaign it is necessary to evaluate the types of waste generated, the availability of the permitted treatment system that will process the waste, and the permitted rate at which the material can be processed.

The Waste Analysis Plan (WAP) of the UMCDF RCRA permit outlines the types of secondary waste that will be generated at the facility and described the methods to be used to treat the waste. Table 5 provides a summary of this information along with an estimate of the quantity of each waste that will be generated during the agent campaigns. Table 6 provides closure waste estimates. Values in Table 5 were taken from site estimates generated in calendar year 2000 and reported in the permit modification request UMCDF-00-016-WAST(3). Some entries were modified to more accurately reflect actual waste generation rates. Table 6 values were taken from JACADS closure waste records. Table 7 provides an estimate of the furnace times needed to treat the agent campaign related waste if the material is processed at the maximum rate indicated in the Section VII of the RCRA permit. The noncombustible secondary waste in Table 7 which is destined for the MPF corresponds to the noncombustible MPF maintenance waste and the ACS/AQS/SDS maintenance waste (agent collection system [ACS], agent quantification system [AQS], and spent decontamination system [SDS]). All other MPF destined waste was classified as combustible waste.

Table 5: Agent Campaign Secondary Waste Estimates.

Waste Stream	**Quantity for Furnace Processing (lbs)**	**Fate Stated in WAP**	**Campaign Generated**
Misc Agent Contaminated Liquid (lbs)	9372	LIC	GB, VX, HD
ECR Maint. Wastes (lbs)	9586	DFS	GB, VX
ACS/AQS/SDS Maint. Waste (lbs)	10000	MPF	GB, VX, HD
Noncombustible MDB Maint. Waste (lbs)	57639	MPF	GB, VX, HD
Combustible MDB Maint. Waste (lbs)	81579	MPF	GB, VX, HD
Ventilation System Filters (lbs)	27772	MPF	GB, VX, HD
Spent Carbon (lbs)	706035	DFS/CMS	GB, VX, HD
PPE Carbon Filter Canisters (lbs)	0.00 [a]	MPF	GB, VX, HD
Lab Solid Waste (lbs)	19606	MPF	GB, VX, HD
Misc. Agent Contaminated Dunnage (lbs)	15223	Off-Site/MPF	GB, VX
DPE Suits (lbs)	257372	MPF	GB, VX, HD
TAP Gear (lbs)	44820	MPF	GB, VX, HD

[a] Included in Spent Carbon Estimate.

Table 6: Secondary Waste Generated During Closure [a]

Waste Stream	**Estimate Quantity, $M_{j,sw}$ (lbs)**	**Maximum Permitted Feed Rate, $Q^{\max}_{closure,j}$ (lb/hr)**	$\left(\frac{M_{j,sw}}{Q^{\max}_{closure,j}\cdot\left(\theta^{Total}_{closure}\right)}\right)_{sw}$
MPF Non-combustible secondary waste	2,191,863.8	6176	2.03E-02
MPF Combustible secondary waste	457,493.6	410	6.37E-02
LIC Treated Waste	262,641.2	4071	3.68E-03
DFS/CMS Treated Carbon	706,035.0	550	7.33E-02

[a] The last column represents the fraction of closure period (assumed as 2 years) needed to process the indicated waste type at maximum processing rates.

Table 7: Waste Processing Times for SW Processed During Agent Campaigns

Waste Type	**Required Processing Time - GB (hr)**	**Required Processing Time - VX (hr)**	**Required Processing Time - HD (hr)**
MPF Non-combustible secondary waste	1.68E+01	1.06E+01	9.15E+00
MPF Combustible secondary waste	5.07E+02	3.19E+02	2.63E+02
LIC Treated Waste	1.06E+00	6.68E-01	5.76E-01
DFS Treated Waste	2.06E+02	1.30E+02	0.00E+00

A comparison of the hours needed to process the agent campaign secondary waste with available furnace time during the corresponding campaign reveals that ample time is available to process all waste. Hence, for the purpose of this analysis we will assume that all campaign generated waste (except activated carbon which requires DFS modifications before treatment) is processed during the corresponding campaign.

The contribution of secondary waste processing during agent operations to individual furnace emission can be incorporated by adding an additional term to Equation (6) as follows:

$$ER_{i,k,j} = \sum_{l} (ER_{i,k,j}^{\max})_l \cdot \left(\frac{N_l \cdot m_{j,l}}{Q_{k,j}^{\max} \cdot \left(\theta_k^{Total}\right)} \right)_l + \sum_{sw} \left(ER_{i,k,j}^{\max}\right)_{sw} \cdot \left(\frac{\theta_{k,j,sw}}{\theta_k^{Total}} \right) \qquad (9)$$

With $\theta_{k,j,sw}$ representing the amount of time the jth furnace would need to processing the all the swth secondary waste stream generated in the kth campaign at the maximum permitted feed rate. Values of $\left(\frac{\theta_{k,j,sw}}{\theta_k^{Total}} \right)$ are given in Table 8.

Table 8: Fraction of Campaign Needed to Process Secondary waste at Maximum Permitted Feed Rates

Waste Stream	$\left(\frac{\theta_{GB,j,sw}}{\theta_{GB}^{Total}} \right)$	$\left(\frac{\theta_{VX,j,sw}}{\theta_{VX}^{Total}} \right)$	$\left(\frac{\theta_{HD,j,sw}}{\theta_{HD}^{Total}} \right)$
MPF Non-combustible secondary waste	5.22E-04	5.22E-04	5.22E-04
MPF Combustible secondary waste	1.57E-02	1.57E-02	1.50E-02
LIC Treated Waste	3.28E-05	3.28E-05	3.28E-05
DFS Treated Waste	6.40E-03	6.40E-03	0.00E+00

Equation (9) replaces Equation (6) in calculating the furnace specific emission rates for each agent campaign which are then applied to Equation (7) to calculate the average common stack emission rate for each campaign.

Including the impact on emission rates from processing secondary waste during closure requires modification of Equation (8) as follows:

$$\overline{ER_i} = \frac{ER_{i,GB} \cdot \left(\theta_{GB}^{Total}\right) + ER_{i,VX} \cdot \left(\theta_{VX}^{Total}\right) + ER_{i,HD} \cdot \left(\theta_{HD}^{Total}\right) + ER_{i,Closure} \cdot \left(\theta_{Closure}^{Total}\right)}{\theta_{GB}^{Total} + \theta_{VX}^{Total} + \theta_{HD}^{Total} + \theta_{Closure}^{Total}} \qquad (10)$$

Where $\theta_{Closure}^{Total}$ represents the time required to complete closure (assumed as 2 yr) and $ER_{i,closure}$ is the average emission rate for the ith COPC during closure. This average rate is given by Equation (7) with k equal to closure:

$$ER_{i,closure} = ER_{i,closure,LIC1} + ER_{i,closure,LIC2} + ER_{i,closure,DFS} + ER_{i,closure,MPF} \qquad (11)$$

The individual contributions of each furnace to the average common stack emission rate during closure can be calculated in a manner analogous to Equation (6) by recognizing that the term $(N_l \cdot m_{j,l})$ represents the total quantity of a material to be processed in the jth furnace and can be represented by $(M_{j,l})$. Equation (6) can be written for closure as:

$$ER_{i,closure,j} = \sum_{sw} (ER_{i,closure,j}^{\max})_{sw} \cdot \left(\frac{M_{j,sw}}{Q_{closure,j}^{\max} \cdot \left(\theta_{closure}^{Total}\right)} \right)_{sw} \qquad (12)$$

Table 6 provides values for $\left(\frac{M_{j,sw}}{Q_{closure,j}^{\max} \cdot \left(\theta_{closure}^{Total}\right)} \right)_{sw}$ for all secondary waste streams identified for processing during closure.

<u>Application of Emission Rate Estimates to Media Concentration Equations</u>

Air dispersion model outputs (air concentrations and deposition rates) are provided on a unit emission rate (1.0 g/s) basis. These values are converted to COPC specific concentrations and deposition rates by multiplying by the emission rates for a given source. Implicit in this approach is the assumption of continuous, constant emissions from the contributing sources. This assumption is far from reality for a facility like the UMCDF where types and amounts of individual furnace feeds vary, and where there are limitations on the number of hours per year a furnace can operate. However, the assumption is necessary given the state of computational tools for air dispersion modeling and risk assessment. It should be noted that the values of $\overline{ER_i}$ computed using the approach outlined above are consistent with the assumption of continuous, constant emissions since $\overline{ER_i}$ represents an average over the duration of plant operation. That is, the emission rate for the ith component is computed as the sum of the mass generated in all campaigns divided by the combined duration of all campaigns. In this way a mass balance over the life of the plant is maintained since the mass of the ith COPC applied to risk assessment is equal to the amount calculated from estimates of furnace use and the trial burn results.

Recognizing this compatibility allows the direct application of $\overline{ER_i}$ in the EPA Equations without further scaling for down-time. For example, $\overline{ER_i}$ can be directly substituted for *Q* in Table B-5-1 of EPA 2005 (Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, EPA530-R-05-006) allowing the chronic air concentration for the ith COPC to be described as:

$$C_{a,i}^{chronic} = \overline{ER_i} \cdot \left(F_{v,i} \cdot C_{yv} + (1 - F_{v,i}) \cdot C_{yp} \right) \qquad (13)$$

Where:

$F_{v,i}$ = Fraction of the ith COPC present in the vapor phase.

C_{yv} = Unitized yearly average air concentration from the vapor phase (µg-s/g-m^3).

C_{yp} = Unitized yearly average air concentration from the particle phase (µg-s/g-m^3).

The one exception to the direct application of the values of $\overline{ER_i}$ calculated in Equation 13 is with the acute air concentrations where we want to evaluate a worst case, short term exposure. For this application it is more appropriate to estimate a high emission rate condition and apply this to the unitized one-hour maximum concentrations generated by the air model. For example, since all four furnaces are used for the demolition of GB and VX projectiles, it can be assumed that all might be operating simultaneously at maximum feed rates for a brief period of time. In addition, to comply with the 2004 Umatilla Risk Assessment Work Plan, it is necessary to account for one furnace operating under upset conditions. This criterion can be incorporated by multiplying the emissions from one of the furnaces by a factor of ten. Under these conditions the possible values for $ER_{i,GB}$ and $ER_{i,VX}$ are represented by:

$$ER_{i,GB} = 10 \cdot \sum_l (ER_{i,GB,LIC1}^{\max})_l + \sum_l (ER_{i,GB,LIC2}^{\max})_l + \sum_l (ER_{i,GB,DFS}^{\max})_l + \sum_l (ER_{i,GB,MPF}^{\max})_l \qquad (14a)$$

$$ER_{i,GB} = \sum_l (ER_{i,GB,LIC1}^{\max})_l + 10 \cdot \sum_l (ER_{i,GB,LIC2}^{\max})_l + \sum_l (ER_{i,GB,DFS}^{\max})_l + \sum_l (ER_{i,GB,MPF}^{\max})_l \qquad (14b)$$

$$ER_{i,GB} = \sum_l (ER_{i,GB,LIC1}^{\max})_l + \sum_l (ER_{i,GB,LIC2}^{\max})_l + 10 \cdot \sum_l (ER_{i,GB,DFS}^{\max})_l + \sum_l (ER_{i,GB,MPF}^{\max})_l \qquad (14c)$$

$$ER_{i,GB} = \sum_l (ER_{i,GB,LIC1}^{\max})_l + \sum_l (ER_{i,GB,LIC2}^{\max})_l + \sum_l (ER_{i,GB,DFS}^{\max})_l + 10 \cdot \sum_l (ER_{i,GB,MPF}^{\max})_l \qquad (14d)$$

$$ER_{i,VX} = 10 \cdot \sum_l (ER^{\max}_{i,VX,LIC1})_l + \sum_l (ER^{\max}_{i,VX,LIC2})_l + \sum_l (ER^{\max}_{i,VX,DFS})_l + \sum_l (ER^{\max}_{i,VX,MPF})_l \quad (15a)$$

$$ER_{i,VX} = \sum_l (ER^{\max}_{i,VX,LIC1})_l + 10 \cdot \sum_l (ER^{\max}_{i,VX,LIC2})_l + \sum_l (ER^{\max}_{i,VX,DFS})_l + \sum_l (ER^{\max}_{i,VX,MPF})_l \quad (15b)$$

$$ER_{i,VX} = \sum_l (ER^{\max}_{i,VX,LIC1})_l + \sum_l (ER^{\max}_{i,VX,LIC2})_l + 10 \cdot \sum_l (ER^{\max}_{i,VX,DFS})_l + \sum_l (ER^{\max}_{i,VX,MPF})_l \quad (15c)$$

$$ER_{i,VX} = \sum_l (ER^{\max}_{i,VX,LIC1})_l + \sum_l (ER^{\max}_{i,VX,LIC2})_l + \sum_l (ER^{\max}_{i,VX,DFS})_l + 10 \cdot \sum_l (ER^{\max}_{i,VX,MPF})_l \quad (15d)$$

Similarly, the worst case conditions for the HD campaign and for the closure campaign corresponds to maximum emissions from all applicable furnaces with one furnace in upset. Applicable furnaces for the HD campaign are the LIC1, LIC2, and the MPF. Applicable furnaces for closure are the LIC1, LIC2, DFS, and MPF. Possible values of $ER_{i,HD}$ and $ER_{i,closure}$ are given by:

$$ER_{i,HD} = 10 \cdot \sum_l (ER^{\max}_{i,HD,LIC1})_l + \sum_l (ER^{\max}_{i,HD,LIC2})_l + \sum_l (ER^{\max}_{i,HD,MPF})_l \quad (16a)$$

$$ER_{i,HD} = \sum_l (ER^{\max}_{i,HD,LIC1})_l + 10 \cdot \sum_l (ER^{\max}_{i,HD,LIC2})_l + \sum_l (ER^{\max}_{i,HD,MPF})_l \quad (16b)$$

$$ER_{i,HD} = \sum_l (ER^{\max}_{i,HD,LIC1})_l + \sum_l (ER^{\max}_{i,HD,LIC2})_l + 10 \cdot \sum_l (ER^{\max}_{i,HD,MPF})_l \quad (16c)$$

$$ER_{i,closure} = \begin{bmatrix} 10 \cdot \sum_l (ER^{\max}_{i,closure,LIC1})_l + \sum_l (ER^{\max}_{i,closure,LIC2})_l + \\ \sum_l (ER^{\max}_{i,closure,DFS})_l + \sum_l (ER^{\max}_{i,closure,MPF})_l \end{bmatrix} \quad (17a)$$

$$ER_{i,closure} = \begin{bmatrix} \sum_l (ER^{\max}_{i,closure,LIC1})_l + 10 \cdot \sum_l (ER^{\max}_{i,closure,LIC2})_l + \\ \sum_l (ER^{\max}_{i,closure,DFS})_l + \sum_l (ER^{\max}_{i,closure,MPF})_l \end{bmatrix} \quad (17b)$$

$$ER_{i,closure} = \begin{bmatrix} \sum_l (ER^{\max}_{i,closure,LIC1})_l + \sum_l (ER^{\max}_{i,closure,LIC2})_l + \\ 10 \cdot \sum_l (ER^{\max}_{i,closure,DFS})_l + \sum_l (ER^{\max}_{i,closure,MPF})_l \end{bmatrix} \quad (17c)$$

$$ER_{i,closure} = \begin{bmatrix} \sum_l (ER^{\max}_{i,closure,LIC1})_l + \sum_l (ER^{\max}_{i,closure,LIC2})_l + \\ \sum_l (ER^{\max}_{i,closure,DFS})_l + 10 \cdot \sum_l (ER^{\max}_{i,closure,MPF})_l \end{bmatrix} \quad (17d)$$

Since the emission rate, $\overline{ER_i}$, is a combination of individual campaign emission rates (see Equation 10), it will be necessary to evaluate all possible combinations of campaign emission rates to find the worst case acute exposure. This yields 192 separate evaluations (4 GB cases, 4 VX cases, 3 HD cases, 4 closure cases) that must be completed unless other simplifying assumption are made.

Example Calculation of Average Common Stack Emission Rate

Assume that the site has the following five COPCs: acetone, benzene, bromodichloromethane, bromoform, bromomethane, 2-butanone (MEK) and that the following trial burns have been conducted:

Table 9: Trial Burns for Example Problems

Trial Burns	GB	VX	HD	Secondary Waste
LIC 1 Agent	X	X	X	
LIC 2 Agent	X	X	X	
MPF Agent	X	X	X	
DFS Agent	X	X		
MPF - Non Combustible SW	X	X	X	
MPF – Combustible SW				X
DFS/CMS SW Processing				X

In Table 9 it is assumed, for simplicity, that a single trial burn will represent an agent/furnace combination. For example a single, worst case, trial burn result will be used for the processing of all GB munitions in the MPF (projectiles, bombs, ton containers). Also, it is assumed that SW processing in the LIC1 and LIC2 during closure can be represented by worst case emissions from all the LIC1 and LIC2 agent trial burns. Finally, emission rates for non-combustible MPF SW that is treated during closure will be estimated from the worst case MPF agent trial burn. Non-combustible SW processed in the MPF during an agent campaign will rely on the emission rates from the corresponding MFP agent trial burn. Secondary waste processed in the DFS during the HD campaign will rely on worst case emission rates from the VX and GB DFS-agent trial burns.

Hypothetical emission rates for the trial burns shown in Table 9 are provided in Tables 10 through 13.

Table 10: Example GB Campaign Trial Burn Results

Compound	**LIC1** [a] **(g/s)**	**LIC2** [a] **(g/s)**	**MPF** [b] **(g/s)**	**DFS** [c] **(g/s)**
Acetone	1.50E-03	1.88E-03	2.74E-04	6.21E-03
Benzene	6.86E-05	8.58E-05	2.12E-05	5.40E-04
Bromodichloromethane	2.53E-05	3.16E-05	2.33E-05	1.09E-04
Bromoform	2.90E-05	3.62E-05	2.33E-05	9.23E-05
Bromomethane (Methyl Bromide)	1.28E-04	1.60E-04	5.52E-05	6.66E-04
2-Butanone (MEK)	1.45E-04	1.81E-04	1.17E-04	5.42E-04

[a] The maximum emission rate from the LIC1 and LIC2 agent trial burns will be applied to SW processed in either LIC during the agent campaign.

[b] Values will also be used for non-combustible SW processed in the MPF during the agent campaign.

[c] Values will also be used for SW processed in the DFS during the agent campaign.

Table 11: Example VX Campaign Trial Burn Results

Compound	**LIC1** [a] **(g/s)**	**LIC2** [a] **(g/s)**	**MPF** [b] **(g/s)**	**DFS** [c] **(g/s)**
Acetone	2.74E-04	3.43E-04	3.29E-04	2.74E-04
Benzene	2.12E-05	2.65E-05	2.54E-05	2.12E-05
Bromodichloromethane	2.33E-05	2.91E-05	2.80E-05	2.33E-05
Bromoform	2.33E-05	2.91E-05	2.80E-05	2.33E-05
Bromomethane (Methyl Bromide)	5.52E-05	6.90E-05	6.62E-05	5.52E-05
2-Butanone (MEK)	1.17E-04	1.46E-04	1.40E-04	1.17E-04

[a] The maximum emission rate from the LIC1 and LIC2 agent trial burns will be applied to SW processed in either LIC during the agent campaign.

[b] Values will also be used for non-combustible SW processed in the MPF during the agent campaign.

[c] Values will also be used for SW processed in the DFS during the agent campaign.

Table 12: Example HD Campaign Trial Burn Results [c]

Compound	**LIC1 [a] (g/s)**	**LIC2 [a] (g/s)**	**MPF [b] (g/s)**
Acetone	2.98E-04	3.73E-04	1.06E-02
Benzene	3.12E-04	3.90E-04	2.24E-03
Bromodichloromethane	1.97E-06	2.46E-06	5.22E-04
Bromoform	1.11E-04	1.38E-04	5.26E-04
Bromomethane (Methyl Bromide)	1.97E-06	2.46E-06	1.04E-03
2-Butanone (MEK)	1.47E-03	1.83E-03	2.34E-03

[a] The maximum emission rate from the LIC1 and LIC2 agent trial burns will be applied to SW processed in either LIC during the agent campaign.

[b] Values will also be used for non-combustible SW processed in the MPF during the agent campaign.

[c] Secondary waste processed in the DFS during the agent campaign will use worst case emission rates from the GB and VX DFS agent trial burns.

Table 13: Example Secondary Waste Campaign Trial Burn Results [c]

Compound	**MPF Combustible SW (g/s)**	**DFS/CMS (g/s)**
Acetone	5.48E-04	6.21E-03
Benzene	4.24E-05	5.40E-04
Bromodichloromethane	4.66E-05	1.09E-04
Bromoform	4.66E-05	9.23E-05
Bromomethane (Methyl Bromide)	1.10E-04	6.66E-04
2-Butanone (MEK)	2.33E-04	5.42E-04

[c] Secondary waste other than carbon processed in the DFS during the closure campaign will use worst case emission rates from the GB and VX DFS agent trial burns.

Tables 14 and 15 provides the multipliers for trial burn emission rates necessary to calculate $ER_{i,k,j}$ using Equation (9).

Table 14: Multipliers on Emission Rates for Agent Campaigns for application of Equation (9) [a]

Munition Type	$\left(\frac{N_l \cdot m_{LIC1,l}}{Q^{\max}_{k,LIC1} \cdot \left(\theta_k^{Total}\right)}\right)_l$	$\left(\frac{N_l \cdot m_{LIC2,l}}{Q^{\max}_{k,LIC2} \cdot \left(\theta_k^{Total}\right)}\right)_l$	$\left(\frac{N_l \cdot m_{DFS,l}}{Q^{\max}_{k,DFS} \cdot \left(\theta_k^{Total}\right)}\right)_l$	$\left(\frac{N_l \cdot m_{MPF,l}}{Q^{\max}_{k,MPF} \cdot \left(\theta_k^{Total}\right)}\right)_l$
k = GB Campaign, $\theta_{GB}^{Total} = 3.68\,years$				
l = GB M55 Rocket	7.37E-03	7.37E-03	7.37E-03	0.00E+00
l = GB MK-94 Bombs	2.20E-05	2.20E-05	0.00E+00	2.48E-04
l = GB MC-1 Bombs	4.01E-03	4.01E-03	0.00E+00	2.22E-02
l = GB M426 Projectiles	1.56E-03	1.56E-03	2.84E-02	9.68E-03
l = GB M121A1 Projectiles	2.32E-03	2.32E-03	3.56E-02	1.81E-02
k = VX Campaign, $\theta_{VX}^{Total} = 2.32\,years$				
l = VX M55 Rockets	2.63E-03	2.63E-03	1.95E-02	0.00E+00
l = VX Spray Tanks	3.83E-03	3.83E-03	0.00E+00	7.68E-03
l = VX M121A1 Projectiles	3.51E-03	3.51E-03	3.85E-02	1.96E-02
l = VX M426 Projectiles	9.84E-04	9.84E-04	1.19E-02	4.05E-03
l = VX M23 Mines	2.22E-03	2.22E-03	4.05E-03	4.25E-02
k = HD Campaign, $\theta_{HD}^{Total} = 2.0\,years$				
l = HD Ton Containers	4.90E-02	4.90E-02	0.00E+00	8.90E-02

[a] The data in this table is a duplication of Table 4, but is repeated here for clarity.

Table 15: Emission Rate Multipliers for Secondary Waste Processed During Agent Campaigns [a]

Waste Stream	$\left(\frac{\theta_{GB,j,sw}}{\theta_{GB}^{Total}}\right)$	$\left(\frac{\theta_{VX,j,sw}}{\theta_{VX}^{Total}}\right)$	$\left(\frac{\theta_{HD,j,sw}}{\theta_{HD}^{Total}}\right)$
MPF Non-combustible secondary waste (j=MPF)	5.22E-04	5.22E-04	5.22E-04
MPF Combustible secondary waste (i=MPF)	1.57E-02	1.57E-02	1.50E-02
LIC Treated Waste (j=LIC1)	3.28E-05	3.28E-05	3.28E-05
DFS Treated Waste (j=DFS)	6.40E-03	6.40E-03	0.00E+00

[a] The data in this table is a duplication of Table 8, but is repeated here for clarity.

For the LIC1 GB campaign the calculation would be as follows:

$$ER_{i,GB,LIC1} = (ER_{i,GB,LIC1}^{\max})\cdot\begin{bmatrix}\left(\dfrac{N_{M55}\cdot m_{LIC1,M55}}{Q_{GB,LIC1}^{\max}\cdot\left(\theta_{GB}^{Total}\right)}\right)+\\ \left(\dfrac{N_{MK94}\cdot m_{LIC1,Mk94}}{Q_{GB,LIC1}^{\max}\cdot\left(\theta_{GB}^{Total}\right)}\right)+\\ \left(\dfrac{N_{MC1}\cdot m_{LIC1,MC1}}{Q_{GB,LIC1}^{\max}\cdot\left(\theta_{GB}^{Total}\right)}\right)+\\ \left(\dfrac{N_{M426}\cdot m_{LIC1,M426}}{Q_{GB,LIC1}^{\max}\cdot\left(\theta_{GB}^{Total}\right)}\right)+\\ \left(\dfrac{N_{M212A1}\cdot m_{LIC1,M212A1}}{Q_{GB,LIC1}^{\max}\cdot\left(\theta_{GB}^{Total}\right)}\right)\end{bmatrix}+\left(Max[ER_{i,GB,LIC1}^{\max},ER_{i,GB,LIC2}^{\max}]\right)_{sw}\cdot\left(\frac{\theta_{GB,LIC1,sw}}{\theta_{GB}^{Total}}\right)$$

The second term on the right hand side of the above equation reflects the selection of the larger of the LIC1 or LIC2 emission rate. For acetone, benzene, and MEK we can; using Tables 10, 14, and 15; write the following (remember, it was assumed the LIC secondary waste maximum emission rates are taken from the agent trial burns in Table 10):

$$ER_{acetone,GB,LIC1} = (1.50E-03)\cdot\begin{bmatrix}7.37E-03+2.2E-05+\\ 4.01E-03+1.56E-03+\\ 2.32E-03\end{bmatrix}+(1.88E-03)\cdot[3.28E-05]$$

$$ER_{Benzene,GB,LIC1} = (6.86E-05)\cdot\begin{bmatrix}7.37E-03+2.2E-05+\\ 4.01E-03+1.56E-03+\\ 2.32E-03\end{bmatrix}+(8.58E-05)\cdot[3.28E-05]$$

$$ER_{MEK,GB,LIC1} = (1.45E-04)\cdot\begin{bmatrix} 7.37E-03+2.2E-05+ \\ 4.01E-03+1.56E-03+ \\ 2.32E-03 \end{bmatrix} + (1.81E-04)\cdot\left[3.28E-05\right]$$

Where the first term on the right hand side represents the agent processing contribution to the emission rate and the second term represents secondary waste processing.

For the DFS GB campaign the calculation would be as follows:

$$ER_{l,GB,DFS} = (ER^{\max}_{l,GB,DFS})\cdot\begin{bmatrix} \left(\dfrac{N_{M55}\cdot m_{DFS,M55}}{Q^{\max}_{GB,DFS}\cdot\left(\theta^{Total}_{GB}\right)}\right)+\left(\dfrac{N_{MK94}\cdot m_{DFS,Mk94}}{Q^{\max}_{GB,DFS}\cdot\left(\theta^{Total}_{GB}\right)}\right)+ \\ \left(\dfrac{N_{MC1}\cdot m_{DFS,MC1}}{Q^{\max}_{GB,DFS}\cdot\left(\theta^{Total}_{GB}\right)}\right)+\left(\dfrac{N_{M426}\cdot m_{DFS,M426}}{Q^{\max}_{GB,DFS}\cdot\left(\theta^{Total}_{GB}\right)}\right)+ \\ \left(\dfrac{N_{M212A1}\cdot m_{DFS,M212A1}}{Q^{\max}_{GB,DFS}\cdot\left(\theta^{Total}_{GB}\right)}\right) \end{bmatrix} + \left(ER^{\max}_{l,GB,DFS}\right)_{sw}\cdot\left(\frac{\theta_{GB,DFS,sw}}{\theta^{Total}_{GB}}\right)$$

Or, for acetone, benzene, and MEK we can; using Tables 10, 13, 14, and 15; write:

$$ER_{acetone,GB,DFS} = (6.21E-03)\cdot\begin{bmatrix} 7.37E-03+2.84E-02+ \\ 3.56E-02 \end{bmatrix} + (6.21E-03)\cdot\left[6.40E-03\right]$$

$$ER_{Benzene,GB,DFS} = (5.40E-04)\cdot\begin{bmatrix} 7.37E-03+2.84E-02+ \\ 3.56E-02 \end{bmatrix} + (5.40E-04)\cdot\left[6.40E-03\right]$$

$$ER_{MEK,GB,DFS} = (5.42E-04)\cdot\begin{bmatrix} 7.37E-03+2.84E-02+ \\ 3.56E-02 \end{bmatrix} + (5.42E-04)\cdot\left[6.40E-03\right]$$

For the MPF GB campaign the calculation would be as follows:

$$ER_{i,GB,MPF} = (ER_{i,GB,MPF}^{\max}) \cdot \begin{bmatrix} \left(\dfrac{N_{M55} \cdot m_{MPF,M55}}{Q_{GB,MPF}^{\max} \cdot \left(\theta_{GB}^{Total} \right)} \right) + \\ \left(\dfrac{N_{MK94} \cdot m_{MPF,Mk94}}{Q_{GB,MPF}^{\max} \cdot \left(\theta_{GB}^{Total} \right)} \right) + \\ \left(\dfrac{N_{MC1} \cdot m_{MPF,MC1}}{Q_{GB,MPF}^{\max} \cdot \left(\theta_{GB}^{Total} \right)} \right) + \\ \left(\dfrac{N_{M426} \cdot m_{MPF,M426}}{Q_{GB,MPF}^{\max} \cdot \left(\theta_{GB}^{Total} \right)} \right) + \\ \left(\dfrac{N_{M212A1} \cdot m_{MPF,M212A1}}{Q_{GB,MPF}^{\max} \cdot \left(\theta_{GB}^{Total} \right)} \right) \end{bmatrix} + \begin{bmatrix} \left(ER_{i,GB,MPF}^{\max} \right)_{combust-sw} \cdot \left(\dfrac{\theta_{GB,MPF,combust-sw}}{\theta_{GB}^{Total}} \right) + \\ \left(ER_{i,GB,MPF}^{\max} \right)_{noncombust-sw} \cdot \left(\dfrac{\theta_{GB,MPF,noncombust-sw}}{\theta_{GB}^{Total}} \right) \end{bmatrix}$$

For acetone, benzene, and MEK we can; using Tables 10, 13, 14, and 15; write:

$$ER_{acetone,GB,MPF} = (2.74E-04) \cdot \begin{bmatrix} 2.48E-04+ \\ 2.22E-02+ \\ 9.68E-03+ \\ 1.81E-02 \end{bmatrix} + (2.74E-04) \cdot [5.22E-04] + (5.48E-04) \cdot [1.57E-02]$$

$$ER_{Benzene,GB,MPF} = (2.12E-05) \cdot \begin{bmatrix} 2.48E-04+ \\ 2.22E-02+ \\ 9.68E-03+ \\ 1.81E-02 \end{bmatrix} + (2.12E-05) \cdot [5.22E-04] + (4.24E-05) \cdot [1.57E-02]$$

$$ER_{MEK,GB,MPF} = (1.17E-04) \cdot \begin{bmatrix} 2.48E-04+ \\ 2.22E-02+ \\ 9.68E-03+ \\ 1.81E-02 \end{bmatrix} + (1.17E-04) \cdot [5.22E-04] + (2.33E-04) \cdot [1.57E-02]$$

Estimates for $ER_{i,k,j}$ for secondary waste processing during closure can be calculated from Equation (12) and the data in Tables 6 and 10 through 13. Table 16 provides values of $\left(\dfrac{M_{j,sw}}{Q_{closure,j}^{\max} \cdot \left(\theta_{closure}^{Total} \right)} \right)_{sw}$ presented in Table 6.

Table 16: Fraction of Closure Period Needed to Process Waste at Maximum Feed Rates

Waste Type	$\left(\frac{M_{j,sw}}{Q^{\max}_{closure,j}\cdot\left(\theta^{Total}_{closure}\right)}\right)_{sw}$
MPF Non-combustible secondary waste (j=MPF)	2.03E-02
MPF Combustible secondary waste (j=MPF)	6.37E-02
LIC Treated Waste (j=LIC)	3.68E-03
CMS Carbon Processing (j=DFS/CMS)	7.33E-02

Assuming we apply the maximum value of emission rates for each COPC for the LIC and MPF non-combustible waste then Equation 12 for acetone becomes:

$$ER_{acetone,closure,LIC} = \left(1.88E-03\right)\cdot\left[3.68E-03\right]$$

$$ER_{acetone,closure,DFS/CMS} = \left(6.21E-03\right)\cdot\left[7.33E-02\right]$$

$$ER_{acetone,closure,MPF} = \left(1.06E-02\right)\cdot\left[2.03E-02\right]+\left(5.48E-04\right)\cdot\left[6.37E-02\right]$$

Table 17 provides a complete summary of the results for $ER_{i,k,j}$ for all campaigns and all COPCs used this example.

Table 17: $ER_{i,k,j}$ Values for All Campaigns

Compound	$ER_{i,k,LIC1}$	$ER_{i,k,LIC2}$	$ER_{i,k,MPF}$	$ER_{i,k,DFS}$
k = GB Campaign				
Acetone	2.30E-05	2.86E-05	2.83E-05	1.35E-04
Benzene	1.05E-06	1.31E-06	2.19E-06	1.17E-05
Bromodichloromethane	3.87E-07	4.82E-07	2.41E-06	2.36E-06
Bromoform	4.44E-07	5.53E-07	2.41E-06	2.00E-06
Bromomethane (Methyl Bromide)	1.96E-06	2.45E-06	5.70E-06	1.44E-05
2-Butanone (MEK)	2.22E-06	2.77E-06	1.21E-05	1.17E-05
k = VX Campaign				
Acetone	3.62E-06	4.51E-06	3.31E-05	2.20E-05
Benzene	2.80E-07	3.49E-07	2.56E-06	1.70E-06
Bromodichloromethane	3.08E-07	3.83E-07	2.81E-06	1.87E-06
Bromoform	3.08E-07	3.83E-07	2.81E-06	1.87E-06
Bromomethane (Methyl Bromide)	7.29E-07	9.08E-07	6.66E-06	4.43E-06
2-Butanone (MEK)	1.54E-06	1.92E-06	1.41E-05	9.37E-06
k = HD Campaign				
Acetone	1.46E-05	1.83E-05	1.38E-05	0.00E+00
Benzene	1.53E-05	1.91E-05	1.81E-06	0.00E+00
Bromodichloromethane	9.65E-08	1.21E-07	9.72E-07	0.00E+00
Bromoform	5.43E-06	6.78E-06	9.74E-07	0.00E+00
Bromomethane (Methyl Bromide)	9.66E-08	1.21E-07	2.20E-06	0.00E+00
2-Butanone (MEK)	7.19E-05	8.99E-05	4.73E-06	0.00E+00
k = Closure				
Acetone	6.91E-06	0.00E+00 [a]	2.50E-04 [b]	4.55E-04
Benzene	1.44E-06	0.00E+00	4.81E-05	3.95E-05
Bromodichloromethane	1.16E-07	0.00E+00	1.35E-05	7.97E-06
Bromoform	5.10E-07	0.00E+00	1.36E-05	6.77E-06
Bromomethane (Methyl Bromide)	5.90E-07	0.00E+00	2.82E-05	4.88E-05
2-Butanone (MEK)	6.76E-06	0.00E+00	6.24E-05	3.97E-05

[a] All materials are assumed to be processed in a single LIC since less than 100 hours of processing time are needed to treat all liquid wastes.

[b] $ER_{i,k,MPF}$ for secondary waste is the sum of the contributions from both combustible and noncombustible waste.

The average emission rate for each campaign can now be calculated from the values in Table 17 using Equation (7). Values for $ER_{i,k}$ are shown in Table 18 along with the averages . Example calculations for $ER_{i,k}$ and $\overline{ER_i}$ (from Equation [10]) for acetone are as follows:

$$ER_{acetone,GB} = (2.30E-05)+(2.86E-05)+(2.83E-05)+(1.35E-04) = 2.15E-04$$

$$ER_{acetone,VX} = (3.62E-06)+(4.51E-06)+(3.31E-05)+(2.20E-05) = 6.32E-05$$

$$ER_{acetone,HD} = (1.46E-05)+(1.83E-05)+(1.38E-05)=4.67E-05$$

$$ER_{acetone,closure} = (6.91E-06)+(2.50E-04)+(4.55E-04)=7.12E-04$$

$$\overline{ER_{acetone}} = \left[\begin{array}{c} \dfrac{(2.15E-04)\cdot(3.68)+(6.32E-05)\cdot(2.32)}{10}+ \\ \dfrac{(4.67E-05)\cdot(2.0)+(7.12E-04)\cdot(2.0)}{10} \end{array}\right] = 2.45E-04$$

Note that, in the latter equation, campaign durations of 3.68, 2.32, 2.0, and 2.0 years have been assumed for the GB, VX, HD, and closure campaigns, respectively.

Table 18: Campaign and Overall Average Emission Rates.

Compound	$ER_{i,GB}$ (g/s)	$ER_{i,VX}$ (g/s)	$ER_{i,HD}$ (g/s)	$ER_{i,closure}$ (g/s)	$\overline{ER_i}$ (g/s)
Acetone	2.15E-04	6.32E-05	4.67E-05	7.12E-04	2.45E-04
Benzene	1.62E-05	4.89E-06	3.62E-05	8.90E-05	3.22E-05
Bromodichloromethane	5.63E-06	5.37E-06	1.19E-06	2.16E-05	7.88E-06
Bromoform	5.40E-06	5.37E-06	1.32E-05	2.09E-05	1.01E-05
Bromomethane (Methyl Bromide)	2.45E-05	1.27E-05	2.42E-06	7.76E-05	2.80E-05
2-Butanone (MEK)	2.88E-05	2.69E-05	1.67E-04	1.09E-04	7.19E-05

E Appendix E – Master COPC List

COPC Number	Compound Name	CAS Number	Group Number[1]
1	Acetone	67-64-1	1
2	Benzene	71-43-2	1
3	Bromodichloromethane	75-27-4	1
5	Bromoform (Tribromomethane)	75-25-2	1
6	Bromomethane (Methyl Bromide)	74-83-9	1
7	2-Butanone (MEK)	78-93-3	1
9	Carbon Disulfide	75-15-0	1
10	Carbon Tetrachloride	56-23-5	1
11	Chlorobenzene	108-90-7	1
12	Chloroethane (Ethyl Chloride)	75-00-3	1
13	Trichloromethane (Chloroform)	67-66-3	1
14	Chloromethane (Methyl Chloride)	74-87-3	1
16	Dibromochloromethane	124-48-1	1
21	Dichlorodifluoromethane (Freon 12)	75-71-8	1
24	1,1-Dichloroethene	75-35-4	1
27	cis-1,3-Dichloropropene	10061-01-5	1
28	trans-1,3-Dichloropropene	10061-02-6	1
29	Ethylbenzene	100-41-4	1
30	n-Hexane	110-54-3	1
32	Iodomethane (Methyl iodide)	74-88-4	1
33	Methylene Chloride (Dichloromethane)	75-09-2	1
34	4-Methyl-2-pentanone (Methyl IsoButyl Ketone, MIBK)	108-10-1	1
38	Toluene	108-88-3	1
41	Trichloroethene (TCE)	79-01-6	1
43	Trichlorofluoromethane	75-69-4	1
44	Vinyl acetate	108-05-4	1
45	Styrene (Vinyl benzene)	100-42-5	1
46	Vinyl chloride	75-01-4	1
49	m,p-Xylene	1330-20-7	1
50	o-Xylene	95-47-6	1
51	Total Xylenes	999-999-999[2]	1
62	Benzoic acid	65-85-0	1
70	Benzyl alcohol	100-51-6	1
71	Benzaldehyde	100-52-7	1
74	Bis(2-Ethylhexyl)-phthalate (BEHP)	117-81-7	1
91	Di-n-butyl phthalate	84-74-2	1
93	1,2-Dichlorobenzene	95-50-1	1

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[1] Total COPC are 101, 12, 409, and 181 for groups 1, 2, 3, and 4, respectively.

[2] A 999-999-999 Chemical Abstract Service (CAS) Number indicates that no CAS number could be found for this compound. Unique CAS numbers of the format 0-xx-x (where xx-x represent numerical digest) were later assigned to the Group 1 compounds without pre-assigned CAS numbers. These CAS numbers are shown in other tables in this report.

COPC Number	Compound Name	CAS Number	Group Number[1]
95	1,4-Dichlorobenzene	106-46-7	1
99	Diethyl phthalate	84-66-2	1
104	Dimethyl phthalate	131-11-3	1
108	2,4-Dinitrotoluene	121-14-2	1
127	2-Methylnaphthalene	91-57-6	1
128	2-Methylphenol (o-Cresol)	95-48-7	1
132	Naphthalene	91-20-3	1
160	2,4,6-Trinitrotoluene	118-96-7	1
162	2,3,7,8-TCDD	1746-01-6	1
172	OCDD	3268-87-9	1
173	2,3,7,8-TCDF	51207-31-9	1
183	1,2,3,4,6,7,8-HpCDF	67562-39-4	1
184	1,2,3,4,7,8,9-HpCDF	55673-89-7	1
186	OCDF	39001-02-0	1
187	Total PCBs (no congeners)	1336-36-3	1
191	3,3',4,4'- Tetra CB (77)	32598-13-3	1
193	2,3',4,4',5-Penta CB (118)	31508-00-6	1
194	2,3,3',4,4'-Penta CB (105)	32598-14-4	1
195	2,3,4,4',5-Penta CB (114)	74472-37-0	1
197	3,3',4,4',5-Penta CB (126)	57465-28-8	1
199	2,3,3',4,4',5-Hexa CB (156)	38380-08-4	1
200	2,3',4,4',5,5'-Hexa CB (167)	52663-72-6	1
203	2,3,3',4,4',5,5'-Hepta CB (189)	39635-31-9	1
204	2,3,3',4,4',5'-Hexa CB (157)	69782-90-7	1
205	3,4,4',5-Tetra CB (81)	70362-50-4	1
209	Aluminum	7429-90-5	1
210	Antimony	7440-36-0	1
211	Arsenic	7440-38-2	1
212	Barium	7440-39-3	1
213	Beryllium	7440-41-7	1
214	Boron	7440-42-8	1
215	Cadmium	7440-43-9	1
216	Chromium	7440-47-3	1
218	Cobalt	7440-48-4	1
219	Copper	7440-50-8	1
220	Lead	7439-92-1	1
221	Manganese	7439-96-5	1
222	Total Mercury	7439-97-6	1
223	Nickel	7440-02-0	1
224	Phosphorus	7723-14-0	1
225	Selenium	7782-49-2	1
226	Silver	7440-22-4	1
227	Thallium	7440-28-0	1
228	Tin	7440-31-5	1
229	Vanadium	7440-62-2	1

COPC Number	Compound Name	CAS Number	Group Number[1]
230	Zinc	7440-66-6	1
231	Agent: GB (Sarin)	107-44-8	1
232	Agent: HD (Mustard) Bis (2-chloroethyl sulfide)	505-60-2	1
233	Agent: VX	50782-69-9	1
234	Acid Gases: Hydrogen chloride (HCl)	7647-01-0	1
235	Acid Gases: Hydrogen fluoride (HF)	7664-39-3	1
236	Chlorine	7782-50-5	1
238	Criteria Pollutant: Nitrogen Oxides (NOx)	10102-44-0	1
239	Criteria Pollutant: Sulfur Oxides (SOx)	7446-09-5	1
382	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	76-13-1	1
615	Bromoethane	74-96-4	1
631	Bromochloromethane	74-97-5	1
719	Elemental Mercury		1
720	Mercuric Chloride		1
721	Methyl Mercury		1
722	Composite TOE - Volatile	999-999-999	1
723	Composite TOE - Semivolatile	999-999-999	1
724	Composite TOE - Nonvolatile	999-999-999	1
725	EA2192	73207-98-4	1
188	Total monochlorobiphenyls	27323-18-8	2
189	Total dichlorobiphenyls	25512-42-9	2
190	Total trichlorobiphenyls	25323-68-6	2
192	Total Tetrachlorobiphenyls	26914-33-0	2
198	Total Pentachlorobiphenyls	25429-29-2	2
202	Total Hexachlorobiphenyls	26601-64-9	2
206	Total Heptachlorobiphenyls	28655-71-2	2
207	Total Octachlorobiphenyls	55722-26-4	2
208	Total Nonachlorobiphenyls	53742-07-7	2
241	Particulate Matter (PM10 and PM2.5)	999-999-999	2
496	Total Decachlorobiphenyls	2051-24-3	2
540	TOC -- Total	999-999-999	2
4	Bromoethene (Vinyl Bromide)	593-60-2	3
8	1,3-Butadiene	106-99-0	3
15	2-Chloropropane (Isopropyl chloride)	75-29-6	3
17	1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	3
18	Dibromomethane (Methylene Bromide)	74-95-3	3
19	cis-1,4-Dichloro-2-butene	1476-11-5	3
20	trans-1,4-Dichloro-2-butene	110-57-6	3
22	1,1-Dichloroethane	75-34-3	3
23	1,2-Dichloroethane (EDC)	107-06-2	3
25	trans-1,2-Dichloroethene	156-60-5	3
26	1,2-Dichloropropane (Propylene dichloride)	78-87-5	3
31	2-Hexanone (Methyl butyl ketone)	591-78-6	3
35	1,1,1,2-Tetrachloroethane	630-20-6	3
36	1,1,2,2-Tetrachloroethane	79-34-5	3

COPC Number	Compound Name	CAS Number	Group Number[1]
37	Tetrachloroethene (Tetrachloroethylene)	127-18-4	3
39	1,1,1-Trichloroethane (TCA or methyl chloroform)	71-55-6	3
40	1,1,2-Trichloroethane	79-00-5	3
42	1,2,3-Trichloropropane	96-18-4	3
52	Acenaphthene	83-32-9	3
53	Acenaphthylene	208-96-8	3
54	Acetophenone	98-86-2	3
55	2-Acetylaminofluorene	53-96-3	3
56	4-Aminobiphenyl (p-Biphenylamine)	92-67-1	3
57	3-Amino-9-ethylcarbazole	132-32-1	3
58	Aniline	62-53-3	3
59	Anthracene	120-12-7	3
60	Aramite	140-57-8	3
61	Benzidine	92-87-5	3
63	Benzo (a) anthracene	56-55-3	3
64	Benzo (b) fluoranthene	205-99-2	3
65	Benzo (j) fluoranthene	205-82-3	3
66	Benzo (k) fluoranthene	207-08-9	3
67	Benzo (g,h,i) perylene	191-24-2	3
68	Benzo (a) pyrene	50-32-8	3
69	Benzo (e) pyrene	192-97-2	3
72	Benzenethiol (Phenylmercaptan or Thiophenol)	108-98-5	3
73	1,1'-Biphenyl (Phenylbenzene or Diphenyl)	92-52-4	3
75	Butyl benzyl phthalate	85-68-7	3
76	2-sec-Butyl-4,6-dinitro-phenol (Dinoseb)	88-85-7	3
77	4-Chloroaniline	106-47-8	3
78	bis(2-Chloroethoxy)-methane	111-91-1	3
79	bis(2-Chloroethyl)ether	111-44-4	3
80	2,2'-Oxybis[1-chloropropane] (bis-chloroisopropyl-ether)	108-60-1	3
81	Chlorobenzilate	510-15-6	3
82	4-Chloro-3-methylphenol	59-50-7	3
83	1-Chloronaphthalene	90-13-1	3
84	2-Chloronaphthalene	91-58-7	3
85	2-Chlorophenol	95-57-8	3
86	4-Chlorophenyl-phenyl ether	7005-72-3	3
87	Chrysene	218-01-9	3
88	Dibenz(a,h)anthracene	53-70-3	3
89	Dibenz(a,j)acridine	224-42-0	3
90	Dibenzofuran	132-64-9	3
92	bis(n-octyl) phthalate	117-84-0	3
94	1,3-Dichlorobenzene	541-73-1	3
96	3,3'-Dichlorobenzidine	91-94-1	3
97	2,4-Dichlorophenol	120-83-2	3
98	2,6-Dichlorophenol	87-65-0	3
100	4-(Dimethylamino)azobenzene	60-11-7	3

COPC Number	Compound Name	CAS Number	Group Number[1]
101	7,12-Dimethylbenz[a]-anthracene (DMBA)	57-97-6	3
102	a,a-Dimethylphenethyl-amine (Phentermine)	122-09-8	3
103	2,4-Dimethylphenol	105-67-9	3
105	1,3-Dinitrobenzene	99-65-0	3
106	4,6-Dinitro-2-methylphenol (Dinitro-o-cresol)	534-52-1	3
107	2,4-Dinitrophenol	51-28-5	3
109	2,6-Dinitrotoluene	606-20-2	3
110	Diphenylamine	122-39-4	3
111	1,2-Diphenylhydrazine	122-66-7	3
113	Ethyl methanesulfonate	62-50-0	3
114	Ethyl parathion (Parathion)	56-38-2	3
115	Fluoranthene	206-44-0	3
116	Fluorene	86-73-7	3
117	Hexachlorobenzene	118-74-1	3
118	Hexachlorobutadiene (Hexachloro-1,3-butadiene)	87-68-3	3
119	Hexachlorocyclopentadiene	77-47-4	3
120	Hexachloroethane	67-72-1	3
122	Hexachloropropene	1888-71-7	3
123	Indeno(1,2,3-cd)pyrene	193-39-5	3
124	Isophorone	78-59-1	3
125	3-Methylcholanthrene	56-49-5	3
126	Methyl methanesulfonate	66-27-3	3
129	3-Methylphenol (m-Cresol)	108-39-4	3
130	4-Methylphenol (p-Cresol)	106-44-5	3
131	3,4-Methylphenol	999-999-999	3
133	1-Naphthylamine	134-32-7	3
134	2-Naphthylamine	91-59-8	3
135	2-Nitroaniline	88-74-4	3
136	3-Nitroaniline	99-09-2	3
137	Nitrobenzene	98-95-3	3
138	2-Nitrophenol	88-75-5	3
139	4-Nitrophenol	100-02-7	3
140	N-Nitroso-di-n-butylamine	924-16-3	3
141	N-Nitrosodimethylamine	62-75-9	3
142	N-Nitrosodiphenylamine	86-30-6	3
143	N-Nitroso-di-n-propylamine	621-64-7	3
144	N-Nitrosopiperidine	100-75-4	3
146	Pentachlorobenzene	608-93-5	3
147	Pentachloronitrobenzene (PCNB)	82-68-8	3
148	Pentachlorophenol	87-86-5	3
149	Phenacetin	62-44-2	3
150	Phenanthrene	85-01-8	3
151	Phenol	108-95-2	3
152	2-Picoline	109-06-8	3
153	Pronamide	23950-58-5	3

COPC Number	Compound Name	CAS Number	Group Number[1]
154	Pyrene	129-00-0	3
155	1,2,4,5-Tetrachlorobenzene	95-94-3	3
156	2,3,4,6-Tetrachlorophenol	58-90-2	3
157	1,2,4-Trichlorobenzene	120-82-1	3
158	2,4,5-Trichlorophenol	95-95-4	3
159	2,4,6-Trichlorophenol	88-06-2	3
164	1,2,3,7,8-PeCDD	40321-76-4	3
166	1,2,3,4,7,8-HxCDD	39227-28-6	3
167	1,2,3,6,7,8-HxCDD	57653-85-7	3
168	1,2,3,7,8,9-HxCDD	19408-74-3	3
170	1,2,3,4,6,7,8-HpCDD	35822-46-9	3
175	1,2,3,7,8-PeCDF	57117-41-6	3
176	2,3,4,7,8-PeCDF	57117-31-4	3
178	1,2,3,4,7,8-HxCDF	70648-26-9	3
179	1,2,3,6,7,8-HxCDF	57117-44-9	3
180	2,3,4,6,7,8-HxCDF	60851-34-5	3
181	1,2,3,7,8,9-HxCDF	72918-21-9	3
196	2',3,4,4',5-Penta CB (123)	65510-44-3	3
201	3,3',4,4',5,5'-Hexa CB (169)	32774-16-6	3
240	Nitroglycerine	55-63-0	3
242	RDX (Cyclonite, Cyclotrimethylene trinitramine)	121-82-4	3
258	N,N'-Diisopropylcarbodimide (DICDI)	693-13-0	3
299	Diisopropyl methyl phosphonate (DIMP)	1445-75-6	3
307	Isopropanol	67-63-0	3
324	Decane, n-	124-18-5	3
352	4-Bromophenyl phenyl ether	101-55-3	3
353	4-Nitroaniline	100-01-6	3
354	1,3,5-Trinitrobenzene	99-35-4	3
355	2-Methyl-5-nitroaniline b	99-55-8	3
356	2-Toluidine	95-53-4	3
357	3,3'-Dimethylbenzidine	119-93-7	3
358	4,4'-DDE	72-55-9	3
359	4-Nitroquinoline 1-oxide	56-57-5	3
360	5-Nitroacenaphthene	602-87-9	3
361	DBCP (1,2-Dibromo-3-chloropropane)	96-12-8	3
362	Diallate	2303-16-4	3
363	Dihydrosafrole	94-58-6	3
364	Dioxathion	78-34-2	3
365	Heptachlor	76-44-8	3
366	Isosafrole	120-58-1	3
367	Methapyrilene	91-80-5	3
368	Methoxychlor	72-43-5	3
369	Methylcyclohexane	108-87-2	3
370	N-Nitrosomethylethylamine (NMEA)	10595-95-6	3
371	N-Nitrosomorpholine	59-89-2	3

COPC Number	Compound Name	CAS Number	Group Number[1]
372	N-Nitrosopyrrolidine	930-55-2	3
374	para-Phenylenediamine	106-50-3	3
375	Pentachloroethane	76-01-7	3
376	p-Toluidine	106-49-0	3
377	Pyridine	110-86-1	3
378	Quinoline	91-22-5	3
379	Safrole	94-59-7	3
380	Tributylamine	102-82-9	3
383	1,2-Benzenedicarboxylic acid	88-99-3	3
386	1,4-Naphthoquinone	130-15-4	3
389	1-Octanol, 2-butyl	3913-02-8	3
397	2-Fluoro-6-nitrophenol	1526-17-6	3
403	Acetic acid, (triphenylphosphoranylidene)-,methyl ester	2605-67-6	3
405	Benzene, (1-methylethyl)-	98-82-8	3
406	Benzene, propyl-	103-65-1	3
407	Benzonitrile	100-47-0	3
408	Benzyaldehyde, ethyl-	53951-50-1	3
413	bis(2-Ethylhexl)adipate	103-23-1	3
414	Butanoic acid, 2-methyl-, methyl ester	868-57-5	3
416	Butonic acid, methyl ester	623-42-7	3
418	Carbonyl Sulfide	463-58-1	3
420	Cyclohexane, 1-methyl-2-propyl	4291-79-6	3
430	Cyclotetrasiloxane, Octamethyl (TIC)	556-67-2	3
432	Decane,2,2,6-trimethyl-	999-999-999	3
433	Decane,2,2-dimethyl	17302-37-3	3
437	Decane,3-methyl	13151-34-3	3
441	Dodecane	112-40-3	3
443	Erucylamide	112-84-5	3
446	Heptacosane	593-49-7	3
447	Heptane (TIC)	142-82-5	3
457	Hexacosane	630-01-3	3
458	Hexadecane,2,6,10,14-tetramet	638-36-8	3
459	Hexadecanoic acid	57-10-3	3
462	Hexatriacontane	630-06-8	3
466	N-Nitrosodiethylamine	55-18-5	3
468	Nonane	111-84-2	3
470	Nonane,2-methyl-	871-83-0	3
471	Nonane,3-methyl-	5911-04-6	3
472	Nonane,4-methyl-	17301-94-9	3
474	Octacosane	630-02-4	3
475	Octadeconoic acid	57-11-4	3
476	Octane,2,2,6-trimethyl-	62016-28-8	3
482	Octane,3,6-dimethyl-	15869-94-0	3
488	Squalene	7683-64-9	3
490	Tridecane	629-50-5	3

COPC Number	Compound Name	CAS Number	Group Number[1]
491	Triphenyl phosphine oxide	791-28-6	3
492	Undecane	1120-21-4	3
494	HMX	2691-41-0	3
500	Tricosane	638-67-5	3
501	Tetracosane	646-31-1	3
502	Phenol, 2,2'-methylenebis[6-(1,1-dimethylethyl)-4-methyl-	119-47-1	3
503	Docosane	629-97-0	3
504	Heptadecane	629-78-7	3
505	Tetratriacontane	14167-59-0	3
506	2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,23-hexamethyl-, (all-E)-	111-02-4	3
507	Triacontane	638-68-6	3
508	Heptadecane, 9-octyl-	7225-64-1	3
509	3-Pentanone	96-22-0	3
510	R-(-)-1,2-propanediol	4254-14-2	3
511	2-Pentanol, 4-methyl	108-11-2	3
512	7-Oxabicyclo[4.1.0]heptane	286-20-4	3
513	2-Cyclohexen-1-one	930-68-7	3
514	Ethanol, 2-(2-ethoxyethoxy)-	111-90-0	3
515	Nonanal	124-19-6	3
516	Ethanone, 1-(4-ethylphenyl)-	937-30-4	3
517	Benzaldehyde, 4-hydroxy-3-methoxy-	121-33-5	3
518	4-Cyanocyclohexene	100-45-8	3
519	Tetratetracontane	7098-22-8	3
520	Dotriacontane	544-85-4	3
521	2-Hexanol	626-93-7	3
522	Phenol, 2-(2-propenyl)-	1745-81-9	3
524	Nonanoic acid	112-05-0	3
525	Eicosane	112-95-8	3
526	2-Propanone, 1-nitro-	10230-68-9	3
527	Pentacosane	629-99-2	3
528	Cyclopentasiloxane, decamethyl-	541-02-6	3
529	Benzaldehyde, 3-hydroxy-4-methoxy-	621-59-0	3
530	Pentadecane	629-62-9	3
531	Silane, difluorodimethyl-	353-66-2	3
532	Butane	106-97-8	3
533	Silane, fluorotrimethyl-	420-56-4	3
534	Silane, chlorotrimethyl-	75-77-4	3
535	Dodecane, 4,6-dimethyl-	61141-72-8	3
536	Ethane, 1,1-difluoro-	75-37-6	3
537	Decane, 2,3,5-trimethyl-	62238-11-3	3
538	Silane, (2-methoxyethyl)trimethyl-	18173-63-2	3
539	Silane, methoxytrimethyl-	1825-61-2	3
541	9-Octadecenamide, (z)-	301-02-0	3
542	Isophthalaldehyde	626-19-7	3

COPC Number	Compound Name	CAS Number	Group Number[1]
543	Formyl methylene triphenyl phosphorane	2136-75-6	3
544	Heneicosane	629-94-7	3
545	Thiophene, tetrahydro-, 1,1-dioxide	126-33-0	3
546	Nonadecane	629-92-5	3
547	Pentatriacontane	630-07-9	3
548	Butane, 2-methoxy-2-methyl-	994-05-8	3
549	Benzene, 1-ethenyl-4-ethyl-	3454-07-7	3
550	2-Pentanone	107-87-9	3
551	Silanol, trimethyl-	1066-40-6	3
552	2H-1,4Benzothiazine, 3,4-dihydro-	3080-99-7	3
553	Pyrido[4,3-d]pyrimidin-4(3H)-one	16952-64-0	3
554	Silane, 1,4-phenylenebis[trimethyl-]	13183-70-5	3
555	Benzeneacetonitrile	140-29-4	3
556	Benzeneacetonitrile, .alpha.-oxo-	613-90-1	3
558	Furan, tetrahydro-2-methyl-	96-47-9	3
559	2,3-Butanediol	513-85-9	3
560	1-Phenyl-1-butene	824-90-8	3
561	Tridecanal	10486-19-8	3
562	Hexadecanoic acid, methyl ester	112-39-0	3
563	Octadecanoic acid, methyl ester	112-61-8	3
564	Hexadecanal	629-80-1	3
565	Propanoic acid, 2-methyl-, methyl ester	547-63-7	3
566	1,3-Butanediol	107-88-0	3
567	Adamantane, 1,3-dimethyl	702-79-4	3
568	Decanal	112-31-2	3
569	Undecanal	112-44-7	3
570	Cyclodecane	293-96-9	3
571	Diisobutyl phthalate	84-69-5	3
572	Butane, 2-methyl (TIC)	78-78-4	3
573	Pentane (TIC)	109-66-0	3
574	Propane, 2-methyl (TIC)	75-28-5	3
575	1-Propyne (TIC)	74-99-7	3
576	1-Propene (TIC)	115-07-1	3
577	Triethyl phosphate	78-40-0	3
578	1-Naphthalenepropanol, alpha	1438-62-6	3
579	Pentane, 2-methyl-	107-83-5	3
580	2-Pentene, (E)-	646-04-8	3
581	1,3,5-Cycloheptatriene	544-25-2	3
582	5-Methyldecane	13151-35-4	3
583	7-Hexyltridecane	7225-66-3	3
584	4-Ethylbenzoic Acid	619-64-7	3
585	1-Eicosanol	629-96-9	3
586	1,1,1,2-Tetrafluoroethane	811-97-2	3
587	Nitromethane	75-52-5	3
588	2-Butene, (Z)-	590-18-1	3

COPC Number	Compound Name	CAS Number	Group Number[1]
589	2-Butene, (E)-	624-64-6	3
590	Pentane, 3-methyl-	96-14-0	3
591	Hexane, 3-methyl-	589-34-4	3
592	1,1'-Bicyclopropyl	5685-46-1	3
593	2-Butene	107-01-7	3
594	1,2-Benzenediol, 4-(1,1-dimethylethyl)-	98-29-3	3
595	1-Decene	872-05-9	3
596	5-Tetradecene, (E)-	41446-66-6	3
597	a-Nitroacetophenone	614-21-1	3
598	Carbonic acid, dimethyl ester	616-38-6	3
599	Cinnamaldehyde, (E)-	14371-10-9	3
600	Cyclododecane	294-62-2	3
601	Cyclopropane, nonyl	74663-85-7	3
602	Decane, 2-methyl-	6975-98-0	3
603	Phenol, 2,3-dimethyl-	526-75-0	3
604	Tetradecane	629-59-4	3
605	1-Propene, 2-methyl-	115-11-7	3
606	1,2,4-Trioxolane, 3,5-diphenyl-	23888-15-5	3
607	1,4-Benzenedicarboaldehyde	623-27-8	3
608	Benzenemethanol, 4-(1-methylethyl)-	536-60-7	3
609	Cyclohexadecane	295-65-8	3
610	3,7-Dimethyldecane	17312-54-8	3
611	D-Limonene	5989-27-5	3
612	1-Hexanol, 2-ethyl-	104-76-7	3
613	Hexadecanoic acid, 2,3-dihydroxypropyl ester	542-44-9	3
614	Octane, 5-ethyl-2-methyl-	62016-18-6	3
616	bis(2-Chloroisopropyl)ether	39638-32-9	3
617	Hexamethyl-Cyclotrisiloxane	541-05-9	3
618	2,6-Dimethyloctane	2051-30-1	3
619	14-methyl-Pentadecanoic acid	4669-02-7	3
620	4-Ethyl Benzaldehyde	4748-78-1	3
621	Dodecamethyl cyclohexasiloxane	540-97-6	3
622	Dodecanoic acid	143-07-7	3
623	Hexadecanamide	629-54-9	3
624	1,3,5,7-Cyclooctatetraene	629-20-9	3
626	Methyl Cyclodecane	13151-43-4	3
627	Tetradecanamide	638-58-4	3
628	(z)-6-Tridecene	6508-77-6	3
629	Heptafluorobutyric acid, n-trid	375-22-4	3
630	Bromobenzene	108-86-1	3
632	2-Chlorotoluene	95-49-8	3
633	4-Chlorotoluene	106-43-4	3
634	cis-1,2-Dichloroethene	156-59-2	3
635	1,3-Dichloropropane	142-28-9	3
636	2,2-Dichloropropane	594-20-7	3

COPC Number	Compound Name	CAS Number	Group Number[1]
637	1,1-Dichloropropene	563-58-6	3
638	Furan	110-00-9	3
639	2,4,4-trimethyl-1-Pentene	107-39-1	3
640	Octane	111-65-9	3
641	(z)-5,5-Dimethyl 2-Hexene	39761-61-0	3
642	Ether, heptyl hexyl	7289-40-9	3
643	3-Methyl-Hexadecane	6418-43-5	3
644	Isocyano Benzene	931-54-4	3
645	Benzene, 1-phenyl-4-(2-cyano-2-phenylethyl	999-999-999	3
646	Hexadecane	544-76-3	3
647	2,2-Dimethyl Undecane	17312-64-0	3
648	2,2,8-Trimethyl Decane	62238-01-1	3
649	2,6,10,15-Tetramethyl Heptadecane	54833-48-6	3
650	4-Ethyl-2,2,6,6-Tetramethyl Heptane	62108-31-0	3
651	2,2-Dimethyl Heptane	1071-26-7	3
652	4-Methyl-Tetradecane	25117-24-2	3
653	2,3,4-Trimethyl Decane	62238-15-7	3
654	2,3,6-Trimethyl Decane	62238-12-4	3
655	(z)-3-Dodecene	7239-23-8	3
656	1-IODO-2-Methylnonane	849835-12-7	3
657	6-Tridecene	24949-38-0	3
658	2,6,11-Trimethyl Dodecane	31295-56-4	3
659	1-Pentene	109-67-1	3
660	3-Chloro 1-Propene	107-05-1	3
661	1-Butene	106-98-9	3
662	3-Penten-1-yne	2206-23-7	3
663	1,5-Hexadiene	592-42-7	3
664	1-Hexene	592-41-6	3
665	2-Heptene	592-77-8	3
666	1,2,3-Trichloro 1-Propene	96-19-5	3
667	3,3,3-Trichloro 1-Propene	2233-00-3	3
668	(E)-2-Decene	20063-97-2	3
669	Octyl Cyclopropane	1472-09-9	3
670	1,2,3,4-Tetrachloro- 1,3-Cyclopentadiene	695-77-2	3
671	Acetaldehyde	75-07-0	3
672	(E)-2-Butenal	123-73-9	3
673	Cyclobutane, 1,2-diethyl-, trans-	19341-98-1	3
674	1-Methyl-2-Pentyl Cyclopropane	41977-37-1	3
675	1-Dodecene	112-41-4	3
676	(E)-4-Dodecene	7206-15-7	3
677	1-Methyl-2-Octyl-Cyclopropane	37617-26-8	3
678	Octane, 3-Methyl-	2216-33-3	3
679	Dodecanal	112-54-9	3
680	Pregnane-3,20-dione, 11-[(trim	57305-27-8	3
681	Pentadecane, 8-hexyl-	13475-75-7	3

COPC Number	Compound Name	CAS Number	Group Number[1]
682	Diisoctyl Adipate	1330-86-5	3
683	Benzenemethanol, ar-ethenyl-	30584-69-1	3
684	Cyclopropane, ethyl-	1191-96-4	3
686	3-Butenoic Acid	625-38-7	3
687	Cyclopentane	287-92-3	3
688	7,9-Di-tert-butyl-1-oxaspiro(4	82304-66-3	3
689	Cyclic octaatomic sulfur	10544-50-0	3
690	1-Octadecene	112-88-9	3
691	Propylene glycol	57-55-6	3
692	5-Ethyl-2,2,3-trimethyl heptane	62199-06-8	3
693	Tridecanoic acid	638-53-9	3
694	Tris(2,3-dichloropropyl) phosphate	78-43-3	3
695	Undecane, 2,8-dimethyl	17301-25-6	3
696	2-Methyl hexane	591-76-4	3
697	1-Ethyl-3-methyl benzene	620-14-4	3
698	2,4,6-Trimethyl octane	62016-37-9	3
699	1,7,7-trimethyl bicyclo[2.2.1] hept-2-ene	464-17-5	3
700	1,3-Pentadiene	504-60-9	3
701	1-Chloro-1-propene	590-21-6	3
702	2,3,3-Trimethylpentane	560-21-4	3
703	3,4-Dimethyl octane	15869-92-8	3
704	2,2,9-Trimethyl decane	62238-00-0	3
705	2,2,4,6,6-Pentamethyl heptane	13475-82-6	3
706	2-Methyl-5-propyl nonane	31081-17-1	3
707	6-Ethyl-2-methyl octane	62016-19-7	3
708	8-Methyl heptadecane	13287-23-5	3
709	1-Nonadecene	18435-45-5	3
710	1,4-Benzenedicarbonitrile	623-26-7	3
711	Limonene	138-86-3	3
712	2-Butenal	4170-30-3	3
713	1-Methyl-2-(2-propenyl) benzene	1587-04-8	3
714	1-Octadecanol	112-92-5	3
715	Dioctadecyl phosphonic ester	19047-85-9	3
716	2-Methyl tetradecane	1560-95-8	3
717	Dihydro-3-methyl-2,5-furandione	2170-03-8	3
718	Pentachloro-1-propene	1600-37-9	3
121	Hexachlorophene	70-30-4	4
161	2,3,7,8-TCDD TEQ (Dioxin and furan congeners)	999-999-999	4
217	Hexavalent Chromium	18540-29-9	4
237	Criteria Pollutant: Carbon Monoxide (CO)	630-08-0	4
246	Acrolein	107-02-8	4
247	Diesel particulate matter	999-999-999	4
248	Formaldehyde (Formalin)	50-00-0	4
249	Carbon dioxide	124-38-9	4
250	Phosphorus pentoxide	1314-56-3	4

COPC Number	Compound Name	CAS Number	Group Number[1]
251	Chlorinated hydrocarbons	999-999-999	4
252	Ferrous chloride	7758-94-3	4
253	Fluoromethane (MF)	593-53-3	4
254	Sulfuric acid	7664-93-9	4
255	Iron	7439-89-6	4
256	Mercaptan, free	75-08-1	4
257	Difluoromethane	75-10-5	4
259	Pyrodiester	999-999-999	4
260	Sulfur, free	7704-34-9	4
261	Antimony sulfide	1345-04-6	4
262	Barium nitrate	10022-31-8	4
263	Calcium resinate	9007-13-0	4
264	Cellulose Nitrate-Camphor	999-999-999	4
265	Charcoal	999-999-999	4
266	Egyptian Lacquer	999-999-999	4
267	Graphite	7782-42-5	4
268	Lead azide	13424-46-9	4
269	Lead thiocyanate	592-87-0	4
270	Lead stearate	1072-35-1	4
271	Lead styphnate	15245-44-0	4
273	Magnesium	7439-95-4	4
274	Nitrocellulose	9004-70-0	4
275	2-Nitro-diphenylamine	119-75-5	4
276	Potassium chlorate	3811-04-9	4
277	Potassium perchlorate	7778-74-7	4
278	Tetracene	92-24-0	4
279	Tetryl (2,4,6-Trinitrophenyl-methylnitramine)	479-45-8	4
280	Triacetin (Glycerol triacetate)	102-76-1	4
281	1,2-Bis(2-chloro-ethylthio) ethane and oligomers	3563-36-8	4
282	Bis (2-chloroethoxy)-2(2-chloroethylthio)ethane	999-999-999	4
283	Bis-2 (bis(2-hydroxy ethyl-sulfonium ethyl) sulfide dichloride	999-999-999	4
284	Bis (2-Diisopropylaminoethyl) thioether	999-999-999	4
285	Bis (2-Diisopropylaminoethyl) disulfide	65332-44-7	4
286	2-chloroethyl vinyl sulfide	81142-02-1	4
287	2,2'-dichlorodiethyl disulfide	999-999-999	4
288	Diethyl disulfide	110-81-6	4
289	O,O'-diethylmethyl phosphonate	683-08-9	4
290	O,S- diethylmethyl phosphonate	999-999-999	4
291	O,O'-diethylmethyl phosphonthioate	6996-81-2	4
292	O,S- diethylmethyl phosphonthioate	2511-10-6	4
293	Diisopropylamine	108-18-9	4
294	Diisopropylaminoethyl ethyl sulfide	999-999-999	4
295	Diisopropylaminoethyl mercaptan	999-999-999	4
296	S,S- diisopropylaminoethyl methyl phosphonate	999-999-999	4
297	S-ethyl, S-diisopropylaminoethyl methyl phosphonothioate	999-999-999	4

COPC Number	Compound Name	CAS Number	Group Number[1]
298	S,S'-ethyl, S-diisopropylaminoethyl methyl phosphonothioate	999-999-999	4
300	Divinyl sulfide	627-51-0	4
301	Dithiane	51330-42-8	4
302	Ethanol	64-17-5	4
303	2-Chloroethyl ethyl sulfide	693-07-2	4
304	Monoethyl methylphosphonate	1832-53-7	4
305	Hydrogen sulfide	7783-06-4	4
306	2-Hydroxy ethyl vinyl chloride	999-999-999	4
308	Isopropyl methylphosphonic acid	1832-54-8	4
309	Methyl phosphonic acid	993-13-5	4
310	Methyl Phosphonofluoridic Acid	1511-67-7	4
311	Oxathiane	15980-15-1	4
312	Propane	74-98-6	4
313	Thiodiglycol	111-48-8	4
314	Thiolamine (diisopropylamino ethylthiolate)	5842-07-9	4
315	Monosodium salt of isopropyl methylphosphonic acid	999-999-999	4
316	Sodium carbonate	497-19-8	4
317	Sodium chloride	7647-14-5	4
318	Sodium fluoride	7681-49-4	4
319	Sodium O-ethyl methyl phosphonate diisopropylamine	999-999-999	4
320	Sodium sulfate	7757-82-6	4
321	Acetic acid, glacial	64-19-7	4
322	Bromofluorobenzene, 4- (BFB)	460-00-4	4
323	Buffer solutions	999-999-999	4
325	Dibutyl butylphosphonate (DBBP)	78-46-6	4
326	Dimethyl methylphosphonate, 97% (DMMP)	756-79-6	4
328	Hydrogen peroxide, 30%	7722-84-1	4
329	Methanol (methyl alcohol)	67-56-1	4
330	Micro concentrated cleaning solution	999-999-999	4
331	Nitric acid, 68% - 71%	7697-37-2	4
332	Perfluorotributylamine (PFTBA)	311-89-7	4
333	Snoop (leak detector)	999-999-999	4
334	Sodium hypochlorite, 5% (Bleach)	7681-52-9	4
335	Chromosorb P, coated with triethanolamine	999-999-999	4
336	Chromosorb 106	999-999-999	4
338	HayeSep D	999-999-999	4
339	Phenolphthalein Indicator (3,3-bis(p-hydroxyphenyl) phthalide)	77-09-8	4
340	Potassium chloride	7447-40-7	4
341	Potassium iodide	7681-11-0	4
342	Silver fluoride conversion pads	999-999-999	4
343	Sodium arsenite	7784-46-5	4
344	Sodium bicarbonate	144-55-8	4
345	Sodium hydroxide	1310-73-2	4
346	Sodium thiosulfate	7772-98-7	4

COPC Number	Compound Name	CAS Number	Group Number[1]
347	Tenax TA	999-999-999	4
348	Tetryl explosive standard	999-999-999	4
349	Thyodene indicator	9005-84-9	4
350	Trinitrotoluene explosive standard (TNT)	999-999-999	4
351	Chlorodibromoethane	73506-94-2	4
373	O,O,O-Triethylphosphorothioate	126-68-1	4
381	(Carbethoxyethylidine) triphenyl phosphorane	5717-37-3	4
384	1,4-Butanediol (TIC)	110-63-4	4
385	1,4-Dichloro-2-butene	764-41-0	4
387	1-Decene,2,4-dimethyl-	55170-80-4	4
388	1-Hexadecanol	36653-82-4	4
390	1-Propanol, 2-(2-methoxy-1-methylethoxy)	55956-21-3	4
391	1-Propen-1-one,2-methyl	598-26-5	4
392	2,2-Dimethoxybutane	3453-99-4	4
393	2,4-dimethyl-1-heptene	19549-87-2	4
394	2-Butanone, 4-Acetyloxy (TIC)	10150-87-5	4
395	2-Cyclohexene-1-one, 3,5-Dimethyl (TIC)	1123-09-7	4
396	2-Decanal, (z)-	2497-25-8	4
398	2-Naphthalenecarboxaldehyde	66-99-9	4
399	2-Pentene, 3,4,4-trimethyl-	598-96-9	4
400	3-Nonene(c,t)	20063-92-7	4
401	3-Penten-2-one, 4-methyl-	141-79-7	4
402	4-Hydroxy-4-methyl-2-pentanone	123-42-2	4
404	Acetic anhydride	108-24-7	4
409	Benzene,1,2,3-trichloro-	87-61-6	4
410	Benzene,1,2,3-trimethyl	526-73-8	4
411	Benzene, 1-ethyl-2-methyl-	611-14-3	4
415	Butanoic acid, propyl ester	105-66-8	4
417	C3-Naphthalene	999-999-999	4
419	Cyclohexane	110-82-7	4
421	Cyclohexane, Pentyl (TIC)	4292-92-6	4
422	Cyclohexane,1,2,3,-trimethyl-	1678-97-3	4
423	Cyclohexane,butyl-	1678-93-9	4
424	Cyclohexane,diethyl	1331-43-7	4
425	Cyclohexane,methylpropyl-	26967-64-6	4
426	Cyclohexane,propyl-	1678-92-8	4
427	Cyclopentane, 1,2,3,4,5-pentamethyl-	33067-32-2	4
428	Cyclopentane,1,2,3-trimethyl-	2815-57-8	4
429	Cyclopropane,1-butyl-1-methyl	5458-16-2	4
431	Decane,2,2,5-trimethyl	999-999-999	4
434	Decane,2,5,6-trimethyl	999-999-999	4
435	Decane,2,6,6-trimethyl-	999-999-999	4
436	Decane,2,6,8-trimethyl-	999-999-999	4
438	Decane,4-methyl	2847-72-5	4
439	2-ethyl-1-decanol	21078-65-9	4

COPC Number	Compound Name	CAS Number	Group Number[1]
440	Diethylene glycol	111-46-6	4
442	Dodecane 2-cyclohexyl-, 2-cyclohexyl-	999-999-999	4
444	Ethanol, 2-(2-Butoxyethoxy)- (TIC)	112-34-5	4
445	Furan, tetrahydro-2,5-dimethyl	1003-38-9	4
448	Heptadecane, 7-methyl	20959-33-5	4
449	Heptane,2,4-dimethyl-	2213-23-2	4
450	Heptane,2,5,5-trimethyl-	1189-99-7	4
451	Heptane,3,3,5-trimethyl-	7154-80-5	4
452	Heptane,3,4-dimethyl-	922-28-1	4
453	Heptane,3-ethyl-2methyl	14676-29-0	4
454	Heptane,4-ethyl-	2216-32-2	4
455	Heptane,4-ethyl-2,2,6,6-tetra	999-999-999	4
456	Heptane,5-ethyl-2,-methyl-	13475-78-0	4
460	Hexanoic Acid (TIC)	142-62-1	4
461	Hexanoic Acid, 2-Ethyl- (TIC)	149-57-5	4
463	Hexonoic Acid, -Ethyl- (TIC)	999-999-999	4
464	Methyl nitrite	624-91-9	4
465	Naphthalene,decahydro,trans	493-02-7	4
467	Nonacosane	630-03-5	4
469	Nonane,2,6-dimethyl	17302-28-2	4
473	Nonanol	28473-21-4	4
477	Octane,2,3,6-trimethyl-	62016-33-5	4
478	Octane,2,5,6-trimethyl-	62016-14-2	4
479	Octane,2,5-dimethyl-	15869-89-3	4
480	Octane,3,3-dimethyl-	4110-44-5	4
481	Octane,3,5-dimethyl-	15869-93-9	4
483	Oxirane	75-21-8	4
484	Phenol, 2-(2H-benzotriazol-2-yl)4-methyl	2440-22-4	4
485	Phenol, 3-fluoro-4-nitro-	394-41-2	4
486	Phenol,4,4'-butylene bis [2-1,1-dimethylethyl]	999-999-999	4
487	Silicic acid, tetramethyl ester	681-84-5	4
489	Thipene,2,3-dimethyl-	999-999-999	4
493	Undecane, 2,6-dimethyl-	17301-23-4	4
495	Polycyclic organic matter (POM)	999-999-999	4
497	Calcium	7440-70-2	4
498	Potassium	7440-09-7	4
499	Perylene	198-55-0	4
557	1-Propanone, 3-chloro-1-phenyl-	936-59-4	4

F Appendix F – Risk Equations

TRhe human health risk assessment equations used in the Lakes Environmental Software are based on Appendix B and C of "Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities" (EPA 2005). These equations included on the companion compact disk provided with this report under the directory named "Appendix F." Modifications to these equations to implement UMCDF specific fuctions are described in Appendix I of this report.

G Appendix G – Furnace-Specific Emission Rate Tables

Furnace and agent campaign specific emission rate tables are provided on the compact disk provided with this report under the directory named "Appendix G". The following table provides details for each file:

Table G-1: Reference Table for
Furnace/Agent Specific Emission Rate Tables
for the Base Model

File Name	Furnace	Waste Processed
Table1_REV2.out	LIC 1	GB
Table2_REV2.out	LIC 1	VX
Table3_REV2.out	LIC 1	HD
Table4_REV2.out	LIC 2	GB
Table5_REV2.out	LIC 2	VX
Table6_REV2.out	LIC 2	HD
Table7_REV2.out	MPF	GB
Table8_REV2.out	MPF	VX
Table9_REV2.out	MPF	HD
Table10_REV2.out	DFS	GB
Table11_REV2.out	DFS	VX
Table12_REV2.out	MPF	Combustible Secondary Waste
Table13_REV2.out	LIC 1	Secondary Waste
Table14_REV2.out	MPF	Non-combustible Secondary Waste
Table15_REV2.out	DFS	Secondary Waste
Table16_REV2.out	BRA	GB,VX,HD
Table17_REV2.out	MDB	GB,VX,HD
Table18_REV2.out	LAB	GB,VX,HD

Table G-2: Reference Table for
Furnace/Agent Specific Emission Rate Tables
for Special Case 6

File Name	**Furnace**	**Waste Processed**
Table1_REV3.csv	LIC 1	GB
Table2_REV3.csv	LIC 1	VX
Table3_REV3.csv	LIC 1	HD
Table4_REV3.csv	LIC 2	GB
Table5_REV3.csv	LIC 2	VX
Table6_REV3.csv	LIC 2	HD
Table7_REV3.csv	MPF	GB
Table8_REV3.csv	MPF	VX
Table9_REV3.csv	MPF	HD
Table10_REV3.csv	DFS	GB
Table11_REV3.csv	DFS	VX
Table12_REV3.csv	MPF	Combustible Secondary Waste
Table13_REV3.csv	LIC 1	Secondary Waste
Table14_REV3.csv	MPF	Non-combustible Secondary Waste
Table15_REV3.csv	DFS	Secondary Waste
Table16_REV3.csv	BRA	GB,VX,HD
Table17_REV3.csv	MDB	GB,VX,HD
Table18_REV3.csv	LAB	GB,VX,HD

H Appendix H – Acute Analysis Emission Rate Tables

The emission rate tables for the nine acute cases are provided on the compact disk provided with this report under the directory named "Appendix H". The following table provides details for each file:

Table H-1: Reference Table for
Furnace/Agent Specific Emission Rate Tables

File Name	Condition
Case1_Base_Case.csv	Base Case
Case2_LIC1_upset.csv	LIC1 in upset
Case3_LIC2_upset.csv	LIC2 in upset
Case4_DFS_upset.csv	DFS in upset
Case5_MPF_upset.csv	MPF processing combustible materials in upset
Case6_MPFnc_upset.csv	MPF processing non-combustible materials in upset
Case7_BRA_upset.csv	BRA in upset
Case8_LAB_upset.csv	LAB exhaust in upset
Case9_MDB_upset.csv	MDB exhaust in upset

Each of the files listed in Table H-1 is in a comma separated format with columns corresponding to the source name, COPC CAS number, COPC Name, and COPC emission rate (g/s). An example of the first line of one of the files is given below.

COMSTK, 00-01-2, Aluminum compounds, 0.008565

I Appendix I – IRAP-h Umatilla Design Documents

Version 7

(June 12, 2006)

The following modifications to the Lakes Environmental IRAP-h software are requested to support implementation of the Human Health Risk Assessment (HHRA) for the Umatilla Chemical Weapons Disposal Facility (UMCDF):

Three additional exposure scenarios:

1. Native American adult and child subsistence scenarios
2. Depot worker scenario
3. Depot military resident scenario

Eight additional exposure pathways:

1. Inhalation of resuspended dust using site-specific particulate emission factors
2. Ingestion of surface water
3. Dermal contact with surface water
4. Consumption of goat meat
5. Inhalation exposure of COPCs during sweat lodge use
6. Dermal contact with COPCs during sweat lodge use
7. Dermal contact with surface soils
8. Addition of dioxin-like PCBs to breast milk pathway

Each of these eleven modifications is discussed in detail in subsequent sections.

Native American Adult and Child Subsistence Scenarios

The following text was taken directly from Section 4.1.2.4 of the Post-Trial Burn Risk Assessment Work Plan for the Umatilla Chemical Agent Disposal Facility (Ecology and Environment inc., August 2004) (here after termed the RAWP).

Native Americans are considered a special subpopulation that maintains a lifestyle that is not represented by the exposure scenarios described above. The nearest Native American population center, the Umatilla Indian Reservation, is located 60 kilometers (37 miles) southeast of the UMCDF. The local Tribes maintains treaty-reserved rights for hunting, fishing, and gathering throughout the assessment area. The HHRA assumes that all potential contact with COPCs is within the 50-kilometer (31 mile) assessment area boundary.

The Native American adult may contact UMCDF emissions through pathways that are unique to Native Americans. For example, Native American adults may harvest native vegetation for consumption and other uses, rely on local game for subsistence, and use a sweat lodge. Intake of COPCs via consumption of foods will be estimated using home-grown produce as a surrogate for native vegetation, and home-raised beef, goat, and chicken will be surrogates for wild game and fowl. Local surface water is used in the sweat lodge. The sweat lodge is an ancient custom practiced by Native Americans throughout the United States for purification, spiritual renewal, healing, and education. The lodge itself consists of a small structure in which moist hot air is generated by evaporating water on heated rocks. Traditional medicines are often added to the water or the rocks to create healing vapors that are absorbed through the skin and inhaled.

COPCs in water heated to produce steam are volatilized and/or aerosolized and then subsequently inhaled or absorbed through the skin. Thus, the Native American is assumed to contact UMCDF emissions through the following pathways:

- Direct inhalation of vapours and particulate matter in air;
- Inhalation of resuspended dust;
- Incidental ingestion of and dermal (skin) contact with soil;
- Ingestion of and dermal contact with surface water;
- Ingestion of native vegetation;
- Ingestion of local game and fowl;
- Ingestion of locally caught fish;
- Ingestion of milk and eggs; and
- Inhalation of and dermal (skin) contact with surface water vapor in a sweat lodge.

Exposure assumptions for each of these pathways can be found in Tables 4-3g, 4-3h, and 4-3p of the 2004 RWAP.

The Native American child scenario will be evaluated to represent potential exposures to a child whose family maintains a subsistence lifestyle. Except for the sweat lodge scenario, pathways for the child are the same as those for the Native American adult. Potential contact with COPCs in a sweat lodge will not be evaluated for the child because children typically are not allowed to use a sweat lodge

Depot Worker Scenario

The following text was taken directly from Section 4.1.2.5 of the RWAP (Ecology and Environment inc., 2004).

The on-site worker may participate in various on-site activities, including natural resource management, building maintenance, construction, or other activities related to current and future land use at the UMCD. On-site workers who reside within the assessment area may have high potential for exposure to UMCDF emissions because they will spend a significant amount of time near the facility during and after operation. For this reason, an on-site worker scenario will be evaluated in the HHRA. The on-site worker is assumed to contact facility emissions through the same pathways as those of the resident adult. However, the duration of time spent in an off-site residential location versus an on-site work location will distinguish the worker scenario from the residential scenario. Therefore, the on-site worker is assumed to contact UMCDF emissions through the following pathways:

- Direct inhalation of vapors and particulate matter in air;
- Inhalation of resuspended dust;
- Ingestion of and dermal (skin) contact with surface water as drinking water;
- Incidental ingestion of and dermal contact with soil; and
- Ingestion of home-grown produce.

Exposure assumptions for this pathway can be found in Tables 4-3i, 4-3j, and 4-3k of the 2004 RWAP.

Depot Military Resident Scenario

The following text was taken directly from Section 4.1.2.6 of the RWAP (Ecology and Environment inc., 2004).The on-site military resident scenario will represent a military worker serving a two-year tour of duty who resides in the Administration Area of the Umatilla Depot (UMCD) during the operational period only. The on-site military resident may have direct contact with facility emissions during work and leisure time for a maximum of two years during the UMCDF operational period. During the post-operational period, the on-site military resident will be evaluated only for indirect contact with emissions. The on-site military resident is assumed to have contact with emissions from the UMCDF through the following pathways:

- Direct inhalation of vapors and particulate matter in air,
- Inhalation of resuspended dust,
- Ingestion of and dermal (skin) contact with surface water as drinking water,
- Incidental ingestion of and dermal contact with soil, and
- Ingestion of home-grown produce.

Exposure assumptions for this pathway can be found in Tables 4-31 through 4-3n of the 2004 RWAP.

Inhalation of resuspended dust

Modeling inhalation of resuspended dust will follow the calculation format outlined in Chapter 5 of "Methodology for Assessing Health Risks Associated with Multiple Pathways of Exposure to Combustor Emissions" (EPA, 1998b). As discussed in the Umatilla RAWP only two sources of resuspended dust will be considered in this effort; agricultural wind erosion and agricultural tilling.

I.1.1 Wind Erosion

Wind erosion dust generation rates can be estimated based on the approach outlined the NRCS (Natural Resource Conservation Service) Wind Erosion Equation (WEQ) detailed in the National Agronomy Manual (USDA, 2002). This computational approach appears to be equivalent to that shown as Equation 5-1 in EPA 1998b, with the exception that the EPA equation describes the fraction of eroded dust that can be inhaled (i.e. PM_{10}) and the NRCS equations calculate total eroded dust. This difference results in the EPA equations producing a result that is 1.25% of the corresponding NRCS result. The following discussion will refer exclusively to the NRCS approach since several inconsistencies were noted in a detailed review of the EPA equations and more supporting information is available for the NRCS work. In keeping with the EPA calculation approach, the final result from the NRCS equations will be modified with a PM_{10} multiplier (η=0.0125) to account for the fact that not all blown dust is available for inhalation.

The wind erosion estimate, E_p, is the estimated average annual tons of soil per acre that the wind will erode from an area represented by an unsheltered distance, L, and for soil, climate, and site conditions represented by the parameters I, K, C, and V. That is,

$$E_p = f(I \cdot K \cdot C \cdot L \cdot V)$$

The relationship between E_p and I, K, C, and V was developed empirically based on wind tunnel data and field observed erosion rates (Woodruff et al. 1976). The NRCS has compiled tables for E_p. These tables are available for downloading at http://www.weru.ksu.edu/nrcs.

The parameters I, K, C, L, and V are defined in the following table along with suggested values for the Hermiston area. These values are based on the predominance of a loamy fine sand soil type for the UMCD and surrounding area (E & E, 2004; Page 1-12).

Parameter	Description	Default Value
E_p =	Wind erosion estimate (tons/acre/year)	5.3; From NRCS E-Tables, also see figure below which was generated from E-tables
L =	Unsheltered distance (feet)	>2000 ft; value will be specific to wind direction for a given year
I =	Soil erodibility index (tons/acre/year)	134; Range in area from 134-310 USDA, 2002, Exhibit 502-2 for loamy fine sand. Also see NRCS maps and data from Umatilla and Morrow County at www.or.nrcs.usda.gov/pnw_soil/or_data.html
K =	Surface roughness factor (unitless)	0.75; Ranges from 0.1 to 1.0 with 0.75 representing an average for the types of crops grown near Hermiston (Alfalfa, potatoes, wheat, vegetables)
C =	Climatic factor (unitless)	26.4; Calculated as shown below using annual precipitation and temperature data from 2002
V =	Vegetative cover factor (small grain equivalents)	1000; Value for wheat from NRCS manual

The climatic factor, C, is expressed empirically as (USDA, 2002):

$$C = 34.48 \times \left(\frac{v^3}{PE^2} \right)$$

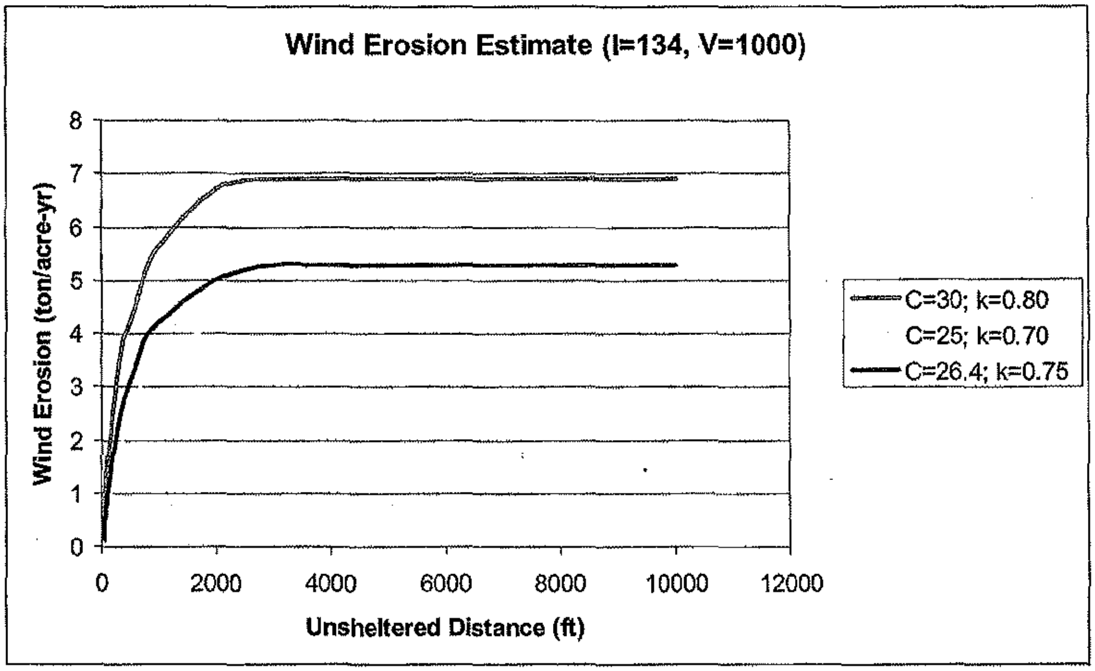
$$PE = \sum_{i=1}^{12} 115 \times \left(\frac{P_i}{(T_i - 10)} \right)^{\frac{10}{9}}$$

Parameter	Description	Default Value
v =	average annual wind velocity (mi/hr)	8.7; Tetra Tech Memorandum to DEQ dated 12 September 2005
PE =	Annual Thornthwaite precipitation effectiveness index (unitless)	Calculated as shown above
P_i =	Average monthly precipitation (in)	Site specific by year, see following table
T_i =	Average monthly temperature (°F)	Site specific by year; see following table

The average monthly weather conditions measured at the Pendleton weather station between 1928 and 2005 are shown in the following table. The adjusted temperature and precipitation data represent values that are capped at a minimum of 28.4 °F and 0.5 in, respectively. This adjustment is consistent with method outlined in NRCS (USDA, 2002) for determining PE. The calculation of PE represented in the following table assumes that the average daily temperature is the mid-point between the minimum and maximum temperature values.

Month	T-min (°F)	T-max (°F)	T-mid (°F)	Precipitation (in)	T-adj (°F)	P-adj (in)	PE_i
Jan	26.1	39.2	32.65	1.48	32.65	1.48	5.55
Feb	30	46.1	38.05	1.14	38.05	1.14	3.27
Mar	30.2	54.6	42.4	1.17	42.4	1.17	2.87
Apr	35	62.4	48.7	1.07	48.7	1.07	2.13
May	39.6	70.8	55.2	1.12	55.2	1.12	1.89
Jun	46	78.7	62.35	0.91	62.35	0.91	1.27
Jul	52.2	88.3	70.25	0.31	70.25	0.5	0.56
Aug	57.7	86.5	72.1	0.39	72.1	0.5	0.54
Sept	56.7	77.4	67.05	0.58	67.05	0.58	0.70
Oct	49.8	64	56.9	1.04	56.9	1.04	1.67
Nov	33.3	48.8	41.05	1.44	41.05	1.44	3.79
Dec	29	41.5	35.25	1.52	35.25	1.52	5.07
						Sum →	29.33

The relationship between wind erosion losses and unsheltered distance for the soil conditions which predominate near the UMCDF are indicated in the following figure. As is evident from this figure, E_p reaches a maximum at unsheltered distances greater than 2000 ft, and is insensitive to this parameter after this point. Hence, for the purposes of the UMCDF risk assessment, values of L > 2000 ft should be chosen.



The fraction of erosion dust that can be inhaled is computed as follows:

$$E_p' = \eta \cdot E_p$$

Where E_p' is the rate of generation of dust that can be inhaled (tons/acre/year) and η is the fraction of erosion that is of a particle size that can penetrate into the lungs. The parameter η is equivalent to the ratio of the mass of PM_{10} to the total mass of eroded material from a given field. From EPA 1988, this is equivalent to the combined terms ($k \cdot a$) in their Equation 7-1. These terms are reported as (EPA, 1988):

$k = 0.5$ (Mass PM_{10}/Mass Total Suspended Particles)
$a = 0.025$ (Mass Total Suspended Particles/Mass Total Eroded Material)

Hence, η=0.0125 (ton-PM10/ton- Total Eroded Material) and the rate that dust generation for the Hermiston area is:

$$E_p' = 5.3 \cdot 0.0125 = 0.066 \text{ (tons=PM}_{10}\text{/acre/year); or } 4.7\times10^{-7} \text{ g/m}^2\text{-sec}$$

I.1.2 Agricultural Tillage

Dust resuspension rates caused by agricultural tillage can be calculated from Equation 5-4 of EPA 1998b as follows:

$$E_f' = \left(3.2\times10^{-9}\right)(k)(5.38)\left(S_c^{0.6}\right)$$

Parameter	Description	Default Value
$E_f' =$	Emission of resuspended dust due to agricultural tillage (g/m^2-sec)	2.8×10^{-8}; Calculated as shown above
k =	particle size multiplier for total resuspended particulate matter (unitless)	0.21; Page 7-1, EPA 1988.
$S_c =$	Silt content of surface soil (%)	30; Loamy fine sand by definition has a silt+2(clay) content of 30% or less
5.38 =	Empirical constant (kg/ha-yr)	NA
$3.2\times10^{-9} =$	Unit conversion factor [(g-ha-yr)/(kg-m^2-yr)]	NA

I.1.3 Contaminant Concentrations in Resuspended Dust – Inhalation Rate Estimates

Conversion of the estimated dust resuspension rates per unit area (E_p' and E_f') to inhalation rates for the various exposure scenarios requires an understanding of the amount of area that will serve as a source for dust, the location of the dust source(s), the contaminant concentration within the source(s), and the size distribution of the dust particles. With this information resuspended dust can be incorporated into the site risk model as area sources with the ISC-AREMOD View modeling framework. The following computation approach can be used to develop the necessary modeling inputs.

Step 1: For each year to be modeled run ISC-AREMOD View with the four point sources (BRA, Common, LAB, Filter) using unit emission rates and other pertinent data as determined from the trial burns. This will result in a normalized concentration distribution for each model year. The predominant wind direction for each year should also be noted.

Step 2: For each year to be modeled the ISC-AREMOD View results should be imported into the IRAP-h software and the appropriate stack contaminant concentration data applied to the unit emissions to determine a concentration profile for surface soils.

Step 3: Maximum soil concentration for each contaminant within the agricultural region that lies outside the UMCDF fence line, and is within the quadrant that contains the predominant wind direction, should be identified for each year modeled. These values should be saved in an Excel or similar file for later use. It should be noted that the region within the fence line is not being evaluated since it is assumed that demolition activities around the facility will result in a large amount soil disturbance and the dilution of contaminated soils with clean backfill. The maximum values will serve as the initial screening soil concentration for both wind and tillage derived resuspended dust for the corresponding model year. If resuspended dust pathway proves to be a significant source of exposure, it will be necessary refine this calculation procedure using an average soil concentration.

Step 4: The source region for dust for a given year should be identified by consulting Figure 1-2 of the Umatilla RWAP (E&E, 2004) and choosing the open agricultural region that lies parallel to the primary wind direction for that year as determined in Step 1. The size of the dust region should correspond to the area that lies between the UMCDF fence line and the nearest major receptor such as a population center. It is assumed that this procedure will result in an unsheltered distance (L) greater than 2000 ft. However, this fact must be verified. If a distance of less than 2000 feet results then the value of E_p would need to be recalculated using the actual value for L. For simplicity, the region used for computing both wind and tillage dust generation should be the same. With this assumption the total dust resuspension rate per unit area can be computed as:

$$E_{dust} = E_p^{'} + E_f^{'}$$

This computation results in a UMCDF risk assessment dust generation rate of **5.0×10^{-7} (g/m^2-sec).**

The corresponding contaminant emission flux for the ith contaminant is calculated as:

$$E_c^i = Cs_{\max}^i \cdot E_{dust} \cdot ER \cdot 1\times10^{-6}$$

Parameter	Description	Default Value
E_c^i =	Contaminant emission flux for the ith contaminant (g/m^2-sec)	Contaminant specific
E_{dust} =	Dust emission flux (g/m^2-sec)	5.0×10^{-7}
ER=	Enrichment ratio that accounts for the fact that contaminants concentrate on smaller particles (unitless)	Organics – 3; Page 7-42, EPA 1998b Inorganics – 1; Page 7-42, EPA 1998b
$Cs_{\max}^i$ =	Concentration of ith contaminant within the dust source (µg/g)	Contaminant specific
1×10^{-6} =	Unit conversion factor (g/µg)	NA

Step 5: For the dust source region identified in Step 4, determine the maximum emission rate for each contaminant that is possible within a year. This value is determined from the total mass of a contaminant in the soil in this region.

$$E_{\max}^i = \sum_{k=1}^{\#\_operating\_years} \left[\left(\frac{\eta \cdot ER \cdot 1\times10^{-2}}{A_T \cdot \theta_T} \right) \cdot \sum_{j=1}^{\#Nodes} \left(Cs_j^i \cdot d \cdot A_{node,j} \cdot \rho_{bulk} \right) \right]_k$$

The outer summation in the above equation accounts for the deposition of contaminants in the current year of operation being modeled and all previous years of operation. The term $A_{node,j}$ is calculated by dividing the dust region into regions of equal surface area with each region represented by a single soil concentration. $A_{node,j}$ is then the surface area of jth region.

Parameter	Description	Default Value
$E^i_{\max}$ =	Maximum contaminant emission flux (g/m^2-sec)	Calculated as shown above
A_T =	Total Area of dust generation region (m^2)	Site specific
θ_T =	Number of seconds in a year (sec)	31,536,000
d =	depth of soil that can be contaminated (cm)	1; assumption
$A_{node,j}$ =	Area of the node represented by the node concentration (m^2)	Site specific
ρ_{bulk} =	Bulk density of the soil (g/cm^3)	1.5
Cs^i_j =	Concentration of ith contaminant with in the jth node (μg/g)	Node specific
1×10^{-2} =	Unit conversion factor (g-cm^2/μg-m^2)	NA

Step 6: For each contaminant determine, the emission rate to be used in subsequent computations ($E^i_{analysis}$) as follows:

If $E^i_c \le E^i_{\max}$ then $E^i_{analysis} = E^i_c$.

If $E^i_c > E^i_{\max}$ then $E^i_{analysis} = E^i_{\max}$.

It should be noted that this distinction is necessary to cap the quantity of emissions from a dust source at the amount present in the soil.

Step 7: Rerun the ISC-AERMOD View model for each year with the four point sources and an area source that corresponds in size, location, and orientation to the dust generation region identified in Step 4. An emissions rate of the inverse of the dust area in square meters [1/(area in m^2)] (g/m^2-sec) should be used for the area source along with a release height of 2 meters, which corresponds to the typical breathing zone. The particle size distribution suggested in Table 5-6 of EPA 1998b can be used for the area source if no site specific dust data is available. This table has been reproduced below for reference.

PARTICLE SIZE (MM)		
Range	**Midpoint of Range**	**Mass Fraction**
<1.0	0.5	0.035
1.0 – 2.5	1.75	0.065
2.5 – 10	6.25	0.40
10 – 30	20	0.50

Step 8: For each year to be modeled the corresponding ISC-AREMOD View results from Step 7 should be applied to IRAP-h using the stack contaminant concentration data as in Step 2 and an area source concentration corresponding to:

$$C^i_{as} = E^i_{analysis} \cdot A_T$$

Ingestion of surface water

This pathway will be applied to all exposure scenarios except the breast-feeding infant and acute exposure scenarios (see Table 4-1 of the Umatilla RWAP). IRAP-h will need to be modified to allow for different waterbodies to be designated for drinking, fishing, and sweat lodge use. Computing the impacts of the ingestion of surface water on human health risk it is appropriate to follow the drinking water ingestion computations from Appendix B and C of the "Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (EPA, 2005). These calculations are detailed in the remainder of this section.

Table C-1-5 indicates the COPC intake from drinking water is described by:

$$I_{dw} = \frac{C_{wctot} \cdot CR_{dw} \cdot F_{dw}}{BW} \text{ (From Table C-1-5 of EPA, 2005);}$$

with:

$$C_{wctot} = f_{wc} \cdot C_{wtot} \cdot \frac{d_{wc} + d_{bs}}{d_{wc}} \text{ (From Tables B-4-23 of EPA, 2005);}$$

$$f_{wc} = \frac{\left(1 + Kd_{sw} \cdot TSS \cdot 1 \times 10^{-6}\right) \cdot \frac{d_{wc}}{d_z}}{\left(1 + Kd_{sw} \cdot TSS \cdot 1 \times 10^{-6}\right) \cdot \frac{d_{wc}}{d_z} + (\theta_{bs} + Kd_{bs} \cdot C_{BS}) \cdot \frac{d_{bs}}{d_z}} \text{ (Table B-4-16 of EPA, 2005);}$$

$$d_z = d_{wc} + d_{bs} \text{ (Table B-4-16 of EPA, 2005);}$$

$$Kd_{sw} = f_{oc,sw} \cdot K_{oc} \text{ (See Page A-2-13 of EPA, 2005);}$$

$$Kd_{bs} = f_{oc,bs} \cdot K_{oc} \text{ (See Page A-2-13 of EPA, 2005).}$$

Parameters used in the above equations are listed in the following table.

Parameter	Description	Default Value
C_{wctot} =	Total COPC in water column (mg/L)	Calculated as shown above
I_{dw} =	Daily intake of COPC from drinking water (mg/kg-day)	Calculated as shown above
CR_{dw} =	Water consumption rate (L/day)	See page 4-43, Umatilla RWAP
F_{dw} =	Fraction of drinking water is contaminated (unitless)	1.0
BW =	Body weight (kg)	See Table 4-3, Umatilla RWAP
f_{wc} =	Fraction of total water body COPC concentration in the water column (unitless)	Calculated as shown above
d_{wc} =	Depth of water column (m)	Umatilla River: 2 Columbia River: 10
d_{bs} =	Depth of upper benthic sediment layer (m)	0.03
C_{wtot} =	Total water body COPC concentration including water column and bed sediments (mg-COPC/L-water)	Calculated as shown below
Kd_{sw} =	Suspended sediments/surface water partition coefficient (L-water/kg-suspended-sediment)	Calculated as shown above
$f_{oc,sw}$ =	Fraction of organic carbon in surface water (unitless)	0.075
$f_{oc,bs}$ =	Fraction of organic carbon in bed sediments (unitless)	0.04
K_{oc} =	Organic carbon partition coefficient (cm^3/g)	Calculated from K_{ow} (see Section 10 of this document)
TSS =	Total suspended solids (mg/L)	2 to 300, need water body data. Columbia River: 5 mg/L (1995-2000 average from measurement station located just above the mouth of the snake river (Station CBP100) (www.epa.gov/storet/index.html).
d_z =	Total water body depth (m)	Calculated as shown above
θ_{bs} =	Bed sediment porosity (L-water/L-sediment)	0.6
Kd_{bs} =	Bed sediment/sediment pore water partition coefficient (L-water/kg-bed sediments)	Calculated as shown above
C_{BS} =	Bed sediment concentration (or bed sediment bulk density) (g/cm^3)	1.0
1×10^{-6} =	Conversion factor (kg/mg)	NA

The total water body COPC concentration (C_{wtot}) which is needed to calculate the water column COPC concentration (C_{wctot}) is given by:

$$C_{wtot} = \frac{L_T}{Vf_x \cdot f_{wc} + k_{wt} \cdot A_w \cdot (d_{wc} + d_{bs})}$$ (Table B-4-15, EPA 2005);

$L_T = L_{DEP} + L_{dif} + L_{RI} + L_R + L_E$ (Table B-4-7, EPA 2005).

Parameters for these two equations which have not been previously defined are listed in the following table.

Parameter	Description	Default Value
L_T =	Total COPC load to the water body (g/yr)	Calculated as shown above
Vf_x =	Average volumetric flow rate through water body (m^3/yr)	Site data required
k_{wt} =	Overall total water body dissipation rate constant (yr^{-1})	Calculated as shown below (See Table B-4-17; EPA, 2005)
f_{wc} =	Fraction of total water body COPC concentration in the water column (unitless)	Calculated as shown above (See Table B-4-16, EPA 2005)
A_w =	Water body surface area (m^2)	Umatilla River: 9.8×10^6 Columbia River: 1.5×10^8
L_{DEP} =	Total (wet and dry) particle phase and wet vapor phase COPC direct deposition load to water body (g/yr)	Calculated, see Table B-4-8 (EPA, 2005)
L_{dif} =	Vapor phase COPC diffusion (dry deposition) load to water body (g/yr)	Calculated, see Table B-4-12 (EPA, 2005)
L_{RI} =	Runoff load from impervious surfaces (g/yr)	Calculated, see Table B-4-9 (EPA, 2005)
L_R =	Runoff load from pervious surfaces (g/yr)	Calculated, see Table B-4-10 (EPA, 2005)
L_E =	Soil erosion load (g/yr)	Calculated, see Table B-4-11 (EPA, 2005)

Tables B-4-8 through B-4-12 of EPA 2005 detail calculations that are based primarily on air modeling results. These equations are as follows:

$L_{DEP} = Q \cdot [F_v \cdot Dytwv + (1 - F_v) \cdot Dytwp] \cdot A_w$ (Table B-4-8 EPA, 2005; All but Hg);

$L_{DEP} = 0.48 \cdot Q_{(Total)} \cdot \left[F_{v_{(Hg^{2+})}} \cdot Dytwv + (1 - F_{v_{(Hg^{2+})}}) \cdot Dytwp \right] \cdot A_w$ (Total Hg);

$L_{RI} = Q \cdot [F_v \cdot Dytwv + (1 - F_v) \cdot Dytwp] \cdot A_I$ (Table B-4-9 EPA, 2005; All but Hg);

$L_{RI} = 0.48 \cdot Q_{(Total)} \cdot \left[F_{v_{(Hg^{2+})}} \cdot Dytwv + (1 - F_{v_{(Hg^{2+})}}) \cdot Dytwp \right] \cdot A_I$ (Total Hg);

$L_R = 0.01 \cdot RO \cdot (A_L - A_I) \cdot \dfrac{Cs \cdot BD}{\theta_{sw} + Kd_s \cdot BD}$ (Table B-4-10, EPA, 2005);

$L_E = 0.001 \cdot X_e \cdot SD \cdot ER \cdot (A_L - A_I) \cdot \dfrac{Cs \cdot BD \cdot Kd_s}{\theta_{sw} + Kd_s \cdot BD}$ (Table B-4-11, EPA 2005);

$$L_{dif} = \frac{T_{wk} \cdot R \cdot K_v \cdot Q \cdot F_v \cdot Cywv \cdot A_w \cdot (1 \times 10^{-6})}{H}$$ (Table B-4-12, EPA 2005; All but Hg);

$$L_{dif} = \frac{0.48 \cdot T_{wk} \cdot R \cdot K_v \cdot Q_{(Total)} \cdot F_{v_{(Hg^{2+})}} \cdot Cywv \cdot A_w \cdot (1 \times 10^{-6})}{H}$$ (Total Hg);

The following parameters are also required for implementation of the equations in Tables B-4-8 through B-4-12.

Parameter	Description	Default Value
Q =	COPC-specific emission rate (g/s)	From air modeling
$Q_{(Total)}$ =	Total Mercury emission rate (g/s)	From air modeling
F_v =	Fraction of COPC air concentration in vapor phase (unitless)	Calculated, see Section A2-2.5 of EPA, 2005 (outlined below)
A_w =	Water body surface area (m^2)	Umatilla River: 9.8×10^6 Columbia River: 1.5×10^8
A_I =	Impervious watershed area (m^2)	Umatilla River Watershed: 1.4×10^8 Columbia River Watershed: 2.2×10^8
Dytwv =	Unitized yearly average total deposition from vapor phase (s/m^2-yr)	From air modeling
Dytwp =	Unitized yearly average total deposition from particle phase (s/m^2-yr)	From air modeling
Cywv =	United yearly watershed air concentration from vapor phase (μg-s/g-m^3)	From air modeling
0.01 =	Unit conversion factor (kg-cm^2/mg-m^2)	NA
RO =	Average annual surface runoff from pervious area (cm/yr)	Site data required
0.001 =	Unit conversion factor (g/mg)	NA
A_L =	Total water shed area receiving COPC deposition (m^2)	Site data required
Cs =	Average soil concentration over exposure duration (mg-COPC/kg-soil)	Calculated (see Section 10 of this document)
BD =	Soil bulk density (g/cm^3)	1.5
θ_{sw} =	Soil volumetric water content (mL-water/cm^3-soil)	0.2
Kd_s	Soil-water partition coefficient (cm^3-water/g-soil)	Calculated (see Section 10 of this document)
X_e =	Unit soil loss (kg/m^2-yr)	Calculated as shown below (see Table B-4-13; EPA, 2005).
SD =	Watershed sediment delivery ratio (unitless)	Calculated as shown below (see Table B-4-14; EPA 2005).
ER =	Soil enrichment ratio (unitless)	Inorganics – 1.0 Organics – 3.0
K_v =	Overall transfer rate coefficient (m/yr)	Calculated as shown below (see Tables B-4-19, B-4-20, and B-4-21; EPA, 2005)
H =	Henry's law constant (atm-m^3/gmol)	COPC specific
R =	Universal gas constant (atm-m^3/gmol-K)	8.205×10^{-5}
T_{wk} =	Water body temperature (K)	298
1×10^{-6}	Unit conversion factor ($g/\mu g$)	NA

Tables B-4-13, B-4-14, B-4-19, B-4-20, and B-4-21 which are referenced above contain the following computations:

$X_e = RF \cdot K \cdot LS \cdot C \cdot PF \cdot \frac{907.18}{4047}$ (From Table B-4-13 of EPA, 2005);

$SD = a \cdot (A_L)^{-b}$ (From Table B-4-14 of EPA, 2005);

$K_v = \left[K_L^{-1} + \left(K_G \frac{H}{R \cdot T_{wk}} \right)^{-1} \right]^{-1} \cdot \theta^{(T_{wk}-293)}$ (From Table B-4-19 of EPA, 2005);

$K_L = \sqrt{\frac{(1\times10^{-4}) \cdot D_w \cdot u}{d_z}} \cdot (3.1536\times10^{7})$ (From Table B-4-20 of EPA, 2005 streams/rivers);

$K_L = (C_d^{0.5} \cdot W) \cdot (\frac{\rho_a}{\rho_w})^{0.5} \cdot (\frac{k^{0.33}}{\lambda_z}) \cdot (\frac{\mu_w}{\rho_w \cdot D_w})^{-0.67} \cdot (3.1536\times10^{7})$ (Table B-4-20 of EPA, 2005 lakes/ponds);

$K_G = 36500$ m/yr (From Table B-4-21 of EPA, 2005 streams/rivers);

$K_G = (C_d^{0.5} \cdot W) \cdot (\frac{k^{0.33}}{\lambda_z}) \cdot (\frac{\mu_w}{\rho_a \cdot D_a})^{-0.67} \cdot (3.1536\times10^{7})$ (Table B-4-21 of EPA, 2005 lakes/ponds).

The following are the parameters which have not been previously defined and are required for implementing the equations in Tables B-4-13, B-4-14, B-4-19, B-4-20, and B-4-21.

Parameter	Description	Default Value
RF =	USLE rainfall factor (yr^{-1})	50 to 300
K =	USLE erodibility factor (ton/acre)	0.39; Table B-4-13; EPA, 2005
LS =	USLE length-slope factor (unitless)	1.5; Table B-4-13; EPA, 2005
C =	USLE cover management factor (unitless)	0.1; Table B-4-13; EPA, 2005
PF =	USLE supporting practice factor (unitless)	1.0, or Renard et al. (1996)
907.18 =	Conversion factor (kg/ton)	NA
4047 =	Conversion factor (m^2/acre)	NA
a =	Empirical coefficient (unitless)	Values listed in Table B-4-14 (EPA 2005) by watershed area
b =	Empirical coefficient (unitless)	0.125; Table B-4-14; EPA, 2005
K_L =	Liquid phase transfer coefficient (m/yr)	Calculated as shown above
K_G =	Gas phase transfer coefficient (m/yr)	Calculated as shown above
θ =	Temperature correction factor (unitless)	1.026; Table B-4-19; EPA, 2005
D_w =	Diffusivity of COPC in water (cm^2/s)	COPC specific, see Section A2-2.7 of EPA, 2005
D_a =	Diffusivity of COPC in air (cm^2/s)	COPC specific, see Section A2-2.7 of EPA, 2005
u =	Current velocity (m/s)	Site specific data required
3.1536×10^7 =	Conversion factor (s/yr)	NA
C_d =	Drag coefficient (unitless)	0.0011
W =	Average annual wind speed (m/s)	3.9 (calculated from air modeling data)
ρ_a =	Density of air (g/cm^3)	0.0012; Table B-4-20; EPA, 2005
ρ_w =	Density of water (g/cm^3)	1.0; Table B-4-20; EPA, 2005
k =	von Karman's constant (unitless)	0.4; Table B-4-20; EPA, 2005
λ_z =	Dimensionless viscous sublayer thickness (unitless)	4; Table B-4-20; EPA, 2005
μ_w =	Viscosity of water at T_{wk} (g/cm-s)	1.691×10^{-2}; Table B-4-20; EPA, 2005
μ_a =	Viscosity of air (g/cm-s)	1.81×10^{-4}; Table B-4-21; EPA, 2005
1×10^{-4}	Unit conversion factor (m^2/cm^2)	NA

Computation of the fraction of a pollutant air concentration in the vapor phase (F_v) is described in Section A2-2.5 of EPA, 2005. These calculations are as follows:

$F_v = 1.0$ (for gases organics at ambient conditions);

$$F_v = 1.0 - \frac{c \cdot S_T}{P_L^{\circ} + c \cdot S_T} \text{ (for liquid organics at ambient conditions, elemental mercury);}$$

$$F_v = 1.0 - \frac{c \cdot S_T}{\left(P_s^{\circ} \cdot \exp\left[6.79 \cdot \frac{(T_m - T_{air})}{T_{air}}\right]\right) + c \cdot S_T} \text{ (for solid organics at ambient conditions);}$$

$F_v = 0.0$ (for metals).

$F_v = 0.85$ (for mercuric chloride, Hg^{2+}).

$F_v = 0.0$ (for methyl mercury).

The following table provides details on the parameters used to calculate F_v.

Parameter	Description	Default Value
$c =$	Junge constant (atm-cm)	1.7E-04
$P^\circ_L =$	Liquid phase vapor pressure (atm)	COPC specific property
$P^\circ_s =$	Solid phase vapor pressure (atm)	COPC specific property
6.79 =	Ratio of entropy of fusion/ideal gas constant (unitless)	NA
$S_T =$	Whitby's average surface area of particles (cm^2/cm^3)	3.5E-06; Lorber et. al. (1994).
$T_m =$	Melting point (K)	COPC specific property
$T_{air} =$	Ambient air temperature (K)	298

Computation of k_{wt} for use in the calculation of C_{wtot} as described in Table B-4-15 relies on the computations detailed in Tables B-4-16, B-4-17, B-4-18, and B-4-22 as follows:

$k_{wt} = f_{wc} \cdot k_v + f_{bs} \cdot k_b$ (From Table B-4-17 of EPA, 2005);

$f_{bs} = 1.0 - f_{wc}$ (From Table B-4-16 of EPA, 2005);

$$k_v = \frac{K_v}{d_z \cdot (1 + Kd_{sw} \cdot TSS \cdot (1 \times 10^{-6}))} \text{ (From Table B-4-18 of EPA, 2005);}$$

$$k_b = \left(\frac{1000 \cdot X_e \cdot A_L \cdot SD - Vf_x \cdot TSS}{A_w \cdot TSS} \right) \cdot \left(\frac{TSS \cdot 1 \times 10^{-6}}{C_{BS} \cdot d_{bs}} \right) \text{ (From Table B-4-22 of EPA, 2005).}$$

The following are the parameters which have not been previously defined and are required for implementation of the equations in Tables B-4-16, B-4-17, B-4-18, and B-4-22.

Parameter	Description	Default Value
$k_v =$	Water column volatilization rate (yr^{-1})	Calculated as shown above
$f_{bs} =$	Fraction of total water body COPC concentration in benthic sediment (unitless)	Calculated as shown above
$k_b =$	Benthic burial rate constant (yr^{-1})	Calculated as shown above
1×10^{-6}	Unit conversion factor (kg/mg)	NA
1×10^{-6}	Unit conversion factor (cm^3/m^3)	NA
1×10^{3}	Unit conversion factor (g/kg)	NA

Dermal contact with surface water during bathing and swimming

This pathway will be applied to all exposure scenarios except the breast-feeding infant and acute exposure scenarios (see Table 4-1 of the Umatilla RWAP). Computation of dermal COPC intake rates caused by contact with surface water will follow the approached outlined in Section 3.1 of "Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual [Part E, Supplemental Guidance for Dermal Risk Assessment]" (EPA, 2004). It should be noted that both bathing and swimming should accounted for in each scenario. In addition, for the Native American scenario the total dermal exposure will be the sum of bathing, swimming, and sweat lodge use. Daily dermal COPC intake is defined in EPA 2004 as:

$$DAD_w = \frac{DA_{event} \cdot EV \cdot ED \cdot EF \cdot A_s}{BW \cdot AT} \text{ (Equation 3.1; EPA 2004).}$$

The following table indicates the parameters used in this equation and provides suggested values or calculation methods for each.

Parameter	Description	Default Values
DAD_w =	Dermal Absorbed Dose (mg/kg-day)	Calculated as shown above
DA_{event} =	Absorbed dose per event (mg/cm^2-event)	Calculated as shown below
EV =	Event frequency (events/day)	Bathing – 1.0 Swimming – 1.0
ED =	Exposure Duration (yr)	Use $ED_{indirect}$ in Table 4-3, Umatilla RWAP
EF =	Exposure frequency (day/year)	Bathing – 350 Swimming - 7
A_s =	Skin surface area available for contact (cm^2)	See Table 4-3, Umatilla RWAP
BW =	Body weight (kg)	See Table 4-3, Umatilla RWAP
AT =	Averaging time (days)	NonCarcinogen: AT = ED×365 Carcinogen: AT = 70×365

For organic chemicals DA_{event} can be calculated as:

If $t_{event} \leq t^*$ then

$$DA_{event} = \frac{2 \cdot Kp_l \cdot FA \cdot C_{wctot} \cdot \sqrt{\frac{6 \cdot \tau_{event} \cdot t_{event}}{\pi}}}{1000} \text{ (Equation 3.2; EPA 2004)}$$

If $t_{event} > t^*$ then

$$DA_{event} = \frac{Kp_l \cdot FA \cdot C_{wctot} \cdot \left[\frac{t_{event}}{1+B} + 2 \cdot \tau_{event} \cdot \left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]}{1000} \text{ (Equation 3.3; EPA 2004).}$$

Required parameters for calculating DA_{event} are indicated in the following table.

Parameter	Description	Default Values
Kp_l =	Water to skin permeability coefficient for contaminant (cm/hr)	Inorganics – See table below Organics – Calculated as shown below

FA =	Fraction absorbed water (dimensionless)	COPC Specific, see Appendix B of EPA 2004
C_{dw} =	Concentration of contaminant dissolved in water (mg/L)	Calculated as shown in Section 5
t_{event} =	Duration of event (hr/event).	Bathing: 0.25 (EPA, 2004) Swimming: 0.5 (EPA, 1998b)
τ_{event} =	Lag time (hr)	Calculated as shown below
t^* =	Time to reach steady-state (hr)	Calculated as shown below
B =	Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless)	Calculated as shown below
1000 =	Conversion factor (cm^3/L)	NA

For inorganic chemicals DA_{event} can be calculated as:

$$DA_{event} = \frac{Kp_l \cdot C_{wctot} \cdot t_{event}}{1000}$$ (Equation 3.4; EPA 2004).

For organic chemicals the skin permeability coefficient can be estimated as:

$$Log(Kp_l) = -2.80 + 0.66 \cdot Log(K_{ow}) - 0.0056 \cdot MW$$ (Equation 3.8 of EPA, 2004).

The skin permeability coefficient for inorganic chemicals is given by Exhibit 3-1 of EPA 2004. This table is reproduced below for convenience:

Compound	Permeability Coefficient, K_p (cm/hr)
Cadmium	1×10^{-3}
Chromium (+6)	2×10^{-3}
Chromium (+3)	1×10^{-3}
Cobalt	4×10^{-4}
Lead	1×10^{-4}
Mercury (+2)	1×10^{-3}
Methyl mercury	1×10^{-3}
Mercury vapor	2.4×10^{-1}
Nickel	2×10^{-4}
Potassium	2×10^{-3}
Silver	6×10^{-4}
Zinc	6×10^{-4}
All other inorganics	1×10^{-3}

Calculation of the lag time (τ_{event}) is detailed in Equations A.3 and A.4 of EPA, 2004 as follows:

$$\tau_{event} = \frac{l_{sc}^2}{6 \cdot D_{sc}}$$ (Equation A.4 of EPA 2004);

$Log\left(\frac{D_{sc}}{l_{sc}}\right) = -2.80 - 0.0056 \cdot MW$ (Equation A.3 of EPA 2004);

where l_{sc} is the apparent thickness of the stratum corneum (0.001 cm) and D_{sc} (cm^2/hr) is the diffusion coefficient of the chemical in the stratum corneum.

The ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis, B, is given by:

$B = Kp_l \frac{\sqrt{MW}}{2.6}$ (Equation A.1, EPA 2004).

The time to reach steady-state (t^*, hr) can be calculated as indicted in Equations A.5 through A.8 of EPA, 2004. These equations are as follows:

If $B \leq 0.6$, *then* $t^* = 2.4 \cdot \tau_{event}$ (Equation A.5, EPA 2004);

If $B > 0.6$, *then* $t^* = (b - \sqrt{b^2 - c^2}) \cdot \left(\frac{l_{sc}^2}{D_{sc}}\right)$ (Equation A.6, EPA 2004);

with;

$b = \frac{2}{\pi}(1+B)^2 - c$ (Equation A.7, EPA 2004);

$c = \frac{1 + 3 \cdot B + 3 \cdot B^2}{3 \cdot (1+B)}$ (Equation A.8, EPA 2004).

Consumption of goat meat

A goat meat exposure pathway is to be added to the subsistence farmer adult and child exposure scenarios. The concentration of COPCs in goat meat should be modeled in a manner analogous to beef cattle. Briefly, the ingestion rate from goat is calculated from:

$I_{goat} = A_{goat} \cdot CR_{goat} \cdot f_{goat}$

Required parameters for calculating I_{goat} are indicated in the following table.

Parameter	Description	Default Values
I_{goat} =	Daily intake of COPC from goat consumption (mg/kg-day)	Calculated as shown above
A_{goat} =	Concentration of COPC in goat meat (mg/kg-fw)	Calculated as shown below
CR_{goat} =	Consumption rate of goat (kg-FW/kg-day)	See Table 4-3, Umatilla RWAP
f_{goat} =	Fraction of animal tissue that is contaminated (unitless)	1.0

The concentration of a COPC within goat meat is determined from (c.f. Table B-3-10 of EPA, 2005 for beef equations):

$$A_{goat} = \left(\sum_i (F_i \cdot Qp_i \cdot P_i) + Qs \cdot Cs \cdot Bs\right) \cdot Ba_{goat} \cdot MF$$

where "i" represents the plant type (grain, silage, forage).

The parameters required for the above equation are shown in the following table.

Parameter	Description	Default Values
F_i =	Fraction of plant type (i) grown on contaminated soil and ingested by the goat (unitless)	1.0
Qp_i	Quantity of plant (i) ingested by the goat per day (kg-dw-plant/day)	Forage: 0.76 (scaled on body weight) Grain: 0.041 (scaled on body weight) Silage: 0.22 (scaled on body weight)
P_i =	Concentration of COPC in plant type (i) ingested by the animal (mg/kg-dw-plant)	Calculated as indicated below
Qs =	Quantity of soil ingested by the animal (kg/day)	0.0014 (DOE-ORNL, 2005)
Cs =	Average soil concentration over exposure duration (mg-COPC/kg-soil)	Calculated as shown below
Bs =	Soil bioavailability factor for goat (unitless)	1.0
Ba_{goat}	Biotransfer factor for goat (day/kg-fw)	Calculated as shown below
MF =	Metabolism factor (unitless)	0.01 for bis(2-ethylhexyl)phthalate 1.0 for all other COPCs

Unknown values of animal uptake and bioaccumulation parameters were determined based on scaling parameters for cattle. The following table contains information used to develop scaling factors.

Parameter	Cattle Value	Goat Value	Scaling Factor
Live weight at slaughter	1160 lbs [a]	100 lbs [b]	$\frac{100}{1160} = 0.0862$ (lb/lb)
Fat content	19% [c]	12% [d]	$\frac{0.12}{0.19} = 0.632$ (%/%)

[a] www.beefusa.org/NEWSCattleWeightsUP3450.aspx

[b] www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex1363/$file/435_830-1.pdf?OpenElement

[c] EPA, 2005. Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Appendix A, Section A2-2.13.1

[d] Almeida, A.M., L. M. Schwalbach, H.O. deWaal, J.P.C. Greyling, and L.A. Cardoso. 2003. Growth and carcass traits of young boer goat bucks fed a diet of winter veld hay and supplemented. *Arch. Zootec.* **52**: 393-396.

Biotransfer factors for goat (Ba_{goat}) can be calculated (for organics) from Ba_{beef} values in Appendix A of EPA, 2005 as follows:

$$Ba_{goat} = Ba_{beef} \cdot [0.632]$$

Organic compounds not included in Appendix A can be estimated as indicated in the next equation (see Section A2-2.13.1 of EPA, 2005).

Organics:

$$Ba_{goat} = [10^{(-0.099\cdot[\log(K_{ow})]^2 + 1.07\cdot\log(K_{ow}) - 3.56)}]\cdot[0.12]$$

Application of this equation is only applicable for K_{ow} values between -0.67 and 8.2. Values below -0.67 and above 8.2 should be assigned a K_{ow} of -0.67 and 8.2, respectively.

Metals:

$$Ba_{goat} = Ba_{beef}$$

The concentration of COPC in plant type "i" (P_i) ingested by an animal can be calculated using the equations in Tables B-3-7 through B-3-9 of EPA 2005:

$$P_i = P_{d_i} + P_{v_i} + P_{r_i} \;;$$

$$P_{d_i} = \frac{1000\cdot\left[Q\cdot(1-F_v)\cdot[Dydp + (F_w\cdot Dywp)]\cdot R_{p_i}\cdot\left[1.0-\exp(-kp\cdot Tp_i)\right]\right]}{Yp_i\cdot kp} \text{ (all but Hg);}$$

$$P_{d_i} = \frac{1000\cdot\left[0.48\cdot Q\cdot(1-F_v)\cdot[Dydp + (F_w\cdot Dywp)]\cdot R_{p_i}\cdot\left[1.0-\exp(-kp\cdot Tp_i)\right]\right]}{Yp_i\cdot kp} \text{ (total Hg);}$$

$$P_{d_i} = \frac{1000\cdot\left[0.37\cdot Q\cdot(1-F_v)\cdot[Dydp + (F_w\cdot Dywp)]\cdot R_{p_i}\cdot\left[1.0-\exp(-kp\cdot Tp_i)\right]\right]}{Yp_i\cdot kp} \text{ (Hg}^{++}\text{);}$$

$$P_{d_i} = \frac{1000 \cdot \left[0.11 \cdot Q \cdot (1 - F_v) \cdot [Dydp + (F_w \cdot Dywp)]\right] \cdot R_{p_i} \cdot \left[1.0 - \exp(-kp \cdot Tp_i)\right]}{Yp_i \cdot kp} \text{ (MHg);}$$

$$P_{v_i} = Q \cdot F_v \cdot \frac{Cyv \cdot Bv_{forage} \cdot VG_{ag_i}}{\rho_a} \text{ (all but mercury);}$$

$$P_{v_i} = 0.48 \cdot Q \cdot F_v \cdot \frac{Cyv \cdot Bv_{forage} \cdot VG_{ag_i}}{\rho_a} \text{ (total mercury);}$$

$$P_{v_i} = 0.37 \cdot Q \cdot F_v \cdot \frac{Cyv \cdot Bv_{forage} \cdot VG_{ag_i}}{\rho_a} \text{ (Hg}^{++}\text{);}$$

$$P_{v_i} = 0.11 \cdot Q \cdot F_v \cdot \frac{Cyv \cdot Bv_{forage} \cdot VG_{ag_i}}{\rho_a} \text{ (MHg);}$$

$$P_{r_i} = C_s \cdot Br_{forage} \ .$$

The following table provide information on the parameters necessary to calculated P_d, P_v, and P_r.

Parameter	Description	Default Values
P_d =	Concentration of COPC in forage and silage due to direct deposition (mg-COPC/kg-DW)	Calculated as shown above.
1000 =	Conversion factor (mg/g)	NA
Q =	COPC-specific emission rage (g/s)	From air modeling
D_{ydp} =	Unitized yearly average dry deposition from particle phase (s/m^2-yr)	From air modeling
F_w =	Fraction of COPC wet deposition that adheres to plant surfaces (unitless)	Anions – 0.2 Cations/Organics – 0.6
F_v =	Fraction of COPC air concentration in vapor phase (unitless)	Calculated, see Section 5 above
D_{ywp} =	Unitized yearly average wet deposition from particle phase (s/m^2-yr)	From air modeling
Rp_i =	Interception fraction of the edible portion of plant (unitless)	Forage – 0.5 Silage – 0.46
kp =	Plant surface loss coefficient (yr^{-1})	18
Tp_i =	Length of plant exposure to deposition per harvest of edible portion of plant (yr)	Forage – 0.12 Silage – 0.16
Yp_i =	Yield or standing crop biomass of the edible portion of the plant (kg-DW/m^2)	Forage – 0.24 Silage – 0.8
P_v =	Forage and silage concentration due to air-to-plant transfer (mg-COPC/kg-DW)	Calculated as shown above
C_{yv} =	Unitized yearly average air concentration from vapor phase (µg-s/g-m^3)	From air modeling
Bv_{forage} =	Air-to-plant biotransfer factor of forage and silage (mg-COPC/g-plant-DW)/(mg-COPC/g-air)	Calculated as shown below for organics. Value for metals is assumed to be 0.0
$VG_{ag,I}$ =	Empirical correction factor or forage and silage (Unitless)	Forage – 1.0 Silage – 0.5
ρ_a =	Density of air (g/m^3)	1200
Pr =	Concentration of COPC in forage/silage/grain due to root uptake (mg-COPC/kg-DW plant tissue)	Calculated as shown above
Cs =	Average soil concentration over exposure duration (mg/kg)	Calculated by IRAP-h, see Table B-3-1 of EPA, 2005 for methodology
Br_{forage} =	Plant-soil bioconcentration factor for forage, silage, and grain (mg-COPC/g-plant-DW)/(mg-COPC/g-soil)	Calculated as shown below for organics. Values for metals are included in the supplemental database for EPA 2005

The plant-soil concentration factor for organic compounds in forage (Br_{forage}) can be estimated as indicated in Section A2-2.12.3 in Appendix A of the 2005 EPA HHRA guidance. This estimation approach is as follows:

$\log(Br_{forage}) = 1.588 - 0.578 \cdot \log(K_{ow})$ (For organics).

The Air-to-plant biotransfer factor of forage and silage are described for organics other than dioxins and furans by Equations A-3-15a and A-3-15b in Appendix A of the 2005 EPA HHRA guidance. These equations are:

$$\log(B_{vol}) = 1.065 \cdot \log(K_{ow}) - \log\left(\frac{H}{R \cdot T}\right) - 1.654 \text{ (Equation A-2-19 of EPA 2005);}$$

$$Bv_{forage} = \frac{\rho_{air} \cdot B_{vol}}{(1 - f_{water}) \cdot \rho_{forage}} \text{ (Equation A-3-20 of EPA 2005).}$$

Suggested values for f_{water}, ρ_{air} and ρ_{forage} are 0.85, 1.19 g/L, and 770 g/L, respectively (EPA, 2005).

Values of Bv_{forage} for dioxins and furans are provided in supplemental database of the 2005 EPA HHRA guidance. For metals Bv_{forage} is assumed to be Zero (Page A-2-22 of EPA, 2005).

Inhalation exposure of COPCs during sweat lodge use

For volatile and semivolatile compounds (defined for this exposure pathway as a compound with a boiling point (T_{boil}) less than, or equal to, 150°F) the following equation describes inhalation exposure for Native American adults inside the sweat lodge.

$$I_{inh} = \frac{C_{wctot} \cdot \left(\frac{V_{w,vol}}{2}\right) \cdot \left(\frac{1}{\frac{2}{3} \cdot \pi \cdot r^3}\right) \cdot IR \cdot ET \cdot EF \cdot ED}{BW \cdot AT \cdot CF} \text{ (Compounds w/ } T_{boil} \leq 150\ °\text{F).}$$

Where:

Parameter	Description	Default Values
I_{inh} =	Intake of COPCs from inhalation in the sweat lodge (mg/kg-day)	Calculated as shown above
C_{wctot} =	Total water column concentration of COPCs (mg/L)	Calculated according to EPA 2005, Appendix B (Also see Section 5, above)
$V_{w,vol}$ =	Volume of water used in a single sweat (L)	Volatile/Semivolatiles: 4
$V_{w,nonvol}$ =	Volume of water necessary to obtain 100% humidity in the sweat lodge.	0.34
π =	The constant *pi* (unitless)	3.14159
r =	Radius of sweat lodge (m)	1
IR =	Inhalation rate (m^3/hr)	1.25
ET =	Exposure time (hr/event)	2
ED =	Exposure duration (yr)	70
BW =	Body weight (kg)	70
AT =	Averaging time for carcinogens (AT_C) or noncarcinogens (AT_N) (yr)	70
CF =	Units conversion factor (day/yr)	365
EF =	Exposure frequency (events/yr)	365

For nonvolatile compounds (defined for this exposure pathway as $T_{boil} > 150$ °F) inhalation exposure is described by:

$$I_{inh} = \frac{C_{wctot} \cdot \left(\frac{V_{w,nonvol}}{\frac{2}{3} \cdot \pi \cdot r^3} \right) \cdot IR \cdot ET \cdot EF \cdot ED}{BW \cdot AT \cdot CF} \quad \text{(Compounds w/ } T_{boil} > 150\ ^\circ\text{F);}$$

with $V_{w,nonvol} = 0.34$ liters. This value represents the volume of water needed to produce 100% saturation in a hemispherical sweat lodge of radius 1 meter and is calculated from the vapor pressure of water at 150 °F as follows.

$$V_{w,nonvol} = \left[VP_{w,150F} \right] \cdot \left[V_{lodge} \right] \cdot \left[\frac{MW_w}{R \cdot T \cdot \rho_w} \right]$$

where:

Parameter	Description	Default Values
$VP_{w,150F}$ =	Vapor pressure of water at 150 °F (atm)	0.252
V_{lodge} =	Internal volume of the sweat lodge (L)	2100
MW_w =	Molecular Weight of water (AMU)	18
R =	Ideal gas constant (atm-L/gmol-K)	0.08206
T =	Temperature in sweat lodge (K)	339
ρ_w =	Density of water (g/L)	1000

Use of $V_{w,nonvol}$ is based on the assumption that nonvolatile compounds become airborne as an aerosol mist and the quantity of nonvolatile constituents is limited by the amount of water that may be in the air at any given time.

Dermal contact with COPCs during sweat lodge use

Dermal uptake for volatile and semi-volatile compounds (a boiling point less than, or equal to 150 °F) can be represented by the following equation:

$$I_d = \frac{C_{wctot} \cdot \left(\frac{V_{w,vol}}{2} \right) \cdot \left(\frac{1}{\frac{2}{3} \cdot \pi \cdot r^3} \right) \cdot SA \cdot f_{SA,v} \cdot Kp_v \cdot ET \cdot EF \cdot ED \cdot CF_1}{BW \cdot AT \cdot CF_2} \quad \text{(Compounds w/} T_{boil} \le 150\ ^\circ\text{F).}$$

Dermal uptake for compounds with $T_{boil} > 150$ °F is represented by:

$$I_d = \frac{C_{wctot} \cdot SA \cdot f_{SA,l} \cdot Kp_l \cdot ET \cdot EF \cdot ED \cdot CF_3}{BW \cdot AT \cdot CF_2} \quad \text{(Compounds w/ } T_{boil} > 150\ ^\circ\text{F).}$$

Where:

Parameter	Description	Default Values
I_d =	Intake of COPC from dermal absorption within the sweat lodge (mg/kg-day)	Calculated as shown above
C_{wctot} =	Total water column concentration of COPC (mg/L)	Calculated according to EPA 1998a, Appendix B
$V_{w,vol}$ =	Volume of water used in a single sweat (L)	4
π =	The constant *pi* (unitless)	3.14159
r =	Radius of sweat lodge (m)	1
Kp_v=	COPC-specific vapor to skin permeability constant (cm/hr)	Values shown in Table 7-7 of Section 7 of EPA 1992
Kp_l=	COPC-specific water to skin permeability constant (cm/hr)	Calculated as shown in Section 6 above
$f_{SA,v}$ =	Fraction of skin area (SA) in contact with water during a sweat (unitless)	1.0 (conservative assumption)
$f_{SA,l}$ =	Fraction of skin area (SA) in contact with water during a sweat (unitless)	1.0 (conservative assumption)
IR =	Inhalation rate (m^3/hr)	1.25
ET =	Exposure time (hr/event)	2
ED =	Exposure duration (yr)	70
EF =	Exposure frequency (events/yr)	365
BW =	Body weight (kg)	70
SA_{water} =	Body surface area available for contact (m^2)	1.8
AT =	Averaging time for carcinogens (AT_C) or noncarcinogens (AT_N) (yr)	70
CF1 =	Unit conversion factor (m/cm)	0.01
CF2 =	Unit conversion factor (day/yr)	365
CF3 =	Unit conversion factor (L/m^2-cm)	10

Dermal contact with surface soils

This pathway will be applied to all exposure scenarios except the breast-feeding infant and acute exposure scenarios (see Table 4-1 of the Umatilla RWAP). Modeling dermal contact with surface soils will follow the calculation format defined in Section 3.2 of "Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual [Part E, Supplemental Guidance for Dermal Risk Assessment]" (EPA, 2004). In this document the daily dermal intake from surface soils is described by:

$$DAD_s = \frac{DA_{event} \cdot EF \cdot ED \cdot EV \cdot SA_{soil}}{AT \cdot BW}$$ (Equation 3.11; EPA, 2004);

$$DA_{event} = (1 \times 10^{-6}) \cdot C_s \cdot AF \cdot ABS$$ (Equation 3.12; EPA, 2004);

The following table details the parameters required for these calculations.

Parameter	Description	Default Values
DAD_s =	Daily dermal intake of contaminated soil (mg/kg-day)	Calculated as shown above
DA_{event} =	Absorbed dose per event (mg/cm^2-event)	Calculated as shown above
EF =	Exposure frequency (events/year)	See EF values in Table 4-3, Umatilla RAWP
SA_{soil} =	Skin surface area available for contact (cm^2)	See Table 4-3, Umatilla RAWP
BW =	Body weight (kg)	70
ED =	Exposure duration (yr)	Use $ED_{indirect}$ in Table 4-3, Umatilla RWAP
EV =	Event frequency (events/day)	1
AT =	Averaging time (days)	Noncarcinogen: AT = ED×365 Carcinogen: AT = 70×365
C_s =	Concentration of contaminant in soil (μg/g-soil)	Calculated according to EPA 1998, Appendix B, Table B-1-1
AF =	Adherence factor of soil to skin (mg-soil/cm^2-event)	See the table that follows
ABS =	Absorption fraction (unitless)	See the table that follows
1×10^{-6} =	Conversion factor (g/μg)	NA

Consistent with the guidance detailed in Section 3.2.2.3 of EPA 2004 the following values for the Adherence factor (AF) are suggested for use in the Umatilla RAWP. These values were obtained by selecting an activity that represents a central tendency for a given exposure scenario and using the high-end weighted value for that activity (i.e. 95th Percentile).

Exposure Scenario	Adherence Factor (mg/cm^2)	Activity
Resident Adult	0.2	Landscaping
Resident Child	0.3	Daycare children
Farmer Adult	0.4	Farming
Farmer Child	0.4	Children playing in dry soil
Fisher Adult	0.4	Farming
Fisher Child	3.3	Children playing in wet soil
Native American Adult	0.5	Commercial Gardening
Native American Child	3.3	Children playing in wet soil[1]
On-site Worker	0.2	Landscaping
Military Resident	0.2	Landscaping

[1] Wet soil is chosen since Native American children often accompany their relatives during plant gathering activities in wet land areas.

According to Section 3.2.2.4 of EPA 2004 the absorption fraction (ABS) has only been determined for the compounds shown in the following table. This table is a reproduction of Exhibit 3-4 of EPA 2004.

Compound	Dermal Absorption Fraction (ABS)
Arsenic	0.03
Cadmium	0.001
Chlordane	0.04
2-4-Dichlorophenoxyacetic acid	0.05
DDT	0.03
TCDD and other dioxins	Organic Content of Soil ≤ 10%: 0.03 Organic Content of Soil > 10%: 0.001
Lindane	0.04
Benzo(a)pyrene and other PAHs	0.13
PCBs	0.14
Pentachlorophenol	0.25
Semivolatile organic compounds	0.1

An ABS value of 0.0 should be assumed for all other chemical species, which effectively removes them from the dermal adsorption calculation process. For the purpose of this exposure pathway a semivolatile organic compound will be defined as a compound which has a vapor pressure between 4.54×10^{-2} and 3.60×10^{-15} atm at ambient temperature. This vapor pressure range corresponds to the span of vapor pressures that encompasses the semivolatile compounds listed in Table 2-1 of the Umatilla RWAP.

The soil COPC concentration (C_s) needed to compute DA_{event} is determined as detailed in Table B-1-1 of the EPA HHRA guidance (EPA, 1998a). This computation procedure is as follows for the average and highest soil concentration:

Soil Concentration Averaged Over Exposure Duration:

$$Cs = \frac{\left(\frac{Ds \cdot tD - Cs_{tD}}{ks}\right) + \left(\frac{Cs_{tD}}{ks} \cdot \left(1 - \exp\left[-ks \cdot (T_2 - tD)\right]\right)\right)}{(T_2 - T_1)} \quad \text{for } T_1 < tD < T_2 \;;$$

$$Cs = \frac{Ds}{ks \cdot (tD - T_1)} \cdot \left(\left[tD + \frac{\exp(-ks \cdot tD)}{ks}\right] - \left[T_1 + \frac{\exp(-ks \cdot T_1)}{ks}\right]\right) \quad \text{for } tD \geq T_2 \;.$$

Highest Annual Average Soil Concentration:

$$Cs_{tD} = \frac{Ds \cdot \left[1 - \exp\left(-ks \cdot tD\right)\right]}{ks} \;;$$

with;

$$Ds = \frac{100 \cdot Q}{Z_s \cdot BD} \cdot \left[F_v \cdot \left(Dydv + Dywv\right) + \left(Dydp + Dywp\right) \cdot (1 - F_v)\right] \text{ (all but Hg);}$$

$$Ds_{(Hg)} = \frac{100 \cdot (0.48 \cdot Q)}{Z_s \cdot BD} \cdot \left[F_v \cdot \left(Dydv + Dywv\right) + \left(Dydp + Dywp\right) \cdot (1 - F_v)\right]$$

$Ds_{(Hg^{2+})} = 0.98 \cdot Ds_{(Hg)}$ (divalent mercury)

$Ds_{(MHg)} = 0.02 \cdot Ds_{(Hg)}$ (methyl mercury)

$Ds_{(Hg^{0})} = 0.0$ (elemental mercury

Necessary parameters for the above equations are:

Parameter	Description	Default Values
Cs =	Average soil concentration over exposure duration (mg-COPC/kg-soil)	Calculated as shown above
Cs_{tD} =	Soil concentration at time tD (mg-COPC/kg-soil)	Calculated as shown above
Ds =	Deposition term (mg-COPC/kg-soil/yr)	Calculated as shown above
tD =	Time period over which deposition occurs (i.e. time period of combustion) [yr]	See ED_{direct} in Table 4-3a through 4-3p in the UMCDF RWAP
ks =	COPC soil loss constant due to all processes (yr^{-1})	Calculated according to EPA 2005, Appendix B, Table B-1-2
T_2 =	Length of exposure duration (yr)	See $ED_{indirect}$ in Table 4-3a through 4-3p in the UMCDF RWAP
T1 =	Time period at the beginning of combustion (yr)	0.0
100 =	Unit conversion factor ($mg\text{-}m^2/kg\text{-}cm^2$)	NA
Q =	COPC-specific emission rate (g/s)	Calculated from air modeling
Z_s =	Soil mixture zone depth (cm)	Untilled soil – 2 Tilled soil – 20
BD	Soil bulk density (g/cm^3)	1.5
F_v =	Fraction of COPC air concentration in vapor phase (unitless)	Calculated, see Section A2-2.5 of EPA, 2005 (See Section 5 above)
Dydv =	Unitized yearly average dry deposition from vapor phase ($s/m^2\text{-}yr$)	From air modeling
Dywv =	Unitized yearly average wet deposition from vapor phase ($s/m^2\text{-}yr$)	From air modeling
Dydp =	Unitized yearly average dry deposition from particulate phase ($s/m^2\text{-}yr$)	From air modeling
Dywp =	Unitized yearly average wet deposition from particulate phase ($s/m^2\text{-}yr$)	From air modeling

Determination of the COPC soil loss constant (ks) relies on the equations outlined in Table B-1-2 through B-1-6 as follows:

$ks = ksg + kse + ksr + ksl + ksv$ (Table B-1-2);

$kse = \frac{0.1 \cdot X_e \cdot SD \cdot ER}{BD \cdot Z_s} \cdot \left(\frac{Kd_s \cdot BD}{\theta_{sw} + \left(Kd_s \cdot BD\right)} \right)$ (Table B-1-3);

$$ksr = \frac{RO}{\theta_{sw} \cdot Z_s} \cdot \left(\frac{1}{1 + \left(\frac{Kd_s \cdot BD}{\theta_{sw}} \right)} \right) \text{ (Table B-1-4);}$$

$$ksl = \frac{P + I - RO - E_v}{\theta_{sw} \cdot Z_s \cdot \left[1.0 + \left(\frac{Kd_s \cdot BD}{\theta_{sw}} \right) \right]} \text{ (Table B-1-5);}$$

$$ksv = \left[\frac{3.1536 \times 10^7 \cdot H}{Z_s \cdot Kd_s \cdot R \cdot T_a \cdot BD} \right] \cdot \left[\frac{D_a}{Z_s} \right] \cdot \left[1 - \frac{BD}{\rho_{soil}} - \theta_{sw} \right] \text{ (Table B-1-6);}$$

$Kd_s = f_{oc,s} \cdot K_{oc}$ (Equation A-2-10, Appendix A of EPA 2005).

With:

$K_{oc} = 10^{[0.00028+(0.983 \cdot \log[K_{ow}])]}$ (for organics with $H < 10^{-3}$ except PCDDs and PCDFs);

$K_{oc} = 10^{[0.0784+(0.7919 \cdot \log[K_{ow}])]}$ (for organics with $H \geq 10^{-3}$);

$K_{oc} = 10^{[\log[K_{ow}]-0.21]}$ (for PCDDs and PCDFs);

$K_{oc} = 0.0$ (for inorganics).

The following parameters are required for calculation of ksg, kse, ksr, and ksl.

Parameter	Description	Default Values
ksg =	COPC loss constant due to biotic and abiotic degradation (yr^{-1})	0.0 unless data available to support transformation rate
kse =	COPC loss constant due to soil erosion (yr^{-1})	Calculated as shown above (see Table B-1-3)
ksr =	COPC loss constant due to surface runoff (yr^{-1})	Calculated as shown above (see Table B-1-4)
ksl =	COPC loss constant due to leaching (yr^{-1})	Calculated as shown above (see Table B-1-5)
ksv =	COPC loss constant due to volatilization (yr^{-1})	Calculated as shown above (see Table B-1-6)
0.1 =	Unit conversion factor ($g\text{-}m^2/kg\text{-}cm^2$)	NA
X_e =	Unit soil loss ($kg/m^2\text{-}yr$)	Calculated using Table B-4-13 (see Section 5 above)
SD =	Sediment delivery ratio (unitless)	Calculated using Table B-4-13 (see Section 5 above)
ER =	Soil enrichment ratio (unitless)	Inorganics: 1.0 Organics: 3.0
BD =	Soil bulk density (g/cm^3)	1.5
Z_s =	Soil mixture zone depth (cm)	Untilled soil – 2 Tilled soil – 20
θ_{sw} =	Soil volumetric water content (mL/cm^3)	0.2
RO =	Average annual surface runoff from pervious areas (cm/yr)	Site data required
Kd_s =	Soil-water partition coefficient (cm^3-water/g-soil)	Calculated as shown above
$f_{oc,s}$ =	Fraction of organic carbon in soils (unitless)	0.002 to 0.024, See Page A-2-13 of EPA, 2005.
K_{oc} =	Organic carbon partition coefficient (cm^3/g)	Calculated as shown above
K_{ow} =	Octanol water partition coefficient (unitless)	COPC specific parameter
P =	Average annual precipitation (cm/yr)	22.9
I =	Average annual irrigation (cm/yr)	75
E_v =	Average annual evapotranspiration (cm/yr)	35 to 100
3.1536×10^7 =	Conversion factor (s/yr)	NA
H =	Henry's law constant ($atm/m^3\text{-}gmol$)	COPC specific parameter
Da =	Diffusivity of COPC in air (cm^2/s)	COPC specific parameter
BD =	Soil bulk density (g/cm^3)	1.5
T_a =	Ambient Temperature (K)	298
ρ_{soil} =	Solids particle density (g/cm^3)	2.7
R =	Ideal gas constant ($atm\text{-}m^3/gmol\text{-}K$)	8.205×10^{-5}

Addition of dioxin-like PCBs to breast milk pathway

The fourteen dioxin-like PCBs identified by the World Health Organization (WHO) will be added to the infant breast milk pathway. These fourteen compounds along with their respective toxicity equivalency factors are indicated in the following table:

Specific Isomer	Compound Name	TEF (WHO, 1997)
3,3',4,4'-TeCB	Tetrachlorobiphenyl (PCB 77)	0.0001
3,4,4',5-TCB	Tetrachlorobiphenyl (PCB 81)	0.0001
2,3,3'4,4'-PeCB	Pentachlorobiphenyl (PCB 105)	0.0001
2,3,4,4',5-PeCB	Pentachlorobiphenyl (PCB 114)	0.0005
2,3',4,4',5-PeCB	Pentachlorobiphenyl (PCB 118)	0.0001
2',3,4,4',5-PeCB	Pentachlorobiphenyl (PCB 123)	0.0001
3,3',4,4',5-PeCB	Pentachlorobiphenyl (PCB 126)	0.1
2,3,3',4,4',5-HxCB	Hexachlorobiphenyl (PCB 156)	0.0005
2,3,3',4,4',5'-HxCB	Hexachlorobiphenyl (PCB 157)	0.0005
2,3',4,4',5,5'-HxCB	Hexachlorobiphenyl (PCB 167)	0.00001
3,3',4,4',5,5'-HxCB	Hexachlorobiphenyl (PCB 169)	0.01
2,2',3,3',4,4',5-HpCB	Heptachlorobiphenyl (PCB 170)	0
2,2',3,4,4',5,5'-HpCB	Heptachlorobiphenyl (PCB 180)	0
2,3,3',4,4',5,5'-HpCB	Heptachlorobiphenyl (PCB 189)	0.0001

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J Appendix J – Human Health Exposure Scenario Parameters

Table J-1: Exposure Scenario Parameters for Adults

Parameter	**Unit**	**Resident Adult**	**UMDF Worker**	**Military Adult**	**Farmer Adult**	**Fisher Adult**	**Native Adult**
Adherence factor of soil to skin	mg-soil/cm^2-event	0.07	0.07	0.07	0.1	0.07	0.1
Averaging time for carcinogens	yr	70	70	70	70	70	70
Averaging time for noncarcinogens	yr	30	25	2	40	30	70
Consumption rate of BEEF (WILD GAME for Natives)	kg/kg-day FW	0	0	0	0.00417	0	0.00198
Body weight	kg	70	70	70	70	70	70
Consumption rate of POULTRY (FOWL for Natives)	kg/kg-day FW	0	0	0	0.00227	0	0.000154
Consumption rate of ABOVEGROUND PRODUCE	kg/kg-day DW	0.00032	0.00032	0.00032	0.00176	0.00032	0.00124
Consumption rate of BELOWGROUND PRODUCE	kg/kg-day DW	0.00014	0.00014	0.00014	0.000552	0.00014	0.000706
Consumption rate of DRINKING WATER	L/day	2	2	2	2	2	3
Consumption rate of PROTECTED ABOVEGROUND PRODUCE	kg/kg-day DW	0.00061	0.00061	0.00061	0.00064	0.00061	0.00183
Consumption rate of SOIL	kg/d	0.0001	0.0002	0.0001	0.0002	0.0001	0.0002
Exposure duration	yr	30	25	2	40	30	70
Exposure frequency	day/yr	350	250	250	350	350	365
Exposure frequency of bathing	day/year	350	250	250	350	350	365
Exposure frequency during sweat lodge use	events/year	0	0	0	0	0	365
Exposure frequency of dermal contact with soil	events/year	350	250	250	350	350	365
Exposure frequency of swimming	day/year	10.5	0	10.5	10.5	10.5	10.95
Consumption rate of EGGS	kg/kg-day FW	0	0	0	0.00185	0	0.0003
Exposure time during sweat lodge use	hr/event	0	0	0	0	0	2
Event frequency of dermal contact with water and soil	events/day	1	1	1	1	1	1
The number of sweat lodge use	events/day	0	0	0	0	0	1
Fraction contaminated ABOVEGRD PRODUCE	–	1	1	1	1	1	1

Parameter	Unit	Resident Adult	UMDF Worker	Military Adult	Farmer Adult	Fisher Adult	Native Adult
Fraction of contaminated DRINKING WATER	--	1	1	1	1	1	1
Fraction contaminated SOIL	--	1	1	1	1	1	1
Consumption rate of FISH	kg/kg-day FW	0	0	0	0	0.0035	0.00849
Fraction of contaminated FISH	--	1	1	1	1	1	1
Consumption rate of GOAT	kg/kg-day FW	0	0	0	0.0017	0	0
Inhalation exposure duration	yr	10	10	2	10	10	10
Inhalation exposure frequency	day/yr	350	250	250	350	350	365
Inhalation exposure time	hr/day	24	8	8	24	24	24
Fraction of contaminated BEEF (WILD GAME for Natives)	--	1	1	1	1	1	1
Fraction of contaminated POULTRY (FOWL for Natives)	--	1	1	1	1	1	1
Fraction of contaminated EGGS	--	1	1	1	1	1	1
Fraction of contaminated GOAT	--	1	1	1	1	1	1
Fraction of contaminated MILK	--	1	1	1	1	1	1
Fraction of contaminated PORK	--	1	1	1	1	1	1
Inhalation rate	m^3/hr	0.83	1.5	1.5	0.83	0.83	1.25
Consumption rate of MILK	kg/kg-day FW	0	0	0	0.0044	0	0.0044
Consumption rate of PORK	kg/kg-day FW	0	0	0	0	0	0
Skin surface area available for contact with soil	cm^2	5700	5700	5700	5700	5700	5700
Skin surface area available for contact with water	cm^2	18000	18000	18000	18000	18000	18000
Body surface area available for contact during a sweat	m^2	0	0	0	0	0	1.8
Time period at the beginning of combustion	yr	0	0	0	0	0	0
Length of exposure duration	yr	30	25	2	40	30	70

Table J-2: Exposure Scenario Parameters for Children

Parameter	Unit	Resident Child	Farmer Child	Fisher Child	Native Child
Adherence factor of soil to skin	mg-soil/cm^2-event	0.2	0.2	0.2	0.2
Averaging time for carcinogens	yr	70	70	70	70
Averaging time for noncarcinogens	yr	6	6	6	6
Consumption rate of BEEF (WILD GAME for Natives)	kg/kg-day FW	0	0.00256	0	0.00131
Body weight	kg	15	15	15	15
Consumption rate of POULTRY (FOWL for Natives)	kg/kg-day FW	0	0.00155	0	0.000105
Consumption rate of ABOVEGROUND PRODUCE	kg/kg-day DW	0.00077	0.00176	0.00077	0.00124
Consumption rate of BELOWGROUND PRODUCE	kg/kg-day DW	0.00023	0.00052	0.00023	0.000706
Consumption rate of DRINKING WATER	L/day	1	1	0.67	1.5
Consumption rate of PROTECTED ABOVEGROUND PRODUCE	kg/kg-day DW	0.0015	0.00136	0.0015	0.00183
Consumption rate of SOIL	kg/d	0.0002	0.0002	0.0002	0.0002
Exposure duration	yr	6	6	6	6
Exposure frequency	day/yr	350	350	350	365
Exposure frequency of bathing	day/year	350	350	350	365
Exposure frequency during sweat lodge use	events/year	0	0	0	0
Exposure frequency of dermal contact with soil	events/year	350	350	350	365
Exposure frequency of swimming	day/year	10.5	10.5	10.5	10.95
Consumption rate of EGGS	kg/kg-day FW	0	0.00133	0	0.000216
Exposure time during sweat lodge use	hr/event	0	0	0	0
Event frequency of dermal contact with water and soil	events/day	1	1	1	1
The number of sweat lodge use	events/day	0	0	0	1
Fraction contaminated ABOVEGRD PRODUCE	--	1	1	1	1
Fraction of contaminated DRINKING WATER	--	1	1	1	1
Fraction contaminated SOIL	--	1	1	1	1

Parameter	**Unit**	**Resident Child**	**Farmer Child**	**Fisher Child**	**Native Child**
Consumption rate of FISH	kg/kg-day FW	0	0	0.00088	0.00598
Fraction of contaminated FISH	--	1	1	1	1
Consumption rate of GOAT	kg/kg-day FW	0	0.0013	0	0
Inhalation exposure duration	yr	6	6	6	6
Inhalation exposure frequency	day/yr	350	350	350	365
Inhalation exposure time	hr/day	24	24	24	24
Fraction of contaminated BEEF (WILD GAME for Natives)	--	1	1	1	1
Fraction of contaminated POULTRY (FOWL for Natives)	--	1	1	1	1
Fraction of contaminated EGGS	--	1	1	1	1
Fraction of contaminated GOAT	--	1	1	1	1
Fraction of contaminated MILK	--	1	1	1	1
Fraction of contaminated PORK	--	1	1	1	1
Inhalation rate	m^3/hr	0.5	0.5	0.5	0.5
Consumption rate of MILK	kg/kg-day FW	0	0.0073	0	0.0073
Consumption rate of PORK	kg/kg-day FW	0	0	0	0
Skin surface area available for contact with soil	cm^2	2800	2800	2800	2800
Skin surface area available for contact with water	cm^2	6600	6600	6600	6600
Body surface area available for contact during a sweat	m^2	0	0	0	0
Time period at the beginning of combustion	yr	0	0	0	0
Length of exposure duration	yr	6	6	6	6

K Appendix K – COPC Fate, Transport, and Toxicity Data

Table K-1: COPC Parameter Set 1

CAS_NUMBER	COPC_NAME	MW (g/mol)	T_m (°K)	V_p (atm)	S (mg/L)	H (atm-m3/mol)	D_a (cm2/sec)	Dw (cm2/sec)
00-01-2	Aluminum compounds	2.700E+01	6.600E+02	0.000E+00	9.500E+04	0.000E+00	0.000E+00	0.000E+00
00-01-3	Antimony compounds	1.250E+02	9.030E+02	9.000E-01	2.300E+04	2.500E-02	7.720E-02	9.570E-06
00-01-4	Arsenic compounds	7.800E+01	1.090E+03	3.300E-12	3.470E+04	7.700E-01	7.720E-02	9.570E-06
00-01-5	Barium compounds	1.390E+02	1.000E+03	5.580E-12	5.480E+04	0.000E+00	7.720E-02	9.570E-06
00-01-6	Beryllium compounds	9.010E+00	1.570E+03	5.580E-12	1.490E+05	1.500E-02	7.720E-02	9.570E-06
00-01-7	Cadmium compounds	1.120E+02	5.930E+02	5.450E-12	1.230E+05	3.100E-02	7.720E-02	9.570E-06
00-01-8	Chromium compounds	5.200E+01	2.170E+03	5.580E-12	8.670E+04	0.000E+00	1.270E-01	1.410E-05
00-01-9	Copper compounds	6.400E+01	1.100E+03	0.000E+00	5.700E+02	0.000E+00	7.720E-02	9.570E-06
00-02-0	Lead compounds	2.090E+02	6.030E+02	3.970E-12	9.580E+03	2.500E-02	7.720E-02	9.570E-06
00-02-2	Manganese compounds	5.500E+01	1.200E+03	0.000E+00	1.100E+03	0.000E+00	0.000E+00	0.000E+00
00-02-3	Mercury compounds	2.010E+02	2.340E+02	2.630E-06	6.000E-02	7.100E-03	1.090E-02	3.010E-05
00-02-4	Nickel compounds	5.870E+01	1.770E+03	5.580E-12	4.220E+05	2.500E-02	7.720E-02	9.570E-06
00-02-5	Selenium compounds	7.900E+01	4.930E+02	1.870E-13	2.060E+03	9.700E-03	7.720E-02	9.570E-06
00-02-6	Silver compounds	1.080E+02	1.230E+03	5.580E-12	7.050E+04	0.000E+00	7.720E-02	9.570E-06
00-02-7	Thallium compounds	2.050E+02	5.730E+02	5.580E-12	2.650E+04	0.000E+00	7.720E-02	9.570E-06
00-02-8	Vanadium compounds	5.100E+01	1.900E+03	0.000E+00	7.000E+02	0.000E+00	0.000E+00	0.000E+00
00-02-9	Zinc compounds	6.540E+01	6.930E+02	5.090E-12	3.440E+05	2.500E-02	7.720E-02	9.570E-06
00-07-2	PCB Mixture (non-dioxin like, 5+ chlorines)	3.260E+02	2.830E+02	1.010E-07	4.300E-02	2.830E-04	1.000E-03	1.000E-05
00-15-3	Cobalt compounds	5.900E+01	1.500E+03	0.000E+00	1.700E+03	0.000E+00	0.000E+00	0.000E+00
00-15-5	m,p-Xylene	0.000E+00	0.000E+00	0.000E+00	1.600E+02	0.000E+00	0.000E+00	0.000E+00
00-16-3	Composite TOE - Volatile	7.771E+01	1.591E+02	5.400E-01	9.428E+02	4.500E-02	1.043E-01	1.208E-05
00-16-4	Composirte TOE - Semivolatile	1.471E+02	2.701E+02	1.520E-04	1.237E+02	1.810E-04	6.820E-02	7.896E-06
00-16-5	Composirte TOE - Nonvolatile	2.720E+02	3.770E+02	4.940E-10	1.818E-03	7.391E-05	4.526E-02	5.240E-06
00-16-6	Boron compounds	1.100E+01	2.100E+03	1.560E-05	3.600E+04	0.000E+00	0.000E+00	0.000E+00
00-16-9	Tin compounds	1.190E+02	5.050E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
56-23-5	Carbon tetrachloride	1.540E+02	2.500E+02	1.580E-01	7.900E+02	3.000E-02	7.800E-02	8.800E-06
65-85-0	Benzoic acid	1.220E+02	3.960E+02	9.210E-07	3.400E+03	2.870E-06	1.000E-03	7.970E-06
67-64-1	Acetone	5.810E+01	1.780E+02	3.030E-01	1.000E+06	3.900E-05	1.240E-01	1.140E-05
67-66-3	Chloroform	1.190E+02	2.090E+02	2.630E-01	7.900E+03	3.700E-03	1.040E-01	1.000E-05

CAS_NUMBER	COPC_NAME	MW (g/mol)	T_m (°K)	V_p (atm)	S (mg/L)	H (atm-m3/mol)	D_a (cm2/sec)	Dw (cm2/sec)
71-43-2	Benzene	7.810E+01	2.790E+02	1.250E-01	1.800E+03	5.600E-03	8.800E-02	1.020E-05
74-83-9	Methyl bromide	9.490E+01	1.790E+02	2.130E+00	1.520E+04	6.240E-03	7.280E-02	1.210E-05
74-87-3	Methyl chloride	5.050E+01	1.750E+02	5.660E+00	5.330E+03	8.820E-03	1.260E-01	6.500E-06
74-88-4	Methyl iodide	1.420E+02	2.070E+02	5.320E-01	1.380E+04	5.260E-03	6.981E-02	8.083E-06
74-96-4	Bromoethane	1.090E+02	1.542E+02	6.100E-01	8.940E+03	7.490E-03	8.328E-02	9.643E-06
74-97-5	Bromochloromethane	1.294E+02	1.853E+02	1.875E-01	1.670E+04	1.460E-03	7.427E-02	8.600E-06
75-00-3	Ethyl chloride	6.450E+01	1.330E+02	1.320E+00	5.700E+03	8.800E-03	2.710E-01	1.150E-05
75-01-4	Vinyl chloride	6.250E+01	1.230E+02	3.950E+00	8.800E+03	2.700E-02	1.060E-01	1.230E-05
75-09-2	Dichloromethane	8.490E+01	1.780E+02	5.660E-01	1.300E+04	2.200E-03	1.010E-01	1.170E-05
75-15-0	Carbon disulfide	7.610E+01	1.530E+02	4.740E-01	1.200E+03	3.000E-02	1.040E-01	1.000E-05
75-25-2	Tribromomethane	2.530E+02	2.810E+02	7.250E-03	3.100E+03	6.500E+00	1.490E-02	1.030E-05
75-27-4	Bromodichloromethane	1.690E+02	2.160E+02	6.580E-02	6.700E+03	1.600E-03	1.000E-03	1.000E-05
75-35-4	1,1-Dichloroethylene	9.900E+01	1.530E+02	7.890E-01	2.300E+03	2.600E-02	9.000E-02	1.040E-05
75-69-4	Trichlorofluoromethane	1.370E+02	1.630E+02	1.050E+00	1.100E+03	9.700E-02	8.700E-02	9.700E-06
75-71-8	Dichlorodifluoromethane	1.210E+02	1.150E+02	6.380E+00	2.800E+02	3.430E-01	1.000E-03	1.000E-05
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	1.874E+02	2.368E+02	4.360E-01	1.700E+02	4.809E-01	7.800E-02	8.200E-06
78-93-3	Methyl ethyl ketone	7.210E+01	1.860E+02	1.250E-01	2.200E+05	5.600E-05	8.080E-02	9.800E-06
79-01-6	Trichloroethylene	1.310E+02	1.880E+02	9.610E-02	1.500E+03	1.000E-02	7.900E-02	9.100E-06
84-66-2	Diethyl phthalate	2.220E+02	2.320E+02	2.110E-06	1.100E+03	4.500E-07	1.000E-03	1.000E-05
84-74-2	Dibutyl phthalate	2.780E+02	2.380E+02	9.610E-08	1.100E+01	1.800E-06	4.380E-02	7.860E-06
91-20-3	Naphthalene	1.280E+02	3.530E+02	1.120E-04	3.100E+01	4.800E-04	5.900E-02	7.500E-06
91-57-6	2-Methylnaphthalene	1.400E+02	3.080E+02	8.940E-05	2.500E+01	5.180E-04	7.047E-02	8.160E-06
95-47-6	2-Xylene	1.060E+02	2.480E+02	8.680E-03	1.800E+02	5.200E-03	8.700E-02	1.000E-05
95-48-7	o-Cresol	1.090E+02	3.040E+02	3.930E-04	2.600E+04	1.200E-06	7.400E-02	8.300E-06
95-50-1	1,2-Dichlorobenzene	1.470E+02	2.560E+02	1.790E-03	1.560E+02	1.900E-03	6.900E-02	7.900E-06
100-41-4	Ethylbenzene	1.060E+02	1.780E+02	1.260E-02	1.700E+02	7.900E-03	7.500E-02	7.800E-06
100-42-5	Styrene	1.040E+02	2.420E+02	8.030E-03	3.100E+02	2.700E-03	7.100E-02	8.000E-06
100-51-6	Benzyl alcohol	1.080E+02	2.580E+02	8.240E-05	4.000E+04	3.370E-07	1.000E-03	1.000E-05
100-52-7	Benzaldehyde	1.060E+02	2.470E+02	1.670E-03	3.000E+03	2.670E-05	1.000E-03	1.000E-05
106-46-7	1,4-Dichlorobenzene	1.470E+02	3.260E+02	1.320E-03	7.900E+01	2.400E-03	6.900E-02	7.900E-06
107-44-8	GB	1.400E+02	2.170E+02	2.760E-03	1.000E+06	5.400E-07	7.047E-02	8.160E-06
108-05-4	Vinyl acetate	8.610E+01	1.802E+02	1.180E-01	2.000E+04	5.100E-04	8.500E-02	9.200E-06
108-10-1	Methyl isobutyl ketone	1.000E+02	1.890E+02	2.630E-02	1.900E+04	1.400E-04	7.500E-02	7.800E-06

CAS_NUMBER	COPC_NAME	MW (g/mol)	T_m (°K)	V_p (atm)	S (mg/L)	H (atm-m3/mol)	D_a (cm2/sec)	Dw (cm2/sec)
108-88-3	Toluene	9.210E+01	1.780E+02	3.680E-02	5.300E+02	6.600E-03	8.700E-02	8.600E-06
108-90-7	Chlorobenzene	1.130E+02	2.280E+02	1.580E-02	4.700E+02	3.700E-03	7.300E-02	8.700E-06
110-54-3	n-Hexane	8.620E+01	1.780E+02	1.990E-01	9.500E+00	1.800E+00	9.737E-02	1.127E-05
117-81-7	Bis(2-ethylhexyl)phthalate	3.910E+02	2.180E+02	8.950E-11	3.400E-01	1.000E-07	3.510E-02	3.660E-06
118-96-7	2,4,6-Trinitrotoluene	2.270E+02	3.530E+02	2.660E-09	1.240E+02	4.870E-09	1.000E-03	1.000E-05
121-14-2	2,4-Dinitrotoluene	1.820E+02	3.420E+02	1.930E-07	2.700E+02	9.260E-08	2.030E-01	7.060E-06
124-48-1	Chlorodibromomethane	2.080E+02	2.510E+02	6.450E-03	2.600E+03	7.830E-04	1.000E-03	1.000E-05
131-11-3	Dimethylphthalate	1.940E+02	2.740E+02	2.170E-06	4.000E+03	1.050E-07	5.680E-02	6.290E-06
505-60-2	Sulfur mustard (or H/HD)	1.590E+02	2.870E+02	1.450E-04	9.200E+02	2.100E-05	6.474E-02	7.496E-06
1330-20-7	Xylene (mixed)	1.100E+02	0.000E+00	1.050E-02	1.100E+02	6.630E-03	8.276E-02	9.583E-06
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	3.220E+02	5.790E+02	1.970E-12	1.930E-05	3.290E-05	1.040E-01	5.600E-06
3268-87-9	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	4.610E+02	5.990E+02	1.090E-15	7.400E-08	6.750E-06	8.690E-02	8.000E-06
7439-97-6	Mercury	2.010E+02	2.340E+02	2.630E-06	6.000E-02	7.100E-03	1.090E-02	3.010E-05
7446-09-5	Sulfur dioxide	6.410E+01	2.010E+02	3.940E+00	1.070E+05	8.100E-04	1.186E-01	1.374E-05
7487-94-7	Mercuric chloride	2.715E+02	5.501E+02	1.200E-04	6.900E+04	7.100E-10	4.530E-02	5.250E-06
7647-01-0	Hydrochloric acid	3.650E+01	1.590E+02	4.660E+01	7.200E+05	2.360E-03	1.000E-03	1.000E-05
7664-38-2	Phosphoric acid	9.800E+01	3.160E+02	2.710E-14	5.390E+05	7.600E-15	8.939E-02	1.035E-05
7664-39-3	Hydrofluoric acid	2.000E+01	0.000E+00	1.210E+00	9.220E+02	5.760E-04	3.880E-01	3.300E-05
7782-50-5	Chlorine	7.090E+01	1.720E+02	7.700E+00	6.300E+03	1.170E-02	1.000E-03	1.000E-05
10061-01-5	cis-1,3-Dichloropropene	1.110E+02	2.230E+02	3.460E-02	2.180E+03	2.710E-03	6.260E-02	1.000E-05
10061-02-6	trans-1,3-Dichloropropene	1.110E+02	0.000E+00	4.470E-02	2.800E+03	8.710E-04	8.226E-02	9.525E-06
10102-44-0	Nitrogen dioxide	4.600E+01	2.640E+02	1.190E+00	1.710E+05	2.450E-02	1.480E-01	1.714E-05
22967-92-6	Methyl mercury	2.160E+02	0.000E+00	0.000E+00	0.000E+00	4.700E-07	5.280E-02	6.110E-06
31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	3.270E+02	0.000E+00	1.180E-08	1.340E-02	2.880E-04	4.003E-02	4.635E-06
32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	2.920E+02	0.000E+00	2.150E-08	5.690E-04	1.103E-02	4.317E-02	4.998E-06
32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	3.260E+02	0.000E+00	8.570E-09	3.400E-03	8.250E-04	4.011E-02	4.645E-06
38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	3.610E+02	0.000E+00	2.110E-09	5.330E-03	1.430E-04	3.748E-02	4.339E-06
39001-02-0	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	4.450E+02	5.320E+02	4.930E-15	1.160E-06	1.880E-06	1.950E-02	8.000E-06
39635-31-9	2,3,4,5,3',4',5'-Heptachlorobiphenyl	3.950E+02	0.000E+00	1.710E-10	7.530E-04	5.070E-05	3.529E-02	4.087E-06
50782-69-9	VX	2.670E+02	2.340E+02	9.210E-07	3.000E+04	3.500E-09	4.582E-02	5.306E-06
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	3.060E+02	5.010E+02	1.970E-11	4.190E-04	1.440E-05	2.350E-02	6.010E-06
52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	3.610E+02	0.000E+00	7.630E-10	2.230E-03	6.850E-05	3.748E-02	4.339E-06
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	4.090E+02	4.950E+02	4.040E-13	1.400E-06	1.400E-05	2.030E-02	8.000E-06

CAS_NUMBER	COPC_NAME	MW (g/mol)	T_m (°K)	V_p (atm)	S (mg/L)	H (atm-m3/mol)	D_a (cm2/sec)	Dw (cm2/sec)
57465-28-8	3,4,5,3',4'-Pentachlorobiphenyl	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.090E+02	5.100E+02	4.610E-14	1.350E-06	1.410E-05	2.030E-02	8.000E-06
69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
70362-50-4	3,4,4',5-Tetrachlorobiphenyl	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
73207-98-4	EA 2192	2.393E+02	0.000E+00	6.763E-09	1.400E+04	4.380E-12	4.929E-02	5.707E-06
74472-37-0	2,3,4,4'5-Pentachlorobiphenyl	3.260E+02	3.710E+02	7.180E-09	1.600E-02	9.240E-05	4.011E-02	4.645E-06

Table K-2: COPC Parameter Set 2

CAS_NUMBER	COPC_NAME	K_ow (unitless)	K_oc (mL/g)	Kd_s (cm3/g)	Kd_sw (L/kg)	Kd_bs (cm3/g)	K_sg (per year)	f_v (unitless)
00-01-2	Aluminum compounds	0.000E+00	0.000E+00	9.900E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
00-01-3	Antimony compounds	5.370E+00	0.000E+00	4.500E+01	4.500E+01	4.500E+01	0.000E+00	0.000E+00
00-01-4	Arsenic compounds	4.786E+00	0.000E+00	2.900E+01	2.900E+01	2.900E+01	0.000E+00	0.000E+00
00-01-5	Barium compounds	1.698E+00	0.000E+00	4.100E+01	4.100E+01	4.100E+01	0.000E+00	0.000E+00
00-01-6	Beryllium compounds	2.692E-01	0.000E+00	7.900E+02	7.900E+02	7.900E+02	0.000E+00	0.000E+00
00-01-7	Cadmium compounds	8.511E-01	0.000E+00	7.500E+01	7.500E+01	7.500E+01	0.000E+00	0.000E+00
00-01-8	Chromium compounds	1.698E+00	0.000E+00	1.900E+01	1.900E+01	1.900E+01	0.000E+00	9.000E-03
00-01-9	Copper compounds	2.692E-01	0.000E+00	4.300E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
00-02-0	Lead compounds	5.370E+00	0.000E+00	9.000E+02	9.000E+02	9.000E+02	0.000E+00	0.000E+00
00-02-2	Manganese compounds	1.698E+00	0.000E+00	6.500E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
00-02-3	Mercury compounds	4.169E+00	0.000E+00	1.000E+03	1.000E+03	3.000E+03	0.000E+00	8.500E-01
00-02-4	Nickel compounds	2.692E-01	0.000E+00	6.500E+01	6.500E+01	6.500E+01	0.000E+00	0.000E+00
00-02-5	Selenium compounds	1.738E+00	0.000E+00	5.000E+00	5.000E+00	5.000E+00	0.000E+00	0.000E+00
00-02-6	Silver compounds	1.698E+00	0.000E+00	8.300E+00	8.300E+00	8.300E+00	0.000E+00	0.000E+00
00-02-7	Thallium compounds	1.698E+00	0.000E+00	7.100E+01	7.100E+01	7.100E+01	0.000E+00	0.000E+00
00-02-8	Vanadium compounds	0.000E+00	0.000E+00	1.000E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
00-02-9	Zinc compounds	3.388E-01	0.000E+00	6.200E+01	6.200E+01	6.200E+01	0.000E+00	0.000E+00
00-07-2	PCB Mixture (non-dioxin like, 5+ chlorines)	3.162E+06	2.450E+06	2.450E+04	1.840E+05	9.810E+04	3.000E-02	9.920E-01
00-15-3	Cobalt compounds	1.698E+00	0.000E+00	4.500E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
00-15-5	m,p-Xylene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
00-16-3	Composite TOE - Volatile	1.338E+02	9.926E+02	9.926E+00	7.444E+01	3.970E+01	5.250E+00	1.000E+00
00-16-4	Composirte TOE - Semivolatile	1.201E+03	1.065E+03	1.065E+01	7.987E+01	4.260E+01	7.071E+00	1.000E+00
00-16-5	Composirte TOE - Nonvolatile	1.471E+07	1.112E+07	1.112E+05	8.337E+05	4.447E+05	3.777E-01	8.340E-01
00-16-6	Boron compounds	0.000E+00	0.000E+00	3.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00
00-16-9	Tin compounds	0.000E+00	0.000E+00	2.500E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
56-23-5	Carbon tetrachloride	6.310E+02	1.520E+02	3.500E-01	1.140E+01	6.080E+00	7.000E-01	1.000E+00
65-85-0	Benzoic acid	7.413E+01	6.000E-01	6.000E-03	5.000E-02	2.400E-02	0.000E+00	1.000E+00
67-64-1	Acetone	5.754E-01	5.800E-01	8.700E-02	4.000E-02	2.000E-02	3.610E+01	1.000E+00
67-66-3	Chloroform	1.000E+02	5.250E+01	8.000E-02	3.940E+00	2.100E+00	1.410E+00	1.000E+00
71-43-2	Benzene	1.259E+02	6.170E+01	1.200E-01	4.630E+00	2.470E+00	1.580E+01	1.000E+00
74-83-9	Methyl bromide	1.549E+01	9.000E+00	9.000E-02	6.750E-01	3.600E-01	9.030E+00	1.000E+00
74-87-3	Methyl chloride	8.128E+00	6.300E+00	6.000E-02	4.700E-01	2.500E-01	9.030E+00	1.000E+00

CAS_NUMBER	COPC_NAME	K_ow (unitless)	K_oc (mL/g)	Kd_s (cm3/g)	Kd_sw (L/kg)	Kd_bs (cm3/g)	K_sg (per year)	f_v (unitless)
74-88-4	Methyl iodide	3.236E+01	1.880E+01	1.880E-01	1.410E+00	7.520E-01	9.035E+00	1.000E+00
74-96-4	Bromoethane	4.074E+01	2.256E+01	2.256E-01	1.692E+00	9.024E-01	7.226E+00	1.000E+00
74-97-5	Bromochloromethane	2.570E+01	1.567E+01	1.567E-01	1.175E+00	6.267E-01	0.000E+00	1.000E+00
75-00-3	Ethyl chloride	2.512E+01	1.540E+01	3.200E-02	1.150E+00	6.200E-01	9.030E+00	1.000E+00
75-01-4	Vinyl chloride	2.512E+01	1.540E+01	3.700E-02	1.150E+00	6.200E-01	1.410E+00	1.000E+00
75-09-2	Dichloromethane	1.995E+01	1.000E+01	2.400E-02	7.500E-01	4.000E-01	9.030E+00	1.000E+00
75-15-0	Carbon disulfide	1.585E+02	6.620E+01	9.100E-02	4.960E+00	2.650E+00	0.000E+00	1.000E+00
75-25-2	Tribromomethane	2.344E+02	1.260E+02	1.260E+00	9.450E+00	5.040E+00	1.410E+00	1.000E+00
75-27-4	Bromodichloromethane	1.259E+02	5.510E+01	1.100E-01	4.130E+00	2.210E+00	0.000E+00	1.000E+00
75-35-4	1,1-Dichloroethylene	1.259E+02	6.500E+01	1.200E-01	4.880E+00	2.600E+00	1.410E+00	1.000E+00
75-69-4	Trichlorofluoromethane	3.162E+02	1.140E+02	2.400E-01	8.570E+00	4.570E+00	7.000E-01	1.000E+00
75-71-8	Dichlorodifluoromethane	1.445E+02	6.150E+01	6.200E-01	4.610E+00	2.460E+00	1.410E+00	1.000E+00
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	1.445E+03	3.809E+02	3.809E+00	2.857E+01	1.524E+01	0.000E+00	1.000E+00
78-93-3	Methyl ethyl ketone	1.950E+00	1.930E+00	2.900E-01	1.400E-01	8.000E-02	3.610E+01	1.000E+00
79-01-6	Trichloroethylene	2.512E+02	9.430E+01	3.300E-01	7.070E+00	3.770E+00	7.000E-01	1.000E+00
84-66-2	Diethyl phthalate	3.162E+02	8.220E+01	4.400E+01	6.170E+00	3.290E+00	4.520E+00	1.000E+00
84-74-2	Dibutyl phthalate	5.012E+04	1.570E+03	5.200E+03	1.180E+02	6.280E+01	1.100E+01	9.940E-01
91-20-3	Naphthalene	1.995E+03	1.190E+03	3.000E+02	8.930E+01	4.760E+01	5.270E+00	1.000E+00
91-57-6	2-Methylnaphthalene	7.943E+03	6.823E+03	9.500E+02	5.117E+02	2.729E+02	0.000E+00	1.000E+00
95-47-6	2-Xylene	1.259E+03	2.410E+02	7.300E-01	1.810E+01	9.640E+00	9.030E+00	1.000E+00
95-48-7	o-Cresol	8.913E+01	8.260E+01	8.300E-01	6.200E+00	3.310E+00	3.610E+01	1.000E+00
95-50-1	1,2-Dichlorobenzene	2.399E+03	3.790E+02	3.790E+00	2.840E+01	1.520E+01	1.410E+00	1.000E+00
100-41-4	Ethylbenzene	1.259E+03	2.040E+02	7.300E-01	1.530E+01	8.160E+00	2.530E+01	1.000E+00
100-42-5	Styrene	1.000E+03	9.120E+02	1.200E+02	6.840E+01	3.650E+01	9.030E+00	1.000E+00
100-51-6	Benzyl alcohol	1.259E+01	1.210E+01	1.200E-01	9.000E-01	4.800E-01	0.000E+00	1.000E+00
100-52-7	Benzaldehyde	3.020E+01	2.850E+01	2.900E-01	2.140E+00	1.140E+00	0.000E+00	1.000E+00
106-46-7	1,4-Dichlorobenzene	3.162E+03	6.160E+02	1.200E+00	4.620E+01	2.460E+01	1.410E+00	1.000E+00
107-44-8	GB	1.991E+00	5.888E+01	5.888E-01	4.416E+00	2.355E+00	0.000E+00	1.000E+00
108-05-4	Vinyl acetate	5.370E+00	5.220E+00	7.900E-01	3.900E-01	2.100E-01	0.000E+00	1.000E+00
108-10-1	Methyl isobutyl ketone	1.585E+01	1.510E+01	2.200E+00	1.130E+00	6.100E-01	3.610E+01	1.000E+00
108-88-3	Toluene	5.012E+02	1.400E+02	3.600E-01	1.050E+01	5.600E+00	1.150E+01	1.000E+00
108-90-7	Chlorobenzene	6.310E+02	2.240E+02	4.400E-01	1.680E+01	8.960E+00	1.690E+00	1.000E+00
110-54-3	n-Hexane	7.943E+03	1.468E+03	1.468E+01	1.101E+02	5.873E+01	0.000E+00	1.000E+00

CAS_NUMBER	COPC_NAME	K_ow (unitless)	K_oc (mL/g)	Kd_s (cm3/g)	Kd_sw (L/kg)	Kd_bs (cm3/g)	K_sg (per year)	f_v (unitless)
117-81-7	Bis(2-ethylhexyl)phthalate	1.259E+05	1.110E+05	2.300E+06	8.330E+03	4.440E+03	1.100E+01	1.310E-01
118-96-7	2,4,6-Trinitrotoluene	3.981E+01	3.740E+01	3.700E-01	2.800E+00	1.500E+00	1.410E+00	9.400E-01
121-14-2	2,4-Dinitrotoluene	9.550E+01	8.840E+01	8.800E-01	6.630E+00	3.540E+00	1.410E+00	9.990E-01
124-48-1	Chlorodibromomethane	1.698E+02	6.990E+01	7.000E-01	5.240E+00	2.800E+00	1.410E+00	1.000E+00
131-11-3	Dimethylphthalate	3.631E+01	3.420E+01	3.400E-01	2.560E+00	1.370E+00	3.610E+01	1.000E+00
505-60-2	Sulfur mustard (or H/HD)	2.344E+01	1.318E+02	1.318E+00	9.887E+00	5.273E+00	2.333E+04	1.000E+00
1330-20-7	Xylene (mixed)	1.585E+03	1.399E+03	2.900E+02	1.049E+02	5.597E+01	9.040E+00	0.000E+00
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	6.310E+06	3.890E+06	3.890E+04	2.920E+05	1.560E+05	3.000E-02	6.640E-01
3268-87-9	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	1.585E+08	9.770E+07	9.770E+05	7.330E+06	3.910E+06	3.000E-02	2.000E-03
7439-97-6	Mercury	4.170E+00	0.000E+00	1.000E+03	1.000E+03	3.000E+03	0.000E+00	1.000E+00
7446-09-5	Sulfur dioxide	6.310E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00
7487-94-7	Mercuric chloride	6.095E-01	0.000E+00	5.800E+04	1.000E+05	5.000E+04	0.000E+00	8.500E-01
7647-01-0	Hydrochloric acid	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00
7664-38-2	Phosphoric acid	1.698E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.863E-05
7664-39-3	Hydrofluoric acid	1.698E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7782-50-5	Chlorine	7.079E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00
10061-01-5	cis-1,3-Dichloropropene	1.148E+02	1.060E+02	1.060E+00	7.949E+00	4.240E+00	1.053E+01	1.000E+00
10061-02-6	trans-1,3-Dichloropropene	1.072E+02	9.903E+01	9.903E-01	7.427E+00	3.961E+00	1.053E+01	0.000E+00
10102-44-0	Nitrogen dioxide	2.630E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00
22967-92-6	Methyl mercury	2.570E+00	0.000E+00	7.000E+03	1.000E+05	3.000E+03	0.000E+00	0.000E+00
31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	1.318E+07	9.983E+06	9.983E+04	7.487E+05	3.993E+05	2.770E-02	0.000E+00
32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	4.266E+06	3.293E+06	3.293E+04	2.470E+05	1.317E+05	2.770E-02	0.000E+00
32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	6.166E+06	4.730E+06	4.730E+04	3.547E+05	1.892E+05	2.770E-02	0.000E+00
38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	3.981E+07	2.959E+07	2.959E+05	2.219E+06	1.183E+06	2.770E-02	0.000E+00
39001-02-0	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	1.000E+08	6.170E+07	6.170E+05	4.620E+06	2.470E+06	3.000E-02	2.000E-03
39635-31-9	2,3,4,5,3',4',5'-Heptachlorobiphenyl	1.862E+08	1.348E+08	1.348E+06	1.011E+07	5.392E+06	2.770E-02	0.000E+00
50782-69-9	VX	1.230E+02	3.162E+02	3.162E+00	2.372E+01	1.265E+01	0.000E+00	9.994E-01
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	1.259E+06	7.760E+05	7.760E+03	5.820E+04	3.100E+04	3.000E-02	7.700E-01
52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	3.162E+07	2.359E+07	2.359E+05	1.769E+06	9.437E+05	2.770E-02	0.000E+00
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.512E+07	1.550E+07	1.550E+05	1.160E+06	6.200E+05	3.000E-02	5.700E-02
57465-28-8	3,4,5,3',4'-Pentachlorobiphenyl	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.770E-02	0.000E+00
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.512E+07	1.550E+07	1.550E+05	1.160E+06	6.200E+05	3.000E-02	1.000E-02
69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.770E-02	0.000E+00

CAS_NUMBER	COPC_NAME	K_ow (unitless)	K_oc (mL/g)	Kd_s (cm3/g)	Kd_sw (L/kg)	Kd_bs (cm3/g)	K_sg (per year)	f_v (unitless)
70362-50-4	3,4,4',5-Tetrachlorobiphenyl	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.770E-02	0.000E+00
73207-98-4	EA 2192	3.311E+01	6.457E+03	6.457E+01	4.842E+02	2.583E+02	0.000E+00	1.000E+00
74472-37-0	2,3,4,4'5-Pentachlorobiphenyl	9.550E+06	7.271E+06	7.271E+04	5.454E+05	2.909E+05	2.770E-02	9.845E-01

Table K-3: COPC Parameter Set 3

CAS_NUMBER	COPC_NAME	RCF ([µg/g DW plant]/[µg/ml soil water])	br_root_veg ([µg/g DW plant]/[µg/g soil])	br_leafy_veg ([µg/g DW plant]/[µg/g soil])	br_forage ([µg/g DW plant]/[µg/g soil])	bv_leafy_veg ([µg/g DW plant]/[µg/g air])	bv_forage ([µg/g DW plant]/[µg/g air])	ba_milk (day/kg FW tissue)
00-01-2	Aluminum compounds	0.000E+00	6.500E-04	6.500E-04	6.500E-04	0.000E+00	0.000E+00	2.000E-04
00-01-3	Antimony compounds	0.000E+00	3.000E-02	3.190E-02	3.190E-02	0.000E+00	0.000E+00	1.000E-04
00-01-4	Arsenic compounds	0.000E+00	8.000E-03	6.330E-03	6.330E-03	0.000E+00	0.000E+00	6.000E-05
00-01-5	Barium compounds	0.000E+00	1.500E-02	3.220E-02	3.220E-02	0.000E+00	0.000E+00	3.500E-04
00-01-6	Beryllium compounds	0.000E+00	1.500E-03	2.580E-03	2.580E-03	0.000E+00	0.000E+00	9.000E-07
00-01-7	Cadmium compounds	0.000E+00	6.400E-02	1.250E-01	1.250E-01	0.000E+00	0.000E+00	6.500E-06
00-01-8	Chromium compounds	0.000E+00	4.500E-03	4.880E-03	4.880E-03	0.000E+00	0.000E+00	1.500E-03
00-01-9	Copper compounds	0.000E+00	2.500E-01	2.500E-01	2.500E-01	0.000E+00	0.000E+00	1.500E-03
00-02-0	Lead compounds	0.000E+00	9.000E-03	1.360E-02	1.360E-02	0.000E+00	0.000E+00	2.500E-04
00-02-2	Manganese compounds	0.000E+00	5.000E-02	5.000E-02	5.000E-02	0.000E+00	0.000E+00	3.500E-04
00-02-3	Mercury compounds	0.000E+00	2.000E-01	2.000E-01	2.000E-01	0.000E+00	0.000E+00	4.500E-04
00-02-4	Nickel compounds	0.000E+00	8.000E-03	9.310E-03	9.310E-03	0.000E+00	0.000E+00	1.000E-03
00-02-5	Selenium compounds	0.000E+00	2.200E-02	1.950E-02	1.950E-02	0.000E+00	0.000E+00	5.860E-03
00-02-6	Silver compounds	0.000E+00	1.000E-01	1.380E-01	1.380E-01	0.000E+00	0.000E+00	2.000E-02
00-02-7	Thallium compounds	0.000E+00	4.000E-04	8.580E-04	8.580E-04	0.000E+00	0.000E+00	2.000E-03
00-02-8	Vanadium compounds	0.000E+00	3.000E-03	3.000E-03	3.000E-03	0.000E+00	0.000E+00	2.000E-05
00-02-9	Zinc compounds	0.000E+00	9.000E-01	9.700E-02	9.700E-02	0.000E+00	0.000E+00	3.250E-05
00-07-2	PCB Mixture (non-dioxin like, 5+ chlorines)	2.350E+04	9.580E-01	6.780E-03	6.780E-03	1.650E+03	1.650E+03	6.500E-03
00-15-3	Cobalt compounds	0.000E+00	7.000E-03	7.000E-03	7.000E-03	0.000E+00	0.000E+00	2.000E-03
00-15-5	m,p-Xylene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00
00-16-3	Composite TOE - Volatile	1.310E+00	1.320E-01	2.285E+00	2.285E+00	2.285E-04	2.285E-04	7.408E-04
00-16-4	Composite TOE - Semivolatile	7.098E+00	6.665E-01	6.428E-01	6.428E-01	5.879E-01	5.879E-01	2.502E-03
00-16-5	Composite TOE - Nonvolatile	9.977E+03	8.975E-02	2.787E-03	2.787E-03	3.252E+04	3.252E+04	4.220E-03
00-16-6	Boron compounds	0.000E+00	2.000E+00	2.000E+00	2.000E+00	0.000E+00	0.000E+00	1.500E-03
00-16-9	Tin compounds	0.000E+00	6.000E-03	6.000E-03	6.000E-03	0.000E+00	0.000E+00	1.000E-03
56-23-5	Carbon tetrachloride	3.330E+01	9.510E+01	9.320E-01	9.320E-01	1.790E-03	1.790E-03	1.830E-03
65-85-0	Benzoic acid	1.270E+01	2.120E+03	3.210E+00	3.210E+00	1.910E+00	1.910E+00	1.190E-05
67-64-1	Acetone	6.460E+00	7.420E+01	8.380E+00	8.380E+00	7.960E-04	7.960E-04	6.020E-06
67-66-3	Chloroform	8.050E+00	1.010E+02	2.700E+00	2.700E+00	2.040E-03	2.040E-03	6.110E-04
71-43-2	Benzene	9.620E+00	8.010E+01	2.370E+00	2.370E+00	1.720E-03	1.720E-03	7.120E-04
74-83-9	Methyl bromide	8.220E+00	9.140E+01	7.950E+00	7.950E+00	1.660E-04	1.660E-04	1.500E-04

CAS_NUMBER	COPC_NAME	RCF ([µg/g DW plant]/[µg/ml soil water])	br_root_veg ([µg/g DW plant]/[µg/g soil])	br_leafy_veg ([µg/g DW plant]/[µg/g soil])	br_forage ([µg/g DW plant]/[µg/g soil])	bv_leafy_veg ([µg/g DW plant]/[µg/g air])	bv_forage ([µg/g DW plant]/[µg/g air])	ba_milk (day/kg FW tissue)
74-87-3	Methyl chloride	7.470E+00	1.190E+02	8.380E+00	8.380E+00	5.900E-05	5.900E-05	8.590E-05
74-88-4	Methyl iodide	2.902E+00	1.544E+01	5.191E+00	5.191E+00	4.311E-04	4.311E-04	2.704E-04
74-96-4	Bromoethane	3.465E+00	1.536E+01	4.544E+00	4.544E+00	3.869E-04	3.869E-04	3.222E-04
74-97-5	Bromochloromethane	2.431E+00	1.551E+01	5.930E+00	5.930E+00	1.215E-03	1.215E-03	2.259E-04
75-00-3	Ethyl chloride	9.090E+00	2.840E+02	6.010E+00	6.010E+00	1.970E-04	1.970E-04	2.220E-04
75-01-4	Vinyl chloride	9.090E+00	2.460E+02	6.010E+00	6.010E+00	6.410E-05	6.410E-05	2.220E-04
75-09-2	Dichloromethane	8.640E+00	3.590E+02	6.860E+00	6.860E+00	6.160E-04	6.160E-04	1.840E-04
75-15-0	Carbon disulfide	1.150E+01	1.260E+02	2.070E+00	2.070E+00	4.100E-04	4.100E-04	8.260E-04
75-25-2	Tribromomethane	1.550E+01	1.230E+01	1.650E+00	1.650E+00	2.870E-06	2.870E-06	1.050E-03
75-27-4	Bromodichloromethane	9.620E+00	8.740E+01	2.370E+00	2.370E+00	6.020E-03	6.020E-03	7.120E-04
75-35-4	1,1-Dichloroethylene	9.620E+00	8.010E+01	2.370E+00	2.370E+00	3.710E-04	3.710E-04	7.120E-04
75-69-4	Trichlorofluoromethane	1.950E+01	8.140E+01	1.390E+00	1.390E+00	2.650E-04	2.650E-04	1.250E-03
75-71-8	Dichlorodifluoromethane	1.070E+01	1.740E+01	2.190E+00	2.190E+00	3.250E-05	3.250E-05	7.790E-04
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	8.188E+00	2.150E+00	5.775E-01	5.775E-01	2.696E-04	2.696E-04	2.721E-03
78-93-3	Methyl ethyl ketone	6.700E+00	2.310E+01	8.380E+00	8.380E+00	2.030E-03	2.030E-03	2.210E-05
79-01-6	Trichloroethylene	1.640E+01	4.960E+01	1.590E+00	1.590E+00	2.010E-03	2.010E-03	1.100E-03
84-66-2	Diethyl phthalate	1.950E+01	4.440E-01	1.390E+00	1.390E+00	5.710E+01	5.710E+01	1.250E-03
84-74-2	Dibutyl phthalate	9.660E+02	1.860E-01	7.400E-02	7.400E-02	3.150E+03	3.150E+03	7.660E-03
91-20-3	Naphthalene	8.070E+01	2.690E-01	4.790E-01	4.790E-01	3.810E-01	3.810E-01	3.130E-03
91-57-6	2-Methylnaphthalene	3.041E+01	3.201E-02	2.157E-01	2.157E-01	1.537E+00	1.537E+00	5.120E-03
95-47-6	2-Xylene	5.660E+01	7.760E+01	6.250E-01	6.250E-01	2.150E-02	2.150E-02	2.560E-03
95-48-7	o-Cresol	1.370E+01	1.660E+01	2.890E+00	2.890E+00	5.560E+00	5.560E+00	5.640E-04
95-50-1	1,2-Dichlorobenzene	9.300E+01	2.450E+01	4.310E-01	4.310E-01	1.170E-01	1.170E-01	3.370E-03
100-41-4	Ethylbenzene	5.660E+01	7.760E+01	6.250E-01	6.250E-01	1.420E-02	1.420E-02	2.560E-03
100-42-5	Styrene	4.740E+01	3.950E-01	7.140E-01	7.140E-01	3.240E-02	3.240E-02	2.300E-03
100-51-6	Benzyl alcohol	7.940E+00	6.580E+01	8.380E+00	8.380E+00	2.460E+00	2.460E+00	1.260E-04
100-52-7	Benzaldehyde	9.510E+00	3.340E+01	5.400E+00	5.400E+00	7.890E-02	7.890E-02	2.560E-04
106-46-7	1,4-Dichlorobenzene	1.150E+02	9.590E+01	3.670E-01	3.670E-01	1.240E-01	1.240E-01	3.750E-03
107-44-8	GB	3.390E-01	5.757E-01	2.601E+01	2.601E+01	2.155E-01	2.155E-01	2.255E-05
108-05-4	Vinyl acetate	7.160E+00	9.060E+00	8.380E+00	8.380E+00	6.570E-04	6.570E-04	5.894E-05
108-10-1	Methyl isobutyl ketone	8.260E+00	3.750E+00	7.840E+00	7.840E+00	7.570E-03	7.570E-03	1.530E-04
108-88-3	Toluene	2.790E+01	7.740E+01	1.070E+00	1.070E+00	6.360E-03	6.360E-03	1.620E-03

CAS_NUMBER	COPC_NAME	RCF ([µg/g DW plant]/[µg/ml soil water])	br_root_veg ([µg/g DW plant]/[µg/g soil])	br_leafy_veg ([µg/g DW plant]/[µg/g soil])	br_forage ([µg/g DW plant]/[µg/g soil])	bv_leafy_veg ([µg/g DW plant]/[µg/g air])	bv_forage ([µg/g DW plant]/[µg/g air])	ba_milk (day/kg FW tissue)
108-90-7	Chlorobenzene	3.330E+01	7.560E+01	9.320E-01	9.320E-01	1.450E-02	1.450E-02	1.830E-03
110-54-3	n-Hexane	3.041E+01	2.071E+00	2.157E-01	2.157E-01	4.423E-04	4.423E-04	5.120E-03
117-81-7	Bis(2-ethylhexyl)phthalate	1.960E+03	8.540E-04	4.370E-02	4.370E-02	1.510E+05	1.510E+05	8.400E-03
118-96-7	2,4,6-Trinitrotoluene	1.030E+01	2.740E+01	4.600E+00	4.600E+00	5.810E+02	5.810E+02	3.170E-04
121-14-2	2,4-Dinitrotoluene	1.410E+01	1.590E+01	2.780E+00	2.780E+00	7.750E+01	7.750E+01	5.920E-04
124-48-1	Chlorodibromomethane	1.210E+01	1.730E+01	1.990E+00	1.990E+00	1.690E-02	1.690E-02	8.630E-04
131-11-3	Dimethylphthalate	1.000E+01	2.930E+01	4.860E+00	4.860E+00	2.440E+01	2.440E+01	2.950E-04
505-60-2	Sulfur mustard (or H/HD)	2.264E+00	1.718E+00	6.254E+00	6.254E+00	7.661E-02	7.661E-02	2.100E-04
1330-20-7	Xylene (mixed)	8.790E+00	3.031E-02	5.475E-01	5.475E-01	2.157E-02	2.157E-02	2.833E-03
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	4.000E+04	1.030E+00	4.550E-03	4.550E-03	6.550E+04	6.550E+04	5.500E-03
3268-87-9	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	4.790E+05	4.900E-01	7.050E-04	7.050E-04	2.360E+06	2.360E+06	1.440E-03
7439-97-6	Mercury	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.500E-04
7446-09-5	Sulfur dioxide	4.036E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00
7487-94-7	Mercuric chloride	0.000E+00	3.600E-02	1.450E-02	0.000E+00	1.800E+03	1.800E+03	2.262E-03
7647-01-0	Hydrochloric acid	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.100E-05
7664-38-2	Phosphoric acid	5.094E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00
7664-39-3	Hydrofluoric acid	3.000E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00
7782-50-5	Chlorine	7.360E+00	7.000E+01	8.380E+00	8.380E+00	0.000E+00	0.000E+00	7.590E-05
10061-01-5	cis-1,3-Dichloropropene	1.165E+00	1.099E+00	2.496E+00	2.496E+00	3.224E-03	3.224E-03	6.701E-04
10061-02-6	trans-1,3-Dichloropropene	1.104E+00	1.115E+00	2.598E+00	2.598E+00	9.319E-03	9.319E-03	6.400E-04
10102-44-0	Nitrogen dioxide	7.135E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00
22967-92-6	Methyl mercury	0.000E+00	9.900E-02	2.940E-02	0.000E+00	0.000E+00	0.000E+00	3.380E-04
31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	9.171E+03	9.187E-02	2.969E-03	2.969E-03	7.429E+03	7.429E+03	4.382E-03
32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	3.847E+03	1.168E-01	5.700E-03	5.700E-03	5.830E+01	5.830E+01	6.087E-03
32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	5.109E+03	1.080E-01	4.607E-03	4.607E-03	1.154E+03	1.154E+03	5.534E-03
38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	2.148E+04	7.260E-02	1.567E-03	1.567E-03	4.854E+04	4.854E+04	2.856E-03
39001-02-0	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	4.790E+05	7.760E-01	9.200E-04	9.200E-04	2.280E+06	2.280E+06	1.850E-03
39635-31-9	2,3,4,5,3',4',5'-Heptachlorobiphenyl	7.045E+04	5.226E-02	6.426E-04	6.426E-04	7.079E+05	7.079E+05	1.443E-03
50782-69-9	VX	1.228E+00	3.884E-01	2.399E+00	2.399E+00	2.687E+03	2.687E+03	7.013E-04
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	1.160E+04	1.490E+00	1.150E-02	1.150E-02	4.570E+04	4.570E+04	7.680E-03
52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	1.799E+04	7.625E-02	1.791E-03	1.791E-03	7.930E+04	7.930E+04	3.150E-03
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.160E+05	7.480E-01	2.050E-03	2.050E-03	8.300E+05	8.300E+05	3.460E-03

CAS_NUMBER	COPC_NAME	RCF ([µg/g DW plant]/[µg/ml soil water])	br_root_veg ([µg/g DW plant]/[µg/g soil])	br_leafy_veg ([µg/g DW plant]/[µg/g soil])	br_forage ([µg/g DW plant]/[µg/g soil])	bv_leafy_veg ([µg/g DW plant]/[µg/g air])	bv_forage ([µg/g DW plant]/[µg/g air])	ba_milk (day/kg FW tissue)
57465-28-8	3,4,5,3',4'-Pentachlorobiphenyl	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.160E+05	7.480E-01	2.050E-03	2.050E-03	8.300E+05	8.300E+05	3.460E-03
69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00
70362-50-4	3,4,4',5-Tetrachlorobiphenyl	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00
73207-98-4	EA 2192	2.954E+00	4.575E-02	5.122E+00	5.122E+00	5.306E+05	5.306E+05	2.753E-04
74472-37-0	2,3,4,4'5-Pentachlorobiphenyl	7.155E+03	9.840E-02	3.577E-03	3.577E-03	1.642E+04	1.642E+04	4.868E-03

Table K-4: COPC Parameter Set 4

CAS_NUMBER	COPC_NAME	ba_beef (day/kg FW tissue)	ba_pork (day/kg FW tissue)	BCF_fish (L/kg FW)	BAF_fish (L/kg FW tissue)	BSAF_fish (unitless)
00-01-2	Aluminum compounds	1.500E-03	0.000E+00	1.000E+00	0.000E+00	0.000E+00
00-01-3	Antimony compounds	1.000E-03	0.000E+00	4.000E+01	0.000E+00	0.000E+00
00-01-4	Arsenic compounds	2.000E-03	0.000E+00	1.140E+02	0.000E+00	0.000E+00
00-01-5	Barium compounds	1.500E-04	0.000E+00	6.330E+02	0.000E+00	0.000E+00
00-01-6	Beryllium compounds	1.000E-03	0.000E+00	6.200E+01	0.000E+00	0.000E+00
00-01-7	Cadmium compounds	1.200E-04	1.910E-04	9.070E+02	0.000E+00	0.000E+00
00-01-8	Chromium compounds	5.500E-03	0.000E+00	1.900E+01	0.000E+00	0.000E+00
00-01-9	Copper compounds	1.000E-02	0.000E+00	3.162E+00	0.000E+00	0.000E+00
00-02-0	Lead compounds	3.000E-04	0.000E+00	9.000E-02	0.000E+00	0.000E+00
00-02-2	Manganese compounds	4.000E-04	0.000E+00	3.162E+00	0.000E+00	0.000E+00
00-02-3	Mercury compounds	2.500E-01	0.000E+00	3.162E+00	0.000E+00	0.000E+00
00-02-4	Nickel compounds	6.000E-03	0.000E+00	7.800E+01	0.000E+00	0.000E+00
00-02-5	Selenium compounds	2.270E-03	1.880E-01	1.290E+02	0.000E+00	0.000E+00
00-02-6	Silver compounds	3.000E-03	0.000E+00	8.770E+01	0.000E+00	0.000E+00
00-02-7	Thallium compounds	4.000E-02	0.000E+00	1.000E+04	0.000E+00	0.000E+00
00-02-8	Vanadium compounds	2.500E-03	0.000E+00	1.000E+00	0.000E+00	0.000E+00
00-02-9	Zinc compounds	9.000E-05	1.280E-04	2.060E+03	0.000E+00	0.000E+00
00-07-2	PCB Mixture (non-dioxin like, 5+ chlorines)	3.100E-02	3.700E-02	8.410E+04	2.069E+06	2.000E+00
00-15-3	Cobalt compounds	2.000E-02	0.000E+00	3.162E+00	0.000E+00	0.000E+00
00-15-5	m,p-Xylene	1.000E+00	0.000E+00	1.000E+00	1.000E+00	0.000E+00
00-16-3	Composite TOE - Volatile	3.519E-03	4.260E-03	8.657E+00	0.000E+00	0.000E+00
00-16-4	Composirte TOE - Semivolatile	1.188E-02	1.438E-02	4.690E+01	0.000E+00	0.000E+00
00-16-5	Composirte TOE - Nonvolatile	2.005E-02	2.427E-02	3.806E+04	9.257E+05	0.000E+00
00-16-6	Boron compounds	8.000E-04	0.000E+00	1.000E+00	0.000E+00	0.000E+00
00-16-9	Tin compounds	8.000E-02	0.000E+00	1.000E+00	0.000E+00	0.000E+00
56-23-5	Carbon tetrachloride	8.680E-03	1.050E-02	2.860E+01	0.000E+00	0.000E+00
65-85-0	Benzoic acid	5.650E-05	6.840E-05	3.160E+00	0.000E+00	0.000E+00
67-64-1	Acetone	2.860E-05	3.460E-05	3.160E+00	0.000E+00	0.000E+00
67-66-3	Chloroform	2.900E-03	3.510E-03	6.920E+00	0.000E+00	0.000E+00
71-43-2	Benzene	3.380E-03	4.090E-03	8.260E+00	0.000E+00	0.000E+00
74-83-9	Methyl bromide	7.110E-04	8.610E-04	1.650E+00	0.000E+00	0.000E+00
74-87-3	Methyl chloride	4.080E-04	4.940E-04	3.160E+00	0.000E+00	0.000E+00
74-88-4	Methyl iodide	1.284E-03	1.555E-03	2.902E+00	0.000E+00	0.000E+00
74-96-4	Bromoethane	1.531E-03	1.853E-03	3.465E+00	0.000E+00	0.000E+00
74-97-5	Bromochloromethane	1.073E-03	1.299E-03	2.431E+00	0.000E+00	0.000E+00

CAS_NUMBER	COPC_NAME	ba_beef (day/kg FW tissue)	ba_pork (day/kg FW tissue)	BCF_fish (L/kg FW)	BAF_fish (L/kg FW tissue)	BSAF_fish (unitless)
75-00-3	Ethyl chloride	1.050E-03	1.280E-03	2.390E+00	0.000E+00	0.000E+00
75-01-4	Vinyl chloride	1.050E-03	1.280E-03	2.390E+00	0.000E+00	0.000E+00
75-09-2	Dichloromethane	8.760E-04	1.060E-03	2.000E+00	0.000E+00	0.000E+00
75-15-0	Carbon disulfide	3.920E-03	4.750E-03	9.860E+00	0.000E+00	0.000E+00
75-25-2	Tribromomethane	5.000E-03	6.050E-03	1.330E+01	0.000E+00	0.000E+00
75-27-4	Bromodichloromethane	3.380E-03	4.090E-03	8.260E+00	0.000E+00	0.000E+00
75-35-4	1,1-Dichloroethylene	3.380E-03	4.090E-03	8.260E+00	0.000E+00	0.000E+00
75-69-4	Trichlorofluoromethane	5.960E-03	7.210E-03	1.680E+01	0.000E+00	0.000E+00
75-71-8	Dichlorodifluoromethane	3.700E-03	4.480E-03	9.190E+00	0.000E+00	0.000E+00
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	1.292E-02	1.564E-02	5.410E+01	0.000E+00	0.000E+00
78-93-3	Methyl ethyl ketone	1.050E-04	1.270E-04	3.160E+00	0.000E+00	0.000E+00
79-01-6	Trichloroethylene	5.210E-03	6.300E-03	1.410E+01	0.000E+00	0.000E+00
84-66-2	Diethyl phthalate	5.960E-03	7.210E-03	1.680E+01	0.000E+00	0.000E+00
84-74-2	Dibutyl phthalate	3.640E-02	4.400E-02	8.300E+02	1.800E+03	0.000E+00
91-20-3	Naphthalene	1.480E-02	1.800E-02	6.930E+01	0.000E+00	0.000E+00
91-57-6	2-Methylnaphthalene	2.432E-02	2.944E-02	2.009E+02	0.000E+00	0.000E+00
95-47-6	2-Xylene	1.210E-02	1.470E-02	4.860E+01	0.000E+00	0.000E+00
95-48-7	o-Cresol	2.680E-03	3.240E-03	6.330E+00	0.000E+00	0.000E+00
95-50-1	1,2-Dichlorobenzene	1.600E-02	1.940E-02	7.990E+01	0.000E+00	0.000E+00
100-41-4	Ethylbenzene	1.210E-02	1.470E-02	4.860E+01	0.000E+00	0.000E+00
100-42-5	Styrene	1.090E-02	1.320E-02	4.070E+01	0.000E+00	0.000E+00
100-51-6	Benzyl alcohol	5.970E-04	7.230E-04	3.140E-01	0.000E+00	0.000E+00
100-52-7	Benzaldehyde	1.220E-03	1.470E-03	2.750E+00	0.000E+00	0.000E+00
106-46-7	1,4-Dichlorobenzene	1.780E-02	2.160E-02	9.890E+01	0.000E+00	0.000E+00
107-44-8	GB	1.071E-04	1.297E-04	3.162E+00	0.000E+00	0.000E+00
108-05-4	Vinyl acetate	2.800E-04	3.390E-04	3.160E+00	0.000E+00	0.000E+00
108-10-1	Methyl isobutyl ketone	7.250E-04	8.770E-04	1.670E+00	0.000E+00	0.000E+00
108-88-3	Toluene	7.690E-03	9.310E-03	2.390E+01	0.000E+00	0.000E+00
108-90-7	Chlorobenzene	8.680E-03	1.050E-02	2.860E+01	0.000E+00	0.000E+00
110-54-3	n-Hexane	2.432E-02	2.944E-02	2.009E+02	0.000E+00	0.000E+00
117-81-7	Bis(2-ethylhexyl)phthalate	3.990E-02	4.830E-02	5.330E+01	1.940E+02	0.000E+00
118-96-7	2,4,6-Trinitrotoluene	1.500E-03	1.820E-03	3.400E+00	0.000E+00	0.000E+00
121-14-2	2,4-Dinitrotoluene	2.810E-03	3.410E-03	6.680E+00	0.000E+00	0.000E+00
124-48-1	Chlorodibromomethane	4.100E-03	4.960E-03	1.040E+01	0.000E+00	0.000E+00
131-11-3	Dimethylphthalate	1.400E-03	1.700E-03	3.170E+00	0.000E+00	0.000E+00
505-60-2	Sulfur mustard (or H/HD)	9.973E-04	1.207E-03	2.264E+00	0.000E+00	0.000E+00

CAS_NUMBER	COPC_NAME	ba_beef (day/kg FW tissue)	ba_pork (day/kg FW tissue)	BCF_fish (L/kg FW)	BAF_fish (L/kg FW tissue)	BSAF_fish (unitless)
1330-20-7	Xylene (mixed)	1.346E-02	1.629E-02	5.808E+01	0.000E+00	0.000E+00
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	2.610E-02	3.160E-02	3.440E+04	9.174E+05	9.000E-02
3268-87-9	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	6.850E-03	8.300E-03	1.470E+03	6.643E+03	1.000E-04
7439-97-6	Mercury	2.500E-01	0.000E+00	3.160E+00	0.000E+00	0.000E+00
7446-09-5	Sulfur dioxide	1.000E+00	0.000E+00	3.162E+00	0.000E+00	0.000E+00
7487-94-7	Mercuric chloride	5.220E-03	3.390E-05	3.162E+00	0.000E+00	0.000E+00
7647-01-0	Hydrochloric acid	5.230E-05	6.330E-05	3.160E+00	0.000E+00	0.000E+00
7664-38-2	Phosphoric acid	1.000E+00	0.000E+00	3.162E+00	0.000E+00	0.000E+00
7664-39-3	Hydrofluoric acid	1.000E+00	0.000E+00	3.162E+00	0.000E+00	0.000E+00
7782-50-5	Chlorine	3.600E-04	4.360E-04	3.160E+00	0.000E+00	0.000E+00
10061-01-5	cis-1,3-Dichloropropene	3.183E-03	3.853E-03	7.695E+00	0.000E+00	0.000E+00
10061-02-6	trans-1,3-Dichloropropene	3.040E-03	3.680E-03	7.296E+00	0.000E+00	0.000E+00
10102-44-0	Nitrogen dioxide	1.000E+00	0.000E+00	3.162E+00	0.000E+00	0.000E+00
22967-92-6	Methyl mercury	7.800E-04	5.070E-06	3.162E+00	6.800E+06	0.000E+00
31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	2.082E-02	2.520E-02	4.422E+04	1.126E+06	2.000E+00
32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	2.891E-02	3.500E-02	2.542E+04	6.520E+05	2.000E+00
32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	2.629E-02	3.182E-02	3.375E+04	9.001E+05	2.000E+00
38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	1.357E-02	1.642E-02	9.727E+03	1.629E+05	2.000E+00
39001-02-0	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	8.770E-03	1.060E-02	2.750E+03	2.144E+04	1.000E-04
39635-31-9	2,3,4,5,3',4',5'-Heptachlorobiphenyl	6.855E-03	8.298E-03	1.175E+03	3.891E+03	2.000E+00
50782-69-9	VX	3.331E-03	4.033E-03	3.162E+00	0.000E+00	0.000E+00
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	3.650E-02	4.420E-02	9.930E+03	1.766E+05	9.000E-02
52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	1.496E-02	1.811E-02	1.334E+04	2.529E+05	2.000E+00
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.640E-02	1.990E-02	1.830E+04	3.850E+05	5.000E-03
57465-28-8	3,4,5,3',4'-Pentachlorobiphenyl	1.000E+00	0.000E+00	1.000E+00	1.000E+00	2.000E+00
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.640E-02	1.990E-02	1.830E+04	3.850E+05	5.000E-03
69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	1.000E+00	0.000E+00	1.000E+00	1.000E+00	2.000E+00
70362-50-4	3,4,4',5-Tetrachlorobiphenyl	1.000E+00	0.000E+00	1.000E+00	1.000E+00	2.000E+00
73207-98-4	EA 2192	1.307E-03	1.583E-03	3.162E+00	0.000E+00	0.000E+00
74472-37-0	2,3,4,4'5-Pentachlorobiphenyl	2.312E-02	2.799E-02	4.727E+04	1.241E+06	2.000E+00

Table K-5: COPC Parameter Set 5

CAS_NUMBER	COPC_NAME	RfD (mg/kg-day)	Oral_csf (per mg/kg-day)	RfC (mg/m3)	inhalation_urf (per µg/m3)	inhalation_csf (per mg/kg-day)	Chemical_type (unitless)	Chemical_subtype (unitless)
00-01-2	Aluminum compounds	1.000E+00	0.000E+00	5.000E-03	0.000E+00	0.000E+00	I	Metal
00-01-3	Antimony compounds	4.000E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	I	Metal
00-01-4	Arsenic compounds	3.000E-04	1.500E+00	3.000E-05	4.300E-03	1.500E+01	I	Metal
00-01-5	Barium compounds	2.000E-01	0.000E+00	5.000E-04	0.000E+00	0.000E+00	I	Metal
00-01-6	Beryllium compounds	2.000E-03	0.000E+00	2.000E-05	2.400E-03	8.400E+00	I	Metal
00-01-7	Cadmium compounds	5.000E-04	0.000E+00	2.000E-05	1.800E-03	6.300E+00	I	Metal
00-01-8	Chromium compounds	1.500E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	I	Metal
00-01-9	Copper compounds	3.700E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	I	Metal
00-02-0	Lead compounds	0.000E+00	8.500E-03	0.000E+00	1.200E-05	4.200E-02	I	Metal
00-02-2	Manganese compounds	1.400E-01	0.000E+00	5.000E-05	0.000E+00	0.000E+00	I	Metal
00-02-3	Mercury compounds	3.000E-04	0.000E+00	3.000E-04	0.000E+00	0.000E+00	I	Metal
00-02-4	Nickel compounds	2.000E-02	0.000E+00	9.000E-05	2.400E-04	8.400E-01	I	Metal
00-02-5	Selenium compounds	5.000E-03	0.000E+00	2.000E-02	0.000E+00	0.000E+00	I	Metal
00-02-6	Silver compounds	5.000E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	I	Metal
00-02-7	Thallium compounds	8.000E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	I	Metal
00-02-8	Vanadium compounds	9.000E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	I	Metal
00-02-9	Zinc compounds	3.000E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	I	Metal
00-07-2	PCB Mixture (non-dioxin like, 5+ chlorines)	2.000E-05	2.000E+00	0.000E+00	1.000E-04	4.000E-01	O	PCB
00-15-3	Cobalt compounds	0.000E+00	0.000E+00	1.000E-04	0.000E+00	0.000E+00	I	Metal
00-15-5	m,p-Xylene	2.000E-01	0.000E+00	1.000E-01	0.000E+00	0.000E+00	O	None
00-16-3	Composite TOE - Volatile	8.000E-01	6.700E-02	2.000E+00	1.000E-05	3.700E-02	O	None
00-16-4	Composirte TOE - Semivolatile	3.000E-02	4.000E-01	4.000E-01	1.000E-04	4.400E-01	O	None
00-16-5	Composirte TOE - Nonvolatile	9.000E-02	2.500E+01	1.000E-01	4.000E-04	5.500E+01	O	None
00-16-6	Boron compounds	2.000E-01	0.000E+00	2.000E-02	0.000E+00	0.000E+00	I	Metal
00-16-9	Tin compounds	6.000E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	I	Metal
56-23-5	Carbon tetrachloride	7.000E-04	1.300E-01	2.000E-01	1.500E-05	5.300E-02	O	None
65-85-0	Benzoic acid	4.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	O	Ionizing
67-64-1	Acetone	9.000E-01	0.000E+00	3.100E+01	0.000E+00	0.000E+00	O	None
67-66-3	Chloroform	1.000E-02	3.100E-02	1.000E-01	2.300E-05	8.100E-02	O	None
71-43-2	Benzene	4.000E-03	5.500E-02	3.000E-02	7.800E-06	2.700E-02	O	None
74-83-9	Methyl bromide	1.400E-03	0.000E+00	5.000E-03	0.000E+00	0.000E+00	O	None
74-87-3	Methyl chloride	0.000E+00	1.300E-02	9.000E-02	1.800E-06	6.300E-03	O	None

CAS_NUMBER	**COPC_NAME**	**RfD (mg/kg-day)**	**Oral_csf (per mg/kg-day)**	**RfC (mg/m3)**	**inhalation_urf (per µg/m3)**	**inhalation_csf (per mg/kg-day)**	**Chemical_type (unitless)**	**Chemical_subtype (unitless)**
74-88-4	Methyl iodide	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	O	None
74-96-4	Bromoethane	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	O	None
74-97-5	Bromochloromethane	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	O	None
75-00-3	Ethyl chloride	0.000E+00	0.000E+00	1.000E+01	0.000E+00	0.000E+00	O	None
75-01-4	Vinyl chloride	3.000E-03	1.500E+00	1.000E-01	8.800E-06	3.100E-02	O	None
75-09-2	Dichloromethane	6.000E-02	7.500E-03	1.000E+00	4.700E-07	1.600E-03	O	None
75-15-0	Carbon disulfide	1.000E-01	0.000E+00	7.000E-01	0.000E+00	0.000E+00	O	None
75-25-2	Tribromomethane	2.000E-02	7.900E-03	0.000E+00	1.100E-06	3.900E-03	O	None
75-27-4	Bromodichloromethane	2.000E-02	6.200E-02	0.000E+00	3.700E-05	1.300E-01	O	None
75-35-4	1,1-Dichloroethylene	5.000E-02	0.000E+00	2.000E-01	0.000E+00	1.200E+00	O	None
75-69-4	Trichlorofluoromethane	3.000E-01	0.000E+00	7.000E-01	0.000E+00	0.000E+00	O	None
75-71-8	Dichlorodifluoromethane	2.000E-01	0.000E+00	2.000E-01	0.000E+00	0.000E+00	O	None
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	3.000E+01	0.000E+00	3.000E+01	0.000E+00	0.000E+00	O	None
78-93-3	Methyl ethyl ketone	6.000E-01	0.000E+00	5.000E+00	0.000E+00	0.000E+00	O	None
79-01-6	Trichloroethylene	3.000E-04	4.000E-01	4.000E-02	0.000E+00	4.000E-01	O	None
84-66-2	Diethyl phthalate	8.000E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	O	None
84-74-2	Dibutyl phthalate	1.000E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	O	None
91-20-3	Naphthalene	2.000E-02	1.200E-01	3.000E-03	3.400E-05	1.200E-01	O	None
91-57-6	2-Methylnaphthalene	4.000E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	O	None
95-47-6	2-Xylene	2.000E-01	0.000E+00	1.000E-01	0.000E+00	0.000E+00	O	None
95-48-7	o-Cresol	5.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	O	None
95-50-1	1,2-Dichlorobenzene	9.000E-02	0.000E+00	2.000E-01	0.000E+00	0.000E+00	O	None
100-41-4	Ethylbenzene	1.000E-01	0.000E+00	1.000E+00	0.000E+00	0.000E+00	O	None
100-42-5	Styrene	2.000E-01	0.000E+00	1.000E+00	0.000E+00	0.000E+00	O	None
100-51-6	Benzyl alcohol	5.000E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	O	None
100-52-7	Benzaldehyde	1.000E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	O	None
106-46-7	1,4-Dichlorobenzene	7.000E-02	5.400E-03	8.000E-01	1.100E-05	4.000E-02	O	None
107-44-8	GB	2.000E-05	0.000E+00	1.000E-06	0.000E+00	0.000E+00	O	None
108-05-4	Vinyl acetate	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	O	None
108-10-1	Methyl isobutyl ketone	8.000E-02	0.000E+00	3.000E+00	0.000E+00	0.000E+00	O	None
108-88-3	Toluene	8.000E-02	0.000E+00	5.000E+00	0.000E+00	0.000E+00	O	None
108-90-7	Chlorobenzene	2.000E-02	0.000E+00	5.000E-02	0.000E+00	0.000E+00	O	None
110-54-3	n-Hexane	1.100E+01	0.000E+00	7.000E-01	0.000E+00	0.000E+00	O	None

CAS_NUMBER	COPC_NAME	RfD (mg/kg-day)	Oral_csf (per mg/kg-day)	RfC (mg/m3)	inhalation_urf (per µg/m3)	inhalation_csf (per mg/kg-day)	Chemical_type (unitless)	Chemical_subtype (unitless)
117-81-7	Bis(2-ethylhexyl)phthalate	2.000E-02	1.400E-02	0.000E+00	2.400E-06	8.400E-03	O	P
118-96-7	2,4,6-Trinitrotoluene	5.000E-04	3.000E-02	0.000E+00	0.000E+00	0.000E+00	O	None
121-14-2	2,4-Dinitrotoluene	2.000E-03	3.100E-01	0.000E+00	8.900E-05	3.100E-01	O	None
124-48-1	Chlorodibromomethane	2.000E-02	8.400E-02	0.000E+00	2.700E-05	9.400E-02	O	None
131-11-3	Dimethylphthalate	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	O	None
505-60-2	Sulfur mustard (or H/HD)	7.000E-06	7.700E+00	2.000E-05	0.000E+00	3.000E+02	O	None
1330-20-7	Xylene (mixed)	2.000E-01	0.000E+00	1.000E-01	0.000E+00	0.000E+00	O	None
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.000E+00	1.500E+05	0.000E+00	3.800E+01	1.300E+05	O	D
3268-87-9	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	0.000E+00	4.500E+01	0.000E+00	0.000E+00	3.900E+01	O	None
7439-97-6	Mercury	0.000E+00	0.000E+00	3.000E-04	0.000E+00	0.000E+00	I	None
7446-09-5	Sulfur dioxide	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	I	None
7487-94-7	Mercuric chloride	3.000E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	I	Divalent
7647-01-0	Hydrochloric acid	0.000E+00	0.000E+00	2.000E-02	0.000E+00	0.000E+00	I	None
7664-38-2	Phosphoric acid	0.000E+00	0.000E+00	1.000E-02	0.000E+00	0.000E+00	I	Metal
7664-39-3	Hydrofluoric acid	0.000E+00	0.000E+00	1.400E-02	0.000E+00	0.000E+00	I	None
7782-50-5	Chlorine	1.000E-01	0.000E+00	2.000E-04	0.000E+00	0.000E+00	I	None
10061-01-5	cis-1,3-Dichloropropene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	O	None
10061-02-6	trans-1,3-Dichloropropene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	O	None
10102-44-0	Nitrogen dioxide	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	I	None
22967-92-6	Methyl mercury	1.000E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	O	None
31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	0.000E+00	4.500E+00	0.000E+00	0.000E+00	3.900E+00	O	PCB
32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	0.000E+00	1.500E+01	0.000E+00	0.000E+00	1.300E+01	O	PCB
32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	0.000E+00	4.500E+00	0.000E+00	0.000E+00	3.900E+00	O	PCB
38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	0.000E+00	4.500E+00	0.000E+00	0.000E+00	3.900E+00	O	PCB
39001-02-0	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	0.000E+00	4.500E+01	0.000E+00	0.000E+00	3.900E+01	O	F
39635-31-9	2,3,4,5,3',4',5'-Heptachlorobiphenyl	0.000E+00	4.500E+00	0.000E+00	0.000E+00	3.900E+00	O	PCB
50782-69-9	VX	6.000E-07	0.000E+00	6.000E-07	0.000E+00	0.000E+00	O	None
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	0.000E+00	1.500E+04	0.000E+00	0.000E+00	1.300E+04	O	F
52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	0.000E+00	4.500E+00	0.000E+00	0.000E+00	3.900E+00	O	PCB
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.000E+00	1.500E+03	0.000E+00	0.000E+00	1.300E+03	O	F
57465-28-8	3,4,5,3',4'-Pentachlorobiphenyl	0.000E+00	1.500E+04	0.000E+00	0.000E+00	1.300E+04	O	PCB
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.000E+00	1.500E+03	0.000E+00	0.000E+00	1.300E+03	O	F
69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	0.000E+00	4.500E+00	0.000E+00	0.000E+00	3.900E+00	O	PCB

CAS_NUMBER	COPC_NAME	RfD (mg/kg-day)	Oral_csf (per mg/kg-day)	RfC (mg/m3)	inhalation_urf (per µg/m3)	inhalation_csf (per mg/kg-day)	Chemical_type (unitless)	Chemical_subtype (unitless)
70362-50-4	3,4,4',5-Tetrachlorobiphenyl	0.000E+00	4.500E+01	0.000E+00	0.000E+00	3.900E+01	O	PCB
73207-98-4	EA 2192	6.000E-07	0.000E+00	7.000E-07	0.000E+00	0.000E+00	O	None
74472-37-0	2,3,4,4'5-Pentachlorobiphenyl	0.000E+00	4.500E+00	0.000E+00	0.000E+00	3.900E+00	O	PCB

Table K-6: COPC Parameter Set 6

CAS_NUMBER	COPC_NAME	br_grain ([µg/d DW plant]/[µg/g soil])	ba_egg (day/kg FW tissue)	ba_chicken (day/kg FW tissue)	inhalation_rfd (mg/kg/day)	tef (unitless)	abs (unitless)	t_b (°K)
00-01-2	Aluminum compounds	6.500E-04	0.000E+00	0.000E+00	1.000E-03	0.000E+00	1.000E+00	2.603E+03
00-01-3	Antimony compounds	3.190E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.500E-01	1.913E+03
00-01-4	Arsenic compounds	6.330E-03	0.000E+00	0.000E+00	9.000E-06	0.000E+00	1.000E+00	8.880E+02
00-01-5	Barium compounds	3.220E-02	0.000E+00	0.000E+00	1.000E-04	0.000E+00	7.000E-02	1.913E+03
00-01-6	Beryllium compounds	2.580E-03	0.000E+00	0.000E+00	6.000E-06	0.000E+00	7.000E-03	3.243E+03
00-01-7	Cadmium compounds	1.250E-01	2.500E-03	1.060E-01	6.000E-06	0.000E+00	2.500E-02	1.038E+03
00-01-8	Chromium compounds	4.880E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.300E-02	2.913E+03
00-01-9	Copper compounds	2.500E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00	2.873E+03
00-02-0	Lead compounds	1.360E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00	2.013E+03
00-02-2	Manganese compounds	5.000E-02	0.000E+00	0.000E+00	1.000E-05	0.000E+00	4.000E-02	2.373E+03
00-02-3	Mercury compounds	2.000E-01	0.000E+00	0.000E+00	9.000E-05	0.000E+00	7.000E-02	6.300E+02
00-02-4	Nickel compounds	9.310E-03	0.000E+00	0.000E+00	3.000E-05	0.000E+00	4.000E-02	3.003E+03
00-02-5	Selenium compounds	1.950E-02	1.130E+00	1.130E+00	6.000E-03	0.000E+00	1.000E+00	9.580E+02
00-02-6	Silver compounds	1.380E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.000E-02	2.483E+03
00-02-7	Thallium compounds	8.580E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00	1.743E+03
00-02-8	Vanadium compounds	3.000E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.600E-02	3.683E+03
00-02-9	Zinc compounds	9.700E-02	8.750E-03	8.750E-03	0.000E+00	0.000E+00	1.000E+00	1.181E+03
00-07-2	PCB Mixture (non-dioxin like, 5+ chlorines)	6.780E-03	1.300E-02	2.300E-02	0.000E+00	0.000E+00	1.000E+00	6.380E+02
00-15-3	Cobalt compounds	7.000E-03	0.000E+00	0.000E+00	3.000E-05	0.000E+00	1.000E+00	3.143E+03
00-15-5	m,p-Xylene	0.000E+00	1.000E+00	1.000E+00	3.000E-02	0.000E+00	1.000E+00	2.730E+02
00-16-3	Composite TOE - Volatile	2.285E+00	1.482E-03	2.593E-03	5.000E-01	0.000E+00	1.000E+00	3.108E+02
00-16-4	Composirte TOE - Semivolatile	6.428E-01	5.003E-03	8.756E-03	1.000E-01	0.000E+00	1.000E+00	4.599E+02
00-16-5	Composirte TOE - Nonvolatile	2.787E-03	8.440E-03	1.477E-02	4.000E-02	0.000E+00	1.000E+00	6.695E+02
00-16-6	Boron compounds	2.000E+00	0.000E+00	0.000E+00	6.000E-03	0.000E+00	1.000E+00	2.823E+03
00-16-9	Tin compounds	6.000E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00	2.543E+03
56-23-5	Carbon tetrachloride	9.320E-01	3.660E-03	6.400E-03	6.000E-02	0.000E+00	1.000E+00	3.497E+02
65-85-0	Benzoic acid	3.210E+00	2.380E-05	4.160E-05	0.000E+00	0.000E+00	1.000E+00	5.220E+02
67-64-1	Acetone	8.380E+00	1.200E-05	2.110E-05	8.900E+00	0.000E+00	1.000E+00	3.292E+02
67-66-3	Chloroform	2.700E+00	1.220E-03	2.140E-03	3.000E-02	0.000E+00	1.000E+00	3.347E+02
71-43-2	Benzene	2.370E+00	1.420E-03	2.490E-03	9.000E-03	0.000E+00	1.000E+00	3.531E+02
74-83-9	Methyl bromide	7.950E+00	2.990E-04	5.240E-04	1.000E-03	0.000E+00	1.000E+00	2.766E+02

CAS_NUMBER	COPC_NAME	br_grain ([µg/d DW plant]/[µg/g soil])	ba_egg (day/kg FW tissue)	ba_chicken (day/kg FW tissue)	inhalation_rfd (mg/kg/day)	tef (unitless)	abs (unitless)	t_b (°K)
74-87-3	Methyl chloride	8.380E+00	1.720E-04	3.010E-04	3.000E-02	0.000E+00	1.000E+00	2.488E+02
74-88-4	Methyl iodide	5.191E+00	5.408E-04	9.465E-04	0.000E+00	0.000E+00	1.000E+00	3.154E+02
74-96-4	Bromoethane	4.544E+00	6.444E-04	1.128E-03	0.000E+00	0.000E+00	1.000E+00	3.115E+02
74-97-5	Bromochloromethane	5.930E+00	4.518E-04	7.907E-04	0.000E+00	0.000E+00	1.000E+00	3.410E+02
75-00-3	Ethyl chloride	6.010E+00	4.440E-04	7.760E-04	2.900E+00	0.000E+00	1.000E+00	2.853E+02
75-01-4	Vinyl chloride	6.010E+00	4.440E-04	7.760E-04	3.000E-02	0.000E+00	1.000E+00	2.591E+02
75-09-2	Dichloromethane	6.860E+00	3.690E-04	6.450E-04	3.000E-01	0.000E+00	1.000E+00	3.128E+02
75-15-0	Carbon disulfide	2.070E+00	1.650E-03	2.890E-03	2.000E-01	0.000E+00	1.000E+00	3.192E+02
75-25-2	Tribromomethane	1.650E+00	2.100E-03	3.680E-03	0.000E+00	0.000E+00	1.000E+00	4.230E+02
75-27-4	Bromodichloromethane	2.370E+00	1.420E-03	2.490E-03	0.000E+00	0.000E+00	1.000E+00	3.631E+02
75-35-4	1,1-Dichloroethylene	2.370E+00	1.420E-03	2.490E-03	6.000E-02	0.000E+00	1.000E+00	3.047E+02
75-69-4	Trichlorofluoromethane	1.390E+00	2.510E-03	4.390E-03	2.000E-01	0.000E+00	1.000E+00	2.968E+02
75-71-8	Dichlorodifluoromethane	2.190E+00	1.560E-03	2.730E-03	6.000E-02	0.000E+00	1.000E+00	2.432E+02
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.775E-01	5.441E-03	9.523E-03	8.600E+00	0.000E+00	1.000E+00	3.207E+02
78-93-3	Methyl ethyl ketone	8.380E+00	4.420E-05	7.730E-05	1.000E+00	0.000E+00	1.000E+00	3.526E+02
79-01-6	Trichloroethylene	1.590E+00	2.190E-03	3.840E-03	1.000E-02	0.000E+00	1.000E+00	3.599E+02
84-66-2	Diethyl phthalate	1.390E+00	2.510E-03	4.390E-03	0.000E+00	0.000E+00	1.000E+00	5.710E+02
84-74-2	Dibutyl phthalate	7.400E-02	1.530E-02	2.680E-02	0.000E+00	0.000E+00	1.000E+00	6.130E+02
91-20-3	Naphthalene	4.790E-01	6.250E-03	1.090E-02	9.000E-04	0.000E+00	1.000E+00	4.910E+02
91-57-6	2-Methylnaphthalene	2.157E-01	1.024E-02	1.792E-02	0.000E+00	0.000E+00	1.000E+00	5.141E+02
95-47-6	2-Xylene	6.250E-01	5.110E-03	8.950E-03	3.000E-02	0.000E+00	1.000E+00	4.170E+02
95-48-7	o-Cresol	2.890E+00	1.130E-03	1.970E-03	0.000E+00	0.000E+00	1.000E+00	4.640E+02
95-50-1	1,2-Dichlorobenzene	4.310E-01	6.740E-03	1.180E-02	6.000E-02	0.000E+00	1.000E+00	4.535E+02
100-41-4	Ethylbenzene	6.250E-01	5.110E-03	8.950E-03	3.000E-01	0.000E+00	1.000E+00	4.090E+02
100-42-5	Styrene	7.140E-01	4.590E-03	8.040E-03	3.000E-01	0.000E+00	1.000E+00	4.180E+02
100-51-6	Benzyl alcohol	8.380E+00	2.510E-04	4.400E-04	0.000E+00	0.000E+00	1.000E+00	4.780E+02
100-52-7	Benzaldehyde	5.400E+00	5.130E-04	8.970E-04	0.000E+00	0.000E+00	1.000E+00	4.520E+02
106-46-7	1,4-Dichlorobenzene	3.670E-01	7.500E-03	1.310E-02	2.000E-01	0.000E+00	1.000E+00	4.460E+02
107-44-8	GB	2.601E+01	4.510E-05	7.892E-05	3.000E-07	0.000E+00	1.000E+00	4.200E+02
108-05-4	Vinyl acetate	8.380E+00	1.179E-04	2.063E-04	0.000E+00	0.000E+00	1.000E+00	3.457E+02
108-10-1	Methyl isobutyl ketone	7.840E+00	3.050E-04	5.340E-04	9.000E-01	0.000E+00	1.000E+00	3.900E+02
108-88-3	Toluene	1.070E+00	3.240E-03	5.670E-03	1.000E+00	0.000E+00	1.000E+00	3.840E+02

CAS_NUMBER	COPC_NAME	br_grain ([µg/d DW plant]/[µg/g soil])	ba_egg (day/kg FW tissue)	ba_chicken (day/kg FW tissue)	inhalation_rfd (mg/kg/day)	tef (unitless)	abs (unitless)	t_b (°K)
108-90-7	Chlorobenzene	9.320E-01	3.660E-03	6.400E-03	1.000E-02	0.000E+00	1.000E+00	4.030E+02
110-54-3	n-Hexane	2.157E-01	1.024E-02	1.792E-02	2.000E-01	0.000E+00	1.000E+00	3.420E+02
117-81-7	Bis(2-ethylhexyl)phthalate	4.370E-02	1.680E-02	2.940E-02	0.000E+00	0.000E+00	1.000E+00	6.600E+02
118-96-7	2,4,6-Trinitrotoluene	4.600E+00	6.330E-04	1.110E-03	0.000E+00	0.000E+00	1.000E+00	5.130E+02
121-14-2	2,4-Dinitrotoluene	2.780E+00	1.180E-03	2.070E-03	0.000E+00	0.000E+00	1.000E+00	5.730E+02
124-48-1	Chlorodibromomethane	1.990E+00	1.730E-03	3.020E-03	0.000E+00	0.000E+00	1.000E+00	3.930E+02
131-11-3	Dimethylphthalate	4.860E+00	5.910E-04	1.030E-03	0.000E+00	0.000E+00	1.000E+00	5.570E+02
505-60-2	Sulfur mustard (or H/HD)	6.254E+00	4.199E-04	7.349E-04	6.000E-06	0.000E+00	1.000E+00	4.880E+02
1330-20-7	Xylene (mixed)	5.475E-01	5.667E-03	9.917E-03	3.000E-02	0.000E+00	1.000E+00	4.115E+02
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	4.550E-03	1.100E-02	1.920E-02	0.000E+00	1.000E+00	1.000E+00	7.730E+02
3268-87-9	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	7.050E-04	2.890E-03	5.050E-03	0.000E+00	3.000E-04	1.000E+00	7.830E+02
7439-97-6	Mercury	0.000E+00	1.000E+00	1.000E+00	8.571E-05	0.000E+00	1.000E+00	6.300E+02
7446-09-5	Sulfur dioxide	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00	2.630E+02
7487-94-7	Mercuric chloride	9.300E-03	2.393E-02	2.393E-02	0.000E+00	0.000E+00	7.000E-02	5.750E+02
7647-01-0	Hydrochloric acid	0.000E+00	2.200E-05	3.860E-05	6.000E-03	0.000E+00	1.000E+00	1.879E+02
7664-38-2	Phosphoric acid	0.000E+00	0.000E+00	0.000E+00	3.000E-03	0.000E+00	1.000E+00	2.730E+02
7664-39-3	Hydrofluoric acid	0.000E+00	0.000E+00	0.000E+00	4.000E-03	0.000E+00	1.000E+00	2.930E+02
7782-50-5	Chlorine	8.380E+00	1.520E-04	2.660E-04	6.000E-05	0.000E+00	1.000E+00	2.390E+02
10061-01-5	cis-1,3-Dichloropropene	2.496E+00	1.340E-03	2.345E-03	0.000E+00	0.000E+00	1.000E+00	3.770E+02
10061-02-6	trans-1,3-Dichloropropene	2.598E+00	1.280E-03	2.240E-03	0.000E+00	0.000E+00	1.000E+00	3.850E+02
10102-44-0	Nitrogen dioxide	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+00	2.942E+02
22967-92-6	Methyl mercury	1.900E-02	3.575E-03	3.575E-03	0.000E+00	0.000E+00	1.000E+00	2.730E+02
31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	2.969E-03	8.765E-03	1.534E-02	0.000E+00	3.000E-05	1.000E+00	2.730E+02
32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	5.700E-03	1.217E-02	2.131E-02	0.000E+00	1.000E-04	1.000E+00	2.730E+02
32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	4.607E-03	1.107E-02	1.937E-02	0.000E+00	3.000E-05	1.000E+00	2.730E+02
38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	1.567E-03	5.713E-03	9.997E-03	0.000E+00	3.000E-05	1.000E+00	2.730E+02
39001-02-0	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	9.200E-04	3.690E-03	6.460E-03	0.000E+00	3.000E-04	1.000E+00	8.100E+02
39635-31-9	2,3,4,5,3',4',5'-Heptachlorobiphenyl	6.426E-04	2.886E-03	5.051E-03	0.000E+00	3.000E-05	1.000E+00	2.730E+02
50782-69-9	VX	2.399E+00	1.403E-03	2.455E-03	2.000E-07	0.000E+00	1.000E+00	5.710E+02
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	1.150E-02	1.540E-02	2.690E-02	0.000E+00	1.000E-01	1.000E+00	7.110E+02
52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	1.791E-03	6.300E-03	1.102E-02	0.000E+00	3.000E-05	1.000E+00	2.730E+02
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.050E-03	6.920E-03	1.210E-02	0.000E+00	1.000E-02	1.000E+00	7.800E+02

CAS_NUMBER	COPC_NAME	br_grain ([µg/d DW plant]/[µg/g soil])	ba_egg (day/kg FW tissue)	ba_chicken (day/kg FW tissue)	inhalation_rfd (mg/kg/day)	tef (unitless)	abs (unitless)	t_b (°K)
57465-28-8	3,4,5,3',4'-Pentachlorobiphenyl	0.000E+00	1.000E+00	1.000E+00	0.000E+00	1.000E-01	1.000E+00	2.730E+02
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.050E-03	6.920E-03	1.210E-02	0.000E+00	1.000E-02	1.000E+00	7.800E+02
69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	0.000E+00	1.000E+00	1.000E+00	0.000E+00	3.000E-05	1.000E+00	2.730E+02
70362-50-4	3,4,4',5-Tetrachlorobiphenyl	0.000E+00	1.000E+00	1.000E+00	0.000E+00	3.000E-04	1.000E+00	2.730E+02
73207-98-4	EA 2192	5.122E+00	5.505E-04	9.634E-04	2.000E-07	0.000E+00	1.000E+00	5.710E+02
74472-37-0	2,3,4,4'5-Pentachlorobiphenyl	3.577E-03	9.736E-03	1.704E-02	0.000E+00	3.000E-05	1.000E+00	2.730E+02

Table K-7: COPC Parameter Set 7

CAS_NUMBER	COPC_NAME	fa (unitless)	p_c (cm/hr)	kpv (cm/hr)
00-01-2	Aluminum compounds	0.000E+00	1.000E-03	0.000E+00
00-01-3	Antimony compounds	0.000E+00	1.000E-03	0.000E+00
00-01-4	Arsenic compounds	0.000E+00	1.000E-03	0.000E+00
00-01-5	Barium compounds	0.000E+00	1.000E-03	0.000E+00
00-01-6	Beryllium compounds	0.000E+00	1.000E-03	0.000E+00
00-01-7	Cadmium compounds	0.000E+00	1.000E-03	0.000E+00
00-01-8	Chromium compounds	0.000E+00	1.000E-03	0.000E+00
00-01-9	Copper compounds	0.000E+00	1.000E-03	0.000E+00
00-02-0	Lead compounds	0.000E+00	1.000E-04	0.000E+00
00-02-2	Manganese compounds	0.000E+00	1.000E-03	0.000E+00
00-02-3	Mercury compounds	0.000E+00	1.000E-03	0.000E+00
00-02-4	Nickel compounds	0.000E+00	2.000E-04	0.000E+00
00-02-5	Selenium compounds	0.000E+00	1.000E-03	0.000E+00
00-02-6	Silver compounds	0.000E+00	6.000E-04	0.000E+00
00-02-7	Thallium compounds	0.000E+00	1.000E-03	0.000E+00
00-02-8	Vanadium compounds	0.000E+00	1.000E-03	0.000E+00
00-02-9	Zinc compounds	0.000E+00	6.000E-04	0.000E+00
00-07-2	PCB Mixture (non-dioxin like, 5+ chlorines)	7.000E-01	4.617E-01	0.000E+00
00-15-3	Cobalt compounds	0.000E+00	4.000E-04	0.000E+00
00-15-5	m,p-Xylene	0.000E+00	0.000E+00	8.720E-01
00-16-3	Composite TOE - Volatile	1.000E+00	1.473E-02	0.000E+00
00-16-4	Composirte TOE - Semivolatile	1.000E+00	2.564E-02	0.000E+00
00-16-5	Composirte TOE - Nonvolatile	6.000E-01	2.554E+00	0.000E+00
00-16-6	Boron compounds	0.000E+00	1.000E-03	0.000E+00
00-16-9	Tin compounds	0.000E+00	1.000E-03	0.000E+00
56-23-5	Carbon tetrachloride	1.000E+00	1.600E-02	1.370E-01
65-85-0	Benzoic acid	1.000E+00	5.700E-03	0.000E+00
67-64-1	Acetone	1.000E+00	5.203E-04	0.000E+00
67-66-3	Chloroform	1.000E+00	6.800E-03	6.100E-02
71-43-2	Benzene	1.000E+00	1.500E-02	2.060E-01
74-83-9	Methyl bromide	1.000E+00	2.800E-03	0.000E+00
74-87-3	Methyl chloride	1.000E+00	3.300E-03	1.000E-02

CAS_NUMBER	COPC_NAME	fa (unitless)	p_c (cm/hr)	kpv (cm/hr)
74-88-4	Methyl iodide	1.000E+00	2.500E-03	0.000E+00
74-96-4	Bromoethane	1.000E+00	4.491E-03	0.000E+00
74-97-5	Bromochloromethane	1.000E+00	2.547E-03	1.210E-01
75-00-3	Ethyl chloride	1.000E+00	6.100E-03	1.000E-02
75-01-4	Vinyl chloride	1.000E+00	5.600E-03	1.000E-02
75-09-2	Dichloromethane	1.000E+00	3.500E-03	2.000E-02
75-15-0	Carbon disulfide	1.000E+00	1.700E-02	0.000E+00
75-25-2	Tribromomethane	1.000E+00	2.200E-03	0.000E+00
75-27-4	Bromodichloromethane	1.000E+00	4.600E-03	1.210E-01
75-35-4	1,1-Dichloroethylene	1.000E+00	1.200E-02	1.000E-02
75-69-4	Trichlorofluoromethane	1.000E+00	1.300E-02	0.000E+00
75-71-8	Dichlorodifluoromethane	1.000E+00	9.000E-03	1.000E-02
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	1.000E+00	1.723E-02	0.000E+00
78-93-3	Methyl ethyl ketone	1.000E+00	9.600E-04	0.000E+00
79-01-6	Trichloroethylene	1.000E+00	1.200E-02	2.330E-01
84-66-2	Diethyl phthalate	1.000E+00	3.900E-03	0.000E+00
84-74-2	Dibutyl phthalate	9.000E-01	2.400E-02	0.000E+00
91-20-3	Naphthalene	1.000E+00	4.700E-02	0.000E+00
91-57-6	2-Methylnaphthalene	1.000E+00	9.772E-02	0.000E+00
95-47-6	2-Xylene	1.000E+00	4.492E-02	8.810E-01
95-48-7	o-Cresol	1.000E+00	7.700E-03	0.000E+00
95-50-1	1,2-Dichlorobenzene	1.000E+00	4.100E-02	0.000E+00
100-41-4	Ethylbenzene	1.000E+00	4.900E-02	0.000E+00
100-42-5	Styrene	1.000E+00	3.700E-02	1.665E+00
100-51-6	Benzyl alcohol	1.000E+00	2.095E-03	0.000E+00
100-52-7	Benzaldehyde	1.000E+00	3.830E-03	0.000E+00
106-46-7	1,4-Dichlorobenzene	1.000E+00	4.200E-02	0.000E+00
107-44-8	GB	1.000E+00	4.105E-04	0.000E+00
108-05-4	Vinyl acetate	1.000E+00	1.584E-03	0.000E+00
108-10-1	Methyl isobutyl ketone	1.000E+00	2.700E-03	0.000E+00
108-88-3	Toluene	1.000E+00	3.100E-02	4.620E-01
108-90-7	Chlorobenzene	1.000E+00	2.800E-02	5.870E-01
110-54-3	n-Hexane	1.000E+00	1.956E-01	3.900E-02

CAS_NUMBER	COPC_NAME	fa (unitless)	p_c (cm/hr)	kpv (cm/hr)
117-81-7	Bis(2-ethylhexyl)phthalate	8.000E-01	2.500E-02	0.000E+00
118-96-7	2,4,6-Trinitrotoluene	1.000E+00	9.656E-04	0.000E+00
121-14-2	2,4-Dinitrotoluene	1.000E+00	3.100E-03	0.000E+00
124-48-1	Chlorodibromomethane	1.000E+00	3.200E-03	9.010E-01
131-11-3	Dimethylphthalate	1.000E+00	1.400E-03	0.000E+00
505-60-2	Sulfur mustard (or H/HD)	1.000E+00	4.500E-03	0.000E+00
1330-20-7	Xylene (mixed)	1.000E+00	4.966E-02	0.000E+00
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	5.000E-01	8.100E-01	0.000E+00
3268-87-9	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	1.000E-01	1.073E+00	0.000E+00
7439-97-6	Mercury	0.000E+00	2.400E-01	0.000E+00
7446-09-5	Sulfur dioxide	0.000E+00	1.000E-03	0.000E+00
7487-94-7	Mercuric chloride	0.000E+00	1.000E-03	0.000E+00
7647-01-0	Hydrochloric acid	0.000E+00	1.000E-03	0.000E+00
7664-38-2	Phosphoric acid	0.000E+00	1.000E-03	0.000E+00
7664-39-3	Hydrofluoric acid	0.000E+00	1.000E-03	0.000E+00
7782-50-5	Chlorine	0.000E+00	1.000E-03	0.000E+00
10061-01-5	cis-1,3-Dichloropropene	1.000E+00	8.670E-03	0.000E+00
10061-02-6	trans-1,3-Dichloropropene	1.000E+00	8.283E-03	0.000E+00
10102-44-0	Nitrogen dioxide	0.000E+00	1.000E-03	0.000E+00
22967-92-6	Methyl mercury	0.000E+00	1.000E-03	0.000E+00
31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	5.000E-01	1.169E+00	0.000E+00
32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	6.000E-01	8.722E-01	0.000E+00
32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	7.000E-01	7.175E-01	0.000E+00
38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	3.000E-01	1.565E+00	0.000E+00
39001-02-0	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	1.000E-01	9.727E-01	0.000E+00
39635-31-9	2,3,4,5,3',4',5'-Heptachlorobiphenyl	2.000E-01	2.794E+00	0.000E+00
50782-69-9	VX	1.000E+00	1.214E-03	0.000E+00
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	8.000E-01	3.254E-01	0.000E+00
52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	3.000E-01	1.344E+00	0.000E+00
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	4.000E-01	6.217E-01	0.000E+00
57465-28-8	3,4,5,3',4'-Pentachlorobiphenyl	0.000E+00	0.000E+00	0.000E+00
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.000E-01	6.217E-01	0.000E+00
69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	0.000E+00	0.000E+00	0.000E+00

CAS_NUMBER	**COPC_NAME**	**fa (unitless)**	**p_c (cm/hr)**	**kpv (cm/hr)**
70362-50-4	3,4,4',5-Tetrachlorobiphenyl	0.000E+00	0.000E+00	0.000E+00
73207-98-4	EA 2192	1.000E+00	7.295E-04	0.000E+00
74472-37-0	2,3,4,4'5-Pentachlorobiphenyl	5.000E-01	9.576E-01	0.000E+00

Table K-8: Dioxin and Furan COPC Parameter Set 1

Cas Number	COPC Name	MW	T_m	V_p	S	H	D_a	Dw
		(g/mol)	(°K)	(atm)	(mg/L)	(atm-m3/mol)	(cm2/sec)	(cm2/sec)
35822-46-9	HeptaCDD, 1,2,3,4,6,7,8-	4.25E+02	5.38E+02	7.37E-15	2.40E-06	1.20E-05	9.05E-02	8.00E-06
39227-28-6	HexaCDD, 1,2,3,4,7,8-	3.91E+02	5.47E+02	5.00E-14	4.42E-06	1.07E-05	9.44E-02	8.00E-06
57653-85-7	HexaCDD, 1,2,3,6,7,8-	3.91E+02	5.59E+02	4.73E-14	4.40E-06	1.10E-05	9.44E-02	8.00E-06
19408-74-3	HexaCDD, 1,2,3,7,8,9-	3.91E+02	5.17E+02	6.45E-14	4.40E-06	1.10E-05	9.44E-02	8.00E-06
70648-26-9	HexaCDF, 1,2,3,4,7,8-	3.75E+02	4.99E+02	3.16E-13	8.25E-06	1.43E-05	2.12E-02	8.00E-06
57117-44-9	HexaCDF, 1,2,3,6,7,8-	3.75E+02	5.06E+02	2.89E-13	1.77E-05	7.31E-06	2.12E-02	8.00E-06
72918-21-9	HexaCDF, 1,2,3,7,8,9-	3.75E+02	5.21E+02	3.68E-13	1.30E-05	1.10E-05	2.12E-02	8.00E-06
60851-34-5	HexaCDF, 2,3,4,6,7,8-	3.75E+02	5.13E+02	2.63E-13	1.30E-05	1.10E-05	2.12E-02	8.00E-06
40321-76-4	PentaCDD, 1,2,3,7,8-	3.56E+02	5.14E+02	5.79E-13	1.18E-04	2.60E-06	9.88E-02	8.00E-06
57117-41-6	PentaCDF, 1,2,3,7,8-	3.40E+02	4.99E+02	2.23E-12	2.40E-04	5.00E-06	2.23E-02	8.00E-06
57117-31-4	PentaCDF, 2,3,4,7,8-	3.40E+02	4.69E+02	3.42E-12	2.36E-04	4.98E-06	2.23E-02	8.00E-06

Table K-9: Dioxin and Furan COPC Parameter Set 2

Cas Number	COPC Name	K_ow (unitless)	K_oc (mL/g)	Kd_s (cm3/g)	Kd_sw (L/kg)	Kd_bs (cm3/g)	K_sg (per year)	f_v (unitless)
35822-46-9	HeptaCDD, 1,2,3,4,6,7,8-	1.00E+08	6.17E+07	6.17E+05	4.62E+06	2.47E+06	3.00E-02	3.00E-03
39227-28-6	HexaCDD, 1,2,3,4,7,8-	6.31E+07	3.89E+07	3.89E+05	2.92E+06	1.56E+06	3.00E-02	2.40E-02
57653-85-7	HexaCDD, 1,2,3,6,7,8-	2.00E+07	1.23E+07	1.23E+05	9.23E+05	4.92E+05	3.00E-02	2.90E-02
19408-74-3	HexaCDD, 1,2,3,7,8,9-	2.00E+07	1.23E+07	1.23E+05	9.23E+05	4.92E+05	3.00E-02	1.60E-02
70648-26-9	HexaCDF, 1,2,3,4,7,8-	1.00E+07	6.17E+06	6.17E+04	4.62E+05	2.47E+05	3.00E-02	4.90E-02
57117-44-9	HexaCDF, 1,2,3,6,7,8-	1.00E+07	6.17E+06	6.17E+04	4.62E+05	2.47E+05	3.00E-02	5.20E-02
72918-21-9	HexaCDF, 1,2,3,7,8,9-	1.00E+07	6.17E+06	6.17E+04	4.62E+05	2.47E+05	3.00E-02	9.00E-02
60851-34-5	HexaCDF, 2,3,4,6,7,8-	1.00E+07	6.17E+06	6.17E+04	4.62E+05	2.47E+05	3.00E-02	5.50E-02
40321-76-4	PentaCDD, 1,2,3,7,8-	4.37E+06	2.69E+06	2.69E+04	2.02E+05	1.08E+05	3.00E-02	1.17E-01
57117-41-6	PentaCDF, 1,2,3,7,8-	6.17E+06	3.80E+06	3.80E+04	2.85E+05	1.52E+05	3.00E-02	2.68E-01
57117-31-4	PentaCDF, 2,3,4,7,8-	3.16E+06	1.95E+06	1.95E+04	1.46E+05	7.80E+04	3.00E-02	2.21E-01

Table K-10: Dioxin and Furan COPC Parameter Set 3

Cas Number	COPC Name	RCF	br_root_veg	br_leafy_veg	br_forage	bv_leafy_veg	bv_forage	ba_milk
		([µg/g DW plant]/[µg/ml soil water])	([µg/g DW plant]/[µg/g soil])	([µg/g DW plant]/[µg/g soil])	([µg/g DW plant]/[µg/g soil])	([µg/g DW plant]/[µg/g air])	([µg/g DW plant]/[µg/g air])	(day/kg FW tissue)
35822-46-9	HeptaCDD, 1,2,3,4,6,7,8-	3.36E+05	5.45E-01	9.20E-04	9.20E-04	9.10E+05	9.10E+05	1.85E-03
39227-28-6	HexaCDD, 1,2,3,4,7,8-	2.36E+05	6.05E-01	1.20E-03	1.20E-03	5.20E+05	5.20E+05	2.32E-03
57653-85-7	HexaCDD, 1,2,3,6,7,8-	9.71E+04	7.89E-01	2.34E-03	2.34E-03	5.20E+05	5.20E+05	3.78E-03
19408-74-3	HexaCDD, 1,2,3,7,8,9-	9.71E+04	7.89E-01	2.34E-03	2.34E-03	5.20E+05	5.20E+05	3.78E-03
70648-26-9	HexaCDF, 1,2,3,4,7,8-	5.70E+04	9.25E-01	3.48E-03	3.48E-03	1.62E+05	1.62E+05	4.80E-03
57117-44-9	HexaCDF, 1,2,3,6,7,8-	5.70E+04	9.25E-01	3.48E-03	3.48E-03	1.62E+05	1.62E+05	4.80E-03
72918-21-9	HexaCDF, 1,2,3,7,8,9-	5.70E+04	9.25E-01	3.48E-03	3.48E-03	1.62E+05	1.62E+05	4.80E-03
60851-34-5	HexaCDF, 2,3,4,6,7,8-	5.70E+04	9.25E-01	3.48E-03	3.48E-03	1.62E+05	1.62E+05	4.80E-03
40321-76-4	PentaCDD, 1,2,3,7,8-	3.01E+04	1.12E+00	5.62E-03	5.62E-03	2.39E+05	2.39E+05	6.05E-03
57117-41-6	PentaCDF, 1,2,3,7,8-	3.93E+04	1.03E+00	4.61E-03	4.61E-03	9.75E+04	9.75E+04	5.53E-03
57117-31-4	PentaCDF, 2,3,4,7,8-	2.35E+04	1.21E+00	6.78E-03	6.78E-03	9.75E+04	9.75E+04	6.52E-03

Table K-11: Dioxin and Furan COPC Parameter Set 4

Cas Number	COPC Name	ba_beef	ba_pork	bcf_egg	bcf_chicken	BCF_fish	BAF_fish	BSAF_fish
		(day/kg FW tissue)		(L/kg-fw)	(L/kg-fw)	(L/kg FW)	(L/kg FW tissue)	(unitless)
35822-46-9	HeptaCDD, 1,2,3,4,6,7,8-	8.77E-03	1.06E-02	2.55E-02	3.90E-01	2.75E+03	2.14E+04	5.00E-03
39227-28-6	HexaCDD, 1,2,3,4,7,8-	1.10E-02	1.33E-02	4.53E-02	1.83E+00	5.18E+03	6.24E+04	4.00E-02
57653-85-7	HexaCDD, 1,2,3,6,7,8-	1.79E-02	2.17E-02	3.70E-02	1.17E+00	2.51E+04	5.74E+05	4.00E-02
19408-74-3	HexaCDD, 1,2,3,7,8,9-	1.79E-02	2.17E-02	2.33E-02	6.30E-01	2.51E+04	5.74E+05	4.00E-02
70648-26-9	HexaCDF, 1,2,3,4,7,8-	2.28E-02	2.76E-02	4.51E-02	1.58E+00	4.90E+04	1.29E+06	4.00E-02
57117-44-9	HexaCDF, 1,2,3,6,7,8-	2.28E-02	2.76E-02	4.53E-02	1.62E+00	4.90E+04	1.29E+06	4.00E-02
72918-21-9	HexaCDF, 1,2,3,7,8,9-	2.28E-02	2.76E-02	0.00E+00	0.00E+00	4.90E+04	1.29E+06	4.00E-02
60851-34-5	HexaCDF, 2,3,4,6,7,8-	2.28E-02	2.76E-02	2.71E-02	7.90E-01	4.90E+04	1.29E+06	4.00E-02
40321-76-4	PentaCDD, 1,2,3,7,8-	2.88E-02	3.48E-02	4.71E-02	2.50E+00	2.59E+04	6.64E+05	9.00E-02
57117-41-6	PentaCDF, 1,2,3,7,8-	2.63E-02	3.18E-02	0.00E+00	0.00E+00	3.38E+04	9.01E+05	9.00E-02
57117-31-4	PentaCDF, 2,3,4,7,8-	3.10E-02	3.75E-02	5.61E-02	3.28E+00	2.02E+04	4.97E+05	9.00E-02

Table K-12: Dioxin and Furan COPC Parameter Set 5

Cas Number	COPC Name	RfD	Oral_csf	RfC	inhalation_urf	inhalation csf	Chemical type	Chemical subtype
		mg/kg-day)	(per mg/kg-day)	(mg/m3)	(per µg/m3)	(per mg/kg-day)	(unitless)	(unitless)
35822-46-9	HeptaCDD, 1,2,3,4,6,7,8-	0.00E+00	1.50E+03	0.00E+00	0.00E+00	1.30E+03	O	D
39227-28-6	HexaCDD, 1,2,3,4,7,8-	0.00E+00	1.50E+04	0.00E+00	0.00E+00	1.30E+04	O	D
57653-85-7	HexaCDD, 1,2,3,6,7,8-	0.00E+00	1.50E+04	0.00E+00	0.00E+00	1.30E+04	O	D
19408-74-3	HexaCDD, 1,2,3,7,8,9-	0.00E+00	1.50E+04	0.00E+00	0.00E+00	1.30E+04	O	D
70648-26-9	HexaCDF, 1,2,3,4,7,8-	0.00E+00	1.50E+04	0.00E+00	0.00E+00	1.30E+04	O	F
57117-44-9	HexaCDF, 1,2,3,6,7,8-	0.00E+00	1.50E+04	0.00E+00	0.00E+00	1.30E+04	O	F
72918-21-9	HexaCDF, 1,2,3,7,8,9-	0.00E+00	1.50E+04	0.00E+00	0.00E+00	1.30E+04	O	F
60851-34-5	HexaCDF, 2,3,4,6,7,8-	0.00E+00	1.50E+04	0.00E+00	0.00E+00	1.30E+04	O	F
40321-76-4	PentaCDD, 1,2,3,7,8-	0.00E+00	1.50E+05	0.00E+00	0.00E+00	1.30E+05	O	D
57117-41-6	PentaCDF, 1,2,3,7,8-	0.00E+00	4.50E+03	0.00E+00	0.00E+00	3.90E+03	O	F
57117-31-4	PentaCDF, 2,3,4,7,8-	0.00E+00	4.50E+04	0.00E+00	0.00E+00	3.90E+04	O	F

Table K-13: Dioxin and Furan COPC Parameter Set 6

Cas Number	COPC Name	br_grain ([µg/d DW plant]/[µg/g soil])	ba_egg (day/kg FW tissue)	ba_chicken (day/kg FW tissue)	inhalation_rfd (mg/kg/day)	tef (unitless)	abs (unitless)	t_b (°K)
35822-46-9	HeptaCDD, 1,2,3,4,6,7,8-	9.20E-04	3.69E-03	6.46E-03	0.00E+00	1.00E-02	3.00E-02	7.80E+02
39227-28-6	HexaCDD, 1,2,3,4,7,8-	1.20E-03	4.63E-03	8.11E-03	0.00E+00	1.00E-01	3.00E-02	6.90E+02
57653-85-7	HexaCDD, 1,2,3,6,7,8-	2.34E-03	7.56E-03	1.32E-02	0.00E+00	1.00E-01	3.00E-02	7.18E+02
19408-74-3	HexaCDD, 1,2,3,7,8,9-	2.34E-03	7.56E-03	1.32E-02	0.00E+00	1.00E-01	3.00E-02	7.18E+02
70648-26-9	HexaCDF, 1,2,3,4,7,8-	3.48E-03	9.60E-03	1.68E-02	0.00E+00	1.00E-01	3.00E-02	7.61E+02
57117-44-9	HexaCDF, 1,2,3,6,7,8-	3.48E-03	9.60E-03	1.68E-02	0.00E+00	1.00E-01	3.00E-02	7.61E+02
72918-21-9	HexaCDF, 1,2,3,7,8,9-	3.48E-03	9.60E-03	1.68E-02	0.00E+00	1.00E-01	3.00E-02	6.93E+02
60851-34-5	HexaCDF, 2,3,4,6,7,8-	3.48E-03	9.60E-03	1.68E-02	0.00E+00	1.00E-01	3.00E-02	6.88E+02
40321-76-4	PentaCDD, 1,2,3,7,8-	5.62E-03	1.21E-02	2.12E-02	0.00E+00	1.00E+00	3.00E-02	6.71E+02
57117-41-6	PentaCDF, 1,2,3,7,8-	4.61E-03	1.11E-02	1.94E-02	0.00E+00	3.00E-02	3.00E-02	6.75E+02
57117-31-4	PentaCDF, 2,3,4,7,8-	6.78E-03	1.30E-02	2.28E-02	0.00E+00	3.00E-01	3.00E-02	7.38E+02

Table K-14: Dioxin and Furan COPC Parameter Set 7

Cas Number	COPC Name	fa	p_c	kpv
		(unitless)	(cm/hr)	(cm/hr)
35822-46-9	HeptaCDD, 1,2,3,4,6,7,8-	1.00E-01	1.26E+00	0.00E+00
39227-28-6	HexaCDD, 1,2,3,4,7,8-	2.00E-01	1.44E+00	0.00E+00
57653-85-7	HexaCDD, 1,2,3,6,7,8-	4.00E-01	6.74E-01	0.00E+00
19408-74-3	HexaCDD, 1,2,3,7,8,9-	4.00E-01	6.74E-01	0.00E+00
70648-26-9	HexaCDF, 1,2,3,4,7,8-	5.00E-01	5.25E-01	0.00E+00
57117-44-9	HexaCDF, 1,2,3,6,7,8-	5.00E-01	5.25E-01	0.00E+00
72918-21-9	HexaCDF, 1,2,3,7,8,9-	5.00E-01	5.25E-01	0.00E+00
60851-34-5	HexaCDF, 2,3,4,6,7,8-	5.00E-01	5.25E-01	0.00E+00
40321-76-4	PentaCDD, 1,2,3,7,8-	6.00E-01	3.88E-01	0.00E+00
57117-41-6	PentaCDF, 1,2,3,7,8-	6.00E-01	5.99E-01	0.00E+00
57117-31-4	PentaCDF, 2,3,4,7,8-	6.00E-01	3.85E-01	0.00E+00

L Appendix L – Compounds Used In TOE Evaluation

Table L-1: Volatile Compounds

CAS Number	COPC Name	Melting Point (K)	Boiling Point (K)	MW (AMU)	Vapor Pressure (atm)	Aqueous Solubility (mg/L)	K_{ow}	Half-life (day)
67-63-0	Isopropanol	185	355	60.1	5.98E-02	1.00E+06	1.12E+00	1.92E-02
71-55-6	1,1,1-Trichloroethane	243	347	133.0	1.58E-01	1.30E+03	3.16E+02	7.48E-01
74-95-3	Dibromomethane	220	370	173.9	5.84E-02	1.19E+04	3.38E+01	ND
74-99-7	1-Propyne	170	250	40.1	5.67E+00	3.64E+03	8.71E+00	ND
75-07-0	Acetaldehyde	150	293	44.1	ND	1.00E+06	6.03E-01	ND
75-28-5	Isobutane	114	261	58.1	3.43E+00	4.88E+01	6.31E+02	ND
75-29-6	2-Chloropropane	156	309	78.5	6.78E-01	3.10E+03	7.94E+01	ND
75-34-3	1,1-Dichloroethane	176	330	99.0	3.03E-01	5.10E+03	6.31E+01	4.22E-01
75-37-6	1,1-Difluoroethane	156	246	66.1	5.99E+00	2.80E+03	5.62E+00	ND
75-77-4	Trimethylchlorosilane	233	331	109.0	3.08E-01	8.35E+02	3.02E+02	ND
78-78-4	Isopentane	114	303	72.2	9.07E-01	4.80E+01	5.25E+02	ND
78-87-5	1,2-Dichloropropane	203	370	113.0	6.84E-02	2.80E+03	1.00E+02	ND
96-14-0	3-Methylpentane	110	336	86.2	2.50E-01	1.79E+01	3.98E+03	ND
96-47-9	2-Methyltetrahydrofuran		352	86.1	1.28E-01	1.39E+05	2.24E+01	ND
106-97-8	Butane	135	273	58.1	2.39E+00	6.12E+01	5.75E+02	ND
106-99-0	1,3-Butadiene	164	269	54.1	2.77E+00	7.34E+02	9.77E+01	7.67E-02
107-01-7	2-Butene	134	277	56.1	1.79E+00	4.24E+02	2.14E+02	ND
107-05-1	Allyl chloride	139	318	76.5	4.84E-01	3.37E+03	2.82E+01	ND
107-06-2	1,2-Dichlorethane	237	357	99.0	1.04E-01	8.50E+03	3.16E+01	4.93E-01
107-83-5	2-Methylpentane	119	333	86.2	2.78E-01	1.40E+01	1.62E+03	ND
109-66-0	Pentane	143	309	72.2	6.76E-01	3.80E+01	2.45E+03	ND
109-67-1	Pentene-1	108	303	40.1	8.36E-01	1.48E+02	4.57E+02	ND
110-00-9	Furan	188	304	68.1	7.93E-01	1.00E+04	2.19E+01	ND
115-07-1	Propylene	88	226	42.1	1.14E+01	2.00E+02	5.89E+01	7.66E-02
115-11-7	Isobutylene	133	266	56.1	3.04E+00	2.63E+02	2.19E+02	ND

CAS Number	COPC Name	Melting Point (K)	Boiling Point (K)	MW (AMU)	Vapor Pressure (atm)	Aqueous Solubility (mg/L)	K_{ow}	Half-life (day)
142-82-5	Heptane	183	371	100.2	6.05E-02	3.40E+00	4.57E+04	4.00E-02
156-59-2	cis-1,2-Dichloroethylene	193	333	96.9	2.63E-01	3.50E+03	7.94E+01	ND
156-60-5	trans-1,2-Dichloroethylene	223	321	96.9	4.34E-01	6.30E+03	1.26E+02	ND
287-92-3	Cyclopentane	179	322	70.1	4.17E-01	1.56E+02	1.00E+03	ND
353-66-2	Difluorodimethylsilane	186	276	96.2	ND	ND	ND	ND
463-58-1	Carbonyl sulfide	134	223	60.1	1.24E+01	1.22E+03	6.31E+00	ND
504-60-9	1,3-Pentadiene	ND	315	68.1	5.33E-01	3.26E+02	2.82E+02	ND
547-63-7	Methyl isobutyrate	188	366	102.1	6.49E-02	9.27E+03	1.91E+01	ND
563-58-6	1,1-Dichloropropene	ND	350	111.0	1.19E-01	7.49E+02	3.39E+02	ND
589-34-4	3-Methylhexane	154	363	100.2	8.09E-02	4.95E+00	5.13E+03	ND
590-18-1	cis-2-Butene	134	277	56.1	2.11E+00	6.59E+02	2.14E+02	ND
590-21-6	1-Chloro-1-propene	ND	309	76.5	6.70E-01	2.42E+03	1.10E+02	ND
592-41-6	1-Hexene	133	336	84.2	2.42E-01	5.00E+01	2.45E+03	ND
592-42-7	1,5-Hexadiene	132	332	82.2	2.91E-01	1.69E+02	7.41E+02	ND
593-60-2	Vinyl bromide	134	289	107.0	1.36E+00	5.68E+03	3.72E+01	ND
594-20-7	2,2-Dichloropropane	239	342	113.0	ND	3.91E+02	8.32E+02	ND
616-38-6	Carbonic acid, dimethyl ester	276	363	90.1	7.29E-02	1.38E+05	1.70E+00	ND
624-64-6	trans-2-Butene	168	274	56.1	2.32E+00	5.11E+02	2.04E+02	ND
646-04-8	trans-2-Pentene	133	309	70.1	6.66E-01	2.03E+02	3.80E+02	ND
811-97-2	1,1,1,2-Tetrafluoroethane	172	299	102.0	6.57E+00	2.04E+03	4.79E+01	ND
994-05-8	Tert-amyl methyl ether	ND	359	102.0	9.89E-02	2.64E+03	8.32E+01	ND
1191-96-4	Ethylcyclopropane	124	309	70.1	6.78E-01	2.35E+02	4.07E+02	ND

ND implies no data was available.

Table L-2: Semi-volatile Compounds

CAS Number	COPC Name	Melting Point (K)	Boiling Point (K)	MW (AMU)	Vapor Pressure (atm)	Aqueous Solubility (mg/L)	K_{ow}	Half-life (day)
51-28-5	2,4-Dinitrophenol	386	386	184.0	6.71E-06	2.79E+03	3.47E+01	
55-18-5	N-Nitrosodiethylamine	263	450	102.0	1.13E-03	9.30E+04	3.02E+00	4.93E-01
55-63-0	Nitroglycerin	287	491	227.0	2.63E-07	1.38E+03	4.17E+01	1.92E-02
56-49-5	3-Methylcholanthrene	453	553	268.4	1.02E-11	2.90E-03	2.63E+06	3.84E+00
57-10-3	Palmitic acid	335	488	256.4	5.00E-10	8.21E-01	1.48E+07	ND
57-55-6	Propylene glycol	213	461	76.1	1.69E-04	1.00E+06	3.89E-02	ND
58-90-2	2,3,4,6-Tetrachlorophenol	343	423	232.0	1.89E-06	1.00E+02	2.82E+04	ND
59-50-7	3-Methyl-4-chlorophenol	340	508	143.0	6.58E-05	3.83E+03	1.26E+03	ND
59-89-2	N-Nitrosomorpholine	302	498	116.1	4.70E-05	8.62E+05	3.63E-01	5.00E-01
60-11-7	4-(Dimethylamino)azobenzene	389	473	225.3	9.21E-11	2.30E-01	3.80E+04	7.67E-02
62-50-0	Ethyl methanesulfonate	273	486	124.0	2.71E-04	6.30E+03	1.12E+00	ND
62-53-3	Aniline	267	457	93.6	6.45E-04	3.60E+04	7.94E+00	ND
62-75-9	N-Nitrosodimethylamine	223	425	74.0	3.55E-03	1.00E+06	2.69E-01	5.00E-01
66-27-3	Methyl methanesulfonate	293	476	110.1	4.08E-04	1.00E+06	2.19E-01	ND
67-72-1	Hexachloroethane	460	462	237.0	2.76E-04	5.00E+01	8.51E+03	ND
75-52-5	Nitromethane	245	374	61.0	4.70E-02	1.11E+05	4.47E-01	1.00E-01
76-01-7	Pentachloroethane	244	435	202.3	4.61E-03	4.80E+02	7.76E+02	ND
77-47-4	Hexachlorocyclopentadiene	284	512	273.0	7.89E-05	1.80E+00	1.10E+05	ND
78-40-0	Triethyl phosphate	217	489	182.2	5.17E-04	5.00E+05	6.31E+00	ND
78-59-1	Isophorone	265	488	138.0	5.76E-04	1.20E+04	5.01E+01	ND
79-00-5	1,1,2-Trichloroethane	236	387	133.0	3.03E-02	4.40E+03	1.00E+02	9.86E-01
79-34-5	1,1,2,2-Tetrachloroethane	229	419	168.0	6.05E-03	3.00E+03	2.51E+02	1.21E-01
83-32-9	Acenaphthene	366	552	154.0	3.29E-06	3.60E+00	7.94E+03	ND
86-30-6	N-nitrosodiphenylamine	340	541	198.0	8.82E-07	3.50E+01	1.26E+03	ND
86-73-7	Fluorene	383	568	166.0	8.29E-07	2.00E+00	1.58E+04	ND
87-65-0	2,6-Dichlorophenol	342	493	163.0	4.30E-05	1.90E+03	4.37E+02	2.00E-02
87-68-3	Hexachloro-1,3-butadiene	252	483	261.0	2.89E-04	3.20E+00	6.31E+04	ND
88-06-2	2,4,6-Trichlorophenol	342	518	198.0	3.16E-05	8.00E+02	5.01E+03	ND

CAS Number	COPC Name	Melting Point (K)	Boiling Point (K)	MW (AMU)	Vapor Pressure (atm)	Aqueous Solubility (mg/L)	K_{ow}	Half-life (day)
88-74-4	2-Nitroaniline	344	557	138.0	1.16E-06	1.47E+03	7.08E+01	ND
88-75-5	2-Nitrophenol	318	488	139.0	1.49E-04	2.19E+03	6.17E+01	ND
90-13-1	1-Chloronaphthalene	271	532	162.6	3.80E-05	1.74E+01	1.00E+04	ND
91-58-7	2-Chloronaphthalene	333	529	163.0	1.05E-05	1.17E+01	2.40E+03	ND
92-52-4	Biphenyl	344	529	154.2	7.60E-05	7.10E+00	1.23E+04	2.00E-02
94-59-7	Safrole	284	506	162.2	9.29E-05	8.11E+02	4.57E+02	ND
95-49-8	2-Chlorotoluene	ND	432	ND	ND	ND	ND	ND
95-53-4	2-Aminotoluene	257	477	107.2	4.21E-04	1.66E+04	2.09E+01	ND
95-57-8	2-Chlorophenol	283	449	129.0	3.08E-03	2.20E+04	1.45E+02	ND
95-94-3	1,2,4,5-Tetrachlorobenzene	413	519	216.0	7.11E-06	5.90E-01	6.31E+04	ND
95-95-4	2,4,5-Trichlorophenol	341	526	198.0	2.63E-05	1.20E+03	5.25E+03	ND
96-18-4	1,2,3-Trichloropropane	258	429	147.0	4.87E-03	1.80E+03	1.00E+02	ND
96-19-5	1,2,3-Trichloropropene	ND	415	145.4	5.79E-03	3.34E+02	6.03E+02	ND
96-22-0	3-Pentanone	234	374	86.1	4.96E-02	4.81E+04	9.77E+00	ND
98-29-3	4-tert-Butylpyrocatechol	327	558	166.2	4.38E-07	2.00E+03	8.71E+02	ND
98-82-8	Cumene	177	426	120.2	5.92E-03	6.10E+01	5.01E+03	ND
98-86-2	Acetophenone	293	475	120.0	5.22E-04	6.13E+03	3.80E+01	ND
98-95-3	Nitrobenzene	279	484	123.0	3.22E-04	2.09E+03	7.08E+01	ND
99-65-0	1,3-Dinitrobenzene	363	570	168.0	1.18E-06	8.60E+02	3.16E+01	ND
100-02-7	4-Nitrophenol	387	552	139.0	5.39E-08	1.16E+04	8.13E+01	ND
100-47-0	Benzonitrile	260	464	103.0	1.01E-03	2.00E+03	3.63E+01	ND
100-75-4	N-Nitrosopiperidine	ND	492	114.2	ND	ND	2.29E+00	5.00E-01
103-65-1	n-Propylbenzene	174	432	120.2	4.50E-03	5.22E+01	3.72E+03	ND
104-76-7	2-Ethyl-1-hexanol	197	458	130.2	1.79E-04	1.01E+04	6.46E+02	ND
105-67-9	2,4-Dimethylphenol	298	484	122.0	1.29E-04	7.90E+03	2.00E+02	ND
106-43-4	4-Chlorotoluene	281	435	126.6	3.89E-03	1.06E+02	2.14E+03	ND
106-44-5	p-Cresol	309	475	109.0	1.45E-04	2.20E+04	7.94E+01	1.83E-03
106-47-8	4-Chloroaniline	346	505	128.0	1.62E-05	5.30E+03	6.76E+01	ND
106-50-3	1,4-Benzenediamine	419	540	108.1	9.55E-07	3.70E+04	4.88E-01	ND

CAS Number	COPC Name	Melting Point (K)	Boiling Point (K)	MW (AMU)	Vapor Pressure (atm)	Aqueous Solubility (mg/L)	K_{ow}	Half-life (day)
106-93-4	Ethylene dibromide	283	405	188.0	1.71E-02	4.00E+03	1.00E+02	4.93E-01
107-39-1	2,4,4-Trimethyl-1-pentene	180	374	112.2	5.88E-02	4.04E+00	3.55E+04	ND
107-87-9	2-Pentanone	195	383	86.1	4.66E-02	4.30E+04	8.13E+00	ND
107-88-0	1,3-Butanediol	196	481	90.1	2.76E-05	1.00E+06	4.13E-02	ND
108-11-2	4-Methyl-2-pentanol	183	405	102.0	6.97E-03	1.64E+04	2.69E+01	ND
108-39-4	m-Cresol	285	475	109.0	1.82E-04	2.27E+04	9.12E+01	ND
108-60-1	Bis(2-chloro-1-methylethyl) ether	176	460	171.1	1.16E-03	1.70E+04	3.02E+02	ND
108-86-1	Bromobenzene	243	429	157.0	5.50E-03	4.46E+02	9.77E+02	ND
108-95-2	Phenol	314	455	94.1	3.68E-04	8.30E+04	3.16E+01	2.74E-02
109-06-8	2-Methylpyridine	203	402	93.1	1.47E-02	ND	1.29E+01	ND
110-57-6	trans-1,4-Dichlorobutene-2	275	428	125.0	4.51E-03	8.50E+02	3.98E+02	9.00E-03
110-86-1	Pyridine	232	388	79.1	2.74E-02	1.00E+06	4.47E+00	ND
111-44-4	Bis(2-chloroethyl) ether	226	452	143.0	2.04E-03	1.72E+04	1.95E+01	ND
111-65-9	N-Octane	216	399	114.2	1.86E-02	6.60E-01	1.51E+05	ND
111-84-2	Nonane	220	424	128.3	5.86E-03	2.20E-01	4.47E+05	ND
111-90-0	Diethylene glycol monoethyl ether	197	470	134.0	1.66E-04	1.00E+06	7.03E-01	7.66E-02
111-91-1	Bis(2-chloroethoxy)methane	241	488	173.0	1.84E-07	1.21E+05	5.62E+00	ND
112-31-2	Decanal	268	482	156.0	1.36E-04	6.08E+01	5.75E+03	ND
112-40-3	Dodecane	264	489	170.3	1.78E-04	3.70E-03	1.26E+06	ND
112-41-4	1-Dodecene	238	487	168.3	2.09E-04	1.13E-01	1.26E+06	ND
112-54-9	Dodecanal	318	458	184.3	2.01E-05	4.65E+00	5.62E+04	ND
112-88-9	1-Octadecene	291	452	252.5	8.88E-08	1.26E-04	1.10E+09	ND
112-92-5	1-Octadecanol	333	483	270.5	3.55E-09	1.10E-03	5.25E+07	ND
117-84-0	Di-n-octyl phthalate	298	493	391.0	3.42E-09	2.00E-02	1.26E+08	ND
119-93-7	3,3'-Dimethylbenzidine	403	573	212.3	1.12E-10	1.30E+03	2.19E+02	2.00E-02
120-58-1	Isosafrole	281	526	162.2	1.22E-04	4.45E+01	5.62E+02	8.00E-02
120-82-1	1,2,4-Trichlorobenzene	290	487	181.0	5.66E-04	3.50E+01	1.00E+04	ND
120-83-2	2,4-Dichlorophenol	318	483	163.0	8.82E-05	4.50E+03	7.94E+02	ND
121-33-5	4-Hydroxy-3-methoxybenzaldehyde	355	558	152.2	1.55E-07	1.10E+04	1.62E+01	2.00E-02

CAS Number	COPC Name	Melting Point (K)	Boiling Point (K)	MW (AMU)	Vapor Pressure (atm)	Aqueous Solubility (mg/L)	K_{ow}	Half-life (day)
122-66-7	1,2-Diphenylhydrazine	403	402	184.2	5.66E-07	6.80E+01	7.94E+02	ND
123-73-9	(E)-Crotonaldehyde	199	377	70.1	4.05E-02	1.56E+05	4.27E+00	ND
124-18-5	Decane	243	447	142.3	1.88E-03	5.20E-02	1.02E+05	ND
124-19-6	Nonanal	254	475	142.0	4.87E-04	9.60E+01	1.86E+03	ND
126-33-0	Tetrahydrothiophene-1,1-dioxide	301	558	120.2	8.16E-06	3.79E+05	1.70E-01	8.00E-03
127-18-4	Tetrachloroethylene	251	394	166.0	2.50E-02	2.00E+02	2.51E+03	9.86E-01
132-64-9	Dibenzofuran	360	560	170.0	2.37E-07	3.10E+00	1.26E+04	8.00E-02
138-86-3	Limonene	178	449	136.2	2.63E-02	1.38E+01	1.71E+04	ND
140-29-4	Benzyl cyanide	249	507	117.0	1.18E-04	1.00E+02	3.63E+01	ND
142-28-9	1,3-Dichloropropane	174	394	113.0	2.39E-02	2.75E+03	1.00E+02	ND
143-07-7	Dodecanoic Acid	316	572	200.3	2.11E-07	4.81E+00	3.98E+04	ND
208-96-8	Acenaphthylene	366	538	150.0	1.19E-06	1.60E+01	1.26E+04	1.64E-01
286-20-4	Cyclohexene oxide	263	405	98.2	1.50E-02	6.07E+03	4.57E+01	ND
293-96-9	Cyclodecane	283	475	140.3	7.37E-04	9.89E-01	1.38E+05	ND
294-62-2	Cyclododecane	334	520	168.3	3.88E-05	4.70E-03	1.32E+06	ND
295-65-8	Cyclohexadecane	ND	573	ND	ND	ND	ND	ND
375-22-4	Heptafluorobutyric acid, n-trid	256	394	214.0	8.38E-03	4.61E+03	2.69E+02	ND
464-17-5	1,7,7-trimethyl bicyclo[2.2.1] hept-2-ene	386	419	136.2	1.01E-03	1.38E+00	1.48E+04	ND
510-15-6	Chlorobenzilate	309	431	325.2	2.89E-09	1.30E+01	2.29E+04	ND
513-85-9	2,3-Butanediol	298	455	90.1	3.20E-04	1.00E+06	1.20E-01	ND
526-75-0	2,3-Dimethylphenol	346	490	122.2	1.17E-04	4.57E+03	3.02E+02	5.00E-02
536-60-7	Benzenemethanol, 4-(1-methylethyl)-	301	521	150.2	4.16E-06	2.31E+03	3.39E+02	ND
540-97-6	Dodecamethylcyclohexasiloxane	270	518	444.9	2.96E-05	5.10E-03	2.14E+06	ND
541-05-9	Hexamethylcyclotrisiloxane	338	407	222.5	4.60E-03	1.57E+00	2.95E+04	ND
541-73-1	1,3-Dichlorobenzene	248	446	147.0	2.83E-03	1.34E+02	3.98E+03	ND
544-25-2	1,3,5-Cycloheptatriene	194	390	92.1	3.09E-02	6.20E+02	4.27E+02	ND
544-76-3	Hexadecane	291	560	226.0	1.88E-06	9.00E-04	1.78E+08	ND
556-67-2	Octamethylcyclotetrasiloxane	291	449	297.0	1.27E-03	5.00E-03	2.82E+04	ND
560-21-4	2,3,3-Trimethylpentane	172	388	114.2	3.55E-02	9.91E+00	1.23E+04	ND

CAS Number	COPC Name	Melting Point (K)	Boiling Point (K)	MW (AMU)	Vapor Pressure (atm)	Aqueous Solubility (mg/L)	K_{ow}	Half-life (day)
591-78-6	2-Hexanone	218	400	100.0	1.53E-02	1.75E+04	2.40E+01	ND
606-20-2	2,6-Dinitrotoluene	344	573	182.0	7.46E-07	1.82E+02	5.25E+01	4.93E-01
608-93-5	Pentachlorobenzene	359	550	250.0	2.88E-06	1.33E+00	1.48E+05	ND
613-90-1	alpha-Oxophenylacetonitrile	404	479	131.1	2.76E-04	5.91E+04	1.58E+00	ND
621-64-7	N-Nitrosodi-N-propylamine	280	479	130.0	1.71E-04	9.89E+03	2.29E+01	ND
623-27-8	1,4-Benzenedicarboaldehyde	390	519	134.1	5.00E-06	2.00E+02	2.69E+01	ND
623-42-7	Methyl butyrate	187	375	102.1	4.25E-02	1.50E+04	1.95E+01	ND
625-38-7	3-Butenoic Acid	238	442	86.1	2.16E-03	1.30E+05	8.51E+00	ND
626-19-7	Isophthalaldehyde	363	519	134.1	1.00E-05	2.73E+03	2.69E+01	ND
626-93-7	2-Hexanol	ND	409	102.2	3.28E-03	1.37E+04	5.75E+01	ND
629-20-9	1,3,5,7-Cyclooctatetraene	269	414	104.2	1.03E-02	7.73E+01	1.20E+03	ND
629-50-5	n-Tridecane	268	508	184.4	7.30E-05	4.70E-03	5.37E+06	ND
629-59-4	n-Tetradecane	279	527	198.4	1.50E-05	2.20E-03	1.58E+07	ND
629-62-9	n-Pentadecane	283	544	212.0	4.51E-06	7.60E-05	5.13E+07	ND
630-20-6	1,1,1,2-Tetrachloroethane	204	404	168.0	1.58E-02	1.10E+03	1.07E+03	1.83E-01
871-83-0	2-Methylnonane	199	440	142.3	2.49E-03	8.99E-01	1.51E+05	ND
872-05-9	1-Decene	207	444	140.3	2.20E-03	5.70E-01	5.01E+05	ND
924-16-3	N,N-Dibutylnitrosoamine	275	507	158.0	3.95E-05	1.27E+03	8.32E+01	ND
930-55-2	N-Nitrosopyrrolidine	ND	487	100.1	3.29E-05	ND	6.46E-01	5.00E-01
930-68-7	2-Cyclohexenone	220	443	104.2	4.76E-03	3.62E+04	4.07E+00	ND
937-30-4	1-(4-Ethylphenyl) ethanone	253	387	148.2	1.20E-03	3.73E+02	5.13E+02	ND
1071-26-7	2,2-Dimethylheptane	160	406	128.3	1.42E-02	2.90E+00	4.47E+04	ND
1120-21-4	n-Undecane	248	469	156.3	5.42E-04	4.40E-03	3.16E+06	ND
1330-86-5	Diisoctyl Adipate	203	493	320.6	3.49E-08	5.40E-04	1.32E+08	ND
1476-11-5	1,4-Dichloro-cis-2-butene	225	426	125.0	5.38E-03	5.80E+02	3.98E+02	1.00E-02
1587-04-8	1-Methyl-2-(2-propenyl)benzene	ND	454	132.2	1.13E-03	3.94E+01	8.51E+03	ND
1600-37-9	1,1,2,3,3-Pentachloro-1-propene	ND	458	214.3	9.96E-04	4.13E+01	2.82E+03	ND
1745-81-9	o-Allylphenol	267	493	134.2	8.26E-05	3.72E+03	8.13E+02	ND
1888-71-7	Perchloropropene	200	483	248.8	3.21E-04	1.70E+01	2.40E+04	ND

CAS Number	COPC Name	Melting Point (K)	Boiling Point (K)	MW (AMU)	Vapor Pressure (atm)	Aqueous Solubility (mg/L)	K_{ow}	Half-life (day)
2051-30-1	2,6-Dimethyloctane	ND	433	142.3	3.88E-03	1.04E+00	1.29E+05	ND
2216-33-3	3-Methyloctane	166	417	128.3	8.23E-03	2.87E+00	4.90E+04	ND
2233-00-3	3,3,3-Trichloro 1-Propene	243	388	145.4	2.62E-02	3.07E+02	1.07E+03	ND
2303-16-4	Diallate	300	381	270.2	1.97E-07	1.40E+01	6.31E+04	2.50E-01
3454-07-7	p-Ethylstyrene	223	465	132.2	1.24E-03	2.38E+01	1.55E+04	ND
4170-30-3	Crotonaldehyde	197	377	86.0	3.94E-02	1.81E+05	3.98E+00	ND
4748-78-1	4-Ethylbenzaldehyde	ND	531	134.2	ND	ND	ND	ND
5911-04-6	3-Methylnonane	188	441	142.3	3.03E-03	9.70E-01	1.51E+05	ND
5989-27-5	(D)-Limonene	409	449	136.0	2.63E-02	1.38E+01	1.71E+04	ND
6975-98-0	2-Methyldecane	224	462	156.3	7.92E-04	2.97E-01	4.68E+05	ND
7005-72-3	p-Chlorophenyl phenyl ether	265	557	205.0	3.55E-06	3.30E+00	1.20E+04	ND
10595-95-6	N-Nitrosomethylethylamine	ND	436	88.1	1.45E-03	3.00E-05	1.10E+00	ND
13151-34-3	3-Methyl decane	180	461	156.3	1.19E-03	3.25E-01	4.68E+05	ND
13475-82-6	2,2,4,6,6-Pentamethyl heptane	206	451	170.3	1.92E-03	1.77E-01	8.71E+05	ND
14371-10-9	Cinnamaldehyde, (E)-	266	519	132.2	4.40E-05	3.76E+03	6.61E+01	ND
15869-92-8	3,4-Dimethyl octane	ND	436	142.3	3.71E-03	1.04E+00	1.29E+05	ND
17301-94-9	4-Methylnonane	174	439	142.3	3.34E-03	9.70E-01	1.51E+05	ND
39638-32-9	Bis(2-chloroisopropyl) ether	370	460	171.1	7.00E-03	1.30E+03	ND	ND
39761-61-0	(z)-5,5-Dimethyl 2-Hexene	ND	380	112.2	4.27E-02	1.33E+01	8.71E+03	ND

ND implies no data was available.

Table L-3: Non-volatile Compounds

CAS Number	COPC Name	Melting Point (K)	Boiling Point (K)	MW (AMU)	Vapor Pressure (atm)	Aqueous Solubility (mg/L)	K_{ow}	Half-life (day)
50-32-8	Benzo(a)pyrene	453	768	252.0	7.24E-12	1.60E-03	1.00E+06	ND
53-70-3	Dibenzo(a,h)anthracene	543	797	278.0	1.32E-13	2.50E-03	3.16E+06	ND
53-96-3	2-Acetylaminofluorene	467	576	223.3	7.34E-08	5.29E+00	1.74E+03	5.00E-01
56-38-2	Parathion	279	648	291.0	1.27E-08	6.54E+00	6.76E+03	ND
56-55-3	Benz(a)anthracene	357	711	228.0	1.45E-10	9.40E-03	5.01E+05	ND
57-11-4	Stearic acid	342	656	284.5	9.50E-10	3.40E+02	1.70E+08	1.67E-02
57-97-6	7,12-Dimethylbenz(a)anthracene	396	753	256.4	7.41E-12	6.10E-02	6.31E+05	8.00E-02
82-68-8	Pentachloronitrobenzene	417	601	295.0	1.49E-07	5.50E-01	4.37E+04	ND
85-01-8	Phenanthrene	372	613	178.0	1.45E-07	1.10E+00	3.16E+04	5.48E-01
85-68-7	Butyl benzyl phthalate	238	643	312.0	1.09E-08	2.70E+00	7.94E+04	1.92E-02
87-86-5	Pentachlorophenol	443	583	266.0	4.21E-08	2.00E+03	1.26E+05	ND
88-85-7	Dinoseb	313	605	240.2	9.87E-08	5.20E+01	4.90E+03	3.37E-01
91-59-8	2-Naphthylamine	385	579	143.0	1.10E-06	2.63E+02	1.91E+02	4.93E-01
91-94-1	3,3'-Dichlorobenzidine	405	641	253.0	4.88E-11	3.10E+00	3.24E+03	ND
92-67-1	4-Biphenylamine	327	575	169.2	3.88E-07	4.49E+02	6.31E+02	ND
92-87-5	Benzidine	393	673	180.0	1.05E-11	5.00E+02	5.01E+01	2.00E-02
99-09-2	3-Nitroaniline	387	579	138.0	1.26E-07	1.21E+03	2.34E+01	ND
99-35-4	1,3,5-Trinitrobenzene	393	588	213.0	8.42E-09	2.80E+02	1.58E+01	ND
100-01-6	4-Nitroaniline	422	605	138.0	1.09E-08	7.28E+02	2.45E+01	ND
101-55-3	p-Bromophenyl phenyl ether	292	583	249.0	1.97E-06	4.60E+00	1.75E+05	ND
103-23-1	Bis(2-ethylhexyl) adipate	205	690	371.0	3.09E-09	1.00E-01	1.58E+04	7.66E-02
111-02-4	Squalen	253	698	411.0	1.50E-09	1.05E-09	1.32E+14	ND
112-05-0	n-Nonanoic acid	285	783	158.0	1.54E-06	2.84E+02	2.63E+03	ND
112-39-0	Methyl hexadecanoate	303	690	270.5	6.18E-08	1.17E-02	2.40E+07	ND
112-61-8	Methyl stearate	312	716	298.5	1.79E-08	1.17E-03	2.24E+08	ND
112-95-8	n-Eicosane	310	616	282.6	6.08E-09	1.90E-03	1.58E+10	ND
118-74-1	Hexachlorobenzene	503	605	285.0	2.37E-08	6.20E-06	2.00E+05	ND

CAS Number	COPC Name	Melting Point (K)	Boiling Point (K)	MW (AMU)	Vapor Pressure (atm)	Aqueous Solubility (mg/L)	K_{ow}	Half-life (day)
120-12-7	Anthracene	493	613	178.0	3.55E-09	4.30E-02	3.16E+04	ND
122-39-4	N,N-Diphenylamine	327	575	159.0	8.79E-07	3.57E+01	3.16E+03	7.67E-02
129-00-0	Pyrene	423	677	202.0	6.05E-09	1.40E+00	7.94E+04	
134-32-7	1-Naphthylamine	323	574	143.2	3.62E-06	1.70E+03	1.78E+02	5.00E-01
191-24-2	Benzo(g,h,i)perylene	551	773	280.0	1.31E-13	2.60E-04	3.98E+06	1.78E+00
192-97-2	Benzo(e)pyrene	451	584	252.3	7.50E-12	6.30E-03	2.75E+06	ND
193-39-5	Indeno(1,2,3-cd)pyrene	433	809	276.0	1.32E-13	2.20E-05	3.98E+06	ND
205-82-3	Benzo(j)fluoranthene	439	753	252.3	3.45E-03	2.50E-03	1.29E+06	ND
205-99-2	Benz(b)fluoranthene	441	630	252.0	6.58E-10	1.50E-03	1.33E+06	ND
206-44-0	Fluoranthene	383	648	202.0	1.03E-08	2.10E-01	1.00E+05	1.21E+00
207-08-9	Benzo(k)fluoranthene	493	753	252.0	2.63E-12	8.00E-04	1.26E+06	ND
218-01-9	Chrysene	533	721	228.0	8.16E-12	6.30E-03	5.01E+05	ND
224-42-0	Dibenz(a,j)acridine	489	753	279.3	2.43E-12	1.80E-02	4.27E+05	ND
534-52-1	4,6-Dinitro-o-cresol	358	585	198.1	4.26E-07	1.98E+02	1.32E+02	6.00E-02
544-85-4	Dotriacontane	343	740	450.9	2.63E-10	8.29E-12	1.15E+16	ND
591-76-4	2-Methylhexane	155	636	100.1	ND	ND	ND	ND
593-49-7	Heptacosane	333	715	380.8	3.70E-10	2.83E-09	3.98E+13	ND
620-14-4	1-Methyl-3-ethylbenzene	176	708	120.2	ND	ND	3.17E+03	ND
629-78-7	n-Heptadecane	295	575	240.5	3.00E-07	2.94E-04	4.90E+08	ND
629-92-5	n-Nonadecane	305	603	269.0	6.45E-08	2.97E-05	4.68E+09	ND
629-94-7	n-Heneicosane	314	630	296.6	1.15E-07	2.90E-08	4.47E+10	ND
629-96-9	1-Eicosanol	339	629	298.6	5.95E-11	1.51E-03	5.01E+08	ND
629-97-0	Docosane	318	642	311.0	1.68E-09	7.90E-09	1.41E+11	ND
629-99-2	Pentacosane	327	675	352.7	1.99E-09	2.90E-08	4.17E+12	ND
630-01-3	n-Hexacosane	330	685	366.7	6.17E-10	1.70E-03	1.29E+13	ND
630-02-4	Octacosane	338	705	394.8	2.11E-12	8.84E-10	1.23E+14	ND
630-07-9	Pentatriacontane	348	763	493.0	7.09E-15	2.47E-13	3.39E+17	ND
638-53-9	Tridecanoic acid	318	585	214.4	1.65E-03	3.30E+01	3.09E+05	ND
638-67-5	Tricosane	321	653	324.6	2.29E-08	2.95E-07	4.37E+11	ND

CAS Number	COPC Name	Melting Point (K)	Boiling Point (K)	MW (AMU)	Vapor Pressure (atm)	Aqueous Solubility (mg/L)	K_{ow}	Half-life (day)
638-68-6	n-Triacontane	339	723	422.8	3.59E-14	8.58E-11	1.17E+15	ND
646-31-1	Tetracosane	327	664	338.7	5.36E-09	9.25E-08	1.35E+12	ND
791-28-6	Triphenylphosphine oxide	430	633	278.3	3.42E-12	6.28E+01	6.76E+02	ND
7098-22-8	Tetratetracontane	361	821	619.2	1.95E-12	6.28E-18	8.91E+21	ND
10544-50-0	Octasulfur	ND	718	256.5	ND	ND	ND	ND
14167-59-0	Tetratriacontane	346	756	478.9	1.02E-10	7.97E-13	1.10E+17	ND
18435-45-5	1-Nonadecene	296	602	266.5	5.01E-08	3.99E-05	3.47E+09	ND
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	517	718	391.0	6.45E-14	4.40E-06	2.00E+07	2.50E+01
23950-58-5	Pronamide	428	594	256.0	5.72E-10	1.50E+01	2.69E+03	ND
32774-16-6	3,3',4,4',5,5'-Hexachlorobiphenyl	475	673	361.0	7.63E-10	5.10E-04	2.57E+07	2.50E+01
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	538	780	425.0	7.37E-15	2.40E-06	1.00E+08	2.50E+01
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	547	760	391.0	5.00E-14	4.42E-06	6.31E+07	2.50E+01
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	514	738	356.0	5.79E-13	1.18E-04	4.37E+06	2.50E+01
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	469	738	340.0	3.42E-12	2.36E-04	3.16E+06	2.50E+01
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	499	738	340.0	2.23E-12	2.40E-04	6.17E+06	2.50E+01
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	506	761	375.0	2.89E-13	1.77E-05	1.00E+07	2.50E+01
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	559	718	391.0	4.73E-14	4.40E-06	2.00E+07	2.50E+01
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	513	761	375.0	2.63E-13	1.30E-05	1.00E+07	2.50E+01
65510-44-3	2',3,4,4',5-Pentachloro-1,1'-biphenyl	398	654	326.0	ND	1.00E+04	ND	2.50E+01
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	499	761	375.0	3.16E-13	8.25E-06	1.00E+07	2.50E+01
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	521	761	375.0	3.68E-13	1.30E-05	1.00E+07	2.50E+01

ND implies no data was available.

M Appendix M – Fate and Transport Property Equations

Equations for estimating COPC fate and transport properties are included in the PDF file on the compact disk provided with this report under the directory titled “Appendix M”.

N Appendix N – Human Health Data for TOE Compounds

Table N-1: Human Health Data for Volatile Compounds

CAS No.	COPC Name	Oral RfD (mg/kg-day)	RfC (ug/m^3)	Inhalation RfD (mg/kg-day)	Oral CSF (mg/kg-day)	Inhalation CSF (mg/kg-day)	Inhalation UR (m^3/ug)	Acute Inhalation RfC (mg/m^3)
67-63-0	Isopropanol	ND	7.00E+00	2.00E+00	ND	ND	ND	3.00E+00
71-55-6	1,1,1-Trichloroethane (TCA or methyl chloroform)	ND	2.20E+00	6.30E-01	ND	ND	ND	7.00E+01
74-95-3	Dibromomethane (Methylene Bromide)	1.00E-02	ND	ND	ND	ND	ND	5.00E+01
74-99-7	1-Propyne (TIC)	ND	ND	ND	ND	ND	ND	6.00E+02
75-07-0	Acetaldehyde	ND	9.00E-03	2.57E-03	ND	ND	ND	8.00E+01
75-28-5	Propane, 2-methyl (TIC)	ND	ND	ND	ND	ND	ND	1.00E+03
75-29-6	2-Chloropropane (Isopropyl chloride)	ND	1.00E-01	2.86E-02	ND	ND	ND	1.00E+02
75-34-3	1,1-Dichloroethane	2.00E-01	5.00E-01	1.43E-01	5.70E-03	5.70E-03	1.60E-06	3.00E+02
75-37-6	Ethane, 1,1-difluoro-	ND	4.00E+01	1.14E+01	ND	ND	ND	3.00E+04
75-77-4	Silane, chlorotrimethyl-	ND	ND	ND	ND	ND	ND	8.00E+00
78-78-4	Butane, 2-methyl (TIC)	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	4.00E+02
78-87-5	1,2-Dichloropropane (Propylene dichloride)	9.00E-02	4.00E-03	1.14E-03	3.60E-02	3.60E-02	1.00E-05	1.00E+00
96-14-0	Pentane, 3-methyl-	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	4.00E+02
96-47-9	Furan, tetrahydro-2-methyl-	ND	ND	ND	ND	ND	ND	2.00E+01
106-97-8	Butane	ND	ND	ND	ND	ND	ND	1.00E+04
106-99-0	1,3-Butadiene	ND	2.00E-03	5.71E-04	3.40E+00	1.00E-01	3.00E-05	1.00E+03
107-01-7	2-Butene	ND	ND	ND	ND	ND	ND	3.00E+00
107-05-1	3-Chloro 1-Propene	ND	1.00E-03	2.86E-04	2.10E-02	ND	ND	9.00E+00
107-06-2	1,2-Dichloroethane (EDC)	ND	2.40E+00	6.86E-01	9.10E-02	9.10E-02	2.60E-05	2.00E+02
107-83-5	Pentane, 2-methyl-	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	4.00E+02
109-66-0	Pentane (TIC)	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	4.00E+02
109-67-1	1-Pentene	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	ND
110-00-9	Furan	1.00E-03	ND	ND	ND	ND	ND	2.00E+00

CAS No.	COPC Name	Oral RfD (mg/kg-day)	RfC (ug/m^3)	Inhalation RfD (mg/kg-day)	Oral CSF (mg/kg-day)	Inhalation CSF (mg/kg-day)	Inhalation UR (m^3/ug)	Acute Inhalation RfC (mg/m^3)
115-07-1	1-Propene (TIC)	ND	3.00E+00	8.57E-01	ND	ND	ND	6.00E+02
115-11-7	1-Propene, 2-methyl-	ND	ND	ND	ND	ND	ND	2.00E+03
142-82-5	Heptane (TIC)	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	4.00E+02
156-59-2	cis-1,2-Dichloroethene	1.00E-02	ND	ND	ND	ND	ND	6.00E+02
156-60-5	trans-1,2-Dichloroethene	2.00E-02	6.00E-02	1.71E-02	ND	ND	ND	2.00E+00
287-92-3	Cyclopentane	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	ND
463-58-1	Carbonyl Sulfide	ND	ND	ND	ND	ND	ND	3.00E+00
504-60-9	1,3-Pentadiene	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	ND
563-58-6	1,1-Dichloropropene	ND	ND	ND	ND	ND	ND	2.00E+02
589-34-4	Hexane, 3-methyl-	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	ND
590-18-1	2-Butene, (Z)-	ND	ND	ND	ND	ND	ND	4.00E+04
592-41-6	1-Hexene	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	ND
592-42-7	1,5-Hexadiene	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	ND
593-60-2	Bromoethene (Vinyl Bromide)	ND	3.00E-03	8.57E-04	ND	ND	ND	2.00E+01
594-20-7	2,2-Dichloropropane	ND	ND	ND	ND	ND	ND	1.00E+00
616-38-6	Carbonic acid, dimethyl ester	ND	ND	ND	ND	ND	ND	4.00E+01
624-64-6	2-Butene, (E)-	ND	ND	ND	ND	ND	ND	1.00E+04
646-04-8	2-Pentene, (E)-	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	ND
811-97-2	1,1,1,2-Tetrafluoroethane	ND	8.00E+01	2.29E+01	ND	ND	ND	3.00E+04
994-05-8	Butane, 2-methoxy-2-methyl-	ND	ND	ND	ND	ND	ND	2.00E+02
1191-96-4	Cyclopropane, ethyl-	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	ND

Table N-2: Human Health Data for Semi-volatile Compounds

CAS No.	COPC Name	Oral RfD (mg/kg-day)	RfC (ug/m^3)	Inhalation RfD (mg/kg-day)	Oral CSF (mg/kg-day)	Inhalation CSF (mg/kg-day)	Inhalation UR (m^3/ug)	Acute Inhalation RfC (mg/m^3)
51-28-5	2,4-Dinitrophenol	2.00E-03	ND	ND	ND	ND	ND	1.00E+00
55-18-5	N-Nitrosodiethylamine	ND	ND	ND	1.50E+02	1.50E+02	4.30E-02	ND
55-63-0	Nitroglycerine	ND	ND	ND	1.70E-02	ND	ND	3.00E-02
56-49-5	3-Methylcholanthrene	3.00E-02	ND	ND	2.20E+01	2.20E+01	6.30E-03	1.00E-01
57-10-3	Hexadecanoic acid	ND	ND	ND	ND	ND	ND	1.00E+01
58-90-2	2,3,4,6-Tetrachlorophenol	3.00E-02	ND	ND	ND	ND	ND	ND
59-50-7	4-Chloro-3-methylphenol	ND	ND	ND	ND	ND	ND	5.00E+00
59-89-2	N-Nitrosomorpholine	ND	ND	ND	6.70E+00	6.70E+00	1.90E-03	8.00E+00
60-11-7	4-(Dimethylamino)azobenzene	ND	ND	ND	4.60E+00	4.60E+00	1.30E-03	1.00E+01
62-50-0	Ethyl methanesulfonate	ND	ND	ND	ND	ND	ND	4.00E-01
62-53-3	Aniline	7.00E-03	1.00E-03	2.86E-04	5.70E-03	5.70E-03	1.60E-06	3.00E+01
62-75-9	N-Nitrosodimethylamine	8.00E-06	ND	ND	5.10E+01	4.90E+01	1.40E-02	3.00E+00
66-27-3	Methyl methanesulfonate	ND	ND	ND	9.90E-02	9.90E-02	2.80E-05	ND
67-72-1	Hexachloroethane	1.00E-03	ND	ND	1.40E-02	1.40E-02	4.00E-06	1.00E+02
75-52-5	Nitromethane	ND	2.00E-02	5.71E-03	ND	ND	ND	4.00E+01
76-01-7	Pentachloroethane	ND	ND	ND	ND	ND	ND	8.00E+00
77-47-4	Hexachlorocyclopentadiene	6.00E-03	2.00E-04	5.71E-05	ND	ND	ND	5.00E-02
78-40-0	Triethyl phosphate	ND	ND	ND	ND	ND	ND	2.00E+01
78-59-1	Isophorone	2.00E-01	2.00E+00	5.71E-01	9.50E-04	ND	ND	6.00E+00
79-00-5	1,1,2-Trichloroethane	4.00E-03	ND	ND	5.70E-02	5.60E-02	1.60E-05	1.00E+01
79-34-5	1,1,2,2-Tetrachloroethane	6.00E-02	ND	ND	2.00E-01	2.00E-01	5.80E-05	9.00E+00
83-32-9	Acenaphthene	6.00E-02	2.00E-01	5.71E-02	ND	ND	ND	3.00E-01
86-30-6	N-Nitrosodiphenylamine	2.00E-02	ND	ND	4.90E-03	9.00E-03	2.60E-06	6.00E+00
86-73-7	Fluorene	4.00E-02	2.00E-01	5.71E-02	ND	ND	ND	6.00E+00
87-65-0	2,6-Dichlorophenol	ND	ND	ND	ND	ND	ND	1.00E+00
87-68-3	Hexachlorobutadiene (Hexachloro-1,3-butadiene)	2.00E-04	ND	ND	7.80E-02	7.70E-02	2.20E-05	1.00E+01

CAS No.	COPC Name	Oral RfD (mg/kg-day)	RfC (ug/m^3)	Inhalation RfD (mg/kg-day)	Oral CSF (mg/kg-day)	Inhalation CSF (mg/kg-day)	Inhalation UR (m^3/ug)	Acute Inhalation RfC (mg/m^3)
88-06-2	2,4,6-Trichlorophenol	ND	ND	ND	1.10E-02	1.10E-02	3.10E-06	8.00E+00
88-74-4	2-Nitroaniline	3.00E-03	1.00E-04	2.86E-05	ND	ND	ND	5.00E+00
88-75-5	2-Nitrophenol	ND	ND	ND	ND	ND	ND	1.00E+00
90-13-1	1-Chloronaphthalene	ND	ND	ND	ND	ND	ND	5.00E+00
91-58-7	2-Chloronaphthalene	8.00E-02	ND	ND	ND	ND	ND	1.00E-01
92-52-4	1,1'-Biphenyl (Phenylbenzene or Diphenyl)	5.00E-02	2.00E-01	5.71E-02	ND	ND	ND	1.00E+00
94-59-7	Safrole	ND	ND	ND	2.20E-01	2.20E-01	6.30E-05	4.00E+00
95-49-8	2-Chlorotoluene	2.00E-02	ND	ND	ND	ND	ND	1.00E-01
95-53-4	2-Toluidine	ND	ND	ND	1.80E-01	1.80E-01	5.10E-05	5.00E+00
95-57-8	2-Chlorophenol	5.00E-03	ND	ND	ND	ND	ND	2.00E+00
95-94-3	1,2,4,5-Tetrachlorobenzene	3.00E-04	ND	ND	ND	ND	ND	8.00E+00
95-95-4	2,4,5-Trichlorophenol	1.00E-01	ND	ND	ND	ND	ND	8.00E+00
96-18-4	1,2,3-Trichloropropane	6.00E-03	ND	ND	7.00E+00	ND	ND	1.00E-01
96-22-0	3-Pentanone	ND	ND	ND	ND	ND	ND	3.00E+02
98-29-3	1,2-Benzenediol, 4-(1,1-dimethylethyl)-	ND	ND	ND	ND	ND	ND	7.00E-02
98-82-8	Benzene, (1-methylethyl)-	1.00E-01	4.00E-01	1.14E-01	ND	ND	ND	2.00E+02
98-86-2	Acetophenone	1.00E-01	ND	ND	ND	ND	ND	8.00E+00
98-95-3	Nitrobenzene	5.00E-04	2.00E-03	5.71E-04	ND	ND	ND	4.00E+00
99-65-0	1,3-Dinitrobenzene	1.00E-04	ND	ND	ND	ND	ND	8.00E-01
100-02-7	4-Nitrophenol	ND	ND	ND	ND	ND	ND	6.00E-01
100-47-0	Benzonitrile	ND	ND	ND	ND	ND	ND	8.00E-01
100-75-4	N-Nitrosopiperidine	ND	ND	ND	9.40E+00	9.40E+00	2.70E-03	ND
103-65-1	Benzene, propyl-	4.00E-02	2.00E-01	5.71E-02	ND	ND	ND	1.00E+02
104-76-7	1-Hexanol, 2-ethyl-	ND	ND	ND	ND	ND	ND	5.00E-01
105-67-9	2,4-Dimethylphenol	2.00E-02	ND	ND	ND	ND	ND	3.00E-01
106-43-4	4-Chlorotoluene	ND	ND	ND	ND	ND	ND	6.00E-01
106-44-5	4-Methylphenol (p-Cresol)	5.00E-03	ND	ND	ND	ND	ND	5.00E+00
106-47-8	4-Chloroaniline	4.00E-03	ND	ND	ND	ND	ND	4.00E-01

CAS No.	COPC Name	Oral RfD (mg/kg-day)	RfC (ug/m^3)	Inhalation RfD (mg/kg-day)	Oral CSF (mg/kg-day)	Inhalation CSF (mg/kg-day)	Inhalation UR (m^3/ug)	Acute Inhalation RfC (mg/m^3)
106-50-3	para-Phenylenediamine	1.90E-01	ND	ND	ND	ND	ND	1.00E-01
106-93-4	1,2-Dibromoethane (Ethylene Dibromide)	9.00E-03	9.00E-03	2.57E-03	2.00E+00	2.10E+00	6.00E-04	1.00E+02
107-39-1	2,4,4-trimethyl-1-Pentene	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	3.00E+02
107-87-9	2-Pentanone	ND	ND	ND	ND	ND	ND	2.00E+02
107-88-0	1,3-Butanediol	ND	ND	ND	ND	ND	ND	2.00E+01
108-39-4	3-Methylphenol (m-Cresol)	5.00E-02	ND	ND	ND	ND	ND	5.00E+00
108-60-1	2,2'-Oxybis[1-chloropropane] (bis-chloroisopropyl-ether)	4.00E-02	ND	ND	7.00E-02	3.50E-02	1.00E-05	2.00E+01
108-86-1	Bromobenzene	ND	ND	ND	ND	ND	ND	9.00E+01
108-95-2	Phenol	3.00E-01	2.00E-01	5.71E-02	ND	ND	ND	6.00E+00
109-06-8	2-Picoline	ND	ND	ND	ND	ND	ND	4.00E+00
110-57-6	trans-1,4-Dichloro-2-butene	ND	ND	ND	ND	ND	ND	1.00E-01
110-86-1	Pyridine	1.00E-03	ND	ND	ND	ND	ND	1.00E+01
111-44-4	bis(2-Chloroethyl)ether	ND	ND	ND	1.10E+00	1.20E+00	3.30E-04	2.00E+01
111-65-9	Octane	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	3.00E+02
111-84-2	Nonane	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	8.00E+02
111-90-0	Ethanol, 2-(2-ethoxyethoxy)-	6.00E-02	ND	ND	ND	ND	ND	4.00E+01
111-91-1	bis(2-Chloroethoxy)-methane	3.00E-03	ND	ND	ND	ND	ND	4.00E+00
112-31-2	Decanal	ND	ND	ND	ND	ND	ND	1.00E+01
112-40-3	Dodecane	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	9.00E-02
112-41-4	1-Dodecene	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND
112-88-9	1-Octadecene	2.00E+00	ND	ND	ND	ND	ND	ND
117-84-0	bis(n-octyl) phthalate	4.00E-02	ND	ND	ND	ND	ND	1.00E+01
119-93-7	3,3'-Dimethylbenzidine	ND	ND	ND	2.30E+00	ND	ND	7.00E-02
120-82-1	1,2,4-Trichlorobenzene	1.00E-02	4.00E-03	1.14E-03	3.60E-03	ND	ND	9.00E+00
120-83-2	2,4-Dichlorophenol	3.00E-03	ND	ND	ND	ND	ND	1.00E+00
121-33-5	Benzaldehyde, 4-hydroxy-3-methoxy-	ND	ND	ND	ND	ND	ND	4.00E+00
122-66-7	1,2-Diphenylhydrazine	ND	ND	ND	8.00E-01	7.70E-01	2.20E-04	1.00E-01
123-73-9	(E)-2-Butenal	ND	ND	ND	1.90E+00	ND	ND	5.00E-01

CAS No.	COPC Name	Oral RfD (mg/kg-day)	RfC (ug/m^3)	Inhalation RfD (mg/kg-day)	Oral CSF (mg/kg-day)	Inhalation CSF (mg/kg-day)	Inhalation UR (m^3/ug)	Acute Inhalation RfC (mg/m^3)
124-18-5	Decane, n-	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	3.00E-01
124-19-6	Nonanal	ND	ND	ND	ND	ND	ND	2.00E+00
126-33-0	Thiophene, tetrahydro-, 1,1-dioxide	ND	ND	ND	ND	ND	ND	5.00E+01
127-18-4	Tetrachloroethene (Tetrachloroethylene)	1.00E-02	3.00E-01	8.57E-02	5.40E-01	2.10E-02	5.90E-06	2.00E+01
132-64-9	Dibenzofuran	ND	ND	ND	ND	ND	ND	8.00E+00
138-86-3	Limonene	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND
140-29-4	Benzeneacetonitrile	ND	ND	ND	ND	ND	ND	1.00E-01
142-28-9	1,3-Dichloropropane	2.00E-02	ND	ND	ND	ND	ND	9.00E-01
143-07-7	Dodecanoic acid	ND	ND	ND	ND	ND	ND	6.00E+00
208-96-8	Acenaphthylene	4.00E-02	ND	ND	ND	ND	ND	5.00E-02
293-96-9	Cyclodecane	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND
294-62-2	Cyclododecane	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND
295-65-8	Cyclohexadecane	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND
510-15-6	Chlorobenzilate	2.00E-02	ND	ND	1.10E-01	1.10E-01	3.10E-05	2.00E-01
540-97-6	Dodecamethyl cyclohexasiloxane	ND	ND	ND	ND	ND	ND	6.00E+00
541-05-9	Hexamethyl-Cyclotrisiloxane	ND	ND	ND	ND	ND	ND	3.00E+00
541-73-1	1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	3.00E+00
544-76-3	Hexadecane	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND
556-67-2	Cyclotetrasiloxane, Octamethyl (TIC)	ND	ND	ND	ND	ND	ND	1.00E+02
560-21-4	2,3,3-Trimethylpentane	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	ND
591-78-6	2-Hexanone (Methyl butyl ketone)	ND	ND	ND	ND	ND	ND	1.00E+01
606-20-2	2,6-Dinitrotoluene	1.00E-03	ND	ND	ND	ND	ND	1.00E-01
608-93-5	Pentachlorobenzene	8.00E-04	ND	ND	ND	ND	ND	8.00E+00
621-64-7	N-Nitroso-di-n-propylamine	ND	ND	ND	7.00E+00	7.00E+00	2.00E-03	5.00E-02
626-93-7	2-Hexanol	ND	ND	ND	ND	ND	ND	4.00E+00
629-20-9	1,3,5,7-Cyclooctatetraene	ND	ND	ND	ND	ND	ND	3.00E+01
629-50-5	Tridecane	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	9.00E-02
629-59-4	Tetradecane	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	3.00E-01

CAS No.	COPC Name	Oral RfD (mg/kg-day)	RfC (ug/m^3)	Inhalation RfD (mg/kg-day)	Oral CSF (mg/kg-day)	Inhalation CSF (mg/kg-day)	Inhalation UR (m^3/ug)	Acute Inhalation RfC (mg/m^3)
629-62-9	Pentadecane	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	2.00E+01
630-20-6	1,1,1,2-Tetrachloroethane	3.00E-02	ND	ND	2.60E-02	2.60E-02	7.40E-06	2.00E+01
871-83-0	Nonane,2-methyl-	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND
872-05-9	1-Decene	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND
924-16-3	N-Nitroso-di-n-butylamine	ND	ND	ND	5.40E+00	5.60E+00	1.60E-03	ND
930-55-2	N-Nitrosopyrrolidine	ND	ND	ND	2.10E+00	2.10E+00	6.10E-04	ND
1071-26-7	2,2-Dimethyl Heptane	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND
1120-21-4	Undecane	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	2.00E+00
1587-04-8	1-Methyl-2-(2-propenyl) benzene	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND
1888-71-7	Hexachloropropene	ND	ND	ND	ND	ND	ND	1.00E+00
2051-30-1	2,6-Dimethyloctane	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	3.00E+00
2216-33-3	Octane, 3-Methyl-	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND
2303-16-4	Diallate	ND	ND	ND	6.10E-02	ND	ND	ND
4170-30-3	2-Butenal	ND	ND	ND	ND	ND	ND	5.00E-01
4748-78-1	4-Ethyl Benzaldehyde	ND	ND	ND	ND	ND	ND	5.00E+00
5911-04-6	Nonane,3-methyl-	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND
5989-27-5	D-Limonene	ND	ND	ND	ND	ND	ND	1.00E+02
6975-98-0	Decane, 2-methyl-	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND
7005-72-3	4-Chlorophenyl-phenyl ether	ND	ND	ND	ND	ND	ND	2.00E-03
10595-95-6	N-Nitrosomethylethylamine (NMEA)	ND	ND	ND	2.20E+01	2.20E+01	6.30E-03	ND
13151-34-3	Decane,3-methyl	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND
13475-82-6	2,2,4,6,6-Pentamethyl heptane	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND
14371-10-9	Cinnamaldehyde, (E)-	ND	ND	ND	ND	ND	ND	4.00E-01
15869-92-8	3,4-Dimethyl octane	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND
17301-94-9	Nonane,4-methyl-	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	1.00E+01
39638-32-9	bis(2-Chloroisopropyl)ether	4.00E-02	ND	ND	ND	1.00E-02	2.70E-06	5.00E-03
39761-61-0	(z)-5,5-Dimethyl 2-Hexene	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	4.00E+02
999-999-999	Heptafluorobutyric acid, n-trid	ND	ND	ND	ND	ND	ND	9.00E+01

CAS No.	COPC Name	Oral RfD (mg/kg-day)	RfC (ug/m^3)	Inhalation RfD (mg/kg-day)	Oral CSF (mg/kg-day)	Inhalation CSF (mg/kg-day)	Inhalation UR (m^3/ug)	Acute Inhalation RfC (mg/m^3)
999-999-999	1,7,7-trimethyl bicyclo[2.2.1] hept-2-ene	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND

Table N-3: Human Health Data for Non-volatile Compounds

CAS No.	COPC Name	Oral RfD (mg/kg-day)	RfC (ug/m^3)	Inhalation RfD (mg/kg-day)	Oral CSF (mg/kg-day)	Inhalation CSF (mg/kg-day)	Inhalation UR (m^3/ug)	Acute Inhalation RfC (mg/m^3)
50-32-8	Benzo (a) pyrene	3.00E-02	ND	ND	7.30E+00	3.90E+00	1.10E-03	1.00E-01
53-70-3	Dibenz(a,h)anthracene	3.00E-02	ND	ND	7.30E+00	4.10E+00	1.20E-03	6.00E-04
53-96-3	2-Acetylaminofluorene	ND	ND	ND	3.80E+00	3.80E+00	1.30E-03	2.00E-01
56-38-2	Ethyl parathion (Parathion)	6.00E-03	ND	ND	ND	ND	ND	7.00E-02
56-55-3	Benzo (a) anthracene	3.00E-02	ND	ND	7.30E-01	3.90E-01	1.10E-04	7.00E-02
57-11-4	Octadeconoic acid	ND	ND	ND	ND	ND	ND	4.00E+01
57-97-6	7,12-Dimethylbenz[a]-anthracene (DMBA)	3.00E-02	ND	ND	2.50E+02	2.50E+02	7.10E-02	ND
82-68-8	Pentachloronitrobenzene (PCNB)	3.00E-03	ND	ND	2.60E-01	ND	ND	4.00E-01
85-01-8	Phenanthrene	4.00E-02	2.00E-01	5.71E-02	ND	ND	ND	3.00E-01
85-68-7	Butyl benzyl phthalate	2.00E-01	ND	ND	ND	ND	ND	4.00E+00
87-86-5	Pentachlorophenol	3.00E-02	ND	ND	1.20E-01	1.80E-02	4.60E-06	6.00E-01
88-85-7	2-sec-Butyl-4,6-dinitro-phenol (Dinoseb)	1.00E-03	ND	ND	ND	ND	ND	6.00E-01
91-59-8	2-Naphthylamine	ND	ND	ND	1.80E+00	1.80E+00	ND	1.00E+00
91-94-1	3,3'-Dichlorobenzidine	ND	ND	ND	4.50E-01	1.20E+00	3.40E-04	2.00E+00
92-67-1	4-Aminobiphenyl (p-Biphenylamine)	ND	ND	ND	2.10E+01	2.10E+01	6.00E-03	4.00E-01
92-87-5	Benzidine	3.00E-03	ND	ND	2.30E+02	2.40E+02	6.70E-02	1.00E-01
99-09-2	3-Nitroaniline	3.00E-04	1.00E-03	2.86E-04	2.10E-02	ND	ND	4.00E-01
99-35-4	1,3,5-Trinitrobenzene	3.00E-02	ND	ND	ND	ND	ND	8.00E+00
100-01-6	4-Nitroaniline	3.00E-03	4.00E-03	1.14E-03	2.10E-02	ND	ND	2.00E+00
101-55-3	4-Bromophenyl phenyl ether	ND	ND	ND	ND	ND	ND	2.00E+00
103-23-1	bis(2-Ethylhexl)adipate	6.00E-01	ND	ND	1.20E-03	ND	ND	4.00E+01
111-02-4	2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,23-hexamethyl-, (all-E)-	2.00E+00	ND	ND	ND	ND	ND	2.00E+01
112-05-0	Nonanoic acid	ND	ND	ND	ND	ND	ND	2.00E+01
112-95-8	Eicosane	2.00E+00	ND	ND	ND	ND	ND	ND
118-74-1	Hexachlorobenzene	8.00E-04	ND	ND	1.60E+00	1.60E+00	4.60E-04	2.00E-03
120-12-7	Anthracene	3.00E-01	2.00E-01	5.71E-02	ND	ND	ND	1.00E+00
122-39-4	Diphenylamine	2.50E-02	ND	ND	ND	ND	ND	8.00E+00

CAS No.	COPC Name	Oral RfD (mg/kg-day)	RfC (ug/m^3)	Inhalation RfD (mg/kg-day)	Oral CSF (mg/kg-day)	Inhalation CSF (mg/kg-day)	Inhalation UR (m^3/ug)	Acute Inhalation RfC (mg/m^3)
129-00-0	Pyrene	3.00E-02	2.00E-01	5.71E-02	ND	ND	ND	2.00E+00
134-32-7	1-Naphthylamine	ND	ND	ND	ND	ND	ND	4.00E-01
191-24-2	Benzo (g,h,i) perylene	3.00E-02	ND	ND	ND	ND	ND	8.00E+00
192-97-2	Benzo (e) pyrene	3.00E-02	ND	ND	ND	ND	ND	ND
193-39-5	Indeno(1,2,3-cd)pyrene	3.00E-02	ND	ND	7.30E-01	3.90E-01	1.10E-04	1.00E-01
205-82-3	Benzo (j) fluoranthene	3.00E-02	ND	ND	1.20E+00	3.90E-01	1.10E-04	ND
205-99-2	Benzo (b) fluoranthene	3.00E-02	ND	ND	7.30E-01	3.90E-01	1.10E-04	1.00E-01
206-44-0	Fluoranthene	4.00E-02	2.00E-01	5.71E-02	ND	ND	ND	3.00E-03
207-08-9	Benzo (k) fluoranthene	3.00E-02	ND	ND	7.30E-02	3.90E-01	1.10E-04	1.00E-01
218-01-9	Chrysene	3.00E-02	ND	ND	7.30E-03	3.90E-02	1.10E-05	1.00E-01
224-42-0	Dibenz(a,j)acridine	ND	ND	ND	1.20E+00	3.90E-01	1.10E-04	ND
534-52-1	4,6-Dinitro-2-methylphenol (Dinitro-o-cresol)	1.00E-04	ND	ND	ND	ND	ND	5.00E-02
544-85-4	Dotriacontane	2.00E+00	ND	ND	ND	ND	ND	ND
593-49-7	Heptacosane	2.00E+00	ND	ND	ND	ND	ND	ND
629-78-7	Heptadecane	2.00E+00	ND	ND	ND	ND	ND	1.00E+02
629-92-5	Nonadecane	2.00E+00	ND	ND	ND	ND	ND	ND
629-94-7	Heneicosane	2.00E+00	ND	ND	ND	ND	ND	ND
629-97-0	Docosane	2.00E+00	ND	ND	ND	ND	ND	ND
629-99-2	Pentacosane	2.00E+00	ND	ND	ND	ND	ND	ND
630-01-3	Hexacosane	2.00E+00	ND	ND	ND	ND	ND	ND
630-02-4	Octacosane	ND	ND	ND	ND	ND	ND	9.00E+01
630-07-9	Pentatriacontane	2.00E+00	ND	ND	ND	ND	ND	8.00E+00
638-67-5	Tricosane	2.00E+00	ND	ND	ND	ND	ND	ND
638-68-6	Triacontane	2.00E+00	ND	ND	ND	ND	ND	ND
646-31-1	Tetracosane	2.00E+00	ND	ND	ND	ND	ND	ND
791-28-6	Triphenyl phosphine oxide	2.00E-02	ND	ND	ND	ND	ND	ND
18435-45-5	1-Nonadecene	2.00E+00	ND	ND	ND	ND	ND	ND
19408-74-3	1,2,3,7,8,9-HxCDD	ND	ND	ND	1.50E+04	1.30E+04	ND	4.00E-03

CAS No.	COPC Name	Oral RfD (mg/kg-day)	RfC (ug/m^3)	Inhalation RfD (mg/kg-day)	Oral CSF (mg/kg-day)	Inhalation CSF (mg/kg-day)	Inhalation UR (m^3/ug)	Acute Inhalation RfC (mg/m^3)
23950-58-5	Pronamide	7.50E-02	ND	ND	ND	ND	ND	ND
32774-16-6	3,3',4,4',5,5'-Hexa CB (169)	ND	ND	ND	4.50E+03	3.90E+03	ND	1.00E-01
35822-46-9	1,2,3,4,6,7,8-HpCDD	ND	ND	ND	1.50E+03	1.30E+03	ND	1.00E-01
39227-28-6	1,2,3,4,7,8-HxCDD	ND	ND	ND	1.50E+04	1.30E+04	ND	3.00E-04
40321-76-4	1,2,3,7,8-PeCDD	ND	ND	ND	1.50E+05	1.30E+05	ND	6.00E-04
57117-31-4	2,3,4,7,8-PeCDF	ND	ND	ND	4.50E+04	3.90E+04	ND	2.00E-05
57117-41-6	1,2,3,7,8-PeCDF	ND	ND	ND	4.50E+03	3.90E+03	ND	2.00E-03
57117-44-9	1,2,3,6,7,8-HxCDF	ND	ND	ND	1.50E+04	1.30E+04	ND	6.00E-04
57653-85-7	1,2,3,6,7,8-HxCDD	ND	ND	ND	1.50E+04	1.30E+04	ND	4.00E-03
60851-34-5	2,3,4,6,7,8-HxCDF	ND	ND	ND	1.50E+04	1.30E+04	ND	4.00E-04
65510-44-3	2',3,4,4',5-Penta CB (123)	ND	ND	ND	4.50E+00	3.90E+00	ND	1.00E-01
70648-26-9	1,2,3,4,7,8-HxCDF	ND	ND	ND	1.50E+04	1.30E+04	ND	2.00E-03
72918-21-9	1,2,3,7,8,9-HxCDF	ND	ND	ND	1.50E+04	1.30E+04	ND	3.00E-02
999-999-999	2-Methyl hexane	5.00E+00	1.84E+01	5.26E+00	ND	ND	ND	ND
999-999-999	1-Ethyl-3-methyl benzene	1.00E-01	1.00E+00	2.86E-01	ND	ND	ND	ND

O Appendix O – Not Yet Completed

P Appendix P – Feb 2008 HHRA Modificatons

Review of Current Risk Assessment Refinements to the Army Feb 2008 Health Risk Assessment for the UMCDF

The purpose of this handout is to update the USACHPPM February 2008 HRA report with several technical refinements and to also address the health risks associated with the unknown portion of the total organic emissions (TOE). The following sections address each of these issues.

1. Agent Emission Rate Refinements

In the Feb 2008 HRA, agent emissions were assumed to be equal to be 20 percent of the allowable stack concentration from the permit. However, site data demonstrates that actual measured emissions have been less than this assumed emission rate. Therefore, agent emissions were reduced based on actual measured data.

For this HRA refinement, the GB and VX new emission rates were set to the highest detection limit recorded at UMCDF and HD emission rates were set to the highest detection limit reported to date in the TOCDF agent trial burns. The revised agent emission rates are presented in Table 1. This refinement results in the following changes, as compared to the original assumptions in the Feb 2008 HRA.

- Common stack, BRA stack GB and VX emissions -- 300 times less than original
- Common stack, BRA stack HD emissions -- 55 times less than original
- MDB HVC and LAB HVC GB and VX emissions -- 60 times less than original
- MDB HVC and LAB HVC HD emissions -- 1.1 times less than original

2. Spent Carbon Adjustment

In the Feb HRA, the emission rates for the DFS during the Closure Campaign were adjusted using a common stack adjustment factor of 0.0733 (HRA Volume 2, Appendix J, Exhibit 2). This factor was based on the estimation that 706,035 lbs of spent carbon will process in the DFS during that campaign (HRA Volume 2, Appendix C, Tables 5 and 6). However, the actual amount of spent carbon to be processed will be lower. Based on permit actions to ship agent free carbon and limiting the HVAC carbon change out and removal of the ACS, the new spent carbon estimate is 55,320 lbs.

For this HRA refinement, the DFS Closure Secondary Waste adjustment factor for the common stack was changed from 0.0733 to 0.00574. The following equations provide the recalculation.

<u>Equation1</u>

$$(2\ beds \times 9\ filters \times 48\, trays \times 55\, lbs\ spent\ carbon) + 6{,}200\, lbs\ ACS\ filter\ carbon + 1600\, lbs\ mask\ carbon\ filters = 55{,}320\, lbs\ spent\ carbon$$

Equation 2

$$\frac{55{,}320\ lbs\ spent\ carbom}{550\, lb/hr \times 17{,}520\, hrs} = 0.00574$$

3. Nonuse of the BRA during the HD and Closure Campaigns

In the Feb HRA, health risk estimates were generated in two ways, (1) assumed that the BRA would operate during all agent campaigns and the secondary waste closure campaign, and (2) assuming that the BRA was not operating during any campaign. This was done because a potential health risk concern for one of the hypothetical exposure scenarios was identified for mercury resulting from emissions from the BRA during the HD campaign. However, the removal of the BRA for all campaigns (scenario #2 above) was an efficient HRA model run for a quick "what-if" scenario, but this does not directly estimate health risks associated with removal of the BRA for only the HD and Closure Campaigns.

For this HRA refinement, the model was constructed to assume that the BRA would operate during the GB and VX campaigns but not during the HD and Closure campaigns.

4. HRA Results based on Refinements

All the refinements discussed above were incorporated into a new HRA model run. For comparison purposes, the original Feb HRA results are summarized in Tables 2 and 3. Tables 4 and 5 summarize the refined HRA results.

5. Qualitative Evaluation of the Potential Risk Associated with the Unknown Fraction of the Total Organic Emissions

In the Feb HRA, the risk assessment model was implemented for only the detected chemicals. This approach follows the EPA guidance; however, the EPA guidance recommends that the potential risk associated with the unknown fraction of the total organic emissions be evaluated qualitatively. EPA recognizes that only limited number of organics compounds can that be accurately identified and quantified during laboratory analysis. These unidentified compounds however may still contribute the overall risk and should be considered qualitatively. U.S. EPA has developed the total organic compound (TOE) test to account for the unidentified organic compounds because pre-existing methods do not fully determine the total mass of organics present in stack gas emissions. The TOE test is used in conjunction with identified organic compounds to calculate a TOE Correction Factor.

In order to do this evaluation, CHPPM ran the refined HRA model discussed above but increased the emission rates of each detected chemical using TOE factors from the emission rate database prepared by the Enviromet. A summary of the TOE correction factors used in this evaluation is presented in Table 6. Tables 7 and 8 present the refined HRA results that include the TOE correction factors.

Table 1. Refined Agent Emission Rates

SubTblNum	Unit	Waste_Treat	COPCNum	COPCName	Max1Hr_Rev2 (g/sec)	Annual_U (g/sec)
1	LIC1	GB	231	Agent: GB	2.60E-09	2.60E-09
1	LIC1	GB	232	Agent: HD	0	0
1	LIC1	GB	233	Agent: VX	0	0
2	LIC1	VX	231	Agent: GB	0	0
2	LIC1	VX	232	Agent: HD	0	0
2	LIC1	VX	233	Agent: VX	2.60E-09	2.60E-09
3	LIC1	HD	231	Agent: GB	0	0
3	LIC1	HD	232	Agent: HD	1.43E-06	1.43E-06
3	LIC1	HD	233	Agent: VX	0	0
4	LIC2	GB	231	Agent: GB	2.60E-09	2.60E-09
4	LIC2	GB	232	Agent: HD	0	0
4	LIC2	GB	233	Agent: VX	0	0
5	LIC2	VX	231	Agent: GB	0	0
5	LIC2	VX	232	Agent: HD	0	0
5	LIC2	VX	233	Agent: VX	2.60E-09	2.60E-09
6	LIC2	HD	231	Agent: GB	0	0
6	LIC2	HD	232	Agent: HD	1.43E-06	1.43E-06
6	LIC2	HD	233	Agent: VX	0	0
7	MPF	GB	231	Agent: GB	3.90E-09	3.90E-09
7	MPF	GB	232	Agent: HD	0	0
7	MPF	GB	233	Agent: VX	0	0
8	MPF	VX	231	Agent: GB	0	0
8	MPF	VX	232	Agent: HD	0	0
8	MPF	VX	233	Agent: VX	3.90E-09	3.90E-09
9	MPF	HD	231	Agent: GB	0	0
9	MPF	HD	232	Agent: HD	2.15E-06	2.15E-06
9	MPF	HD	233	Agent: VX	0	0
10	DFS	GB	231	Agent: GB	7.75E-09	7.75E-09
10	DFS	GB	232	Agent: HD	0	0
10	DFS	GB	233	Agent: VX	0	0
11	DFS	VX	231	Agent: GB	0	0
11	DFS	VX	232	Agent: HD	0	0
11	DFS	VX	233	Agent: VX	7.75E-09	7.75E-09
12	MPF	SW_Comb	231	Agent: GB	3.90E-09	3.90E-09
12	MPF	SW_Comb	232	Agent: HD	2.15E-06	2.15E-06
12	MPF	SW_Comb	233	Agent: VX	3.90E-09	3.90E-09
13	LIC_Closr	SW_Max	231	Agent: GB	2.60E-09	2.60E-09
13	LIC_Closr	SW_Max	232	Agent: HD	1.43E-06	1.43E-06
13	LIC_Closr	SW_Max	233	Agent: VX	2.60E-09	2.60E-09
14	MPF_Closr	SW_NonC_Max	231	Agent: GB	3.90E-09	3.90E-09
14	MPF_Closr	SW_NonC_Max	232	Agent: HD	2.15E-06	2.15E-06
14	MPF_Closr	SW_NonC_Max	233	Agent: VX	3.90E-09	3.90E-09

SubTblNum	Unit	Waste_Treat	COPCNum	COPCName	Max1Hr_Rev2 (g/sec)	Annual_U (g/sec)
15	DFS_Closr	SW_Carb	231	Agent: GB	7.75E-09	7.75E-09
15	DFS_Closr	SW_Carb	232	Agent: HD	4.26E-06	4.26E-06
15	DFS_Closr	SW_Carb	233	Agent: VX	7.75E-09	7.75E-09
16	BRA	Brine	231	Agent: GB	2.17E-08	2.17E-08
16	BRA	Brine	232	Agent: HD	1.19E-05	1.19E-05
16	BRA	Brine	233	Agent: VX	2.17E-08	2.17E-08
17	MDB_HVC	ALL_Agents	231	Agent: GB	4.81E-08	4.81E-08
17	MDB_HVC	ALL_Agents	232	Agent: HD	2.65E-05	2.65E-05
17	MDB_HVC	ALL_Agents	233	Agent: VX	4.81E-08	4.81E-08
18	LAB_HVC	ALL_Agents	231	Agent: GB	6.80E-09	6.80E-09
18	LAB_HVC	ALL_Agents	232	Agent: HD	3.74E-06	3.74E-06
18	LAB_HVC	ALL_Agents	233	Agent: VX	6.80E-09	6.80E-09

Table 2. Summary of Original Feb 2008 HRA Results: Human Health Estimates

Human Health Risk Assessment Results, All campaigns, All emission sources

Highest estimated result for each result type (green font) or all results indicating potential for adverse human health impacts (***italicized, bolded, and red font***). The green risk estimates meet the traditional risk management targets and the *red* risk estimates do not.

Population or Community	Result Type	Result Value	Target Level	COPC(s) Contributing Most to Result	Exposure Pathway(s) Contributing Most to Result	Emission Source(s) Contributing Most to Result
Native American Adults	Excess Lifetime Cancer Risk (Human)	5E-07	**≤ 1E - 05**	*Mustard (or HD/HT) (76.9)	Ambient Air Inhalation (68.5%)	BRA (70.1%)
Native American Adults	Chronic Noncarcinogenic Hazard Index (Human)	***0.34 (unitless)***	**≤ 0.25**	*VX (54.8%) Methyl Mercury (24.3%)	Gamefish Meat Ingestion (44.6%) Protected Above Ground Produce Ingestion (15.0%) Drinking Water Ingestion (14.2%)	BRA (69.3%)
Native American Adults Mothers	Chronic Noncarcinogenic Hazard Index (Human)	***0.34 (unitless)***	**≤ 0.25**	*VX (54.8%) Methyl Mercury (24.3%)	Gamefish Meat Ingestion (44.6%) Protected Above Ground Produce Ingestion (15.0%) Drinking Water Ingestion (14.2%)	BRA (69.3%)
Native American Children	Chronic Noncarcinogenic Hazard Index (Human)	***0.34 (unitless)***	**≤ 0.25**	*VX (64.9%) Methyl Mercury (16.8%)	Drinking Water Ingestion (32.7%) Gamefish Meat Ingestion (30.9%)	BRA (66.9%)
UMCDF Workers	Acute Noncarcinogenic Hazard Index (Human)	0.3 (unitless)	**≤ 1**	Not needed	Not applicable	MPF/upset (81.8%)
All human populations	ODEQ Ambient Benchmark Concentrations (Human)	0.04 (unitless) (Arsenic compounds)	**≤ 1**	Not applicable	Not applicable	Not needed
Native American Children	Blood Lead Levels	1 µg/dL	**10 µg/dL**	Not applicable	Diet Pathways	Not needed
Native American Infants	Breastmilk Ingestion	0.007 pg/kg	**≤ 60 pg/kg**	Not needed	Not needed	Not needed

* COPC not detected but included in the risk assessment at the detection limit (6.50E-06 g/sec for VX and 6.50E-04 g/sec for HD/HT).

Table 3. Summary of Original Feb 2008 HRA Results: Ecological Estimates

Ecological Risk Assessment Results, All campaigns, All emission sources

The table below presents allometrically scaled Hazard Quotients (HQs) for populations/communities which had HQs higher than the target level of 0.25. All allometrically scaled HQs which were less than the target level of 0.25 are highlighted below in **green font**. Results indicating potential for adverse ecological impacts are in ***italicized, bolded, and red font*** (no results fell into this category).

Population or Community	Result Type	Result Value	COPC(s) Contributing Most to Result	Exposure Pathway(s) Contributing Most to Result	Emission Source(s) Contributing Most to Result
Umatilla River Wildlife Population	Carnivorous Birds: Peregrine Falcon (Ecological)	$HQa^{2,3,7,8\text{-}TCDF}=0.085$ $HQa^{Bis}=0.029$	2,3,7,8-Tetrachlorodibenzofuran (69.2%) Bis(2-ethylhexyl)phthalate (23.8%)	Omnivorous Birds Ingestion (99.1%)	DFS (96.1%)
	Carnivorous Birds: Spotted Sandpiper (Ecological)	$HQa^{Bis}=0.060$ $HQa^{2,3,7,8\text{-}TCDD}=0.057$	Bis(2-ethylhexyl)phthalate (49.8%) 2,3,7,8-Tetrachlorodibenzofuran (46.7%)	Benthic Invertebrates Ingestion (100.0%)	DFS (96.4%)
	Carnivorous Birds: Bald Eagle (Ecological)	$HQa^{2,3,7,8\text{-}TCDD}=0.024$	2,3,7,8-Tetrachlorodibenzofuran (69.2%)	Omnivorous Birds Ingestion (99.4%)	DFS (95.5%)

$HQa^{2,3,7,8\text{-}TCDD}$= Allometrically Scaled Hazard Quotient for 2,3,7,8-Tetrachlorodibenzo-p-dioxin
HQa^{Bis}= Allometrically Scaled Hazard Quotient for Bis(2-ethylhexyl)phthalate

Table 4. Summary of Refined HRA Results: Human Health Estimates

Human Health Risk Assessment Results, All campaigns, All emission sources (No BRA emissions for the HD & Closure Campaigns), no composite Total Organic Emissions (TOE) Surrogate Chemicals, no TOE Correction Factors applied to detected COPCs)

Highest estimated result for each result type (green font) or all results indicating potential for adverse human health impacts (***italicized, bolded, and red font***)

Population or Community	Result Type	Result Value	COPC(s) Contributing Most to Result	Exposure Pathway(s) Contributing Most to Result	Emission Source(s) Contributing Most to Result
Native American Adults	Excess Lifetime Cancer Risk (Human)	*1E-07*	PCB Mixture (non-dioxin like, 5+ chlorines) (71.8%)	Gamefish Meat Ingestion (78.3%) Ambient Air Inhalation (19.1%)	MPF (65.1%) DFS (13.8%)
Native American Mother Adults	Excess Lifetime Cancer Risk (Human)	*1E-07*	PCB Mixture (non-dioxin like, 5+ chlorines) (84.7%)	Gamefish Meat Ingestion (92.6%) Ambient Air Inhalation (3.8%)	MPF (76.3%) DFS (16.2%)
Native American Children	Excess Lifetime Cancer Risk (Human)	*4E-08*	PCB Mixture (non-dioxin like, 5+ chlorines) (68.9%)	Gamefish Meat Ingestion (76.5%) Ambient Air Inhalation (10.8%)	MPF (62.4%) DFS (15.0%)
Offsite Resident Adults	Excess Lifetime Cancer Risk (Human)	*3E-09*	Mustard gas (or HD/HT) (90.1%)	Ambient Air Inhalation (72.1%) Drinking Water Ingestion (20.9%)	MDB HVC (61.7%) BRA (15.8%)
Offsite Resident Children	Excess Lifetime Cancer Risk (Human)	*6E-09*	Mustard gas (or HD/HT) (91.0%)	Ambient Air Inhalation (67.4%) Drinking Water Ingestion (25.8%)	MDB HVC (62.3%) BRA (16.3%)
Umatilla River Subsistence Fisher Adults	Excess Lifetime Cancer Risk (Human)	*2E-08*	PCB Mixture (non-dioxin like, 5+ chlorines) (70.7%)	Gamefish Meat Ingestion (77.4%)	MPF (64.1%) MDB HVC (14.4%)
Umatilla River Subsistence Fisher Children	Excess Lifetime Cancer Risk (Human)	*1E-08*	Mustard gas (or HD/HT) (54.0%)	Gamefish Meat Ingestion (41.4%)	MDB HVC (37.0%) MPF (35.0%)
Columbia River Subsistence Fisher Adults	Excess Lifetime Cancer Risk (Human)	*3E-09*	Mustard gas (or HD/HT) (73.0%)	Ambient Air Inhalation (77.4%)	MDB HVC (50.2%) MPF (19.1%)
Columbia River Subsistence Fisher Children	Excess Lifetime Cancer Risk (Human)	*5E-09*	Mustard gas (or HD/HT) (84.0%)	Ambient Air Inhalation (88.9%)	MDB HVC (57.8%) BRA (15.4%)
Subsistence Farmer Adults	Excess Lifetime Cancer Risk (Human)	*5E-09*	Mustard gas (or HD/HT) (60.9%)	Ambient Air Inhalation (48.8%)	MDB HVC (41.8%)
Subsistence Farmer Children	Excess Lifetime Cancer Risk (Human)	*8E-09*	Mustard gas (or HD/HT) (69.1%)	Ambient Air Inhalation (51.2%) Beef Milk Ingestion (20.8%)	MDB HVC (47.3%)

Population or Community	Result Type	Result Value	COPC(s) Contributing Most to Result	Exposure Pathway(s) Contributing Most to Result	Emission Source(s) Contributing Most to Result
Military Resident Adults	Excess Lifetime Cancer Risk (Human)	*3E-09*	Mustard gas (or HD/HT) (86.9%)	Ambient Air Inhalation (72.6%) Drinking Water Ingestion (21.5%)	MDB HVC (49.1%)
Worker Adults	Excess Lifetime Cancer Risk (Human)	*2E-08*	Mustard gas (or HD/HT) (82.2%)	Ambient Air Inhalation (84.2%)	LAB HVC (47.5%)
Native American Adults	Chronic Noncarcinogenic Hazard Index (Human)	*8.34E-02*	Methyl Mercury (60.9%) Thallium compounds (22.5%)	Gamefish Meat Ingestion (95.3%)	BRA (76.9%)
Native American Mother Adults	Chronic Noncarcinogenic Hazard Index (Human)	*8.34E-02*	Methyl Mercury (60.9%) Thallium compounds (22.5%)	Gamefish Meat Ingestion (95.3%)	BRA (76.9%)
Native American Children	Chronic Noncarcinogenic Hazard Index (Human)	*5.99E-02*	Methyl Mercury (59.8%) Thallium compounds (22.1%)	Gamefish Meat Ingestion (93.6%) Ambient Air Inhalation (2.3%)	BRA (74.9%)
Offsite Resident Adults	Chronic Noncarcinogenic Hazard Index (Human)	*9.98E-04*	*VX (35.1%) *Mustard (or HD/HT) (29.7%)	Ambient Air Inhalation (46.5%) Drinking Water Ingestion (25.1%)	MDB HVC (47.7%)
Offsite Resident Children	Chronic Noncarcinogenic Hazard Index (Human)	*2.54E-03*	*VX (32.6%) *Mustard (or HD/HT) (30.5%)	Ambient Air Inhalation (51.4%) Drinking Water Ingestion (22.0%)	MDB HVC (46.5%)
Umatilla River Subsistence Fisher Adults	Chronic Noncarcinogenic Hazard Index (Human)	*1.22E-02*	Methyl Mercury (58.7%) Thallium compounds (21.6%)	Gamefish Meat Ingestion (91.8%) Ambient Air Inhalation (3.8%)	BRA (73.8%)
Umatilla River Subsistence Fisher Children	Chronic Noncarcinogenic Hazard Index (Human)	*1.04E-02*	Methyl Mercury (48.4%) Thallium compounds (17.9%)	Gamefish Meat Ingestion (75.7%) Ambient Air Inhalation (12.5%)	BRA (63.8%)
Columbia River Subsistence Fisher Adults	Chronic Noncarcinogenic Hazard Index (Human)	*1.11E-03*	Methyl Mercury (24.6%) Chlorine (18.3%)	Ambient Air Inhalation (41.8%) Gamefish Meat Ingestion (34.5%)	BRA (33.0%)
Columbia River Subsistence Fisher Children	Chronic Noncarcinogenic Hazard Index (Human)	*2.20E-03*	*Mustard (or HD/HT) (25.1%) Chlorine (24.5%)	Ambient Air Inhalation (59.3%) Protected Aboveground Produce Ingestion (16.0%)	MDB HVC (35.9%)

Population or Community	Result Type	Result Value	COPC(s) Contributing Most to Result	Exposure Pathway(s) Contributing Most to Result	Emission Source(s) Contributing Most to Result
Subsistence Farmer Adults	Chronic Noncarcinogenic Hazard Index (Human)	*1.30E-03*	*VX (42.9%) *Mustard (or HD/HT) (22.8%)	Ambient Air Inhalation (35.7%) Drinking Water Ingestion (19.2%)	MDB HVC (48.5%)
Subsistence Farmer Children	Chronic Noncarcinogenic Hazard Index (Human)	*3.01E-03*	*VX (38.5%) *Mustard (or HD/HT) (25.8%)	Ambient Air Inhalation (43.4%) Drinking Water Ingestion (18.6%)	MDB HVC (47.5%)
Military Resident Adults	Chronic Noncarcinogenic Hazard Index (Human)	*4.38E-03*	Chlorine (50.9%) *Mustard (or HD/HT) (22.6%)	Ambient Air Inhalation (91.2%) Drinking Water Ingestion (5.7%)	DFS (31.5%)
Worker Adults	Chronic Noncarcinogenic Hazard Index (Human)	*7.50E-03*	Chlorine (55.3%) *Mustard (or HD/HT) (18.7%)	Ambient Air Inhalation (87.5%)	DFS (34.2%)
UMCDF Workers	Acute Noncarcinogenic Hazard Index (Human)	2.10E-01	Nitrogen dioxide (76.2%) Arsenic compounds (20.3%)	Not applicable	MPF/upset (88.1%)
All human populations	ODEQ Ambient Benchmark Concentrations (Human)	0.03 Arsenic compounds	Not applicable	Not applicable	Not needed
Native American Children	Blood Lead Levels	1 µg/dL	Not applicable	Diet Pathways	Not needed
Native American Infants	Breastmilk Ingestion	0.01 pg/kg	Not needed	Not needed	Not needed

* COPC not detected

Table 5. Summary of Refined HRA Results: Ecological Estimates

Ecological Risk Assessment Results, All campaigns, All emission sources (No BRA emissions for the HD & Closure Campaigns), no composite Total Organi Emissions (TOE) Surrogate Chemicals, no TOE Correction Factors applied to detected COPCs)

The table below presents allometrically scaled Hazard Quotients (HQs) for populations and communities which had HQs higher than the target level of 0.25. All allometrically scaled HQs which were less than the target level of 0.25 are highlighted below in green font.

Population or Community	Result Type	Result Value	COPC(s) Contributing Most to Result	Exposure Pathway Contributing Most to Result	Emission Source(s) Contributing Most to Result
Umatilla River Wildlife Population	Carnivorous Birds: Peregrine Falcon (Ecological)	$HQa^{2,3,7,8\text{-}TCDF}$=0.0854 HQa^{Bis} =0.0293	2,3,7,8-Tetrachlorodibenzofuran (62.9%) Bis(2-ethylhexyl)phthalate (31.3%)	Omnivorous Birds Ingestion (99.1%)	DFS (96.1%)
	Carnivorous Birds: Spotted Sandpiper (Ecological)	HQa^{Bis} =0.0603 $HQa^{2,3,7,8\text{-}TCDF}$=0.0566	Bis(2-ethylhexyl)phthalate (59.0%) 2,3,7,8-Tetrachlorodibenzofuran (38.1%)	Benthic Invertebrates Ingestion (100.0%)	DFS (96.4%)
	Carnivorous Birds: Bald Eagle (Ecological)	$HQa^{2,3,7,8\text{-}TCDF}$=0.024	2,3,7,8-Tetrachlorodibenzofuran (62.9%)	Omnivorous Birds Ingestion (99.5%)	DFS (95.6%)

$HQa^{2,3,7,8\text{-}TCDF}$= Allometrically Scaled Hazard Quotient for 2,3,7,8-Tetrachlorodibenzofuran
HQa^{Bis}= Allometrically Scaled Hazard Quotient for Bis(2-ethylhexyl)phthalate

Table 6. Summary of TOE factors for Detected Substance by Table Number / Unit / Waste Treatment

Table Number	Unit	Waste Treatment	Max TOE	Min TOE	Avg TOE	Standard Deveation	Variance
ST 1	LIC1	GB	18.19	1	13.17	7.8	61.6
ST 2	LIC1	VX	153.45	1	108.93	69.6	4,847.7
ST 3	LIC1	HD	13.35	1	9.74	5.6	31.8
ST 4	LIC2	GB	50.12	1	35.78	22.4	503.3
ST 5	LIC2	VX	153.45	1	108.93	69.6	4,847.7
ST 6	LIC2	HD	13.35	1	9.74	5.6	31.8
ST 7	MPF	GB	32.06	1	22.99	14.2	201.2
ST 8	MPF	VX	1.00	1	1.00	0	0.0
ST 9	MPF	HD	28.51	1	20.47	12.6	157.8
ST 10	DFS	GB	15.86	1	11.52	6.8	46.1
ST 11	DFS	VX	256.35	1	181.78	116.6	13,600.8
ST 12	MPF	SW_Comb	16.64	1	12.07	7.1	51.0
ST 13	LIC_Closr	SW_Max	1.00	1	1.00		
ST 14	MPF_Closr	SW_NonC_Max	1.00	1	1.00		
ST 15	DFS_Closr	SW_Carb	1.00	1	1.00	0	0
ST 16	BRA	Brine	1.00	1	1.00	0	0
ST 17	MDB_HVC	ALL_Agents	1.00	1	1.00	0	0
ST 18	LAB_HVC	ALL_Agents	1.00	1	1.00	0	0

Table 7. Summary of Refined HRA Results with the TOE Correction Factor: Human Health Estimates

Human Health Risk Assessment Results, All campaigns, All emission sources (No BRA emissions for the HD campaign & Closure), no composite Total Organic Emissions (TOE) Chemicals of Potential Concern (COPCs), TOE Factors applied to detected COPCs.

Highest estimated result for each result type (green font) or all results indicating potential for adverse human health impacts (***italicized, bolded, and red font***).

Population or Community	Result Type	Result Value	COPC(s) Contributing Most to Result	Exposure Pathway(s) Contributing Most to Result	Emission Source(s) Contributing Most to Result
Native American Adults	Excess Lifetime Cancer Risk (Human)	*7E-06*	PCB Mixture (non-dioxin like, 5+ chlorines) (62.7%)	Gamefish Meat Ingestion (94.7%) Wild Game Ingestion (2.3%)	DFS (75.1%) MPF (23.5%)
Native American Mother Adults	Excess Lifetime Cancer Risk (Human)	*6E-06*	PCB Mixture (non-dioxin like, 5+ chlorines) (62.6%)	Gamefish Meat Ingestion (94.9%) Wild Game Ingestion (2.6%)	DFS (75.5%) MPF (23.4%)
Native American Children	Excess Lifetime Cancer Risk (Human)	*2E-06*	PCB Mixture (non-dioxin like, 5+ chlorines) (56.6%)	Gamefish Meat Ingestion (86.5%) Beef Milk Ingestion (6.8%)	DFS (77.4%) MPF (21.2%)
Offsite Resident Adults	Excess Lifetime Cancer Risk (Human)	*3E-08*	2,3,7,8-Tetrachlorodibenzofuran (62.0%)	Bathing Dermal Contact (59.5%) Ambient Air Inhalation (18.8%)	DFS (85.6%) MDB HVC (7.3%)
Offsite Resident Children	Excess Lifetime Cancer Risk (Human)	*4E-08*	2,3,7,8-Tetrachlorodibenzofuran (52.1%)	Bathing Dermal Contact (52.2%) Ambient Air Inhalation (22.2%)	DFS (82.8%) MDB HVC (9.3%)
Umatilla River Subsistence Fisher Adults	Excess Lifetime Cancer Risk (Human)	*7E-07*	PCB Mixture (non-dioxin like, 5+ chlorines) (63.2%)	Gamefish Meat Ingestion (95.8%)	DFS (74.9%) MPF (23.6%)
Umatilla River Subsistence Fisher Children	Excess Lifetime Cancer Risk (Human)	*3E-07*	PCB Mixture (non-dioxin like, 5+ chlorines) (56.4%)	Gamefish Meat Ingestion (85.4%)	DFS (75.8%) MPF (21.2%)
Columbia River Subsistence Fisher Adults	Excess Lifetime Cancer Risk (Human)	*4E-08*	PCB Mixture (non-dioxin like, 5+ chlorines) (55.7%)	Gamefish Meat Ingestion (77.6%)	DFS (72.4%) MPF (21.1%)

Population or Community	Result Type	Result Value	COPC(s) Contributing Most to Result	Exposure Pathway(s) Contributing Most to Result	Emission Source(s) Contributing Most to Result
Columbia River Subsistence Fisher Children	Excess Lifetime Cancer Risk (Human)	*4E-08*	PCB Mixture (non-dioxin like, 5+ chlorines) (38.1%)	Gamefish Meat Ingestion (52.3%)	DFS (72.4%) MPF (14.8%)
Subsistence Farmer Adults	Excess Lifetime Cancer Risk (Human)	*4E-07*	2,3,7,8-Tetrachlorodibenzofuran (94.4%)	Beef Milk Ingestion (69.4%)	DFS (97.5%)
Subsistence Farmer Children	Excess Lifetime Cancer Risk (Human)	*5E-07*	2,3,7,8-Tetrachlorodibenzofuran (93.8%)	Beef Milk Ingestion (81.9%) Beef Meat Ingestion (8.5%)	DFS (97.5%)
Military Resident Adults	Excess Lifetime Cancer Risk (Human)	*2E-08*	2,3,7,8-Tetrachlorodibenzofuran (49.1%)	Ambient Air Inhalation (44.9%) Bathing Dermal Contact (37.6%)	DFS (83.5%)
Worker Adults	Excess Lifetime Cancer Risk (Human)	*2E-07*	2,3,7,8-Tetrachlorodibenzofuran (53.1%)	Ambient Air Inhalation (52.6%)	DFS (85.9%)
Native American Adults	Chronic Noncarcinogenic Hazard Index (Human)	***4.61E-01***	PCB Mixture (non-dioxin like, 5+ chlorines) (83.4%) Methyl Mercury (11.0%)	Gamefish Meat Ingestion (98.7%)	DFS (52.4%)
Native American Mother Adults	Chronic Noncarcinogenic Hazard Index (Human)	***4.61E-01***	PCB Mixture (non-dioxin like, 5+ chlorines) (83.4%) Methyl Mercury (11.0%)	Gamefish Meat Ingestion (98.7%)	DFS (52.4%)
Native American Children	Chronic Noncarcinogenic Hazard Index (Human)	***3.27E-01***	PCB Mixture (non-dioxin like, 5+ chlorines) (83.0%) Methyl Mercury (11.0%)	Gamefish Meat Ingestion (98.0%) Drinking Water Ingestion (0.5%)	DFS (52.4%)
Offsite Resident Adults	Chronic Noncarcinogenic Hazard Index (Human)	*1.62E-03*	*VX (21.6%) *Mustard (or HD/HT) (18.3%)	Ambient Air Inhalation (32.8%) Drinking Water Ingestion (19.9%)	DFS (41.4%)

Population or Community	Result Type	Result Value	COPC(s) Contributing Most to Result	Exposure Pathway(s) Contributing Most to Result	Emission Source(s) Contributing Most to Result
Offsite Resident Children	Chronic Noncarcinogenic Hazard Index (Human)	*3.98E-03*	*VX (20.7%) *Mustard (or HD/HT) (19.4%)	Ambient Air Inhalation (37.6%) Drinking Water Ingestion (18.1%)	DFS (39.9%)
Umatilla River Subsistence Fisher Adults	Chronic Noncarcinogenic Hazard Index (Human)	*6.59E-02*	PCB Mixture (non-dioxin like, 5+ chlorines) (82.6%) Methyl Mercury (10.8%)	Gamefish Meat Ingestion (97.5%) Ambient Air Inhalation (0.8%)	DFS (52.3%)
Umatilla River Subsistence Fisher Children	Chronic Noncarcinogenic Hazard Index (Human)	*4.92E-02*	PCB Mixture (non-dioxin like, 5+ chlorines) (78.5%) Methyl Mercury (10.2%)	Gamefish Meat Ingestion (91.9%) Ambient Air Inhalation (3.0%)	DFS (51.6%)
Columbia River Subsistence Fisher Adults	Chronic Noncarcinogenic Hazard Index (Human)	*5.01E-03*	PCB Mixture (non-dioxin like, 5+ chlorines) (72.9%) Methyl Mercury (5.4%)	Gamefish Meat Ingestion (78.4%) Ambient Air Inhalation (10.6%)	DFS (54.3%)
Columbia River Subsistence Fisher Children	Chronic Noncarcinogenic Hazard Index (Human)	*5.55E-03*	PCB Mixture (non-dioxin like, 5+ chlorines) (48.0%) *Mustard (or HD/HT) (10.0%)	Gamefish Meat Ingestion (49.9%) Ambient Air Inhalation (27.0%)	DFS (48.9%)
Subsistence Farmer Adults	Chronic Noncarcinogenic Hazard Index (Human)	*2.54E-03*	PCB Mixture (non-dioxin like, 5+ chlorines) (25.7%) *VX (22.0%)	Beef Milk Ingestion (22.9%) Ambient Air Inhalation (21.0%)	DFS (44.3%)
Subsistence Farmer Children	Chronic Noncarcinogenic Hazard Index (Human)	*5.34E-03*	*VX (21.7%) PCB Mixture (non-dioxin like, 5+ chlorines) (20.6%)	Ambient Air Inhalation (28.0%) Beef Milk Ingestion (18.1%)	DFS (42.3%)
Military Resident Adults	Chronic Noncarcinogenic Hazard Index (Human)	*5.89E-03*	Chlorine (37.3%) *Mustard (or HD/HT) (16.8%)	Ambient Air Inhalation (83.4%) Drinking Water Ingestion (5.5%)	DFS (46.7%)
Worker Adults	Chronic Noncarcinogenic	*1.03E-02*	Chlorine (39.7%) Methyl bromide (15.5%)	Ambient Air Inhalation (79.9%)	DFS (49.9%)

Population or Community	Result Type	Result Value	COPC(s) Contributing Most to Result	Exposure Pathway(s) Contributing Most to Result	Emission Source(s) Contributing Most to Result
	Hazard Index (Human)				
UMCDF Workers	Acute Noncarcinogenic Hazard Index (Human)	8.83E-01	Bis(2-ethylhexyl)phthalate (59.1%) Chloroform (14.5%)	Not applicable	DFS/upset (94.6%)
All human populations	ODEQ Ambient Benchmark Concentrations (Human)	0.07 Benzene	Not applicable	Not applicable	Not needed
Native American Children	Blood Lead Levels	1 μg/dL	Not applicable	Diet Pathways	Not needed
Native American Infants	Breastmilk Ingestion	1.81 pg/kg	Not needed	Not needed	Not needed

* COPC not detected

Table 8. Summary of Refined HRA Results with the TOE Correction Factor: Ecological Estimates

Ecological Risk Assessment Results, All campaigns, All emission sources (No BRA emissions for the HD campaign_& Closure), no composite Total Organic Emissions (TOE) Chemicals of Potential Concern (COPCs), TOE Factors applied to detected COPCs.

The table below presents allometrically scaled HQs for populations and communities which had HQs higher than the target level of 0.25.
All allometrically scaled HQs which were less than the target level of 0.25 are highlighted below in green font; results indicating potential for adverse ecological impacts are in ***bolded, red font.***

Population or Community	Result Type	Result Value	COPC(s) Contributing Most to Result	Exposure Pathway Contributing Most to Result	Emission Source(s) Contributing Most to Result
Columbia River Wildlife Population	Carnivorous Birds: Peregrine Falcon (Ecological)	**$HQa^{2,3,7,8\text{-}TCDF}=1.0$**	2,3,7,8-Tetrachlorodibenzofuran (71.8%)	Omnivorous Birds Ingestion (99.1%)	DFS (99.0%)
	Carnivorous Birds: Spotted Sandpiper (Ecological)	**$HQa^{2,3,7,8\text{-}TCDF}=0.6$** **$HQa^{Bis}=0.5$**	2,3,7,8-Tetrachlorodibenzofuran (52.6%) Bis(2-ethylhexyl)phthalate (41.7%)	Benthic Invertebrates Ingestion (100.0%)	DFS (99.2%)
	Carnivorous Birds: Bald Eagle (Ecological)	**$HQa^{2,3,7,8\text{-}TCDF}=0.3$**	2,3,7,8-Tetrachlorodibenzofuran (71.8%)	Omnivorous Birds Ingestion (99.8%)	DFS (99.0%)
	Omnivorous Birds: Mallard Duck (Ecological)	$HQa^{2,3,7,8\text{-}TCDF}=0.0818$ $HQa^{Bis}=0.0648$	2,3,7,8-Tetrachlorodibenzofuran (44.2%) Bis(2-ethylhexyl)phthalate (50.9%)	Benthic Invertebrates Ingestion (100.0%)	DFS (99.2%)
	Omnivorous Mammals: Raccoon (Ecological)	$HQa^{2,3,7,8\text{-}TCDF}=0.056$	2,3,7,8-Tetrachlorodibenzofuran (69.7%)	Benthic Invertebrates Ingestion (99.9%)	DFS (98.0%)
Umatilla River Wildlife Population	Carnivorous Birds: Peregrine Falcon (Ecological)	**$HQa^{2,3,7,8\text{-}TCDF}=21.3$** **$HQa^{Bis}=7.1$** **$HQa^{2,3,4,4',5\text{-}PCB}=1.7$**	2,3,7,8-Tetrachlorodibenzofuran (70.7%) Bis(2-ethylhexyl)phthalate (23.6%) 2,3,4,4',5-Pentachlorobiphenyl (5.6%)	Omnivorous Birds Ingestion (99.1%)	DFS (99.1%)
	Carnivorous Birds: Spotted Sandpiper (Ecological)	**$HQa^{Bis}=14.8$** **$HQa^{2,3,7,8\text{-}TCDF}=14.2$** **$HQa^{2,3,4,4',5\text{-}PCB}=0.9$**	Bis(2-ethylhexyl)phthalate (49.5%) 2,3,7,8-Tetrachlorodibenzofuran (47.5%) 2,3,4,4',5-Pentachlorobiphenyl	Benthic Invertebrates Ingestion (100.0%)	DFS (99.2%)

Population or Community	Result Type	Result Value	COPC(s) Contributing Most to Result	Exposure Pathway Contributing Most to Result	Emission Source(s) Contributing Most to Result
			(3.0%)		
	Carnivorous Birds: Bald Eagle (Ecological)	**$HQa^{2,3,7,8\text{-}TCDF}=6.0$** **$HQa^{Bis}=2.0$** **$HQa^{2,3,4,4',5\text{-}PCB}=0.5$**	2,3,7,8-Tetrachlorodibenzofuran (70.7%) Bis(2-ethylhexyl)phthalate (23.6%) 2,3,4,4',5-Pentachlorobiphenyl (5.6%)	Omnivorous Birds Ingestion (99.9%)	DFS (99.1%)
	Omnivorous Birds: Mallard Duck (Ecological)	**$HQa^{Bis}=1.9$** **$HQa^{2,3,7,8\text{-}TCDF}=1.8$**	Bis(2-ethylhexyl)phthalate (49.5%) 2,3,7,8-Tetrachlorodibenzofuran (47.5%)	Benthic Invertebrates Ingestion (100.0%)	DFS (99.2%)
	Carnivorous Birds: Great Blue Heron (Ecological)	$HQa^{PCB}= 0.0294$	PCB Mixture (non-dioxin like, 5+ chlorines) (79.0%)	Trophic Level 4 Fish Ingestion (84.9%)	DFS (68.9%)
	Omnivorous Mammals: Raccoon (Ecological)	**$HQa^{2,3,7,8\text{-}TCDF}=1.2$** **$HQa^{2,3,4,4',5\text{-}PCB}=0.3$**	2,3,7,8-Tetrachlorodibenzofuran (76.8%) 2,3,4,4',5-Pentachlorobiphenyl (16.0%)	Benthic Invertebrates Ingestion (99.9%)	DFS (98.3%)
	Carnivorous Mammals: Otter (Ecological)	**$HQa^{2,3,7,8\text{-}TCDF}=0.5$**	2,3,7,8-Tetrachlorodibenzofuran (76.8%)	Benthic Invertebrates Ingestion (92.8%)	DFS (97.4%)
Depot Collocation Wildlife Population	Carnivorous Birds: Western Burrowing Owl (Ecological)	**$HQa^{Bis}=4.5$**	Bis(2-ethylhexyl)phthalate (99.8%)	Omnivorous Mammals Ingestion (96.3%)	DFS (99.2%)
	Herbivorous Birds: Mourning Dove (Ecological)	$HQa^{Bis}=0.234$	Bis(2-ethylhexyl)phthalate (93.9%)	Terrestrial Plants Ingestion (97.6%)	DFS (98.6%)
	Omnivorous Birds: Western Meadowlark (Ecological)	$HQa^{Bis}=0.101$	Bis(2-ethylhexyl)phthalate (99.1%)	Terrestrial Invertebrates Ingestion (96.5%)	DFS (99.2%)
	Omnivorous Mammals: Deer Mouse (Ecological)	$HQa^{Bis}=0.0797$ $HQa^{2,3,7,8\text{-}TCDF}=0.0216$	Bis(2-ethylhexyl)phthalate (73.13%) 2,3,7,8-Tetrachlorodibenzofuran (19.85%)	Terrestrial Invertebrates Ingestion (76.0%)	DFS (96.2%)

$HQa^{2,3,7,8\text{-}TCDF}$= Allometrically Scaled Hazard Quotient for 2,3,7,8-Tetrachlorodibenzofuran
HQa^{Bis}= Allometrically Scaled Hazard Quotient for Bis(2-ethylhexyl)phthalate
$HQa^{2,3,4,4',5\text{-}PCB}$= Allometrically Scaled Hazard Quotient for 2,3,4,4',5-Pentachlorobiphenyl
HQa^{PCB}= Allometrically Scaled Hazard Quotient for PCB Mixture (non-dioxin like, 5+ chlorines)

Q Appendix Q - Acute Inhalation Exposure Criteria

Table Q-1: Acute Inhalation Exposure Criteria

CAS Number	Compound Name	AIEC (mg/m^3)
67-64-1	Acetone	124
71-43-2	Benzene	1.3
75-27-4	Bromodichloromethane	1
75-25-2	Tribromomethane	1.25
74-83-9	Methyl bromide	3.9
78-93-3	Methyl ethyl ketone	13
75-15-0	Carbon disulfide	6.2
56-23-5	Carbon tetrachloride	1.9
108-90-7	Chlorobenzene	46
75-00-3	Ethyl chloride	307
67-66-3	Chloroform	0.15
74-87-3	Methyl chloride	5
124-48-1	Chlorodibromomethane	1.5
75-71-8	Dichlorodifluoromethane	3750
75-35-4	1,1-Dichloroethylene	62.5
10061-01-5	cis-1,3-Dichloropropene	15
10061-02-6	trans-1,3-Dichloropropene	1.5
100-41-4	Ethylbenzene	125
110-54-3	n-Hexane	375
74-88-4	Methyl iodide	150
75-09-2	Dichloromethane	14
108-10-1	Methyl isobutyl ketone	75
108-88-3	Toluene	37
79-01-6	Trichloroethylene	64
75-69-4	Trichlorofluoromethane	625
108-05-4	Vinyl acetate	23.6
100-42-5	Styrene	21
75-01-4	Vinyl chloride	180
00-15-5	m,p-Xylene	22
95-47-6	2-Xylene	22
1330-20-7	Xylene (mixed)	22
65-85-0	Benzoic acid	3.125
100-51-6	Benzyl alcohol	62.5
100-52-7	Benzaldehyde	3.75
117-81-7	Bis(2-ethylhexyl)phthalate	2.5
84-74-2	Dibutyl phthalate	3.75
95-50-1	1,2-Dichlorobenzene	75
106-46-7	1,4-Dichlorobenzene	34
84-66-2	Diethyl phthalate	3.75
131-11-3	Dimethylphthalate	3.75
121-14-2	2,4-Dinitrotoluene	0.15

CAS Number	Compound Name	AIEC (mg/m^3)
91-57-6	2-Methylnaphthalene	5
95-48-7	o-Cresol	5
91-20-3	Naphthalene	18.75
118-96-7	2,4,6-Trinitrotoluene	1.875
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.000375
3268-87-9	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	0.0025
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	0.0005
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.0375
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.0625
39001-02-0	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	0.001875
00-07-2	PCB Mixture (non-dioxin like, 5+ chlorines)	0.375
32598-13-3	3,3',4,4'-Tetrachlorobiphenyl	0.15
31508-00-6	2,3',4,4',5-Pentachlorobiphenyl	0.15
32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl	0.15
74472-37-0	2,3,4,4'5-Pentachlorobiphenyl	0.15
57465-28-8	3,4,5,3',4'-Pentachlorobiphenyl	0.15
38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl	0.15
52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	0.15
39635-31-9	2,3,4,5,3',4',5'-Heptachlorobiphenyl	0.15
69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	0.15
70362-50-4	3,4,4',5-Tetrachlorobiphenyl	0.15
00-01-2	Aluminum compounds	3.75
00-01-3	Antimony compounds	0.375
00-01-4	Arsenic compounds	0.00019
00-01-5	Barium compounds	0.375
00-01-6	Beryllium compounds	0.00125
00-16-6	Boron compounds	1.875
00-01-7	Cadmium compounds	0.0075
00-01-8	Chromium compounds	0.563
00-15-3	Cobalt compounds	0.025
00-01-9	Copper compounds	0.1
00-02-0	Lead compounds	0.0375
00-02-2	Manganese compounds	0.75
00-02-3	Mercury compounds	0.0018
00-02-4	Nickel compounds	0.006
7664-38-2	Phosphoric acid	0.75
00-02-5	Selenium compounds	0.15
00-02-6	Silver compounds	0.075
00-02-7	Thallium compounds	0.075
00-16-9	Tin compounds	1.5
00-02-8	Vanadium compounds	0.03
00-02-9	Zinc compounds	7.5
107-44-8	GB	0.0028
505-60-2	Sulfur mustard (or H/HD)	0.003
50782-69-9	VX	0.00017

CAS Number	Compound Name	AIEC (mg/m^3)
7647-01-0	Hydrochloric acid	2.1
7664-39-3	Hydrofluoric acid	0.24
7782-50-5	Chlorine	0.21
10102-44-0	Nitrogen dioxide	0.47
7446-09-5	Sulfur dioxide	0.66
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	2500
74-96-4	Ethyl bromide	1500
74-97-5	Chlorobromomethane	750
7439-97-6	Mercury, elemental	0.0018
7487-94-7	Mercuric chloride	0.03125
22967-92-6	Mercury, Methyl	0.00805
00-16-3	Composite Nondetectable Volatile Organics	100 [a]
00-16-4	Composite Nondetectable Semivolatile Organics	3.0 [a]
00-16-5	Composite Nondetectable Nonvolatile Organics	0.2 [a]
73207-98-4	EA 2192	0.00017

[a] These values are 1000 times used in the January 2008 Ecology and Environment analysis (Ecology and Environment, 2008). The body of their report indicates these larger values (see their Table 3-4), but their model input files showed the smaller values. No explanation was provided in their report for the differences. Independent evaluation of the data used to generate theses estimates indicate the larger values were correct and so were applied in this effort.

R Appendix R – Special Case 4 Dioxin/Furan Data

Table R-1: GB Data

CAS Number	Name	Detection Limits, (g/s)			
		UMCDF GB ATB			
		LIC 1	LIC 2	DFS	MPF
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1.41E-11	8.49E-12	4.54E-11	9.89E-12
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	9.32E-12	5.76E-12	3.34E-11	5.33E-12
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	7.91E-12	5.28E-12	2.8E-11	4.88E-12
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	8.4E-12	5.22E-12	2.97E-11	8.64E-12
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1.02E-11	1.25E-11	3.56E-11	7.88E-12
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	9.2E-12	5.36E-12	2.26E-11	4.35E-12
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	9.33E-12	5.22E-12	2.26E-11	4.22E-12
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	6.61E-12	3.87E-12	1.95E-11	4.36E-12
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	6.05E-12	3.49E-12	1.71E-11	4.02E-12
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	6.59E-12	4.01E-12	1.86E-11	4.38E-12
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	7.02E-12	4.44E-12	2.14E-11	4.52E-12
32774-16-6	3,3',4,4',5,5'-Hexachlorobiphenyl (169)	7.78E-11	1.17E-10	2.24E-10	1.61E-10
Used for COMSTK Data Table Number >>		*1*	*4*	*10*	*7*

Table R-2: VX Data

CAS Number	Name	Detection Limits, (g/s)			
		UMCDF VX ATB			
		LIC 1	LIC 2	DFS	MPF
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	3.9E-12	3.9E-12	1.43E-11	9.88E-12
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	2.36E-12	2.36E-12	1.28E-11	8.42E-12
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	2.11E-12	2.11E-12	1.13E-11	7.87E-12
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1.63E-12	1.63E-12	1E-11	6.86E-12
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	3.32E-12	3.32E-12	1.61E-11	1.14E-11
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	1.87E-12	1.87E-12	1.07E-11	7.39E-12
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	1.87E-12	1.87E-12	1.16E-11	7.68E-12
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	1.97E-12	1.97E-12	1.19E-11	7.41E-12
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	1.7E-12	1.7E-12	9.19E-12	6.28E-12
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	2.04E-12	2.04E-12	1.02E-11	7.25E-12
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	2.23E-12	2.23E-12	1.05E-11	7.31E-12
32774-16-6	3,3',4,4',5,5'-Hexachlorobiphenyl (169)	7.78E-11	1.17E-10	2.24E-10	1.61E-10
Used for COMSTK Data Table Number >>		*2*	*5*	*11*	*8*

Table R-3 HD Data

CAS Number	Name	Detection Limits, (g/s)			
		HD - Used Max of GB and VX Tests			
		LIC 1	LIC 2	DFS	MPF
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1.41E-11	8.49E-12	4.54E-11	9.89E-12
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	9.32E-12	5.76E-12	3.34E-11	8.42E-12
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	7.91E-12	5.28E-12	2.8E-11	7.87E-12
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	8.4E-12	5.22E-12	2.97E-11	8.64E-12
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1.02E-11	1.25E-11	3.56E-11	1.14E-11
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	9.2E-12	5.36E-12	2.26E-11	7.39E-12
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	9.33E-12	5.22E-12	2.26E-11	7.68E-12
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	6.61E-12	3.87E-12	1.95E-11	7.41E-12
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	6.05E-12	3.49E-12	1.71E-11	6.28E-12
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	6.59E-12	4.01E-12	1.86E-11	7.25E-12
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	7.02E-12	4.44E-12	2.14E-11	7.31E-12
32774-16-6	3,3',4,4',5,5'-Hexachlorobiphenyl (169)	7.78E-11	1.17E-10	2.24E-10	1.61E-10
Used for COMSTK Data Table Number >>		*3, 13*	*6*	*15*	*9, 14*

Table R-4: MPF Secondary Waste Data

CAS Number	Name	Detection Limits, (g/s)
		UMCDFSW ATB
		MPFsw
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1.89E-11
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1.67E-11
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1.6E-11
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1.52E-11
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1.78E-11
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	1.21E-11
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	1.17E-11
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	1.22E-11
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	1.16E-11
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	1.24E-11
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	1.23E-11
32774-16-6	3,3',4,4',5,5'-Hexachlorobiphenyl (169)	2.91E-10
Used for COMSTK Data Table Number >>		*12*

S Appendix S – Furnace Upset Methodology

The purpose of this is to propose a different methodology for establishing the upset factors in the Post-RA, rather than the EPA default value. The following is similar to the methodology utilized at TOCDF and ANCDF referenced in Appendix A (Evaluation of the TOCDF Upset Data) of the ANCDF Risk Assessment Report. Appendix A included a 1999 TOCDF report that identified the associated upset criteria and results for 1998. Appendix A also included Addendum 1 which was a similar evaluation conducted by ANCDF to determine the TOCDF upset data for 1999 and 2000.

METHODOLOGY FOR CHARACTERIZING AN UPSET CONDITION			
	LIC	DFS	MPF
Condition 1 (Organics)	Totalize the amount of time that the CO value (uncorrected for O_2) was greater than 100 ppm when waste (agent and/or SDS) was fed to the LIC and during the 5-minute period after the waste had been cutoff.	Totalize the amount of time that the CO value (uncorrected for O_2) was greater than 100 ppm when waste was fed to the DFS and during the 15-minute period after the waste had been discharged from the heated discharge conveyor.	Totalize the amount of time that the CO value was greater than 100 ppm when waste was treated in the primary chamber (including the discharge airlock) and during the 15-minute period after the waste was discharged from the discharge airlock.
Condition 2 (Metals/PM)	Totalize the time during which any of the three parameters listed below were outside of the permitted limits when waste (agent and/or SDS) was fed to the LIC and during the 5-minute period after the waste had been cutoff. 1) Maximum Primary and Secondary Chamber Temperature 2) Minimum Venturi scrubber brine flow rate 3) Minimum Venturi scrubber differential pressure	Totalize the time during which any of the three parameters listed below were outside of the permitted limits when waste was fed to the DFS and during the 15-minute period after the waste had been discharged from the heated discharge conveyor. 1) Maximum Post-quench exhaust temperature 2) Minimum Venturi scrubber brine flow rate 3) Minimum Venturi scrubber differential pressure	Totalize the time during which any of the three parameters listed below were outside of the permitted limits when waste was treated in the primary chamber (including the discharge airlock) and during the 15-minute period after the waste was discharged from the discharge airlock. 1) Maximum Primary chamber zone temperature 2) Minimum Venturi scrubber brine flow rate 3) Minimum Venturi scrubber differential pressure

Table S-1: UMCDF Upset Factors For 2004

	2004			
	LIC1	**LIC2**	**DFS**	**MPF**
Total Hazardous Waste Processing Time (hrs)	6.17	N/A	250.40	N/A
Organics Upset Condition Total Time (hrs)	0.05	N/A	0.0	N/A
Metals Upset Condition Total Time (hrs)	0.0	N/A	0.0	N/A
Percent Organics Upset Condition Time (%)	0.81	N/A	0.0	N/A
Percent Metals Upset Condition Time (%)	0.0	N/A	0.0	N/A
Upset Condition Emission Rate Multiplier	10.00	10.00	10.00	10.00
Organic Emissions Upset Factor	1.07	N/A	1.00	N/A
Metal Emissions Upset Factor	1.00	N/A	1.00	N/A

Table S-2: UMCDF Upset Factors For 2005

	2005			
	LIC1	**LIC2**	**DFS**	**MPF**
Total Hazardous Waste Processing Time (hrs)	1109.87	N/A	3146.00	62.30
Organics Upset Condition Total Time (hrs)	0.93	N/A	2.42	0.10
Metals Upset Condition Total Time (hrs)	0.21	N/A	0.04	0.10
Percent Organics Upset Condition Time (%)	0.08	0.0	0.08	0.16
Percent Metals Upset Condition Time (%)	0.02	0.0	0.0	0.16
Upset Condition Emission Rate Multiplier	10.00	10.00	10.00	10.00
Organic Emissions Upset Factor	1.01	1.00	1.01	1.01
Metal Emissions Upset Factor	1.00	1.00	1.00	1.01

Table S-3: UMCDF Upset Factors For 2006

	2006			
	LIC1	**LIC2**	**DFS**	**MPF**
Total Hazardous Waste Processing Time (hrs)	1970.84	818.79	6565.30	2774.10
Organics Upset Condition Total Time (hrs)	1.67	3.82	7.72	0.85
Metals Upset Condition Total Time (hrs)	0.34	0.20	0.83	0.85
Percent Organics Upset Condition Time (%)	0.08	0.47	0.12	0.20
Percent Metals Upset Condition Time (%)	0.02	0.02	0.01	0.03
Upset Condition Emission Rate Multiplier	10.00	10.00	10.00	10.00
Organic Emissions Upset Factor	1.01	1.04	1.01	1.02
Metal Emissions Upset Factor	1.00	1.00	1.00	1.00

Table S-4: UMCDF Upset Factors for Combined Years 2004, 2005 and 2006

	3 Year			
	LIC1	**LIC2**	**DFS**	**MPF**
Total Hazardous Waste Processing Time (hrs)	3086.88	818.79	9961.70	2836.40
Organic Upset Condition Total Time (hrs)	2.65	3.82	10.14	0.95
Metal Upset Condition Total Time (hrs)	0.55	0.20	0.87	0.95
Percent Organic Upset Conditions (%)	0.09	0.47	0.10	0.03
Percent Metal Upset Conditions (%)	0.02	0.02	0.01	0.03
Upset Condition Emission Rate Multiplier	10.00	10.00	10.00	10.00
Organic Emissions Upset Factor	1.01	1.04	1.01	1.00
Metal Emissions Upset Factor	1.00	1.00	1.00	1.00

08-0638

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
US ARMY CHEMICAL MATERIALS AGENCY
UMATILLA CHEMICAL AGENT DISPOSAL FACILITY
78072 ORDNANCE ROAD
HERMISTON, OREGON 97838

REPLY TO
ATTENTION OF:

JUN 1 1 2008

US Army Chemical Materials Agency
UMCDF Field Office

ENV-08-0129

SUBJECT: Umatilla Chemical Agent Disposal Facility (UMCDF) Hazardous Waste Permit (ORQ 000 009 431) – Permittees' Comments on the Results of the UMCDF Post-Trial Burn Risk Assessment

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY
RECEIVED
JUN 11 2008
HERMISTON OFFICE

Richard Duval, Program Administrator
Chemical Demilitarization Program
Oregon Department of Environmental Quality
256 East Hurlburt Avenue, Suite 105
Hermiston, Oregon 97838

Dear Mr. Duval:

Reference public notice, Department of Environmental Quality (DEQ), DEQ Item No. 08-0490(881), April 28, 2008, subject: Public Notice: Request for Comments and Notice of Public Hearing, Results of the UMCDF Post-Trial Burn Risk Assessment.

This letter transmits the Permittees' comments on the "Results of the UMCDF Post-Trial Burn Risk Assessment." These comments are submitted in accordance with the referenced notice.

If you have any questions, please call our technical point of contact, Mr. Kaylin Burnett, (541) 564-7069.

Sincerely,

Date of Signature: 11 JUN 08
Robert T. Stein
Lieutenant Colonel, CM, USA
Commander
*CERTIFICATION STATEMENT

Date of Signature: 6/11/08
Douglas G. Hamrick
Washington Demilitarization Company, LLC
Project General Manager
*CERTIFICATION STATEMENT

Enclosures

*I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION ACCORDING TO A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

COMMENTS ON THE RESULTS OF THE UMATILLA CHEMICAL AGENT DISPOSAL FACILITY POST-TRIAL BURN RISK ASSESSMENT

With this letter, the Umatilla Chemical Agent Disposal Facility (UMCDF), including the Chemical Materials Agency (CMA) and Washington Demilitarization Company (WDC), are submitting comments on the results of the UMCDF Post-Trial Burn Risk Assessment (PostRA) performed by the Oregon Department of Environmental Quality (DEQ). Detailed comments on the UMCDF PostRA are provided in Enclosure A.

The discussion below highlights the collaborative risk assessment process that the CMA and WDC have participated in over the last six years, summarizes some refinements made by the U.S. Army Center for Health Promotion and Preventive Medicine (CHPPM) to their initial risk assessment results, and summarizes the current CHPPM risk assessment results (the "June Addendum" results). Enclosure B provides the June Addendum report issued by CHPPM.

COLLABORATIVE EFFORT

The PostRA protocol has been a collaborative process between several organizations since the outset. The UMCDF worked along side the DEQ, the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), and other stakeholders since the PostRA protocol was set in motion in 2001. The UMCDF provided a considerable amount of resources to assist in the completion of the PostRA Risk Assessment Work Plan (RAWP). Due to professional differences regarding the conservatism of the assumptions in the RAWP, the RAWP included a provision which stated that in the event initial results indicated any exceedances of target risk levels, the factors contributing the risk can be scrutinized and refined to reflect site-specific conditions for a more accurate estimate of risk. The RAWP was completed in 2004 prior to the commencement of chemical agent treatment operations at the UMCDF.

The UMCDF continued to be heavily engaged with the risk assessment working group (DEQ and CTUIR) after chemical agent operations began to develop the necessary data (i.e., emissions database, air dispersion and deposition modeling, fate and transport data, toxicity data) for input into the risk assessment model. The UMCDF provided substantial expertise in risk assessment applications to assist in finalizing the model.

In 2006, due to a delay in the completion of the risk assessment, the UMCDF continued to proceed with conducting a human health risk assessment (HHRA) and an ecological risk assessment (ERA) utilizing CHPPM. CHPPM has conducted numerous risk assessments for other chemical demilitarization facilities [i.e., Anniston Chemical Agent Disposal Facility, Pine Bluff Chemical Agent Disposal Facility, and Tooele Chemical Agent Disposal Facility (TOCDF)]. CHPPM conducted a multi-pathway HHRA and ERA for stack emissions from the UMCDF. The results of the CHPPM HHRA and ERA were submitted to the DEQ under cover letter, ENV-08-0601, in February 2008.[1]

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[1] Final Health Risk Assessment for the Umatilla Chemical Agent Disposal Facility, Umatilla Chemical Depot, Hermiston, Oregon, U.S. Army Center for Health Promotion and Preventive Medicine, Aberdeen Proving Ground, Maryland, Report No. 39-DA-08CF-07, February 2008.

FEBRUARY 2008 HHRA AND ERA RESULTS

The results of the February 2008 CHPPM HHRA and ERA can be summarized as follows:

- The excess lifetime cancer risks in the HHRA were calculated by estimating the total risk associated with exposure to all of the compounds of potential concern (COPCs) through each exposure pathway for each receptor population (exposure scenario). All total lifetime cancer risks for receptor populations were below the regulatory criterion of 1×10^{-5} (also expressed as 1E-05).

- Non-cancer hazard estimates were calculated by generating COPC-specific hazard quotients (HQ) for each pathway. Then, for each population, the resulting HQs were summed for each pathway, then across pathways culminating in the total hazard index (HI). The Native American Adult, Native American Child, and Native American Mother populations had HIs that were higher than the regulatory criterion of 0.25. The highest estimated HI was 0.34.

- Acute human health hazards were evaluated by comparing each COPC estimated 1-hour maximum concentration to its COPC-specific acute reference concentration. Then, the resulting acute hazard quotients were summed for all the COPCs to obtain an acute hazard index (AHI) for each exposure location. Estimated AHIs for all emission sources were lower than the regulatory criterion of 1 (or unity) for the off-site and on-site co-location populations.

- In order to assess the potential for adverse effects to ecological receptors, the HQ method was utilized. For the terrestrial sites, the off-site co-located location HQ was lower than the screening target level of 0.25 for all receptors. For the aquatic site, Umatilla River and Columbia River, the HQ was lower than the screening target level of 0.25 for all receptors.

RISK ASSESSMENT REFINEMENTS

Since submittal of the report in February 2008, the UMCDF, CHPPM, and others have been working cooperatively with CTUIR personnel and Dr. Bruce Hope of the DEQ to address concerns the CTUIR has raised about the CHPPM risk assessment and the DEQ risk assessment prepared by Ecology and Environment, Inc.[2] The culmination of this effort was a "June Addendum" to the CHPPM risk assessment report which included several technical refinements and which addressed the health risks associated with the unknown portion of the total organic emissions (TOE).

Technical refinements are permitted under the PostRA RAWP:

> "If initial results indicate an exceedance of target risk levels, the screening-level approach allows for identification of the factor(s) contributing to the high risk

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[2] Technical Report - Calculating Human Health and Ecological Risks for the Umatilla Chemical Agent Disposal Facility, Hermiston, Oregon, Ecology and Environment, Inc., January 31, 2008.

> level. These factors can then be scrutinized further and refined to reflect site-specific conditions for a more accurate estimate of risk." (p. 1-7)

Two examples of the technical refinements that CHPPM included in its risk assessment addendum are as follows:

- **Agent Emission Rate Refinements**
  In the February 2008 CHPPM HRA, chemical agents were assumed to be emitted continuously from the four incinerators and the Brine Reduction Area at the allowable stack concentrations (ASCs). The Munitions Demilitarization Building and the Laboratory Ventilation Filter Systems were assumed to emit GB and VX continuously at 20% of the ASC levels and HD continuously at 20% at the time-weighted average levels. However, review of site-specific data demonstrates that actual measured emissions have been much less than the assumed emission rate. Therefore, chemical agent emissions were reduced based on the detection limits of the monitoring equipment. The revised GB and VX emission rates were set to the highest detection limit recorded at the UMCDF and HD emission rates were set to the highest detection limit reported to date in the TOCDF agent trial burns.

- **Spent Carbon Adjustment**
  The February 2008 CHPPM HHRA assumed that over 700,000 pounds of spent carbon will be processed in the Carbon Micronization System and the Deactivation Furnace System during closure. The quantity of spent carbon generated was reviewed and lowered to account for an approved permit modification regarding the ventilation filter system carbon changeout requirements as well as future changes in management practices.

The February 2008 CHPPM risk assessment was implemented for only the detected chemicals demonstrated during trial burns. This approach follows the Environmental Protection Agency (EPA) guidance; however, the EPA guidance recommends that the potential risk associated with the unknown fraction of the TOE be evaluated qualitatively. The EPA has developed the TOE factor test to account for the unidentified organic compounds. The TOE measurements made during the trial burns are used in conjunction with identified organic compounds to calculate a TOE Correction Factor.

At the request of the CTUIR, organic COPCs that could potentially be in the incinerator feed streams were identified based on information contained in the RAWP. A total of fourteen (14) COPCs that had not been quantitatively evaluated in the February 2008 HHRA (because they were not detected in any trial burn) were placed back into the analysis. The TOE factors were re-calculated to account for these additional COPCs per EPA guidance. This revised emissions database (called Revision 3)[3] along with the refinements discussed above were used to generate the CHPPM June Addendum results.

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[3] Electronic communication between Gary Napp, EnviroMet and Matt McAtee (USACHPPM), and others, Subject: ***Revised*** Rev 3 of the UMCDF PostRA Emissions Database, 09 June 2008.

The CHPPM June Addendum results are provided as Enclosure B to this letter and can be summarized as follows:

- The results of the June Addendum risk assessment demonstrate that the potential public health risks associated with the day-to-day operations of the UMCDF facility should be acceptable to the regulatory authority.
- The excess lifetime cancer risk estimates were all less than the regulatory target criteria, meaning that unacceptable cancer risks were not identified. This remains the case even when the emission rates of detected compounds and undetected feed compounds (at detection limits) were artificially increased by the TOE correction factor.
- The noncancer health hazard estimates for the chronic exposure scenarios from the revised baseline iteration were all less than the regulatory target criteria (0.25), meaning that unacceptable noncancer risks were not identified. When the emission rates of detected compounds and undetected feed compounds (at detection limits) were artificially increased by the TOE correction factor, then the noncancer health hazard estimates for the Native American Adult populations were greater than the regulatory target. The target is a ratio of less than or equal to 0.25 and the estimated ratio was 0.34. This should generally be considered acceptable to risk managers, given the large number of protective assumptions and other uncertainties associated with this type of analysis.
- The acute health hazard estimates from the revised baseline iteration were all less than the regulatory target criterion, meaning that unacceptable acute risks were not identified. When the emission rates of detected compounds and undetected feed compounds (at detection limits) were artificially increased by the TOE correction factor, then the acute health hazard estimates for some of the scenarios were greater than the regulatory target. However, the acute assessment is considered to be health-protective and the highest result for a hypothetical location on-site is within an order of magnitude of the regulatory target.
- The following overall conclusions can be drawn from the ecological analysis. Impacts on the survival, growth, and reproduction of terrestrial community receptors are not expected. Impacts on the development and reproductive success of wildlife populations and of individuals of threatened or endangered species are not expected.

CONCLUSION

The development of the PostRA protocol and conducting the PostRA has been a collaborative effort between several organizations including the UMCDF. Substantial expertise has been utilized to produce results that are consistent with the RAWP and associated EPA guidance. Based on the results of the UMCDF PostRA conducted by the DEQ in conjunction with the HHRA and ERA conducted by CHPPM, the UMCDF is in support of the DEQ conclusion that continued operation of the UMCDF presents no major adverse impacts to human health or the environment. The CMA and WDC are committed to operating the UMCDF and destroying chemical agent and associated munitions/bulk items in an environmentally sound manner.

Enclosure A

Comments on the Results of the UMCDF PostRA

US Army Center for Health Promotion and Preventive Medicine
Environmental Health Risk Assessment Program
Review of the of the Oregon Department of the Environment
Technical Report: Calculating Human health and Ecological Risks for the Umatilla Chemical Agent Disposal Facility (Jan 08)

#	Page #	Text in report	**Comment**	**Recommendation**
1.	General Comment		Clarification on Army Collaborative Effort CHPPM operated in a transparent process and developed detailed plans and datasets, which were shared and improved upon with the help the DEQ, its contractor, E&E, and the CTUIR technical representatives. These methods and datasets provided the foundation for the risk assessment produced by the DEQ. Some technical methodologies needed revision and CHPPM initiated a consensus-based process for reaching agreement with DEQ and the CTUIR technical representatives. Nearly all methodological issues were resolved. The most important factor where technical differences of opinion remain among the HRA team is in how best to characterize the uncertain risks associated with estimated emissions of organic compounds that could not be identified as specific chemicals. USACHPPM has collaborated with the CTUIR representative on several of the refinements that address important factors driving potential risk management uncertainty. The June 2008 addendum to the Feb 2008 Final UMCDF HRA addresses the health risks associated with the unknown portion of the total organic emissions.	Provide improved accuracy and clarity on the role of the Army team and CHPPM specifically.

#	Page #	Text in report	**Comment**	**Recommendation**
2.	General Comment		CHPPM Role in the Development HRA Report In the fall of 2006, CHPPM and an Army team were tasked to produce a risk assessment. The Army team wanted to implement the intent of the DEQ Risk Assessment Work Plan and incorporate updates from the U.S. Environmental Protection Agency technical guidance published October 2005 after the DEQ Risk Assessment Work Plan was finalized. In June 2007, the USACHPPM was informed that they would no longer be involved in the development of the ODEQ UMCDF HRA report. USACHPPM never opted-out of the process. The UMCDF field office requested USACHPPM to continue preparing a HRA report for the Army. In Feb 2008 the Army team published a risk assessment report, which represents a baseline analysis that implements the intent of the Work Plan in light of the newer national EPA technical guidance. The DEQ Risk Assessment Work Plan recommends technical risk assessment refinements to a baseline analysis if needed, so the Army team has prepared a June 2008 addendum report to our Feb 2008 risk assessment.	Provide improved accuracy and clarity on the role of the Army team and CHPPM specifically.
3.	General Comment	Through out the report	The DEQ has reported risk estimates using several different approaches to characterize the potential risk associated with these unidentified organic emissions without settling on a set of primary results and the preferred set of TOE-based results.	CHPPM and the Army team urge the DEQ, and all risk managers associated with the permitting of the facility, to emphasize the TOE correction/scaling factor approach recommended by the 2005 U.S. EPA technical guidance.

#	Page #	Text in report	**Comment**	**Recommendation**
4.	General Comment	Through out the report	Referencing and labeling results as CHPPM assumptions is inaccurate. Ultimately E & E determined the inputs used to generate the ODEQ risk assessment. CHPPM was not tasked to produce the ODEQ risk analysis and only provided recommendation for inputs into producing a technically sound risk assessment. CHPPM had no control over the inputs used by E & E which are labeled as CHPPM assumptions. E & E refers to RAWP intake rates as CHPPM assumptions (see comment on 51); however, the RAWP was authored by E & E. Producing results labeled as CHPPM assumptions is unjustified and inappropriate.	Remove all results labeled and presented as results from CHPPM assumptions.
5.	General Comment	Through out the report	CHPPM software was not used to generate results for the ODEQ risk assessment and is mentioned multiple times throughout the report (pages iv, vi, xx, 3-4, and 4-17). No results presented in the ODEQ report were produced by CHPPM software; therefore, only references to software used to generate results should be mentioned in the report.	Remove all references to software not used to produce results presented in the ODEQ risk assessment report
6.	General Comment	Through out the report	The report lacks transparency in presenting input data used to calculate risks and hazards. Data presented in the appendices appears unorganized and incomplete (example: dermal input parameters and calculations) making it complicated to locate and interpret. It is extremely difficult for reviewers to perform quality control calculations of the risk results based on the data provided in the appendices. Additionally, no intermediate parameter results could be located (examples: calculated exposure point concentrations, average daily intakes, and water body loading terms). Due to the lack of data organization and clarity, reviewer quality control checks could not be completed.	Incorporate improvements in input data transparency and cross-referencing for ease of reviewer quality control checks plus include intermediate parameter results.
7.	iii	Paragraph 2.	The sentence "…there were professional differences of opinion..." does not indicate that these differences were deemed acceptable by ODEQ.	Add verbiage that indicates that the differences were accepted as valid by ODEQ.

#	Page #	Text in report	**Comment**	**Recommendation**
8.	iii	Paragraph 3	EnviroMet is referred to as CHPPM's air modeler. EnviroMet should be represented as "subcontractor to URS-EG&G Division	Change to EnviroMet (CHPPM's air modeler) to EnviroMet (subcontractor to URS-EG&G Division)
9.	iv	Table 1	It states in rows 4 and 6 of Table 1 "TOE fraction eliminated" yet the HHRAP TOE method was used in these two models.	Reword the table to eliminate this inconsistency.
10.	v	Table 2	The ILCRs in Table 2 and in other tables throughout the document should be presented with one significant digit as recommended by EPA.	Present results using one significant digit
11.	viii	Paragraph 1	The third sentence, "The primary explanation for this is the toxicity values for the chemical agents (VX, HD, and GB) are much lower than the other 98 COPCs indicating toxicity at much lower daily dosages" is incorrect.	Change the sentence, to "There are two main reasons for this: 1) it was assumed that the chemical agents (VX, HD, and GB) were being emitted continuously at worst-case (Allowable Stack Concentration or ASC) levels; and, 2) the toxicity values for the chemical agents are much lower than the other 98 COPCs indicating toxicity at much lower daily dosages."
12.	viii	Paragraph after bullets, last two sentences.	Using a HQ = 0.25 as the target level accounts for background exposures and is justified in the Human Health guidance (EPA 2005). The RAWP suggests using a 0.25 target level as well.	
13.	xi	Paragraph	The sentence "Another factor that had a significant effect on the results was the inclusion of the chemical agents at their detection limits." is incorrect. Chemical agents were assumed to be emitted continuously at the worst-case (ASC) level.	Change the sentence to "Another factor that had a significant effect on the results was the assumption that the chemical agents are emitted continuously at worst-case (ASC) levels."
14.	2-1	First paragraph, last sentence.		Clarify that the HHRAP was finalized AFTER the RAWP was published.

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#	Page #	Text in report	**Comment**	**Recommendation**
15.	2-1	Second paragraph, first sentence.	This is a misstatement of fact. CHPPM was told by the field office in late June 2007 that CHPPM would no longer participate in the State's HRA process, but would continue to run the HRA for the field office. There are several references throughout document about CHPPM not doing the HRA.	Revise this statement to reflect USACHPPM continue to work on the HRA for the UMCDF field office.
16.	3-4	First paragraph, Section 3.3.1 Reference to RisKit that it is an incinerator risk assessment program.	Report refers to Ris**Kit** as Risk**It**. Could it be perceived by the public as a "mockery" of the seriousness of the Army's attitude towards HRAs? Also, improper characterization of RisKit.	Change RisKit to RiskIt and provide an description of RiskIt.
17.	3-5	First paragraph	1. The RAWP stated that the Umatilla River and Wanaket Wildlife Mitigation Area were to be evaluated, whereas CHPPM chose to evaluate the Umatilla River and Columbia River. CHPPM assessed aquatic habitats within a 10 km radius from the study sites since the worse case scenario was the main focus for the screening-level assessment. The Wanaket Wildlife Mitigation Area was not within the 10 km radius.	
18.	3-5	Paragraph 3.	The wildlife receptor list indicates that it was updated to eliminate redundancy but the muskrat was eliminated and replaced with the raccoon because the muskrat is not found in the surrounding area but the raccoon (a receptor from the same feeding guild) is found in the surrounding area.	Edit the text to indicate why the muskrat was replaced with the raccoon.

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#	Page #	Text in report	**Comment**	**Recommendation**
19.	3-6	Paragraph 5.	The sentence "…accounts for a small percentage of total chemical exposed for wildlife, there was no further discussion of these differences." does not indicate that these differences were deemed acceptable by ODEQ. This was documented in an e-mail from Carl Mach on 7 December 2007.	Consider editing verbiage such as "there was no further discussion of these differences, and E&E considered these differences acceptable." to indicate that the differences were deemed acceptable to the ODEQ.
20.	3-7	Third paragraph, Section 3.3.3.1 Initial Evaluation 1. E&E recommendation for including separate columns in database for plant and soil-invertebrate screening benchmarks. 2. Surrogate TRV values	1. The algorithm, "Selection of Ecological Measures of Effect for Combustion Facility Risk Assessments, Version 2.0 (USACHPPM 2007), was used for selecting all media and wildlife TRV benchmarks. The lower value of either the plant or earthworm data is chosen to represent the low-effect benchmark for the conservative screening-level assessments. Use of this algorithm was approved by ODEQ and documented in an e-mail dated 23 February 2007. 2. CHPPM did not use surrogate TRVs, as stated in an e-mail dated 05 November 2007 because the suggested surrogates are already unique compounds in the database.	

#	Page #	Text in report	**Comment**	**Recommendation**
21.	3-7	Third paragraph, Section 3.3.3.1 Identifying test species	3. It is unclear what is meant by identifying test species and proper referencing of sources since discussions with regard to those topics were not discussed.	Provide an explanation on what is meant by identifying test species.
22.	3-7	Fourth paragraph, Section 3.3.3.1 Initial Evaluation	It was stated that the approach was tentatively accepted by ODEQ, however, the algorithm was accepted by ODEQ on 23 February 2007 and using the interspecies UF=10 was in the algorithm used by CHPPM.	Edit the text to indicate that the approach was accepted by ODEQ and their technical representatives E & E, by removing "tentatively" and any verbiage that indicates that the CHPPM approach was in question.
23.	3-7	Paragraph 5.	The report specifies that CHPPM's first tier approach of dividing all TRVs by 10 "has little or no precedent in current ecological risk assessment guidance." The UF=10 is mentioned in the algorithm that was approved by ODEQ and documented in an e-mail dated 23 February 2007.	Consider removing comments indicating that using inter-species UFs of 10 has little or no precedent in current ecological risk assessment guidance. As noted in CHPPM's ecotoxicology algorithm for determining TRVs, the use of inter-species UFs of 10 were derived from the CHPPM Technical Guide 254 (*Standard Practice for Wildlife Toxicity Reference Values: Technical Guide No. 254, USACHPPM 2000*) and Chapman, et al., 1998 (*A Critical Evaluation of Safety (Uncertainty) Factors for Ecological Risk Assessment*).
24.	3-8	First Paragraph, Section 3.3.3.2 Comprehensive Evaluation	After addressing comments from ODEQ and E&E and coming to consensus on various issues, CHPPM updated the ecotox database to reflect any changes. All revisions to the database should have been apparent to all parties involved. CHPPM followed the agreed upon algorithm, so deviations from the algorithm (i.e., separate columns for plant and soil-invertebrate data) were not incorporated.	

#	Page #	Text in report	**Comment**	**Recommendation**
25.	3-9	Paragraph 1.	The report indicates that CHPPM soil benchmarks include a mixture of small mammal benchmarks, when small mammal benchmarks were removed as per a comment provided to CHPPM by E&E.	Remove verbiage that CHPPM included small mammal benchmarks.
26.	3-9	Paragraph 1.	The report does not explain that while the CHPPM soil benchmarks included plant and soil invertebrate benchmarks, the lowest toxicity benchmark was used in order to create conservative risk estimates.	Include verbiage to illustrate the conservative process that CHPPM employed in selecting soil benchmarks
27.	3-9	Paragraph 1.	The report alleges that full discussion of CHPPM soil benchmark values was impossible due to submission of CHPPM ecological toxicity database ("Because of the timing of the receipt of CHPPM's latest ecological toxicity database, E & E did not hold any further discussions with CHPPM with regard to its content."). All CHPPM toxicity data was submitted concurrently allowing ample time for discussion.	Remove sentence in order to comply with the actual timeline.

#	Page #	Text in report	**Comment**	**Recommendation**
28.	3-10		Table 3-1 1. Mercury compounds value 2. Composite Nondetectable Nonvolatile Organics 3. The benchmarks for the PCB congeners were reported as data gaps in the database. 4. Dioxin/Furan values and comment about using TEFs for deriving surface water values 5. Use of surrogate values for PCBs 6. Antimony sediment value 7. PCB mixture sediment value 8. 2,4-Dinitrotoluene 9. Dibutyl phthalate	
30.	3-22	Paragraph 2.	The paragraph indicates that the mass TOE with boiling points below 100 degrees Celsius represents non-volatiles.	Edit verbiage to indicate that the mass TOE with boiling points below 100 degrees Celsius represents volatiles.

#	Page #	Text in report	**Comment**	**Recommendation**
31.	3-22	Paragraph 2.	The TOE surrogate toxicity values were derived from very limited data. Only 2.1% (avians), 10.6% (water and sediment communities), 17% (soil communities) and 25.5% (mammals) of the COPCs from which the Volatile TOE surrogate values were derived had any toxicity data. 3.7% (avians), 19.5% (water and sediment communities), 34.1% (soil communities) and 54.3% (mammals) of the COPCs from which the Semi-volatile TOE surrogate values were derived had any toxicity data. And 28.6% (avians), 53.2% (mammals), 65.9% (water and sediment communities) and 78.7% (soil communities) of the COPCs from which the Non-volatile TOE surrogate values were derived had any toxicity data. Basing the TOE surrogate toxicity values on such sparse data does not represent the unknown chemicals well and introduces large amounts of uncertainty. Additionally without first proving whether E & E's approach adequately represents the TRVs of a combined group of chemicals and is scientifically defensible, enormous amounts of uncertainty are introduced into the risk assessment. Such an amount of uncertainty will make any conclusions regarding these TOE surrogate chemicals unreliable at best.	Consider accounting for the unknown emissions volume by removing the TOE surrogates and applying a TOE factor to all known chemical emissions instead. This process is supported by the EPA guidance and will provide more realistic and reliable conclusions.
32.	3-22	Paragraph 5	The phrase "… the information they had provided was the detection limits for the TOE fractions" is incorrect. The TOE data EnviroMet provided in the emissions database included values that were detected and others that were not.	
33.	4-2	Table 4-2	Table 4-2 identifies a CHPPM format, but there is no discussion regarding the CHPPM format or the CTUIR format.	Include a brief description on the CHPPM and CTUIR format in the text.

#	Page #	Text in report	**Comment**	**Recommendation**
34.	4-3	Table 4-3	Table 4-3 lists the UTM stack locations of modeled stacks rounded to the nearest whole meter. The stack locations in the air modeling files are to the hundredths of meters. With the maximum impacts occurring at receptors very near to the stacks, such alterations of 1-2 feet in stack direction (as represented by the dropping of these decimals) would make the modeling results non-reproducible. Other rounding occurs in the listing of exit temperature, and exit velocity for the common stack, and for stack height of the MDB stack. It is important that the values that went into the modeling analysis be shown using the proper accuracy of decimal places.	Revise tabble to represent the exact values input to the air modeling.
35.	4-5	Paragraph 1	There is no Figure 4-1.	Either include the figure or remove the sentence.
36.	4-5	Paragraph 1	The sentence is confusing. Mentions collocating, but does not define what it is. Also sentence is fragmented.	Rephrase sentence and also provide an explanation on what collocating is.
37.	4-7	Table 4-5	The maximum air concentrations identified in table for the four exposure areas do not match the EnviroMet air modeling output results. CHPPM reviewed the output results obtained from Environmet and could not reproduce the same maximum values. CHPPM used the same approach of collocating highest CDRs for the 4 exposure areas	Verify that the correct air modeling output data was used in IRAP software.
38.	4-8	Last Paragraph, 4:2.3 Receptor and Scenarios	Mentioning results for exposure scenarios that do not exist in the risk assessment report is confusing and misleading. CHPPM risk assessment results are not presented and/or used for comparison in the ODEQ report. CHPPM supplied data was only used as LAKES Software input values for generating the ODEQ risk evaluation based on E & E exposure assumptions. It is unclear why CHPPM results for exposure assumptions, which are not present in the report, are discussed.	Consider rewording or deleting the paragraph to provide clarity.

#	Page #	Text in report	**Comment**	**Recommendation**
39.	4-9	Paragraph 3	The method described to calculate the TOE factor appears to be inconsistent with the USEPA 2005 HHRAP guidance. That guidance defines the TOE factor as the ratio of the total TOE mass to the mass of identified organic compounds. The TOE factors in the November 2007 emissions database were calculated using this approach. The value of 6.21E-11 in the last paragraph should be 2.06E-03.	Verify that correct TOE factors were used for this report.
40.	4-11	First Paragraph,	CHPPM Final UMCDF HRA was not based on Iteration 10.	Change to reflect what was actually used for CHPPM's Final HRA.
41.	4-11	Last Paragraph, 4.3.3 Receptor Parameters	Labeling RAWP intake rates as CHPPM assumptions is inaccurate. CHPPM did not develop the intake rates presented in the RAWP; therefore, they are not assumptions made by CHPPM. The intake rates presented in the RAWP were developed by E & E the author of the work plan. This paragraph implies CHPPM did not perform or support a risk analysis using 2005 HHRAP guidance intake rates but rather focused on intake rates presented in the RAWP. CHPPM has run multiple risk assessments using both 2005 HHRAP guidance and RAWP intake rates. CHPPM Iteration 10 risk assessment was a stakeholder consensus to perform a risk analysis based on RAWP inputs to compare results with E & E and CTUIR. CHPPM has always supported/recommended performing the ODEQ risk assessment using established regulatory guidance. It is incorrect to label the RAWP inputs as CHPPM assumptions and professionally unprincipled to insinuate throughout the risk assessment that CHPPM is unqualified and biased in the risk assessment development and decision process.	Label RAWP intake rates as RAWP assumptions. Remove/reword the negative connotations suggesting CHPPM did not adjust intake rates to reflect the 2005 HHRAP.

#	Page #	Text in report	**Comment**	**Recommendation**
42.	4-17	First Paragraph, 4.4.4 Comparison of Results between Different Base Models	CHPPM was not tasked to produce the final ODEQ risk assessment; therefore, it is inappropriate to reference CHPPM software. The results presented in the ODEQ risk assessment were produced solely by E & E. No results produced by CHPPM are presented; thereby, a comparison can not be made and should not be mentioned.	Remove the reference and name of the software used to produce CHPPM results.
43.	4-20	Last Paragraph, 4.5 Upset Conditions Analysis	It is unclear why differences between E & E acute hazard quotients and CHPPM draft acute hazards results are mentioned. CHPPM did not perform the ODEQ risk analysis; thereby, CHPPM risk assessment results are not presented as part of the ODEQ risk assessment report. The paragraph appears to serve no purpose other than to point out the difference in E & E and CHPPM acute hazards, and has no significance to presenting E & E results.	Consider deleting the paragraph to eliminate confusion.
44.	4-22	Table 4-14 Sum of Acute Inhalation Hazard Quotients for Upset Conditions	The table presents acute hazard results for adult and child populations; however, an explanation of how individual adult and child acute hazards are calculated could not be found in the risk assessment. The 2005 EPA combustion risk assessment guidance does not provide acute inhalation criteria for separately calculating adult and child acute hazards. When assessing acute hazard, the adult and child population are considered to be the same.	Provide a paragraph or section detailing how acute hazards are calculated for adult and child populations.
45.	5-7	Table 5-5.	The table does not have entirely correct food items used in the CHPPM run.	For the burrowing owl add "Invert Terrestrial" and remove "Bird Herbivore". For the coyote add "Plant Terrestrial". For the river otter add "Invert Benthic". For the raccoon add "Fish Omnivore".

#	Page #	Text in report	**Comment**	**Recommendation**
46.	5-7	Table 5-5. Inclusion of the peregrine falcon in the freshwater food web rationale.	The note does not provide justification as to why the peregrine falcon was included in the freshwater food web nor that it was agreed upon by E & E that the peregrine falcon would be an acceptable freshwater receptor.	Include verbiage which provides an explanation as to why the peregrine falcon was included in the freshwater food web. The peregrine falcon was included in the freshwater food web as a carnivorous avian because the 2004 Risk Assessment Work Plan indicates that it is found in the freshwater habitat and because the red-tailed hawk was the agreed upon by ODEQ and CHPPM to be the surrogate for carnivorous avians in the terrestrial (shrub-steppe) scenario. Also please include verbiage to reflect the fact that these assumptions were never questioned and deemed acceptable by ODEQ.
47.	5-21	Paragraph 1.	See Comment 20.	

Enclosure B

Addendum to the Final Health Risk Assessment for the Umatilla Chemical Agent Disposal Facility

U.S. Army Center for Health Promotion and Preventive Medicine

Addendum to the Final Health Risk Assessment for the Umatilla Chemical Agent Disposal Facility Umatilla Chemical Depot, Hermiston, Oregon

Report No. 39-DA-08CF-07a

June 2008

Prepared for:

Commander, Umatilla Chemical Demilitarization Facility
Hermiston, Oregon

Prepared by:

US Army Center for Health Promotion and Preventive Medicine
Environmental Health Risk Assessment Program
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Approved for public release; distribution unlimited. Requests for this document shall be referred to Umatilla Chemical Depot, Cleanup Division (SFAE-CD-CO-A), Hermiston, Oregon 97838.

CHPPM FORM 433-E (MCHB-CS-IPD), OCT 03

Readiness Thru Health

U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE

The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) lineage can be traced back over 50 years to the Army Industrial Hygiene Laboratory. That organization was established at the beginning of World War II and was under the direct jurisdiction of The Army Surgeon General. It was originally located at the Johns Hopkins School of Hygiene and Public Health, with a staff of three and an annual budget not to exceed $3000. Its mission was to conduct occupational health surveys of Army operated industrial plants, arsenals, and depots. These surveys were aimed at identifying and eliminating occupational health hazards within the Department of Defense's (DOD) industrial production base and proved to be beneficial to the Nation's war effort.

Until 1995, it was nationally and internationally known as the U.S. Army Environmental Hygiene Agency or AEHA. Its mission is expanding to support the worldwide preventive medicine programs of the Army, DOD and other Federal Agencies through consultations/ supportive services; investigations and training.

Today, AEHA is redesignated the U.S. Army Center for Health Promotion and Preventive Medicine. Its mission for the future is to provide worldwide technical support for implementing preventive medicine, public health and health promotion/wellness services into all aspects of America's Army and the Army Community anticipating and rapidly responding to operational needs and adaptable to a changing work environment.

The professional disciplines represented at the Center include chemists, physicists, engineers, physicians, optometrists, audiologists, nurses, industrial hygienists, toxicologists, entomologists, and many other as well as sub-specialties within these professions.

The organization's quest has always been one of excellence and continuous quality improvement; and today its vision, to be the nationally recognized Center for Health Promotion and Preventive Medicine, is clearer than ever. To achieve that end, it holds ever fast to its values which are steeped in its rich heritage:

- *Integrity is the foundation*
- *Excellence is the standard*
- *Customer satisfaction is the focus*
- *Its people are the most valued resource*
- *Continuous quality improvement is its pathway*

The organization, which stands on the threshold of even greater challenges and responsibilities, has General Officer leadership. As it moves into the next century, new programs are being added related to health promotion/wellness, soldier fitness and disease surveillance. As always, its mission focus is centered upon the Army Imperatives so that we are trained and ready to enhance the Army's readiness for war and operations other than war.

It is an organization fiercely proud of its history, yet equally excited about the future. It is destined to continue its development as a world-class organization with expanded services to the Army, DOD, other Federal Agencies, the Nation and the World Community.

DEPARTMENT OF THE ARMY
US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
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EXECUTIVE SUMMARY
ADDENDUM TO THE FINAL HEALTH RISK ASSESSMENT
FOR THE UMATILLA CHEMICAL AGENT DISPOSAL FACILITY
UMATILLA CHEMICAL DEPOT, HERMISTON, OREGON
REPORT NO. 39-DA-08CF-07a
JUNE 2008

1. PURPOSE. The Umatilla Chemical Agent Disposal Facility (UMCDF) commenced disposal by incineration of the chemical agent stockpile stored at the Umatilla Chemical Depot in 2004. A health risk assessment (HRA) was conducted and considered as part of the decision-making process for a Resource Conservation and Recovery Act (RCRA) Part B Permit. The purpose of this Addendum report is to update the February 2008 HRA report produced by this Center with several technical refinements and to also address the health risks associated with the unknown portion of the total organic emissions.

2. CONCLUSIONS. The creation of a risk assessment product is an iterative process designed to be refined over several revisions until there is consensus on the most important and most uncertain factors affecting the results. How confident decision-makers need to be on these important but uncertain factors should drive the duration and complexity of the risk assessment life-cycle. A health risk assessment provides mathematical estimates of potential public health risks that are model-based and do not represent direct measurements of reality. However, the estimates can still be very useful to ensure that the public health is protected. Proper risk estimates incorporate several layers of health-protective assumptions that are anchored by site-specific conditions and site-specific data so that the results are meaningful and useful. The following conclusions are made based on this revised HRA.

a. The overall conclusion is that the results of the HRA demonstrate that the potential public health risks associated with the day-to-day operations of the UMCDF facility should be acceptable to the regulatory authority.

b. The excess lifetime cancer risk estimates were all less than the regulatory target criteria, meaning that unacceptable cancer risks were not identified. This remains the case even when the emission rates of detected compounds and undetected feed compounds (at detection limits) were artificially increased by the TOE correction factor.

c. The noncancer health hazard estimates for the chronic exposure scenarios from the revised baseline iteration were all less than the regulatory target criteria, meaning that unacceptable noncancer risks were not identified. The highest estimates were for the Native American Adult populations, however they were still lower than the regulatory target. When the emission rates of detected compounds and undetected feed compounds (at detection limits) were artificially increased by the TOE correction factor, then the noncancer health hazard estimates for the Native American Adult populations were greater than the regulatory target. The target is a ratio of less than or equal to 0.25 and the estimated ratio was 0.34. This finding indicates a very small potential risk contribution from the unidentified organic emissions, in light of the magnitude of the estimates. The increase in noncancer hazard attributable to the unidentified TOE compared to the baseline iteration in an increase from 0.17 to 0.34. Also, the estimates are all well within an order of magnitude of the regulatory target. This should generally be considered acceptable to risk managers, given the large number of protective assumptions and other uncertainties associated with this type of analysis.

d. The acute health hazard estimates from the revised baseline iteration were all less than the regulatory target criterion, meaning that unacceptable acute risks were not identified. When the emission rates of detected compounds and undetected feed compounds (at detection limits) were artificially increased by the TOE correction factor, then the acute health hazard estimates for some of the scenarios were greater than the regulatory target. The target is a ratio of less than or equal to 1.0 and the estimated ratios ranged from much less than this to 12. This finding indicated that additional consideration of the acute analysis should be made. The range of cumulative total AHI values that are greater than the target range from 1 to 3 for normal operations and a single high value of 10 for an on-site Depot Collocation when the DFS is in an upset condition. The assumption was made that an upset condition would result in emissions 10-times higher than normal for less than an hour. Since the "normal" emissions were always set to the maximum detected levels, this result is an overestimate. In addition, the analysis assumed that all emitted compounds would have the same toxicological effect and that the effects will be additive, when research generally shows that this is not the case. All exceedences are attributed to either the DFS or MPF furnaces and are due to fluoranthene, an undetected compound included in the assessment at it's detection limit and increased by the TOE correction factor. In summary, the acute assessment is considered to be health-protective (for these and other reasons) and the highest result for a hypothetical location on-site is within an order of magnitude of the regulatory target. Therefore, the acute results should not prevent the issuance of an operating permit.

e. Based on the ecological analysis presented in this Addendum, the following overall conclusions were drawn. Impacts on the survival, growth, and reproduction of community receptors are not expected. Impacts on the development and reproductive success of wildlife populations and of individuals of threatened or endangered species are not expected.

3. RECOMMENDATIONS. Use the results of this analysis during the risk management decision-making process for the UMCDF facility. Consult with this Center if there are UMCDF operational considerations that may alter the facility assumptions used in the generation of the risk assessment results.

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VOLUME 4 APPENDICES FOR THE TOE CORRECTION FACTOR ITERATION
Human Health Risk Assessment

VOLUME 5 APPENDICES FOR THE TOE CORRECTION FACTOR ITERATION
Screening-Level Ecological Risk Assessment

TABLES

STUDY TEAM

The USACHPPM project team consisted of the following individuals.

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ADDENDUM TO THE FINAL HEALTH RISK ASSESSMENT FOR THE UMATILLA CHEMICAL AGENT DISPOSAL FACILITY UMATILLA CHEMICAL DEPOT, HERMISTON, OREGON

REPORT NO. 39-DA-08CF-07a
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1. REFERENCES

Appendix A of Volume 1 provides the references cited.

2. PURPOSE

The purpose of this Addendum is to update the February 2008 risk assessment report (USACHPPM 2008) with several technical refinements and to also address the health risks associated with the unknown portion of the total organic emissions (TOE).

3. BACKGROUND

In 2004, the Umatilla Chemical Agent Disposal Facility (UMCDF) located near Hermiston, Oregon, commenced disposal by incineration of the chemical agent stockpile stored at the Umatilla Chemical Depot (UMCD). The UMCDF is used to destroy the stockpile of GB (sarin) and VX nerve agents and HD (mustard) blister agent. Before facility construction and operations, the UMCDF was required to obtain a Resource Conservation and Recovery Act (RCRA) Part B Permit from Oregon's permitting authority, the Oregon Department of Environmental Quality (ODEQ). Additional site-specific background information is presented in the February HRA report (USACHPPM 2008).

A post-trial burn health risk assessment work plan (RAWP) was published in August of 2004 (ODEQ 2004) in preparation for conducting a post-trial burn HRA for UMCDF. Since the finalization of the first HRA in 1997, the EPA risk assessment guidance was revised (twice), the chemical agent stockpile was declassified, UMCDF-specific meteorological data were available, and different air dispersion models were developed. The RAWP outlined methods for performing a post-trial burn HRA accounting for all these changes and in accordance with modifications required by ODEQ. More than a year after ODEQ completed their RAWP, EPA finalized its guidance for conducting combustion HRAs with release of *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Final*, September 2005 (Final HHRAP) (EPA 2005).

In the fall of 2006, the UMCDF requested for this Center to produce a post-trial burn risk assessment. The Army team wanted to implement the intent of the ODEQ RAWP and incorporate updates from the EPA guidance. Some technical methodologies needed revision and USACHPPM initiated a consensus-based process for reaching agreement with technical representatives from ODEQ and the local Confederated Tribes of the Umatilla Indian Reservation (CTUIR). USACHPPM operated in a transparent process and developed detailed plans and datasets, which are shared and improved upon with the help of ODEQ, its contractor (E&E, Inc.) and the CTUIR technical representative. These methods and datasets provided the foundation for the preliminary risk assessment calculations produced by ODEQ (E&E 2008). Most all methodological issues were resolved and have been publically summarized, though the summary is not entirely accurate, by the ODEQ and the ODEQ contractor (ODEQ 2008a, E&E 2008).

In February 2008, a health risk assessment (HRA) report was produced by this Center (USACHPPM 2008) for the UMCDF, using available UMCDF trial burn emissions data and data from other chemical-agent disposal incinerator facilities. This Feb 2008 risk assessment report was designed to provide a baseline set of results to the Army team. The ODEQ is nearing a decision point whereby a determination will be made as to the acceptability of the potential human health and ecological risks associated with the "normal" operations of the UMCDF. What is meant by "normal" is non-accidental risks associated with regular day-to-day operations of the facility. As part of the ODEQ decision making process, they produced an independent set of preliminary risk assessment results at the end of January 2008 (E&E 2008), an ODEQ staff paper (ODEQ 2008a), and presented a summary of updated results at a public information session in May 2008 (ODEQ 2008b). The ODEQ is also considering information provided in the Army team's February report (USACHPPM 2008), information and risk assessment calculations received from the CTUIR technical representatives, and other information and public comments received by the public by 11 June 2008.

This Addendum to the Final HRA report represents the Army team's revised technical results that address remaining technical issues of importance that have not been fully resolved for the record.

4. METHODOLOGY

The methods used to generate this risk assessment addendum were largely the same as those used for the Feb HRA; however, this addendum incorporated technical refinements and an additional evaluation of the uncertainty of the potential risks associated with the unknown portion of the total organic emissions (TOE). These changes are described below. Taken as a whole these changes reflect recommended methods from the U.S. Environmental Protection Agency guidance (USEPA 2005) and site-specific information related to the operation of the UMCDF.

4.1 Agent Emission Rate Refinements

In the Feb 2008 HRA, agent emissions were assumed to be equal to be 20 percent of the allowable stack concentration from the permit. However, site data demonstrates that actual measured emissions have been less than this assumed emission rate. Therefore, agent emissions were reduced based on actual measured data.

For this HRA refinement, the GB and VX new emission rates were set to the highest detection limit recorded at UMCDF and HD emission rates were set to the highest detection limit reported to date in the TOCDF agent trial burns. The revised agent emission rates are presented in Table 1. This refinement results in the following changes, as compared to the original assumptions in the Feb 2008 HRA.

- Common stack, BRA stack GB and VX emissions -- 300 times less than original
- Common stack, BRA stack HD emissions -- 55 times less than original
- MDB HVC and LAB HVC GB and VX emissions -- 60 times less than original
- MDB HVC and LAB HVC HD emissions -- 1.1 times less than original

Table 1 **Refined Agent Emission Rates**

SubTblNum	Unit	Waste_Treat	COPCNum	COPCName	Maximum 1 Hour Emission Rate (g/sec)	Maximum Annual Emission Rate (g/sec)
1	LIC1	GB	231	Agent: GB	2.60E-09	2.60E-09
1	LIC1	GB	232	Agent: HD	0	0
1	LIC1	GB	233	Agent: VX	0	0
2	LIC1	VX	231	Agent: GB	0	0
2	LIC1	VX	232	Agent: HD	0	0
2	LIC1	VX	233	Agent: VX	2.60E-09	2.60E-09
3	LIC1	HD	231	Agent: GB	0	0
3	LIC1	HD	232	Agent: HD	1.43E-06	1.43E-06
3	LIC1	HD	233	Agent: VX	0	0
4	LIC2	GB	231	Agent: GB	2.60E-09	2.60E-09
4	LIC2	GB	232	Agent: HD	0	0
4	LIC2	GB	233	Agent: VX	0	0
5	LIC2	VX	231	Agent: GB	0	0
5	LIC2	VX	232	Agent: HD	0	0
5	LIC2	VX	233	Agent: VX	2.60E-09	2.60E-09
6	LIC2	HD	231	Agent: GB	0	0
6	LIC2	HD	232	Agent: HD	1.43E-06	1.43E-06
6	LIC2	HD	233	Agent: VX	0	0
7	MPF	GB	231	Agent: GB	3.90E-09	3.90E-09
7	MPF	GB	232	Agent: HD	0	0
7	MPF	GB	233	Agent: VX	0	0
8	MPF	VX	231	Agent: GB	0	0
8	MPF	VX	232	Agent: HD	0	0
8	MPF	VX	233	Agent: VX	3.90E-09	3.90E-09
9	MPF	HD	231	Agent: GB	0	0
9	MPF	HD	232	Agent: HD	2.15E-06	2.15E-06
9	MPF	HD	233	Agent: VX	0	0
10	DFS	GB	231	Agent: GB	7.75E-09	7.75E-09
10	DFS	GB	232	Agent: HD	0	0
10	DFS	GB	233	Agent: VX	0	0
11	DFS	VX	231	Agent: GB	0	0
11	DFS	VX	232	Agent: HD	0	0
11	DFS	VX	233	Agent: VX	7.75E-09	7.75E-09
12	MPF	SW_Comb	231	Agent: GB	3.90E-09	3.90E-09
12	MPF	SW_Comb	232	Agent: HD	2.15E-06	2.15E-06
12	MPF	SW_Comb	233	Agent: VX	3.90E-09	3.90E-09
13	LIC_Closr	SW_Max	231	Agent: GB	2.60E-09	2.60E-09
13	LIC_Closr	SW_Max	232	Agent: HD	1.43E-06	1.43E-06
13	LIC_Closr	SW_Max	233	Agent: VX	2.60E-09	2.60E-09
14	MPF_Closr	SW_NonC_Max	231	Agent: GB	3.90E-09	3.90E-09
14	MPF_Closr	SW_NonC_Max	232	Agent: HD	2.15E-06	2.15E-06

SubTblNum	Unit	Waste_Treat	COPCNum	COPCName	Maximum 1 Hour Emission Rate (g/sec)	Maximum Annual Emission Rate (g/sec)
14	MPF_Closr	SW_NonC_Max	233	Agent: VX	3.90E-09	3.90E-09
15	DFS_Closr	SW_Carb	231	Agent: GB	7.75E-09	7.75E-09
15	DFS_Closr	SW_Carb	232	Agent: HD	4.26E-06	4.26E-06
15	DFS_Closr	SW_Carb	233	Agent: VX	7.75E-09	7.75E-09
16	BRA	Brine	231	Agent: GB	2.17E-08	2.17E-08
16	BRA	Brine	232	Agent: HD	1.19E-05	1.19E-05
16	BRA	Brine	233	Agent: VX	2.17E-08	2.17E-08
17	MDB_HVC	ALL_Agents	231	Agent: GB	4.81E-08	4.81E-08
17	MDB_HVC	ALL_Agents	232	Agent: HD	2.65E-05	2.65E-05
17	MDB_HVC	ALL_Agents	233	Agent: VX	4.81E-08	4.81E-08
18	LAB_HVC	ALL_Agents	231	Agent: GB	6.80E-09	6.80E-09
18	LAB_HVC	ALL_Agents	232	Agent: HD	3.74E-06	3.74E-06
18	LAB_HVC	ALL_Agents	233	Agent: VX	6.80E-09	6.80E-09

4.2 Spent Carbon Adjustment

In the Feb HRA, the emission rates for the DFS during the Closure Campaign were adjusted using a common stack adjustment factor of 0.0733 (Feb HRA Volume 2, Appendix J, Exhibit 2). This factor was based on the estimation that 706,035 lbs of spent carbon will process in the DFS during that campaign (Feb HRA Volume 2, Appendix C, Tables 5 and 6). However, the actual amount of spent carbon to be processed will be lower. Based on permit actions to ship agent free carbon and limiting the HVAC carbon change out and removal of the ACS, the new spent carbon estimate is 55,320 lbs.

For this HRA refinement, the DFS Closure Secondary Waste adjustment factor for the common stack was changed from 0.0733 to 0.00574. The following equations provide the recalculation.

Equation1

$$(2\ \textit{beds}\ \times 9\ \textit{filters}\ \times 48\,\textit{trays} \times\ 55\,\textit{lbs spent carbon}) + 6{,}200\,\textit{lbs ACS filter carbon} + 1600\,\textit{lbs mask carbon filters} = 55{,}320\,\textit{lbs spent carbon}$$

Equation 2

$$\frac{55{,}320\ \textit{lbs spent carbom}}{550\,\textit{lb}\,/\,\textit{hr}\ \times 17{,}520\,\textit{hrs}} = 0.00574$$

This change is reflected in a revised methodological appendix contained in this Addendum, presented as Volume 1 Appendix B (Emission Rate Framework).

4.3 Nonuse of the BRA during the HD and Closure Campaigns

In the Feb HRA, health risk estimates were generated in two ways, (1) assumed that the Brine Reduction Area (BRA) would operate during all agent campaigns and the secondary waste closure campaign, and (2) assuming that the BRA was not operating during any campaign. This was done because a potential health risk concern for one of the hypothetical exposure scenarios was identified for mercury resulting from emissions from the BRA during the HD campaign. The Army risk management team wanted to explore the effect on health risk estimates if they continued operations without the BRA (whereby the brine waste would be disposed of via an alternative method). While the removal of the BRA for all campaigns (scenario #2 above) was an efficient HRA model run for a quick "what-if" scenario, it did not directly estimate health risks associated with removal of the BRA for only the HD and Closure Campaigns.

For this HRA refinement, the model was constructed to assume that the BRA would operate during the GB and VX campaigns but not during the HD and Closure campaigns. This change is reflected in a revised methodological appendix contained in this Addendum, presented as Volume 1 Appendix B (Emission Rate Framework).

4.4 Inclusion of Undetected Waste-feed Organic and Other Compounds of Special Concern

The Feb HRA did not include organic compounds that could potentially be present in the UMCDF feed that were analyzed for but were undetected. These compounds were classified as Group 3 Chemicals of Potential Concern (COPCs) in the ODEQ RAWP (ODEQ 2004). For this HRA refinement, the RAWP Table 2-1 (ODEQ 2004) was used to identify the Group 3 organic feed COPCs for each incinerator. A total of 14 were identified. Additionally, in order to maintain this same methodological approach for the detected feed compounds (i.e., Group 1 COPCs) that were occasionally not detected in some trial burns, these undetected Group 1 organic feed COPCs were also included in the emission rates database at their detection levels.

The Feb HRA directly assessed the risk associated with detected polychlorinated-dibenzo-p-dioxins (PCDDs), polychlorinated-dibenzofurans (PCDFs), polyaromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs). However, it not include an assessment of potential risk associated with undetected PCDDs, PCDFs, PAHs, and PCBs, which arguably, may still be present in the emissions at low levels that are undetectable. These compound groups are of special concern due to their environmental persistence, high toxicity, and their likelihood of being in the waste feed and/or formed during combustion.

For this HRA refinement, the analysis directly assessed these COPCs at their detection limits (when undetected). Tables 2 – 4 provide a list of all of the Group 1 and Group 3 organic feed COPCs that were identified for potential inclusion in the revised emission rates database. These changes are reflected in a revised methodological appendix contained in this Addendum, presented as Volume 1 Appendix B (Emission Rate Framework).

Table 2 **Group 1 and Group 3 Organic Feed COPCs for the Liquid Incinerators**

COPCNum	COPCName	CASRN	COPCGroup	LIC Feed From RAWP Table 2-1?
1	Acetone	67-64-1	1	Y
9	Carbon Disulfide	75-15-0	1	Y
13	Trichloromethane (Chloroform)	67-66-3	1	Y
14	Chloromethane (Methyl Chloride)	74-87-3	1	Y
23	1,2-Dichloroethane (EDC)	107-06-2	3	Y
33	Methylene Chloride (Dichloromethane)	75-09-2	1	Y
35	1,1,1,2-Tetrachloroethane	630-20-6	3	Y
36	1,1,2,2-Tetrachloroethane	79-34-5	3	Y
39	1,1,1-Trichloroethane (TCA or methyl chloroform)	71-55-6	3	Y
40	1,1,2-Trichloroethane	79-00-5	3	Y
43	Trichlorofluoromethane	75-69-4	1	Y
46	Vinyl chloride	75-01-4	1	Y
115	Fluoranthene	206-44-0	3	Y
132	Naphthalene	91-20-3	1	Y
258	N,N'-Diisopropylcarbodimide (DICDI)	693-13-0	3	Y
299	Diisopropyl methyl phosphonate (DIMP)	1445-75-6	3	Y
307	Isopropanol	67-63-0	3	Y
324	Decane, n-	124-18-5	3	Y

Table 3 **Group 1 and Group 3 Organic Feed COPCs for the Deactivation Furnace System**

COPCNum	COPCName	CASRN	COPCGroup	DFS Feed From RAWP Table 2-1?
9	Carbon Disulfide	75-15-0	1	Y
13	Trichloromethane (Chloroform)	67-66-3	1	Y
14	Chloromethane (Methyl Chloride)	74-87-3	1	Y
23	1,2-Dichloroethane (EDC)	107-06-2	3	Y
33	Methylene Chloride (Dichloromethane)	75-09-2	1	Y
35	1,1,1,2-Tetrachloroethane	630-20-6	3	Y
36	1,1,2,2-Tetrachloroethane	79-34-5	3	Y
39	1,1,1-Trichloroethane (TCA or methyl chloroform)	71-55-6	3	Y
40	1,1,2-Trichloroethane	79-00-5	3	Y
43	Trichlorofluoromethane	75-69-4	1	Y
46	Vinyl chloride	75-01-4	1	Y
104	Dimethyl phthalate	131-11-3	1	Y
115	Fluoranthene	206-44-0	3	Y
132	Naphthalene	91-20-3	1	Y
160	2,4,6-Trinitrotoluene	118-96-7	1	Y
187	Total PCBs (no congeners)	1336-36-3	1	Y
188	Total monochlorobiphenyls	27323-18-8	2	Y
189	Total dichlorobiphenyls	25512-42-9	2	Y
190	Total trichlorobiphenyls	25323-68-6	2	Y
191	3,3',4,4'- Tetra CB (77)	32598-13-3	1	Y
192	Total Tetrachlorobiphenyls	26914-33-0	2	Y
193	2,3,4,4,5-Penta CB (118)	31508-00-6	1	Y
194	2,3,3,4,4-Penta CB (105)	32598-14-4	1	Y
195	2,3,4,4,5-Penta CB (114)	74472-37-0	1	Y
196	2,3,4,4,5-Penta CB (123)	65510-44-3	3	Y
197	3,3,4,4,5-Penta CB (126)	57465-28-8	1	Y
198	Total Pentachlorobiphenyls	25429-29-2	2	Y
199	2,3,3,4,4,5-Hexa CB (156)	38380-08-4	1	Y
200	2,3,4,4,5,5'-Hexa CB (167)	52663-72-6	1	Y
201	3,3,4,4',5,5-Hexa CB (169)	32774-16-6	3	Y
202	Total Hexachlorobiphenyls	26601-64-9	2	Y
203	2,3,3,4,4,5,5-Hepta CB (189)	39635-31-9	1	Y
204	2,3,3',4,4',5'-Hexa CB (157)	69782-90-7	1	Y
205	3,4,4',5-Tetra CB (81)	70362-50-4	1	Y
206	Total Heptachlorobiphenyls	28655-71-2	2	Y
207	Total Octachlorobiphenyls	55722-26-4	2	Y
208	Total Nonachlorobiphenyls	53742-07-7	2	Y
240	Nitroglycerine	55-63-0	3	Y
242	RDX (Cyclonite, Cyclotrimethylene trinitramine)	121-82-4	3	Y
258	N,N'-Diisopropylcarbodimide (DICDI)	693-13-0	3	Y
299	Diisopropyl methyl phosphonate (DIMP)	1445-75-6	3	Y
307	Isopropanol	67-63-0	3	Y
496	Total Decachlorobiphenyls	2051-24-3	2	Y

Table 4 Group 1 and Group 3 Organic Feed COPCs for the Metal Parts Furnace

COPCNum	COPCName	CASRN	COPCGroup	MPF Feed From RAWP Table 2-1?
9	Carbon Disulfide	75-15-0	1	Y
13	Trichloromethane (Chloroform)	67-66-3	1	Y
14	Chloromethane (Methyl Chloride)	74-87-3	1	Y
23	1,2-Dichloroethane (EDC)	107-06-2	3	Y
33	Methylene Chloride (Dichloromethane)	75-09-2	1	Y
35	1,1,1,2-Tetrachloroethane	630-20-6	3	Y
36	1,1,2,2-Tetrachloroethane	79-34-5	3	Y
39	1,1,1-Trichloroethane (TCA or methyl chloroform)	71-55-6	3	Y
40	1,1,2-Trichloroethane	79-00-5	3	Y
43	Trichlorofluoromethane	75-69-4	1	Y
46	Vinyl chloride	75-01-4	1	Y
115	Fluoranthene	206-44-0	3	Y
132	Naphthalene	91-20-3	1	Y
258	N,N'-Diisopropylcarbodimide (DICDI)	693-13-0	3	Y
299	Diisopropyl methyl phosphonate (DIMP)	1445-75-6	3	Y
307	Isopropanol	67-63-0	3	Y

4.5 Qualitative Evaluation of the Potential Risk Associated with the Unknown Fraction of the Total Organic Emissions

In the Feb HRA, the risk assessment model was implemented for only the detected chemicals in order to produce a set of baseline (or primary) results. The EPA guidance also recommends that the potential risk associated with the unknown fraction of the total organic emissions be evaluated qualitatively. The EPA recognizes (USEPA 2005) that only a limited number of organics compounds can that be accurately identified and quantified during laboratory analysis. These unidentified compounds however may still contribute the overall risk and should be considered qualitatively. The EPA has developed the total organic compound (TOE) test to account for the unidentified organic compounds because pre-existing methods do not fully determine the total mass of organics present in stack gas emissions. The TOE test is used in conjunction with identified organic compounds to calculate a TOE Correction Factor (EPA 2005, p2. 2-9 to 2-13).

The TOE Correction Factors previously explored by the consensus HRA team were re-calculated to include the organic feed COPCs discussed above. One exception to the standard approach to the derivation of the TOE factors should be noted (summarized in next paragraph).

The emission data for the processing of carbon in the CMS/DFS during closure used JACADS CMS Performance Test (PT) data (Subtable 15 in the database). PCBs are Group 1 organic feed COPCs for the DFS, therefore PCBs are included in the database for the DFS whether detected or not (see above refinements). A very large TOE mass was reported for the CMS PT and relatively few organic COPCs are included in the denominator of the TOE factor ratio resulting in a TOE Correction Factor 608.4. Given that 1) there were no detected organics reported for the JACADS PT (other than the three TOE fractions), 2) the PCB detection levels were very low (10-9 range), and 3) it is unlikely that PCBs would be contained in the carbon processed by the CMS/DFS, increasing the PCB emission rates by 600 times is unreasonable.. Therefore, the 13 PCBs in Subtable 15 [12 dioxin-like PCBs and the "Total PCBs (no congeners)" (COPC #187)] were included at the detection level and the TOE factors were assumed to be 1 for all 13 PCBS. The final TOE factor was computed without the PCBs in the denominator. The final TOE factor was applied to all 13 remaining organics in Subtable 15.

In order to implement this supplementary evaluation, we ran the refined HRA model discussed above but that also increased the emission rates of each detected or otherwise included COPC using TOE Correction Factors from the emission rate database prepared by the EnviroMet (see Volume 1 Appendix B of this Addendum report). A summary of the TOE correction factors used in this evaluation is presented in Table 5.

Table 5 **Summary of the Total Organic Emissions Correction Factors**

Table Number	Unit	Waste Treatment	Max TOE	Min TOE	Avg TOE	Standard Deviation	Variance
ST 1	LIC1	GB	8.38	1	6.34	3.3	11.0
ST 2	LIC1	VX	64.54	1	46.94	28.5	814.6
ST 3	LIC1	HD	8.23	1	6.23	3.2	10.6
ST 4	LIC2	GB	18.44	1	13.61	7.8	61.4
ST 5	LIC2	VX	64.54	1	46.94	28.5	814.6
ST 6	LIC2	HD	8.23	1	6.23	3.2	10.6
ST 7	MPF	GB	10.36	1	7.77	4.2	17.7
ST 8	MPF	VX	27.67	1	20.28	12	143.5
ST 9	MPF	HD	18.15	1	7.76	5.0	25.4
ST 10	DFS	GB	7.37	1	5.60	2.9	8.2
ST 11	DFS	VX	78.05	1	56.72	34.6	1,198.1
ST 12	MPF	SW_Comb	11.49	1	8.58	4.7	22.2
ST 13	LIC_Closr	SW_Max	--	--	--	--	--
ST 14	MPF_Closr	SW_NonC_Max	--	--	--	--	--
ST 15	DFS_Closr	SW_Carb	608.45	1	332.76	304	92,171
ST 16	BRA	Brine	1.00	1	1.00	0	0
ST 17	MDB_HVC	ALL_Agents	1.00	1	1.00	0	0
ST 18	LAB_HVC	ALL_Agents	1.00	1	1.00	0	0

5. HUMAN HEALTH RISK ASSESSMENT RESULTS

The results are presented in two sets. The first set of results is referred to as the Revised Baseline Iteration and is provided in Volume 2. The second set of results is referred to as the TOE Correction Factor Iteration and is provided in Volume 4. The distinction between these two sets is defined in the following bullets.

- The Revised Baseline Iteration represents the revision to the original baseline results presented in the Feb HRA report and incorporates all of the technical refinements discussed in the Methodology section. It does not include the evaluation with the TOE Correction Factor. These results are the primary results for use in decision-making (EPA 2005).

- The TOE Correction Factor Iteration represents a quantitative evaluation of the total potential risk that includes a rough estimate of the additional potential contribution to risk of the unidentified compounds in the emissions (or assumed emissions) that constitute the "unknown" fraction of the total organic emissions (TOE). This set of results is more uncertain that the Revised Baseline Iteration results, but can be used by the risk management team to supplement the decision-making process (EPA 2005). On balance, it is assumed that the environmental persistence and toxicity of the unidentified compounds contained in the TOE are similar to those of the known compounds (EPA 2005).

5.1 Human Health Risk Characterization Methods

Risk characterization for the chronic exposure evaluation involves the quantification of cancer risks and non-cancer hazards by combining long-term exposure estimates with health criteria (or toxicity values, measures of what is considered "safe"). Similarly, the acute hazard characterization involves comparison of short-term air concentration estimates to acute reference concentrations.

5.1.1 Estimation of Chronic Carcinogenic Risks

Risk estimates for carcinogenic compounds are generally expressed as an excess upper bound probability that an individual in a population will develop cancer as a result of exposure to the substance (e.g., 1 excess cancer case in 1 million exposed people, also expressed as 1E-06). These risks are termed excess lifetime cancer risks.

For carcinogenic substances, the EPA believes that setting a 10^{-6} risk level for individual COPCs and pathways will result in cumulative risks ranging from 10^{-6} to 10^{-4} for all COPCs and all pathways (EPA 1994b). To ensure the protection of human health, the EPA has selected a target level of 10^{-5} for total incremental cancer risk for exposures to combustion emissions (EPA 1994a). The excess lifetime cancer probabilities for this report were calculated as recommended in the Final HHRAP (EPA 2005). For each population, the total risk associated with exposure to all of the COPCs through each applicable exposure pathway was estimated. Then, for each population, the risks from all applicable exposure pathways were summed.

5.1.2 Estimation of Chronic Non-Cancer Hazards

The estimation of cancer risk is an incremental probability based on the assumption that there is no threshold for a carcinogenic effect; whereas, the estimation of non-cancer hazards presumes that there is a threshold for effect. Below this threshold, no adverse effect will likely occur due to exposure; and above this threshold, the likelihood of effects increases, however, safety factors are embedded in the thresholds used in the analysis. The non-cancer hazard for a COPC is a ratio [or hazard quotient (HQ)] of the estimated COPC exposure to the COPC toxicity value for ingestion/dermal and inhalation exposures, respectively. Non-cancer hazards are also expressed as a hazard index (HI). Hazard indices are the summation of individual HQs for substances with a common systemic health effect. Hazards for this report were calculated as recommended in the Final HHRAP (EPA 2005). The COPC-specific exposure estimates from all indirect pathways were summed. Total intakes were then combined with other exposure parameters to generate the COPC-specific HQs. The HQs were summed to obtain a total indirect exposure HI. For inhalation hazards, HQs were summed to obtain a total inhalation HI regardless of the toxicological endpoint (a health-protective assumption).

The EPA recommends that stack emissions from RCRA-regulated combustors contribute only 25 percent of the non-cancer target level, which in most cases is one (or unity) (EPA 1993 and EPA 1994a). For COPCs that cause chronic systemic effects, a non-cancer target level of 0.25 (as opposed to unity) was used as the regulatory criterion. This level was selected to account for background levels contributed by other sources in the vicinity.

5.1.3 Estimation of Acute Health Hazards

Once air concentrations were determined, each COPC modeled concentration was compared to its respective health benchmark. The acute hazard quotients were summed for all compounds to obtain an acute hazard index (AHI), regardless of the toxicological endpoint (a health-protective assumption).

5.1.4 Unique Approaches to Estimate Risk and Hazard

Several methods were used for compounds with of unique concerns, to include lead, dioxins, furans, and polychlorinated biphenyls. These methods are reviewed where the results are presented below.

5.2 Summary of Human Health Results

5.2.1 Chronic Carcinogenic Risks

Tables 6 and 7 summarize the estimated excess lifetime cancer risks for the thirteen adult and child populations exposure scenarios evaluated in the HHRA for the revised baseline iteration and the TOE correction factor iteration, respectively. All of the maximum risk values were less than the regulatory target criterion of 1E-05, meaning that unacceptable health risks were not identified. For the revised baseline iteration, the highest estimated lifetime cancer risk was 2E-07 for the Native American Adults. Mustard (or HD/HT) and 2,4-Dinitrotoluene had the highest estimated lifetime cancer risk values for most of the exposure scenarios. For the TOE correction factor iteration, the highest total estimated lifetime cancer risk was 3E-06 for the Native American Adults. Here, 2,3,7,8-Tetrachlorodibenzofuran and the non-dioxin-like PCB Mixture had the highest estimated lifetime cancer risk values for most of the exposure scenarios. However, these risk estimates were not greater than the risk management targets.

The results displayed in these tables contain the two highest estimated COPCs for each exposure population from the total risk. The primary exposure pathway is also identified and is the pathway that contributed the most to the total risk. The highest estimated COPCs for the total risk and the highest estimated COPC for the primary exposure pathway may differ.

Table 6 Excess Lifetime Cancer Risk Summary (Revised Baseline Iteration)

Regulatory Criterion: Cancer Risk 1E-05

Exposed Population	Excess Cancer Risk	COPCs (highest individual risk estimates)	Primary Exposure Pathway
Farmers	1E-08	2,4-Dinitrotoluene (5E-09) Mustard (or HD/HT) (3E-09)	Ambient Air Inhalation
Farmer Children	2E-08	2,4-Dinitrotoluene (6E-09) Mustard (or HD/HT) (6E-09)	Ambient Air Inhalation
Columbia River Fishers	6E-09	Mustard (or HD/HT) (2E-09) 2,4-Dinitrotoluene (1E-09)	Ambient Air Inhalation
Columbia River Fisher Children	8E-09	Mustard (or HD/HT) (4E-09) 2,4-Dinitrotoluene (2E-09)	Ambient Air Inhalation
Umatilla River Fishers	2E-08	PCB Mixture (non-dioxin like, 5+ chlorines) (1E-08) 2,4-Dinitrotoluene (5E-09)	Gamefish Meat Ingestion
Umatilla River Fisher Children	2E-08	Mustard (or HD/HT) (6E-09) 2,4-Dinitrotoluene (5E-09)	Ambient Air Inhalation
Native American Mother Adults	1E-07	PCB Mixture (non-dioxin like, 5+ chlorines) (9E-08) 2,4-Dinitrotoluene (2E-08)	Gamefish Meat Ingestion
Native American Adults	2E-07	PCB Mixture (non-dioxin like, 5+ chlorines) (1E-07) Mustard (or HD/HT) (3E-08)	Gamefish Meat Ingestion
Native American Children	6E-08	PCB Mixture (non-dioxin like, 5+ chlorines) (3E-08) 2,4-Dinitrotoluene (1E-08)	Gamefish Meat Ingestion
Adult Offsite Residents	9E-09	2,4-Dinitrotoluene (4E-09) Mustard (or HD/HT) (3E-09)	Ambient Air Inhalation
Child Offsite Residents	1E-08	Mustard (or HD/HT) (6E-09) 2,4-Dinitrotoluene (5E-09)	Ambient Air Inhalation
On-site Military Residents	6E-09	Mustard (or HD/HT) (3E-09) 2,4-Dinitrotoluene (8E-10)	Ambient Air Inhalation
On-site Worker	3E-08	Mustard (or HD/HT) (2E-08) 1,1-Dichloroethylene (5E-09)	Ambient Air Inhalation

Table 7 **Excess Lifetime Cancer Risk Summary (TOE Correction Factor Iteration)**

Regulatory Criterion: Cancer Risk 1E-05

Exposed Population	Excess Cancer Risk	COPCs (highest individual risk estimates)	Primary Exposure Pathway
Farmers	1E-07	2,3,7,8-Tetrachlorodibenzofuran (1E-07) 2,4-Dinitrotoluene (5E-09)	Beef Milk Ingestion
Farmer Children	2E-07	2,3,7,8-Tetrachlorodibenzofuran (1E-07) 2,4-Dinitrotoluene (6E-09)	Beef Milk Ingestion
Columbia River Fishers	2E-08	PCB Mixture (non-dioxin like, 5+ chlorines) (1E-08) 2,3,7,8-Tetrachlorodibenzofuran (3E-09)	Gamefish Meat Ingestion
Columbia River Fisher Children	2E-08	PCB Mixture (non-dioxin like, 5+ chlorines) (6E-09) Mustard (or HD/HT) (4E-09)	Ambient Air Inhalation
Umatilla River Fishers	3E-07	PCB Mixture (non-dioxin like, 5+ chlorines) (2E-07) 2,3,7,8-Tetrachlorodibenzofuran (6E-08)	Gamefish Meat Ingestion
Umatilla River Fisher Children	1E-07	PCB Mixture (non-dioxin like, 5+ chlorines) (7E-08) 2,3,7,8-Tetrachlorodibenzofuran (3E-08)	Gamefish Meat Ingestion
Native American Mother Adults	2E-06	PCB Mixture (non-dioxin like, 5+ chlorines) (2E-06) 2,3,7,8-Tetrachlorodibenzofuran (5E-07)	Gamefish Meat Ingestion
Native American Adults	3E-06	PCB Mixture (non-dioxin like, 5+ chlorines) (2E-06) 2,3,7,8-Tetrachlorodibenzofuran (6E-07)	Gamefish Meat Ingestion
Native American Children	8E-07	PCB Mixture (non-dioxin like, 5+ chlorines) (5E-07) 2,3,7,8-Tetrachlorodibenzofuran (2E-07)	Gamefish Meat Ingestion
Adult Offsite Residents	2E-08	2,3,7,8-Tetrachlorodibenzofuran (6E-09) 2,4-Dinitrotoluene (4E-09)	Bathing Dermal Contact
Child Offsite Residents	3E-08	2,3,7,8-Tetrachlorodibenzofuran (7E-09) Mustard (or HD/HT) (6E-09)	Ambient Air Inhalation
On-site Military Residents	1E-08	2,3,7,8-Tetrachlorodibenzofuran (4E-09) Mustard (or HD/HT) (3E-9)	Ambient Air Inhalation
On-site Worker	1E-07	2,3,7,8-Tetrachlorodibenzofuran (3E-08) Mustard (or HD/HT) (2E-08)	Ambient Air Inhalation

5.2.2 Chronic Noncancer Hazards

Table 8 summarizes the estimated noncarcinogenic hazard indices for the revised baseline iteration for the thirteen adult and child exposure populations evaluated in the HHRA. Methyl Mercury and Thallium compounds had the highest estimated hazards for indirect exposures. Mustard and VX had the highest estimated hazards for direct exposures. The highest estimated HI values were for the Native American Adults and Native American Mother Adults, however they were lower than the regulatory criterion of 0.25, each with an estimated HI of 0.20.

Table 9 summarizes the estimated noncarcinogenic hazard indices for the TOE correction factor iteration for the thirteen adult and child exposure populations evaluated in the HHRA. The non-dioxin-like PCB Mixture and Methyl Mercury had the highest estimated hazards for indirect exposures. Mustard and VX had the highest estimated hazards for direct (inhalation) exposures.

The results displayed in both tables contain the highest estimated COPCs for each exposed scenario from the total hazards. The primary pathway is the pathway that contributes the most to the total hazards. The highest estimated COPCs for the total hazards and the highest estimated COPC for the primary exposure pathway may differ.

The highest estimated HI values were for the Native American Adults and Native American Mother Adults, exceeding the regulatory criterion of 0.25, each with an estimated HI of 0.34. These exceedences were due to solely to the summation across all COPCs, pathways, and sources. That is, no COPC-specific HI, pathway- specific HI, or source-specific HI was greater than the target of 0.25. The sources contributing the most to this total HI exceeded were the BRA (38%), MPF (32%), and the DFS (27%). These results are driven by the HI values for the non-dioxin-like PCB mixture (HI = 0.18) and methyl mercury (HI = 0.14). The next highest HI is less than 0.02. The sole pathway for these COPCs, which results in the exceedence, is the consumption of gamefish meat caught in the Umatilla River.

In summary, no potentially unacceptable cancer risks were identified the Revised Baseline Iteration results. Unacceptable noncancer hazards were also not identified in the Revised Baseline Iteration results. However, the TOE Correction Factor Iteration results did identify a potential concern for additional noncancer risks do to unidentified organic emissions. It is important to note that the mercury and non-dioxin-like PCB estimates in the TOE Correction Factor Iteration do not reflect risks for those compounds, but reflect the additional contribution of the unidentified organic emissions (see Section 4.5). Both of these COPCs were detected in the emissions, but for the TOE Correction Factor Iteration their emission rates were artificially increased to try to account for the risk associated with unidentified organic compounds.

5.2.3 PCDD/PCDF Margin of Exposure Analysis for Adult Populations

Until non-cancer toxicity criteria are established, the EPA suggests using a margin of exposure (MOE) analysis to assess non-carcinogenic health impacts from exposure to dioxin and dioxin-like compounds (EPA 2005). The MOE analysis compares the estimated 2,3,7,8-TCDD (2,3,7,8-tetrachlorodibenzodioxin) TEQ (toxicity equivalent) exposure intake of the adult to the national background level. For adult exposure, the EPA recommends a background exposure range of 1-3 pg TEQ/kg/day (EPA 2005).

Using the estimated intakes from the chronic analysis, an average daily dose (ADD) for exposure to PCDDs and PCDFs (polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans) was calculated for the Subsistence Farmer Adult, Native American Adult, and Native American Adult Mother scenarios and compared to 1 pg TEQ/kg/day (low end of the background level). Estimated ADI_{TEQ} for the adult scenarios were below the average background exposure level target criterion of 1 pg TEQ/kg-day.

Table 8 **Chronic Noncarcinogenic Hazards Indices (HI) (Revised Baseline Iteration)**

Regulatory Criteria: HI 0.25

Exposed Population	HI	COPCs (highest individual HI values)	Primary Exposure Pathway
Farmers	<0.01	VX (6E-04) Mustard (or HD/HT) (3E-04)	Ambient Air Inhalation
Farmer Children	<0.01	VX (1E-03) Mustard (or HD/HT) (8E-04)	Ambient Air Inhalation
Columbia River Fishers	<0.01	Mercury, Methyl (6E-04) Chlorine (2E-04)	Gamefish Meat Ingestion
Columbia River Fisher Children	<0.01	Chlorine (6E-04) Mustard (or HD/HT) (6E-04)	Ambient Air Inhalation
Umatilla River Fishers	0.02	Methyl Mercury (2E-02) Thallium compounds (3E-03)	Gamefish Meat Ingestion
Umatilla River Fisher Children	0.02	Methyl Mercury (1E-02) Thallium compounds (2E-03)	Gamefish Meat Ingestion
Native American Mother Adults	0.17	Methyl Mercury (1E-01) Thallium compounds (2E-02)	Gamefish Meat Ingestion
Native American Adults	0.17	Methyl Mercury (1E-01) Thallium compounds (2E-02)	Gamefish Meat Ingestion
Native American Children	0.12	Methyl Mercury (1E-01) Thallium compounds (1E-02)	Gamefish Meat Ingestion
Adult Offsite Residents	<0.01	VX (4E-04) Mustard (or HD/HT) (3E-04)	Ambient Air Inhalation
Child Offsite Residents	<0.01	VX (8E-04) Mustard (or HD/HT) (8E-04)	Ambient Air Inhalation
On-site Military Residents	<0.01	Chlorine (3E-03) Mustard (or HD/HT) (1E-03)	Ambient Air Inhalation
On-site Worker	<0.01	Chlorine (5E-03) Mustard (or HD/HT) (1E-03)	Ambient Air Inhalation

Table 9 **Chronic Noncarcinogenic Hazards Indices (HI) (TOE Correction Factor Iteration)**

Regulatory Criteria: HI 0.25

Exposed Population	HI	COPCs (highest estimates with individual HI)	Primary Exposure Pathway
Farmers	<0.01	VX (6E-04) PCB Mixture (non-dioxin like, 5+ chlorines) (3E-04)	Ambient Air Inhalation
Farmer Children	<0.01	VX (1E-03) Mustard (or HD/HT) (8E-04)	Ambient Air Inhalation
Columbia River Fishers	<0.01	PCB Mixture (non-dioxin like, 5+ chlorines) (2E-03) Methyl Mercury (6E-04)	Gamefish Meat Ingestion
Columbia River Fisher Children	<0.01	PCB Mixture (non-dioxin like, 5+ chlorines) (1E-03) Chlorine (6E-04)	Gamefish Meat Ingestion
Umatilla River Fishers	0.05	PCB Mixture (non-dioxin like, 5+ chlorines) (2E-02) Methyl Mercury (2E-02)	Gamefish Meat Ingestion
Umatilla River Fisher Children	0.04	PCB Mixture (non-dioxin like, 5+ chlorines) (2E-02) Methyl Mercury (1E-02)	Gamefish Meat Ingestion
Native American Mother Adults	0.34	PCB Mixture (non-dioxin like, 5+ chlorines) (2E-01) Methyl Mercury (1E-01)	Gamefish Meat Ingestion
Native American Adults	0.34	PCB Mixture (non-dioxin like, 5+ chlorines) (2E-01) Methyl Mercury (1E-01)	Gamefish Meat Ingestion
Native American Children	0.24	PCB Mixture (non-dioxin like, 5+ chlorines) (1E-01) Methyl Mercury (1E-01)	Gamefish Meat Ingestion
Adult Offsite Residents	<0.01	VX (4E-04) Mustard (or HD/HT) (3E-04)	Ambient Air Inhalation
Child Offsite Residents	<0.01	VX (8E-04) Mustard (or HD/HT) (8E-04)	Ambient Air Inhalation
On-site Military Residents	<0.01	Chlorine (3E-03) Mustard (or HD/HT) (1E-03)	Ambient Air Inhalation
On-site Worker	0.01	Chlorine (5E-03) Mustard (or HD/HT) (1E-03)	Ambient Air Inhalation

5.2.4 PCDD/PCDF Maternal Milk Average Daily Dose Summary

Table 10 summarizes the estimated average daily dose (ADD) for PCDDs and PCDFs (polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans) using the 2,3,7,8-tetrachlorodibenzodioxin (2,3,7,8-TCDD) toxicity equivalent (TEQ) for each of the eight breast- feeding infant scenarios evaluated in this HHRA for the revised baseline iteration. Estimated ADD for all breast-feeding infant populations were below the average background exposure level for dioxin/furans. The TOE Correction Factor Iteration results (not summarized here) do not alter this conclusion.

Table 10 Maternal Milk Average Daily Dose to Infants Summary (Revised Baseline Iteration)

Regulatory Criterion: Average Daily Dose of 60 pg/kg-day

Exposed Infant Populations	Average Daily Dose (pg/kg-day)
Farmers	0.002
Columbia River Fishers	0.00007
Umatilla River Fishers	0.0010
Native American Adults	0.008
Native American Mother Adults	0.008
Off-site Resident	0.00008
Military Resident	0.0002
Worker	0.0004

5.2.5 Acute Hazards

Tables 11 through 14 provide summaries of the acute hazard assessment for the sources operating independently and concurrently (total) for each acute scenario location for the revised baseline iteration. The total AHI values for all the evaluated locations and populations are lower than the regulatory criterion of 1.0; therefore, no unacceptable exposures were identified.

Tables 15 through 18 provide summaries of the acute hazard assessment for the sources operating independently and concurrently (total) for each acute scenario location for the TOE correction factor iteration. In three of the scenario locations (Depot Collocation, UMCDF Collocation, and Offsite Collocation), the total AHI values were higher than the regulatory criterion of 1.0; therefore, indicating that additional consideration of the acute exposures should be made. The range of cumulative total AHI values that are greater than the target range from 1 to 3 for normal operations and a single high value of 10 for the Depot Collocation when the DFS is in an upset condition. All exceedences are attributed to either the DFS or MPF furnaces and are due to Fluoranthene, an undetected compound included in the assessment at it's detection limit and increased by the TOE correction factor. It should also be noted that the toxicity criterion used for Fluoranthene is highly uncertain – it is a model estimated Protective Action Criteria (formerly called Temporary Emergency Exposure Limits, TEELs) and is not based on experimental data, which is preferred.

Table 11 Acute Noncarcinogenic Hazard Indices (Depot Administration Area)* (Revised Baseline Iteration)

Regulatory Criterion: AHI 1.0

Emissions Source	Exposure Point Location	Total AHI	COPC (highest contributing COPCs)
Cumulative Total (BRA upset)	Depot Administration Area	6E-03	Arsenic compounds, Nickel compounds
Cumulative Total (DFS upset)	Depot Administration Area	1E-02	Fluoranthene, Chlorine
Cumulative Total (LAB HVC upset)	Depot Administration Area	5E-03	Mustard (or HD/HT), VX
Cumulative Total (LIC1 upset)	Depot Administration Area	6E-03	Chlorine, Fluoranthene
Cumulative Total (LIC2 upset)	Depot Administration Area	6E-03	Chlorine, Fluoranthene
Cumulative Total (MDB HVC upset)	Depot Administration Area	5E-03	Mustard (or HD/HT), VX
Cumulative Total (MPF upset)	Depot Administration Area	2E-02	Arsenic compounds, Nitrogen dioxide
Cumulative Total (MPFnc upset)	Depot Administration Area	2E-02	Arsenic compounds, Nitrogen dioxide
Cumulative Total (No source upset)	Depot Administration Area	5E-03	Arsenic compounds, Nitrogen dioxide

* The Cumulative Total Acute Hazard Index (AHI) across all emission sources is presented here. The interpretation of the total AHI, and the nature of the associated uncertainties, is dependent upon site-specific conditions with regard to the likelihood that all of the independent sources operate at the same time during any given hour of exposure to the upset condition.

Table 12 **Acute Noncarcinogenic Hazard Indices (Depot Collocation)* (Revised Baseline Iteration)**

Regulatory Criterion: AHI 1.0

Emissions Source	Exposure Point Location	Total AHI	COPC (highest contributing COPCs)
Cumulative Total (BRA upset)	Depot Collocation	1E-01	Arsenic compounds, Mustard (or HD/HT)
Cumulative Total (DFS upset)	Depot Collocation	2E-01	Fluoranthene, Chlorine
Cumulative Total (LAB HVC upset)	Depot Collocation	9E-02	Mustard (or HD/HT), VX
Cumulative Total (LIC1 upset)	Depot Collocation	1E-01	Chlorine, Fluoranthene
Cumulative Total (LIC2 upset)	Depot Collocation	1E-01	Chlorine, Fluoranthene
Cumulative Total (MDB HVC upset)	Depot Collocation	9E-02	Mustard (or HD/HT), VX
Cumulative Total (MPF upset)	Depot Collocation	4E-01	Arsenic compounds, Nitrogen dioxide
Cumulative Total (MPFnc upset)	Depot Collocation	4E-01	Arsenic compounds, Nitrogen dioxide
Cumulative Total (No source upset)	Depot Collocation	9E-02	Arsenic compounds, Nitrogen dioxide

* The Cumulative Total Acute Hazard Index (AHI) across all emission sources is presented here. The interpretation of the total AHI, and the nature of the associated uncertainties, is dependent upon site-specific conditions with regard to the likelihood that all of the independent sources operate at the same time during any given hour of exposure to the upset condition.

Table 13 **Acute Noncarcinogenic Hazard Indices (Offsite Collocation)* (Revised Baseline Iteration)**

Regulatory Criterion: AHI 1.0

Emissions Source	Exposure Point Location	Total AHI	COPC (highest contributing COPCs)
Cumulative Total (BRA upset)	Offsite Collocation	2E-02	Arsenic compounds, Mustard (or HD/HT)
Cumulative Total (DFS upset)	Offsite Collocation	5E-02	Fluoranthene, Chlorine Mustard (or HD/HT), VX
Cumulative Total (LAB HVC upset)	Offsite Collocation	2E-02	Mustard (or HD/HT), VX
Cumulative Total (LIC1 upset)	Offsite Collocation	2E-02	Chlorine, Fluoranthene
Cumulative Total (LIC2 upset)	Offsite Collocation	2E-02	Chlorine, Fluoranthene
Cumulative Total (MDB HVC upset)	Offsite Collocation	2E-02	Mustard (or HD/HT), VX
Cumulative Total (MPF upset)	Offsite Collocation	8E-02	Arsenic compounds, Nitrogen dioxide
Cumulative Total (MPFnc upset)	Offsite Collocation	8E-02	Arsenic compounds, Nitrogen dioxide
Cumulative Total (No source upset)	Offsite Collocation	2E-02	Arsenic compounds, Nitrogen dioxide

* The Cumulative Total Acute Hazard Index (AHI) across all emission sources is presented here. The interpretation of the total AHI, and the nature of the associated uncertainties, is dependent upon site-specific conditions with regard to the likelihood that all of the independent sources operate at the same time during any given hour of exposure to the upset condition.

Table 14 **Acute Noncarcinogenic Hazard Indices (UMCDF Collocation)* (Revised Baseline Iteration)**

Regulatory Criterion: AHI 1.0

Emissions Source	Exposure Point Location	Total AHI	COPC (highest contributing COPCs)
Cumulative Total (BRA upset)	UMCDF Collocation	1E-01	Arsenic compounds, Mustard (or HD/HT)
Cumulative Total (DFS upset)	UMCDF Collocation	2E-02	Fluoranthene, Chlorine
Cumulative Total (LAB HVC upset)	UMCDF Collocation	9E-02	Mustard (or HD/HT), VX
Cumulative Total (LIC1 upset)	UMCDF Collocation	1E-01	Chlorine, Fluoranthene
Cumulative Total (LIC2 upset)	UMCDF Collocation	1E-01	Chlorine, Fluoranthene
Cumulative Total (MDB HVC upset)	UMCDF Collocation	9E-02	Mustard (or HD/HT), VX
Cumulative Total (MPF upset)	UMCDF Collocation	4E-01	Arsenic compounds, Nitrogen dioxide
Cumulative Total (MPFnc upset)	UMCDF Collocation	4E-01	Arsenic compounds, Nitrogen dioxide
Cumulative Total (No source upset)	UMCDF Collocation	9E-02	Arsenic compounds, Nitrogen dioxide

* The Cumulative Total Acute Hazard Index (AHI) across all emission sources is presented here. The interpretation of the total AHI, and the nature of the associated uncertainties, is dependent upon site-specific conditions with regard to the likelihood that all of the independent sources operate at the same time during any given hour of exposure to the upset condition.

Table 15 Acute Noncarcinogenic Hazard Indices (Depot Administration Area)* (TOE Correction Factor Iteration)

Regulatory Criterion: AHI 1.0

Emissions Source	Exposure Point Location	Total AHI	COPC (highest contributing COPCs)
Cumulative Total (BRA upset)	Depot Administration Area	8E-02	Arsenic compounds, Nickel compounds
Cumulative Total (DFS upset)	Depot Administration Area	6E-01	Fluoranthene, Isopropanol
Cumulative Total (LAB HVC upset)	Depot Administration Area	8E-02	Mustard (or HD/HT), VX
Cumulative Total (LIC1 upset)	Depot Administration Area	1E-01	Fluoranthene, Chlorine
Cumulative Total (LIC2 upset)	Depot Administration Area	1E-01	Fluoranthene, Chlorine
Cumulative Total (MDB HVC upset)	Depot Administration Area	8E-02	Mustard (or HD/HT), VX
Cumulative Total (MPF upset)	Depot Administration Area	1E-01	Fluoranthene, Arsenic compounds
Cumulative Total (MPFnc upset)	Depot Administration Area	1E-01	Fluoranthene, Arsenic compounds
Cumulative Total (No source upset)	Depot Administration Area	8E-02	Fluoranthene, Isopropanol

* The Cumulative Total Acute Hazard Index (AHI) across all emission sources is presented here. The interpretation of the total AHI, and the nature of the associated uncertainties, is dependent upon site-specific conditions with regard to the likelihood that all of the independent sources operate at the same time during any given hour of exposure to the upset condition.

Table 16 **Acute Noncarcinogenic Hazard Indices (Depot Collocation)* (TOE Correction Factor Iteration)**

Regulatory Criterion: AHI 1.0

Emissions Source	Exposure Point Location	Total AHI	COPC (highest contributing COPCs)
Cumulative Total (BRA upset)	Depot Collocation	2E+00	Arsenic compounds (8.3E-03), Mustard (or HD/HT) (1.3E-03)
Cumulative Total (DFS upset)	Depot Collocation	1E+01 **	Fluoranthene (1.1E+01), Isopropanol (2.4E-01)
Cumulative Total (LAB HVC upset)	Depot Collocation	2E+00	Mustard (or HD/HT) (3.2E-03), VX (1.0E-04)
Cumulative Total (LIC1 upset)	Depot Collocation	2E+00	Fluoranthene (5.4E-01), Chlorine (1.2E-02)
Cumulative Total (LIC2 upset)	Depot Collocation	2E+00	Fluoranthene (5.4E-01), Chlorine (1.2E-02)
Cumulative Total (MDB HVC upset)	Depot Collocation	2E+00	Mustard (or HD/HT) (2.5E-03), VX (8.0E-05)
Cumulative Total (MPF upset)	Depot Collocation	2E+00	Fluoranthene (7.6E-01), Arsenic compounds (1.4E-01)
Cumulative Total (MPFnc upset)	Depot Collocation	2E+00	Fluoranthene (7.6E-01), Arsenic compounds (1.4E-01)
Cumulative Total (No source upset)	Depot Collocation	2E+00	Fluoranthene (1.1E+00), Isopropanol (2.4E-02)

* The Cumulative Total Acute Hazard Index (AHI) across all emission sources is presented here. The interpretation of the total AHI, and the nature of the associated uncertainties, is dependent upon site-specific conditions with regard to the likelihood that all of the independent sources operate at the same time during any given hour of exposure to the upset condition.

** This HI is the maximum across all scenarios evaluated in the HHRA.

Table 17 Acute Noncarcinogenic Hazard Indices (Offsite Collocation)* (TOE Correction Factor Iteration)

Regulatory Criterion: AHI 1.0

Emissions Source	Exposure Point Location	Total AHI	COPC (highest contributing COPCs)
Cumulative Total (BRA upset)	Offsite Collocation	3E-01	Arsenic compounds, Mustard (or HD/HT)
Cumulative Total (DFS upset)	Offsite Collocation	2E+00	Fluoranthene (2.2E+00), Isopropanol (4.8E-02)
Cumulative Total (LAB HVC upset)	Offsite Collocation	3E-01	Mustard (or HD/HT), VX
Cumulative Total (LIC1 upset)	Offsite Collocation	4E-01	Fluoranthene, Chlorine
Cumulative Total (LIC2 upset)	Offsite Collocation	4E-01	Fluoranthene, Chlorine
Cumulative Total (MDB HVC upset)	Offsite Collocation	3E-01	Mustard (or HD/HT), VX
Cumulative Total (MPF upset)	Offsite Collocation	5E-01	Fluoranthene, Arsenic compounds
Cumulative Total (MPFnc upset)	Offsite Collocation	5E-01	Fluoranthene, Arsenic compounds
Cumulative Total (No source upset)	Offsite Collocation	3E-01	Fluoranthene, Isopropanol

* The Cumulative Total Acute Hazard Index (AHI) across all emission sources is presented here. The interpretation of the total AHI, and the nature of the associated uncertainties, is dependent upon site-specific conditions with regard to the likelihood that all of the independent sources operate at the same time during any given hour of exposure to the upset condition.

Table 18 Acute Noncarcinogenic Hazard Indices (UMCDF Collocation)* (TOE Correction Factor Iteration)

Regulatory Criterion: AHI 1.0

Emissions Source	Exposure Point Location	Total AHI	COPC (highest contributing COPCs)
Cumulative Total (BRA upset)	UMCDF Collocation	2E+00	Arsenic compounds (7.3E-03), Mustard (or HD/HT) (1.1E-03)
Cumulative Total (DFS upset)	UMCDF Collocation	1E+01	Fluoranthene (1.1E+01), Isopropanol (2.4E-01)
Cumulative Total (LAB HVC upset)	UMCDF Collocation	2E+00	Mustard (or HD/HT) (2.2E-03), VX (7.0E-05)
Cumulative Total (LIC1 upset)	UMCDF Collocation	2E+00	Fluoranthene (5.5E-01), Chlorine (1.2E-02)
Cumulative Total (LIC2 upset)	UMCDF Collocation	2E+00	Fluoranthene (5.5E-01), Chlorine (1.2E-02)
Cumulative Total (MDB HVC upset)	UMCDF Collocation	2E+00	Mustard (or HD/HT) (2.1E-03), VX (6.0E-05)
Cumulative Total (MPF upset)	UMCDF Collocation	3E+00	Fluoranthene (7.7E-01), Arsenic compounds (1.4E-01)
Cumulative Total (MPFnc upset)	UMCDF Collocation	3E+00	Fluoranthene (7.7E-01), Arsenic compounds (1.4E-01)
Cumulative Total (No source upset)	UMCDF Collocation	2E+00	Fluoranthene (1.1E+01), Isopropanol (2.4E-02)

* The Cumulative Total Acute Hazard Index (AHI) across all emission sources is presented here. The interpretation of the total AHI, and the nature of the associated uncertainties, is dependent upon site-specific conditions with regard to the likelihood that all of the independent sources operate at the same time during any given hour of exposure to the upset condition.

5.2.6 Lead Evaluation Summary

The modeled lead concentrations in soil and air were less than the USEPA Region VI target screening levels of 100 mg/kg for soil and 0.2 μg/m^3 for air (EPA 2007) (results presented in Volumes 2 and 4). The EPA Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children (IEUBK Windows Version 1.0, build 264) (EPA 2002) was not evaluated in this Addendum because the change in lead exposure since the February HRA report would not have alerted the conclusion. The estimated blood lead concentrations predicted by the IEUBK model in the February report for children ages 0 to 7 years old were all less than the target criterion of 10 μg of lead/deciliter (μg/dL) of blood.

6. ECOLOGICAL RISK ASSESSMENT RESULTS

As for the human health risk assessment results, the ecological results are presented in two sets. The first set of results is referred to as the Revised Baseline Iteration and is provided in Volume 3. The second set of results is referred to as the TOE Correction Factor Iteration and is provided in Volume 5. The distinction between these two sets is defined in the following bullets.

- The Revised Baseline Iteration represents the revision to the original baseline results presented in the Feb HRA report and incorporates all of the technical refinements discussed in the Methodology section. It does not include the evaluation with the TOE Correction Factor. These results are the primary results for use in decision-making (EPA 2005).

- The TOE Correction Factor Iteration represents a quantitative evaluation of the total potential risk that includes a rough estimate of the additional potential contribution to risk of the unidentified compounds in the emissions (or assumed emissions) that constitute the "unknown" fraction of the total organic emissions (TOE). This set of results is more uncertain that the Revised Baseline Iteration results, but can be used by the risk management team to supplement the decision-making process (EPA 2005). On balance, it is assumed that the environmental persistence and toxicity of the unidentified compounds contained in the TOE are similar to those of the known compounds (EPA 2005).

6.1 Ecological Risk Characterization Methods

In ecological risk characterization, the analysis results are used to develop an estimate and description of the potential risk posed to the ecological entities included in the assessment endpoints. The quantification of risk estimates involves integrating exposure and effects data by combining intake exposures with toxicity reference values.

In predictive risk assessments, risk estimates are developed using comparisons of single-point exposure and effects estimates. Ecological risk estimates are based on the assumption that there is a threshold for effect below which no adverse effects will likely occur from intake of the substance. Single-point exposure and effects ratios (i.e., hazard quotients; HQs) were calculated for each COPC and ecological receptor population, to assess the potential for adverse changes in the assessment endpoints due to facility emissions. The summing of COPC specific HQ ratios into hazard indices (HIs) are traditionally used to assess risk to receptors exposed to more than one chemical. HIs have limited utility in that they are dependent on target organ and mode of action information to have toxicological relevance. In ecological assessments, toxicity values are not separated by target organ as human health risk assessments typically do, therefore this report primarily focuses on calculating HQs.

For this screening-level assessment, the assumed regulatory target guidance is an incremental HQ ratio less than or equal to 0.25 (ODEQ 2004). This target is designed to account for existing background contributions to total exposure.

6.2 Summary of Ecological Results for the Depot Collocation

The depot collocation exposure point location (EPL) is used to assess terrestrial ecological receptors. This exposure point location represents a hypothetical, worst-case exposure point where all maximum one hour or annual unitized C/DRs are collocated, with no regard for whether a particular wildlife receptor lives there or not. Community receptors evaluated at this location were terrestrial plants and terrestrial invertebrates. Wildlife receptors evaluated were herbivorous mammals (i.e. Washington ground squirrel and pronghorn antelope), omnivorous mammals (i.e. deer mouse), carnivorous mammals (i.e. coyote), herbivorous birds (i.e. mourning dove), omnivorous birds (i.e. Western meadowlark), and carnivorous birds (i.e. Western burrowing owl).

6.2.1 Risk Estimation for Terrestrial Community Receptors at the Depot Collocation

Terrestrial community receptors include terrestrial plants and terrestrial invertebrates, which were evaluated considering the following assessment endpoint.

> Assessment Endpoint: Survival, growth, and reproduction of terrestrial community receptors.

The potential for risk to terrestrial communities was estimated by the HQ method: comparing the highest annual average COPC concentration in soil (Cstd) to a COPC specific toxicity benchmark (Bq Low soil). Only one tier of HQs was calculated for these receptors. No HQs exceeded the target level for terrestrial community receptors for the revised baseline iteration or the secondary iteration that included TOE correction factors. Table 19 provides HQ ranges by COPC category.

Table 19 Depot Collocation Terrestrial Community Receptor HQ ranges by COPC category

COPC Category	Assessment Endpoint Entity: Terrestrial Communities	
	Revised Baseline Iteration	TOE Correction Factor Iteration
Dioxins/furans	10^{-8} to 10^{-11}	10^{-6} to 10^{-10}
Inorganic Gases	n/a	n/a
Metals	10^{-2} to 10^{-9}	10^{-2} to 10^{-9}
NVOCs	10^{-5} to 10^{-8}	10^{-4} to 10^{-7}
SVOCs	10^{-4} to 10^{-12}	10^{-2} to 10^{-11}
VOCs	10^{-9}	10^{-7}

6.2.2 Risk Description for Terrestrial Community Receptors at the Depot Collocation

None of the COPCs which were evaluated for in terrestrial community receptors had HQs which exceeded the target level of 0.25. Therefore for the assessment endpoint of *Survival, growth, and reproduction of terrestrial community receptors*, the potential for risk to the terrestrial community receptors is not expected. For the COPCs that could not have HQs calculated (due to data gaps), it is assumed that those HQs would be within the range of those estimated for other COPCs in the corresponding chemical category.

6.2.3 Risk Estimation for Wildlife Populations at the Depot Collocation

Wildlife receptors evaluated at the depot collocation include the following feeding guilds, with their representative species shown in parentheses: herbivorous mammal receptors (Washington ground squirrel and pronghorn antelope), omnivorous mammal receptors (deer mouse), carnivorous mammal receptors (coyote), herbivorous avian receptors (mourning dove), omnivorous avian receptors (Western meadowlark) and carnivorous avian receptors (Western burrowing owl). These receptors were evaluated considering the following assessment endpoint.

> Assessment Endpoint: Development and reproductive success of wildlife populations.

In addition, the following assessment endpoint for herbivorous mammal receptors (Washington ground squirrel) was evaluated because the Washington ground squirrel is an endangered species.

Assessment Endpoint: Development and reproductive success of individuals of threatened or endangered species

The potential for risk was estimated by the HQ method: comparing the wildlife average daily COPC intake from oral ingestion (WADIoral) to an oral TRV (TRVoral or TRVaoral). Table 20 shows the HQ ranges for those COPC categories that did not exceed the target level for mammals. While there were no HQ exceedances for mammal receptors at the depot collocation for the revised baseline iteration, there were was one HQ exceedance for mammal receptors at the depot collocation for the secondary iteration that included TOE correction factors, as shown in Table 21. Table 22 shows the HQ ranges for those COPC categories that did not exceed the target level for birds. While there were no HQ exceedances for avian receptors at the depot collocation for the revised baseline iteration, there were HQ exceedances for avian receptors at the depot collocation for the secondary iteration that included TOE correction factors, as shown in Table 23.

6.2.3.1 *Mammals*

No HQs exceeded the target level for terrestrial mammalian receptors for the revised baseline iteration. One HQ exceeded the target level for terrestrial omnivorous mammalian receptors for the secondary baseline iteration that included TOE correction factors. However, that Tier 2 HQa did not exceed the target level of 0.25. Tables 20 and 21 provide a summary of the results.

Table 20 Depot Collocation Mammal HQ ranges by COPC category that did not exceed 0.25

COPC Category	Receptor Populations					
	Herbivorous Mammals		Omnivorous Mammals		Carnivorous Mammals	
	Revised Baseline Iteration	TOE Correction Factor Iteration	Revised Baseline Iteration	TOE Correction Factor Iteration	Revised Baseline Iteration	TOE Correction Factor Iteration
Dioxins/furans	10^{-4} to 10^{-8}	10^{-2} to 10^{-7}	10^{-3} to 10^{-7}	10^{-2} to 10^{-7}	10^{-4} to 10^{-9}	10^{-2} to 10^{-8}
Inorganic Gases	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-5}	10^{-5}
Metals	10^{-2} to 10^{-16}	10^{-2} to 10^{-16}	10^{-2} to 10^{-16}	10^{-2} to 10^{-16}	10^{-4} to 10^{-16}	10^{-4} to 10^{-16}
NVOCs	10^{-4} to 10^{-6}	10^{-2} to 10^{-5}	10^{-3} to 10^{-5}	10^{-3} to 10^{-4}	10^{-4} to 10^{-7}	10^{-2} to 10^{-7}
SVOCs	10^{-4} to 10^{-11}	10^{-3} to 10^{-9}	10^{-3} to 10^{-10}	10^{-2} to 10^{-9}	10^{-4} to 10^{-11}	10^{-3} to 10^{-9}
VOCs	10^{-6} to 10^{-14}	10^{-5} to 10^{-13}	10^{-6} to 10^{-13}	10^{-4} to 10^{-13}	10^{-7} to 10^{-14}	10^{-7} to 10^{-13}

Table 21 Depot Collocation Mammal Population Receptor HQs exceeding the Target Level and HQas

Receptor	Population	Revised Baseline Iteration		TOE Correction Factor Iteration		COPC
		HQ	HQ_a	HQ	HQ_a	
Omnivorous Mammals	Deer Mouse	n/a	n/a	0.250	0.0244	Bis(2-ethylhexyl) phthalate

HQ = Hazard Quotient
HQa = Allometric Scaled Hazard Quotient
(Note: Only receptors with an HQ exceeding the target ratio of 0.25 have been included in this table.)

6.2.3.2 *Birds*

No HQs exceeded the target level for terrestrial avian receptors for the revised baseline iteration. One HQ exceeded the target level for terrestrial omnivorous and herbivorous avian receptors for the secondary baseline iteration that included TOE correction factors and two HQs exceeded the target level for terrestrial carnivorous avian receptors for the secondary baseline iteration that included TOE correction factors. Only one Tier 2 HQas from the secondary baseline iteration exceeded the target level by a minor margin. Based on the uncertainty inherent in using TOE correction factors, the actual risk estimate is most likely comparable to the revised baseline iteration risk estimates. Tables 22 and 23 provide a summary of the results.

Table 22 Depot Collocation Bird HQ ranges by COPC category that did not exceed 0.25

COPC Category	Receptor Populations					
	Herbivorous Birds		Omnivorous Birds		Carnivorous Birds	
	Revised Baseline Iteration	Revised Correction Factor Iteration	Revised Baseline Iteration	Revised Correction Factor Iteration	Revised Baseline Iteration	Revised Correction Factor Iteration
Dioxins/furans	10^{-4} to 10^{-9}	10^{-2} to 10^{-8}	10^{-5} to 10^{-11}	10^{-3} to 10^{-10}	10^{-3} to 10^{-10}	10^{-5} to 10^{-9}
Inorganic Gases	n/a	n/a	n/a	n/a	n/a	n/a
Metals	10^{-3} to 10^{-16}	10^{-3} to 10^{-16}	10^{-3} to 10^{-16}	10^{-3} to 10^{-16}	10^{-2} to 10^{-6}	10^{-2} to 10^{-16}
NVOCs	10^{-3} to 10^{-4}	10^{-3}	10^{-3} to 10^{-5}	10^{-4}	10^{-1} to 10^{-3}	10^{-2}
SVOCs	10^{-6}	10^{-4} to 10^{-5}	10^{-7} to 10^{-8}	10^{-5} to 10^{-7}	10^{-6} to 10^{-9}	10^{-5} to 10^{-8}
VOCs	10^{-7} to 10^{-10}	10^{-6} to 10^{-8}	10^{-8} to 10^{-10}	10^{-7} to 10^{-9}	10^{-8} to 10^{-10}	10^{-7} to 10^{-9}

Table 23 Depot Collocation Bird Population Receptor HQs exceeding the Target Level and HQas

Receptor	Population	Revised Baseline Iteration		TOE Correction Factor Iteration		COPC
		HQ	HQ_a	HQ	HQ_a	
Carnivorous Birds	Western Burrowing Owl	n/a	n/a	0.267	0.0391	2,3,7,8-TCDF
		n/a	n/a	13.9	1.40	Bis(2-ethylhexyl) phthalate
Omnivorous Birds	Western Meadowlark	n/a	n/a	0.286	0.0310	Bis(2-ethylhexyl) phthalate
Herbivorous Birds	Mourning Dove	n/a	n/a	0.690	0.0717	Bis(2-ethylhexyl) phthalate

HQ = Hazard Quotient
HQa = Allometric Scaled Hazard Quotient
(Note: Only receptors with an HQ exceeding the target ratio of 0.25 have been included in this table.)

6.2.4 Risk Description for Wildlife Populations at the Depot Collocation

For the assessment endpoint of *Development and Reproductive Success of Wildlife Populations*, it appears that the potential for risk from UMCDF operations to terrestrial mammalian receptors is not expected. No HQa risk estimates exceeded the target level of 0.25 for terrestrial herbivorous, omnivorous or carnivorous mammals for both the revised baseline iteration and the secondary iteration that included TOE correction factors. Therefore, the potential for risk to terrestrial herbivorous, omnivorous and carnivorous mammals is not expected. For the COPCs that could not have HQs calculated (due to data gaps), it is assumed that those HQs would be within the range of those estimated for other COPCs in the corresponding chemical category.

For the assessment endpoint of *Development and Reproductive Success of Wildlife Populations*, it appears that the potential for risk from UMCDF operations to terrestrial avian receptors is not expected. No revised baseline iteration risk estimates exceeded the target level of 0.25 for terrestrial herbivorous, omnivorous or carnivorous avians. Four HQs from the secondary iteration that included TOE correction factors exceeded the target level of 0.25, but only one Tier 2 HQa for these COPCs exceeded the target level of 0.25 and then only marginally. The uncertainty inherent in using TOE correction factors indicates the actual risk estimate is most likely comparable to the revised baseline iteration risk estimates. Therefore, the potential for risk to terrestrial herbivorous, omnivorous and carnivorous avians is not expected. For the COPCs that could not have HQs calculated (due to data gaps), it is assumed that those HQs would be within the range of those estimated for other COPCs in the corresponding chemical category.

For the assessment endpoint of *Development and Reproductive Success of individuals of threatened or endangered species*, the potential for risk to Washington ground squirrels is not expected. For both the revised baseline iteration and the secondary iteration that included TOE correction factors, no Tier 1 HQs exceeded the target level of 0.25 for herbivorous terrestrial mammals (Washington ground squirrels). For the COPCs that could not have HQs calculated (due to data gaps), it is assumed that those HQs would be within the range of those estimated for other COPCs in the corresponding chemical category. The conservative nature of the model used to calculate the risk estimate assumes the worst case exposure scenario.

6.3 Summary of Ecological Results for the Umatilla River Water Body

The Umatilla River water body exposure point concentration (EPC) is used to assess aquatic ecological receptors. The air receptor grid points located over the Umatilla River water body were used to determine the average unitized C/DRs for that water body. Community receptors evaluated at the Umatilla River water body were fish, amphibians, aquatic invertebrates (i.e., water column and benthic) and algal species. Wildlife receptors evaluated were herbivorous mammal receptors (long-tailed vole), omnivorous mammal receptors (raccoon), carnivorous mammal receptors (otter), herbivorous avian receptors (Canada goose), omnivorous avian receptors (mallard) and carnivorous avian receptors (bald eagle, spotted sandpiper, peregrine falcon and great blue heron).

Based on dispersion modeling results, larger amounts of the COPCs emitted from UMCDF operations are introduced into the Umatilla River Water Body than are introduced into the Columbia River Water Body. These increased concentration estimates produce higher risk estimates for the Umatilla River receptors than for the Columbia River receptors. For this Addendum, since Umatilla River risk estimates are larger than Columbia River risk estimates, only the Umatilla River risk estimates are shown in the following summary tables. Full documentation of risk estimates and calculation outputs for both rivers is found in the appendices.

6.3.1 Risk Estimation for Aquatic Community Receptors at Umatilla River

Aquatic community receptors include algae, amphibians, fish, water invertebrates and benthic invertebrates, which were evaluated considering the following assessment endpoint.

Assessment Endpoint: Survival, growth, and reproduction of aquatic community receptors.

The potential for risk to aquatic communities was estimated by the HQ method: comparing the highest annual average COPC concentration in bed sediment (Csb) to a COPC specific sediment benchmark (Bq Low sediment) and comparing the highest annual average COPC concentration in the water column (Cwctot) to a COPC specific benchmark (Bq chronic water). Only Tier 1 HQs were calculated for these receptors. Table 24 provides a summary of the results by COPC category. No COPCs exceeded the screening target level of 0.25 for both the revised baseline iteration and the secondary iteration that included TOE correction factors.

Table 24 Umatilla River Aquatic Community Receptor HQ ranges by COPC category

COPC Category	Assessment Endpoint Entity: Aquatic Communities			
	Algae, Amphibians, Fish, Water Invertebrates		Benthic Invertebrates	
	Revised Baseline Iteration	TOE Correction Factor Iteration	Revised Baseline Iteration	TOE Correction Factor Iteration
Dioxins/furans	10^{-5} to 10^{-9}	10^{-4} to 10^{-8}	10^{-6} to 10^{-8}	10^{-4} to 10^{-8}
Inorganic Gases	n/a	n/a	n/a	n/a
Metals	10^{-3} to 10^{-8}	10^{-3} to 10^{-9}	10^{-4} to 10^{-12}	10^{-4} to 10^{-12}
NVOCs	10^{-4} to 10^{-7}	10^{-2} to 10^{-6}	10^{-4} to 10^{-7}	10^{-3} to 10^{-6}
SVOCs	10^{-5} to 10^{-9}	10^{-4} to 10^{-8}	10^{-4} to 10^{-9}	10^{-3} to 10^{-8}
VOCs	10^{-6} to 10^{-9}	10^{-4} to 10^{-8}	10^{-5} to 10^{-9}	10^{-4} to 10^{-8}

6.3.2 Risk Description for Aquatic Community Receptors at Umatilla River

None of the COPCs which were evaluated for in aquatic community receptors had HQs which exceeded the target level of 0.25. Therefore for the assessment endpoint of *Survival, growth, and reproduction of aquatic community receptors*, the potential for risk to the aquatic community receptors is not expected. For the COPCs that could not have HQs calculated (due to data gaps), it is assumed that those HQs would be within the range of those estimated for other COPCs in the corresponding chemical category.

6.3.3 Risk Estimation for Wildlife Populations at Umatilla River

Wildlife receptors evaluated at Umatilla River include the following feeding guilds, with their representative species shown in parentheses: herbivorous mammal receptors (long-tailed vole), omnivorous mammal receptors (raccoon), carnivorous mammal receptors (otter), herbivorous avian receptors (Canada goose), omnivorous avian receptors (mallard) and carnivorous avian receptors (bald eagle, spotted sandpiper, peregrine falcon and great blue heron). These receptors were evaluated considering the following assessment endpoint.

Assessment Endpoint: Development and reproductive success of wildlife populations.

In addition, the following assessment endpoint for carnivorous avian receptors (peregrine falcon and bald eagle) was evaluated because the peregrine falcon is a listed endangered species and the bald eagle is a listed threatened species.

Assessment Endpoint: Development and reproductive success of individuals of threatened or endangered species

The potential for risk was estimated by the HQ method: comparing the wildlife average daily COPC intake from oral ingestion (WADIoral) to an oral TRV (TRVoral or TRVaoral). Table 25 provides the HQ ranges for those COPC categories that did not exceed the target level in mammal populations. While there were no HQ exceedances for mammal receptors at the Umatilla River EPL for the revised baseline iteration, there were HQ exceedances for mammal receptors at the Umatilla River EPL for the secondary iteration that included TOE correction factors, as shown in Table 26. Table 27 provides the HQ ranges for those COPC categories that did not exceed the target level in avian populations. Table 28 shows the revised baseline iteration and secondary iteration that included TOE correction factors HQ exceedances for bird receptors at the Umatilla River EPL for the Tier 1 calculation based on class-specific TRVs and for the Tier 2 calculation using allometrically-scaled TRVs for the hazard quotient (HQa) calculations.

6.3.3.1 *Mammals*

No HQs exceeded the target level for aquatic mammalian receptors for the revised baseline iteration. Two HQs exceeded the target level for both the aquatic omnivorous and carnivorous mammalian receptors for the secondary iteration that included TOE correction factors. Only one Tier 2 HQa from the secondary baseline iteration for the omnivorous mammalian receptor exceeded the target level and then only by a minor margin. Based on the uncertainty inherent in using TOE correction factors, the actual risk estimate is most likely comparable to the revised baseline iteration risk estimates.

Table 25 Umatilla River Mammal HQ ranges by COPC category that did not exceed 0.25

COPC Category	Receptor Populations					
	Herbivorous Mammals		Omnivorous Mammals		Carnivorous Mammals	
	Revised Baseline Iteration	TOE Correction Factor Iteration	Revised Baseline Iteration	TOE Correction Factor Iteration	Revised Baseline Iteration	TOE Correction Factor Iteration
Dioxins/furans	10^{-6} to 10^{-10}	10^{-4} to 10^{-9}	10^{-2} to 10^{-7}	10^{-2} to 10^{-6}	10^{-2} to 10^{-7}	10^{-2} to 10^{-7}
Inorganic Gases	10^{-7}	10^{-7}	10^{-8}	10^{-8}	10^{-8}	10^{-8}
Metals	10^{-6} to 10^{-13}	10^{-6} to 10^{-13}	10^{-4} to 10^{-13}	10^{-4} to 10^{-13}	10^{-2} to 10^{-13}	10^{-2} to 10^{-13}
NVOCs	10^{-6} to 10^{-7}	10^{-5} to 10^{-6}	10^{-3} to 10^{-6}	10^{-1} to 10^{-6}	10^{-3} to 10^{-7}	10^{-2} to 10^{-7}
SVOCs	10^{-4} to 10^{-12}	10^{-3} to 10^{-10}	10^{-3} to 10^{-11}	10^{-2} to 10^{-10}	10^{-2} to 10^{-10}	10^{-1} to 10^{-9}
VOCs	10^{-6} to 10^{-13}	10^{-6} to 10^{-12}	10^{-6} to 10^{-12}	10^{-5} to 10^{-11}	10^{-6} to 10^{-11}	10^{-5} to 10^{-11}

Table 26 Umatilla River Mammal Population HQs exceeding the Target Level and HQas

Receptor	Population	Revised Baseline Iteration		TOE Correction Factor Iteration		COPC
		HQ	HQ_a	HQ	HQ_a	
Carnivorous Mammals	Otter	n/a	n/a	1.38	0.167	2,3,7,8-TCDF
		n/a	n/a	0.284	0.0344	2,3,4,4',5-PCB
Omnivorous Mammals	Raccoon	n/a	n/a	3.17	0.379	2,3,7,8-TCDF
		n/a	n/a	0.66	0.0789	2,3,4,4',5-PCB

HQ = Hazard Quotient

HQa = Allometric Scaled Hazard Quotient

(Note: Only receptors with an HQ exceeding the target ratio of 0.25 have been included in this table.)

6.3.3.2 *Birds*

Table 27 provides the HQ ranges for those COPC categories that did not exceed the target level. For carnivorous avian receptors, two COPCs (2,3,7,8-TCDF and bis(2-ethylhexyl)phthalate) exceeded the Tier 1 target level of 0.25 for the revised baseline iteration. For carnivorous avian receptors and omnivorous avian receptors three COPCs (2,3,4,4',5-PCB, 2,3,7,8-TCDF and bis(2-ethylhexyl)phthalate) exceeded the Tier 1 target level of 0.25 for the secondary iteration that included TOE correction factors (shown in Table 28).

No Tier 2 HQas from the revised baseline iteration exceeded the target level. Ten of the twelve Tier 2 HQas from the secondary baseline iteration for the carnivorous and omnivorous avian receptors exceeded the target level. These exceedances were not significantly larger than the revised baseline iteration HQa results and based on the uncertainty inherent in using TOE correction factors, the actual risk estimate is most likely comparable to the revised baseline iteration risk estimates.

Table 27 Umatilla River Bird HQ ranges by COPC category that did not exceed 0.25

COPC Category	Receptor Populations					
	Herbivorous Birds		Omnivorous Birds		Carnivorous Birds	
	Revised Baseline Iteration	Revised Baseline TOE Correction Factor Iteration	Revised Baseline Iteration	Revised Baseline TOE Correction Factor Iteration	Revised Baseline Iteration	Revised Baseline TOE Correction Factor Iteration
Dioxins/furans	10^{-6} to 10^{-11}	10^{-4} to 10^{-10}	10^{-2} to 10^{-8}	10^{-3} to 10^{-8}	10^{-2} to 10^{-13}	10^{-1} to 10^{-12}
Inorganic Gases	n/a	n/a	n/a	n/a	n/a	n/a
Metals	10^{-5} to 10^{-13}	10^{-5} to 10^{-13}	10^{-5} to 10^{-12}	10^{-5} to 10^{-12}	10^{-3} to 10^{-16}	10^{-3} to 10^{-16}
NVOCs	10^{-6}	10^{-4} to 10^{-5}	10^{-1} to 10^{-5}	10^{-4}	10^{-1} to 10^{-5}	10^{-1} to 10^{-4}
SVOCs	10^{-8} to 10^{-9}	10^{-7} to 10^{-8}	10^{-8} to 10^{-9}	10^{-7} to 10^{-8}	10^{-7} to 10^{-9}	10^{-6} to 10^{-9}
VOCs	10^{-9} to 10^{-10}	10^{-8}	10^{-9} to 10^{-10}	10^{-8}	10^{-9} to 10^{-10}	10^{-8} x 10^{-9}

Table 28 Umatilla River Bird Population Receptor HQs exceeding the Target Level and HQas

Receptor	Population	Revised Baseline Iteration		Revised Baseline TOE Correction Factor Iteration		COPC
		HQ	HQ_a	HQ	HQ_a	
Carnivorous Birds	Spotted Sandpiper	0.334	0.0628	23.1	4.35	2,3,7,8-TCDF
		n/a	n/a	1.45	0.272	2,3,4,4',5-PCB
		0.490	0.0635	35.0	4.53	Bis(2-ethylhexyl) phthalate
	Peregrine Falcon	0.928	0.0948	64.3	6.57	2,3,7,8-TCDF
		n/a	n/a	5.08	0.518	2,3,4,4',5-PCB
		0.438	0.0308	31.2	2.20	Bis(2-ethylhexyl) phthalate
	Bald Eagle	0.348	0.0267	24.1	1.85	2,3,7,8-TCDF
		n/a	n/a	1.90	0.146	2,3,4,4',5-PCB
		n/a	n/a	11.7	0.618	Bis(2-ethylhexyl) phthalate
Omnivorous Birds	Mallard	n/a	n/a	5.74	0.553	2,3,7,8-TCDF
		n/a	n/a	0.359	0.0346	2,3,4,4',5-PCB
		n/a	n/a	8.68	0.576	Bis(2-ethylhexyl) phthalate

HQ = Hazard Quotient
HQa = Allometric Scaled Hazard Quotient
(Note: Only receptors with an HQ exceeding the target ratio of 0.25 have been included in this table.)

6.3.4 Risk Description for Wildlife Populations at Umatilla River

For the assessment endpoint of *Development and Reproductive Success of Wildlife Populations*, it appears that the potential for risk from UMCDF operations to aquatic mammalian receptors is not expected. No revised baseline iteration risk estimates exceeded the target level of 0.25 for aquatic herbivorous, omnivorous or carnivorous mammals. Four HQs from the secondary iteration that included TOE correction factors exceeded the target level of 0.25 but only one Tier 2 HQa for these COPCs exceeded the target level of 0.25 and then only marginally. The uncertainty inherent in using TOE correction factors indicates the actual risk estimate is most likely comparable to the revised baseline iteration risk estimates. Therefore, the potential for risk to aquatic herbivorous, omnivorous and carnivorous mammals is not expected. For the COPCs that could not have HQs calculated (due to data gaps), it is assumed that those HQs would be within the range of those estimated for other COPCs in the corresponding chemical category.

For the assessment endpoint of *Development and Reproductive Success of Wildlife Population* for avian receptors, evidence from this evaluation indicates that the potential for risk from operation of the UMCDF at UMCD is unlikely. For the revised baseline iteration no Tier 1 HQs exceeded the target level of 0.25 for herbivorous or omnivorous aquatic birds and no Tier 2 HQas exceeded the target level of 0.25 for carnivorous aquatic birds. For the secondary iteration that included TOE correction factors ten HQas exceeded the target level of 0.25. The uncertainty inherent in using TOE correction factors indicates the actual risk estimate is most likely comparable to the revised baseline iteration risk estimates. Therefore, the potential for risk to aquatic herbivorous, omnivorous and carnivorous avians is unlikely. For the

COPCs that could not have HQs calculated (due to data gaps), it is assumed that those HQs would be within the range of those estimated for other COPCs in the corresponding chemical category.

For the assessment endpoint of *Development and Reproductive Success of individuals of threatened or endangered species*, the potential for risk to peregrine falcons and bald eagles is unlikely. None of the revised baseline iteration Tier 2 HQa values exceeded the target level of 0.25 for carnivorous aquatic birds (peregrine falcons and bald eagles). For the secondary iteration that included TOE correction factors two Tier 2 HQa values exceeded the target level for the bald eagle receptor and three Tier 2 HQa values exceeded the target level for the peregrine falcon receptor. The uncertainty inherent in using TOE correction factors indicates the actual risk estimate is most likely comparable to the revised baseline iteration risk estimates. Therefore, the potential for risk to peregrine falcons and bald eagles is unlikely. For the COPCs that could not have HQs calculated, it is assumed that those HQs would be within the range of those estimated for other COPCs in the corresponding chemical category.

Revised baseline iteration hazard quotients for 2,3,7,8-TCDF exceeded the target level of 0.25 in carnivorous aquatic avians in the spotted sandpiper (HQ=0.33), peregrine falcon (HQ=0.93) and bald eagle (HQ=0.35) populations. The exceedance of the target level by the class specific, Tier 1 HQ prompted the calculation of a Tier 2 HQa. The resulting HQa values for the spotted sandpiper (HQa=0.06), peregrine falcon (HQa=0.09) and bald eagle (HQa=0.03) populations were all below the target level of 0.25. Based on these low HQas, it is unlikely that there is any potential for risk to the carnivorous aquatic avian receptors from 2,3,7,8-TCDF.

Revised baseline iteration hazard quotients for bis(2-ethylhexyl) phthalate exceeded the target level of 0.25 in carnivorous aquatic avians in the spotted sandpiper (HQ=0.49) and peregrine falcon (HQ=0.44) populations. The exceedance of the target level by the class specific, Tier 1 HQ prompted the calculation of a Tier 2 HQa. The resulting HQas for the spotted sandpiper (HQa=0.06) and peregrine falcon (HQa=0.03) populations were all below the target level of 0.25. Based on these low HQas, it is unlikely that there is any potential for risk to the carnivorous aquatic avian receptors from bis(2-ethylhexyl) phthalate.

7. CONCLUSIONS

The overall conclusion is that the results of the HRA should demonstrate that the potential public health risks associated with the day-to-day operations of the UMCDF facility should be acceptable to the regulatory authority.

7.1 Human Health Risk Assessment Conclusions

The excess lifetime cancer risk estimates were all less than the regulatory target criteria, meaning that unacceptable cancer risks were not identified. This remains the case even when the emission rates of detected compounds and undetected feed compounds (at detection limits) were artificially increased by the TOE correction factor.

The noncancer health hazard estimates for the chronic exposure scenarios from the revised baseline iteration were all less than the regulatory target criteria, meaning that unacceptable noncancer risks were not identified. The highest estimates were for the Native American Adult populations, however they were still lower than the regulatory target. When the emission rates of detected compounds and undetected feed compounds (at detection limits) were artificially increased by the TOE correction factor, then the noncancer health hazard estimates for the Native American Adult populations were greater than the regulatory target. The target is a ratio of less than or equal to 0.25 and the estimated ratio was 0.34. This finding indicates a very small potential risk contribution from the unidentified organic emissions, in light of the magnitude of the estimates. The increase in noncancer hazard attributable to the unidentified TOE compared to the baseline iteration in an increase from 0.17 to 0.34. Also, the estimates are all well within an order of magnitude of the regulatory target. This should generally be considered acceptable to risk managers, given the large number of protective assumptions and other uncertainties associated with this type of analysis.

The acute health hazard estimates from the revised baseline iteration were all less than the regulatory target criterion, meaning that unacceptable acute risks were not identified. When the emission rates of detected compounds and undetected feed compounds (at detection limits) were artificially increased by the TOE correction factor, then the acute health hazard estimates for some of the scenarios were greater than the regulatory target. The target is a ratio of less than or equal to 1.0 and the estimated ratios ranged from much less than this to 12. This finding indicated that additional consideration of the acute analysis should be made.

The range of cumulative total AHI values that are greater than the target range from 1 to 3 for normal operations and a single high value of 10 for an on-site Depot Collocation when the DFS is in an upset condition. The assumption was made that an upset condition would result in emissions 10-times higher than normal for less than an hour. Since the "normal" emissions were always set to the maximum detected levels, this result is an overestimate. In addition, the analysis assumed that all emitted compounds would have the same toxicological effect and that the effects will be additive, when research generally shows that this is not the case. All exceedences are attributed to either the DFS or MPF furnaces and are due to Fluoranthene, an undetected compound included in the assessment at it's detection limit and increased by the TOE correction factor. It should also be noted that the toxicity criterion used for Fluoranthene is highly uncertain – it is a model estimated Protective Action Criteria (formerly called Temporary Emergency Exposure Limits, TEELs) and is not based on experimental data, which is preferred.
In summary, the acute assessment is considered to be health-protective and the highest result for a hypothetical location on-site is within an order of magnitude of the regulatory target. Therefore, the acute results should not prevent the issuance of an operating permit.

7.2 Ecological Risk Assessment Conclusions

Impacts on the survival, growth, and reproduction of terrestrial community receptors are not expected. Impacts on the development and reproductive success of wildlife populations and of individuals of threatened or endangered species are not expected.

8. RECOMMENDATION

Use the results of this analysis during the risk management decision-making process for the UMCDF facility. Consult with this Center if there are UMCDF operational considerations that may alter the facility assumptions used in the generation of the risk assessment results.

APPENDIX A

REFERENCES

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APPENDIX B

EMISSION RATE FRAMEWORK

(REVISION 3)

U.S. Army Center for Health Promotion and Preventive Medicine

Framework for Developing and Utilizing Emission Rates in the Umatilla Post-Trial Burn Health Risk Assessment

Revision 3 June 10, 2008

PURPOSE

This document explains how the emission rates were developed for use in the health risk assessment modeling application and how results are reported accordingly. This document includes an annex prepared by EnviroMet, LLC and an annex prepared by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR).

SUMMARY OF APPROACH

The approach used is summarized here and additional detail is provided in subsequent sections.

Assessment of chronic exposure

For each chemical of potential concern (COPC), emission rates based on maximum feed rates were developed by EnviroMet for each UMCDF emissions source for each campaign (**Annex A**). Since each of the common stack furnaces will not operate at full capacity over the course of operations, these emission rates (i.e., from the common stack furnaces only) were adjusted by CHPPM to account for the average furnace use over the duration of UMCDF operations (10 years). The adjustment factors used were developed in an analysis by CTUIR (**Annex B**), though one of them was revised based on site-specific information.

The adjusted emission rates for the common stack furnaces and the original emission rates for the other sources were then used by CHPPM to generate time-weighted average emission rates over the duration of UMCDF operations for each source. The durations used in the time-weighting were developed by CTUIR (**Annex B**). These 10-year blended average rates took into account the campaign durations and incorporated contributions made to the emissions from the disposal of secondary waste both during agent campaigns and during the closure process.

These source-specific, 10-year blended average emission rates were input into the HRA modeling application. To examine cumulative exposures across all sources, CHPPM used the modeling application to apply the blended emission rates to the source-designated *unitized* air concentrations and deposition rates (UC/DRs) to generate *COPC-specific* C/DRs for each source, which were then summed across the relevant sources to create a "combined source" for the purposes of modeling cumulative exposures and reporting cumulative results.

Assessment of acute exposure

EnviroMet also developed the hourly emission rates for each COPC (**Annex A**). Acute emissions scenarios were developed that assumed one of the sources was operating under an "upset condition" while the other sources were operating under non-upset conditions. The emission rates for the non-upset condition were the estimated maximum hourly emission rate from a source over the entire duration of UMCDF operations.

MATRIX OF EMISSION RATES

Exhibit 1 presents an emission rates data matrix that can be used to visualize the data flow process described above. This data matrix represents several layers of information that is best explained in the order in which the data is assembled for eventual insertion into the HRA model. The matrix also highlights what sources/furnaces are operating during each component step of the UMCDF operation and what the source of the emission rates are for the purposes of modeling environmental exposures.

1. HRA modeling sources and applicable dispersion model. Eight "sources" will be run in the CHPPM HRA model to represent the four actual UMCDF emission stacks. These sources are defined as follows:

HRA modeling source	*Applicable dispersion model*	*Representation*
LIC1	Common stack	Liquid incinerator #1 during agent campaigns and sole operating LIC during closure
LIC2	Common stack	Liquid incinerator #2 during agent campaigns
MPF	Common stack	Metal parts furnace handling agent and combustible secondary waste
MPFnc	Common stack	Metal parts furnace handling non-combustible secondary waste
DFS	Common stack	Deactivation furnace system
BRA	BRA	Brine reduction area pollutant abatement system
LAB HVC	LAB	Laboratory heating, ventilation, and air conditioning system
MDB HVC	MDB	Munitions demilitarization building heating, ventilation, and air conditioning system

In terms of the risk assessment, the term "source" refers to either the eight HRA modeling sources or the four actual emission stacks that are each handled in the air dispersion model independently. The context of the discussion indicates which meaning is inferred.

Defining an MPFnc "source" for emissions associated with the handling of non-combustible secondary waste during and after the agent campaigns was determined to be a potentially useful approach to setting up the HRA model and especially for articulating how the emission rate data sets were assembled.

Exhibit 1. UMCDF Post-Trial Burn HRA Emission Rates Matrix

HRA modeling source	Applicable unitized C/DRs	COPC	GB campaign		VX campaign		HD campaign		Closure	10-yr Blended Average
			Agent	SW	Agent	SW	Agent	SW	SW	
LIC1	Common stack	A	ST 1	Maximum of ST 1 & 4	ST 2	Maximum of ST 2 & 5	ST 3	Maximum of ST 3 & 6	ST 13	
		B								
		C								
LIC2	Common stack	A	ST 4		ST 5		ST 6			
		B								
		C								
MPF	Common stack	A	ST 7	ST 12	ST 8	ST 12	ST 9	ST 12	ST 12	
		B								
		C								
MPFnc	Common stack	A		ST 7		ST 8		ST 9	ST 14	
		B								
		C								
DFS	Common stack	A	ST 10	ST 10	ST 11	ST 11			ST 15	
		B								
		C								
BRA	BRA	A	ST 16		ST 16					
		B								
		C								
LAB HVC	LAB	A	ST 18		ST 18		ST 18		ST 18	
		B								
		C								
MDB HVC	MDB	A	ST 17		ST 17		ST 17		ST 17	
		B								
		C								

An explanation of this data matrix is presented on the following pages.

There are two alternative methods for running the common stack emissions in the HRA model. The traditional method is to evaluate the common stack emission rates as a single unit, where the emissions of the component furnaces are summed before being input into the model (i.e., prior to the application of the UC/DRs). This approach was used in the CTUIR analysis (**Annex B**). The alternative is to treat the component furnaces as independent and input the emission rates of each into the model. This alternative approach is preferred as it allows more efficient exploration of risk assessment results within the HRA model. However, both approaches produce the same final result.

2. Original emission rates. The emission rates developed by EnviroMet (**Annex A**) are represented in the emission rate matrix (**Exhibit 1**) as the white cells. As explained in **Annex A**, the EnviroMet database can be viewed as 18 sub-tables (summarized below). The matrix displays which of the sub-tables are used for the emission rates for each component of the UMCDF operation. For example, the emission rates for the DFS during the GB campaign are derived from sub-table 10 for both agent disposal and secondary waste disposal (the secondary waste emission rates are assumed to be equal to those generated during the disposal of GB agent). Likewise, sub-table 11 is used for the VX campaign emission rates and sub-table 15 is used for the disposal of secondary waste during closure. The DFS is grayed-out for the HD campaign because it will not be utilized during that campaign, thus no emissions will occur.

Sub-Table No.	*Unit*	*Waste_Treat*	*Data Source/Comments*
1	LIC1	GB	UMCDF ATB/STB(Metals)
2	LIC1	VX	ANCDF (CHPPM spreadsheets)
3	LIC1	HD	Tetra Tech Spreadsheet Information
4	LIC2	GB	UMCDF ATB/STB(Metals)
5	LIC2	VX	ANCDF (CHPPM spreadsheets)
6	LIC2	HD	Tetra Tech Spreadsheet Information
7	MPF	GB	UMCDF ATB/STB(Metals)
8	MPF	VX	Tetra Tech Spreadsheet Information
9	MPF	HD	Tetra Tech Spreadsheet Information
10	DFS	GB	UMCDF ATB/STB(Metals) – Worst case from RCRA or TSCA GB ATB
11	DFS	VX	ANCDF (CHPPM spreadsheets)
12	MPF	SW_Comb	Combustible SW (Initially from ANCDF SWTB - TT TA18 spreadsheet – next PostRA iteration UMCDF SWTB). Rod's approach shows combustible SW treated during agent campaigns and during closure.
13	LIC_Closr	SW_Max	Maximum emission rate from LIC1 and LIC2 ATBs/STBs (taken together) will be identified in this table. These values will be used for SW processing in a single LIC during closure.*
14	MPF_Closr	SW_NonC_Max	Maximum emission rate from MPF ATBs/STBs will be identified in this table. These values will be used for SW processing in the MPF during closure.
15	DFS_Closr	SW_Carb	JACADS CMS PT data. Carbon processing only occurs during closure.
16	BRA	Brine	UMCDF BRA PT
17	MDB HVC	All_Agents	Worst-Case Agent Emission Assumptions (0.2 ASC for GB and VX, and 2 TWA for HD)
18	LAB HVC	All_Agents	Worst-Case Agent Emission Assumptions (0.2 ASC for GB and VX, and 2 TWA for HD)

Source: EnviroMet (**Annex A**)

For each database sub-table, EnviroMet generated two sets of hourly and annual emission rates for each COPC. The first set included all the nondetected COPCs with assigned rates based on the detection limit. The second set did not include the nondetected COPCs. For the purposes of the first HRA model iteration, the first set of emission rates were used.

3. 10-Year Blended Average Emission Rates. **Exhibit 1** also presents this column on the far right with the gray-out cells. This column represents the derived emission rates that CHPPM generated for each HRA modeling source using the common stack adjustment factors (**Exhibit 2**) and the duration weights (**Exhibit 3**). The data set that was input into the HRA model for the first iteration of the model was restricted to this column of data—the 10-yr blended average emission rates for each modeling source. The equations used by CHPPM are presented later in this document.

4. Other Uses of the Matrix. **Exhibit 1** can also be used to explain how emission rates for additional types of HRA model runs can be constructed. Health risk estimates could be generated independently for each of the campaign component columns or for each campaign (agent plus secondary waste). However, under these scenarios, the corresponding facility lifetime parameter (***tD***) must be changed to the duration of the campaign (**Exhibit 3**). For example, if one wanted to estimate the health risks attributed to just the GB campaign, then only the GB campaign columns for agent and secondary waste would be combined and the ***tD*** parameter would need to be changed to 3.68 years.

ADJUSTMENT FACTORS FOR THE COMMON STACK FURNACES

Exhibit 2 presents the adjustment factors used to adjust the original emission rates for the common stack furnaces to reflect the average emissions during each campaign. These factors were originally developed by CTUIR (**Annex B**). These adjustment factors represent the average furnace use during each campaign expressed as either the proportion of the maximum permitted feed rate to the common stack or the proportion of the campaign duration needed to process the secondary waste.

Exhibit 2. Adjustment factors (proportions) representing average furnace use during each campaign

Furnace	GB		VX		HD		Closure
	Agent	SW	Agent	SW	Agent	SW	SW
LIC1	0.0153	0.0000328	0.0132	0.0000328	0.049	0.0000328	0.00368
LIC2	0.0153	0	0.0132	0	0.049	0	0
MPF	0.0502	0.0157	0.0738	0.0157	0.089	0.015	0.0637
MPFnc	0	0.000522	0	0.000522	0	0.000522	0.0203
DFS	0.1415	0.0064	0.0739	0.0064	0	0	0.00574

Source: CTUIR (Tables 4, 6, and 8 in **Annex B**)

In the Feb HRA, the emission rates for the DFS during the Closure Campaign were adjusted using a common stack adjustment factor of 0.0733. This factor was based on the estimation that 706,035 lbs of spent carbon will process in the DFS during that campaign (**Annex B**). However, the actual amount of spent carbon to be processed will be lower. Based on permit actions to ship agent free carbon and limiting the HVAC carbon change out and removal of the ACS, the new spent carbon estimate is 55,320 lbs.

For this revision, the DFS Closure Secondary Waste adjustment factor for the common stack was changed from 0.0733 to 0.00574. The following equations provide the recalculation.

Equation1

$$(2\ beds \times 9\ filters \times 48\ trays \times 55\ lbs\ spent\ carbon) + 6{,}200\ lbs\ ACS\ filter\ carbon + 1600\ lbs\ mask\ carbon\ filters = 55{,}320\ lbs\ spent\ carbon$$

Equation 2

$$\frac{55{,}320\ lbs\ spent\ carbom}{550\ lb/hr \times 17{,}520\ hrs} = 0.00574$$

CAMPAIGN DURATION ESTIMATES

Exhibit 3 presents the campaign duration estimates and the proportions used as weights in the development of the 10-yr blended average emission rates for each emissions source. These estimates were developed by CTUIR (**Annex B**). The work plan estimates are provided for comparison, where the closure duration was distributed among the agent campaign durations.

Exhibit 3. Estimated campaign durations and the proportions of the total duration

Data	Measure	GB	VX	HD	Closure	Total
RAWP	Years	4.6	2.9	2.5	*	10
	Proportion	0.46	0.29	0.25	*	1
CTUIR	Years	3.68	2.32	2	2	10
	Proportion	0.368	0.232	0.2	0.2	1

Source: RAWP (Risk Assessment Work Plan of 2004) and CTUIR (**Annex B**)

EQUATIONS USED TO DERIVE ADJUSTED AND BLENDED EMISSION RATES

These equations apply to each HRA modeling source indicated in **Exhibit 1**. The equations rely upon parameter notations that index the individual chemicals by ***i*** and the component of the UMCDF operation by ***c***. The operational components are the white cells in **Exhibit 1**. Each operational component is defined by the intersection of an HRA modeling source row and the campaign column (e.g., LIC1 and VX agent disposal or LIC1 and VX SW disposal) and each component is assigned an emissions database sub-table as the source of the emission rate.

The adjusted annual emission rates for the common stack sources were calculated using **Equation 1**.

$$aER_{ic} = ER_{ic} \times AF_c \qquad \textbf{(1)}$$

aER_{ic} = Adjusted annual emission rate for chemical ***i*** from operational component ***c*** [g/s]
ER_{ic} = Original annual emission rate for chemical ***i*** from operational component ***c*** [g/s] (**Exhibit 1**)
AF_c = Common stack adjustment factor for operational component ***c*** [proportion] (**Exhibit 2**)

Note that for the secondary waste operational components during agent campaigns for the LIC1, the maximum COPC emission rate from the LIC1 and LIC2 sub-tables was used (see **Exhibit 1**).

The 10-yr blended average emission rates for each of the HRA modeling sources were calculated using **Equation 2a** for the common stack furnaces and **Equation 2b and 2c** for the other sources.

$$BER_i = \sum_{c=1} \left(aER_{ic} \times DF_{campaign} \right) \qquad \text{Common stack modeling sources} \qquad \textbf{(2a)}$$

$$BER_i = \sum_{c=1} \left(ER_{ic} \times DF_{campaign} \right) \qquad \text{LAB \& MDB HVC modeling sources} \qquad \textbf{(2b)}$$

$$BER_i = \quad (ER_{ic} \times DF_{GB\,campaign}) + (ER_{ic} \times DF_{VX\,campaign}) \qquad \text{BRA modeling sources} \qquad \textbf{(2c)}$$

BER_i = Blended average emission rate for chemical i for any given HRA modeling source [g/s]
aER_{ic} = Adjusted annual emission rate for chemical i from operational component c [g/s]
ER_{ic} = Original annual emission rate for chemical i from operational component c [g/s]
$DF_{campaign}$ = Duration factor for each campaign [proportion] (**Exhibit 3**)

APPROACH USED TO EVALUATE POTENTIAL ACUTE HOURLY EXPOSURES

The evaluation of potential health risks associated with acute, hourly exposure to UMCDF source emissions was based on a series of hypothetical hourly emission scenarios. These scenarios were designed to represent potential population exposures under worst-case conditions. In each of these scenarios (listed below), one of the HRA modeling sources from **Exhibit 1** is assumed to be in an "upset condition," while the other sources are not in upset but are operating at the same time. That is, the population is exposed to emissions from all the sources at one time and one of those emission sources is in an upset condition.

1. LIC1 Upset
2. LIC2 Upset
3. MPF Upset
4. MPFnc Upset
5. DFS Upset
6. BRA Upset
7. LAB HVC Upset
8. MDB Upset

The first step in setting up these scenarios was to define, for each COPC, the estimated maximum hourly emission rate across the entire duration of operations. This was done by querying for the maximum hourly emission rate from each of the sub-tables for each HRA modeling source; that is, moving from left to right in **Exhibit 1** for each of the HRA modeling sources. These maximum hourly emission rates are defined as the worst-case, non-upset emissions from each source. These were used in the eight scenarios for each source that is not placed in the upset condition.

Next, these worst-case, non-upset emission rates for each source were input into the HRA model. CHPPM used the modeling application to apply these emission rates to the source-designated *unitized* air concentrations and deposition rates (UC/DRs) to generate *COPC-specific* C/DRs for each source under non-upset conditions. Source-specific acute hazard quotients under the non-upset condition were then generated for each specified exposure point location.

At this point, the model is then used to generate each of the eight acute scenarios by making the upset factor adjustment to the appropriate source by multiplying each of it's hazard quotients by the upset factor and then summing to these the non-upset condition hazard quotients from each of the other sources.

The default upset factor of ten from the HHRAP guidance was used for each of the scenarios.

ANNEX A

Emission Rates Database

Prepared by EnviroMet, LLC

Differences Between Rev 2 and Rev 3 Emissions Databases

UMCDF Post-Trial Burn Risk Assessment (PostRA)

The February 2008 HRA Report provides the background information on how Revision 2 of the emissions database was constructed.

Revision 2 of the UMCDF PostRA emissions database (Rev 2) was issued 20 November 2007 and was limited to a total of 116 COPCs (101 Group 1 COPCs and 15 Group 2 intermediaries that are used in calculations). The database has been revised to include more realistic agent emission rates and to address additional organic COPCs that could potentially exist in the incinerator feeds. The revisions have been incorporated to produce Revision 3 (Rev 3) that was issued 07 June 2008. Rev 3 now includes 130 COPCs.

In Rev 3, agent emissions from all four UMCDF stacks (i.e., common, BRA, MDB HVC, and LAB HVC) are now based on[1]:

- GB and VX -- Highest detection limit for GB or VX recorded at UMCDF.
- HD -- Highest detection limit for HD reported in TOCDF agent trial burns to date.

Attachment A provides the agent emission rates included in Rev 3.

UMCDF Field Office personnel, a representative from the CTUIR, and others agreed that as an alternative to the use of a composite TOE approach to addressing unidentified organics was to include in Rev 3 organic COPCs that could potentially be in the incinerator feed (organic feed COPCs) but had previously not been analyzed in Rev 2 because they were undetected or TICs (i.e., Group 3 COPC).[2] The 2004 PostRA Risk Assessment Work Plan Table 2-1 was used to identify the Group 3 organic feed COPCs for each incinerator. A total of 14 were identified.

The emission rates for some Group 1 organic feed COPCs were set to zero in Rev 2 because they were not detected in any agent trial burn used in the database. To be consistent with the approach used for the Group 3 organic feed COPCs, these undetected Group 1 organic feed COPCs were also included in Rev 3 at their detection levels.

Attachments B, C and D provide a list of all of the Group 1 and Group 3 organic feed COPCs that were identified for potential inclusion in Rev 3 for the LICs, the DFS and the MPF, respectively. Attachment E is a listing of all of the fields included in Rev 3. Two sets of emission rates and TOE factors are included in Rev 3. One set (with the designation "_Rev3_DetFeed") includes the organic feed COPCs as well as all of the detected COPCs from Rev 2. The other set (with the designation "_Rev3") includes detected COPCs only and is equivalent to the Rev 2 fields designated as "DOnly".

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[1] EnviroMet 2008a. Electronic communication between Gary Napp, EnviroMet and Rod Skeen, Confederated Tribes of the Umatilla Indian Reservation (CTUIR), and others, Subject: Emissions-Related PostRA Refinements. 19 May 2008.

[2] EnviroMet 2008b. Electronic communication between Gary Napp, EnviroMet and Mike Strong, UMCDF Field Office, and others, Subject: List of Organic Group 3 Feed COPCs from RAWP Table 2-1. 27 May 2008.

The TOE factors were re-calculated to include the organic feed COPCs. These TOE factors are in the field TOE_Rev3_DetFeed.

The TOE_Rev3 factors include detected COPCs only and are equal to the DOnly factors in Rev 2 except for Subtables 2/5 and 11 which were revised to correct a calculation error.

Subtable 15 provides emission data for the processing of carbon in the CMS/DFS during closure using JACADS CMS Performance Test (PT) data. PCBs are Group 1 organic feed COPCs for the DFS therefore PCBs are included in the database for the DFS whether detected or not. A very large TOE mass was reported for the CMS PT and relatively few organic COPCs are included in the denominator of the TOE factor ratio resulting in a TOE_Rev3_DetFeed factor of 608.4.

Given that 1) there were no detected organics reported for the JACADS PT (other than the three TOE fractions), 2) the PCB detection levels were very low (10-9 range), and 3) it is unlikely that PCBs would be contained in the carbon processed by the CMS/DFS, increasing the PCB emission rates by 600 times is unreasonable. Therefore, the 13 PCBs in Subtable 15 [12 dioxin-like PCBs and the "Total PCBs (no congeners)" (COPC #187)] were included at the detection level and the TOE factors were assumed to be 1 for all 13 PCBS. The TOE_Rev3_DetFeed factor was computed without the PCBs in the denominator. The TOE_Rev3_DetFeed factor was applied to all 13 remaining organics in Subtable 15.

Attachment A

Agent Emission Rates Used in Revision 3 of UMCDF PostRA Emissions Database

SubTblNum	Unit	Waste_Treat	COPCNum	COPCName	Maximum 1_Hour Emission Rate (g/sec)	Maximum Annual Emission Rate (g/sec)
1	LIC1	GB	231	Agent: GB	2.60E-09	2.60E-09
1	LIC1	GB	232	Agent: HD	0	0
1	LIC1	GB	233	Agent: VX	0	0
2	LIC1	VX	231	Agent: GB	0	0
2	LIC1	VX	232	Agent: HD	0	0
2	LIC1	VX	233	Agent: VX	2.60E-09	2.60E-09
3	LIC1	HD	231	Agent: GB	0	0
3	LIC1	HD	232	Agent: HD	1.43E-06	1.43E-06
3	LIC1	HD	233	Agent: VX	0	0
4	LIC2	GB	231	Agent: GB	2.60E-09	2.60E-09
4	LIC2	GB	232	Agent: HD	0	0
4	LIC2	GB	233	Agent: VX	0	0
5	LIC2	VX	231	Agent: GB	0	0
5	LIC2	VX	232	Agent: HD	0	0
5	LIC2	VX	233	Agent: VX	2.60E-09	2.60E-09
6	LIC2	HD	231	Agent: GB	0	0
6	LIC2	HD	232	Agent: HD	1.43E-06	1.43E-06
6	LIC2	HD	233	Agent: VX	0	0
7	MPF	GB	231	Agent: GB	3.90E-09	3.90E-09
7	MPF	GB	232	Agent: HD	0	0
7	MPF	GB	233	Agent: VX	0	0
8	MPF	VX	231	Agent: GB	0	0
8	MPF	VX	232	Agent: HD	0	0
8	MPF	VX	233	Agent: VX	3.90E-09	3.90E-09
9	MPF	HD	231	Agent: GB	0	0
9	MPF	HD	232	Agent: HD	2.15E-06	2.15E-06
9	MPF	HD	233	Agent: VX	0	0
10	DFS	GB	231	Agent: GB	7.75E-09	7.75E-09
10	DFS	GB	232	Agent: HD	0	0
10	DFS	GB	233	Agent: VX	0	0

Attachment A (Cont.)

Agent Emission Rates Used in Revision 3 of UMCDF PostRA Emissions Database

SubTblNum	Unit	Waste_Treat	COPCNum	COPCName	Maximum 1_Hour Emission Rate (g/sec)	Maximum Annual Emission Rate (g/sec)
11	DFS	VX	231	Agent: GB	0	0
11	DFS	VX	232	Agent: HD	0	0
11	DFS	VX	233	Agent: VX	7.75E-09	7.75E-09
12	MPF	SW_Comb	231	Agent: GB	3.90E-09	3.90E-09
12	MPF	SW_Comb	232	Agent: HD	2.15E-06	2.15E-06
12	MPF	SW_Comb	233	Agent: VX	3.90E-09	3.90E-09
13	LIC_Closr	SW_Max	231	Agent: GB	2.60E-09	2.60E-09
13	LIC_Closr	SW_Max	232	Agent: HD	1.43E-06	1.43E-06
13	LIC_Closr	SW_Max	233	Agent: VX	2.60E-09	2.60E-09
14	MPF_Closr	SW_NonC_Max	231	Agent: GB	3.90E-09	3.90E-09
14	MPF_Closr	SW_NonC_Max	232	Agent: HD	2.15E-06	2.15E-06
14	MPF_Closr	SW_NonC_Max	233	Agent: VX	3.90E-09	3.90E-09
15	DFS_Closr	SW_Carb	231	Agent: GB	7.75E-09	7.75E-09
15	DFS_Closr	SW_Carb	232	Agent: HD	4.26E-06	4.26E-06
15	DFS_Closr	SW_Carb	233	Agent: VX	7.75E-09	7.75E-09
16	BRA	Brine	231	Agent: GB	2.17E-08	2.17E-08
16	BRA	Brine	232	Agent: HD	1.19E-05	1.19E-05
16	BRA	Brine	233	Agent: VX	2.17E-08	2.17E-08
17	MDB_HVC	ALL_Agents	231	Agent: GB	4.81E-08	4.81E-08
17	MDB_HVC	ALL_Agents	232	Agent: HD	2.65E-05	2.65E-05
17	MDB_HVC	ALL_Agents	233	Agent: VX	4.81E-08	4.81E-08
18	LAB_HVC	ALL_Agents	231	Agent: GB	6.80E-09	6.80E-09
18	LAB_HVC	ALL_Agents	232	Agent: HD	3.74E-06	3.74E-06
18	LAB_HVC	ALL_Agents	233	Agent: VX	6.80E-09	6.80E-09

Attachment B

Group 1 and Group 3 Organic Feed COPCs
LICs

COPCNum	COPCName	CASRN	COPCGroup	LIC Feed From RAWP Table 2-1?
1	Acetone	67-64-1	1	Y
9	Carbon Disulfide	75-15-0	1	Y
13	Trichloromethane (Chloroform)	67-66-3	1	Y
14	Chloromethane (Methyl Chloride)	74-87-3	1	Y
23	1,2-Dichloroethane (EDC)	107-06-2	3	Y
33	Methylene Chloride (Dichloromethane)	75-09-2	1	Y
35	1,1,1,2-Tetrachloroethane	630-20-6	3	Y
36	1,1,2,2-Tetrachloroethane	79-34-5	3	Y
39	1,1,1-Trichloroethane (TCA or methyl chloroform)	71-55-6	3	Y
40	1,1,2-Trichloroethane	79-00-5	3	Y
43	Trichlorofluoromethane	75-69-4	1	Y
46	Vinyl chloride	75-01-4	1	Y
115	Fluoranthene	206-44-0	3	Y
132	Naphthalene	91-20-3	1	Y
258	N,N'-Diisopropylcarbodimide (DICDI)	693-13-0	3	Y
299	Diisopropyl methyl phosphonate (DIMP)	1445-75-6	3	Y
307	Isopropanol	67-63-0	3	Y
324	Decane, n-	124-18-5	3	Y

Attachment C

Group 1 and Group 3 Organic Feed COPCs
DFS

COPCNum	COPCName	CASRN	COPCGroup	DFS Feed From RAWP Table 2-1?
9	Carbon Disulfide	75-15-0	1	Y
13	Trichloromethane (Chloroform)	67-66-3	1	Y
14	Chloromethane (Methyl Chloride)	74-87-3	1	Y
23	1,2-Dichloroethane (EDC)	107-06-2	3	Y
33	Methylene Chloride (Dichloromethane)	75-09-2	1	Y
35	1,1,1,2-Tetrachloroethane	630-20-6	3	Y
36	1,1,2,2-Tetrachloroethane	79-34-5	3	Y
39	1,1,1-Trichloroethane (TCA or methyl chloroform)	71-55-6	3	Y
40	1,1,2-Trichloroethane	79-00-5	3	Y
43	Trichlorofluoromethane	75-69-4	1	Y
46	Vinyl chloride	75-01-4	1	Y
104	Dimethyl phthalate	131-11-3	1	Y
115	Fluoranthene	206-44-0	3	Y
132	Naphthalene	91-20-3	1	Y
160	2,4,6-Trinitrotoluene	118-96-7	1	Y
187	Total PCBs (no congeners)	1336-36-3	1	Y
188	Total monochlorobiphenyls	27323-18-8	2	Y
189	Total dichlorobiphenyls	25512-42-9	2	Y
190	Total trichlorobiphenyls	25323-68-6	2	Y

Attachment C (Cont.)

Group 1 and Group 3 Organic Feed COPCs
DFS

COPCNum	COPCName	CASRN	COPCGroup	DFS Feed From RAWP Table 2-1?
191	3,3',4,4'- Tetra CB (77)	32598-13-3	1	Y
192	Total Tetrachlorobiphenyls	26914-33-0	2	Y
193	2,3,4,4,5-Penta CB (118)	31508-00-6	1	Y
194	2,3,3,4,4-Penta CB (105)	32598-14-4	1	Y
195	2,3,4,4,5-Penta CB (114)	74472-37-0	1	Y
196	2,3,4,4,5-Penta CB (123)	65510-44-3	3	Y
197	3,3,4,4,5-Penta CB (126)	57465-28-8	1	Y
198	Total Pentachlorobiphenyls	25429-29-2	2	Y
199	2,3,3,4,4,5-Hexa CB (156)	38380-08-4	1	Y
200	2,3,4,4,5,5'-Hexa CB (167)	52663-72-6	1	Y
201	3,3,4,4',5,5-Hexa CB (169)	32774-16-6	3	Y
202	Total Hexachlorobiphenyls	26601-64-9	2	Y
203	2,3,3,4,4,5,5-Hepta CB (189)	39635-31-9	1	Y
204	2,3,3',4,4',5'-Hexa CB (157)	69782-90-7	1	Y
205	3,4,4',5-Tetra CB (81)	70362-50-4	1	Y
206	Total Heptachlorobiphenyls	28655-71-2	2	Y
207	Total Octachlorobiphenyls	55722-26-4	2	Y
208	Total Nonachlorobiphenyls	53742-07-7	2	Y
240	Nitroglycerine	55-63-0	3	Y
242	RDX (Cyclonite, Cyclotrimethylene trinitramine)	121-82-4	3	Y
258	N,N'-Diisopropylcarbodimide (DICDI)	693-13-0	3	Y
299	Diisopropyl methyl phosphonate (DIMP)	1445-75-6	3	Y
307	Isopropanol	67-63-0	3	Y
496	Total Decachlorobiphenyls	2051-24-3	2	Y

Attachment D

Group 1 and Group 3 Organic Feed COPCs
MPF

COPCNum	COPCName	CASRN	COPCGroup	MPF Feed From RAWP Table 2-1?
9	Carbon Disulfide	75-15-0	1	Y
13	Trichloromethane (Chloroform)	67-66-3	1	Y
14	Chloromethane (Methyl Chloride)	74-87-3	1	Y
23	1,2-Dichloroethane (EDC)	107-06-2	3	Y
33	Methylene Chloride (Dichloromethane)	75-09-2	1	Y
35	1,1,1,2-Tetrachloroethane	630-20-6	3	Y
36	1,1,2,2-Tetrachloroethane	79-34-5	3	Y
39	1,1,1-Trichloroethane (TCA or methyl chloroform)	71-55-6	3	Y
40	1,1,2-Trichloroethane	79-00-5	3	Y
43	Trichlorofluoromethane	75-69-4	1	Y
46	Vinyl chloride	75-01-4	1	Y
115	Fluoranthene	206-44-0	3	Y
132	Naphthalene	91-20-3	1	Y
258	N,N'-Diisopropylcarbodimide (DICDI)	693-13-0	3	Y
299	Diisopropyl methyl phosphonate (DIMP)	1445-75-6	3	Y
307	Isopropanol	67-63-0	3	Y

Attachment E

Listing of Fields in Revision 3

Parameter	Description	Comments
REV	Revision Number	
SubTblNum	Subtable Number (1 to 18)	
Unit	Emission Unit	Four incinerators, BRA, MDB HVC, LAB HVC
Waste_Treat	Waste Treated by Unit	Agent, secondary waste, or brine
COPCGroup	COPC Group	Group 1 analyzed for the UMCDF HRA.
COPCNum	COPC Number from Master COPC list	
COPCName	COPC Name	
RSUB_PrimaryName	COPC Name used by CHPPM	
CASRN	CAS Registry Number Assigned by EnviroMet	
RSUB_CASRN	CAS Registry Number Assigned by CHPPM	
TTRowNum	Tetra Tech EXCEL Spreadsheet Row Number	If applicable
Detected	Indicates Whether the COPC was Detected (Y/N)	
TIC	Indicates Whether the COPC was Identified as a TIC (Y/N)	All TICs flagged as not detected
Max1Hr_Rev3_DetFeed	Maximum 1-hour emission rate (g/sec) - Including organic feed COPCs	
Max1Hr_Rev3	Maximum 1-hour emission rate (g/sec) - Detected COPCs only	
Annual_U_Rev3_DetFeed	Annual emission rate (g/sec) - Including organic feed COPCs	Product of Max1Hr_Rev3_DetFeed, TOE_Rev3_DetFeed, and UpsetFAC
Annual_U_Rev3	Maximum 1-hour emission rate (g/sec) - Detected COPCs only	Product of Max1Hr_Rev3, TOE_Rev3, and UpsetFAC
Max1Hr_All	Maximum 1-hour emission rate (g/sec) -All COPCs	
TOE_Rev3_DetFeed	TOE factor - Including organic feed COPCs	
TOE_Rev3	TOE factor - Detected COPCs only	
UpsetFAC	Upset Factor	Site-specific upset factors used
TestSite	Demil Site from Which the Emission Rates were Measured	UMCDF-specific data has precedence over other sites. Then precedence is ANCDF > TOCDF > JACADS
TestID	Test Number	Unique number assigned to every STB, ATB, SWTB, or PT used in the database
TestName	Description of Test	e.g., "UMCDF DFS GB TSCA ATB"
TestRef	Test Report Reference	

ANNEX B

Estimating Common Stack Emissions Rates

Prepared by the Confederated Tribes of the Umatilla Indian Reservation

Estimating Common Stack Emission Rates for the UMCDF for the Human Health and Ecological Risk Assessment
Version 1.1
26 February 2007

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Confederated Tribes of the Umatilla Reservation

The Umatilla Chemical Agent Disposal Facility (UMCDF) common stack combines emissions from four furnace systems: liquid incinerators 1 and 2 (LIC1 and LIC2), the deactivation furnace system (DFS), and the metal parts furnace (MPF). To estimate annual emissions for the purpose of evaluating chronic and acute health impacts it is necessary to evaluate the individual contributions from each source and then sum these components to derive the total release rate for individual compound of potential concern (COPC). The following is a description of the approach used to derive this combined emission rate. Secondary waste processing will be initially ignored to simplify the discussion, but is incorporated in the final sections of this document.

Derivation of Average Common Stack Emission Rates

Let $ER^{max}_{i,k,j}$ represent the emission rate (g/s) for the ith COPC from the jth furnace (LIC1, LIC2, DFS, MPF) during kth campaign (GB, VX, and HD) measured at the maximum permitted feed rate. These values correspond to the emission rates measured during trial burns.

Using the assumption that emission rates are proportional to feed rates (prescribed by the UMCDF PostRA Risk Assessment Work Plan [Umatilla RAWP] (p. 2-53)) allows the following relationship to be written:

$$ER_{i,k,j} = ER^{\max}_{i,k,j} \cdot \left(\frac{Q_{k,j}}{Q^{\max}_{k,j}} \right) \tag{1}$$

Where:

$ER^{\max}_{i,k,j}$ = Emission rate for the ith COPC in the kth campaign while the jth furnace is being feed at the maximum rate (g/s) measured in trial burns.

$ER_{i,k,j}$ = Emission rate for the ith COPC in the kth campaign while the jth furnace is fed at a rate of $Q_{k,j}$ (g/s).

$Q^{\max}_{k,j}$ = Maximum feed rate for the jth furnace in the kth campaign (units vary by munition sub-component, but typically lb/hr or item/hr). Set by trial burns.

$Q_{k,j}$ = Feed rate for the jth furnace in the kth campaign (units vary by munition sub-component, but typically lb/hr or item/hr).

Recognizing that, in a given agent campaign the feed to an individual furnace will be a compilation of feeds from multiple types of munition sub-components, then the time weighted average emission rate can be described from the individual feeds as follows:

$$ER_{i,k,j} = \frac{\sum_{l} (ER_{i,k,j}^{\max})_l \cdot \left(\frac{Q_{k,j}}{Q_{k,j}^{\max}}\right)_l \cdot \left(\theta_{k,j}\right)_l}{\left(\theta_k^{Total}\right)} \tag{2}$$

With $(\theta_{k,j})_l$ representing the time to process the feed from the lth sub-component (at a rate equal to $[Q_{k,j}]_l$) in the jth furnace and kth campaign. The term $\left(\theta_k^{Total}\right)$ represents the total duration of the kth campaign. Table 2-4 of the Umatilla RAWP lists the duration of the GB, VX, and HD campaigns as 3.68 yr, 2.32 yr, 2 yr, respectively. A secondary waste (SW) campaign is also listed in Table 2-4 and a duration of 2 years is reported. It is assumed for this analysis that post agent campaign SW waste processing will occur during closure and these final two years of processing will be included in that phase.

It should be noted that the numerator in the above equation represents the total mass of the ith material emitted while the denominator represents the total time over which the material is emitted. The choice to average over the duration of the campaign rather than the sum of the use time on the indicated furnace is necessary to be consistent with the how the air modeling software (AERMOD) computes concentrations and deposition rates. AERMOD assumes a constant, continuous release over the full duration of the period being modeled.

Table 1 provides a list of the munition sub-components which are processed in each agent campaign at the UMCDF. An example of the proper application of the information in Table 1 to Equation 2 is shown in Equation 3 which describes the time-weighted average emission rate for the ith COPC from the DFS during the GB agent campaign

$$ER_{i,GB,DFS} = \left[\left[\frac{(ER_{i,GB,DFS}^{\max})_{M55} \cdot \left(\frac{Q_{k,j}}{Q_{k,j}^{\max}}\right)_{M55} \left(\theta_{k,j}\right)_{M55} + (ER_{i,GB,DFS}^{\max})_{M121} \cdot \left(\frac{Q_{k,j}}{Q_{k,j}^{\max}}\right)_{M121} \left(\theta_{k,j}\right)_{M121}}{\left(\theta_{GB}^{Total}\right)}\right] + \left[\frac{(ER_{i,GB,DFS}^{\max})_{M426} \cdot \left(\frac{Q_{k,j}}{Q_{k,j}^{\max}}\right)_{M426} \left(\theta_{k,j}\right)_{M426}}{\left(\theta_{GB}^{Total}\right)}\right]\right] \tag{3}$$

Table 1: Furnace Feeds by Munition and Agent Campaign.

Munition	**Agent Campaign**	**LIC 1 and 2 Feed**	**DFS Feed**	**MPF Feed**
M55 Rocket	GB	GB Agent	Rocket Pieces	None
M121/A1 Projectiles	GB	GB Agent	Explosives	Projectile Body
M426 Projectiles	GB	GB Agent	Explosives	Projectile Body
MK-94 Bomb	GB	GB Agent	None	Bomb Shell
MC-1 Bomb	GB	GB Agent	None	Bomb Shell
M55 Rocket	VX	VX Agent	Rocket Pieces	None
M23 Mines	VX	VX Agent	Explosives	Drum
M121/A1 Projectiles	VX	VX Agent	Explosives	Projectile Body
M426 Projectiles	VX	VX Agent	Explosives	Projectile Body
Spray Tank	VX	VX Agent	None	Spray Tank
Ton Containers	HD	HD Agent	None	Container

Feed rate values $(Q_{k,j})_l$ will vary unpredictably during a processing campaign. However, an average feed rate can be estimated as the total quantity of material to be processed divided by the total time taken to process the material. This relationship can be written as:

$$(Q_{k,j})_l = \frac{N_l \cdot (m_j)_l}{(\theta_{k,j})_l} \tag{4}$$

Where N_l is the total number of munitions containing the l^{th} subcomponent to be processed in the j^{th} furnace in the k^{th} campaign. The term $m_{j,l}$ represents the amount of the l^{th} subcomponent in a single munition. The following table provides values for both N_l and $m_{j,l}$ for all munitions stored at the UMCDF (UMCDF RCRA Permit Application, Volume I, Attachment C-1).

Table 2: Quantities of munitions and Subcomponents.

Munition Type	Number for Processing (N_i)	LIC Feed per Munition ($m_{LIC,i}$)^{c,e}	DFS Feed per Munition ($m_{DFS,i}$)	MPF Feed per Munition ($m_{MPF,i}$)^d
GB M55 Rocket	91442	10.70	1^a	0
GB MK-94 Bombs	27	108.00	0	1
GB MC-1 Bombs	2418	220.00	0	1
GB M426 Projectiles	14246	14.50	7.3^b	1
GB M121A1 Projectiles	47406	6.50	2.75^b	1
VX M55 Rockets	14519	10.00	1^a	0
VX Spray Tanks	156	1356.00	0b	1
VX M121A1 Projectiles	32313	6.00	2.75^b	1
VX M426 Projectiles	3752	14.50	7.3^b	1
VX M23 Mines	11685	10.50	0.8^b	1/3
HD Ton Containers	2635	1700.00	0	1

[a] Units for M55 rockets are rockets/munition since the whole rocket is fed to the DFS after shearing.
[b] Units for DFS feed for all but M55 rockets are lb-explosives/munition.
[c] Units for $m_{LIC,i}$ are lb-agent/munition.
[d] Units for $m_{MPF,i}$ are casing/munition or drum/munition.
[e] Assumes 100% of agent in munitions is processed in the LIC

Table 3: Maximum Permitted Feed Rates
(UMCDF RCRA Permit, Section VII).

Munition Type	LIC Maximum Permitted Feed Rate (lb/hr)^a	DFS Maximum Permitted Feed Rate^b	MPF Minimum Permitted Tray Interval (minutes)	MPF Munitions per Tray	MPF Maximum Permitted Feed Rate^d (munitions/hour)
GB M55 Rocket	2,060	36.6	NA^c	NA^c	NA^c
GB MK-94 Bombs	2,060	NA	35.5	2	3.38
GB MC-1 Bombs	2,060	NA	35.5	2	3.38
GB M426 Projectiles	2,060	113.6	35.5	27	45.63
GB M121A1 Projectiles	2,060	113.6	35.5	48	81.13
VX M55 Rockets	1,360	36.6	NA^c	NA^c	NA^c
VX Spray Tanks	1,360	NA	60	1	1.00
VX M121A1 Projectiles	1,360	113.6	35.5	48	81.13
VX M426 Projectiles	1,360	113.6	35.5	27	45.63
VX M23 Mines	1,360	113.6	35.5	8	13.52
HD Ton Containers	2,610	NA	35.5	1	1.69

[a] Values represent the sum of LIC1 and LIC2 maximums.
[b] Units for DFS feed for M55 rockets is rockets/hour. Units for all others are lb-explosives/hour.
[c] NA implies not an applicable value
[d] Value calculated from the minimum tray interval and number of munitions per tray.

Combining Equations (2) and (4) yield:

$$ER_{i,k,j} = \frac{\sum_{l} (ER_{i,k,j}^{\max})_l \cdot \left(\frac{N_l \cdot m_{j,l}}{Q_{k,j}^{\max}} \right)_l}{\left(\theta_k^{Total} \right)} \tag{5}$$

This can also be written as:

$$ER_{i,k,j} = \sum_{l} (ER_{i,k,j}^{\max})_l \cdot \left(\frac{N_l \cdot m_{j,l}}{Q_{k,j}^{\max} \cdot \left(\theta_k^{Total} \right)} \right)_l \tag{6}$$

With the second term on the right-hand side of the equation equaling the ratio between the time-averaged processing rate and the maximum processing rate. Table 4 provides values for the aforementioned ratio by furnace and agent campaign. These values were calculated from using the data provided Tables 2 and 3. In Table 4 the LIC1 and LIC2 have been assigned a separate value equal to half the total LIC requirement.

Table 4: Estimated Average Furnace Use Expressed as a Percentage of the Maximum Permitted Feed Rate.

Munition Type	**LIC 1 Average Use (% Max)**	**LIC 2 Average Use (% Max)**	**DFS Average Use (% Max)**	**MPF Average Use (% Max)**
GB Campaign				
GB M55 Rocket	0.74%	0.74%	0.74%	0.00%
GB MK-94 Bombs	0.002%	0.002%	0.00%	0.02%
GB MC-1 Bombs	0.40%	0.40%	0.00%	2.22%
GB M426 Projectiles	0.16%	0.16%	2.84%	0.97%
GB M121A1 Projectiles	0.23%	0.23%	3.56%	1.81%
GB Campaign Total	**1.53%**	**1.53%**	**7.14%**	**5.02%**
VX Campaign				
VX M55 Rockets	0.26%	0.26%	1.95%	0.00%
VX Spray Tanks	0.38%	0.38%	0.00%	0.77%
VX M121A1 Projectiles	0.35%	0.35%	3.85%	1.96%
VX M426 Projectiles	0.10%	0.10%	1.19%	0.41%
VX M23 Mines	0.22%	0.22%	0.40%	4.25%
VX Campaign Total	**1.32%**	**1.32%**	**7.39%**	**7.38%**
HD Campaign				
HD Ton Containers	4.90%	4.90%	0.00%	8.90%
HD Campaign Total	**4.90%**	**4.90%**	**0.00%**	**8.90%**

Computation of the individual furnace emission rates for each COPC can be accomplished using Equation (6) to combine the trial burn results for jth furnace and the kth campaign along with the values in Table 4. The average common stack emission rate for the kth campaign is then the sum of the individual furnace emission rates, as shown in Equation (7).

$$ER_{i,k} = ER_{i,k,LIC1} + ER_{i,k,LIC2} + ER_{i,k,DFS} + ER_{i,k,MPF} \tag{7}$$

The average the emission rate for the ith COPC over all campaigns can now be estimated as the time-weighted average for the three agent campaigns:

$$\overline{ER_i} = \frac{ER_{i,GB}\cdot\left(\theta_{GB}^{Total}\right) + ER_{i,VX}\cdot\left(\theta_{VX}^{Total}\right) + ER_{i,HD}\cdot\left(\theta_{HD}^{Total}\right)}{\theta_{GB}^{Total} + \theta_{VX}^{Total} + \theta_{HD}^{Total}} \tag{8}$$

Incorporating Secondary Waste Processing

Secondary waste will be generated during agent processing and during site closure. To accelerate the closure process it is the desire of site management to process as much agent campaign waste as possible during the campaign in which it is generated. To estimate the quantity of secondary waste that can be processed in each agent campaign it is necessary to evaluate the types of waste generated, the availability of the permitted treatment system that will process the waste, and the permitted rate at which the material can be processed.

The Waste Analysis Plan (WAP) of the UMCDF RCRA permit outlines the types of secondary waste that will be generated at the facility and described the methods to be used to treat the waste. Table 5 provides a summary of this information along with an estimate of the quantity of each waste that will be generated during the agent campaigns. Table 6 provides closure waste estimates. Values in Table 5 were taken from site estimates generated in calendar year 2000 and reported in the permit modification request UMCDF-00-016-WAST(3). Some entries were modified to more accurately reflect actual waste generation rates. Table 6 values were taken from JACADS closure waste records. Table 7 provides an estimate of the furnace times needed to treat the agent campaign related waste if the material is processed at the maximum rate indicated in the Section VII of the RCRA permit. The noncombustible secondary waste in Table 7 which is destined for the MPF corresponds to the noncombustible MPF maintenance waste and the ACS/AQS/SDS maintenance waste (agent collection system [ACS], agent quantification system [AQS], and spent decontamination system [SDS]). All other MPF destined waste was classified as combustible waste.

Table 5: Agent Campaign Secondary Waste Estimates.

Waste Stream	**Quantity for Furnace Processing (lbs)**	**Fate Stated in WAP**	**Campaign Generated**
Misc Agent Contaminated Liquid (lbs)	9372	LIC	GB, VX, HD
ECR Maint. Wastes (lbs)	9586	DFS	GB, VX
ACS/AQS/SDS Maint. Waste (lbs)	10000	MPF	GB, VX, HD
Noncombustible MDB Maint. Waste (lbs)	57639	MPF	GB, VX, HD
Combustible MDB Maint. Waste (lbs)	81579	MPF	GB, VX, HD
Ventilation System Filters (lbs)	27772	MPF	GB, VX, HD
Spent Carbon (lbs)	55320	DFS/CMS	GB, VX, HD
PPE Carbon Filter Canisters (lbs)	0.00 [a]	MPF	GB, VX, HD
Lab Solid Waste (lbs)	19606	MPF	GB, VX, HD
Misc. Agent Contaminated Dunnage (lbs)	15223	Off-Site/MPF	GB, VX
DPE Suits (lbs)	257372	MPF	GB, VX, HD
TAP Gear (lbs)	44820	MPF	GB, VX, HD

[a] Included in Spent Carbon Estimate.

Table 6: Secondary Waste Generated During Closure [a]

Waste Stream	**Estimate Quantity, $M_{j,sw}$ (lbs)**	**Maximum Permitted Feed Rate, $Q^{\max}_{closure,j}$ (lb/hr)**	$\left(\frac{M_{j,sw}}{Q^{\max}_{closure,j}\cdot\left(\theta^{Total}_{closure}\right)}\right)_{sw}$
MPF Non-combustible secondary waste	2,191,863.8	6176	2.03E-02
MPF Combustible secondary waste	457,493.6	410	6.37E-02
LIC Treated Waste	262,641.2	4071	3.68E-03
DFS/CMS Treated Carbon	55,320.0	550	5.7E-03

[a] The last column represents the fraction of closure period (assumed as 2 years) needed to process the indicated waste type at maximum processing rates.

Table 7: Waste Processing Times for SW Processed During Agent Campaigns

Waste Type	Required Processing Time - GB (hr)	Required Processing Time - VX (hr)	Required Processing Time - HD (hr)
MPF Non-combustible secondary waste	1.68E+01	1.06E+01	9.15E+00
MPF Combustible secondary waste	5.07E+02	3.19E+02	2.63E+02
LIC Treated Waste	1.06E+00	6.68E-01	5.76E-01
DFS Treated Waste	2.06E+02	1.30E+02	0.00E+00

A comparison of the hours needed to process the agent campaign secondary waste with available furnace time during the corresponding campaign reveals that ample time is available to process all waste. Hence, for the purpose of this analysis we will assume that all campaign generated waste (except activated carbon which requires DFS modifications before treatment) is processed during the corresponding campaign.

The contribution of secondary waste processing during agent operations to individual furnace emission can be incorporated by adding an additional term to Equation (6) as follows:

$$ER_{i,k,j} = \sum_{l} (ER^{\max}_{i,k,j})_l \cdot \left(\frac{N_l \cdot m_{j,l}}{Q^{\max}_{k,j} \cdot \left(\theta^{Total}_{k}\right)} \right)_l + \sum_{sw} \left(ER^{\max}_{i,k,j}\right)_{sw} \cdot \left(\frac{\theta_{k,j,sw}}{\theta^{Total}_{k}} \right) \qquad (9)$$

With $\theta_{k,j,sw}$ representing the amount of time the jth furnace would need to processing the all the swth secondary waste stream generated in the kth campaign at the maximum permitted feed rate. Values of $\left(\frac{\theta_{k,j,sw}}{\theta^{Total}_{k}} \right)$ are given in Table 8.

Table 8: Fraction of Campaign Needed to Process Secondary waste at Maximum Permitted Feed Rates

Waste Stream	$\left(\frac{\theta_{GB,j,sw}}{\theta^{Total}_{GB}} \right)$	$\left(\frac{\theta_{VX,j,sw}}{\theta^{Total}_{VX}} \right)$	$\left(\frac{\theta_{HD,j,sw}}{\theta^{Total}_{HD}} \right)$
MPF Non-combustible secondary waste	5.22E-04	5.22E-04	5.22E-04
MPF Combustible secondary waste	1.57E-02	1.57E-02	1.50E-02
LIC Treated Waste	3.28E-05	3.28E-05	3.28E-05
DFS Treated Waste	6.40E-03	6.40E-03	0.00E+00

Equation (9) replaces Equation (6) in calculating the furnace specific emission rates for each agent campaign which are then applied to Equation (7) to calculate the average common stack emission rate for each campaign.

Including the impact on emission rates from processing secondary waste during closure requires modification of Equation (8) as follows:

$$\overline{ER_i} = \frac{ER_{i,GB} \cdot \left(\theta_{GB}^{Total}\right) + ER_{i,VX} \cdot \left(\theta_{VX}^{Total}\right) + ER_{i,HD} \cdot \left(\theta_{HD}^{Total}\right) + ER_{i,Closure} \cdot \left(\theta_{Closure}^{Total}\right)}{\theta_{GB}^{Total} + \theta_{VX}^{Total} + \theta_{HD}^{Total} + \theta_{Closure}^{Total}} \tag{10}$$

Where $\theta_{Closure}^{Total}$ represents the time required to complete closure (assumed as 2 yr) and $ER_{i,closure}$ is the average emission rate for the i^{th} COPC during closure. This average rate is given by Equation (7) with k equal to closure:

$$ER_{i,closure} = ER_{i,closure,LIC1} + ER_{i,closure,LIC2} + ER_{i,closure,DFS} + ER_{i,closure,MPF} \tag{11}$$

The individual contributions of each furnace to the average common stack emission rate during closure can be calculated in a manner analogous to Equation (6) by recognizing that the term ($N_l \cdot m_{j,l}$) represents the total quantity of a material to be processed in the j^{th} furnace and can be represented by ($M_{j,l}$). Equation (6) can be written for closure as:

$$ER_{i,closure,j} = \sum_{sw} (ER_{i,closure,j}^{\max})_{sw} \cdot \left(\frac{M_{j,sw}}{Q_{closure,j}^{\max} \cdot \left(\theta_{closure}^{Total}\right)} \right)_{sw} \tag{12}$$

Table 6 provides values for $\left(\frac{M_{j,sw}}{Q_{closure,j}^{\max} \cdot \left(\theta_{closure}^{Total}\right)} \right)_{sw}$ for all secondary waste streams identified for processing during closure.

Application of Emission Rate Estimates to Media Concentration Equations

Air dispersion model outputs (air concentrations and deposition rates) are provided on a unit emission rate (1.0 g/s) basis. These values are converted to COPC specific concentrations and deposition rates by multiplying by the emission rates for a given source. Implicit in this approach is the assumption of continuous, constant emissions from the contributing sources. This assumption is far from reality for a facility like the UMCDF where types and amounts of individual furnace feeds vary, and where there are limitations on the number of hours per year a furnace can operate. However, the assumption is necessary given the state of computational tools for air dispersion modeling and risk assessment. It should be noted that the values of $\overline{ER_i}$ computed using the approach outlined above are consistent with the assumption of continuous, constant emissions since $\overline{ER_i}$ represents an average over the duration of plant operation. That is, the emission rate for the i^{th} component is computed as the sum of the mass generated in all campaigns divided by the combined duration of all campaigns. In this way a mass balance over the life of the plant is maintained since the mass of the i^{th} COPC applied to risk assessment is equal to the amount calculated from estimates of furnace use and the trial burn results.

Recognizing this compatibility allows the direct application of $\overline{ER_i}$ in the EPA Equations without further scaling for down-time. For example, $\overline{ER_i}$ can be directly substituted for Q in Table B-5-1 of EPA 2005 (Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, EPA530-R-05-006) allowing the chronic air concentration for the i^{th} COPC to be described as:

$$C_{a,i}^{chronic} = \overline{ER}_i \cdot \left(F_{v,i} \cdot C_{yv} + (1 - F_{v,i}) \cdot C_{yp}\right) \qquad (13)$$

Where:

$F_{v,i}$ = Fraction of the ith COPC present in the vapor phase.

C_{yv} = Unitized yearly average air concentration from the vapor phase (µg-s/g-m^3).

C_{yp} = Unitized yearly average air concentration from the particle phase (µg-s/g-m^3).

The one exception to the direct application of the values of $\overline{ER}_i$ calculated in Equation 13 is with the acute air concentrations where we want to evaluate a worst case, short term exposure. For this application it is more appropriate to estimate a high emission rate condition and apply this to the unitized one-hour maximum concentrations generated by the air model. For example, since all four furnaces are used for the demolition of GB and VX projectiles, it can be assumed that all might be operating simultaneously at maximum feed rates for a brief period of time. In addition, to comply with the 2004 Umatilla Risk Assessment Work Plan, it is necessary to account for one furnace operating under upset conditions. This criterion can be incorporated by multiplying the emissions from one of the furnaces by a factor of ten. Under these conditions the possible values for $ER_{i,GB}$ and $ER_{i,VX}$ are represented by:

$$ER_{i,GB} = 10 \cdot \sum_l (ER^{\max}_{i,GB,LIC1})_l + \sum_l (ER^{\max}_{i,GB,LIC2})_l + \sum_l (ER^{\max}_{i,GB,DFS})_l + \sum_l (ER^{\max}_{i,GB,MPF})_l \qquad (14a)$$

$$ER_{i,GB} = \sum_l (ER^{\max}_{i,GB,LIC1})_l + 10 \cdot \sum_l (ER^{\max}_{i,GB,LIC2})_l + \sum_l (ER^{\max}_{i,GB,DFS})_l + \sum_l (ER^{\max}_{i,GB,MPF})_l \qquad (14b)$$

$$ER_{i,GB} = \sum_l (ER^{\max}_{i,GB,LIC1})_l + \sum_l (ER^{\max}_{i,GB,LIC2})_l + 10 \cdot \sum_l (ER^{\max}_{i,GB,DFS})_l + \sum_l (ER^{\max}_{i,GB,MPF})_l \qquad (14c)$$

$$ER_{i,GB} = \sum_l (ER^{\max}_{i,GB,LIC1})_l + \sum_l (ER^{\max}_{i,GB,LIC2})_l + \sum_l (ER^{\max}_{i,GB,DFS})_l + 10 \cdot \sum_l (ER^{\max}_{i,GB,MPF})_l \qquad (14d)$$

$$ER_{i,VX} = 10 \cdot \sum_l (ER^{\max}_{i,VX,LIC1})_l + \sum_l (ER^{\max}_{i,VX,LIC2})_l + \sum_l (ER^{\max}_{i,VX,DFS})_l + \sum_l (ER^{\max}_{i,VX,MPF})_l \qquad (15a)$$

$$ER_{i,VX} = \sum_l (ER^{\max}_{i,VX,LIC1})_l + 10 \cdot \sum_l (ER^{\max}_{i,VX,LIC2})_l + \sum_l (ER^{\max}_{i,VX,DFS})_l + \sum_l (ER^{\max}_{i,VX,MPF})_l \qquad (15b)$$

$$ER_{i,VX} = \sum_l (ER^{\max}_{i,VX,LIC1})_l + \sum_l (ER^{\max}_{i,VX,LIC2})_l + 10 \cdot \sum_l (ER^{\max}_{i,VX,DFS})_l + \sum_l (ER^{\max}_{i,VX,MPF})_l \qquad (15c)$$

$$ER_{i,VX} = \sum_l (ER^{\max}_{i,VX,LIC1})_l + \sum_l (ER^{\max}_{i,VX,LIC2})_l + \sum_l (ER^{\max}_{i,VX,DFS})_l + 10 \cdot \sum_l (ER^{\max}_{i,VX,MPF})_l \qquad (15d)$$

Similarly, the worst case conditions for the HD campaign and for the closure campaign corresponds to maximum emissions from all applicable furnaces with one furnace in upset. Applicable furnaces for the HD campaign are the LIC1, LIC2, and the MPF. Applicable furnaces for closure are the LIC1, LIC2, DFS, and MPF. Possible values of $ER_{i,HD}$ and $ER_{i,closure}$ are given by:

$$ER_{i,HD} = 10 \cdot \sum_{l} (ER_{i,HD,LIC1}^{max})_l + \sum_{l} (ER_{i,HD,LIC2}^{max})_l + \sum_{l} (ER_{i,HD,MPF}^{max})_l \tag{16a}$$

$$ER_{i,HD} = \sum_{l} (ER_{i,HD,LIC1}^{max})_l + 10 \cdot \sum_{l} (ER_{i,HD,LIC2}^{max})_l + \sum_{l} (ER_{i,HD,MPF}^{max})_l \tag{16b}$$

$$ER_{i,HD} = \sum_{l} (ER_{i,HD,LIC1}^{max})_l + \sum_{l} (ER_{i,HD,LIC2}^{max})_l + 10 \cdot \sum_{l} (ER_{i,HD,MPF}^{max})_l \tag{16c}$$

$$ER_{i,closure} = \begin{bmatrix} 10 \cdot \sum_{l} (ER_{i,closure,LIC1}^{max})_l + \sum_{l} (ER_{i,closure,LIC2}^{max})_l + \\ \sum_{l} (ER_{i,closure,DFS}^{max})_l + \sum_{l} (ER_{i,closure,MPF}^{max})_l \end{bmatrix} \tag{17a}$$

$$ER_{i,closure} = \begin{bmatrix} \sum_{l} (ER_{i,closure,LIC1}^{max})_l + 10 \cdot \sum_{l} (ER_{i,closure,LIC2}^{max})_l + \\ \sum_{l} (ER_{i,closure,DFS}^{max})_l + \sum_{l} (ER_{i,closure,MPF}^{max})_l \end{bmatrix} \tag{17b}$$

$$ER_{i,closure} = \begin{bmatrix} \sum_{l} (ER_{i,closure,LIC1}^{max})_l + \sum_{l} (ER_{i,closure,LIC2}^{max})_l + \\ 10 \cdot \sum_{l} (ER_{i,closure,DFS}^{max})_l + \sum_{l} (ER_{i,closure,MPF}^{max})_l \end{bmatrix} \tag{17c}$$

$$ER_{i,closure} = \begin{bmatrix} \sum_{l} (ER_{i,closure,LIC1}^{max})_l + \sum_{l} (ER_{i,closure,LIC2}^{max})_l + \\ \sum_{l} (ER_{i,closure,DFS}^{max})_l + 10 \cdot \sum_{l} (ER_{i,closure,MPF}^{max})_l \end{bmatrix} \tag{17d}$$

Since the emission rate, $\overline{ER_i}$, is a combination of individual campaign emission rates (see Equation 10), it will be necessary to evaluate all possible combinations of campaign emission rates to find the worst case acute exposure. This yields 192 separate evaluations (4 GB cases, 4 VX cases, 3 HD cases, 4 closure cases) that must be completed unless other simplifying assumption are made.

Example Calculation of Average Common Stack Emission Rate

Assume that the site has the following five COPCs: acetone, benzene, bromodichloromethane, bromoform, bromomethane, 2-butanone (MEK) and that the following trial burns have been conducted:

Table 9: Trial Burns for Example Problems

Trial Burns	GB	VX	HD	Secondary Waste
LIC 1 Agent	X	X	X	

LIC 2 Agent	X	X	X	
MPF Agent	X	X	X	
DFS Agent	X	X		
MPF - Non Combustible SW	X	X	X	
MPF – Combustible SW				X
DFS/CMS SW Processing				X

In Table 9 it is assumed, for simplicity, that a single trial burn will represent an agent/furnace combination. For example a single, worst case, trial burn result will be used for the processing of all GB munitions in the MPF (projectiles, bombs, ton containers). Also, it is assumed that SW processing in the LIC1 and LIC2 during closure can be represented by worst case emissions from all the LIC1 and LIC2 agent trial burns. Finally, emission rates for non-combustible MPF SW that is treated during closure will be estimated from the worst case MPF agent trial burn. Non-combustible SW processed in the MPF during an agent campaign will rely on the emission rates from the corresponding MFP agent trial burn. Secondary waste processed in the DFS during the HD campaign will rely on worst case emission rates from the VX and GB DFS-agent trial burns.

Hypothetical emission rates for the trial burns shown in Table 9 are provided in Tables 10 through 13.

Table 10: Example GB Campaign Trial Burn Results

Compound	**LIC1**[a] **(g/s)**	**LIC2**[a] **(g/s)**	**MPF**[b] **(g/s)**	**DFS**[c] **(g/s)**
Acetone	1.50E-03	1.88E-03	2.74E-04	6.21E-03
Benzene	6.86E-05	8.58E-05	2.12E-05	5.40E-04
Bromodichloromethane	2.53E-05	3.16E-05	2.33E-05	1.09E-04
Bromoform	2.90E-05	3.62E-05	2.33E-05	9.23E-05
Bromomethane (Methyl Bromide)	1.28E-04	1.60E-04	5.52E-05	6.66E-04
2-Butanone (MEK)	1.45E-04	1.81E-04	1.17E-04	5.42E-04

[a] The maximum emission rate from the LIC1 and LIC2 agent trial burns will be applied to SW processed in either LIC during the agent campaign.

[b] Values will also be used for non-combustible SW processed in the MPF during the agent campaign.

[c] Values will also be used for SW processed in the DFS during the agent campaign.

Table 11: Example VX Campaign Trial Burn Results

Compound	**LIC1**[a] **(g/s)**	**LIC2**[a] **(g/s)**	**MPF**[b] **(g/s)**	**DFS**[c] **(g/s)**
Acetone	2.74E-04	3.43E-04	3.29E-04	2.74E-04
Benzene	2.12E-05	2.65E-05	2.54E-05	2.12E-05
Bromodichloromethane	2.33E-05	2.91E-05	2.80E-05	2.33E-05
Bromoform	2.33E-05	2.91E-05	2.80E-05	2.33E-05
Bromomethane (Methyl Bromide)	5.52E-05	6.90E-05	6.62E-05	5.52E-05
2-Butanone (MEK)	1.17E-04	1.46E-04	1.40E-04	1.17E-04

[a] The maximum emission rate from the LIC1 and LIC2 agent trial burns will be applied to SW processed in either LIC during the agent campaign.

[b] Values will also be used for non-combustible SW processed in the MPF during the agent campaign.

[c] Values will also be used for SW processed in the DFS during the agent campaign.

Table 12: Example HD Campaign Trial Burn Results[c]

Compound	**LIC1[a] (g/s)**	**LIC2[a] (g/s)**	**MPF[b] (g/s)**
Acetone	2.98E-04	3.73E-04	1.06E-02
Benzene	3.12E-04	3.90E-04	2.24E-03
Bromodichloromethane	1.97E-06	2.46E-06	5.22E-04
Bromoform	1.11E-04	1.38E-04	5.26E-04
Bromomethane (Methyl Bromide)	1.97E-06	2.46E-06	1.04E-03
2-Butanone (MEK)	1.47E-03	1.83E-03	2.34E-03

[a] The maximum emission rate from the LIC1 and LIC2 agent trial burns will be applied to SW processed in either LIC during the agent campaign.

[b] Values will also be used for non-combustible SW processed in the MPF during the agent campaign.

[c] Secondary waste processed in the DFS during the agent campaign will use worst case emission rates from the GB and VX DFS agent trial burns.

Table 13: Example Secondary Waste Campaign Trial Burn Results[c]

Compound	**MPF Combustible SW (g/s)**	**DFS/CMS (g/s)**
Acetone	5.48E-04	6.21E-03
Benzene	4.24E-05	5.40E-04
Bromodichloromethane	4.66E-05	1.09E-04
Bromoform	4.66E-05	9.23E-05
Bromomethane (Methyl Bromide)	1.10E-04	6.66E-04
2-Butanone (MEK)	2.33E-04	5.42E-04

[c] Secondary waste other than carbon processed in the DFS during the closure campaign will use worst case emission rates from the GB and VX DFS agent trial burns.

Tables 14 and 15 provides the multipliers for trial burn emission rates necessary to calculate $ER_{i,k,j}$ using Equation (9).

Table 14: Multipliers on Emission Rates for Agent Campaigns for application of Equation (9) [a]

Munition Type	$\left(\frac{N_l \cdot m_{LIC1,l}}{Q^{\max}_{k,LIC1} \cdot \left(\theta^{Total}_k\right)}\right)_l$	$\left(\frac{N_l \cdot m_{LIC2,l}}{Q^{\max}_{k,LIC2} \cdot \left(\theta^{Total}_k\right)}\right)_l$	$\left(\frac{N_l \cdot m_{DFS,l}}{Q^{\max}_{k,DFS} \cdot \left(\theta^{Total}_k\right)}\right)_l$	$\left(\frac{N_l \cdot m_{MPF,l}}{Q^{\max}_{k,MPF} \cdot \left(\theta^{Total}_k\right)}\right)_l$
k = GB Campaign, $\theta^{Total}_{GB} = 3.68\,years$				
l = GB M55 Rocket	7.37E-03	7.37E-03	7.37E-03	0.00E+00
l = GB MK-94 Bombs	2.20E-05	2.20E-05	0.00E+00	2.48E-04
l = GB MC-1 Bombs	4.01E-03	4.01E-03	0.00E+00	2.22E-02
l = GB M426 Projectiles	1.56E-03	1.56E-03	2.84E-02	9.68E-03
l = GB M121A1 Projectiles	2.32E-03	2.32E-03	3.56E-02	1.81E-02
k = VX Campaign, $\theta^{Total}_{VX} = 2.32\,years$				
l = VX M55 Rockets	2.63E-03	2.63E-03	1.95E-02	0.00E+00
l = VX Spray Tanks	3.83E-03	3.83E-03	0.00E+00	7.68E-03
l = VX M121A1 Projectiles	3.51E-03	3.51E-03	3.85E-02	1.96E-02
l = VX M426 Projectiles	9.84E-04	9.84E-04	1.19E-02	4.05E-03
l = VX M23 Mines	2.22E-03	2.22E-03	4.05E-03	4.25E-02
k = HD Campaign, $\theta^{Total}_{HD} = 2.0\,years$				
l = HD Ton Containers	4.90E-02	4.90E-02	0.00E+00	8.90E-02

[a] The data in this table is a duplication of Table 4, but is repeated here for clarity.

Table 15: Emission Rate Multipliers for Secondary Waste Processed During Agent Campaigns[a]

Waste Stream	$\left(\frac{\theta_{GB,j,sw}}{\theta_{GB}^{Total}}\right)$	$\left(\frac{\theta_{VX,j,sw}}{\theta_{VX}^{Total}}\right)$	$\left(\frac{\theta_{HD,j,sw}}{\theta_{HD}^{Total}}\right)$
MPF Non-combustible secondary waste (j=MPF)	5.22E-04	5.22E-04	5.22E-04
MPF Combustible secondary waste (i=MPF)	1.57E-02	1.57E-02	1.50E-02
LIC Treated Waste (j=LIC1)	3.28E-05	3.28E-05	3.28E-05
DFS Treated Waste (j=DFS)	6.40E-03	6.40E-03	0.00E+00

[a] The data in this table is a duplication of Table 8, but is repeated here for clarity.

For the LIC1 GB campaign the calculation would be as follows:

$$ER_{i,GB,LIC1} = (ER_{i,GB,LIC1}^{\max}) \cdot \begin{bmatrix} \left(\dfrac{N_{M55} \cdot m_{LIC1,M55}}{Q_{GB,LIC1}^{\max} \cdot \left(\theta_{GB}^{Total}\right)}\right) + \\ \left(\dfrac{N_{MK94} \cdot m_{LIC1,Mk94}}{Q_{GB,LIC1}^{\max} \cdot \left(\theta_{GB}^{Total}\right)}\right) + \\ \left(\dfrac{N_{MC1} \cdot m_{LIC1,MC1}}{Q_{GB,LIC1}^{\max} \cdot \left(\theta_{GB}^{Total}\right)}\right) + \\ \left(\dfrac{N_{M426} \cdot m_{LIC1,M426}}{Q_{GB,LIC1}^{\max} \cdot \left(\theta_{GB}^{Total}\right)}\right) + \\ \left(\dfrac{N_{M212A1} \cdot m_{LIC1,M212A1}}{Q_{GB,LIC1}^{\max} \cdot \left(\theta_{GB}^{Total}\right)}\right) \end{bmatrix} + \left(Max[ER_{i,GB,LIC1}^{\max}, ER_{i,GB,LIC2}^{\max}]\right)_{sw} \cdot \left(\frac{\theta_{GB,LIC1,sw}}{\theta_{GB}^{Total}}\right)$$

The second term on the right hand side of the above equation reflects the selection of the larger of the LIC1 or LIC2 emission rate. For acetone, benzene, and MEK we can; using Tables 10, 14, and 15; write the following (remember, it was assumed the LIC secondary waste maximum emission rates are taken from the agent trial burns in Table 10):

$$ER_{acetone,GB,LIC1} = (1.50E-03) \cdot \begin{bmatrix} 7.37E-03 + 2.2E-05 + \\ 4.01E-03 + 1.56E-03 + \\ 2.32E-03 \end{bmatrix} + (1.88E-03) \cdot [3.28E-05]$$

$$ER_{Benzene,GB,LIC1} = (6.86E-05) \cdot \begin{bmatrix} 7.37E-03 + 2.2E-05 + \\ 4.01E-03 + 1.56E-03 + \\ 2.32E-03 \end{bmatrix} + (8.58E-05) \cdot [3.28E-05]$$

$$ER_{MEK,GB,LIC1} = (1.45E-04)\cdot\begin{bmatrix}7.37E-03+2.2E-05+\\4.01E-03+1.56E-03+\\2.32E-03\end{bmatrix}+(1.81E-04)\cdot\left[3.28E-05\right]$$

Where the first term on the right hand side represents the agent processing contribution to the emission rate and the second term represents secondary waste processing.

For the DFS GB campaign the calculation would be as follows:

$$ER_{i,GB,DFS} = (ER^{\max}_{i,GB,DFS})\cdot\begin{bmatrix}\left(\frac{N_{M55}\cdot m_{DFS,M55}}{Q^{\max}_{GB,DFS}\cdot\left(\theta^{Total}_{GB}\right)}\right)+\left(\frac{N_{MK94}\cdot m_{DFS,Mk94}}{Q^{\max}_{GB,DFS}\cdot\left(\theta^{Total}_{GB}\right)}\right)+\\\left(\frac{N_{MC1}\cdot m_{DFS,MC1}}{Q^{\max}_{GB,DFS}\cdot\left(\theta^{Total}_{GB}\right)}\right)+\left(\frac{N_{M426}\cdot m_{DFS,M426}}{Q^{\max}_{GB,DFS}\cdot\left(\theta^{Total}_{GB}\right)}\right)+\\\left(\frac{N_{M212A1}\cdot m_{DFS,M212A1}}{Q^{\max}_{GB,DFS}\cdot\left(\theta^{Total}_{GB}\right)}\right)\end{bmatrix}+\left(ER^{\max}_{i,GB,DFS}\right)_{sw}\cdot\left(\frac{\theta_{GB,DFS,sw}}{\theta^{Total}_{GB}}\right)$$

Or, for acetone, benzene, and MEK we can; using Tables 10, 13, 14, and 15; write:

$$ER_{acetone,GB,DFS} = (6.21E-03)\cdot\begin{bmatrix}7.37E-03+2.84E-02+\\3.56E-02\end{bmatrix}+(6.21E-03)\cdot\left[6.40E-03\right]$$

$$ER_{Benzene,GB,DFS} = (5.40E-04)\cdot\begin{bmatrix}7.37E-03+2.84E-02+\\3.56E-02\end{bmatrix}+(5.40E-04)\cdot\left[6.40E-03\right]$$

$$ER_{MEK,GB,DFS} = (5.42E-04)\cdot\begin{bmatrix}7.37E-03+2.84E-02+\\3.56E-02\end{bmatrix}+(5.42E-04)\cdot\left[6.40E-03\right]$$

For the MPF GB campaign the calculation would be as follows:

$$ER_{i,GB,MPF} = (ER^{\max}_{i,GB,MPF}) \cdot \begin{bmatrix} \left(\dfrac{N_{M55} \cdot m_{MPF,M55}}{Q^{\max}_{GB,MPF} \cdot \left(\theta^{Total}_{GB} \right)} \right) + \\ \left(\dfrac{N_{MK94} \cdot m_{MPF,Mk94}}{Q^{\max}_{GB,MPF} \cdot \left(\theta^{Total}_{GB} \right)} \right) + \\ \left(\dfrac{N_{MC1} \cdot m_{MPF,MC1}}{Q^{\max}_{GB,MPF} \cdot \left(\theta^{Total}_{GB} \right)} \right) + \\ \left(\dfrac{N_{M426} \cdot m_{MPF,M426}}{Q^{\max}_{GB,MPF} \cdot \left(\theta^{Total}_{GB} \right)} \right) + \\ \left(\dfrac{N_{M212A1} \cdot m_{MPF,M212A1}}{Q^{\max}_{GB,MPF} \cdot \left(\theta^{Total}_{GB} \right)} \right) \end{bmatrix} + \begin{bmatrix} \left(ER^{\max}_{i,GB,MPF} \right)_{combust-sw} \cdot \left(\dfrac{\theta_{GB,MPF,combust-sw}}{\theta^{Total}_{GB}} \right) + \\ \left(ER^{\max}_{i,GB,MPF} \right)_{noncombust-sw} \cdot \left(\dfrac{\theta_{GB,MPF,noncombust-sw}}{\theta^{Total}_{GB}} \right) \end{bmatrix}$$

For acetone, benzene, and MEK we can; using Tables 10, 13, 14, and 15; write:

$$ER_{acetone,GB,MPF} = (2.74E-04) \cdot \begin{bmatrix} 2.48E-04 + \\ 2.22E-02 + \\ 9.68E-03 + \\ 1.81E-02 \end{bmatrix} + (2.74E-04) \cdot [5.22E-04] + (5.48E-04) \cdot [1.57E-02]$$

$$ER_{Benzene,GB,MPF} = (2.12E-05) \cdot \begin{bmatrix} 2.48E-04 + \\ 2.22E-02 + \\ 9.68E-03 + \\ 1.81E-02 \end{bmatrix} + (2.12E-05) \cdot [5.22E-04] + (4.24E-05) \cdot [1.57E-02]$$

$$ER_{MEK,GB,MPF} = (1.17E-04) \cdot \begin{bmatrix} 2.48E-04 + \\ 2.22E-02 + \\ 9.68E-03 + \\ 1.81E-02 \end{bmatrix} + (1.17E-04) \cdot [5.22E-04] + (2.33E-04) \cdot [1.57E-02]$$

Estimates for $ER_{i,k,j}$ for secondary waste processing during closure can be calculated from Equation (12) and the data in Tables 6 and 10 through 13. Table 16 provides values of $\left(\dfrac{M_{j,sw}}{Q^{\max}_{closure,j} \cdot \left(\theta^{Total}_{closure} \right)} \right)_{sw}$ presented in Table 6.

Table 16: Fraction of Closure Period Needed to Process Waste at Maximum Feed Rates

Waste Type	$\left(\frac{M_{j,sw}}{Q_{closure,j}^{\max}\cdot\left(\theta_{closure}^{Total}\right)}\right)_{sw}$
MPF Non-combustible secondary waste (j=MPF)	2.03E-02
MPF Combustible secondary waste (j=MPF)	6.37E-02
LIC Treated Waste (j=LIC)	3.68E-03
CMS Carbon Processing (j=DFS/CMS)	7.33E-02

Assuming we apply the maximum value of emission rates for each COPC for the LIC and MPF non-combustible waste then Equation 12 for acetone becomes:

$$ER_{acetone,closure,LIC}=(1.88E-03)\cdot[3.68E-03]$$

$$ER_{acetone,closure,DFS/CMS}=(6.21E-03)\cdot[7.33E-02]$$

$$ER_{acetone,closure,MPF}=(1.06E-02)\cdot[2.03E-02]+(5.48E-04)\cdot[6.37E-02]$$

Table 17 provides a complete summary of the results for $ER_{i,k,j}$ for all campaigns and all COPCs used this example.

Table 17: $ER_{i,k,j}$ Values for All Campaigns

Compound	**$ER_{i,k,LIC1}$**	**$ER_{i,k,LIC2}$**	**$ER_{i,k,MPF}$**	**$ER_{i,k,DFS}$**
k = GB Campaign				
Acetone	2.30E-05	2.86E-05	2.83E-05	1.35E-04
Benzene	1.05E-06	1.31E-06	2.19E-06	1.17E-05
Bromodichloromethane	3.87E-07	4.82E-07	2.41E-06	2.36E-06
Bromoform	4.44E-07	5.53E-07	2.41E-06	2.00E-06
Bromomethane (Methyl Bromide)	1.96E-06	2.45E-06	5.70E-06	1.44E-05
2-Butanone (MEK)	2.22E-06	2.77E-06	1.21E-05	1.17E-05
k = VX Campaign				
Acetone	3.62E-06	4.51E-06	3.31E-05	2.20E-05
Benzene	2.80E-07	3.49E-07	2.56E-06	1.70E-06
Bromodichloromethane	3.08E-07	3.83E-07	2.81E-06	1.87E-06
Bromoform	3.08E-07	3.83E-07	2.81E-06	1.87E-06
Bromomethane (Methyl Bromide)	7.29E-07	9.08E-07	6.66E-06	4.43E-06
2-Butanone (MEK)	1.54E-06	1.92E-06	1.41E-05	9.37E-06
k = HD Campaign				
Acetone	1.46E-05	1.83E-05	1.38E-05	0.00E+00
Benzene	1.53E-05	1.91E-05	1.81E-06	0.00E+00
Bromodichloromethane	9.65E-08	1.21E-07	9.72E-07	0.00E+00
Bromoform	5.43E-06	6.78E-06	9.74E-07	0.00E+00
Bromomethane (Methyl Bromide)	9.66E-08	1.21E-07	2.20E-06	0.00E+00
2-Butanone (MEK)	7.19E-05	8.99E-05	4.73E-06	0.00E+00
k = Closure				
Acetone	6.91E-06	0.00E+00 [a]	2.50E-04 [b]	4.55E-04
Benzene	1.44E-06	0.00E+00	4.81E-05	3.95E-05
Bromodichloromethane	1.16E-07	0.00E+00	1.35E-05	7.97E-06
Bromoform	5.10E-07	0.00E+00	1.36E-05	6.77E-06
Bromomethane (Methyl Bromide)	5.90E-07	0.00E+00	2.82E-05	4.88E-05
2-Butanone (MEK)	6.76E-06	0.00E+00	6.24E-05	3.97E-05

[a] All materials are assumed to be processed in a single LIC since less than 100 hours of processing time are needed to treat all liquid wastes.

[b] $ER_{i,k,MPF}$ for secondary waste is the sum of the contributions from both combustible and noncombustible waste.

The average emission rate for each campaign can now be calculated from the values in Table 17 using Equation (7). Values for $ER_{i,k}$ are shown in Table 18 along with the averages . Example calculations for $ER_{i,k}$ and $\overline{ER_i}$ (from Equation [10]) for acetone are as follows:

$$ER_{acetone,GB} = (2.30E-05)+(2.86E-05)+(2.83E-05)+(1.35E-04) = 2.15E-04$$

$$ER_{acetone,VX} = (3.62E-06)+(4.51E-06)+(3.31E-05)+(2.20E-05) = 6.32E-05$$

$$ER_{acetone,HD} = (1.46E-05)+(1.83E-05)+(1.38E-05) = 4.67E-05$$

$$ER_{acetone,closure} = (6.91E-06)+(2.50E-04)+(4.55E-04) = 7.12E-04$$

$$\overline{ER_{acetone}} = \left[\begin{array}{l} \dfrac{(2.15E-04)\cdot(3.68)+(6.32E-05)\cdot(2.32)}{10} + \\ \dfrac{(4.67E-05)\cdot(2.0)+(7.12E-04)\cdot(2.0)}{10} \end{array}\right] = 2.45E-04$$

Note that, in the latter equation, campaign durations of 3.68, 2.32, 2.0, and 2.0 years have been assumed for the GB, VX, HD, and closure campaigns, respectively.

Table 18: Campaign and Overall Average Emission Rates.

Compound	$ER_{i,GB}$ (g/s)	$ER_{i,VX}$ (g/s)	$ER_{i,HD}$ (g/s)	$ER_{i,closure}$ (g/s)	$\overline{ER_i}$ (g/s)
Acetone	2.15E-04	6.32E-05	4.67E-05	7.12E-04	2.45E-04
Benzene	1.62E-05	4.89E-06	3.62E-05	8.90E-05	3.22E-05
Bromodichloromethane	5.63E-06	5.37E-06	1.19E-06	2.16E-05	7.88E-06
Bromoform	5.40E-06	5.37E-06	1.32E-05	2.09E-05	1.01E-05
Bromomethane (Methyl Bromide)	2.45E-05	1.27E-05	2.42E-06	7.76E-05	2.80E-05
2-Butanone (MEK)	2.88E-05	2.69E-05	1.67E-04	1.09E-04	7.19E-05

08-0642

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Richard C. Duval, Administrator
DEQ Chemical Demilitarization Program
256 E. Hurlburt Avenue
Hermiston, OR 97838

10 June 2008

Dear Mr. Duval.

I am submitting this letter as my comments towards the Results of the Umatilla Chemical Agent Disposal Facility (UMCDF) Post-Trial Burn Risk Assessment. I am an employee of Chemical Materials Agency (CMA) with duty location at the Umatilla site. I have been involved with the development of the ARMY Health Risk Assessment (HRA) for the past few months and as an employee on site for the past 3 years. Although I have this limited view of the world, I would like to give my support to the DEQ conclusion of No Major Adverse Effects.

I was introduced to the CMA HRA process while in the refinement phase. The original results were acceptable, but many of the assumptions were grossly conservative, as were those of the DEQ subcontractor E&E. The refinements were a better depiction of the operation of the facility using real data where possible and being a bit more realistic in the assumptions. The end results of the refinements improved risk matrix to a significantly better position. This work done by CMA was openly discussed with DEQ and the Confederated Tribes of Umatilla (CTUIR) for their input and concurrence on assumptions. The CTUIR even ran an independent model to get similar results and validate to the CMA model.

Beyond that is the basis of the HRA as a tool and not as a decision. The HRA summarizes the risk envelope, but does not provide determination as to whether or not to operate within that envelope. The DEQ and UMCDF have been very conservative in their management practices. As an employee on site, I see this every day. I am confident that no health risk (beyond normal life) is being introduced to me or I would find other employment.

I would like to re-iterate that I feel the DEQ's conclusion of "No Major Adverse Effects" is a realistic and honest assessment of the health risk generated by the Umatilla Chemical Agent Disposal Facility.

Sincerely.

Kaylin W. Burnett

08-0643

RAY Shilo

From: Tami Sinor [tami.sinor@umatillaelectric.com]
Sent: Tuesday, June 10, 2008 4:40 PM
To: CDP
Subject: Public Comment

June 9, 2008

Richard C. Duval, Administrator
DEQ Chemical Demilitarization Program
256 E. Hurlbert Avenue
Hermiston, OR 97838

Dear Administrator Duval,

We are responding to the request for "Public Comment" on the "Final Health Risk Assessment for the Umatilla Chemical Agent Disposal Facility Umatilla Chemical Depot, Hermiston, Oregon Report No. 39-DA-08CF-07 February 2008." It is our understanding that the Oregon DEQ has made a tentative recommendation to the Environmental Quality Commission to accept the Risk Assessment referenced above. We also understand that DEQ is recommending that continued operation of the UMCDF presents no major adverse impacts to human health or the environment.

We support the finding of the Risk Assessment report and urge the Environmental Quality Commission to accept the recommendations of DEQ and finish the Demilitarization work we have began.

Thank you.

Sincerely,

M. Steven Eldrige
General Manager and CEO

MSE/trs

RAY Shilo

From: james r wilkinson [jrw_pi@comcast.net]
Sent: Wednesday, June 11, 2008 5:35 PM
To: DUVAL Rich
Cc: RAY Shilo; karynj@charter.net
Subject: Comments on Risk Assessment

Mr. Duval:

I would like to submit the attached document as a comment on the UMCDF Post Burn Risk Assessment, issued May 2008. The pre-trial burn risk assessment suffered from problems that the former EQC chair identified. I submit her testimony during the GASP III trial as my comments, but there are many other problems that were identified by Peter Defur during the GASP III trial.

I submit that the post-trial burn risk assessment did not address the problems identified during the pre-trial burn risk assessment and during the GASP III trial. As a result, the post-trial burn risk assessment is a failure. It should be rejected by the EQC as failing to protect human health, environment, and public safety. The facility has been able to operate all these years without showing clear compliance with all regulatory standards. The State has failed to meet its mandate and the facility should be shut down.

jrw

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Testimony of Ms. Melinda Eden who is a former member and Chair of the Oregon Environmental Quality Commission. She testified November 17, 2002, in response to Department of Justice Attorney Foster questions (Q), and her testimony (A) can be found in Volume 14B, beginning with line five, pages 142-146.

Q As you understand it, what does a capital R, capital A Risk Assessment do? What is it intended to do?

A Intended?

Q Intended.

A In theory or reality?

Q Let's begin with theory?

A Theory, to estimate the risks posed by hazardous substance or activity.

Q And at you understand it, what is the role that it plays in agency decision making?

A In reality or theory? Because they are very different.

Q In theory, what is the role it plays in agency decision making, it should play?

A The theory is that this data comes in, these numerical bright lines, and then the agency undertakes risk management and decides, oh, is this acceptable risk, is this legal limits and so on, and makes a decision about whether to go forward or modify or whatever the activity or substance or whether to deny a permit. Theory -- this is theory.

Q Yes, that's clear from the record.

How does it work in practice, in your view?

A In practice, with my seeing, watching this play out again and again and again over 22 years, risk management and risk assessment are not separate. Quantitative risk assessments of hazardous activities almost always -- or substances almost always rely -- arise in the context of a political battle.

For instance, in this case, the DEQ was processing a permit, hired and paid a risk assessment company who works regularly for DEQ and presumably wouldn't be working regularly for DEQ if they consistently came up with risk assessments that showed that the hazardous activity was hazardous. And so at some level risk management has already started, because DEQ is in the process of permitting the activity. The Risk Assessment is constructed out of many, many, many assumptions and choices.

As William Rucklehouse, who was head of EPA said, at the time, "Risk assessment is like a captured spy: Torture it, and it will tell you anything you want."

And so the reality process is somehow that risk assessment is going to come out so it's acceptable risk. Ideally, it would come out with "no risk". If the data are impossible to put in that way, then it's going to come in "insignificant risk". If the data are impossible to say insignificant risk, it's not insignificant to tell people they are going to get cancer, then it's "acceptable". But one way or the other, that risk assessment is going to support the process. That's how it almost always works.

Q Are you suggesting there is some dishonesty involved?

A No, it's a matter of -- well, dishonesty sometimes. I have seen that many times, yes. Am I -- there is so much discretion to choose which model you do, which cancer model you use, which data you accept, which assumptions you make, how many safety factors you will have or not have, how much will get shoved into those finite safety factors, there is so much choice it's not reproducible. Someone else who is wanting to permit, who is under the process of permitting and somewhat invested in a neutralization technology will come up with a very different risk assessment for the incineration.

So it's not a matter of dishonesty often. It is a matter of being selected. I mean, it is a very definite choice point to say we're just going to treat noncancer effects of dioxin as zero quantitatively. We're going to act like it doesn't exist.

Q Are you saying in this particular case, the E&E risk assessment that E&E made various choices, E&E made various choices in order to ensure that the risk would be -- that the number at the end of the day would come out at some level that DEQ would ultimately find acceptable?

A Uhm, it is probably not that simple. DEQ knows how E&E goes about its risk assessments, and that looks like a good place to go for your risk assessments. I don't think the DEQ would have hired Richard Clapp or Peter deFur to do their risk assessment.

Q You may be right. I don't know one way or the other.

Can you separate -- can you tell me some specific assumptions or models or whatever where EPA -- strike that -- where E&E exercised discretion in this process that resulted in a numerical lessening of the risk? And the distinction -- or resulted in a so-called acceptable number? The distinction I'm drawing now is between assumptions and approximations and formulas and so forth that are in the EPA guidance, which is one thing, as opposed to these exercises of discretion on the part of E&E? I'm interested in knowing where in the risk assessment, the Pretrial Burn Risk Assessment, which we have been talking about lo these many weeks, E&E exercised discretion?

A Uhm, not calculating risk to workers, not calculating risk to people who live on the site 24 hours a day, not calculating bioaccumulation, not considering body burden.

08-0641

RAY Shilo

From: David P. Trott [dptrott92@hotmail.com]
Sent: Sunday, June 08, 2008 4:10 PM
To: CDP
Cc: Larry Clucas; Linda Gettmann; Meyers, Steve F.; Chris Brown
Subject: PUBLIC COMMENT

08 June 2008

Richard C. Duval, Administrator
DEQ Chemical Demilitarization Program
256 E. Hurlburt Avenue
Hermiston, OR 97838

Re: Umatilla Chemical Agent Disposal Facility (UMCDF) post-trial burn risk assessment (postRA).

Dear Mr. Duval,

I have reviewed DEQ Staff Report 08-0471, dated 07 April 2008, providing Oregon's EQC with background material on the UMCDF Post-Trial Burn Risk Assessment (PostRA). Based on the information provided in the document I find myself in agreement with the DEQ staff that the probability of actual risk and hazard posed to human health and the environment attributable to the current operations of the UMCDF is exceptionally low.

And although the recent significant event affecting the UMCDF's Liquid Incinerator (LIC-1) is neither part of the subject staff report or the risk assessment, the very fact that the UMCDF's Munitions Demilitarization Building (MDB) engineering systems (in response to the event) were able to avert significant risk to plant personnel and the off-site, is testimony to the continued safe operation and engineering of the plant facility.

However, with that said about the recent LIC-1 event, additionally I am hopeful that more information is forthcoming to the public regarding the Root Cause Analysis for the LIC-1 event, and also DEQ staff's investigation and assessment of the event. We have come too far to let down our guard regarding protection of our citizens and the environment. Despite this event being localized to the UMCDF, the public has a right to know, and the DEQ an obligation to seek, answers to why this recent situation was able to occur; and to assure our public that adequate measures are being taken to preclude its recurrence.

Sincerely,

David P. Trott, Mayor
City of Umatilla
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08-0640

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY
RECEIVED
JUN 11 2008
HERMISTON OFFICE

Comments UMCDF Post Burn Risk Assessment, May 2008

Prepared by
Dr. Peter L. deFur
Environmental Stewardship Concepts
Richmond VA 23238
June 11, 2008

The following comments are submitted on behalf of G.A.S.P., Oregon Wildlife Federation (OWF), Government Accountability Project (GAP), Sierra Club, Karyn Jones, Debbie McCoy Burns, Susan Lee Jones, Robert Palzer, Jan Lohman, and Judy Brown. In sum, the analysis provided clearly indicates that the UMCDF post-trial burn risk assessment has many deficiencies that likely underestimate or fail to estimate the risks to human health, wildlife and the environment, Even with these shortcomings, the risk assessment indicates that the risks to human health and the environment will be exceeded.

The Executive Summary acknowledges that cancer and non-cancer risks exceed the risk-based thresholds established for protection of human health. The hazard indices for ecological receptors exceeded the standards for environmental protection. These standards, 1 in 100,000 excess cancers and a non-cancer hazard ratio greater than 0.25, are the risk benchmarks that are used to protect the public and the environment. The first risk benchmark 1/100,000 is set by Oregon regulation and the latter, 0.25 hazard index (HI), is standard for use in hazardous waste risk assessments. The HI is set at 0.25 in order to account for uncertainty and exposures from sources in addition to the one under investigation. Even with the limitations, and using and HQ of 1, as did E & E, the ecological receptors are at risk from one specific furan (TCDF), one phthalate (BEHP) and VX.

The conclusions state that the Human Health Risk Assessment is conservative and overstates risk, but such is not the case for ecological risks, human cancer or human non cancer. The risk assessment does not deal with mixtures, has no evaluation of increased sensitivity of groups such as children, no estimate of risks for people with elevated background risks. The problem with only estimating "incremental risks" is that people or animals already exposed to environmental pollutants or stresses often have a lower threshold for response. Thus, for already exposed individuals, a given exposure will cause a greater effect because their system has already compensated for existing stress conditions. This risk assessment does not consider the fact that the residents are already exposed to radiation from the Hanford facility, from pesticides or from emissions form the coal fired power plant. All these sources of chemicals add to the exposure burden that the population in the vicinity of UMCDF faces and to the resulting disease burden.

The process for conducting this risk assessment is most unusual and opens the opportunity for errors and mistakes. As described in the risk assessment Section

2 Chronology, pages 2-1 et seq., the risk assessment effort was led by U.S. Army Center for Health Promotion and Preventive Medicine, CHPPM, until sometime in July 2007, when CHPPM stopped and Oregon Department of Environmental Quality, ODEQ, took over. Then, in late September 2007, CHPPM returned to the process. This change back and forth in the lead and participants makes a number of elements difficult to complete properly. One of the big problems is the collaboration among the agencies (ODEQ, Army, CHPPM and CTUIR) that was employed to decide on work plan implementation. As described in the risk assessment, the agencies had worked together to select input conditions for the risk assessment. Then, after CHPPM issues were agreed to by the parties, CHPPM left the process in the hands of ODEQ. But CHPPM returned to presumably renew their issues over the risk assessment in this process of negotiation and discussion. But the responsibility for completing the risk assessment now fell to ODEQ and the contractor, Ecology & Environment (E&E), Inc.[1]

The Risk Assessment is described as a screening assessment in several places and by ODEQ at the public meeting May 29, 2008. But this risk assessment describes a number of conditions that are not routinely used in screening assessments. In general, a screening assessment is supposed to be a basic and conservative assessment that will highlight any areas that pose clear risks. If these conservative conditions result in no detectable risks, or none that exceed thresholds, then the risk assessment is used as a basis for deciding that the source presents minimal risks to the human population or ecological system. The specific scenarios are more detailed than would be commonly used in a routine screening assessment, and not all of the exposure factors are straight from the exposure factors handbook. The consequence of these modifications is to make the risk assessment less general and more specific to the UMCDF site.

The risk assessment is not conservative because it fails to deal with combinations of exposures (multiple exposures) to all the chemicals at once. The risk assessment limits such evaluations to adding up the HI's for individual chemicals. Chemicals have interactions that are not perfectly captured by making the simple assumption that all effects are additive.

The other group of conditions that were not considered in this risk assessment are those that the population faces as a result of the location and other activities. These factors all contribute to the cumulative risk in the local community. This cumulative risk includes exposure to the Hanford facility emissions, exposure to agricultural chemicals and exposure to already elevated dioxins and furans. All of

---

[1] There is a significant question of whether the Army (CHPPM) and a major federal government contractor (E&E) can provide an objective risk assessment analysis for UMCDF. As it is likely that the Army and ODEQ would find it objectionable for citizens who are opposed to the unsafe disposal of chemical weapons to take charge of the UMCDF risk assessment, it is clearly a conflict of interest for CHPPM and E&E to play a significant role in the development of the risk assessment. E&E's major federal projects are listed in the attached appendix.

these exposures create a long term cumulative risk that is greater than "average" for the US population. These elevated exposures are not considered in the risk assessment.

The risk assessment does not address operating conditions that would be described as upsets or non-normal events, such as occurred in May 2008 when the LIC operated improperly and caused a release of agent. Such upsets or accidents release chemicals that can be include in the risk assessment as an exposure in addition to the normal operations. Such additional exposures from upsets and accidents should be included because these events happen, as demonstrated in the operating record of the facility. Without adding these operating upsets as another exposure, the risk assessment will underestimate risk even more.

One of the significant problems with the risk assessment is the treatment of a large number of chemicals that were not specifically identified, termed the Total Organic Emissions or TOE. The workplan calls for taking the total mass of these emissions, the TOE, and adjusting upwards the emissions of specific "surrogate" compounds to insert the TOE compounds into the emissions profiles. When this procedure is done, the emissions result in risks that exceed the regulatory benchmarks. Unfortunately, the risk assessment does not uniformly include the TOE in any fashion in all the risk estimates. The TOE must be included and if the surrogate method is not used, then an alternative one must be employed, but these emissions must be included.

The risk estimates for workers and wildlife on the site, labeled on-site receptors, are the highest risks for short term and long term exposure conditions, as expected. This result indicates that the land will not be usable or habitable for many decades, if ever, due to the releases of a variety of compounds that either do not break down at all (metals) or breakdown so slowly as to be almost non-degradable (dioxins). The agent HD (sulfur mustard) is persistent and may remain active for years, depending on how it is released (NRC, 1999).

A number of chemicals released from UMCDF cause permanent damage – they exert effects on physiological systems that do not compensate or recover from damage. Neurotoxicants (lead, mercury, PCB's) frequently cause permanent damage, especially to the fetus, neonate or young child. In addition, the effects are cumulative on the target organ, and such cumulative effects are particularly true for the neurological system. These effects are only give cursory consideration in the risk assessment via adding the hazard indices for the individual chemicals. The risk assessment does not consider that the effects of lead mercury, etc, on the developing brain will be permanent- the child with elevated lead exposures will always have neurological effects, for the rest of their life.

The Executive Summary was written for risk experts or those professionals with a comparable level of expertise and knowledge of risk assessment. In spite of any language to the contrary in the risk assessment, the document was written for experts in the field

CHPPM and ODEQ differ in their approach to extrapolating among species in the ecological risk assessment. E & E used a scaling factor of 1, but CHPPM used a factor of 0.1 to account for differences between the target species and the species for which toxicity data exist. This "scaling factor" is a multiple of the toxicity value, the TRV, and the 0.1 multiple lowers the TRV, meaning a higher toxicity. The factor of 1 was for scaling due to size differences, but the factor of 0.1 is for species sensitivity differences (ES page x; Table 3.2) and the risk assessment seeks to equate the two.

There is no evidence that the risk assessment considered the effect of PCBs on freshwater clams, an effect that has been demonstrated in laboratory and field tests conducted by researchers in the lab of Jay Levine at NCSU (Lehmann 2006, Lehmann et al., 2007).

The risk assessment seems to have not assessed fish and amphibians, although amphibians are mentioned. The risk assessment did include benthic invertebrates, such as mussels and insects, but what about fish, and endangered mussels? Mussels in particular are especially sensitive to the effects of metals such as copper, and PCBs.

Section 3.2.1 Changes to the Procedures
It was a mistake to eliminate the airborne pathway from the exposure analysis for all chemicals after operations have ceased. A number of chemicals that are deposited will continue to volatilize and distribute or expose. Mercury, PCBs and dioxins/furans are three of these chemicals. The phthalate (BEHP) is another chemical likely to volatilize and redistribute after the fact. Sulfur mustard will remain in the soil for years after release and volatilize (NRC, 1999). At another military site, Spring Valley, in Washington, DC, mustard gas from 1917 is still able to cause skin burns and lesions. The population around UMCDF is already overexposed to phthalates and in the state of Washington is addressing the problem of phthalate contamination of the Spokane and other rivers (Washington State, 2008).

Section 3.3.2 Ecological Exposure Conditions
The risk assessment explains that mink were dropped from the risk assessment and river otter retained in the assessment. This omission of mink must be explained in some detail with clear justification. Much data for river otter will come from mink and the mink database is likely richer than the river otter, so the mink should have been retained over the river otter. Mink are also among the most sensitive animals to PCBs and some other chemicals, thus by eliminating mink the outcome of the risk assessment will be altered in a way to increase

uncertainty and possibly reduce overall estimates of risk. Such changes should always be documented and justified thoroughly. How did the risk assessment extrapolate from mink to river otter?

Page 3-7 refers to CHPPM's procedure for dividing all the wildlife Toxicity Reference Values by 10 as a first step. This step is taken as a way of accounting for species differences, i.e. the target species and the test species are different. Tables 3-2 explain the differences between E & E-ODEQ and CHPPM. Many differences are due to interspecies extrapolation. This one factor accounts for a huge amount of variation. The Toxicity Reference Values here are based on mammalian NOAELs, many are from rats or mice, few from wildlife in lab or field derived. Some of these differences may also be due to chemical differences. The work by Sample et al. refers to the method by which data are compared among animals of different sizes (mass). Large animals tend to have lower physiological rates (heart rate, breathing, metabolism etc.) per unit body mass.

The literature cited (papers by Sample) on wildlife toxicology and extrapolating deals with only some of the receptors, the terrestrial mammals and birds. No fish, reptiles, amphibians or invertebrates are covered in the publications by Sample et al. the Risk assessment is deficient in failing to accurate assess the risks of these chemicals to other animals.

Table 4-8 exposure factors for human health risk assessment compares CHPPM and E&E/ODEQ-
There is seemingly but one entry for which CHPPM is not higher by a noticeable amount (eggs). Notably, the drinking water rate for an adult is 2 L/day in CHPPM and 1.4 L/day in E&E/ODEQ. Consistently, CHPPM is more conservative, estimating higher intake from the exposure factors. A conservative, screening level risk assessment should take the default higher values and not use lower values that might represent the central tendency but not the highest values. The highest values for exposure (drinking water rate, food intake, chemical absorption, breathing rate, etc.) are used in screening assessments because the higher values will always result in higher exposures to the chemical(s) being assessed.

Couple this pattern of using lower exposure factors with the lower Toxicity Reference Values in the ecological risk assessment, and a clear picture emerges- the state is not using a conservative/protective risk assessment process.

The Ecological risk assessment limited to considering a narrow range of outcomes, due to the methods selected for considering risks. First, only individual species are considered, rather than assemblage of animals or of animals and plants. Ecological systems consist of groups of animals, plants and microbes inhabiting defined spaces over periods of time. Assemblages or communities have relationships that can be affected by pollutants and these relationships are not assessed in single species evaluations. An example of an important relationship that needs consideration is the flow of energy through the trophic system, often a quantitative measure of caloric transfer from prey to predator. Several pollutants such as PCBs are known to alter basic metabolic functions, and prey species may consequently become weak, and lose muscle mass, lowering the food value of the affected animals.

Second, the Toxicity Reference Values are set based on a limited scope of responses over short periods, rather than a wide range of physiological responses over multiple generations. Multigenerational toxicity testing is more commonly conducted with rats and mice for uses in human health risk analysis. Such multigenerational toxicity tests are rarely conducted with fish, amphibians, or invertebrate animals (insects, shrimp, crayfish, and mussels). Prof Jay Levine at North Carolina State University has demonstrated that several week exposure of freshwater clams to low levels of PCBs causes reproductive failure and this effect is not observed in short term exposures.

Lehmann, DH. 2006. Oxidative Stress in the Aquatic Environment: Effects of Hypoxia and Polychlorinated Biphenyls in Fish and Bivalve Molluscs. Ph.D. Dissertation, North Carolina State University. Raleigh, NC.

Lehmann, DH, JF Levine, and M Law. 2007. Polychlorinated Biphenyl Exposure Causes Gonadal Atrophy and Oxidative Stress in *Corbicula fluminea* Clams. Toxicologic Pathology. 35: 356-365.

National Research Council, 1999. Review of the Health Risk Assessments for Oral Exposure to Six Chemical – Warfare Agents, Appendix E Sulfur Mustard. National Academies of Science, National Academy Press, Washington DC. 304 pp.

Washington Department of Ecology, Frequently Asked Questions About PBDE's and Dioxins/furans in the Spokane River. 2008 fact sheet
http://www.ecy.wa.gov/geographic/spokane/spokane_river_basin.htm.
http://www.ecy.wa.gov/programs/eap/pbt/pbde/PBDE_faq.htm.

APPENDIX

Risk Assessment Contractor Ecology & Environment's Major Projects

EISs and Public Involvement for Homebasing of Aircraft, US East Coast
For NAVFAC Altantic, conducted EISs for F/A-18 realignment along the East Coast. Addressed key areas of concern including airfield and airspace use, airborne noise, land use, air conformity, BASH, natural and cultural resource issues, and key socioeconomic issues, such as impacts on housing and traffic.

Conducted an extensive public outreach program for the highly controversial Super Hornet aircraft EIS project, which was subject to intense public scrutiny and litigation.

Fort Hood Real Property Master Planning, Killeen, Texas
Scoped, developed, and completed all components of the real property master plan. Leveraged state-of-the-art GIS applications to create an innovative customized software application referred to as Comprehensive Army Master Planning System (CAMPS) to execute planning tasks including computer modeling/simulations depicting end state conditions and to serve as the day-to-day RPMP implementation and maintenance tool.

USACE Kansas City Sylvania Corning FUSRAP Site, New York
Conducted a remedial investigation (RI) of this 10.5-acre, Formerly Utilized Sites Remedial Action Program (FUSRAP) site on Long Island, which was used for the research, development, and fabrication of nuclear fuel elements. Site is contaminated with radiological waste, PCE, TCE, and nickel.
Hurricane-Related Cleanup of Sabine and Cameron Prairie National Wildlife Refuges, Louisiana

Worked with representatives from USCG, USFWS, and EPA to complete aerial assessments, categorizations, and planning for treatment of national wildlife refuges, which were extensively damaged by Hurricanes Katrina and Rita. Oversaw cleaning of canal channels traversing the refuges, performed on-ground surveys, and monitored the recovery of containers and other hazardous waste.
EPA Superfund Technical Assistance Contract, Washington, Oregon, Idaho, and Alaska

Managing the third consecutive START contract in EPA Region 10. Maintaining 24-hour capability to conduct multidisciplinary site assessment, emergency response, prevention and preparedness, and remedial activities throughout the four states. Focusing on protection of human health and the environment, also assisting in site assessments, Brownfield evaluations, and remedial support activities.

BLM Truckhaven Geothermal Leasing EIS, Imperial County, California
Prepared a NEPA EIS addressing impacts of proposed geothermal lease alternatives in the Truckhaven Geothermal Leasing Area, which includes more than 14,700 acres of federal mineral estate managed by BLM. Draft EIS prepared in less than five months of contract award.

From: http://www.ene.com/service/government/federal.aspx (June 10, 2008)

Risks at UMCDF Depot

Dr. Peter L. deFur
ESC
Richmond, VA
May 29, 2008

Comments on behalf of and funded by:

- G.A.S.P.
- Oregon Wildlife Federation
- Government Accountability Project
- Sierra Club
- Karyn Jones
- Susan Jones
- Judy Brown
- Jan Lohman
- Debbie McCoy-Burns

UMCDF Risk Assessment

- Inform the decision-making
- Chances that some harm may occur
- Prediction of what harm
- Estimate of who may be harmed
- Estimate of wildlife harmed
- Driven by the legal system of decision-making

Some important points

- This risk assessment concludes that risks are elevated
- The process is/was obscure and incomplete
- Stack emissions
- Accidents do happen and did happen two weeks ago
- There will be emissions of agents and other chemicals

The problem

- Emissions and accidents
- Most of the chemical emissions are not known and not estimated here
- Known chemicals are highly toxic and persistent
  - Dioxins
  - Mercury
  - Arsenic
  - Agents
  - Breakdown products

Basic approach

- Probability, nature and extent
- Source
- Agents/stresses
- Media- air, water, soil, food, etc., and All
- Effects
- Dose/response -

Human Health and Ecological Risk

- Both depend on adequate information on
  - Sources
  - Chemicals
  - Effects
  - Toxicology and dose/response
- Restricted or limited to single chemicals
- Limited to known effects
- Do not deal with poorly studied groups of people or animals- children, elderly, infirm, chronically ill

Using Risk Assessment

- Risk assessment is an alternative to comparing emissions with a standard.
- An alternative to simply requiring the best available or maximum achievable technology
- Requires information and depends on knowledge of the situation- can only estimate
- Fails in the face of complete lack of knowledge

Extrapolations and estimates

- Estimating anything from one animal to another- say rats to rabbits or coyotes
- Most toxicology information is based on lab animals- rats, mice, etc.
- No experiments on people, only occupational exposures
- Reliance on other animals provides strong evidence of basic processes

Risk assessment limitations

- In the present case
- Emissions
- Mixtures- effects and exposures
- Backgrounds
- Long term effects from short term data
- Sensitive groups
- Aggregate exposures
- Communities

Human vs Ecological

- One species v many species
- Many levels of biological organization
  - Pop., community, individual, organ, cell…
- Well known or poorly known biology
- Ecosystems have relationships
- Individual v population estimates
- What species need to be assessed?
  - When we know so little

Human

- Uncertain methods for mixtures and combinations
- Children are more sensitive and susceptible
- Existing exposures raise the baseline for some people
  - Dioxins, mercury, arsenic, PCBs, etc.
- Cumulative Community risks
  - Pesticides and herbicides

Ecological risk assessment

- Differences from Human
  - Levels of biological organization
  - Interactions as well as components
- More uncertainties
- More extrapolations
- Otters v mink
- Worms and other soil animals
- Farm animals?

Dioxin

- Will be released
- Health problems
  - Cancers
  - Reproductive
  - Development
  - Neurological
- Persistent- 7-10 yr ½ life in people
- Accumulative
- Already over-exposed

Mercury

- A heavy metal
- Never breaks down or goes away
- Neurological damage
- Children are most vulnerable
- Also accumulates

PCBs

- Polychlorinated biphenyls
- Like dioxins
- Persistent
- Accumulative
- Formed in high temperature

This risk assessment

- Unknown chemical emissions
- Estimate emissions
  - All detected chemicals
  - Total organic emissions
- Uncertain estimate harm for people and wildlife
- Probability of emissions is 1.0
- Under estimates
  - Drinking water, emissions, effects, long term

Accidents, upsets and unknowns

- Two weeks ago
- Human frailties
- Mechanical failures – more predictable
- Unknown condition of the chemicals- aging

Bottom Line

- The Risk Assessment is incomplete
- Use the emissions for agents
- Use the emissions for total organic compounds

Peter deFur.

MR. DEFUR: My name is Peter deFur. I work for Environmental Stewardship Concepts (inaudible) in Richmond, Virginia.

I live at 11223 Fox Meadow Drive, in Richmond, Virginia. I'm here as a representative for and speaking on behalf of citizens here in the area who have hired me to review the risk assessment that have been released both in human health and the ecological risk assessments.

I have worked professionally as a consultant for citizens' organizations around the country over clean up of contaminated sites, Superfund sites, and military bases and military sites.

One of those sites I'm going to raise now, because it pertains to the work that's going on here. It's referred to as Spring Valley. It's in Washington, D.C.

And it's one of the few places in the country where the government is currently excavating, removing, and trying to handle World War I chemical weapons that have been there for 80 years. So we've had some experience with that process, over the last 80 years.

So this evening I want to talk about my

work on this risk assessment. I'm familiar with the project, because I was retained by the citizens several years ago to review an earlier risk assessment.

And they contacted me just a few weeks ago. So I don't have 12, 15, 18 months of experience working with this particular document, exactly as it exists today.

It came into my hands just a few weeks ago. And so I've been reviewing it since then. My comments are based on the work that I have done so far and not upon extensive evaluation.

I do want to say a few things about risk assessment generally, because that's one of my expertises. I teach that part time at the local university.

I'm involved in risk assessment. And have been both for a variety of situations and for several of the compounds that are of concern for us today in this particular situation.

This particular risk assessment is no different than many others. It's intended to inform risk assessment.

And Dr. Hope talked about that. He said "It isn't intended to be the sole silver bullet, nor is it a risk assessment intended to provide the one and only answer for decision makers. Decision makers have to make -- have to bring in a lot of information."

The risk assessment is trying to determine what the chances are that harm will occur. And I'm going to parse that out for you.

I'll remind you that it means we're going to do something about what are the chances and what harm is going to occur.

Both of those steps involve making predictions from limited amount of information. Of course, the limited amount is the tricky part.

So far this evening, we've heard both from DEQ and we've heard from Rod about what the chances are, what the nature are of the compounds that are coming out of the facilities here at the Depot.

I'm going to talk in addition about what are the chances that we know about the harm. More of my expertise stems from the world of biology.

So I'm going to be telling you things about your biological systems and about the animals and plants out there in the wide world.

The problem is and the difficulty is in estimating who will be harmed based on your diversity;

and in estimating what wildlife or what animals are going to be harmed or might be harmed based on both their diversity and what we don't know and the little that we do know about animals.

And then we all can't forget that risk assessments go into a legal decision making framework. So there are components of the analysis that will be very interesting and very important to consider from a scientific perspective and from a citizen's perspective, I have no doubt, but that are not going to be taken into account because they are not either legally required or because including them might challenge the typical ways that we've done things with past decisions. So the legal framework here is of no small import.

Let's make some important points up front. And you've already heard some of them. I agree with several of the things that Rod pointed out to the extent that I have analyzed the risk assessment.

The risk assessment already makes a conclusion, and it's right there in the executive summary, that there are risks that are elevated, risks of cancer from the emissions over a long term and risks of non cancer effects.

And those non cancer effects, let me make a comment about what those might be, those might be neurological damage, they might be effects on the reproductive system, effects on the digestive system.

Things like arsenic will cause skin lesions and skin problems. Things like PCBs and dioxin can cause both skin problems, upset with your hormonal balance, as well as causing cancer. So those are the things that we're taking about.

The risk assessment process here is not only difficult and not only is it complex, but there's a fair amount of it which is not entirely clear.

Having received it a few weeks ago, when I began to look at it, I said "There's a lot of information that is not present here. There's a lot of information that isn't described."

And as I got more information, it became even less clear. Several of the things that you've heard about in terms of the process should raise questions about for example why the Army experts were involved at one point and then stepped out of the process at another point and now have come back to the process at this point in time. And I still don't know exactly why that has occurred or how it's occurred.

The other thing is how is it that there are radical differences in the way that the Army has approached carrying out their quantitative risk assessment and the way in which the State has carried out the risk assessment when they were taking the lead on it.

The other part that I don't quite grasp is why the risk assessment does not present a wider range of results.

And let me tell you what I mean by a wider range of results. You do not all have the same height.

You do not all drink the same amounts of water. Nor do you weigh the same amount. You're not all the same age. You represent a distribution of that.

And in the current day, there are software programs that will allow us to estimate your exposure based upon the differences in your biology and the way you live. That wasn't done in this risk assessment that I can find so far.

The other point about this risk assessment is that there are stack emissions. And I'm going to tell you here in a little bit, that we can count on it. We can expect it.

It's not -- it's the unknown is what's in the stack emissions. We are certain that there will be emissions.

The other thing that we have to question is about accidents. Such as the one that happened two weeks ago with inside the plant.

Accidents frequently happen at industrial facilities. And make no bones about it, this is an industrial facility.

In other incinerators, hazardous waste and nonhazardous waste incinerators that I've examined, one of the most important aspects of the risk assessment is determining what happens when there is an accident or an upset or some operating condition other than the normal one that's put into the exposure conditions in the emissions.

I don't find that in this particular risk assessment. And in fact, I think I find that it's referenced to the fact that that's in a separate document or a separate analysis.

However, it is entirely possible that much of the exposures or much of the release of some of the chemicals occur during such operating conditions.

And then the big -- the last point here that I want to make to open up with is that we can expect that there will be emissions of agents and of other chemicals.

But as Rod pointed out, the difficulty is in finding out and making some prediction about how much is going to be emitted.

The biggest problems identified in the risk assessments are the emissions, but nothing about the accidents.

The emissions are based upon the trial burns. And they identify a large number of chemicals that are not specifically identified.

And you've heard a lot about that from both Bruce and from Rod. And I think they're correct in much of what they said.

But I think what they have to do is take a truly conservative approach, what I would call a precautionary approach, and assume that they are the worst.

Because the reason we do that is because we want to provide the highest level of protection for the citizens in this area.

Such as like Rod pointed out, when you make conditions under which you are going to predict how much you take in and how your body will respond, you assume that one person is going to be working in an office and walking between their car and the office and walking between the office and where they're having lunch. And so they're outside a certain amount of time, they're in the office a certain amount of time.

They eat a certain number of vegetables and a certain amount of meat that they have bought at the market. And that they've done this and they've done that and the other.

And then another person is assumed to be a farmer. And that that farmer has a family. And that they eat vegetables from their farm, from their own farm. And that they probably have meat products from their farm.

So these assumptions are set under conditions. And all of the conditions can be set as sort of an average or they can all be set at the highest conditions that might give you the most exposure.

They also have to be set according to who is going to respond to those conditions. Because I will respond to those conditions separate, differently than many of you will. And there are multiple reasons for that.

There are chemicals that we know are going to come out that stack that we know we have reason to be concerned about.

And if we don't know it, we have such a high confidence that we can count on them coming out of the stack.

And those chemicals are the ones I've identified here. The first category are dioxins that Rod referred to.

The second one is mercury, it's a very toxic metal. The third one is another metal, arsenic. We can count on some level of agents coming out of the stack.

And what we can't count on is being able to accurately predict what levels of agents are coming out of the stack. And then we can count on breakdown products of the agents. Okay.

Rod pointed out that we're making -- that they're making a very good effort right now to try and get better data on what these emissions of the agents will be under normal operating conditions.

Let me say how this is used in the risk assessment. It's used in the risk assessment in a couple of different ways.

First of all, we always have to remember that it's used to determine the probability. What are the chances that certain events are going to occur.

What are the chances that there are going to be emissions, the probability is one. What's the nature of the source of the releases. Either emissions, discharges into the water, or any other generation of waste.

In this particular case we're looking at both agents and other materials that might be coming out.

What are the media through which they are released. And you've heard that the primary concern right now is release of emissions into the air. And then pathways for whether you take it up through soil, dust.

You're breathing in this air. Whether you're breathing in the dust. Whether you're taking in the water that might be contaminated with runoff.

And whether you're taking in food that might be contaminated either because it's been grown on the soil or because it's animals that have picked it up as they have grazed upon the soil. And then what are the effects.

And I'm going to argue that there are a few compounds for which we are certain that the effects are harmful. And they're harmful at low doses and over long periods of time, even with very small exposure.

And the basic approach for risk assessment, all of this boils down to this last line. Which is the dose response curve.

That is how much of a response do you have or does the population have or does the bald eagle have, how much is the response to the amount of exposure that you receive.

And that requires having some knowledge of how you respond to all of those chemicals. For either humans or ecological components, that is wildlife, fish, worms, shrews, birds. We have to have knowledge of all of those components.

But the way risk assessment is practiced in the United States today, it is conducted on individual chemicals that are then added off.

You heard Rod and Bob -- and Bruce Hope both talk about spreadsheets and tables and lists. So we calculate what is the risk from dimethyl, this stuff. And methylethylbenzenes and methylene chlorine and 4278 dibenzo-p-dioxin. And we calculate all of those individually and then add them up.

Risk assessment does not assess the risks from all of those compounds together. Nor do toxicologist have information. So that is a huge unknown. It's a huge uncertainty.

Now, there's a little bit of information on the combined effects of PCBs, polychlorinated biphenyls and dioxins, that's been generated over a period of more than ten years by research scientists at EPA laboratory in Duluth, research scientists in Minnesota and Wisconsin.

And they have found that when fish species, at least, are exposed to this combination of chemicals, that the effect is greater than you would predict on the basis of adding up the response of each one of those chemicals together.

So that when you put them in the spreadsheet, you add them up, you come up with one answer.

And when in fact you put them in the laboratory situation and expose them together, you get a much greater response by several orders of magnitude.

Okay. The other problem we have with predicting effects is that it's limited to those compounds that we have used in laboratory experiments.

We have very limited ability to make predictions about how a great variety, in animals especially, will respond to chemicals that have never been tested in the laboratory.

And particularly when chemicals that we have very little knowledge of have been tested in the laboratories.

And trust me, there are those in the emission stack. Just like there are those in a wide variety of places.

In the area of human health risk assessment, we base a lot of our knowledge of the effects of chemicals on extrapolating from experimental animals or from knowledge of exposures in the workplace, occupational exposure.

And in fact, the National Institute for Occupational Safety and Health regularly publishes in the peer review literature and in their own government reports what they can expect from exposures to benzene, exposure to PCBs, exposures to dioxin, exposure to methylene chloride.

But we do not have good information on how average Americans, how the elder, how children respond.

We do have a good idea that children are more sensitive and more susceptible to a variety of these chemicals.

We're not sure how people who are less than in perfect health, particularly far less than imperfect health. People who already have chronic diseases.

Now, we're gaining a glimpse into this by studies of health effects from other environmental pollutants.

Because it turns out that dust in the air, particulate matter, has an important effect on anybody with a cardiovascular problem.

So particulate matter increases the risk and the incidents of stroke and heart attack, generally; but more so for those people who already have some sort of cardiovascular disease.

And it turns out that there is no known threshold for the effect of dust. I'm not saying we're kicking up dust out of the emission stack.

But what that tells us is that people who are chronically ill with cardiovascular diseases are more sensitive.

So their risk threshold or their response to a given dose is going to be substantially greater because they're far more sensitive.

We also want to point out about risk assessment that it is an alternative to a method that was used for many decades.

Which is simply you meet the standards or you meet the best available or maximum achievable control technology.

And in fact, there are a variety of environmental programs today that use both of those approaches.

They both use risk assessment. And they say you're going to use the best available control technology all on your fact sheet or you're going to use the maximum achievable control technology on your incinerator. Those approaches are used in some cases instead of risk assessments.

Risk assessment also has its greatest weakness where we have the least amount of knowledge of either the facility or the receptors as they are called, you or the animals and plants that might be exposed.

Risk assessments also require a great deal of extrapolation. And this is the area in which I think the risk assessment that we're currently looking at has some severe weaknesses.

And the reason why it has weaknesses is because most of the information as I pointed out to you that we use to set levels that are protected for humans, do not come from humans. They come from rats. And you are not rats.

So we have to extrapolate. We have to extrapolate in several ways. One of them, a different species is involved.

Number two, a different size animal is involved. Number tree, the rat doesn't live for nearly as long as we do.

Also, they drink different amounts of water, they eat different food. So that means extrapolations to make.

And then there are also limitations on what we can measure in rats, because their biology is different.

A number of years ago we discovered that there were a few chemicals that were being regulated very strictly because of the results of lab rat testing.

And it turns out that humans had a very different biology. And they didn't use that chemical at all in the same way.

Happily though, we have a couple of compounds for which the response across all animals tested has been basically similar. Biclorinated biphenyls, mercury, lead, arsenic, and dioxin. We all have basically similar responses.

But what we've learned from animals is

applicable to humans. But about those other 97 percent of the compounds, we can't be quite so sure.

As I pointed out already, we do this because we don't do experiments on people. The information we gather on the exposure of people to these compounds is occupational exposures. And the plan is to not have those.

And as I pointed out, the risk assessment so far as I can tell for the Depot doesn't have an accident analysis component in its risk assessment.

And when I have reviewed others that has emplacement incinerators, the accident component accounted for substantial fraction of the exposures, both inside the plant and outside.

In the present case, the limitations of the risk assessment as you've already heard are the emissions. Less so with the amount than in fluxing them. And so we have to make some extrapolations.

Number two, we have very little idea about how either you or the animals respond to the mixture of compounds.

It's not dioxin alone or mercury alone or the benzenes alone or the ethylbenzenes alone. They're all coming out together.

They're all going to be coming out together during the HD, the mustard burn. Okay. So we have to find a way to assess those together.

The other problem is with this risk assessment, as with others, but it doesn't have to be the case, is they seldom assess the risks added on top of your existing exposures and your existing body burdens.

In the case of some chemicals, I urge you to go to the Centers for Disease Control and Prevention website and look up their data on the average body burden of the Americans, of several of the compounds that you might think are worrisome, such as lead and mercury and dioxin.

We all carry a body burden. And I would bet we all also carry a body burden of compounds that my students don't even hear about anymore because they were banned so long ago. Most of those are pesticides.

But I would guess that everybody in this room carries DDT in their tissues, and dieldrin and aldrin and toxophene, because of the biology of these compounds.

But those existing body burdens, your existing what I will call basic or background exposure is not a component in this risk assessment.

It's always whether or not it exceeds a hazard index independent or whether the incremental cancer exposure.

And the reason that matters is because if you already have enough exposure that your body's already starting to respond to some of these chemicals, then you're going to see an effect sooner. And in fact, EPA predicts that's the case with dioxin.

Most of us, most of the toxicological data do not do a good job on predicating, and such is the case for most of the chemicals for which we have toxicology information coming out of the stack here at the Depot, do not do a good job of predicting long term effects based on short term exposures.

So that we do lab rat experiments and we know about it for two years. We know whether or not they get cancer when they're exposed to certain conditions.

What we do not know is whether or not a population of 30,000 people within a certain mile radius, exposed for 10, 15 years during the operation and then for rest of their lifetime, to whatever residuals may be coming up and volatilizing. And they do.

Because those compounds that were released in the stack will deposit on the ground. And then in the warm summer sun, they will come back up in the air. And they will move short distances. And in the cool evening, they will deposit back out again.

And EPA has demonstrated this for a number of those nonvolatile compounds. That exposure is also one that I didn't see in the risk assessment. So that needs to be accounted for.

But those long term exposures are something that we cannot -- we have not done a good job in predicting.

As I said, we've also not done a good job of predicting sensitive groups. And there are sensitive groups.

Sensitive groups would be those people who because of their genetic make up, because of their personal history, because they're already exposed to things, because they have a chronic disease, because they have asthma, they're going to be more sensitive to one of these chemicals or another or to the combined effects.

And then we don't do -- we do not get a protocol or a mechanism for determining or even estimating how the emissions will effect the community.

Now, in this, in EPA's parlance is referred to as cumulative risk assessment. And in fact about ten years ago it began to develop guidelines on how to conduct cumulative risk assessments or what the cumulative risk assessment -- it's sort of aggregate exposures to everything.

What does your community have, what is it like. If you have trouble thinking about what I'm talking about, consider a community that you may know of or have read about that has been particularly badly harmed by an event that's been in the news.

And the community suffers great damage because it had no infrastructure. It didn't have enough transportation, because its social structure system was weakened. Because there was a --

MR. LOBATO: Hold on just a second please.

(Side B of tape recording).

MR. DEFUR: Because that community has a very low level of healthcare service. The educational level is low.

Because all of the systems that you think of are necessary to have a healthy community are absent.

And when Katrina hit some of those

communities, they were devastated. And their ability to recover and their ability to respond was completely absent. So they were devastated. So that's part of what a cumulative risk assessment might be.

How is this community prepared to deal with either, one, the ongoing emissions, or two, an accident.

This cumulative risk assessment is a process that EPA is in the middle of putting together how you do this.

And they've had a number of reports generated on how to begin to do this. But of course it won't be done, because it's not required by law. So my guess is you'll never see one here. Although this would be a great place to have one.

The other thing that I want to briefly say something about and then start moving on is that when we start to look at the difference between human and ecological systems, you're looking at worlds apart for how risk assessments are conducted.

Because we know a great deal about you. Risk assessors do. They know a lot about you. You can look on the web and get a lot of information about people and your biology and your health.

But how about every other animal out there and their interactions. And not just how they work together as a community, but how their population function. And their cell biology.

We don't know anything about most animals out there in the world. We know little enough about your basic cell biology when it comes down to the doctor diagnosing a difficult situation.

So your biology is very well known, but most of the animals and plants do not have a well known biology. Ecosystems are not one species as you are. They have complex relationships.

Do these chemicals effect the relationship and not the animals. Do they effect how animals feed one upon the other or defend themselves against diseases or predators? Who knows.

And then the other big thing is when risk assessments are done, the ecological risk assessment will seek to protect the population of fish in the river.

It will seek to protect the population of birds. It will seek to protect the population of antelope.

It's going to help, will protect you as individuals. Aha. Those are two completely different approaches.

And risk assessors are loathe to cross that border. So how does it effect your population or your community.

And how does it effect the individual fish that are in the river. Those are probably not going to be assessed, although they need to be.

And then in terms of ecological systems, we just don't know all of the animals and plants that we need to consider worrying about.

We take the large charismatic vertebrates, because they're on postcards. We're going to pick bald eagles, because they were once on the endangered species list and they may well be again.

We pick antelope because we can see them and we like to hunt them. But who likes to assess worms? I mean, what? Nobody does that.

I've already mentioned these. But I do want to say a couple of things about dioxins. And I'm going to jump to that in a minute.

The ecological risk assessments, I've already mentioned that. I do want to point out that in this risk assessment, there was a decision made to assess the risk to river otters and not to mink.

And this is completely baffling here. Because the literature that I know on mink is enormous. And the literature that I know on otters is rather small. And they're very closely related.

And most of what is going to be done about otters is going to be based on all the literature that's generated on mink. So why not use mink or both. This is one of those things that I'm concerned about.

And then as I said, worms and other animals, other sort of animals have to be considered a little bit more carefully.

You can't just do one or two species. You have to look at the combination and the bacteria that make the soil function.

I didn't see anything in there about the health of farm animals. Farm animals and domestic animals are always left out of risk assessments. They're not humans and they're not wildlife. And they're always omitted.

And right now there may be perfect circumstance and they may be at high risk, because there are few of them out there.

We've heard a bit about dioxin. And I think the prediction is with a high degree of certainty that some dioxin is going to be released. It's a problem because we know a fair amount, quite a bit, about its biology, about its toxicology.

It causes cancers. It causes four specific kinds of cancer, which is lung, liver, esophagus sarcoma, and non-Hodgkin's lymphoma.

It also causes an increase in all forms of cancer. Right. It causes reproductive problems, it causes developmental problems of a general nature.

It causes disturbance of testosterone balance in men. It causes endometriosis in women. It causes neurological problems in the developing fetus.

But dioxin is a problem. It is also incredibly persistent. It's almost as persistent as mercury, which is a metal and will never go away. But dioxin is a serious problem.

So sources of dioxin are always going to be a problem. And the dioxin that's emitted today is going to be sticking around for a long time.

The half life in your body is somewhere between seven and ten years, according to EPA's recent dioxin reassessment, which is still in draft form.

It has been for 15 years and probably will be for another 15 years, because it's so controversial.

In soil, where it's not exposed to the sun and where it doesn't volatilize and move away, dioxin may persist for 30 or 40 years at the same concentration.

It accumulates because of its chemistry. It accumulates in your tissues, which is why I can say with some confidence that we all carry some around.

It occurs in 75 different chemicals forms. The most toxic of one -- one of which is the one that's received so much attention, because it's so toxic. They're not all toxic. But a number of them are. And they cause all these effects.

And EPA has estimated for years that all of us are already overexposed to dioxin. So every additional exposure to dioxin can be expected to cause an increase in measurable health effects: cancer, reproductive effects, neurological disorders, whatever.

If you haven't heard about mercury, it would be a surprise to me. Because it's one of the more common broad-based environmental contaminants right now.

One of the largest sources is coal fired tower plants. And if you already have a coal fired tower plant in the area, which we do here, then we already have a body burden of mercury that we don't need to increase.

Because when you think of mercury, think lead. Every additional exposure will increase the neurological damage to your children. Every one.

The more we learn about mercury, the more we discover that it's like lead. And what we know about lead is there is no safe dose.

So every exposure to lead will cause a reduction in IQ in children. Every exposure to mercury will cause a greater neurological problem.

PCBs are also those compounds that are going to be -- that we anticipate will reasonably be released from the stack. Are we a hundred percent certain? No. Are we more than 50 percent certain, yes.

What do PCBs do? Well, they're very much like dioxins, but less toxic. Except they also have some additional features because they cause effects on the endocrine system, they mimic estrogen, some of them block estrogen.

And they cause neurological developmental problems, particularly in children. Back to the children again.

So trying to bring it altogether, this risk assessment admits that there are a large number of unknown chemical emissions.

And that we can have a fair amount of confidence or a high degree of certainty, somewhere in between there, that there will be chemicals emitted that are nonvolatile, that will persist. And that some of those will be dioxins and PCBs.

And we can have a high degree of certainty that there will be mercury emitted. And we can have a high degree of certainty that other metals will be emitted. And these will not go away.

What needs to happen is that we do a better job of estimating emissions. The emissions profile is right now in flux.

You've seen two -- you've seen presentations about two different versions of the risk assessment. And they need to be brought in alignment particularly with regards to the emissions.

You have to use the best available information to estimate what's in those emissions. You can't just drop out a whole group of chemicals because you don't have all the information about them. We have to make some attempt to include them.

So the risk assessment that includes these total organic emissions has to be the one that's finalized and used in the risk assessment.

There is an uncertain estimate of the harm;

that is, how will people and wildlife respond to these. And I think that that's an underestimate right now.

I think there's an underestimate in the drinking water rate in the current risk assessment. Because I saw a table that says that they're going assume that an adult drinks 1.4 liters. When the standard EPA is 2.0.

I'm going to be going back to look at these sort of things and make sure that I haven't misread it.

The estimate of emissions may be well understated, if they've have excluded the total organic emissions.

And I want to make sure that they've accounted for long term exposures and long term effects.

Accident and upsets have to be taken into account somewhere. You know, non normal operating conditions like we had two weeks ago.

They occur because we are human. They occur because we have equipment which is imperfect. And they occur because there are conditions that have changed over the life of the stockpile such as congealing of the material.

And so it no longer behaves as it did when they thought it was a liquid. Or the solidifying of materials.

Also there are a very number of -- there a large number of those materials that we'll call them breakdown time.

One of my experiences both in Spring Valley in Washington, D.C. and in two other military bases where I provide technical advice is that we have -- are still discovering new things about chemical warfare agents and some other chemicals that have come out of military operations.

We are still making new discoveries. And they have surprised us in terms of toxicology and environmental safety and transport.

So I think that there are still a number of incompletions in the risk assessment. That there has to be a better assessment of emissions for the agents to get a better idea of those numbers.

And that they have to use the emissions for the total organic compounds, the total organic emissions for the TOE as they described.

And we will be submitting comments for the record, written comments. So thank you very much.

MR. LOBATO: Thank you, Mr. deFur.

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Peter deFur is an environmental scientist with experience and expertise in the fields of ecological and human health risk assessment, toxicology, dioxin and PCB toxicity, contaminated site clean-up and related issues.

Peter deFur

To review a current copy of Peter's curriculum vitae, click here...

Dr. Peter L. deFur is president of Environmental Stewardship Concepts and an Affiliate Associate Professor and Graduate Coordinator in the Center for Environmental Studies at Virginia Commonwealth University, where he conducts research on environmental health and ecological risk assessment.

He served a term on the National Research Council Board on Environmental Studies and Toxicology (BEST) and has served on several NRC study committees. Peter is on the Virginia State Advisory Board to the Air Pollution Control Board and has served on federal advisory committees.

He received B.S. and M.A. degrees in Biology from the College of William and Mary, in Virginia, and a Ph.D. in Biology (1980) from the University of Calgary, Alberta. He was a postdoctoral fellow in neurophysiology in the Department of Medicine at the University of Calgary.

Peter held faculty positions at George Mason University and Southeastern Louisiana University before joining the staff of the Environmental Defense Fund (EDF) in Washington, DC. During his six years at EDF, he was involved in policy issues that include habitat preservation and quality, wetlands regulations, water quality analysis and risk assessment.

Peter has extensive experience in risk assessment and ecological risk assessment regulations, guidance and policy. He served on the NAS/NRC Risk Characterization Committee that released its report, Understanding Risk in June 1996. He served on numerous scientific reviews of EPA ecological and human health risk assessments, including the assessment for the WTI incinerator in Ohio and EPA's Ecological Risk Assessment Guidelines. He has also served on three federal advisory committees for EPA's Endocrine Disruptor Screening and Testing Program.

Peter presently serves as technical advisor to citizen organizations concerning the cleanup of contaminated sites at FUDS, CERCLA and RCRA sites.

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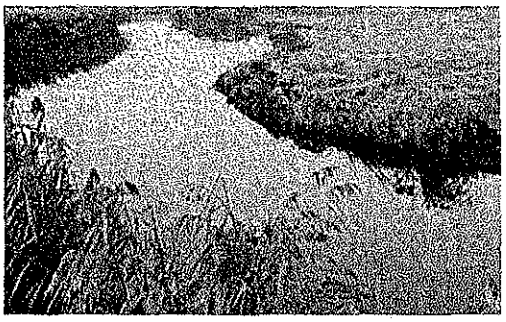

As part of our commitment to the environment, we serve on the board of several conservation organizations, provide expert testimony before government, and lend technical expertise to various groups.

Affiliations

In addition to our ongoing work as technical advisor for a number of initiatives, Peter deFur, president of Environmental Stewardship Concepts, is actively affiliated with several environmental endeavors working as:

Affiliate Associate Professor, Center for Environmental Studies, VCU

Chair, Public Affairs Committee of the American Lung Association of Virginia

---

Chair, Public Affairs Committee of the Society for Integrative and Comparative Biology

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Member, Science Communication Network Advisory Board

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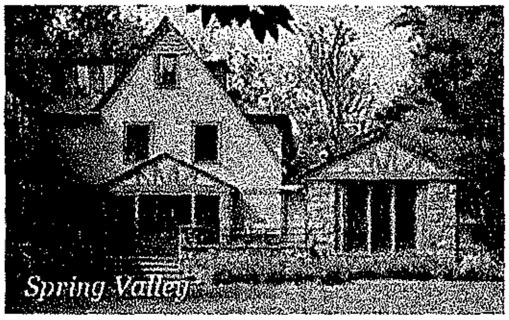
Spring Valley, a predominantly residential area of Washington, DC, is located on a former World War I chemical weapons development and testing site.



Spring Valley Restoration Advisory Board

Washington, DC

Spring Valley is the site of a former World War I chemical weapons development and testing site where chemicals such as arsenic, mustard, and Lewisitte (among some 150 other chemicals) have been discovered.

Since 2002, Environmental Stewardship Concepts has been a technical advisor to the Restoration Advisory Board for the cleanup of the chemical weapons development and testing in this residential area of Washington, DC. Cleanup activities are being carried out under the FUDS program of the Department of Defense. The main human health risks are from arsenic found in the soil as well as buried chemical munitions and containers.

Related

Anacostia River Badger Army Ammunition Plant Center for Justice Citizens For Safe Water
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Duwamish River Cleanup Coalition Fort Ord Environmental
Justice Network Housatonic River Initiative Neuse River Foundation Olympic Environmental Council
Spring Valley Restoration
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From the Housatonic River Initiative in Massachusetts, to the Fort Ord Environmental Justice Network in California, Environmental Stewardship Concepts serves as technical advisor on the cleanup of contaminated sites.

Projects

As technical advisor or consultant to citizen organizations on the cleanup of contaminated sites under Superfund, FUDS, or other state and federal programs, Environmental Stewardship Concepts is responsible for technical review of all phases and aspects of the effort. These reviews begin with evaluation of the extent of knowledge and ignorance regarding the site, and the basic questions and assumptions that govern the site investigations and cleanup decisions.

We review and evaluate every step of the process, including design of the investigations and field work, data analysis and appropriateness of the conclusions.

We regularly conduct public fora to explain the technical issues to the citizens. In fact, we translate the results for the public and our presentations and reports to the citizens are distributed in hard copy and on websites for public information.

Our responsibilities include, but are not restricted to the following activities:

- Remedial Investigation and Feasibility Study (RI/FS)
    - Adequacy of data
    - Alternatives and options
    - Public understanding
- Work Plan
- Field Investigations
- Quality Assurance and Quality Control Plan and Assessments
- Sampling Design
- Sampling Plan
- Measurement Procedures
- Laboratory Investigations, if applicable
- Data Review and Evaluation
    - Agreement with published data and agency standards
- Risk Assessment Review for:
    - Procedures
    - Completeness
    - Conformity with recent developments and practices
    - Data analysis
    - Appropriateness of conclusions
- Public Communication and Understanding
- Literature Searches and Literature Reviews

- Alternative Assessments and Cleanup Options Analysis

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Anacostia River Badger Army Ammunition Plant Center for Justice Citizens For Safe Water Around Badger Clean Water Action Council of Northeast Wisconsin Delaware River Basin Commission Duwamish River Cleanup Coalition Fort Ord Environmental Justice Network Housatonic River Initiative Neuse River Foundation Olympic Environmental Council Spring Valley Restoration
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State of Oregon
Department of Environmental Quality **Memorandum**

Date: June 16, 2008

To: Environmental Quality Commission

From: Dick Pedersen, Director

Subject: Agenda Item C, Action Item: Finding of Best Available Technology Determination for Secondary Wastes Originally Destined for Treatment in the Umatilla Chemical Agent Disposal Facility Dunnage Incinerator
June 19-20 2008 EQC Meeting

Why this is Important

The final judgment in GASP, *et al*, v. Environmental Quality Commission , *et al*, Case No. 9708-06159 (GASP IV) (Attachment A), remanded three issues to the EQC for findings on best available technology (BAT) and no major adverse impact. One of the remanded BAT determinations is the destruction of hazardous wastes originally intended for the dunnage incinerator at the Umatilla Chemical Agent Disposal Facility.

EQC Action Alternatives

The options available to the EQC in this matter include, but are not limited to, the following:

- Find that treatment in the metal parts furnace and deactivation furnace system represents the BAT for agent-contaminated secondary wastes originally intended for destruction in the dunnage incinerator;
- Find that the dunnage incinerator represents the BAT for treatment of the specified agent-contaminated secondary wastes;
- Discontinue secondary waste processing and transport waste to storage until the end of agent operations;
- Discontinue secondary waste processing and transport to an on-site landfill;
- Find that off-site shipment represents the BAT for agent-contaminated secondary wastes;
- Find that neutralization or another alternative technology coupled with off-site shipment or on-site incineration represents the BAT for treatment of agent-contaminated wastes originally intended for destruction in the dunnage incinerator; or
- Take no action at this time.

Department Recommendation

The DEQ recommends that the EQC make a redetermination of the best available technology regarding secondary waste disposal pursuant to ORS 466.055(3) as required by court order of April 17, 2007, in GASP IV and reconsideration as permitted in court order of March 26, 2008, in GASP V and find that incineration in the metal parts furnace and/or deactivation furnace system represents the best available technology for treatment of agent-contaminated wastes originally destined for treatment in the dunnage incinerator.

Background

In order to issue the permit in February 1997, ORS 466.055(3) required the DEQ to find that the proposed UMCDF utilized the BAT for treating agent-filled munitions and bulk items and the resulting secondary wastes. The EQC and DEQ determined the BAT for the UMCDF was the Army's baseline incineration system.

At the time this finding was made, the dunnage incinerator was part of the baseline facility design, and the intent was to install, systemize, and operate the dunnage incinerator to destroy certain secondary wastes. Subsequently, however, due to experience gained from the operation of the dunnage incinerator at the Johnston Atoll Chemical Agent Disposal System and the Tooele Chemical Agent Disposal Facility, the Army decided not to install the dunnage incinerator at the UMCDF.

Since issuance, several modifications have been made to the UMCDF permit to support the processing of secondary wastes through the deactivation furnace system and metal parts furnace. These modifications include the addition of specifications for sampling methods and intervals, secondary waste feed rates, and operating temperatures and pressures, to ensure complete combustion and the most effective and safe operation of the deactivation furnace system and metal parts furnace while processing secondary wastes. With the exception of agent-contaminated spent carbon, all waste streams originally intended for the dunnage incinerator are currently permitted for other existing furnaces.

The secondary waste trial burn conducted in January 2007 successfully demonstrated that the UMCDF can effectively burn over 400 pounds per tray of combustible waste in the metal parts furnace, with 250 pounds of that being demilitarization protective ensemble suits. Data from this trial burn proved that emissions levels were all well below Resource Conservation and Recovery Act and Maximum Achievable Control Technology standards.

Attachments

A GASP IV, Case No. 9708-06159, Judgment, (DEQ Item No. 07-1227)
B Department Memorandum, "Best Available Technology (BAT) Determination for Umatilla Chemical Agent Disposal Facility (UMCDF) Secondary Waste," dated June 4, 2008 (DEQ Item No. 08-0611)
C Response to Comments (DEQ Item No. 08-0609)

Approved:

Section: ______________________
Richard C. Duval, Administrator
DEQ Chemical Demilitarization Program

Division: ______________________
Joni Hammond, Acting Deputy Director

Report Prepared By: Kelly Hodney, Sr. Hazardous Waste Specialist
Phone: (541) 567-8297 x30

Attachment A

GASP IV, Case No. 9708-06159, Judgment

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CIRCUIT COURT
FOR MULTNOMAH COUNTY

IN THE CIRCUIT COURT OF THE STATE OF OREGON

FOR THE COUNTY OF MULTNOMAH

GASP, *et al.*

Petitioners,

v.

ENVIRONMENTAL QUALITY COMMISSION, *et al.*,

Respondents,

and

UNITED STATES ARMY, and WASHINGTON DEMILITARIZATION COMPANY,

Intervenor-Respondents.

Case No. 9708-06159

STIPULATED GENERAL JUDGMENT

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY
RECEIVED
AUG 13 2007
HERMISTON OFFICE

Petitioners have brought a Petition for Review against the State of Oregon Environmental Quality Commission ("EQC") and the State of Oregon Department of Environmental Quality ("DEQ") to require that Air Contaminant Discharge Permit #25-004 ("ACDP") issued by DEQ and Hazardous Waste Permit I.D. No. OR6 213 820 817 ("HWP") issued by EQC be reversed and or remanded; and

The United States Army ("Army") and Washington Demilitarization Company ("WDC"), both named permitees on these permits, having intervened as intervenor-respondents and joined the state in opposing the Petition for Review; and

This Court having dismissed the petition for review as to the ACDP by Order dated June

14, 2006; and

This Court having issued its Opinion and Order dated April 17, 2007 granting in part and denying in part the petition as to the HWP;

It is ADJUDGED that the OREGON EQC'S determinations made pursuant to ORS 466.055 as to whether the Umatilla Chemical Agency Disposal Facility uses the best available technology and has no major adverse impact on public health or the environment in regard to (a) destruction of any mustard in any ton container that contains significantly higher mercury levels than previously reported; (b) the destruction of hazardous waste originally intended for the dunnage incinerator; and (c) the role of PFS carbon filters; are remanded to the State of Oregon Environmental Quality Commission for consideration and further proceedings consistent with the court's opinion of April 17, 2007.

The petition regarding the HWP is granted in regard to the above referenced findings that are remanded to the EQC. The petition regarding the HWP is otherwise denied.

DATED this 12 day of June, 2007.

Michael H. Marcus
Circuit Court Judge

Submitted by: Stuart A. Sugarman
Of Attorneys for Petitioners GASP *et al.*

Marc Abrams
Senior Assistant Attorney General
Of Attorneys for Respondents DEQ and EQC

Attachment B

Memorandum: "Best Available Technology (BAT) Determination for Umatilla Chemical Agent Disposal Facility (UMCDF) Secondary Waste"

State of Oregon
Department of Environmental Quality **Memorandum**

DEQ Item No. 08-0611 (11)

To:	Richard C. Duval, Administrator Chemical Demilitarization Proram	**Date:**	June 4, 2008
From:	Kelly Hodney Sr. Hazardous Waste Specialist		
Subject:	Best Available Technology (BAT) Determination for Umatilla Chemical Agent Disposal Facility (UMCDF) Secondary Waste		

This memorandum documents the Department's redetermination of best available technology as it pertains to the destruction of hazardous wastes originally intended for the Dunnage Incinerator (Reference 23, Item b) pursuant to ORS 466.055(3) as required by court order of April 17, 2007, (Reference 22) and reconsideration as permitted in court order of March 26, 2008.

The information analyzed by the Department clearly showed that incineration of the wastes originally intended for disposal in the Dunnage Incinerator still represented the best available technology. However, the Dunnage Incinerator itself no longer represents the best available incineration technology for the processing of UMCDF secondary wastes as there are other, more effective incinerators already in place at the UMCDF to successfully treat secondary wastes. The existing technologies are more timely, more cost efficient, and technologically superior to the construction and operation of a Dunnage Incinerator.

Background

In February 1997, the Environmental Quality Commission (EQC/Commission) and Department of Environmental Quality (DEQ/Department) issued Permit No. ORQ 000 009 431 to the UMCDF for the storage and treatment of the Umatilla Chemical Depot chemical weapons stockpile. As part of the permitting process, the EQC ensured and verified that several regulatory statutes (ORS 466.050, 466.055[1]-[5]) had been met (Reference 5). As identified above, ORS 466.055(3) requires the Department to find that the proposed facility uses the best available technology for treating agent-filled munitions and bulk items and the resulting secondary wastes. In making this determination, the EQC and the Department developed the following criteria (References 3, 11, and 5 [Items 60, 63, 73, and 74]) from which to make a best available technology determination of the technology proposed for the UMCDF (incineration).

Best Available Technology Criteria:

1. Types, quantities, and toxicity of discharges to the environment by operation of the proposed facility compared to the alternative technologies.

2. Risks of discharge from a catastrophic event or mechanical breakdown in operation of the proposed facility compared to the alternative technologies.

3. Safety of the operations of the proposed facility compared to the alternative technologies.

4. The rapidity with which each of the technologies can destroy the stockpile.

5. Impacts that each of the technologies have on consumption of natural resources.

6. Time required to test the technology and have it fully operational; impacts of time on overall risk of stockpile storage.

7. Cost.

The Department analyzed reports from the Department of the Army and Ecology and Environment (an independent subcontractor to the Department) (Reference 2) and conducted its own investigation requiring numerous manhours to acquire and review documentation on the various technologies, review public testimony, etc. Based on this review, the Department (Reference 4) and EQC (Reference 5) both found that incineration was the best available technology for disposing of the Umatilla Chemical Depot stockpile as well as the secondary wastes that would result from the treatment of the chemical weapons, and would not present a major adverse impact to public health/safety or the environment.

At the time this finding was made, the Dunnage Incinerator was part of the baseline facility design; and the intent was to install, systemize, and operate the Dunnage Incinerator to destroy certain secondary wastes. Subsequently, however, due to experience gained from the operation of the Dunnage Incinerator at the Johnston Atoll Chemical Agent Disposal System and the Tooele Chemical Agent Disposal Facility, the Army decided not to install the Dunnage Incinerator at the UMCDF. Because the Army had not identified alternate treatment methods for waste originally intended for the Dunnage incinerator before it started operations, the Department recommended, as part of Permit Modification Request UMCDF-01-028-MISC(EQC), "Approval Process for UMCDF Operation," that the Permittees be required to submit permit modification requests to address treatment of all anticipated secondary wastes in the other furnaces (Liquid Incinerators, Metal Parts Furance, and Deactivation Furnace System) before the start of surrogate operations. The Commission concurred with the Department's recommendation (Reference 6), and the Permittees met this requirement.

In Opinion and Order dated April 17, 2007 (Reference 22), Judge Michael Marcus of the Multnomah County Circuit Court remanded the EQC's order issuing Hazardous Waste Permit No. ORQ 000 009 431 (Permit) to the Umatilla Chemical Agent Disposal Facility (UMCDF) for the destruction of chemical agent and chemical agent-filled munitions and bulk items stored at the Umatilla Chemical Depot for further action as it pertains to the best available technology and no major adverse effect determinations required by Oregon Revised Statute (ORS) 466.055 (GASP, *et al*, v. Environmental Quality Commission, *et al*, Case No. 9708-06159 [GASP IV]). Judgment was entered in GASP IV on June 12, 2007 (Reference 23), and the Court directed the EQC to reconsider the best available technology and no major adverse effect determinations in light of certain changes in facility design and new evidence.

> "It is ADJUDGED that the OREGON EQC'S determinations made pursuant to ORS 466.055 as to whether the Umatilla Chemical Agency *[sic]* Disposal Facility uses the best available technology and has no major adverse impact[1] on public health or the environment in regard to (a) destruction of any mustard in any ton container that contains significantly higher mercury levels than previously reported; (b) the destruction of hazardous waste originally intended for the dunnage incinerator; and (c) the role of PFS carbon filters; are remanded to the State of Oregon Environmental Quality Commission for consideration and further proceedings consistent with the court's opinion of April 17, 2007."

The "best available technology" determination is required by ORS 466.055, "Criteria for new facility," which states, in part:

> "Before issuing a permit for a new facility designed to dispose of or treat hazardous waste or PCB, the Environmental Quality Commission must find, on the basis of information submitted by the applicant, the Department of Environmental Quality or any other interested party, that the proposed facility meets the following criteria . . .
>
> > (3) The proposed facility uses the ***best available technology*** [emphasis added] for treating or disposing of hazardous waste or PCB as determined by the department or the United States Environmental Protection Agency . . .

Consistent with the above, Oregon Administrative Rule (OAR) 340-120-0010(c) also states:

> *Technology and Design.* The facility shall use the ***best available technology*** [emphasis added] as determined by the Department for treatment and disposal of hazardous waste and PCB. The facility shall use the highest and best practicable treatment and/or control as determined by the Department to protect public health and safety and the environment;

Following is a chronology of events documenting Commission and Department activities related to the subject determination. In addition, although not required, public comment was requested, and these public participation opportunities are also documented in this time line.

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[1] The no major adverse impact determination is being separately addressed as part of the review of the post trial burn human health and ecological risk assessment results.

Best Available Technology Redetermination Time Line

		Reference
08/03/07	Department determination of best available technology and recommendation to the EQC	13
08/07/07	Public notice – Request for comments on Department's recommendation to the EQC on the best available technology determination for UMCDF secondary waste	14
08/07-14/07	First public comment period (nine sets of comments received)	14
08/16/07	Department's formal presentation of recommendation on best available technology for UMCDF secondary waste	15
09/11/07	Commission's decision on best available technology for secondary waste	7/16
01/15/08	Public notice of request for additional public comments on EQC's best available technology decision and notice of public meeting	17
01/15-03/14/08	Second public comment period *(Originally 01/15 through 02/29/08, but extended to 03/14/08 in order to add a public hearing.)*	
02/05/08	Public meeting	18
02/12/08	Notice of public hearing to be held (in addition and subsequent to the public meeting) and extension of the public comment period	19
03/13/08	Public hearing	20
03/14/08	Second public comment period closed (26 sets of comments received)	

Stakeholder Interest

Two comment periods were provided to the public on this subject. The first comment period (August 7 through August 14, 2007) allowed the public to provide comment on the Department's secondary waste best available technology determination. This was prior to the Department's presentation to the Commission on this subject and the Commission's subsequent decision.

The second comment period (January 15, 2008, through March 14, 2008) allowed the public to provide additional comment subsequent to the EQC's decision on the secondary waste best available technology determination.

First Comment Period:

A request for comments regarding the Department's tentative best available technology determination for the treatment of secondary wastes originally destined for the Dunnage

Incinerator was issued on August 7, 2007. During this public comment period, the Department received comments from Umatilla County, the City of Hermiston, private citizens, G.A.S.P., and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR).

Seven of the sets of comments received from private citizens, local business owners, public officials, and the CTUIR expressed support of the use of existing furnaces at the UMCDF to coprocess secondary wastes during agent campaigns.

The CTUIR identified concerns regarding the off-site treatment of secondary wastes highlighting their opposition to the transfer of waste across their land. The CTUIR also communicated its interest in an expedient end to operations at the UMCDF, which could be impacted by delays in secondary waste treatment. The CTUIR expressed their support for the processing of secondary wastes through the MPF and DFS due to the technically superior design of those incinerators in relation to the Dunnage Incinerator.

One citizen recommended burning all agent-contaminated waste on site, and then shipping all resultant by-products offsite for burial at a nuclear waste site.

The only comment supporting a different technology was from G.A.S.P. requesting evaluation of listed alternative technologies for treatment of agent-contaminated dunnage, a request for an additional 30-day public comment period, and their request for the EQC to delay their ruling on this topic until the October 2007 meeting.

Second Comment Period:

A request for comments regarding the Commission's decision was issued on January 15, 2008. During the January 15 through March 14, 2008, public comment period, the Department held both a public meeting and a public hearing, and 26 sets of comments were received.

Four sets of comments pertained to different topics ("destruction of any mustard in any ton container that contains significantly higher mercury levels than previously reported" and the results of the human health and ecological risk assessment) and, thus, were not germane to the subject. However, 18 individuals and organizations submitted comments in support of the Commission/Department's secondary waste best available technology determination, and four sets of comments in support of neutralization/alternative technology were received from a private citizen, G.A.S.P/Government Accountability Project, the Sierra Club, and ARCTECH, Inc. (an alternative technology vendor). These comments, along with those received during the first comment period, were reviewed and evaluated as part of the Department's reconsideration of this best available technology determination.

Please refer to the Department's response to comments for additional information on the comments received (Reference Item 21).

Wastes Originally Intended for Destruction in the Dunnage Incinerator

As previously identified, the Court directed the EQC to redetermine the best available technology in light of certain changes in facility design and new evidence, and the subject of this determination is "the destruction of hazardous waste originally intended for the dunnage incinerator."

It is necessary, then, to first identify which hazardous wastes were originally intended for destruction in the Dunnage Incinerator. The final Part B application upon which the EQC based its original best available technology and issuance of the UMCDF Hazardous Waste Permit listed:

> " . . . a combination of wooden pallets, laboratory solid wastes, metal packaging material, combustible dunnage and residue resulting from UMCDF closure, cleanup materials, and any other miscellaneous wastes that may potentially be contaminated with chemical agent" (Section D-1c, Incineration, Dunnage Incinerator).

Thus, the hazardous wastes originally intended for destruction in the Dunnage Incinerator were 1) secondary wastes[2] (wood pallets, laboratory solid wastes, metal packaging material, combustible dunnage and residue from UMCDF closure, clean-up materials, and other miscellaneous wastes) that were 2) potentially agent contaminated.

The UMCDF secondary wastes have been broken down into six major waste streams: spent carbon, brine solutions and/or brine salts, dunnage (which consists primarily of wooden pallets), metal from munitions or ton containers, plastics (including demilitarization protective ensembles [DPE]), and spent decontamination solutions. The wastes initially slated for treatment in the Dunnage Incinerator fall into two of the six major types of secondary waste streams: potentially agent-contaminated spent activated carbon and dunnage.

Spent Activated Carbon

The estimated rate of generation of spent activated carbon is more than 75 tons per year. Presently, spent activated carbon is being stored at the facility for later treatment. The estimated quantity of agent-contaminated spent carbon to be treated during closure activities is roughly 750,000 pounds.

Dunnage

- Wood dunnage is the wood packing in and on which the munitions are stored in the munitions storage igloos.
- Laboratory solid wastes such as pipette tips and used glassware.
- Metal packaging material such as banding.
- Combustible dunnage and residue from UMCDF closure, clean-up materials and other miscellaneous wastes (e.g., rags, paper, clean-up material)

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[2] For the purposes of this evaluation, secondary waste is defined as any waste generated as the result of storage or destruction of chemical agent. Direct chemical agent destruction operations, as well as indirect or peripheral operations, generate secondary wastes.

> Dunnage is considered hazardous until determined otherwise by sampling/monitoring. Agent-contaminated wastes are treated on-site, while agent-free wastes may be shipped off-site for disposal at a permitted facility.

It should be noted that DPE suits (encapsulating, supplied-air personal protective equipment worn by personnel required to enter areas where chemical agent liquid or vapors are known to exist) and toxicological agent protective (TAP) gear were included in the original application, but were never identified as being intended for disposal in the Dunnage Incinerator.

Treatment of secondary wastes in a safe manner that is in compliance with all applicable laws is a challenge that comes with the destruction of stockpile agents. The laws governing the disposal of these hazardous wastes are dictated primarily by the federal Resource Conservation and Recovery Act (RCRA); treatment, storage, and disposal facility (TSDF) regulations; and requirements of the State of Oregon. The Oregon DEQ has incorporated by reference the federal RCRA regulations for identification and listing of hazardous wastes. In Oregon, the wastes generated from the operation of the UMCDF are listed hazardous wastes. Oregon requires on-site treatment of agent-contaminated secondary wastes; and the UMCDF Hazardous Waste Permit requires all wastes to be agent free by analysis prior to off-site shipment.

Many secondary wastes can be effectively treated during operations. However, current permit requirements and other process limitations have resulted in significant quantities of these wastes accumulating on-site. Secondary wastes can be generated at a rate of approximately 4,000 pounds per week. Management and treatment of the growing volume of secondary wastes has become a major consumer of staff time and effort at the UMCDF. Based on lessons learned from JACADS, the UMCDF has been attempting to limit the amount of secondary wastes sent to permitted storage. Until recently (March 2008), the UMCDF was endeavoring to treat all VX secondary wastes as generated to eliminate the additional worker handling necessary to prepare the wastes for transfer to permitted storage in order to await treatment at a later date. It was also attempting to treat the GB-contaminated secondary wastes stored in J-Block when furnace availability made it possible.

Best Available Technology Determination

For issuance of the permit in 1997, it was determined the fixed-hearth, ram-feed Dunnage Incinerator was the best available technology for processing specified secondary waste streams. This best available technology determination was based on the information available at that time (Reference 2). Subsequent to issuance of the Permit, additional Dunnage Incinerator performance and testing information has been collected. Also, testing and performance evaluations have been done on use of the Metal Parts Furnace (MPF) and Deactivation Furnace System (DFS) in lieu of the Dunnage Incinerator. This additional information has been considered in this reconsideration of the original secondary waste best available technology to determine if the assumptions made in 1996 remain valid, or if other technology approaches are more appropriate for processing specific UMCDF secondary wastes.

Neutralization/Alternative Technologies

In reconsidering the best available technology for processing secondary wastes originally intended for the Dunnage Incinerator at the UMCDF, a number of alternative/neutralization technologies were examined. However, each of these technologies were eliminated as effective technologies for treatment of the secondary wastes as they are either not considered functionally mature or presently available technologies, have not been demonstrated in full-scale pilot testing, only partially decontaminate the wastes, are not suitable for solid secondary wastes, etc. (Reference 24 and Attachment 1).

There is currently no test method to conclusively confirm that most residues of solid secondary wastes that have undergone a nondestructive process are free of agent. In fact, the Environmental Protection Agency (EPA) found it necessary to promulgate alternative treatment standards for contaminated debris in the Land Disposal Restrictions (40 CFR 268.45) due to the difficulty in obtaining representative samples for analysis. "There is a significant potential for error in choosing how and where to sample, and although many debris wastes have been sampled and analyzed, the procedures for both sampling and analyzing (including QA/QC procedures) contaminated debris have not been standardized . . . This lack of QA/QC data probably directly results from complications arising from difficulties in measuring recovery from debris materials" (Reference 8, 56 FR 24444). As a result, the EPA considered but "rejected proposing numerical standards for hazardous debris because of the difficulty of sampling hazardous debris" (Reference 9, 57 FR 37194).

Therefore, neutralization and the other alternative technologies evaluated for this determination were eliminated as a stand-alone best available technology for the solid secondary wastes originally intended for the Dunnage Incinerator because they cannot (or it cannot be confirmed that they) complete the treatment process. Incineration, which destroys organics and generates residue that can be analyzed, is still required in order to meet the Permit requirement to document complete decontamination prior to off-site shipment. With regard to neutralization in particular, the National Research Council's Analysis of Engineering Design Studies for Demilitarization of Assembled Chemical Weapons at Blue Grass Army Depot (Reference 1) states:

> "The reverse assembly of munitions, followed by water or caustic hydrolysis of nerve or mustard agents and associated energetic materials, is a mature, safe, and effective method for ***initial treatment*** of the chemical weapons stored at Blue Grass Army Depot. It is ready for immediate implementation for the neutralization of energetics and agents. ***However, the resulting hazardous streams must be treated further before they are released to the environment.***" [emphasis added]

In addition, not only would this neutralization double the volume of waste and the neutralized solid wastes still require incineration treatment, but the newly generated waste stream—the hydrolysates generated in the neutralization process—would also require incineration or off-site disposal.

There are several options to consider in this best available technology determination, all of which hinge on whether the UMCDF is allowed to ship agent-contaminated waste off site or whether the State will continue to require the UMCDF to treat agent-contaminated wastes on site.

1) Off-Site Shipment of Agent-Contaminated Secondary Wastes

For the past ten years the UMCDF has been required by the Hazardous Waste Permit to determine by analysis that all potentially agent-contaminated wastes are agent-free before off-site shipment may be allowed. Thus, pursuit of this alternative would require a modification to the permit to allow for off-site shipment of wastes that cannot meet the agent-free criteria currently in the permit.

Depending on the receiving facility, the waste could be shipped by rail or truck. Although transportation risk assessments conducted for other sites indicate off-site shipment of agent-contaminated wastes to be an acceptable risk[3], the increased risk to workers must be considered. There are more transfers and storage steps in this process, and workers must be suited in appropriate personal protective equipment during each step to prevent exposure to agent.

A. Off-Site Shipment of Agent-Contaminated Secondary Wastes to a Commercial Incinerator

If the permit was revised to allow the UMCDF to ship agent-contaminated and/or potentially agent-contaminated wastes off-site for treatment and disposal, there are two incineration facilities that could accept the waste; one is located in Grassy Mountain, Utah, the other in Port Arthur, Texas.

This alternative would utilize the same means of disposal presently available at the UMCDF (incineration). However, while the UMCDF Metal Parts Furnace and Deactivation Furnace System were designed for treatment of specific types of hazardous waste (munitions), these commercial incinerators are designed to treat numerous types and large quantities (bulk items) of hazardous wastes. The higher waste feed rates that may be utilized by these larger-capacity commercial incinerators could allow for more expedient treatment of the secondary wastes, once received. However, the emission limitations would be similar.

B. On-Site Neutralization or Other Alternative Treatment Prior to Off-Site Shipment to a Commercial Incinerator

As previously noted, a number of alternative/neutralization technologies were examined but were eliminated as they are either not mature or presently available technologies, only partially decontaminate the wastes, are not suitable for solid secondary wastes, etc. Further, as there is no test method to conclusively confirm that most residues of solid

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[3] The most expedient routes to either facility for both methods of transport cross tribal lands, and the CTUIR has expressed strong opposition to the transport of potentially agent-contaminated wastes across its lands.

secondary wastes that have undergone treatment other than incineration are agent free, these technologies cannot be utilized as a stand-alone treatment method. However, if the UMCDF Permit were revised to allow the off-site shipment of agent-contaminated or potentially agent-contaminated wastes, alternative treatment methods could be utilized provided that wastes were then transported to a commercial incinerator to complete the treatment process.

The addition of an unverifiable nondestructive secondary waste treatment process (that would still require incineration to complete the treatment process) prior to transport to an off-site commercial incinerator would provide little, if any, benefit other than a possible, but most often immeasurable, decrease in the level of agent contamination; would increase potential risk to the workforce due to the additional handling requirements; and unnecessarily delay off-site shipment.

2) On-Site Treatment of Agent-Contaminated Secondary Wastes

If the UMCDF is to continue to be required to treat all agent-contaminated wastes on site, the options to consider are A) installation and operation of a Dunnage Incinerator, B) discontinuation of secondary waste processing paired with storage until the end of agent operations, C) utilization of the Metal Parts Furnace (MPF) and Deactivation Furnace System (DFS) to treat secondary wastes, and D) utilization of a neutralization/alternative treatment technology paired with on-site incineration.

A. Installation and Operation of a Dunnage Incinerator

In evaluating this option, experience gained from other sites was considered; as well as the technical challenges, costs, and the extension to the duration of the project that would result from the additional time required for construction of another incinerator (i.e., the Dunnage Incinerator).

- Programmatic Dunnage Incinerator Experience

  Each of the chemical agent incineration sites has had varying operational experience utilizing the Dunnage Incinerator.

  - **Johnston Atoll Chemical Agent Disposal Facility (JACADS)**
    JACADS, the first-generation incineration facility, constructed and operated a Dunnage Incinerator between June 1989 and March 1996. It was primarily limited to processing wood and cardboard. JACADS conducted a trial burn on the Dunnage Incinerator in December 1994 that consisted of 260 pounds per hour of wood, 50 pounds per hour of cardboard, and 10 pounds per hour of agent.

    Numerous difficulties were experienced in the operation and maintenance of the Dunnage Incinerator at JACADS. These problems included waste jams, the ram feeder riding over waste, flare ups, and a general inefficiency associated with slow waste feed rates. Due to multitudinous mechanical failures, the Dunnage Incinerator was abandoned in place.

Destruction of agent-contaminated carbon in the Dunnage Incinerator was especially problematic and unsuccessfully tested. As an alternative to the Dunnage Incinerator, the facility processed secondary wastes through the Deactivation Furnace System (DFS) and Metal Parts Furnace (MPF). Special testing was also conducted for plastics, including DPE suits. The testing proved the MPF and the DFS could effectively treat these wastes.

A lesson from the closure of JACADS was that the costs and time required for closure were significantly increased because the thousands of tons of secondary waste that had accumulated had to be treated after the end of agent operations. The experience at JACADS clearly showed that it is preferable that secondary wastes should be managed and disposed of concurrently with the primary agent disposal operation, rather than stored to await treatment after conclusion of the agent disposal campaigns.

- **Tooele Chemical Agent Disposal Facility (TOCDF)**
  A Dunnage Incinerator was constructed and systemized at the TOCDF. Preliminary testing was performed on nonhazardous material fed to the Dunnage Incinerator. Despite the construction and systemization, the Dunnage Incinerator was abandoned before the start of agent operations due to problematic function testing during systemization, and no hazardous wastes were processed through the furnace. The State of Utah did not object to abandoning the Dunnage Incinerator. During the renewal of the TOCDF RCRA permit, the Dunnage Incinerator was completely removed from the permit.

  As an alternative to the Dunnage Incinerator, TOCDF plans to use the MPF to process the large majority of secondary waste.

- **Anniston Chemical Agent Disposal Facility (ANCDF)**
  A Dunnage Incinerator was originally constructed at the ANCDF, but was never operated nor systemized as a result of the lessons learned from the JACADS and TOCDF sites.

  As an alternative to the Dunnage Incinerator, ANCDF is primarily utilizing the MPF to process the vast majority of their secondary waste.

- **Umatilla Chemical Agent Disposal Facility (UMCDF) and Pine Bluff Chemical Agent Disposal Facility (PBCDF)**
  While originally permitted, the decision not to construct Dunnage Incinerators at the UMCDF and PBCDF was based upon knowledge gained from experience at JACADS, TOCDF, and ANCDF. These decisions were made after construction of these facilities began.

In summary, U.S. Army chemical demilitarization program operational experience has shown the Dunnage Incinerator to be an inefficient and problem-prone incineration technology. The Dunnage Incinerator has either been abandoned in place or not constructed at all, and alternative, more-effective incineration technologies have been utilized instead.

- Installation of a Dunnage Incinerator at the UMCDF

  The current design of the Dunnage Incinerator has proven to be ineffective. Numerous operational and maintenance problems led to the abandonment of the JACADS Dunnage Incinerator. Further, because of the JACADS operational problems and TOCDF function testing issues, no other facility has operated a Dunnage Incinerator. Thus, pursuit of this option would require a complete redesign of the incinerator. The estimated lifecycle cost of adding a Dunnage Incinerator at the UMCDF is $29.5 million. Recent estimates propose that the construction and systemization of a Dunnage Incinerator would take approximately 27 months, representing a long-term delay in operations and closure.

  Due to the history of difficulties with this incinerator at other demilitarization facilities, the potential additional risk to safe operations due to the likelihood of higher-than-typical maintenance, the unnecessary construction costs to the taxpayers, and the time delay that would be required to construct a Dunnage Incinerator with no benefit as compared to using the MPF and DFS currently on site, the Department does not recommend pursuit of this alternative.

B. Discontinuation of Secondary Waste Processing Coupled with Storage Until the End of Agent Operations

A second alternative to consider is the discontinuation of secondary waste processing until the end of agent operations. Pursuing this option would actually defer the best available technology determination and result in the accumulation and on-site storage of secondary wastes until the end of all three agent campaigns.

This alternative represents an inefficient use of existing furnaces. There are operational gaps in the current campaigns which can be used to process secondary wastes in order to expedite the closure of the facility. This option also represents a potential increased risk to workers due to the addition of many more handling events that would be required in order to containerize and properly store the wastes.

Because JACADS had accumulated its secondary wastes and did not process them until after agent munitions operations had been completed, the costs and time required for closure were significantly increased because of the thousands of tons of secondary waste that had accumulated. Lessons learned from JACADS clearly showed that it is preferable that secondary wastes should be managed and disposed of concurrently with the primary agent disposal operation, rather than stored to await treatment after conclusion of the agent disposal campaigns. Present estimates show that pursuing this option would delay closure of the UMCDF by 12 to 18 months.

C. Discontinuation of Secondary Waste Processing and Transfer of Agent-Contaminated Wastes to an On-Site Landfill

This option does not treat the waste to an agent-free condition; it is actually long-term storage. Due to the amount of time permitting activities and construction of a landfill would require, the agent-contaminated secondary waste would have to be transported to permitted storage to await to completion of the landfill. This represents an increased risk to workers due to the addition of many more handling events that would be required in order to containerize and properly store the wastes. In addition, a hazardous waste landfill could negatively impact the U.S. Army's plans to close the UMCD and may also impact any future use of the property.

D. Utilization of the MPF and DFS to Treat Secondary Wastes

Another option to consider is the utilization of the DFS and MPF for the treatment of secondary wastes initially slated for treatment in the Dunnage Incinerator.

The UMCDF has three types of incinerators constructed and in operation—The Liquid Incinerators (two), the Deactivation Furnace System (DFS), and the Metal Parts Furnace (MPF). A surrogate trial burn has been conducted, as required by the permit, on each of the incinerators after start-up and before feeding any agent. Each incinerator has demonstrated the ability to satisfactorily operate within regulatory requirements and permitted parameters and are all presently operational.

Between 1996 and closure, JACADS successfully utilized its MPF and DFS to process secondary wastes originally intended for the Dunnage Incinerator. Several modifications have been made to the UMCDF permit that support the processing of secondary wastes through the DFS and MPF. These modifications include the addition of sampling methods and intervals, secondary waste feed rates, operating temperatures and pressures, etc. to ensure complete combustion and the most effective and safe operation of the DFS and MPF while processing secondary wastes. With the exception of agent-contaminated spent carbon, all waste streams originally intended for the Dunnage incinerator are currently permitted for other existing furnaces.

A secondary waste trial burn conducted in January 2007 successfully demonstrated that the UMCDF can effectively burn over 400 pounds per tray of combustible waste in the MPF, with 250 pounds of that being DPE suits. Data from this trial burn proved that emissions levels were all well below RCRA and Maximum Achievable Control Technology (MACT) standards. Data from this trial burn was also included in the post-trial burn risk assessment.

As previously stated, agent-contaminated carbon is the only waste stream originally intended for the Dunnage Incinerator that has not yet been permitted for treatment in another furnace at the UMCDF. However, a permit modification request proposing permitting of the DFS for treatment of agent-contaminated carbon is currently under review by the Department. Permit Modification Request UMCDF-05-034-WAST(3) (PMR 05-034) was submitted by the UMCDF October 25, 2005. In addition to proposing modifications to the DFS for effective carbon combustion, PMR 05-034 requests the addition of a carbon micronization system (CMS), which would finely grind agent-contaminated carbon before feeding it into the DFS. The carbon micronization incineration technology was developed as a result of the difficulties experienced in the operation and maintenance of the Dunnage Incinerator at JACADS. Demonstration at JACADS included a performance test burn and several minitest burns. The DFS/CMS technology represents the best available technology for treatment of agent-contaminated carbon.

The following table summarizes the differences in the Dunnage Incinerator, MPF, and DFS design features. (Additional design details, general process drawings, furnace efficiencies, risk information, etc. are provided in the U.S. Army Chemical Materials Agency report, "Secondary Waste Module of the Best Available Technology [BAT] Data Package for Umatilla Chemical Agent Disposal Facility [UMCDF]," dated August 3, 2007 [Reference 25]). This table shows the superiority of the MPF and DFS designs, which include continuous/semicontinuous feed, and a secondary chamber in which the wastes are again exposed to high temperatures thus ensuring effective destruction of the wastes introduced in the primary chamber and complete combustion of flue gases.

Further, the MPF and DFS pollution abatement systems include wet scrubbing capability for effective acid gas removal that is not currently included in the Dunnage Incinerator dry pollution abatement system design.

DUN	**Incinerator Type**	Fixed-hearth	The Dunnage Incinerator is a fixed-hearth incinerator comprised of a refractory-lined chamber into which wastes are introduced. The Dunnage Incinerator originally planned for the UMCDF is designed as a batch mode; that is, it is not intended for long-term, continuous incineration because no provision for automated ash removal is made. The batch feed is conducted through the use of a feed ram system. The ash from the burned waste collects in the lower portion of the furnace and must be periodically manually removed.
	Primary Chamber	Refractory-lined chamber	
	Secondary Chamber	N/A	
	Feed System	Batch (noncontinuous feed)	
DFS	**Incinerator Type**	Rotary kiln	The Deactivation Furnace System is a rotary kiln comprised of a refractory-lined cylindrical steel shell mounted slightly titled on its horizontal axis to facilitate the progression of waste through the furnace. This shell is supported by two or more heavy steel tracks or trundles that encircle the shell. The trundles ride on rollers, which are driven to allow the kiln to rotate on its horizontal axis. The waste material in the kiln is "tumbled" as the kiln rotates. This tumbling action serves to increase turbulence inside the kiln, which improves combustion efficiency. The residence time of solids inside the kiln is determined by the rate of rotation, the length, and the angle of the tilt of the kiln. The rotary kiln is very versatile in that any form of waste may be introduced to the kiln. A secondary combustion chamber downstream of the kiln ensures complete combustion of flue gases.
	Primary Chamber	Refractory-lined cylindrical steel shell	
	Secondary Chamber	Yes	
	Feed System	Rotary kiln-"tumbles" as the kiln rotates (near-continuous feed)	

MPF	**Incinerator Type**	Roller-hearth	The Metal Parts Furnace is a roller-hearth furnace and has a refractory-lined primary chamber as well as a secondary chamber. The secondary chamber exposes any products of incomplete combustion to a high temperature a second time, thus ensure effective destruction of the wastes introduced in the primary chamber. Waste is introduced to the furnace by utilizing a roller-conveyor system that conveys trays of waste into the furnace utilizing a sophisticated automation system. Waste produced from the processing of secondary wastes in the Metal Parts Furnace is captured either in the pollution abatement system or remains as ash in the trays exiting the furnace.
	Primary Chamber	Refractory-lined primary chamber	
	Secondary Chamber	Yes	
	Feed System	Roller-conveyor system (near-continuous feed)	

No additional resources would need to be expended in pursuit of this option. The MPF and DFS are the least likely to cause risk to worker or public safety. Not only are the MPF and DFS are technically superior in design to the Dunnage Incinerator and more effective and efficient in treatment of secondary wastes. The ability to immediately process the secondary wastes reduces handling requirements, thereby significantly reducing potential risk to personnel and reducing the resources required to store the wastes while awaiting treatment. Further, it precludes the risks associated with off-site shipment.

E. Utilization of a Neutralization/Alternative Treatment Technology Coupled With On-Site Incineration

As previously identified, a number of alternative/neutralization technologies were examined but were eliminated as an effective secondary waste treatment technology as they are either not mature or presently available technologies, only partially decontaminate the wastes, or are not suitable for solid secondary wastes. Further, as there is no test method to conclusively confirm that most residues of solid secondary wastes that have undergone treatment other than incineration are agent free, these technologies cannot be utilized as a stand-alone treatment method.

Nevertheless, neutralization/alternative technologies could be utilized as an incomplete "pretreatment," provided treatment was completed by on-site incineration. However, there would be little, if any, benefit to the addition of an unverifiable nondestructive secondary waste treatment process, the effectiveness of which cannot be confirmed by analysis and, thus, requires incineration to complete the treatment process. The only potential gain would be the possible, but most often immeasurable, decrease in the level of agent contamination. The additional handling requirements, both for transport to permitted storage to await installation and systemization of the neutralization/alternative technology, as well as the additional handling required for the alternative treatment process before incineration, would increase the potential risk to the workforce. Also, the additional time required to install and systemize alternative/neutralization technologies (Attachment 1) would delay treatment of the secondary wastes and prolong the life of the project. Clearly, the addition of a second treatment process that would only add to the processing time, the amount of wastes generated, the life of the project, and increase the potential risk to the workforce without providing any measurable benefit (incineration still required) would be counterproductive and not the best available technology.

Each of the options are evaluated below using the best available technology evaluation criteria, which have been revised to be more applicable to destruction of the secondary wastes originally intended for the Dunnage Incinerator (versus the munitions stockpile). As the storage options (permitted storage and on-site landfill) are not treatment technologies, they have not been evaluated as such.

	Agent-Contaminated Secondary Waste Management/Treatment Method						
	Off-Site Treatment		**On-Site Management**				
Best Available Technology Evaluation Criteria	**Commercial Incinerator**	**Alt Tech + Off-Site Ship**	**DUN**	**Permitted Storage**	**Storage + Landfill**	**MPF and DFS**	**Alt Tech + Incineration**
1. Types, quantities, and toxicity of discharges to the environment by operation of the proposed facility.	*	*		■	■	3	3
2. Risks of discharge from a catastrophic event or mechanical breakdown in operation of the proposed facility.	*	*	3	■	■	3	3
3. Safety of the operations of the proposed facility (including risk of transportation).	*	*		■	■	3	3
4. The rapidity with which each of the technologies can destroy or dispose of the secondary waste.	3			■	■	3	
5. Impacts that each of the technologies have on consumption of natural resources.				■	■	3	
6. Time required to test the technology and have it fully operational; impacts of time on overall risk of stockpile storage.	3			■	■	3	
7. Cost.				■	■	3	

*	=	Indeterminate (would have to ascertain whether the chosen off-site facility employed technologies consistent with the best available technology assessment)
DFS	=	Deactivation Furnace System
DUN	=	Dunnage Incinerator
MPF	=	Metal Parts Furnace

Secondary Waste Management at Other Demilitarization Sites

Many of the other demilitarization sites have shipped or are shipping agent-contaminated wastes for off-site treatment.

- Aberdeen Proving Ground secondary wastes were shipped off-site for treatment in Port Arthur, Texas.
- The TOCDF is storing its higher-level wastes (at or above 1.0 of the Vapor Screening Level [VSL]) and has shipped some of its lower-level wastes (below 1.0 of the VSL).
- The PBCDF is currently treating its secondary wastes on site; and, like the UMCDF, it has attempted to proactively treat its secondary wastes as generated (versus transporting to on-site permitted storage for later treatment). Currently, however, the PBCDF is in the process

of pursuing a permit modification to allow the shipment of some agent-contaminated secondary wastes for off-site treatment.
- The ANCDF is utilizing both on-site treatment as off-site shipment of agent-contaminated secondary wastes.

Conclusion

The best available technology for the UMCDF (incineration versus neutralization, etc.) was completed for issuance of the permit and was determined to be incineration. Therefore, this assessment does not reevaluate the chosen technology for operation of the UMCDF as a whole, but is limited to the disposal of hazardous secondary wastes originally intended for treatment in the Dunnage Incinerator. A thorough evaluation of the changes in available technology for secondary waste in the years since the initial permitting produces the same determination in 2008.[4]

Alternative technologies and neutralization of agent-contaminated secondary wastes originally intended for the Dunnage Incinerator are not mature or presently available, and there is currently no means to determine the resulting wastes to be completely decontaminated.

Off-site shipment of agent-contaminated wastes originally destined for the Dunnage Incinerator was determined not to be best available technology. The operational risks, etc. cannot be quantified without first predetermining the destination site, and the transport requires the consumption of additional natural resources. Continued storage and/or a land fill were also eliminated in that these options do not treat the waste and delay selection of the best available technology.

Thus, the Department concludes that incineration is still the best available technology for treatment of agent-contaminated secondary wastes; however, the Dunnage Incinerator no longer represents the best available incineration technology. A thorough analysis by the Department has clearly shown that utilizing the already operational and more effective MPF and DFS incineration technology, and the associated pollution abatement systems (PASs) and PAS carbon filter systems is the best available technology in terms of effectiveness, safety, efficiency, cost, and timeliness when considering treatment of secondary wastes originally intended for the Dunnage Incinerator. Further, processing agent-contaminated secondary wastes concurrent with stockpile destruction operations (when furnace availability exists) will not only minimize the potential risk to workers, but will also shorten the total project duration. This determination was made as result of an assessment of operational experience from other sites, lessons learned, and research studies.

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[4] The BAT for any Mustard agent with higher than expected levels of mercury will be reevaluated and presented for Commission redetermination at a later date.

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4. EQC, November 22, 1996b, Minutes of Environmental Quality Commission Special Session. DEQ Item 2433
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7. EQC, 2007, "Order Determining Best Available Technology for Secondary Waste," dated September 11, 2007. DEQ Item 07-1382
8. Federal Register (FR), Volume 56, page 24444 (56 FR 24444), "Land Disposal Restrictions; Potential Treatment Standards for Newly Identified and Listed Wastes and Contaminated Debris," May 30, 1991.
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14. DEQ, 2007b, "Request for Comments, The EQC's Secondary Waste Best Available Technology Determination for the Umatilla Chemical Agent Disposal Facility," public notice dated August 7, 2007. DEQ Item 07-1220
15. DEQ, 2007c, "Agenda Item B, Action Item: Finding of No Major Adverse Impact from Best Available Technology (BAT Determination for Processing of Secondary Waste Generated at the UMCDF)," memorandum prepared for August 16, 2007, EQC meeting. DEQ Item 07-1226
16. DEQ, 2007d, "Notice of Decision, EQC Order Determining Best Available Technology and No Major Adverse Impact for Secondary Waste Processing," public notice dated September 11, 2007. DEQ Item 07-1383
17. DEQ, 2007e, "Public Notice, Request for Comments and Notice of Public Meeting," public notice dated January 15, 2008. DEQ Item 08-0046
18. DEQ, 2007f, Sign in Sheet for Secondary Waste Best Available Technology DEQ Public Meeting held February 5, 2008. DEQ Item 08-0159
19. DEQ, 2007g, "Public Notice, Extension of Comment Period and Notice of Public Hearing, Secondary Waste Best Available Technology Determination," public notice dated February 12, 2008. DEQ Item 08-0170
20. DEQ, 2007h, Presiding Officer's Report, "Secondary Waste Best Available Technology, UMCDF Permit," March 13, 2008, public hearing report dated March 17, 2008 DEQ Item 08-0358
21. DEQ, 2007i, "Response to Comments, Best Available Technology Determination – Secondary Wastes Originally Intended for the Umatilla Chemical Agent Disposal Facility Dunnage Incinerator," June 4, 2008. DEQ Item 08-0609
22. State of Oregon, Multnomah County Circuit Court, April 17, 2007, "Opinion and Order," Case No. 9708-06159, in the Matter of GASP, et al, vs. EQC, et al," (GASP IV). DEQ Item 07-0678
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24. Umatilla Chemical Agent Disposal Facility (UMCDF), 2008, "Umatilla Chemical Agent Disposal Facility (UMCDF) Secondary Waste Best Available Technology (BAT) Supporting Documentation," comments provided via Letter No. ENV-08-0064 dated March 13, 2008. DEQ Item 08-0316
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KHH:scr
Attachment

Attachment 1

Review and Evaluation of Alternative Technologies for Demilitarization of Assembled Chemical Weapons

(Excerpt from Science Applications International Corporation's "Review Criteria for Secondary Waste Technology Evaluation,"
DEQ Item 08-0316, IN080406)

In the table below potential secondary waste treatment technologies are identified and the technical maturity discussed. As of March 2008, these technologies have not yet achieved a level of technical maturity that would enable a meaningful evaluation against the best available technology evaluation criteria for the proposed use at the UMCDF.

Potential Alternate Treatment Technologies

Developer or Supplier	Technology Type*	Description	Technical Maturity
AEA	Silver II Electrochemical oxidation process	Silver II is an electrochemical process that utilizes silver (II) species for destruction of organic compounds such as agent. The key components of the process are electrochemical cells comprised of anodes and cathodes energized by a high voltage power supply. In the cells, agent is destroyed through chemical oxidation reactions involving silver nitrate and nitric acid at a moderate temperature (approximately 90°C) and near atmospheric pressure. The process is not suitable for handling solid secondary waste materials.	Scale-up issues could create serious processing problems in larger scale systems. The uncertainty of scale-up of the SILVER II process units into an integrated treatment facility are serious enough to challenge the ultimate ability of this process to perform at the required level. This process is not suitable for treating solid-phase secondary wastes designated for treatment in the DUN.
ARCTECH	ACTODEMIL®	ACTODEMIL® is a two-step process based on hydrolysis followed by chemical oxidation. Chemical agents are neutralized by mixing with an alkalized humic acid reactant (a-HAX) solution. After the hydrolysis step, the pH of the resultant solution is lowered by adding nitric acid, precipitating solids. The remaining solution, including the precipitated solids, is treated by hydrogen peroxide with Fe catalyst to complete oxidative destruction of organic compounds. The solids are then filtered for disposal by landfill. Solid materials contaminated with agent can be brought into contact with a-HAX for decontamination. However, the likely reactions between the a-HAX and organic compounds would limit the utility of this process for the disposal of secondary waste materials.	Chemical agent DRE testing for GB, VX, and HD were conducted for ACWA. However, this technology was not chosen for use at any ACWA site. The proposed oxidation step using H_2O_2 has been demonstrated at the bench scale for chemical agent hydrolysate streams but not for secondary wastes.

Potential Alternate Treatment Technologies

Developer or Supplier	Technology Type	Description	Technical Maturity
Burns and Roe	MGC PLASMOX	MGC PLASMOX is a high temperature plasma arc process. It consists of a rotary furnace melter with water-cooled, nitrogen-purged copper electrodes. The unit is operated in a transferred-arc mode under inert or reducing atmosphere using nitrogen as the carrier gas. Tests were conducted on simulated H and GB neutralents with MEA in Switzerland during January 2001. Approximately 20 tons of toxic chemicals, including chemical munitions, were treated in Albania from July to September 2001 but unexpected operating problems were encountered in the exhaust pipe, air cooler, and quench.	A portable and skid-mounted unit has been built and operated in Europe but not in the U.S. Several regulatory issues (e. g. improved gas scrubber, fate of regulated metals, and better characterization of process residual streams) must be resolved before this process can be permitted in the U.S. Additional testing is needed to demonstrate handling of solid waste feeds.
General Atomics	SCWO (Supercritical Water Oxidation)	SCWO is an aqueous oxidation process, developed to treat materials soluble or suspendable in water at supercritical state under a high temperature and pressure critical condition (with operating ranges of 1,100 – 1,500°F and 3,200 – 3,700 psi). Due to the unique nature of supercritical water, the organic materials (or agent) and oxygen are more readily dissolved in the reaction medium and oxygen becomes highly diffusive in SCWO. This creates an aggressive environment for the efficient degradation of organic materials (or agent). To avoid plugging of SCWO vents, solid materials need to be greatly reduced in size for feeding. The shortfalls associated with this technology include corrosion, erosion, and plugging that may develop in the reactor system.	SCWO has been selected for a pilot-scale demonstration at the Blue Grass ACWA project site. During its demonstration, critical design and operational issues are expected to be evaluated and resolved. Air emissions and other key environmental discharge information will be evaluated and operational efficiency will be determined. This information is necessary to effectively evaluate this technology against the criteria established for BAT. This process is not yet a fully demonstrated technology.
Lockheed Martin (Foster/Eco Logic/Kvaerner)	GPCR (Gas Phase Chemical Reduction)	GPCR is a moderate temperature, thermal/chemical reduction process. Typical unit operations include five thermal reduction batch process (TRBP) units, two GPCR reactors, a steam/hydrogen/waste gas pre-heater, and a Pollution Abatement System. The TRBP, which is heated above 1,000°F with an external gas burner, thermally treats solid materials to 5X. The vapors and other off-gases that leave the TRBP, as well as liquid wastes, are fed to the GPCR and electrically heated at approximately 850°C for reaction with hydrogen and steam.	Individual components of this technology have each been implemented with process streams similar to those in the ACWA program; however, they have not been operated or tested as an integrated unit for decontamination of secondary waste. Although the basic technologies are reasonably mature, certain facets of their integration and implementation are still at early stages of development for the treatment of secondary waste. To prevent operating problems, the integrated system needs to be demonstrated prior to full-scale operation.

Potential Alternate Treatment Technologies

Developer or Supplier	Technology Type	Description	Technical Maturity
Parsons	WHEAT (Water Hydrolysis of Explosives and Agent Technology)	WHEAT is a process consisting of five functional units. Out of these, hydrolysis, biological processing, and high-temperature steam units are the key components of the process. Agent is hydrolyzed by water in the hydrolysis reactors. The hydrolysate is then transferred to the bioreactors for conversion to materials acceptable for discharge to the environment. Solid materials are separately decontaminated to 5X by heating in the metal parts treater.	The main process based on water hydrolysis is not suitable for treating solid-phase secondary waste. However, these materials are processed in the metal parts treater, a component of the overall system (see Metal Parts Treater below). For example, DPE suits are shredded and then destroyed in the metal parts treater, leaving behind a small ash residue. Contaminated metals are similarly heated until they meet the requirements for the 5X status.
Teledyne-Commodore	SET (Solvated Electron Technology)	In this process, a SET solution is prepared by mixing liquid sodium and ammonia to form a solution of sodium in liquid ammonia. This solution is used to detoxify agent by solvated electrons in a reactor. The detoxified agent solution with solids is then hydrolyzed with water to destroy excess sodium. Then the solution is separated by centrifuge and further treated by hydrogen peroxide or sodium persulfate to completely destroy the agent. Solid materials are separately decontaminated to 3X through agitation with a SET solution in a tumbler reactor.	The system is quite complex and has never been operated as a totally integrated package. The system involves at least 16 unit operations. Five are for SET treatment of agents, energetics, shredded dunnage, metal parts, and fuzes. This technology is not suitable for processing solid-phase material and has never been fully demonstrated in the decontamination of secondary waste.

Potential Alternate Treatment Technologies

Developer or Supplier	Technology Type	Description	Technical Maturity
Multiple Vendors	Saturated Steam Autoclave System	The autoclave system is designed to decontaminate secondary waste using high temperature (approximately 190 – 275°F) steam at a moderate pressure (less than 100 psi). The decontamination process involves waste loading, steam treatment, evacuation, monitoring, and unloading. During the treatment cycle, steam is used to volatilize, decompose, and/or hydrolyze agent, lowering the contamination level of the waste below the short-term exposure limit (STEL) (3X). The resultant gases and vapors are removed from the autoclave chamber under a vacuum and cooled for collection of condensable materials. The gases exiting the condenser (or heat-exchanger) are filtered or treated before their release to the atmosphere. The decontaminated waste is monitored to ensure the absence of agent, and unloaded from the autoclave chamber for further on-site or off-site treatment. The autoclave process is not a total solution for decontamination of secondary waste. The partially decontaminated waste, the condensate, and the off-gas require further treatment. Also, the process, which relies on steam decontamination, may not be suitable for the complete destruction of porous materials such as spent carbon and dunnage wood, although the design is expected to decontaminate those wastes for offsite shipment or disposal.	The autoclave concept has been used in industry for many years to destroy micro-organism and surface contaminants on medical and dental equipment. The units are typically sized for table top operations and are operated for hard, non-porous materials. Larger scale units have also been designed, however no full-scale process has been operated for the integrated treatment of agent-contaminated secondary waste such as those intended for the DUN.
Tennessee Valley Authority (TVA)	Electrical Resistance Heating (ERH)	This batch process (also referred to as an "autoclave" by TVA) was used by NSCM for treatment of metal parts generated from dismantling the former production facility (FPF) at NECD. The system consisted of a single reactor using electrical resistance heating elements, and could process 4 drums of metal parts per batch. Heat was applied until the internal temperature of the drums reached 1025°F, and was held for 60 minutes. No steam or air was added during the processing, and off gas generated was due to expansion of the air in the drums and vessel. Any off gas was passed through a multistage carbon filtration system before release to the atmosphere.	This system worked well in processing the necessary volume (less than 300 drums) at NECD. This process can be considered capable of processing bulk metal items including ton containers to a 5X condition. The system has not been used to process any other secondary waste materials. The batch process is labor intensive with manual loading and unloading of the drums. It provides limited capacity with an approximate 10 hour batch cycle time.

Potential Alternate Treatment Technologies

Developer or Supplier	Technology Type	Description	Technical Maturity
TVA - Pine Bluff NSCM	Pine Bluff Ton Container Decontamination Facility (PBTCDF)	A system at Pine Bluff is currently being used by Non-Stockpile to decontaminate a total of more than 4,000 empty ton containers (TC). The system uses multiple stations where TCs are heated by electrical induction. Each TC is covered with insulation and surrounded by an electrical induction coil. The alternating current in the coil sets up an electromagnetic field that generates heat at the TC. The TC is heated until it reaches a temperature of 1025°F, and is held for at least 15 minutes to meet the 5X criteria. As the TC heats up any gas inside expands and vents from the TC. Gas passes through a knockout pot to collect any residues, and then travels down an air manifold to a condenser. The gas then passes through HEPA and carbon filtration systems before release to the atmosphere.	This system is now operating successfully at Pine Bluff to decontaminate TCs. This system is designed to process only TCs to a 5X condition. The system has not been used to process any other secondary waste materials.
Parsons	Metal Parts Treater (MPT)	The MPT uses radiant and convection heating in an enclosed metal cylinder to raise metal parts to 1,000°F for at least 15 minutes to destroy agent contamination on these materials. Steam is used as a carrier or sweep gas to remove vapors and particulates released during heating that must be treated in the offgas treatment system. Secondary waste could be treated batch-wise by placing it into the MPT in containers.	The MPT is proposed for use at Blue Grass and Pueblo to decontaminate metal parts and treat contaminated secondary waste before off-site disposal. These ACWA facilities have not been constructed yet so this technology has not been fully demonstrated. A three-quarter-scale proof of concept unit has been constructed and tested during 2007. However, the NRC concluded that this unique design will require full-scale demonstration.

Potential Alternate Treatment Technologies

Developer or Supplier	Technology Type	Description	Technical Maturity
Parsons Infrastructure and Technology Group Inc./Honeywell	Continuous Steam Treater (CST)	This system treats various secondary wastes in a chamber, inductively heated to greater than 1,000 °F. Superheated steam at 1,000 °F is supplied counter currently to the flow of the wastes. A carrier material (like tabular alumina) is mixed with the wastes to help transport the material through the chamber. The secondary wastes are maintained at greater than 1,000 °F for more than 15 minutes to meet 5X criteria. Ash from the secondary wastes is separated from the carrier material and monitored for disposal. Vent gases are processed in a quench tower followed by a catalytic oxidation unit. Gases then pass through a lime bed and charcoal filters before release to the atmosphere.	The Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) processing plans include a CST for treatment of wood, plastic and carbon. This would be considered the first full-scale pilot plant operation for the CST. Previous evaluations of the technology have shown that the conditions in the CST should be capable of destroying agent in the secondary wastes, but the system has not been tested with actual agent. Previous tests have also indicated that some concerns remain regarding corrosion resistance of the materials of construction, and proper sizing of the catalytic oxidation unit.
Bechtel Aberdeen	Supplemental Decontamination Unit (SDU)	The SDU is a moderate temperature (approximately 190 – 350°F) electrically heated decontamination process designed primarily for DPE suits. In addition to DPE suits, miscellaneous solid-phase materials such as hoses, tools, and pumps can be decontaminated to a level below the STEL (3X). The process involves pre-decontamination, loading, heating and cooling, agent monitoring, and unloading. During the heating and cooling cycle, air flows through the unit to the scrubber, but no air flows during the monitoring cycle. The decontaminated materials are unloaded from the SDU and readied typically for off-site treatment.	This process is not designed for full decontamination to 5X, thus it requires further treatment of partially decontaminated 3X waste. Also, the effluent gas and the scrubber solution will require further treatment. The process is not usable for porous or combustible materials such as spent carbon and dunnage wood, and has only been demonstrated in the decontamination of limited types of secondary waste.

Attachment C

Response to Comments

Response to Comments

Best Available Technology Determination – Secondary Wastes Originally Intended for the Umatilla Chemical Agent Disposal Facility Dunnage Incinerator

State of Oregon
Department of Environmental Quality
Umatilla Chemical Demilitarization Program
256 E. Hurlburt Ave.
Hermiston, OR 97838
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PERMIT NUMBER: ORQ 000 009 431

WHAT WAS DECIDED? On September 11, 2007, the Environmental Quality Commission issued a decision on the best available technology for secondary wastes originally intended for destruction in the Dunnage Incinerator. The best available technology was determined to be incineration in the Deactivation Furnace System and Metal Parts Furnace. The Deactivation Furnace System and Metal Parts Furnace are two incinerators already in operation at the Umatilla Chemical Agent Disposal Facility (UMCDF), and have been tested and demonstrated to provide a more efficient and protective (to human health and the environment) means of safely decontaminating the secondary wastes originally permitted to be treated in the Dunnage Incinerator. This decision will be reconsidered by the Environmental Quality Commission during its June 19, 2008, meeting.

PUBLIC COMMENTS: Two public comment periods were conducted for this best available technology determination. The first public comment period on the Department's best available technology determination was held August 7 through 14, 2007, prior to presentation to the Environmental Quality Commission. A second public comment period was held to allow the public to provide comment on the Environmental Quality Commission's decision from January 15 through March 14, 2008. During this second comment period, both a public meeting and a public hearing were held. The DEQ received 33 sets of comments during the public comment periods, the majority of which concurred with the Commission's and Department's best available technology determinations.

List of Commenters

Supportive of DFS/MPF
Marie L. Baldo, LTC, USA Retired
William and Carol Bordwell
City of Hermiston, Oregon
City of Umatilla, Oregon
Confederated Tribes of the Umatilla Indian Reservation (CTUIR) (first comment period)
Patrick L. Cornett
Shannon Cornett
Russell Dorran
M. Steven Eldrige, General Manager and CEO, Umatilla electric Cooperative

Frank J. Harkenrider
Hon. Bob Jenson, Oregon State Representative
Allan Lambert
Tim Mabry, President, Credits, Inc.
Bill Myers
Dave Nevin
Jerry D. Pratton
Anna and Dave Rademacher
Laurie Ross
Nicholas A. Speed
Umatilla County, Oregon, Board of Commissioners
Richard C. Winter, Ph.D.

Supportive of Alternatives to the DFS/MPF
ARCTECH, Inc.
G.A.S.P./Government Accountability Project (GAP)
Steven A. McFadden, M.S.
Esther Monical
Bob Palzer, Ph.D., Chemical Issues Coordinator, Oregon Chapter Sierra Club

Comments Primarily Pertain to Another Matter
CTUIR (second comment period)
Suzanne Marshall, Ph.D.
Michael J. Marvinny
Ann Watters

WHERE CAN I GET MORE INFORMATION? A copy of this response to comments has been provided to each party who provided comment during the public comment period, along with a copy of the associated notice of decision. Copies of the notice of decision and the response to comments will also be placed in each of the information repositories listed in the notice of decision.

ACCESSIBILITY INFORMATION: The DEQ is committed to accommodating people with disabilities. Please notify the DEQ of any special physical or language accommodations or if you need information in large print, Braille, or another format. To make these arrangements, contact Shilo Ray in the DEQ Hermiston office (541) 567-8297, ext. 21, or toll-free in Oregon at (800) 452-4011), fax to (541) 567-4741, TTY (503) 229-6993, or e-mail to deqinfo@deq.state.or.us to request an alternate format.

RESPONSE TO COMMENTS

Response to Comments not in Support of the Deactivation Furnace System/Metal Parts System Technology as the Best Available Technology (BAT) for Treatment of UMCDF Agent-Contaminated Secondary Wastes Originally Intended for Treatment in the Dunnage Incinerator

Response to Comment (RTC) No.	COMMENT (Complete/Summarized Text) (Name of Commenter in Parentheses)	RESPONSE
RTC-1	All agent-contaminated materials should be processed on site, and all resulting products should be buried in a nuclear waste site. (McFadden – 1st comment period)	The UMCDF permit requires all agent-contaminated materials to be treated onsite. Agent-free wastes may be transported to a permitted off-site treatment, storage, and disposal facility (TSDF).
RTC-2	Include evaluation of alternative approaches for treating contaminated dunnage and wastes. None of these *[listed]* technologies (or any other alternatives) were considered by the EQC/DEQ in making their BAT determination in September 2007. The Army's nonincineration sites are employing alternative technologies to dispose of some or all of the secondary wastes. (G.A.S.P. – 1st and 2nd comment periods; Monical, Sierra Club – 2nd comment period)	Alternative (nonincineration) secondary waste treatment methods were evaluated. However, they are not mature, fully-developed technologies and/or, for various other reasons, are not appropriate for treatment of the wastes originally intended for treatment in the Dunnage Incinerator (DUN) (e.g., do not completely decontaminate the waste and thus still require incineration to complete the agent decontamination process, are not suitable for treatment of solid secondary wastes). Further, there is currently no means to test or otherwise confirm the complete decontamination of the secondary wastes after they have undergone nonincineration decontamination treatment. Therefore, they were not identified as viable options. While it is true that some nonincineration sites are testing and employing alternative methods to treat their secondary wastes, those with agent-contaminated wastes* are shipping them offsite to permitted TSDFs for incineration to complete the decontamination process. In one instance, headspace monitoring was used to determine if secondary waste had been completely decontaminated before being shipped to a TSDF. However, the wastes later offgassed agent into the transport container; and, thus, were not completely decontaminated as originally determined. * Some sites' alternative secondary waste treatment testing has been limited to agent-free wastes thus far.
RTC-3	Vendor proposed use of Actodemil® and HUMASORB® for treatment of secondary wastes in lieu of incineration. (ARCHTECH, Inc. – 2nd comment period)	

Response to Comment (RTC) No.	COMMENT (Complete/Summarized Text) (Name of Commenter in Parentheses)	RESPONSE
RTC-4	Why is there no repository for the UMCDF in the state of Washington? (McFadden – 1st comment period)	The Mid-Columbia Library in Kennewick, Washington, served as a UMCDF repository for a number of years. However, based on information provided by the library, the repository was not utilized, the library did not have the staff to adequately maintain it, and it required a great deal of space that the library believed could be better utilized (due to the nonuse of the repository). Therefore, the Kennewick Public Library was removed as a UMCDF public-information repository in September 2006. Public records related to the UMCDF are available through the DEQ's Chemical Demilitarization Program web page (http://www.deq.state.or.us/umatilla/cdpsearch/cdpSearch.asp), or you may contact the Department to view or request documents.
RTC-5	Impacts to worker health and safety from low-level chronic exposure, dioxin contamination (which led to the shut down of the Dunnage Incinerator in Utah) should be factored in the BAT. Also should consider the emissions from using the MPF and DFS for dunnage as a single source of or in combination with like emissions from other sources that pose a danger of noncancer adverse health effects to infants. (G.A.S.P. – 1st comment period, Sierra Club, 2nd comment period)	Both worker and off-site community health as well as environmental impacts were evaluated in the pre-trial burn risk assessment before issuance of the original permit. The recently completed post-trial burn risk assessment also addresses these issues. The systemization problems and inability of the DUN in Utah to meet emissions limits are factors to be considered in making the BAT determination. Both the MPF and DFS have both been tested and demonstrated to comply with the permitted emissions limits and are operated with pollution abatement systems (PASs) superior to the DUN PAS. The permitted emissions limits* for all five furnaces (the two Liquid Incinerators, Deactivation Furnace System [DFS], Metal Parts Furnace [MPF], as well as the DUN) were established in order to ensure the protection of human health and the environment. * The permitted emission limits are the maximum amounts allowable. However, the UMCDF typically operates well below these maximum limits.

Response to Comment (RTC) No.	COMMENT (Complete/Summarized Text) (Name of Commenter in Parentheses)	RESPONSE
RTC-6	What are the components of the secondary waste stream, identify which are agent contaminated, provide information on expected quantities, and provide a breakdown of the various decontamination methods that may be used on each component. Prepare a comprehensive fact sheet addressing each disposal/ decontamination method factor listed in comments and others considered important to the determination of BAT and release it to the public at least two weeks before the EQC's meeting in June (G.A.S.P. – 1st and 2nd comment periods)	The wastes originally intended for the Dunnage Incinerator were identified in the original Part B application as "... a combination of wooden pallets, laboratory solid wastes, metal packaging material, combustible dunnage and residue resulting from UMCDF closure, cleanup materials, and any other miscellaneous wastes that may potentially be contaminated with chemical agent" (Section D-1c, Incineration, Dunnage Incinerator). Based on lessons learned from the Johnston Atoll Chemical Agent Disposal System (JACADS), rather than accumulating agent-contaminated wastes in permitted storage to be treated after the stockpile has been destroyed, the UMCDF is making every effort to proactively treat agent-contaminated wastes concurrently with munitions processing. Nevertheless, the volume of currently stored wastes and expected volumes of waste is immaterial. Agent-contaminated wastes are not permitted to be shipped offsite, and solid secondary wastes treated by neutralization or alternative technologies alone cannot be determined to be agent free. As stated in the National Research Council's 2002 Analysis of Engineering Design Studies for Demilitarization of Assembled Chemical Weapons at Blue Grass Army Depot: "The reverse assembly of munitions, followed by water or caustic hydrolysis of nerve or mustard agents and associated energetic materials, is a mature, safe, and effective method for ***initial treatment*** of the chemical weapons stored at Blue Grass Army Depot. It is ready for immediate implementation for the neutralization of energetics and agents. ***However, the resulting hazardous streams must be treated further before they are released to the environment.***" [emphasis added] The Permit requires the on-site treatment of agent-contaminated waste; and the incineration system design, furnace feed rate limits, and emissions limits ensure the protection of human health and the environment. All the pertinent information has been addressed in the Department's evaluation of the BAT for secondary wastes (DEQ Item 08-0611).

Response to Comment (RTC) No.	COMMENT (Complete/Summarized Text) (Name of Commenter in Parentheses)	RESPONSE
RTC-7	The Resource Conservation and Recovery Act (RCRA) regulations on public participation were ignored. RCRA requires notice of any proposed permit to be published in a local newspaper and that the public be allowed to comment and attend a public hearing. The [first] seven-day public comment period is inadequate and request a minimum 30-day public review and comment period. (G.A.S.P. – 1st comment period)	The RCRA public participation requirements were not ignored, but were not applicable to the situation—the cited public participation requirements are not relevant to a BAT determination. To encourage public participation, U.S. Code Title 42, Section 6974(b)(1) identifies the responsibility of the Environmental Protection Agency Administrator (Administrator) to develop and publish minimum guidelines for public participation in "the development, revision, implementation, and enforcement of any regulation, guideline, information, or program under this chapter" (i.e., Chapter 82, Solid Waste Disposal). The Department and Environmental Quality Commission (Commission/EQC) adhere to the public participation requirements published by the Administrator. U.S. Code Title 42, Section 6974(b)(2) allows a public hearing to be requested but does not require a public hearing to be held; however, and more importantly, it pertains to the issuance of a permit (not a BAT reevaluation after issuance of a permit, which was the situation in this case). Despite the fact that there are no specific public participation requirements for a BAT determination, the Department requested public comment on its BAT determination before presenting same to the Commission. Further, the Commission opened a second comment period to allow the public to provide comment on the BAT determination decision that mirrored the RCRA permitting comment period. The second public comment period was open from January 15 through March 14, 2008.
RTC-8	Requested an alternative to incineration of high-mercury HD ton containers. (Marshall, Marvinny, Sierra Club, Watters – 2nd comment period)	Comments noted, but the destruction of high-mercury HD ton containers is outside the scope of this subject.
RTC-9	Questioned whether secondary waste incineration was accurately represented in both the pre-trial burn risk assessment and the recent data and reports prepared for the post-trial burn human health and ecological risk assessment (post-RA). Expressed desire to defer BAT and no major adverse impact determination. (CTUIR – 2nd comment period)	Comments noted. However, evaluation of the post-RA and its effect on a no major adverse impact determination for the UMCDF is a separate issue outside the scope of this subject. Furthermore, deferral of the BAT determination is not a practical possibility given the GASP V lawsuit and the implicit requirement to achieve redetermination by July 1, 2008.

BEFORE THE ENVIRONMENTAL QUALITY COMMISSION
OF THE STATE OF OREGON

In the Matter of	)	
Umatilla Chemical Demilitarization	)	Final Order Determining
Facility Hazardous Waste	)	Best Available Technology
Permit No. ORQ 000 009 431	)	For Secondary Waste

I. This matter came before the Environmental Quality Commission (EQC) for reconsideration on June 19, 2008.

II. In an Opinion And Order dated April 17, 2007 Judge Michael Marcus of the Multnomah County Circuit Court remanded the EQC's original Order issuing the hazardous waste treatment facility permit for destruction of chemical agent, UMCDF ORQ 000 009 431, for further proceedings regarding statutorily required Best Available Technology (BAT) and No Major Adverse Effect determinations. GASP et al v. Environmental Quality et al case No. 9708-06159, April 17, 2007 (GASP IV).

III. Judgment was entered in GASP IV on June 12, 2007.

IV. The Court Judgment directed the EQC to reassess BAT and No Major Adverse Effect determinations in light of certain changes in facility design and new evidence. In particular, the Court directed the EQC to reassess BAT for certain secondary wastes and mustard agent containing mercury at higher levels than anticipated. And the Court required the EQC to determine the role of the carbon pollution filter system (PFS) in relation to BAT.

V. On September 11, 2007 the EQC issued an Order determining that destruction of secondary waste including spent activated carbon, miscellaneous solid wastes consisting of laboratory solids, rags, paper, clean-up material, and TAP gear in the existing metal parts furnace and deactivation furnace was the BAT for treatment of those wastes, and that the facility using such treatment had No Major Adverse Effect on public health and safety or the environment of adjacent lands.

VI. The EQC subsequently requested permission from the Court to reconsider its September 11, 2007 secondary waste BAT Order to allow more time for public comment and further consideration of alternatives to incineration of secondary waste in the UMCDF furnaces.

VII. By Order of March 26, 2008, Judge Marcus issued an Order that, inter alia, granted the request by the EQC to allow it to reconsider its September 11, 2007 secondary waste BAT Order.

VIII. This EQC Order issued today constitutes the EQC's final secondary waste BAT Order after reconsideration as permitted by the Court.

VIV. The EQC specifically incorporates by reference the administrative record pertaining to its September 11, 2007 secondary waste BAT determination, has reviewed, considered, and adopted the staff report (including attachments A, B, and C) dated June 19, 2008, and has considered public comment.

FINDINGS

The EQC specifically makes the following findings as found and recommended by DEQ:

1. After careful consideration of alternatives, the EQC finds that incineration in the metal parts furnace and deactivation furnace system as currently configured represents the best available technology for treatment of agent-contaminated wastes originally destined for treatment in the Dunnage Incinerator and certain additional secondary wastes as specified in the June 2008 staff report with the exception of agent contaminated carbon. Addition of a carbon micronization process will be required as part of BAT for treatment of any agent contaminated carbon.

2. Incineration of secondary wastes in the UMCDF furnaces will not produce a major adverse impact to health or the surrounding environment. This finding is now further confirmed and supported by the Department's Post-Trial Burn risk assessment presented to the EQC on June 19, 2008 and approved by the EQC at that time.

7-1-08

3. In addition to its prior consideration of secondary waste treatment alternatives in connection with its September 11, 2007 ~~2008~~ BAT determination, the EQC considered additional off-site and on-site options as detailed in the June 2008 staff report and attachments.

2008 7-1-08

4. The EQC finds that alternative technologies (as described in the June ~~2007~~ staff report) and neutralization of agent-contaminated secondary wastes (as described in the June staff report) originally intended for the Dunnage Incinerator are not mature or presently available, and there is currently no means to determine the resulting wastes to be completely decontaminated. Off-site shipment of agent-contaminated wastes originally destined for the Dunnage Incinerator presents operational and handling risks that can not be readily quantified. Continued storage and/or landfilling at the Umatilla facility do not treat the waste and delay selection of the best available technology.

5. The EQC finds that Dunnage Incinerators have not been proven effective and do not represent BAT.

6. Continued storage of secondary waste increases handling and worker risk due to movement of waste from the furnaces back to storage, and results in inefficient use of the metal parts furnace and deactivation furnace during intervals between agent burns.

7. Off-site shipment increases risk to workers and transportation risks, and is opposed by key stakeholders such as the Confederated Tribes of the Umatilla;

8. Secondary waste trial burns from the metal parts furnace and deactivation furnace conducted January 25-30, 2007 indicate that emissions are well below permit and Maximum Achievable Control Technology (MACT) limits.

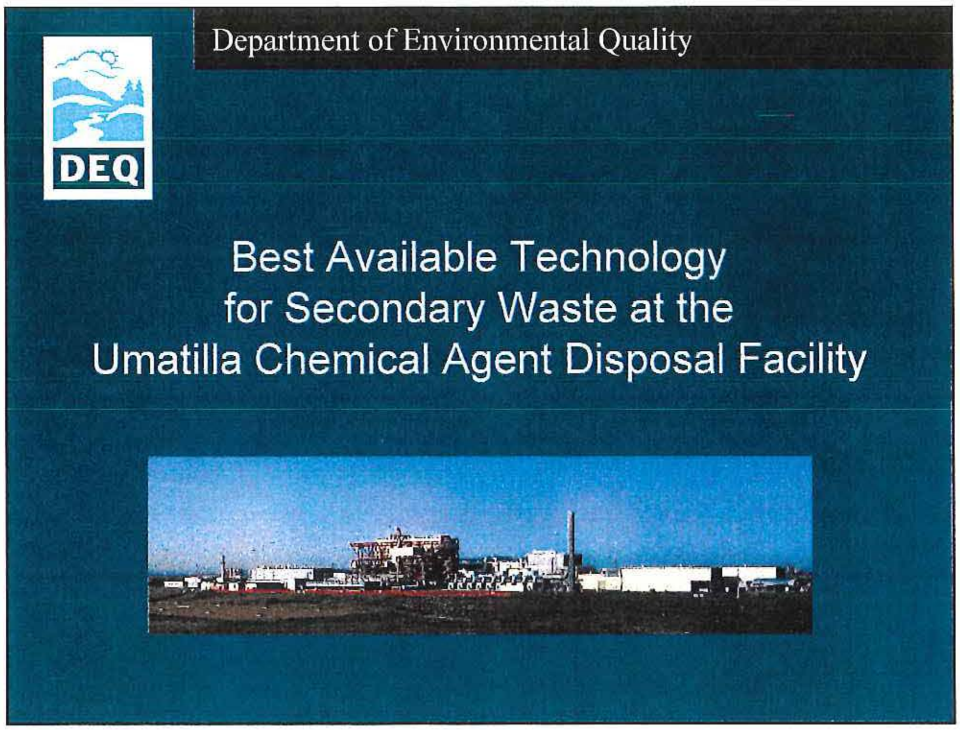
9. Permit modifications UMCDF-02-013, DFS Secondary Waste Treatment, May 21, 2002; UMCDF-02-014, MPF Secondary Waste Treatment, May 21, 2002; UMCDF-02-016, Addition of Wood Pallet Waste Stream, June 3, 2002; UMCDF-03-035, Depot Secondary Waste, July 22, 2003; UMCDF-05-034, Carbon Micronization System, October 24, 2007; UMCDF-06-033, MPF Secondary Waste Trial Burn Plan, August 15, 2006 are in place to allow processing of secondary waste in the MPF and DFS.

Dated this 30 day of June, 2008.

Dick Pedersen
Department of Environmental Quality
On behalf of the
Environmental Quality Commission

GENY3236

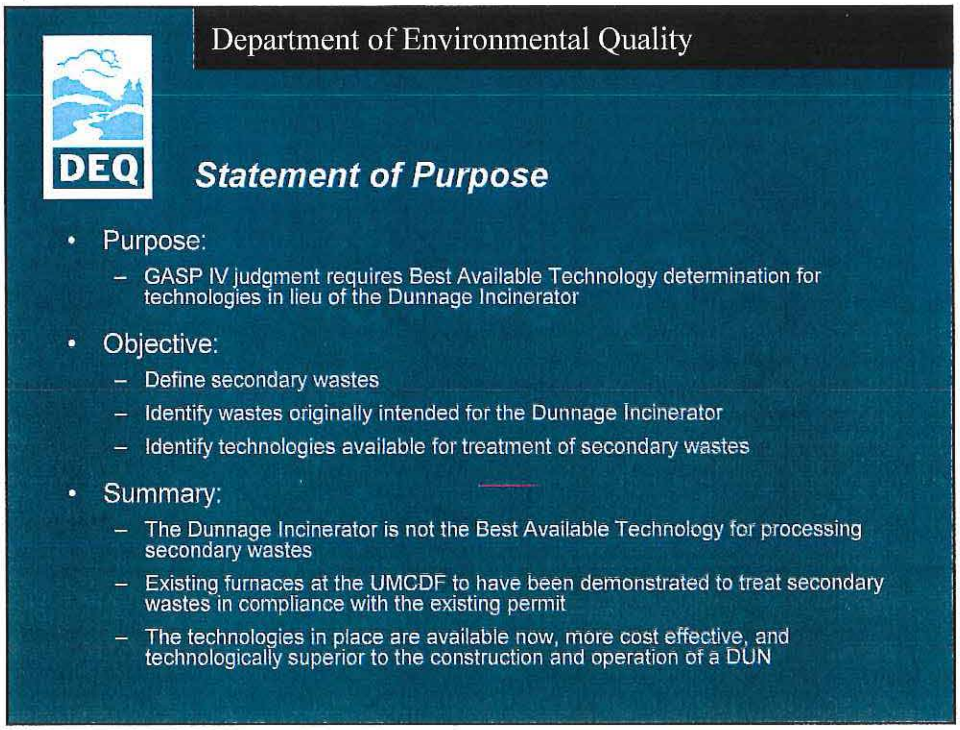
Item C
presentation



Department of Environmental Quality

DEQ

Best Available Technology for Secondary Waste at the Umatilla Chemical Agent Disposal Facility



Department of Environmental Quality

DEQ

Statement of Purpose

- Purpose:
  - GASP IV judgment requires Best Available Technology determination for technologies in lieu of the Dunnage Incinerator
- Objective:
  - Define secondary wastes
  - Identify wastes originally intended for the Dunnage Incinerator
  - Identify technologies available for treatment of secondary wastes
- Summary:
  - The Dunnage Incinerator is not the Best Available Technology for processing secondary wastes
  - Existing furnaces at the UMCDF to have been demonstrated to treat secondary wastes in compliance with the existing permit
  - The technologies in place are available now, more cost effective, and technologically superior to the construction and operation of a DUN

Department of Environmental Quality

Secondary Wastes

- **Definition**
- **Examples include:**
  - Laboratory operations
  - Protection of personnel or the environment
  - Facility maintenance
- **Regulatory requirements**

Department of Environmental Quality

The Six Major Secondary Waste Streams at the UMCDF

- Spent activated carbon
- Brine solutions or brine salts
- Dunnage
- Metal from munitions or ton containers
- Other miscellaneous solid wastes
- Spent decontamination solutions

Department of Environmental Quality

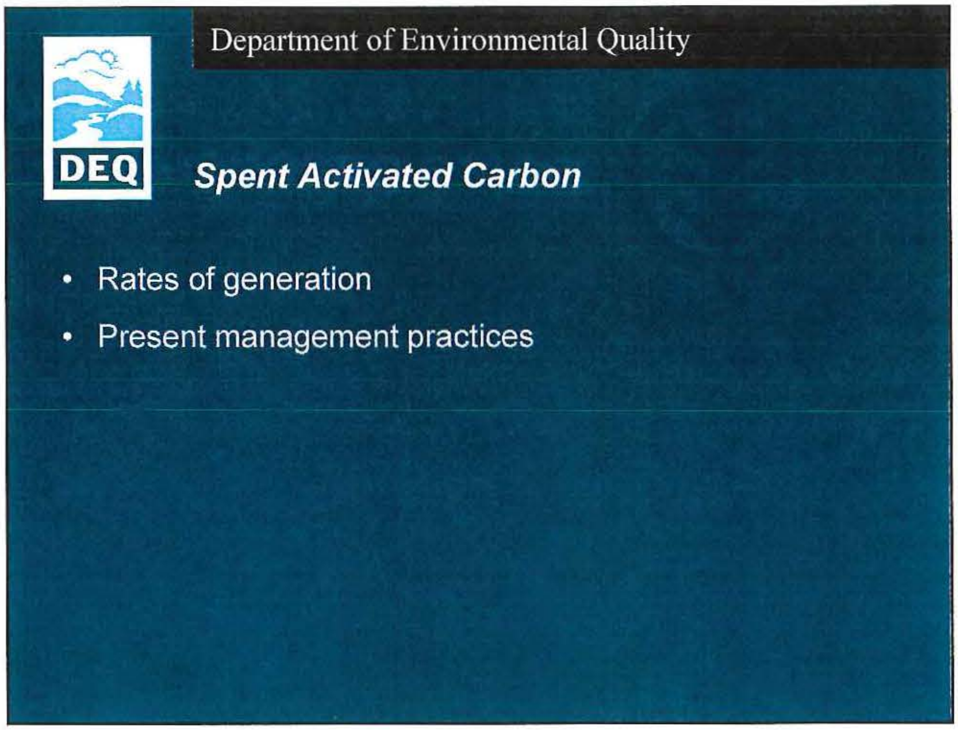
Secondary Waste Challenges

- Permit requirements and process limitations
- Accumulation of secondary wastes
- Maintaining compliance with all applicable laws
- Time consuming

Department of Environmental Quality

Secondary Wastes Originally Intended for the DUN

- Dunnage
- Spent Activated Carbon
- Miscellaneous Solid Wastes



Department of Environmental Quality

DEQ

Spent Activated Carbon

- Rates of generation
- Present management practices

Department of Environmental Quality

DEQ

Dunnage

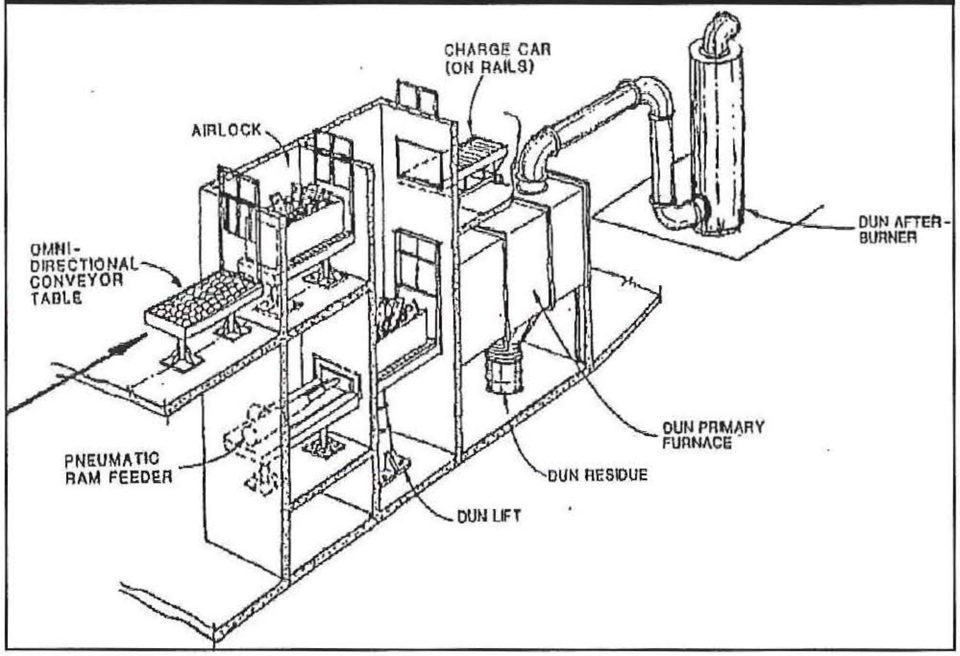
- Composition
- Types
  - Non-hazardous
  - Hazardous
- Present management practices

Department of Environmental Quality

Miscellaneous Solid Wastes

- Composition
  - Laboratory solids
  - Rags
  - Paper
  - Clean-up material
  - TAP Gear
- Does not include Demilitarization Protective Ensemble

Dunnage Incinerator



Department of Environmental Quality

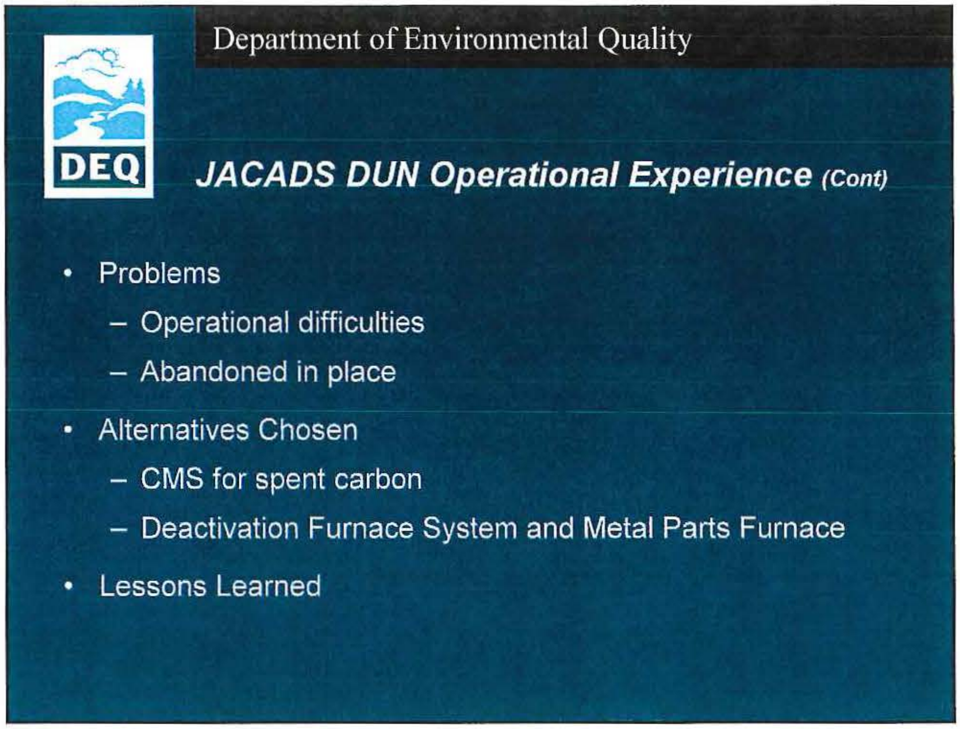
Dunnage Incinerator Operational Experience

- Johnston Atoll Chemical Agent Disposal System (JACADS)
- Tooele Chemical Agent Disposal Facility (TOCDF)
- Anniston Chemical Agent Disposal Facility (ANCDF)
- Pine Bluff Chemical Agent Disposal Facility (PBCDF)
- Umatilla Chemical Agent Disposal Facility (UMCDF)

Department of Environmental Quality

JACADS Operational Experience

- Constructed
- Operational history
  - Operated between June 1989 and March 1996
- Utilization
  - Limited primarily to wood and cardboard
  - Trial burn

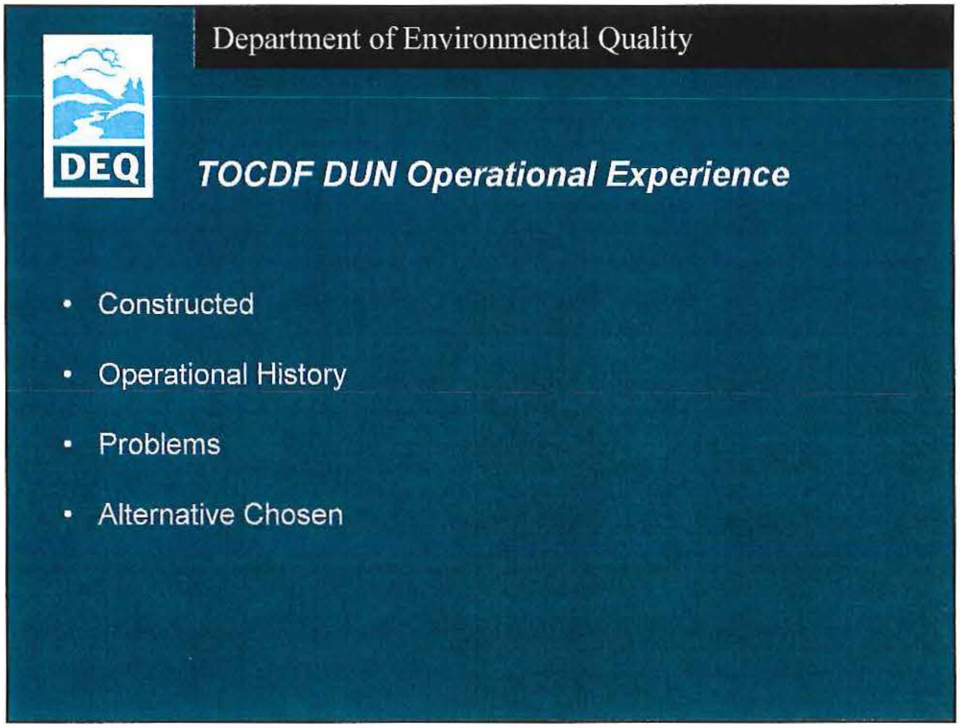


Department of Environmental Quality

DEQ

JACADS DUN Operational Experience *(Cont)*

- Problems
  - Operational difficulties
  - Abandoned in place
- Alternatives Chosen
  - CMS for spent carbon
  - Deactivation Furnace System and Metal Parts Furnace
- Lessons Learned

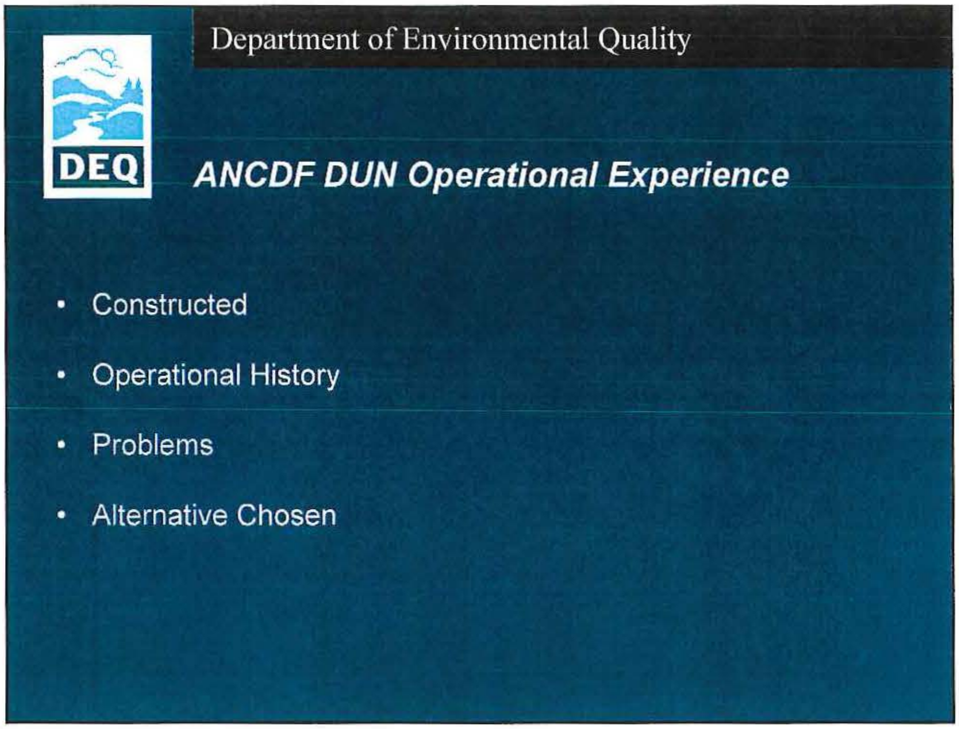


Department of Environmental Quality

DEQ

TOCDF DUN Operational Experience

- Constructed
- Operational History
- Problems
- Alternative Chosen

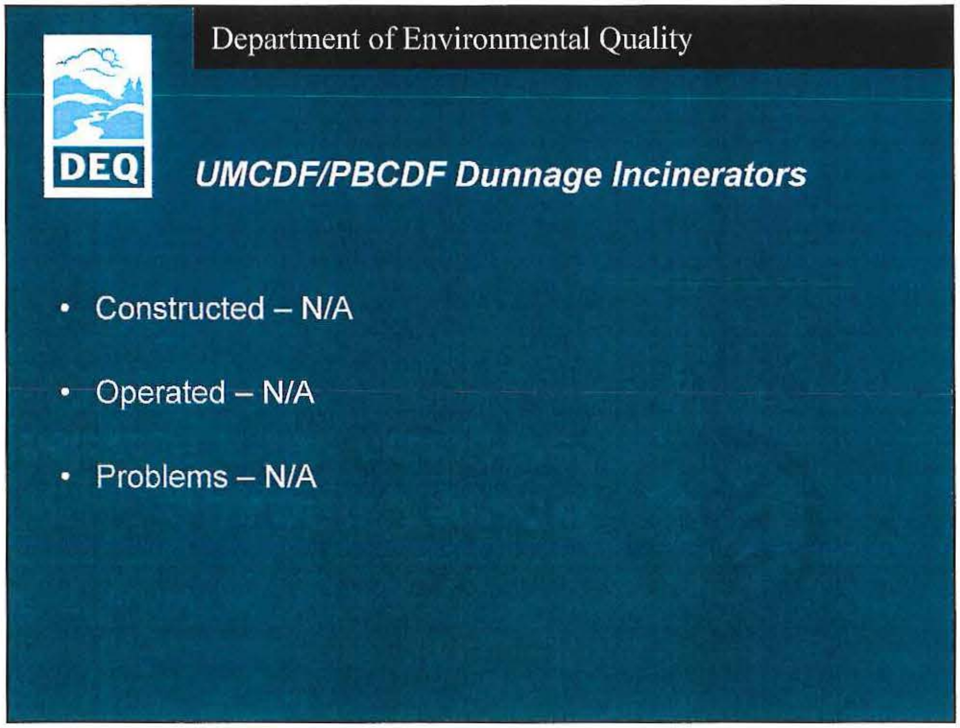


Department of Environmental Quality

DEQ

ANCDF DUN Operational Experience

- Constructed
- Operational History
- Problems
- Alternative Chosen

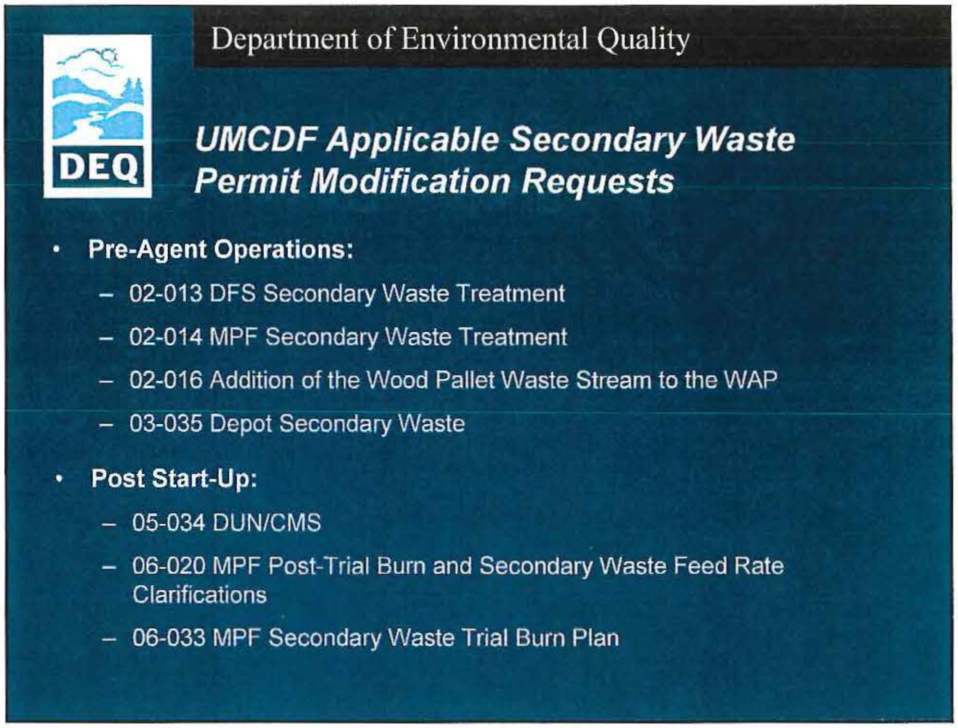


Department of Environmental Quality

DEQ

UMCDF/PBCDF Dunnage Incinerators

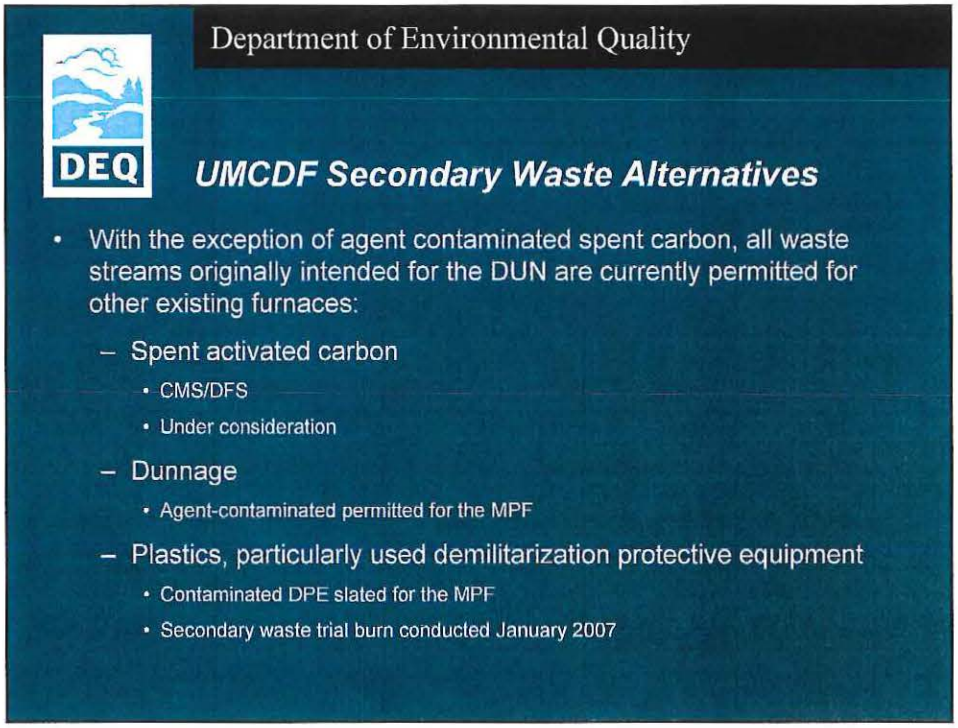
- Constructed – N/A
- Operated – N/A
- Problems – N/A



Department of Environmental Quality

UMCDF Applicable Secondary Waste Permit Modification Requests

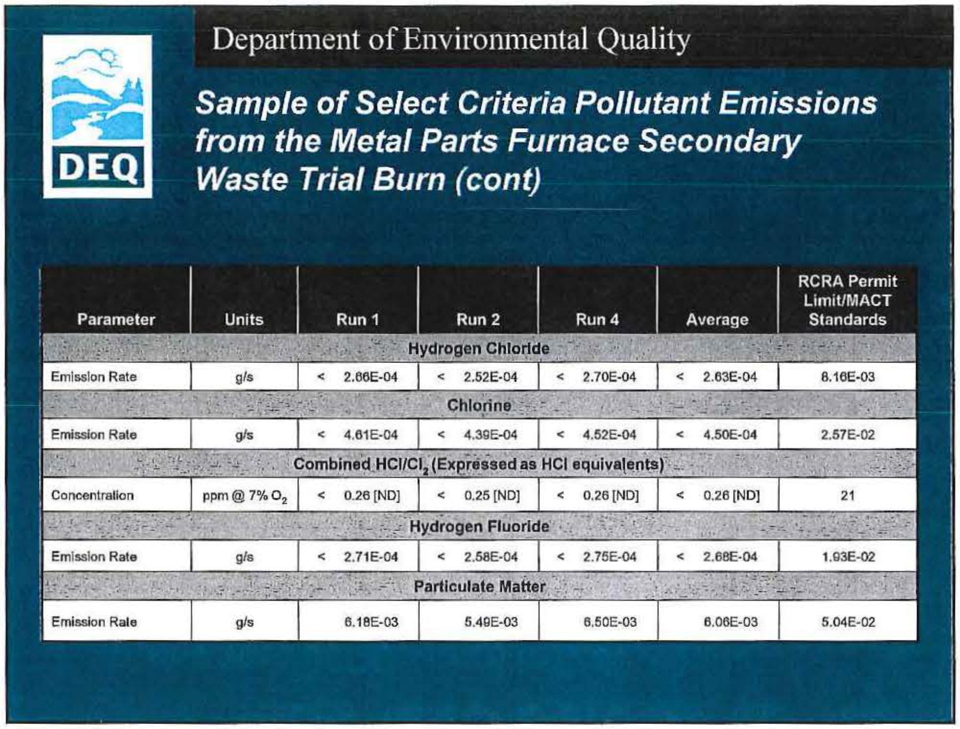
- **Pre-Agent Operations:**
  - 02-013 DFS Secondary Waste Treatment
  - 02-014 MPF Secondary Waste Treatment
  - 02-016 Addition of the Wood Pallet Waste Stream to the WAP
  - 03-035 Depot Secondary Waste
- **Post Start-Up:**
  - 05-034 DUN/CMS
  - 06-020 MPF Post-Trial Burn and Secondary Waste Feed Rate Clarifications
  - 06-033 MPF Secondary Waste Trial Burn Plan



Department of Environmental Quality

UMCDF Secondary Waste Alternatives

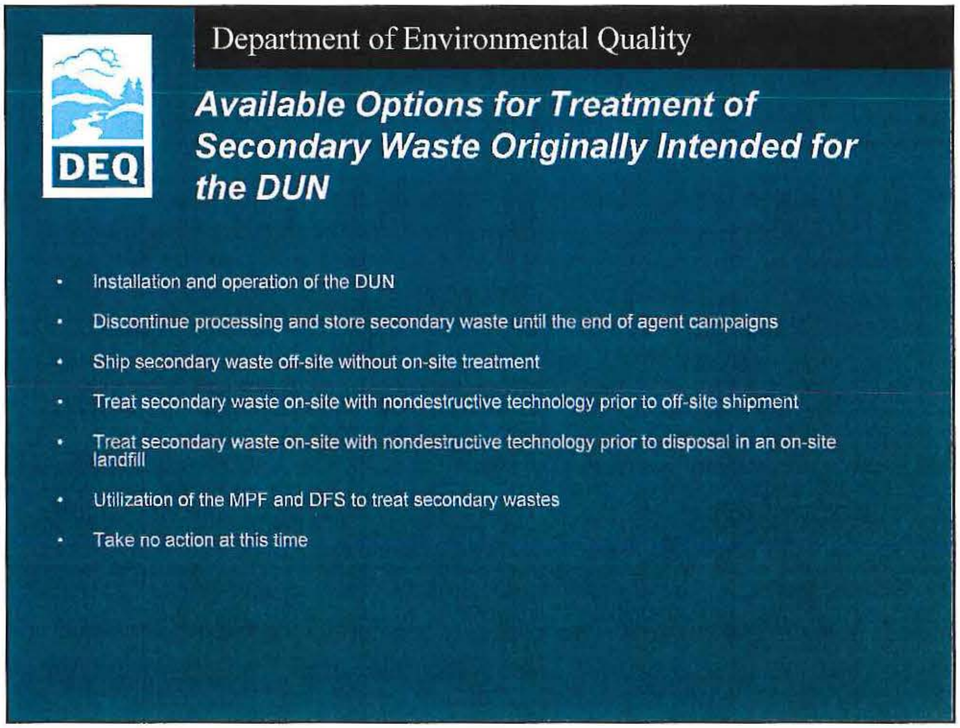
- With the exception of agent contaminated spent carbon, all waste streams originally intended for the DUN are currently permitted for other existing furnaces:
  - Spent activated carbon
    - CMS/DFS
    - Under consideration
  - Dunnage
    - Agent-contaminated permitted for the MPF
  - Plastics, particularly used demilitarization protective equipment
    - Contaminated DPE slated for the MPF
    - Secondary waste trial burn conducted January 2007



Department of Environmental Quality

Sample of Select Criteria Pollutant Emissions from the Metal Parts Furnace Secondary Waste Trial Burn (cont)

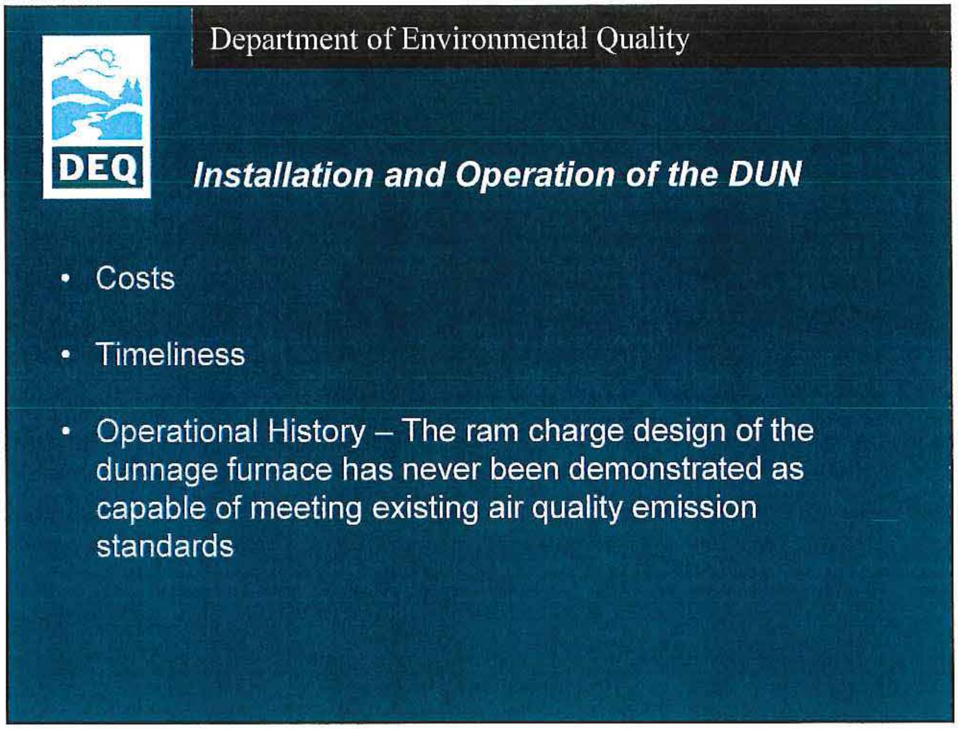
Parameter	Units	Run 1	Run 2	Run 4	Average	RCRA Permit Limit/MACT Standards
Hydrogen Chloride						
Emission Rate	g/s	< 2.66E-04	< 2.52E-04	< 2.70E-04	< 2.63E-04	8.16E-03
Chlorine						
Emission Rate	g/s	< 4.61E-04	< 4.39E-04	< 4.52E-04	< 4.50E-04	2.57E-02
Combined HCl/Cl_2 (Expressed as HCl equivalents)						
Concentration	ppm @ 7% O_2	< 0.26 [ND]	< 0.25 [ND]	< 0.26 [ND]	< 0.26 [ND]	21
Hydrogen Fluoride						
Emission Rate	g/s	< 2.71E-04	< 2.58E-04	< 2.75E-04	< 2.68E-04	1.93E-02
Particulate Matter						
Emission Rate	g/s	6.18E-03	5.49E-03	6.50E-03	6.06E-03	5.04E-02



Department of Environmental Quality

Available Options for Treatment of Secondary Waste Originally Intended for the DUN

- Installation and operation of the DUN
- Discontinue processing and store secondary waste until the end of agent campaigns
- Ship secondary waste off-site without on-site treatment
- Treat secondary waste on-site with nondestructive technology prior to off-site shipment
- Treat secondary waste on-site with nondestructive technology prior to disposal in an on-site landfill
- Utilization of the MPF and DFS to treat secondary wastes
- Take no action at this time

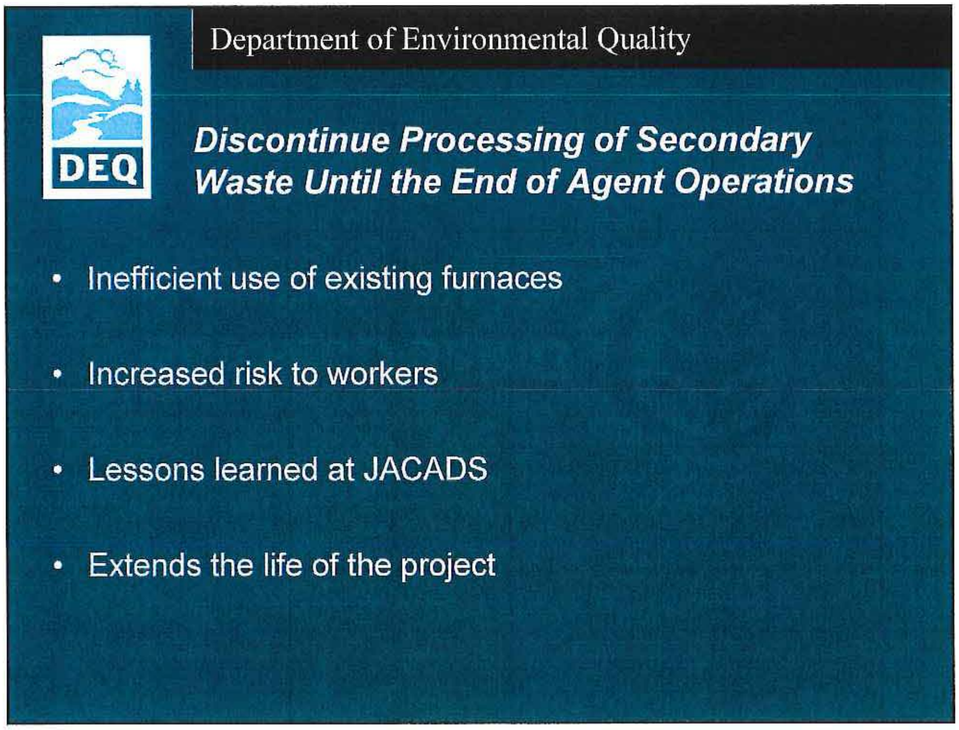


Department of Environmental Quality

DEQ

Installation and Operation of the DUN

- Costs
- Timeliness
- Operational History – The ram charge design of the dunnage furnace has never been demonstrated as capable of meeting existing air quality emission standards



Department of Environmental Quality

DEQ

Discontinue Processing of Secondary Waste Until the End of Agent Operations

- Inefficient use of existing furnaces
- Increased risk to workers
- Lessons learned at JACADS
- Extends the life of the project

Department of Environmental Quality

DEQ

Off-Site Treatment of Secondary Wastes

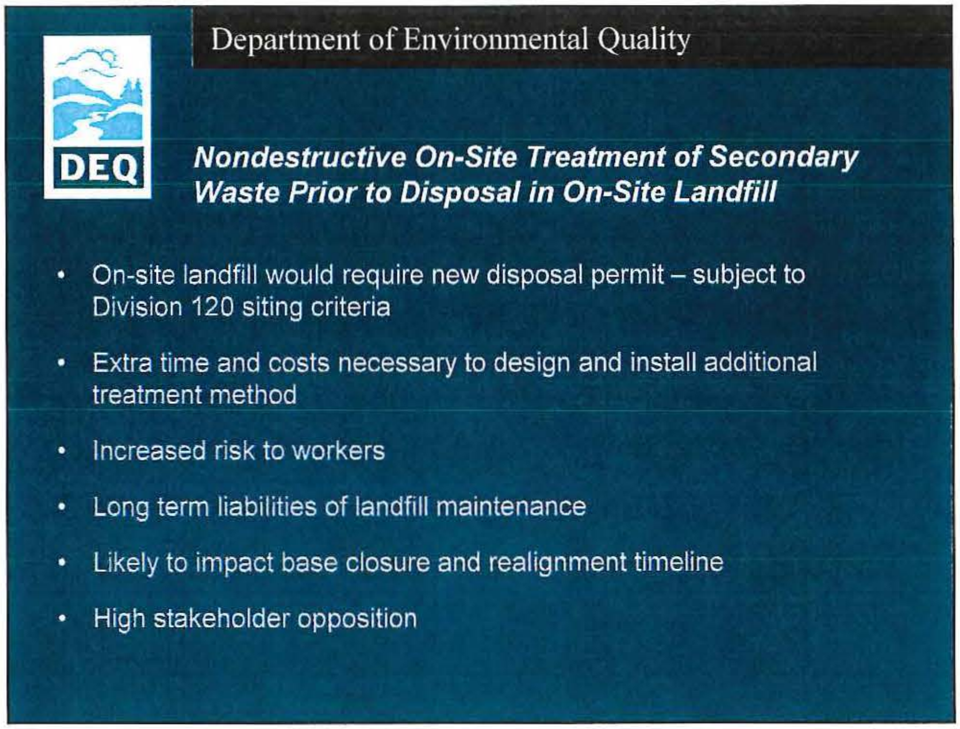
- Two industrial facilities available
  - Utah
  - Texas
- Increased risk to workers
- Inherent risks in transportation
- Requires modification of the existing permit to modify agent-free criteria for off-site shipment
- High stakeholder opposition
- Not suitable for some highly contaminated secondary wastes

Department of Environmental Quality

DEQ

Nondestructive On-Site Treatment of Secondary Waste Prior to Off-Site Shipment

- Two industrial facilities available
- Extra time and costs necessary to design and install additional treatment method
- Increased risk to workers
- Inherent risks in transportation
- Requires modification of the existing permit to modify agent-free criteria for off-site shipment
- High stakeholder opposition

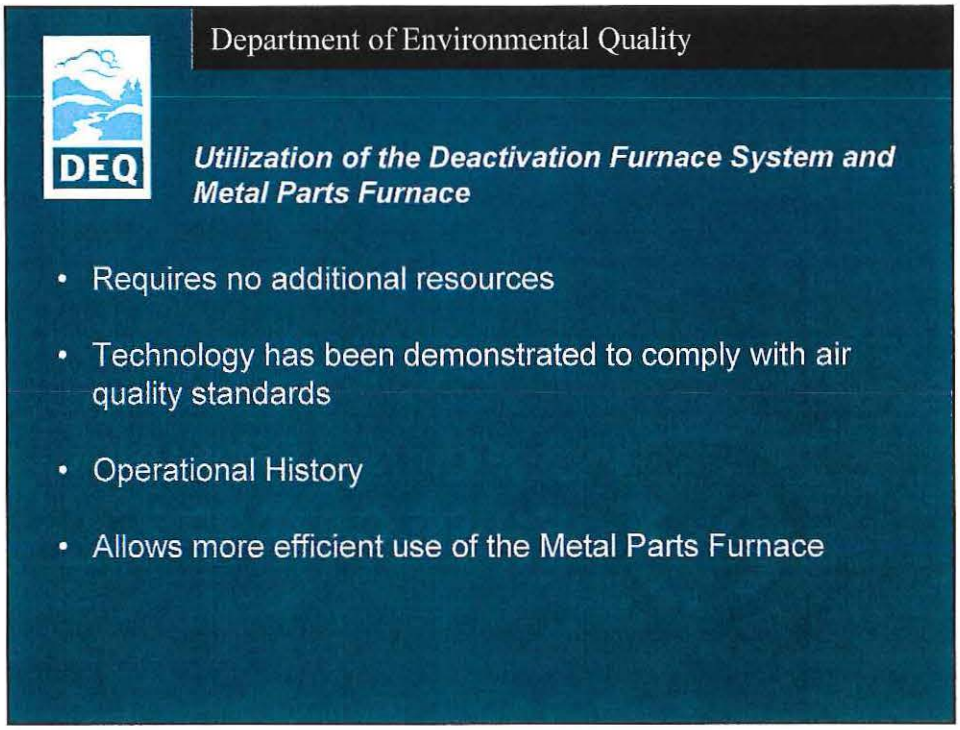


Department of Environmental Quality

DEQ

Nondestructive On-Site Treatment of Secondary Waste Prior to Disposal in On-Site Landfill

- On-site landfill would require new disposal permit – subject to Division 120 siting criteria
- Extra time and costs necessary to design and install additional treatment method
- Increased risk to workers
- Long term liabilities of landfill maintenance
- Likely to impact base closure and realignment timeline
- High stakeholder opposition



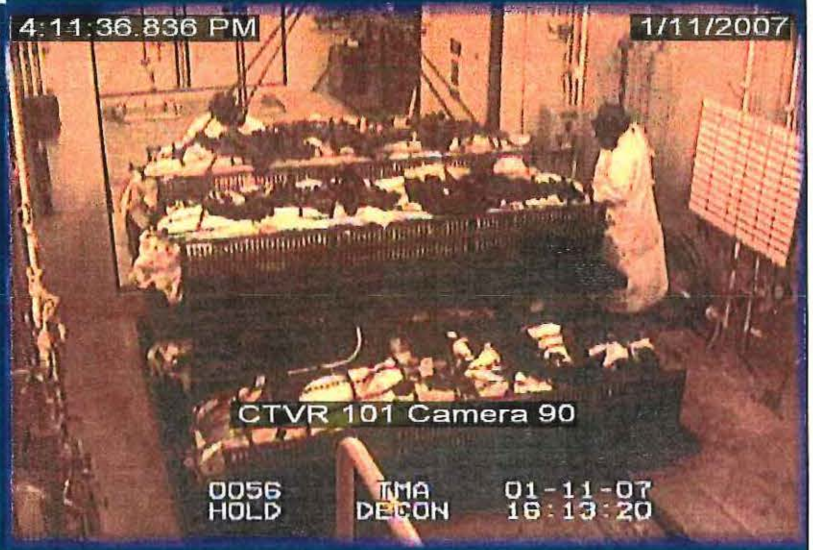
Department of Environmental Quality

DEQ

Utilization of the Deactivation Furnace System and Metal Parts Furnace

- Requires no additional resources
- Technology has been demonstrated to comply with air quality standards
- Operational History
- Allows more efficient use of the Metal Parts Furnace

Department of Environmental Quality



Department of Environmental Quality

Stakeholder Interest

- **Public Comments**
  - Umatilla County
  - City of Hermiston
  - Private citizens
  - GASP

Department of Environmental Quality

DEQ

Stakeholder Interest

- Confederated Tribes of the Umatilla Indian Reservation concerns:
  - Opposes the transfer of waste across their land
  - Interested in an expedient end to UMCDF operations
  - Latest opposition based on interim results of human health and ecological risk assessment
- Supports the use of the DFS/MPF

Department of Environmental Quality

DEQ

DEQ's Recommendation

- Recommendation
  - The Department recommends that the Commission find on reconsideration that incineration in the Metal Parts Furnace and/or Deactivation Furnace System as the best available technology to treat secondary wastes originally intended for the dunnage incinerator.

State of Oregon

Department of Environmental Quality Memorandum

Date: June 2, 2008

To: Environmental Quality Commission

From: Dick Pedersen, Acting Director

Subject: Agenda Item D, Informational Item: Inclusion of the Pollution Abatement System Carbon Filter System in the Umatilla Chemical Agent Disposal Facility Incineration Process as Best Available Technology
June 19-20, 2008 EQC Meeting

Purpose of Item This item provides background on the development and use of the Pollution Abatement System Carbon Filter System (PFS) at the Umatilla Chemical Agent Disposal Facility, and information supporting the Department of Environmental Quality's April 21, 2008 position that the best available technology determination for the UMCDF should be revised to require the PFS as part of the incineration process.

Background The final judgment in GASP, *et al*, v. EQC, *et al*, Case No. 9708-06159 (GASP IV) (Attachment A), remanded three issues to the EQC for findings that UMCDF is using the best available technology and that its operations have no major adverse impact on public health or the environment. One of the remanded best available technology determinations is the role of the PFS in the UMCDF incineration process.

In order to issue the initial operating permit in February 1997, ORS 466.055(3) required DEQ to find that the proposed UMCDF used the best available technology for treating agent-filled munitions and bulk items and the resulting secondary wastes. The EQC and DEQ determined the best available technology for the UMCDF was the Army's baseline incineration system, which was designed to meet all applicable regulatory criteria without a PFS. However, based on recommendations made by the National Research Council, the EQC required the construction and operation of the PFS as an additional measure of safety and as an additional condition of the final permit.

While the PFS was not a demonstrated technology for the chemical demilitarization incineration process when the DEQ issued the permit, the PFS has since been demonstrated to increase emission- removal efficiencies, such as increasing the munitions feed rate at the UMCDF.

In the approval of the Permit Modification Request UMCDF-03-041-PFS(3), "Change in Incinerator Emissions Compliance Point," the EQC found the PFS to be a proven technology and an integral part of the pollution abatement systems on the UMCDF incinerators, testing for compliance after the PFS provided a better means of assessing potential effects on public health, safety, and the environment, and the use of the PFS reduced risk to the public by providing for more expedient destruction of the stockpile.

The EQC's findings identified inclusion of the PFS in the UMCDF incineration process to be the best available technology without making a new, formal best available technology finding.

Key Issues

The key issue is whether the best available technology determination for the UMCDF incineration process should include and require operation of the PFS. The EQC must answer this question in order to address the remand of this issue to the EQC in the Multnomah County Circuit Court's GASP IV decision.

EQC has already identified the PFS as an integral part of the pollution abatement systems on the UMCDF incinerators that provides expedient destruction of the chemical agent munition stockpile.

Next Steps

At the August 2008 EQC meeting, DEQ will request that the EQC make a finding as to whether the best available technology for the UMCDF incineration process should include the PFS.

Attachments

A. GASP IV, Case No. 9708-06159, Judgment, (DEQ Item No. 07-1227)
B. "Findings and Conclusions of the Commission and Order in the matter of PMR UMCDF-03-041-PFS(3), 'Change in Incinerator Emissions Compliance Point,'" May 21, 2004. (DEQ Item 04-0795)

Available Upon Request

- "Agenda Item H, Action Item: Decision on Modification of the UMCDF Hazardous Waste Permit to Change the Incinerator Emission Compliance Point, May 20-21, 2004, EQC Meeting," memorandum dated April 29, 2004. (DEQ Item 04-0695)
- Umatilla Chemical Agent Disposal Facility (UMCDF), 2003, "Submittal of Class 3 Permit Modification Request UMCDF-03-041-PFS(3), "Change in Incinerator Emissions Compliance Point," letter No. ENV-03-0288 dated September 15, 2003. (DEQ Item No. 03-1653)

Approved:

Section: ______________________
Richard C. Duval, Administrator
DEQ Chemical Demilitarization Program

Division: ______________________
Joni Hammond, Acting Deputy Director

Report Prepared By: Kelly Hodney, Sr. Hazardous Waste Specialist
Phone: (541) 567-8297, extension 30

Attachment A

GASP IV, Case No. 9708-06159, Judgment

600.01

07-1247 -0- AJ

ENTERED
JUN 13 2007
IN REGISTER SD

FILED
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CIRCUIT COURT
FOR MULTNOMAH COUNTY

IN THE CIRCUIT COURT OF THE STATE OF OREGON

FOR THE COUNTY OF MULTNOMAH

GASP, *et al.*, Petitioners, v. ENVIRONMENTAL QUALITY COMMISSION, *et al.*, Respondents, and UNITED STATES ARMY, and WASHINGTON DEMILITARIZATION COMPANY, Intervenor-Respondents.	Case No. 9708-06159 **STIPULATED GENERAL JUDGMENT**

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY
RECEIVED
AUG 13 2007
HERMISTON OFFICE

Petitioners have brought a Petition for Review against the State of Oregon Environmental Quality Commission ("EQC") and the State of Oregon Department of Environmental Quality ("DEQ") to require that Air Contaminant Discharge Permit #25-004 ("ACDP") issued by DEQ and Hazardous Waste Permit I.D. No. OR6 213 820 817 ("HWP") issued by EQC be reversed and or remanded; and

The United States Army ("Army") and Washington Demilitarization Company ("WDC"), both named permitees on these permits, having intervened as intervenor-respondents and joined the state in opposing the Petition for Review; and

This Court having dismissed the petition for review as to the ACDP by Order dated June

14, 2006; and

This Court having issued its Opinion and Order dated April 17, 2007 granting in part and denying in part the petition as to the HWP;

It is ADJUDGED that the OREGON EQC'S determinations made pursuant to ORS 466.055 as to whether the Umatilla Chemical Agency Disposal Facility uses the best available technology and has no major adverse impact on public health or the environment in regard to (a) destruction of any mustard in any ton container that contains significantly higher mercury levels than previously reported; (b) the destruction of hazardous waste originally intended for the dunnage incinerator; and (c) the role of PFS carbon filters; are remanded to the State of Oregon Environmental Quality Commission for consideration and further proceedings consistent with the court's opinion of April 17, 2007.

The petition regarding the HWP is granted in regard to the above referenced findings that are remanded to the EQC. The petition regarding the HWP is otherwise denied.

DATED this 12 day of June, 2007.

Michael H. Marcus
Circuit Court Judge

Submitted by: Stuart A. Sugarman
Of Attorneys for Petitioners GASP *et al.*

Marc Abrams
Senior Assistant Attorney General
Of Attorneys for Respondents DEQ and EQC

Attachment B

EQC Decision on Permit Modification Request UMCDF-03-041-PFS(3) "Change in Incinerator Emissions Compliance Point"

04-0795

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY
RECEIVED
MAY 21 2004
HERMISTON OFFICE

BEFORE THE ENVIRONMENTAL QUALITY COMMISSION
OF THE STATE OF OREGON

In the Matter of Hazardous Waste Storage and Treatment Permit No. ORQ 000 009 431 Umatilla Chemical Agent Disposal Facility (UMCDF) Permit Modification No. UMCDF-03-041-PFS(3), "Change in Incinerator Emissions Compliance Point."	FINDINGS AND CONCLUSIONS OF THE COMMISSION AND ORDER

BACKGROUND FINDINGS

1. On February 10, 1997, the Environmental Quality Commission issued FINDINGS AND CONCLUSIONS OF THE COMMISSION AND ORDER ("Commission Order") directing issuance of a Hazardous Waste Storage and Treatment Permit (HW Permit) to the United States Army (Army) for construction and operation of incinerators to destroy chemical weapons stored at the Umatilla Chemical Depot (the incineration facility is known as the Umatilla Chemical Agent Disposal Facility or UMCDF).

2. The UMCDF HW Permit names the U.S. Army Umatilla Chemical Depot (UMCD) and U.S. Army Project Manager for Chemical Stockpile Disposal (PMCSD)[1] as Owner and Operator, and Washington Demilitarization Company (WDC) as Co-Operator. Collectively, these three entities are referred to as the "Permittees."

3. On September 16, 2003 the Permittees submitted a Class 3 Permit Modification Request (PMR) [UMCDF-03-041-PFS(3), "Change in Incinerator Emissions Compliance Point"] to the Department of Environmental Quality (Department). A copy of the PMR was sent to the Commission by the Department on October 2, 2003.

4. PMR UMCDF-03-041-PFS(3) requested that the Department determine each incinerator's compliance with HW Permit limits using the air pollutant levels as measured after the pollution abatement system carbon filter system (PFS).

---

[1] PMCSD is now known as the Program Manager for Elimination of Chemical Weapons (PM ECW).

5. A 60-day public comment period was held open from September 17 through November 17, 2003.

6. The Permittees held a public meeting on October 21, 2003 in Hermiston, Oregon.

7. The Department issued a Notice of Deficiency on the PMR to the Permittees on November 5, 2003.

8. The Department received eight written comments on the PMR by the close of the 60-day comment period on November 17, 2003.

9. The Permittees responded to the Department's Notice of Deficiency on December 1, 2003.

10. On January 9, 2004 the Department sent the Permittees a Notice of Substantial Completion and Intent to Prepare Draft Permit.

11. The Department, having made a tentative decision to recommend that the Commission approve the PMR as originally proposed, prepared a public notice and RCRA (Resource Conservation and Recovery Act) Fact Sheet on January 14, 2004. The public notice was sent to all persons on the Department's mailing list for UMCDF activities.

12. A copy of the Notice of Deficiency, the Permittees' response to the Notice of Deficiency, the public notice, the RCRA Fact Sheet, and a full copy of all comments received during the first comment period were transmitted to the Commission by the Department on January 27, 2004.

13. A public comment period on the proposed permit modification UMCDF-03-041-PFS(3) was held open from January 14 through March 1, 2004.

14. The Commission accepted oral public comment on the proposed permit modification on February 5, 2004. Four persons provided oral comments (two from the same organization).

15. The Department held a public hearing on the proposed permit modification on February 18, 2004. Fifteen oral comments were received.

16. The Department received ten written comments on the PMR by the close of the second comment period on March 1, 2004.

17. Written transcripts of the oral public comments provided on both February 5 and February 18, 2004 were provided in a staff report sent to the Commission on April 29, 2004 for the May 20, 2004 meeting of the Commission (May Staff Report).

18. A total of 28 persons/organizations provided written and/or oral comments during the two comment periods. All written comments were included as an attachment to the May Staff Report sent to the Commission on April 30, 2004.

19. The Commission held a meeting to consider the proposed modification UMCDF-03-041-PFS(3) to the UMCDF HW Permit on May 20, 2004 in Hermiston, Oregon. Additional oral discussion and comment were provided at this meeting by Department staff.

LEGAL STANDARDS

20. 40 C.F.R. 270.41 and 270.42 govern modification of hazardous waste permits. For agency-initiated modifications, "cause" for modification includes:

> "(1) Alterations. There are material and substantial alterations or additions to the permitted facility or activity which occurred after permit issuance which justified the application of permit conditions that are different or absent in the existing permit.
>
> "(2) Information. The [agency] received information. Permits may be modified during their terms for this cause only if the information was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and would have justified the application of different permit conditions at the time of issuance.
>
> "(3) New Statutory Requirements or Regulations. The standards or regulations on which the permit was based have been changed by statute, through promulgation of new or amended standards or regulations, or by judicial decision after the permit was issued."

21. For permit modifications requested by the permittee, the Commission has broad discretion to modify the permit as long as the modification complies with federal and state law, and does not increase the risk of harm to human health and the environment. ORS 466.020(2) and 40 C.F.R. 270.42.

FINDINGS PERTAINING TO PERMIT MODIFICATION REQUEST UMCDF-03-041-PFS(3) "CHANGE IN INCINERATOR EMISSIONS COMPLIANCE POINT"

22. The HW Permit requires that UMCDF incinerators utilize multi-stage pollution abatement systems consisting of quench tower, venturi scrubber, packed bed scrubber tower, mist eliminator vessel, gas reheater, and a carbon filter system (PFS).

23. When the Commission approved the UMCDF HW Permit in February 1997, it required that compliance with emissions standards be determined at a point just before the emissions stream enters the PFS.

24. A petition for judicial review of the February 1997 Commission Order was filed in Multnomah County Circuit Court. In December 1998, the court issued an order on review, finding that "apart from one critical ambiguity," the findings, conclusions and procedures set forth in the February 1997 Commission Order "were consistent with applicable law, supported by substantial evidence in the record as of the time that record closed, and within the discretion afforded to [DEQ/EQC]."

25. The "critical ambiguity" identified by the court related to the PFS. The court remanded the February 1997 Commission Order to the Commission to clarify what role the PFS played in its analysis. On remand, the Commission took written comments and issued a "Clarifying Order" dated March 19, 1999. The Clarifying Order stated that the Commission "did not rely on PAS carbon filters in finding that the baseline incineration technology is the best available technology for destruction of the agent at Umatilla" and that the Commission required the inclusion of the PFS for "an additional measure of safety."

26. In June 1999, the court found that the Clarifying Order resolved the ambiguity and affirmed the Commission Order.

27. The PFS has been installed and is fully operational at UMCDF. The Department and the Commission have received information relating to the PFS that was not available at the time of permit issuance. That information includes:

(a) A report from the National Research Council (NRC) dated August 12, 1999, titled "Carbon Filtration for Reducing Emissions for Chemical Agent Incineration."

(b) Information presented to the Commission during a 60-day public comment period opened on July 19, 1999 for the purpose of receiving information regarding the PFS.

(c) Information presented to the Commission at a special work session held on August 19, 1999 regarding the PFS.

(d) Information presented to the Commission about storage and disposal risk, presented in Attachment M of the May Staff Report.

(e) Information relating to prior permit modification requests submitted by the permittees regarding the PFS, including substantial design improvements to the PFS.

(f) Emission testing results from surrogate trial burns (STB) conducted on the incinerators at UMCDF. A summary of selected STB results is set forth in Attachment N to the May Staff Report.

(g) Information relating to the performance of a virtually identical PFS system at the Anniston (Alabama) chemical weapons incineration facility. The Anniston facility determines compliance with emission standards after the emission stream exits the PFS. A summary of selected STB results is set forth in Attachment N to the May Staff Report.

28. On September 30, 2003, new emission standards, known as Maximum Achievable Control Technology (MACT) standards, went into effect. *See* 40 C.F.R. 63

(subpart EEE). Under the MACT standards, emission levels are tested at the point emissions are released into the atmosphere. As a result, the MACT standards allow the UMCDF permittees to demonstrate compliance with emission standards after the emission stream exits the PFS.

29. Although cause is not specifically required for permit modifications requested by a permittee, the Commission finds that the new information regarding the PFS and the new MACT standards, would support a finding of cause for modifying the permit as requested by the permittees.

30. The Commission concludes in its discretion that the permit should be modified as requested by the permittees. In reaching that conclusion, the Commission notes the following:

(a) Effects on public health, safety and the environment are determined by emissions that enter the atmosphere, not by pollutants in the emissions stream that enter the PFS but are not released into the atmosphere. Testing for compliance with emission standards after the emissions stream exits the PFS provides a better way of assessing the potential effects on public health, safety and the environment.

(b) As explained in the May Staff Report, denying the requested modification would require the permittees to significantly reduce the rocket feed rate to approximately one or two rockets per hour in order to meet all emission standards set forth in the HW Permit. This potentially extends the destruction of the chemical weapons stockpile by five years or more.

(c) Risk assessments have predicted that the risks of continued storage exceed the risks associated with incineration activities, though both levels of risk are relatively low in comparison to risks accepted by the public in everyday life.

Thus, any delay in the stockpile destruction increases the risks to public health and safety.

(d) Public comments from community and tribal leaders and others tend to support granting the requested modification, in part because of opposition to any delays in destroying the chemical weapon stockpile.

(e) The PFS is proven technology and an integral part of the pollution abatement systems on each of the four incinerators at UMCDF.

(f) Approval of this modification provides UMCDF a consistent point of compliance for both the state and federal standards and eliminates the need to test the incinerators with the PFS offline.

(g) Although granting the modification could be criticized as inconsistent with the position adopted by the Commission in the February 1997 Order and the March 1999 Clarifying Order, there are good reasons for granting the modification. The UMCDF facility is capable of meeting emission standards in the HW Permit without accounting for the additional protections provided by the PFS, but feed rates would have to be significantly reduced for the DFS to meet those standards without accounting for the PFS.

- Incineration facilities at JACADS (Johnston Atoll Chemical Agent Disposal System) and TOCDF (Tooele Chemical Agent Disposal Facility) successfully destroyed tons of chemical weapons safely without an operational PFS system.
- STB results have demonstrated that all of the incinerators at UMCDF except for the Deactivation Furnace System (DFS) can satisfy all of the original HW Permit emission standards, and the new MACT standards, without accounting for the additional emission reductions

provided by the PFS, and without significantly reducing the feed rates.

- The DFS can satisfy substantially all of the emission standards in the original HW Permit, and the new MACT standards, without significantly reducing feed rates. STB results have shown that for a few particular metals that were injected into the surrogate materials being tested in order to approximate "worst case" scenarios, the permittees would be required to substantially reduce rocket feed rates for the DFS in order to satisfy the emission standards for those metals.

(h) In addition, the PFS was originally added primarily to address concerns about dioxin and chemical agent emissions. The PFS still serves its original function of providing an added level of protection against dioxin and chemical agent emissions; it also continues to serve its intended purpose of providing an added level of protection against the emission of other hazardous air pollutants.

CONCLUSION OF THE COMMISSION

31. The Commission has adequate legal authority to modify the UMCDF HW Permit as proposed.

32. Under the circumstances, the Commission finds that the modification complies with state and federal law and does not cause any increased risk to public health, safety, and the environment. The permit should be modified as requested for the reasons set forth in this Order and in the May Staff Report dated April 29, 2004.

ORDER

Now, therefore, IT IS ORDERED that:

1. These findings, conclusions and order shall constitute the Commission's final permit modification decision and response to public comments.

2. Hazardous Waste Storage and Treatment Permit No. ORQ 000 009 431 is modified in accordance with Permit Modification No. UMCDF-03-041-PFS(3), "Change in Incinerator Emissions Compliance Point," as set forth in Exhibit 1.

3. This Order shall be an Order in Other Than a Contested Case, subject to judicial review pursuant to ORS 183.484. No administrative appeal of the permit modification shall be provided to the applicant or third parties.

DATED this 21st day of May, 2004.

Mark Reeve, Chair
For the Environmental Quality Commission

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EXHIBIT 1
Permit Modification No. UMCDF-03-041-PFS(3)
"Change in Incinerator Emissions Compliance Point"

Modification to
Umatilla Chemical Agent Disposal Facility
Hazardous Waste Storage and Treatment Permit No. ORQ 000 009 431
[Underlined text to be added; ~~struck-out~~ text to be deleted]

Permit Module	Comments
MODULE VI ("Short Term Incineration - Shakedown, Trial Burn And Post-Trial Burn")	
Condition VI.A.1.vi. (Construction and Maintenance)	Change the phrase "before entering" to "after exiting"
Module VII ("Incineration – Normal Operations")	
Condition VII.A.8 (General Operation))	Change the phrase "before entering" to "after exiting"

MODULE VI - SHORT TERM INCINERATION - SHAKEDOWN, TRIAL BURN AND POST-TRIAL BURN

VI.A. GENERAL CONDITIONS DURING SHAKEDOWN, TRIAL BURN AND POST-TRIAL BURN FOR ALL INCINERATORS AT THE UMCDF SITE

V1.A.1. **Construction and Maintenance** [40 CFR §264.31]

i. – v. [Not shown here]

vi. The Permittee shall maintain and operate each incinerator during shakedown, trial burn and post-trial burn periods in accordance with the operating requirements specified in this permit. Each incinerator shall meet the applicable performance standards specified in Permit Conditions VI.B.1., VI.C.1., VI.D.1., and VI.E.1. ~~before entering~~ after exiting each incinerator's carbon filter system.

MODULE VII - INCINERATION - NORMAL OPERATION

VII.A. GENERAL CONDITIONS FOR ALL INCINERATORS AT THE UMCDF SITE

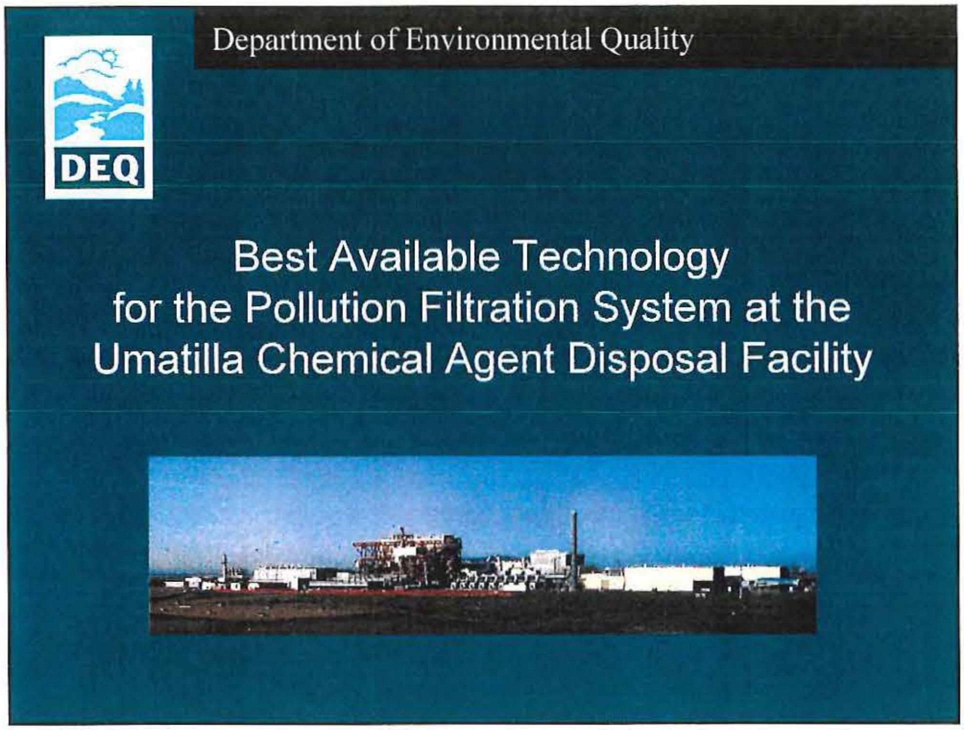
VII.A.1 – VII.A.7 [Not shown here]

VII.A.8. **General Operation**

The Permittee shall maintain and operate each incinerator during shakedown, trial burn and post-trial burn periods in accordance with the operating requirements specified in this Permit. Each incinerator shall meet the applicable performance standards specified in Permit Conditions VII.B.2., VII.C.2., VII.D.2., and VII E.2. ~~before entering~~ after exiting each incinerator's carbon filter system.

EXHIBIT 1, PAGE 2

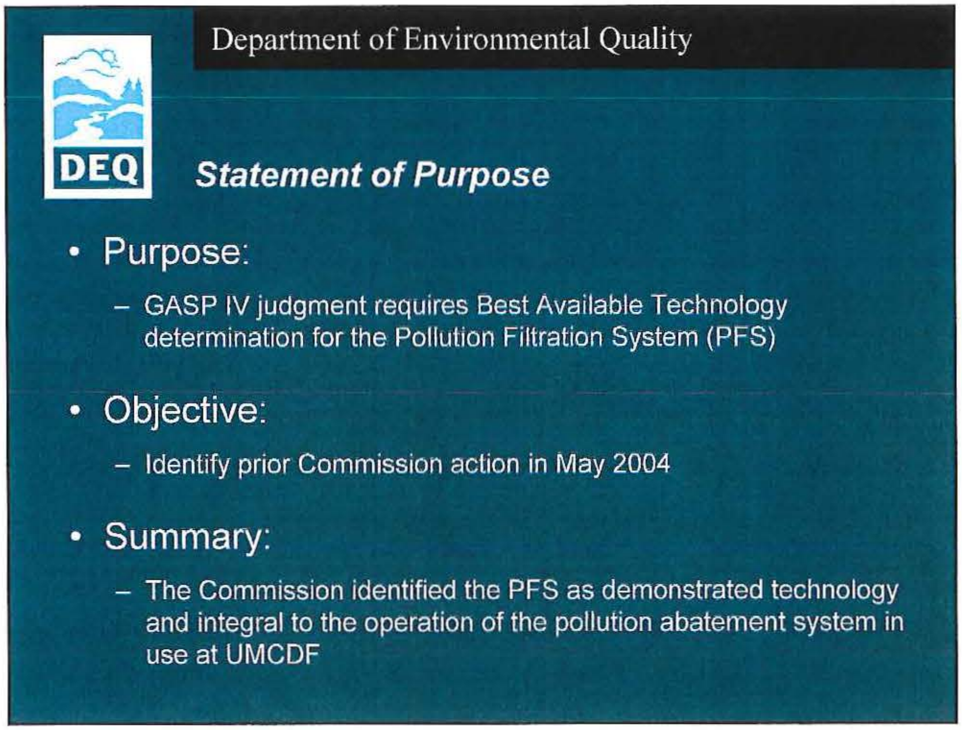
Item D
presentation



Department of Environmental Quality

DEQ

Best Available Technology for the Pollution Filtration System at the Umatilla Chemical Agent Disposal Facility

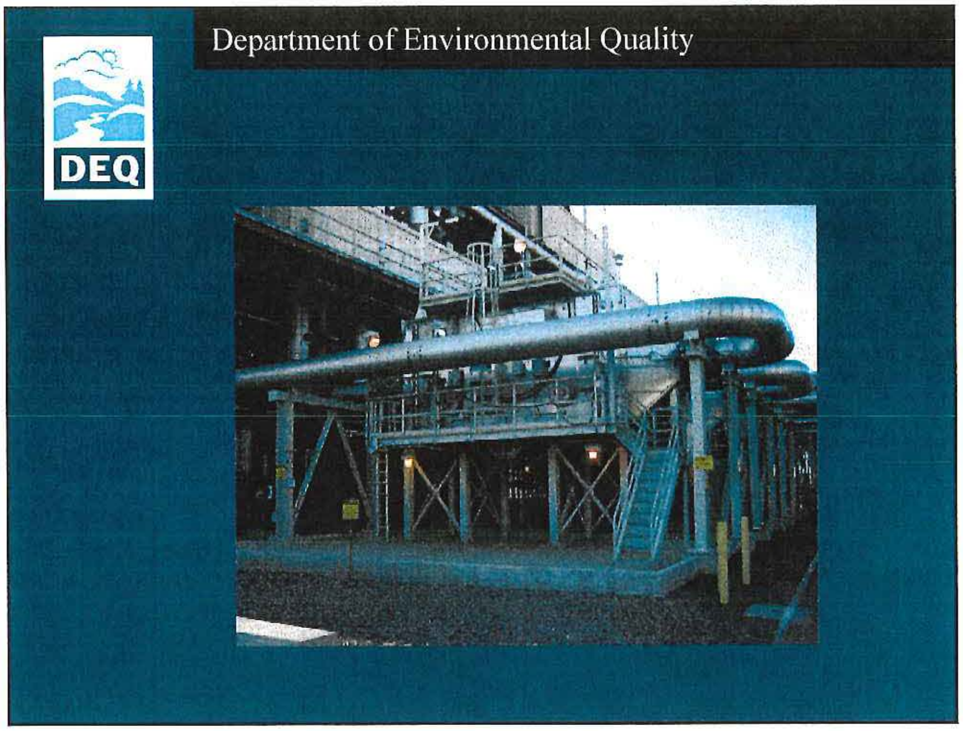


Department of Environmental Quality

DEQ

Statement of Purpose

- Purpose:
  - GASP IV judgment requires Best Available Technology determination for the Pollution Filtration System (PFS)
- Objective:
  - Identify prior Commission action in May 2004
- Summary:
  - The Commission identified the PFS as demonstrated technology and integral to the operation of the pollution abatement system in use at UMCDF

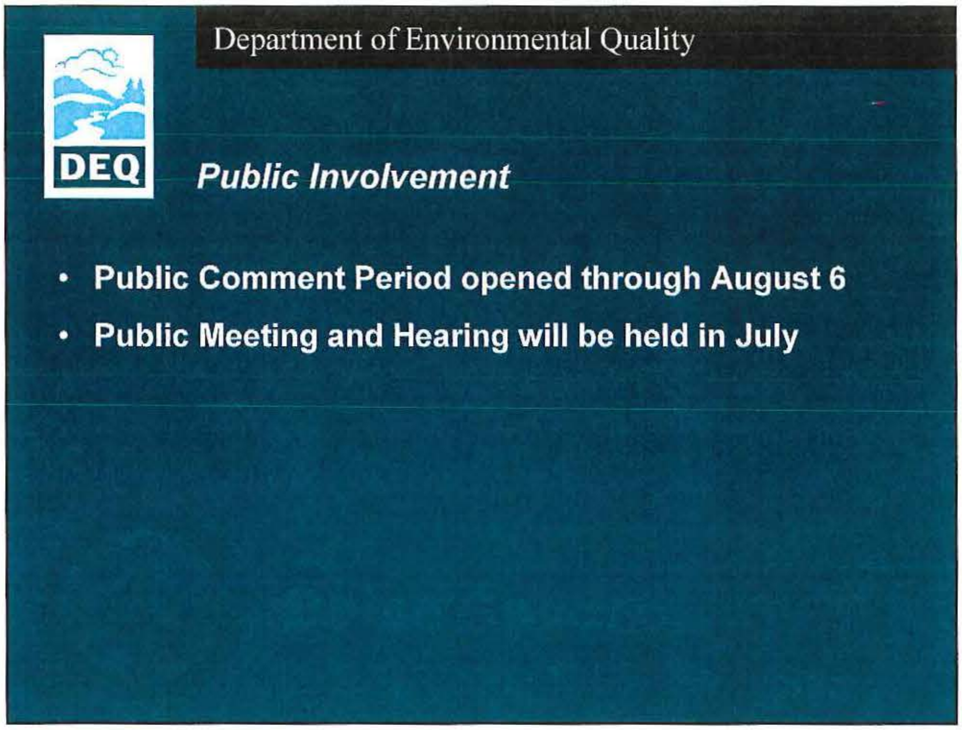


Department of Environmental Quality

Department of Environmental Quality

Previous Commission Action

- At the May 2004 meeting, the Commission approved a Class 3 permit modification that changed the point of compliance from before the PFS, to after the PFS, in order to resolve discrepencies between the HW permit and AQ regulations
- As part of this approval, the Commission issued a finding that identified the PFS as demonstrated technology and integral to the operation of the pollution abatement system in use at UMCDF
- Since no one knew it was necessary, the phrases "best available technology" and "no major adverse impact" were not used

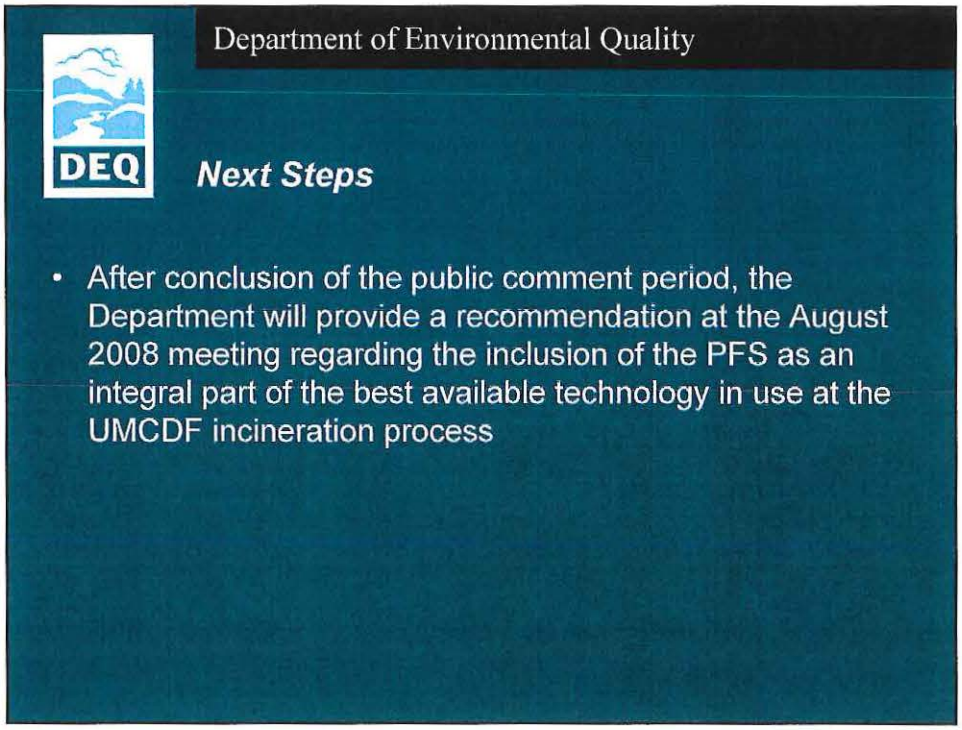


Department of Environmental Quality

DEQ

Public Involvement

- **Public Comment Period opened through August 6**
- **Public Meeting and Hearing will be held in July**



Department of Environmental Quality

DEQ

Next Steps

- After conclusion of the public comment period, the Department will provide a recommendation at the August 2008 meeting regarding the inclusion of the PFS as an integral part of the best available technology in use at the UMCDF incineration process

State of Oregon
Department of Environmental Quality Memorandum

Date: June 16, 2008

To: Environmental Quality Commission

From: Dick Pedersen, Director

Subject: Agenda Item E, Informational Item: Best Available Technology for Treatment of High-Mercury Mustard Ton Containers at the Umatilla Chemical Agent Disposal Facility
June 19-20, 2008 EQC Meeting

Purpose of Item This item provides information describing the Department of Environmental Quality's activities to determine the best available technology for treatment of Mustard (HD) ton containers at the UMCDF with higher-than-expected levels of mercury.

Background In order to issue the initial operating permit February 12, 1997, ORS 466.055(3) required the DEQ to find that the proposed UMCDF used the best available technology for treating agent-filled munitions and bulk items and the resulting secondary wastes. The Environmental Quality Commission and DEQ determined the best available technology for the UMCDF was the Army's baseline incineration system, which was designed to meet all applicable regulatory criteria.

Since issuance of the original permit, the U.S. Army has determined, based on lessons learned from the Tooele Chemical Agent Disposal Facility (TOCDF), that some of the HD ton containers at the UMCDF contain higher than originally anticipated levels of mercury and other metals. It is believed mercury contamination may have been introduced during filling operations through the use of incompletely cleaned ton containers that previously held Lewisite. (CMA December 2007 and November 2007). For the purposes of this item, "high-mercury" ton containers are those with mercury content at or above one part per million (1 ppm) in the liquid portion of the container.

In the final judgment in GASP, *et al*, v. EQC, *et al*, Case No. 9708-06159 (GASP IV) (Attachment A), remanded three issues to the EQC for findings on the best available technology for the UMCDF and that its operations have no major adverse impact on public health or the environment. One of the remanded best available technology determinations is "destruction of any mustard in any ton container that contains significantly higher mercury levels than previously reported."

Based on the correlation between the TOCDF and UMCD HD ton container lots and sampling conducted by the TOCDF, the U.S. Army has estimated that out of the 2,635 HD ton containers in the UMCD stockpile 430 are high-mercury ton containers and contain a total of 343 pounds of mercury (CMA November 2007).

Key Issues

The key issue is what is the best available technology for treatment of the UMCDF HD ton containers containing higher than originally anticipated levels of mercury. The EQC must answer this question in order to address the remand of this issue to the EQC in the Multnomah County Circuit Court's GASP IV decision.

According to sampling conducted at the TOCDF (CMA November 2007), the liquid contents of the high mercury HD ton containers may contain up to 875 ppm of mercury and the heels up to 10,300 ppm. Thus, this material carries the EPA waste code of D009 for mercury and is subject to Land Disposal Restrictions. For the "high-mercury-organic" subcategory (waste containing >260 mg/kg of mercury that also contains organics), the required treatment is incineration or retorting.

In order to determine the best available technology for the treatment of mustard agent containing higher than expected levels of mercury, DEQ is exploring three demonstrated technologies:

1. Baseline incineration with enhancements to the pollution abatement system for mercury capture;

2. Neutralization and biotreatment under a National Pollutant Discharge Elimination System (NPDES) permit; and

3. Treatment utilizing DAVINCH^{TM} contained explosives technology developed by Kobe Steel Group.

Next Steps

DEQ will open a public comment period to solicit information and opinions on the available treatment technologies. The comment period is scheduled to close on August 6, 2008. At the August 2008 EQC meeting, DEQ will present its recommendation for a determination on the best available technology for treatment of Mustard (HD) ton containers with higher-than-expected levels of mercury at the UMCDF for consideration by the EQC.

Attachments

A. GASP IV, Case No. 9708-06159, Judgment, (DEQ Item No. 07-1227)
B. 2003 TOCDF High Mercury HD Ton Container Heel Sampling Results
C. 2006-2008 TOCDF High Mercury HD Ton Container Sampling Results (Metals Analysis of Liquid Contents) (file on CD)
D. 2006-2008 TOCDF HD Ton Container Sampling Results (file on CD)

Available Upon Request

- EG&G Defense Materials, Inc. (EG&G), "Tooele Chemical Agent Disposal Facility (TOCDF) Mustard Characterization Project Report for Deseret Chemical Depot Mustard Ton Containers," Revision 0, January 14, 2004 (DEQ Item 04-0294).
- EG&G, "TOCDF Mustard Sampling Validation Project Report," Revision 0, January 2005 (DEQ Item 05-0303).
- U.S. Army Chemical Materials Agency (CMA), Project Manager for Chemical Stockpile Elimination (PMCSE), "Umatilla Chemical Agent Disposal Facility Mustard Ton Container Best Available Technology Evaluation," Final, December 2007 (DEQ Item 07-1779).
- CMA, PMCSE, "Mercury Projections for Umatilla Distilled Mustard Ton Containers," Interim, November 2007 (DEQ Item 08-___).

Approved:

Section: ____________________
Richard C. Duval, Administrator
DEQ Chemical Demilitarization Program

Division: ____________________
Joni Hammond, Acting Deputy Director

Report Prepared By: Kelly Hodney, Sr. Hazardous Waste Specialist
Phone: (541) 567-8297, extension 30

2003 TOCDF Ton Container Sampling

Ton Container Liquid Samples with High-Mercury (>1 ppm) Results

TC Serial #	Sample ID	Sample Type	AgentLot	Unit	Al	Al Rel	Sb	Sb Rel	As	As Rel	Ba	Ba Rel	Be	Be Rel	B	B Rel	Cd	C	Cr	Cr Rel		Co Rel	Cu	Cu Rel	Pb	Pb Rel	Mn	Mn Rel	Hg	Hg Rel	Ni	Ni Rel	Se	Se Rel	Ag	Ag Rel	Tl	Tl Rel	Sn	Sn Rel	V	V Rel	Zn	Zn Rel
D42249	21-03-021	Liquid	RM-113-165	ppmw	52	<	5.3	<	38.9		5.3	<	5.3	<	11	<	5.3	<	2.7		[illegible]	<	32.2		5.3	<	3.47		24.5		0.91		11	<	5.3	<	5.3	<	11	<	5.3	<	11	<
D42249	21-03-022	Noncohesive Solid	RM-113-165	ppmw	50	<	3.8		3330		0.11		5	<	10	<	0.25		47.3		4.87		31.9		27		320		2830		33.5		25	<	5	<	5	<	11.7		5	<	43.9	
D42249	21-03-023	Solid	RM-113-165	ppmw	27		64.6		3520		0.63		5	<	5.7		0.99		97.1		11.2		771		219		555		1680		158		1.5		0.15		5	<	88.8		5	<	1280	
D46537	21-03-051	Liquid	RM-113-193	ppmw	46	<	4.6	<	16		4.6	<	4.6	<	9.3	<	4.6	<	4.3		0.93	<	33.8		4.6	<	3.33		41.1		0.69		9.3	<	4.6	<	4.6	<	9.3	<	0.94		9.3	<
D46537	21-03-052	Noncohesive Solid	RM-113-193	ppmw	51	<	0.88		670		0.14		5.1	<	10	<	0.35		23		3.18		27.9		11		234		1450		21		26	<	5.1	<	5.1	<	3.2		5.1	<	36.5	
D46537	21-03-053	Solid	RM-113-193	ppmw	14		0.51		882		0.17		5.1	<	10	<	0.47		18.5		3.47		62.7		9.1		277		2440		21		25	<	5.1	<	5.1	<	2.9		5.1	<	56.8	
D48309	21-03-057	Liquid	RM-113-231	ppmw	56	<	5.6	<	7.68		5.6	<	5.6	<	11	<	5.6	<	5.3		1.1	<	39.5		5.6	<	1.92		17.8		0.43		11	<	5.6	<	5.6	<	11	<	1.3		11	<
D48309	21-03-058	Noncohesive Solid	RM-113-231	ppmw	14		0.16		133		0.13		5.2	<	2.1		0.34		12.2		1.37		57		5.4		80.9		861		16.3		26	<	5.2	<	5.2	<	0.86		5.2	<	22.3	
D48309	21-03-059	Solid	RM-113-231	ppmw	11		1.9		3270		0.42		4.8	<	9.5	<	0.58		47.8		9.43		154		37.2		539		10300		23.7		24	<	4.8	<	4.8	<	11.5		4.8	<	450	
D46491	21-03-072	Liquid	RM-113-170	ppmw	47	<	4.7	<	6.33		4.7	<	4.7	<	9.4	<	4.7	<	5.83		0.94	<	40.9		4.7	<	4.01		26.3		1.5		9.4	<	4.7	<	4.7	<	9.4	<	1.2		9.4	<
D46491	21-03-073	Noncohesive Solid	RM-113-170	ppmw	18		2.9		498		0.26		5.1	<	2.3		0.38		39.5		7.44		50.1		18		465		2120		83.9		26	<	5.1	<	5.1	<	10.5		5.1	<	56.3	
D46491	21-03-074	Solid	RM-113-170	ppmw	13		2.2		394		0.15		5.3	<	11	<	0.33		49.7		5.6		76.5		17.2		370		2140		96.6		27	<	5.3	<	5.3	<	9.3		5.3	<	49.5	
D41559	21-03-105	Liquid	RM-113-92	ppmw	19		5.1	<	1.9		5.1	<	5.1	<	10	<	5.1	<	4.9		1	<	25.9		5.1	<	3.38		46.8		5.1	<	10	<	5.1	<	5.1	<	10	<	1.3		10	<
D41559	21-03-106	Noncohesive Solid	RM-113-92	ppmw	49	<	0.42		25.9		0.078		4.9	<	10	<	0.19		13.5		2.58		21.2		10.3		171		1560		29		24	<	4.9	<	4.9	<	2.1		2		44.2	
D41559	21-03-107	Solid	RM-113-92	ppmw	18		2.3		62.8		0.45		5.4	<	11	<	0.07		38.8		5.13		75.5		103		391		2010		137		27		0.078		5.4	<	4.9		1.6		103	
D50034	21-03-135	Liquid	RM-113-150	ppmw	21		5.1	<	3.5		5.1	<	5.1	<	10	<	5.1	<	4.5		1	<	28.6		5.1	<	2.65		57.2		5.1	<	10	<	5.1	<	5.1	<	10	<	1.1		10	<
D50034	21-03-136	Noncohesive Solid	RM-113-150	ppmw	33		2.2		71.6		0.7		5.6	<	11	<	0.28		40.7		4.44		22.8		21.7		266		2580		65.1		28	<	5.6	<	5.6	<	6.1		2.1		50.9	
D50034	21-03-137	Solid	RM-113-150	ppmw	20		2.9		122		0.21		5.4	<	11	<	5.4	<	44.8		6.63		46.2		41.6		406		2110		109		27	<	5.4	<	5.4	<	5.5		1.5		114	
D49168	21-03-141	Liquid	RM-113-191	ppmw	19		5.2	<	5.38		5.2	<	5.2	<	10	<	5.2	<	6.23		1	<	24.2		5.2	<	1.67		5.2		5.2	<	10	<	5.2	<	5.2	<	10	<	1.7		10	<
D49168	21-03-142	Noncohesive Solid	RM-113-191	ppmw	51	<	0.39		113		0.2		5.1	<	10	<	0.17		18.4		2.46		33.2		6.9		182		238		24.7		26	<	5.1	<	5.1	<	4.4		1.6		24.6	
D49168	21-03-143	Solid	RM-113-191	ppmw	18		3.5		1250		0.35		5	<	10	<	5	<	70.4		10.3		87.6		28.5		483		442		66.7		25	<	5	<	5	<	13.8		2.5		68	
D46992	21-03-177	Liquid	RM-113-278	ppmw	51	<	5.1	<	21.6		5.1	<	5.1	<	10	<	5.1	<	4.6		1	<	57		5.1	<	0.52		1.47		1.1		10	<	5.1	<	5.1	<	10	<	1.3		10	<
D46992	21-03-179	Noncohesive Solid	RM-113-278	ppmw	10		0.41		309		0.2		5	<	10	<	0.13		8.07		0.98		51.6		1.9		67.3		101		8.93		25	<	5	<	5	<	1.5		5	<	22.8	
D46992	21-03-181	Solid	RM-113-278	ppmw	53	<	1.9		2050		0.22		5.3	<	11	<	0.27		12.2		3.63		207		14.9		301		694		30.8		27	<	5.3	<	5.3	<	10.9		5.3	<	133	
D47708	21-03-225	Liquid	RM-113-282	ppmw	52	<	5.2	<	5.2	<	5.2	<	5.2	<	10	<	5.2	<	9.69		1	<	52.8		5.2	<	0.44		1.62		0.43		10	<	5.2	<	5.2	<	10	<	1.3		10	<
D47708	21-03-226	Noncohesive Solid	RM-113-282	ppmw	24		0.85		67.9		0.15		4.9	<	9.8	<	0.21		12.4		3.14		89.9		9.8		197		343		11.6		25	<	4.9	<	4.9	<	3.2		1.3		56.7	
D47708	21-03-227	Solid	RM-113-282	ppmw	2930		1.2		63.6		0.51		0.067		11	<	0.38		17.2		3.7		292		39.1		208		95		17.5		26	<	0.09		5.3	<	2.1		1.2		265	
D48273	21-03-269	Liquid	RM-113-164	ppmw	15		5.2	<	5.9		5.2	<	5.2	<	4.1		5.2	<	2.7		1	<	36.1		5.2	<	1.96		27.4		5.2	<	10	<	5.2	<	5.2	<	10	<	5.2	<	10	<
D48273	21-03-270	Noncohesive Solid	RM-113-164	ppmw	49	<	0.22		267		4.9	<	4.9	<	9.8	<	0.2		9.91		2.47		50.5		7.8		176		2910		22.6		24	<	4.9	<	4.9	<	1.1		4.9	<	39.8	
D48273	21-03-271	Solid	RM-113-164	ppmw	50	<	1.8		1770		5	<	5	<	10	<	0.22		26.3		6.24		135		27.6		365		5590		33.8		25	<	5	<	5	<	3		5	<	149	
D51059	21-03-273	Liquid	RM-113-176	ppmw	53	<	5.3	<	1.7		5.3	<	5.3	<	11	<	5.3	<	3.1		1.1	<	29.2		5.3	<	3.23		5.75		0.92		11	<	5.3	<	5.3	<	11	<	5.3	<	11	<
D51059	21-03-274	Noncohesive Solid	RM-113-176	ppmw	50	<	0.14		14.1		0.088		0.054		10	<	0.17		6.98		0.88		33.8		4.5		46		87.3		9.72		25	<	5	<	5	<	0.67		5	<	12.7	
D51059	21-03-275	Solid	RM-113-176	ppmw	51.1		1.2		89.4		0.062		4.7	<	9.4	<	0.26		31.3		5.54		80.3		64.2		352		996		39.1		24	<	4.7	<	4.7	<	4		4.7	<	94.3	
D45179	21-03-282	Liquid	RM-113-180	ppmw	53	<	5.3	<	14.1		5.3	<	5.3	<	11	<	5.3	<	3.5		1.1	<	40		5.3	<	2.93		17.1		5.3	<	11	<	5.3	<	5.3	<	11	<	5.3	<	11	<
D45179	21-03-283	Noncohesive Solid	RM-113-180	ppmw	51	<	5.1	<	15.3		5.1	<	5.1	<	10	<	0.18		2		[illegible]	<	45.3		10	<	3.5		17.2		1.2		26	<	5.1	<	5.1	<	10	<	5.1	<	10	<
D45179	21-03-284	Solid	RM-113-180	ppmw	53	<	1.5		478		0.42		5.3	<	11	<	0.32		32.5		[illegible]		129		37.5		307		1600		36.8		27	<	5.3	<	5.3	<	8		5.3	<	104	
D44007	21-03-294	Liquid	RM-113-188	ppmw	53	<	5.3	<	5.68		5.3	<	5.3	<	11	<	5.3	<	1.6		1.1	<	34.5		5.3	<	4.12		16.3		0.52		11	<	5.3	<	5.3	<	11	<	5.3	<	11	<
D44007	21-03-295	Noncohesive Solid	RM-113-188	ppmw	53	<	3		361		0.2		5.3	<	11	<	0.29		43.5		6.05		29.2		14.1		383		1210		123		27	<	5.3	<	5.3	<	8.9		5.3	<	63	
D44007	21-03-296	Solid	RM-113-188	ppmw	55	<	1.7		545		0.058		5.5	<	11	<	0.28		28.8		7.07		68		31.8		504		1740		62.4		28	<	5.5	<	5.5	<	8.3		5.5	<	83.5	
D48980	21-03-301	Liquid	RM-113-157	ppmw	50	<	5	<	10.9		5	<	5	<	10	<	5	<	2.9		1	<	36		0.54		2.91		65		0.78		10	<	5	<	5	<	10	<	5	<	10	<
D48980	21-03-302	Noncohesive Solid	RM-113-157	ppmw	55	<	1.5		1170		5.5	<	5.5	<	11	<	0.23		36.6		3.71		29.8		16.6		258		1810		62.8		27	<	5.5	<	5.5	<	6.1		5.5	<	40.7	
D48980	21-03-303	Solid	RM-113-157	ppmw	50	<	1.2		961		5	<	5	<	10	<	0.2		42.4		3.72		49.7		19.6		267		1960		39.1		25	<	5	<	5	<	7.1		5	<	32.3	
D49972	21-03-325	Liquid	RM-113-193	ppmw	12		5.1	<	54.7		5.1	<	5.1	<	10	<	5.1	<	2.1		1	<	23.7		5.1	<	1.1		6.96		1.9		10	<	5.1	<	5.1	<	10	<	5.1	<	10	<
D49972	21-03-326	Noncohesive Solid	RM-113-193	ppmw	49	<	0.44		1860		0.13		4.9	<	9.8	<	0.18		13.8		1.44		28.3		3.7		112		621		12.7		25	<	4.9	<	4.9	<	1.6		4.9	<	20.7	
D49972	21-03-327	Solid	RM-113-193	ppmw	22		2.4		10300		0.16		4.9	<	5		0.26		25.6		4.65		98.5		21.5		359		2200		31.9		25	<	4.9	<	4.9	<	5.3		4.9	<	65.1	
D41787	21-03-329	Liquid	RM-113-92	ppmw	51	<	5.1	<	22.4		5.1	<	5.1	<	10	<	5.1	<	1.7		1	<	27.8		5.1	<	1	<	55.8		5.1	<	10	<	5.1	<	5.1	<	10	<	5.1	<	10	<
D41787	21-03-330	Noncohesive Solid	RM-113-92	ppmw	10		4.8	<	62		0.35		4.8	<	9.5	<	0.18		5.37		0.95	<	32.7		9.5	<	9.2		75.9		48.4		24	<	4.8	<	4.8	<	9.5	<	4.8	<	2.2	
D41787	21-03-331	Solid	RM-113-92	ppmw	10		1.8		361		0.096		4.8	<	9.5	<	0.28		34.9		3.43		75.7		22.3		295		3020		115		24	<	0.22		4.8	<	10.4		4.8	<	49.8	
D50997	21-03-333	Liquid	RM-113-92	ppmw	54	<	5.4	<	1.4		5.4	<	5.4	<	11	<	5.4	<	1.9		1.1	<	19		5.4	<	1.24		3.02		5.4	<	11	<	5.4	<	5.4	<	11	<	5.4	<	11	<
D50997	21-03-334	Noncohesive Solid	RM-113-92	ppmw	14		1.2		111		0.13		5.2	<	10	<	0.32		40.1		12.7		26.7		43.8		625		210		188		26	<	5.2	<	5.2	<	11.9		5.2	<	122	
D50997	21-03-335	Solid	RM-113-92	ppmw	105		6.19		33.4		1.3		5.6	<	4.5		0.39		295		8.69		18.1		130		1200		185		1230		28	<	5.6	<	5.6	<	8.7		1.8		27.3	
D44485	21-03-341	Liquid	RM-113-193	ppmw	53	<	5.3	<	38.5		5.3	<	5.3	<	11	<	5.3	<	5.3	<	1.1	<	20.2		5.3	<	1.1	<	4.06		5.3	<	11	<	5.3	<	5.3	<	11	<	5.3	<	11	<
D44485	21-03-342	Noncohesive Solid	RM-113-193	ppmw	50	<	0.51		6350		0.12		5	<	10	<	0.21		28.2		4		22.3		15.6		311		1700		60.5		25	<	5	<	5	<	2.2		5	<	112	
D44485	21-03-343	Solid	RM-113-193	ppmw	16		2.3		12900		2.9		4.9	<	9.7	<	0.33		51.5		9.17		103		169		604		4780		27.4		24	<	4.9	<	4.9	<	4.4		4.9	<	138	

Attachment B

2003 Tooele Chemical Agent Disposal Facility High Mercury HD Ton Container Heel Sampling Results

14, 2006; and

This Court having issued its Opinion and Order dated April 17, 2007 granting in part and denying in part the petition as to the HWP;

It is ADJUDGED that the OREGON EQC'S determinations made pursuant to ORS 466.055 as to whether the Umatilla Chemical Agency Disposal Facility uses the best available technology and has no major adverse impact on public health or the environment in regard to (a) destruction of any mustard in any ton container that contains significantly higher mercury levels than previously reported; (b) the destruction of hazardous waste originally intended for the dunnage incinerator; and (c) the role of PFS carbon filters; are remanded to the State of Oregon Environmental Quality Commission for consideration and further proceedings consistent with the court's opinion of April 17, 2007.

The petition regarding the HWP is granted in regard to the above referenced findings that are remanded to the EQC. The petition regarding the HWP is otherwise denied.

DATED this 12 day of June, 2007.

Michael H. Marcus
Circuit Court Judge

Submitted by: Stuart A. Sugarman
Of Attorneys for Petitioners GASP *et al.*

Marc Abrams
Senior Assistant Attorney General
Of Attorneys for Respondents DEQ and EQC

07-1247 -0-

ENTERED
JUN 13 2007
IN REGISTER SD

FILED
07 JUN 12 AM 8:59
CIRCUIT COURT
FOR MULTNOMAH COUNTY

IN THE CIRCUIT COURT OF THE STATE OF OREGON

FOR THE COUNTY OF MULTNOMAH

GASP, *et al.*

Petitioners,

v.

ENVIRONMENTAL QUALITY COMMISSION, *et al.*,

Respondents,

and

UNITED STATES ARMY, and WASHINGTON DEMILITARIZATION COMPANY,

Intervenor-Respondents.

Case No. 9708-06159

STIPULATED GENERAL JUDGMENT

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY
RECEIVED
AUG 13 2007
HERMISTON OFFICE

Petitioners have brought a Petition for Review against the State of Oregon Environmental Quality Commission ("EQC") and the State of Oregon Department of Environmental Quality ("DEQ") to require that Air Contaminant Discharge Permit #25-004 ("ACDP") issued by DEQ and Hazardous Waste Permit I.D. No. OR6 213 820 817 ("HWP") issued by EQC be reversed and or remanded; and

The United States Army ("Army") and Washington Demilitarization Company ("WDC"), both named permitees on these permits, having intervened as intervenor-respondents and joined the state in opposing the Petition for Review; and

This Court having dismissed the petition for review as to the ACDP by Order dated June

Attachment A

GASP IV, Case No. 9708-06159, Judgment, (DEQ Item No. 07-1227)

Item E
presentation

Department of Environmental Quality

DEQ

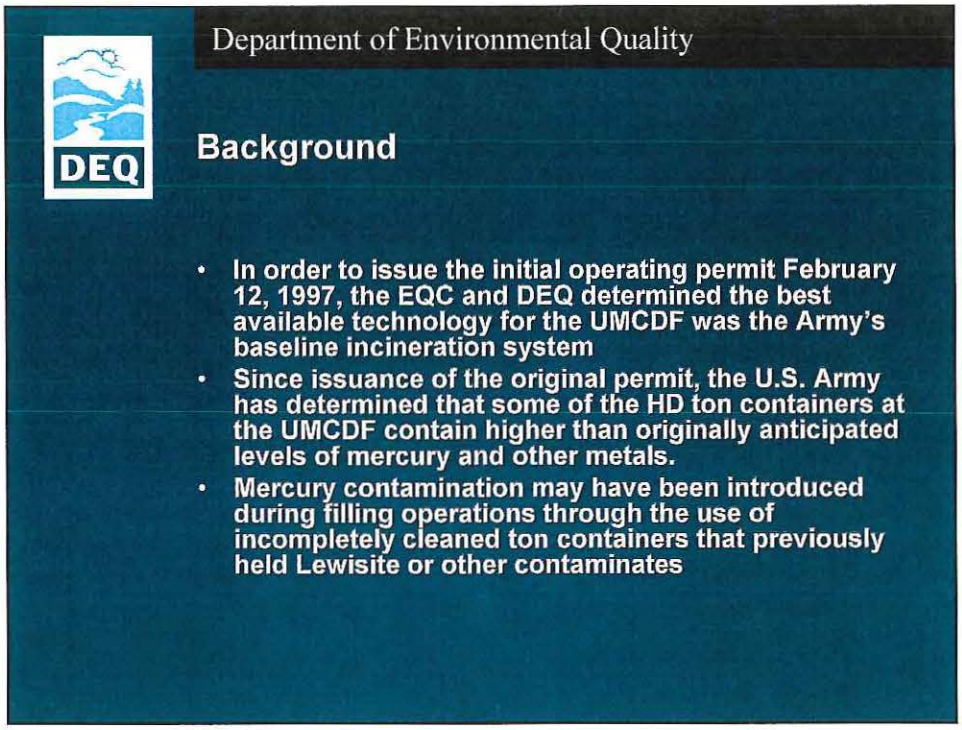
Best Available Technology for the Treatment of Mustard Agent Containing Higher than Anticipated Levels of Mercury at the Umatilla Chemical Agent Disposal Facility

Department of Environmental Quality

DEQ

Statement of Purpose

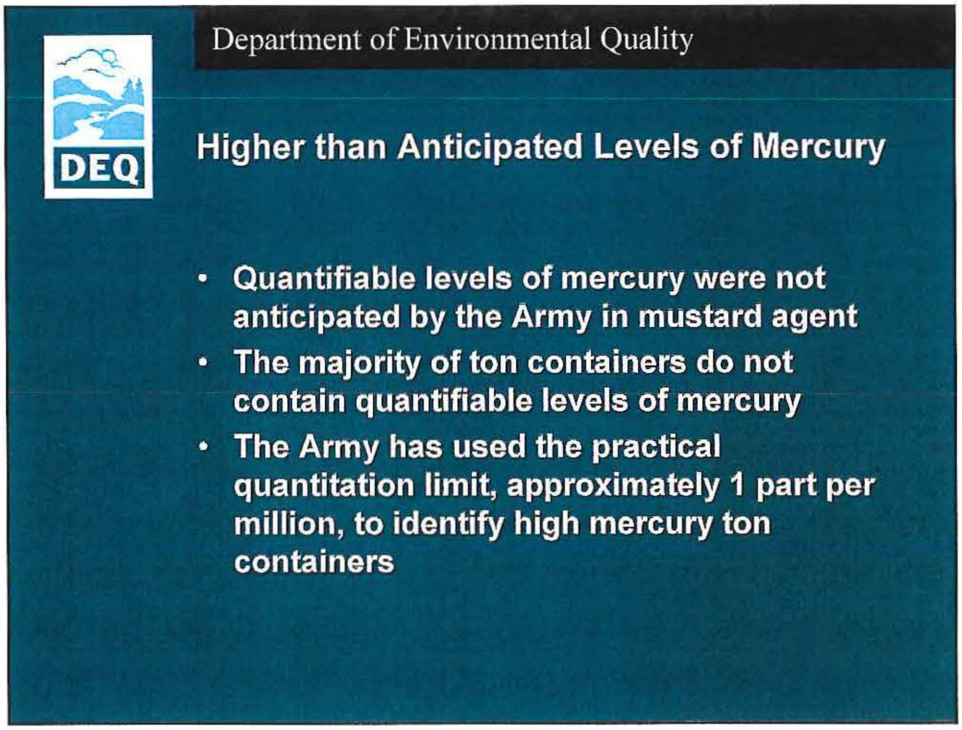
- Purpose:
  - Judge Marcus' GASP IV judgment requires a Best Available Technology determination for mustard agent that contains higher than anticipated levels of mercury
- Objective:
  - Define "higher than anticipated levels of mercury"
  - Identify scope of high mercury ton containers of HD at Umatilla
  - Explore regulatory implications of high mercury content
  - Identify demonstrated technologies available
- Summary:
  - The Department has identified incineration, neutralization and the DAVINCH™ process as demonstrated technologies



Department of Environmental Quality

Background

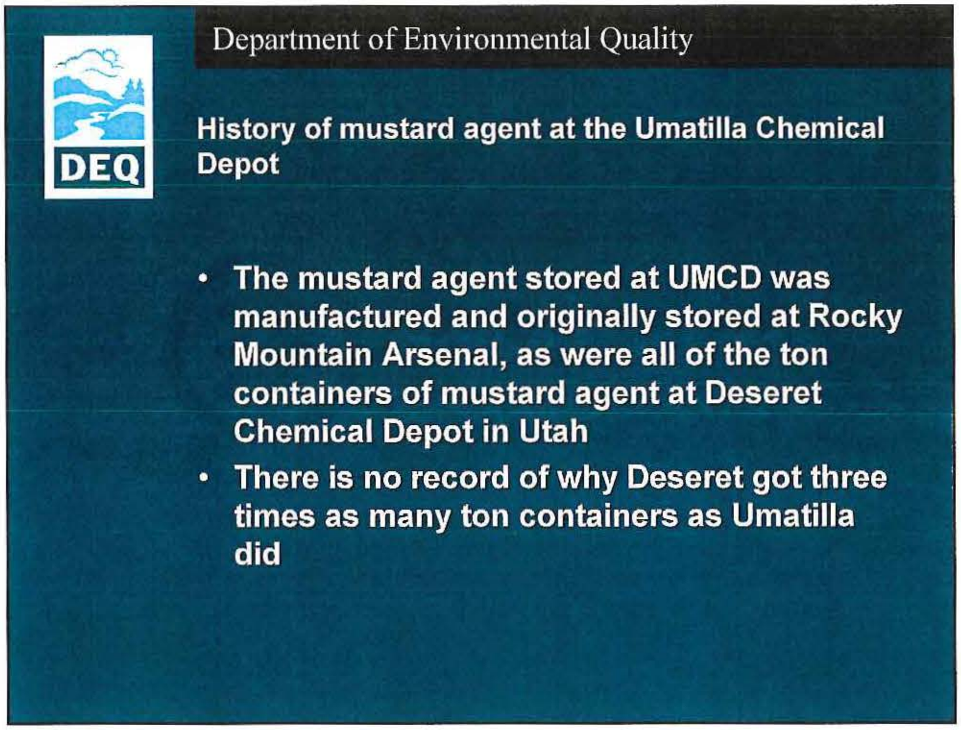
- In order to issue the initial operating permit February 12, 1997, the EQC and DEQ determined the best available technology for the UMCDF was the Army's baseline incineration system
- Since issuance of the original permit, the U.S. Army has determined that some of the HD ton containers at the UMCDF contain higher than originally anticipated levels of mercury and other metals.
- Mercury contamination may have been introduced during filling operations through the use of incompletely cleaned ton containers that previously held Lewisite or other contaminates



Department of Environmental Quality

Higher than Anticipated Levels of Mercury

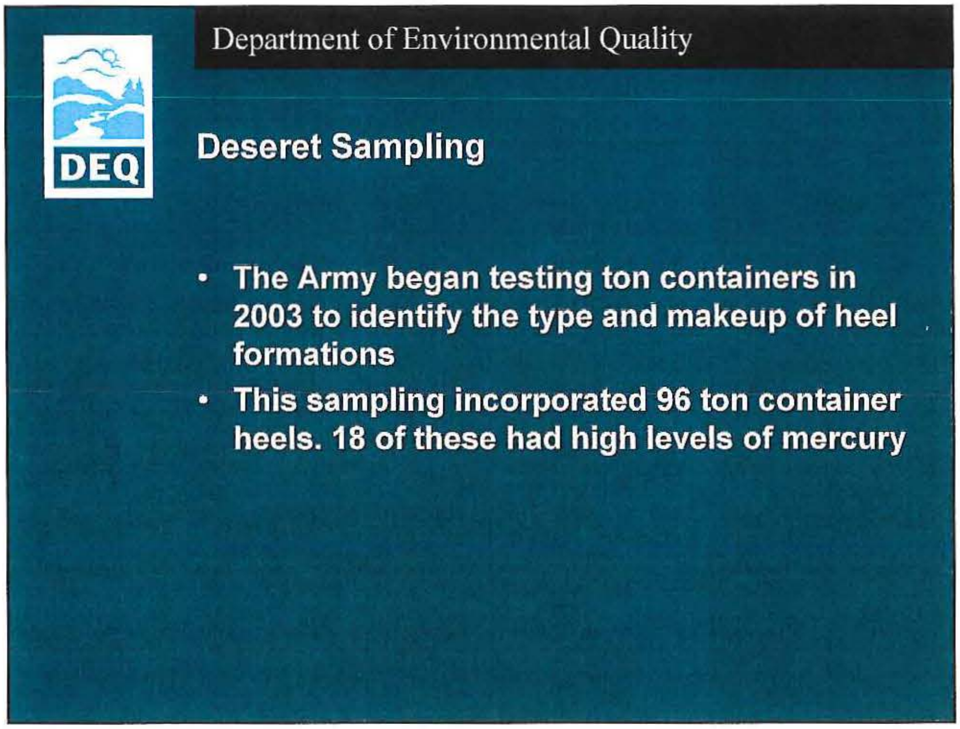
- Quantifiable levels of mercury were not anticipated by the Army in mustard agent
- The majority of ton containers do not contain quantifiable levels of mercury
- The Army has used the practical quantitation limit, approximately 1 part per million, to identify high mercury ton containers



Department of Environmental Quality

History of mustard agent at the Umatilla Chemical Depot

- The mustard agent stored at UMCD was manufactured and originally stored at Rocky Mountain Arsenal, as were all of the ton containers of mustard agent at Deseret Chemical Depot in Utah
- There is no record of why Deseret got three times as many ton containers as Umatilla did



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Deseret Sampling

- The Army began testing ton containers in 2003 to identify the type and makeup of heel formations
- This sampling incorporated 96 ton container heels. 18 of these had high levels of mercury

Department of Environmental Quality

Heel Sample

Department of Environmental Quality

What is in the Heel

- The 18 containers showed elevated levels of arsenic, mercury, chrome and occasionally other metals
- Levels of arsenic and mercury have been identified as high as 10,300 parts per million
- Heel sizes have ranged from to 10% to 50% of the volume of the container
- Heels can not be sampled without breeching the integrity of the container

Department of Environmental Quality

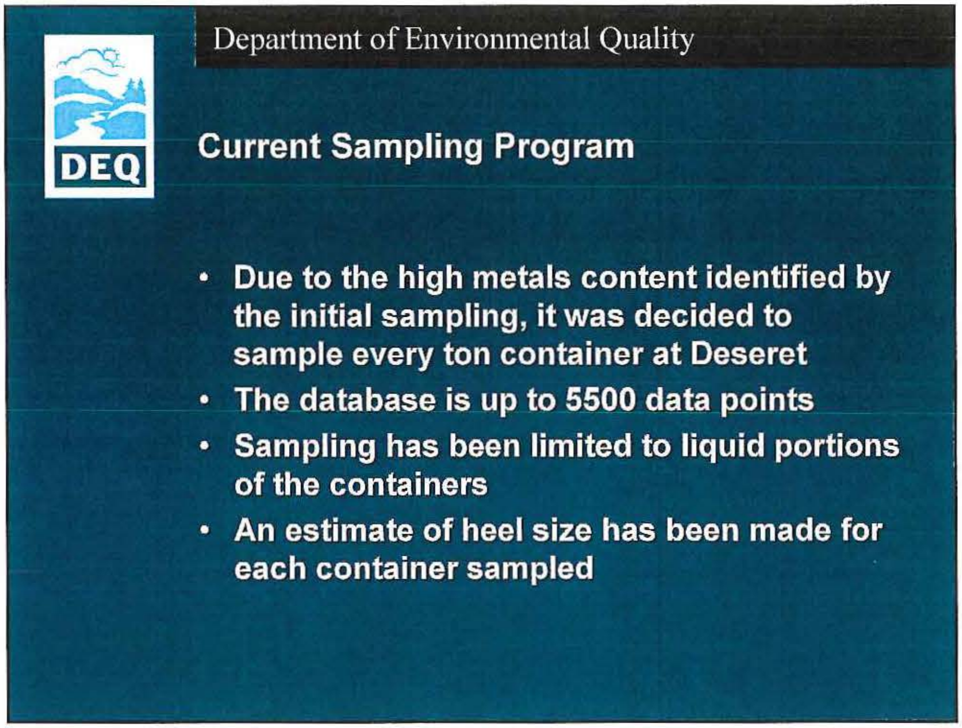
DEQ

Department of Environmental Quality

DEQ

The Liquid Portion

- The liquid portion of the containers with high metal heels also contain elevated levels of metals
- The Army uses the liquid samples to identify containers with high levels of metals



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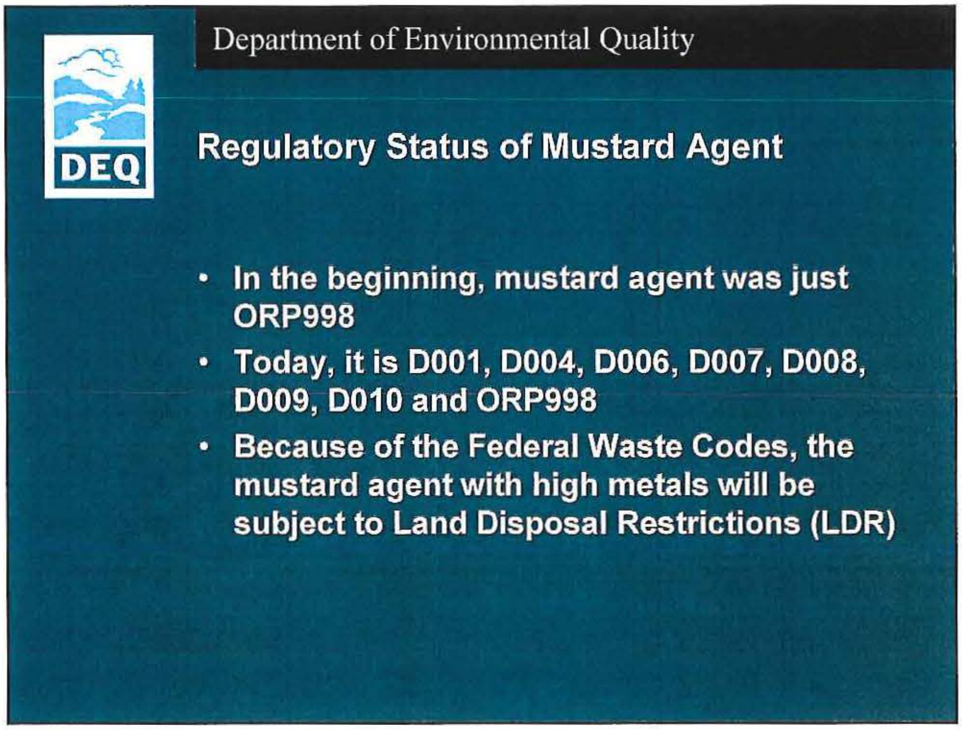
Current Sampling Program

- Due to the high metals content identified by the initial sampling, it was decided to sample every ton container at Deseret
- The database is up to 5500 data points
- Sampling has been limited to liquid portions of the containers
- An estimate of heel size has been made for each container sampled



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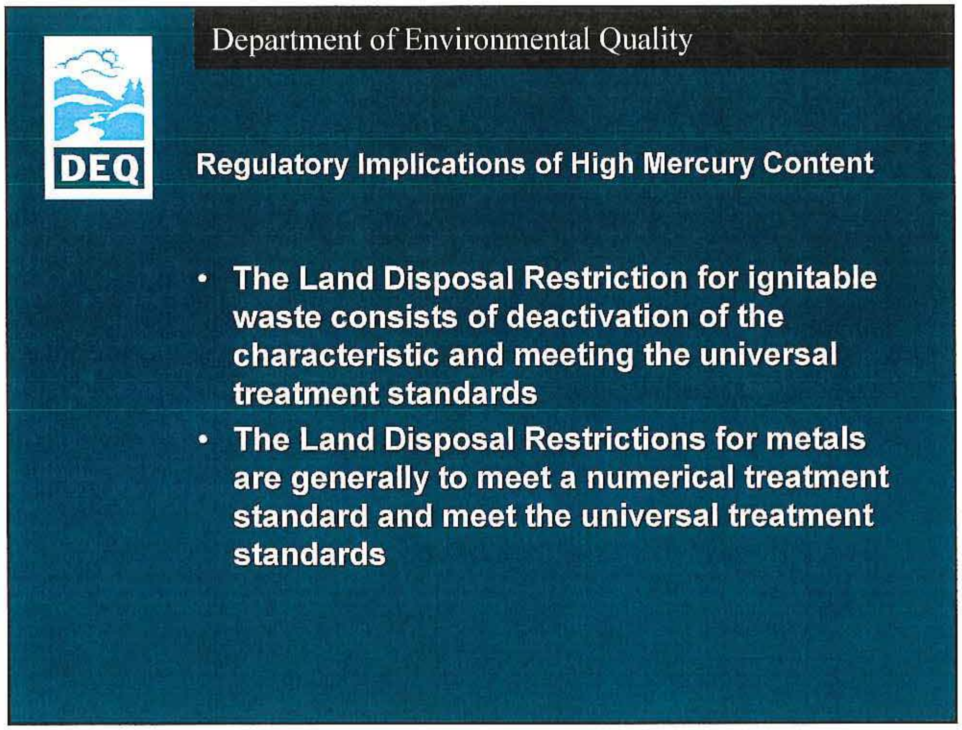
Regulatory Status of Mustard Agent

- In the beginning, mustard agent was just ORP998
- Today, it is D001, D004, D006, D007, D008, D009, D010 and ORP998
- Because of the Federal Waste Codes, the mustard agent with high metals will be subject to Land Disposal Restrictions (LDR)



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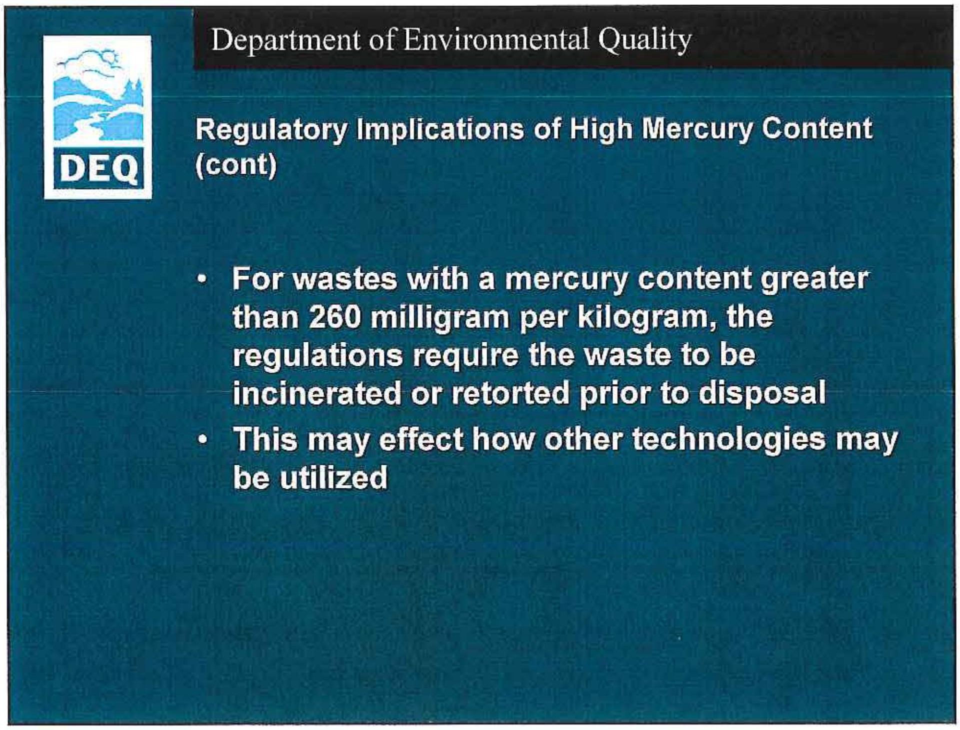
Regulatory Implications of High Mercury Content

- The Land Disposal Restriction for ignitable waste consists of deactivation of the characteristic and meeting the universal treatment standards
- The Land Disposal Restrictions for metals are generally to meet a numerical treatment standard and meet the universal treatment standards



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Regulatory Implications of High Mercury Content (cont)

- For wastes with a mercury content greater than 260 milligram per kilogram, the regulations require the waste to be incinerated or retorted prior to disposal
- This may effect how other technologies may be utilized

Department of Environmental Quality

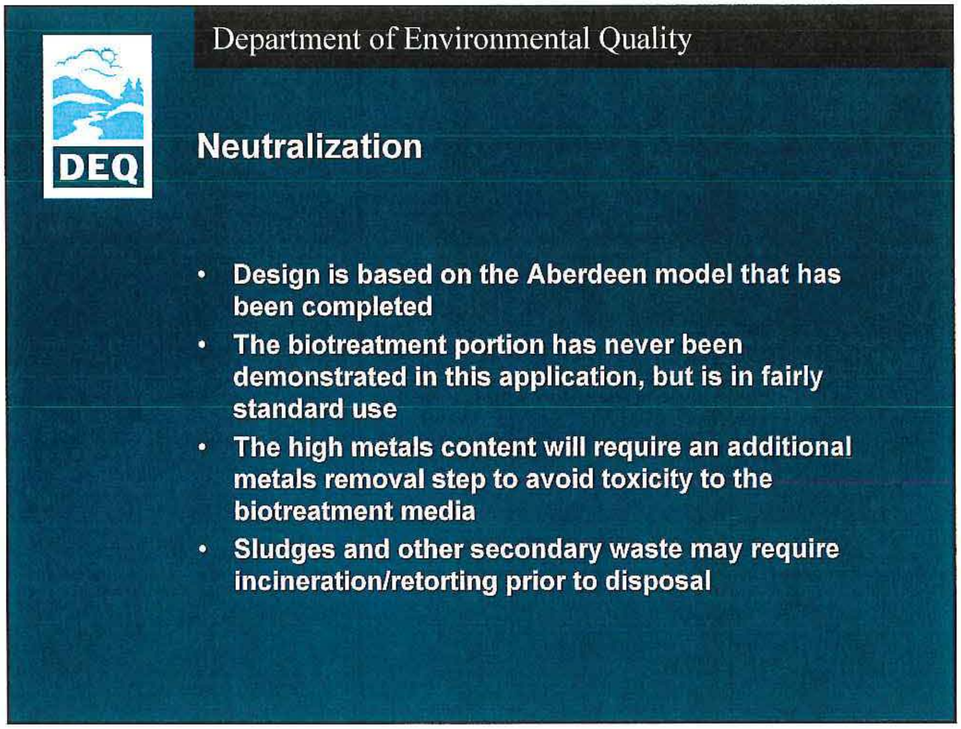
Demonstrated Technologies

- Incineration
- Neutralization
- DAVINCH^{TM} process

Department of Environmental Quality

Incineration

- Currently in place at the site
- Can not meet regulatory standards without upgrades to the pollution abatement system
- Workforce is experienced in the technology



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Neutralization

- Design is based on the Aberdeen model that has been completed
- The biotreatment portion has never been demonstrated in this application, but is in fairly standard use
- The high metals content will require an additional metals removal step to avoid toxicity to the biotreatment media
- Sludges and other secondary waste may require incineration/retorting prior to disposal

Department of Environmental Quality

DAVINCH™

- Demonstrated technology overseas and in the non-stockpile program
- Based on using explosives to destroy organics in a controlled environment

Department of Environmental Quality

DEQ

Public Involvement

- **Public Comment Period opened through August 6**
- **Public Meeting and Hearing will be held in July**

Department of Environmental Quality

DEQ

DEQ's Recommendation

- After conclusion of the public comment period, the Department will provide a recommendation at the August 2008 meeting regarding the best available technology for treating mustard containing higher than anticipated levels of mercury
- Recommendation will be formulated based on the input from the public and other stakeholders
- May include additional technologies

State of Oregon
Department of Environmental Quality
Memorandum

Date: June 2, 2008

To: Environmental Quality Commission

From: Dick Pedersen, Acting Director

Subject: Agenda Item F, Rule Adoption: Clean Diesel Incentives
June 19-20, 2008 EQC Meeting

Why this is Important

Diesel exhaust ranks among the top air toxins in Oregon. It is linked to significant public health issues such as asthma, cardiovascular disease and cancer; and environmental concerns about regional haze and global warming.

These rules initiate a clean diesel upgrade program through grants, loans and tax credits as provided in legislative House Bills 2172 and 3201 with the goal of reducing excess lifetime cancer risk from diesel exhaust exposure in Oregon to no more than one in a million by 2017. Participation in the grants, loan or tax credit programs is voluntary.

Department Recommendation/ Motion

As presented in Attachment A, the Department of Environmental Quality recommends that the Environmental Quality Commission:

- Adopt proposed rules implementing HB 2172 and HB 3201 to administer grants, loans, and tax credits for clean diesel repowers, retrofits, and truck engine scrapping, and
- Amend Section 340, Division 016 of the Oregon Administrative Rules to implement HB 3201 for the truck engine tax credit.

Background and Need for Rulemaking

Oregonians have an increased risk for cancer and other health risks at current levels of exposure in everyday life to diesel particulate matter, which DEQ estimates at around 13 times greater than the goal of a one in a million excess lifetime cancer risk set in HB 2172.

Recent federal regulations require tighter emission standards for new heavy duty vehicles beginning with the 2007 model year. However, because diesel engines are durable and routinely rebuilt, existing pre-2007 engines will continue to be in operation for roughly 30 years before the pollution reduction benefits of federal regulations are fully realized.

In addition to setting an overall goal of reducing risk from diesel exhaust, HB 2172 directed DEQ to adopt a specific target for 2013 to substantially reduce the risk to school children from diesel engine emissions produced by Oregon school buses. Children riding school buses have more exposure to, and are more vulnerable to, adverse health impacts from pollution of diesel particulate matter inside the bus cabin.

Under the proposed rules, projects eligible for the tax credits, grants, and loans can include:

- Scrapping a pre-1994 diesel truck engine;
- Retrofitting a diesel engine with advanced exhaust controls; or
- Repowering a non-road diesel engine with a new, used or remanufactured engine that results in lowered diesel particulate matter emissions, or with electric motors, drives, or fuel cells.

These types of projects all reduce diesel particulate matter emissions. The proposed rules also amend the existing truck engine tax credit as provided in HB 2172.

Effect of Rule

This proposed rulemaking establishes a diesel grant, loan and tax credit program and extends the truck engine tax credit as follows:

Grant Program and Repower/Retrofit Tax Credit

- Establishes a cost effectiveness threshold;
- Specifies the overall goal for the program and targets for reducing impacts from school bus emissions; and
- Establishes standards for qualifying projects.

Grant Program

- Establishes preferences for project funding;
- Specifies a simplified application process for applicants with a small number of diesel engines; and
- Describes the process DEQ will use to certify third party clean diesel service providers.

Repower/Retrofit Tax Credit

- Establishes procedures for issuing repower and retrofit grants and tax credits; and
- Establishes a tax credit application fee of $50 plus a processing fee of one percent of the potential tax credit.

Truck Engine Tax Credit

- Extends the existing tax credit for new truck engines to 2011;
- Decreases the program limitation from $3 million to $500,000 per year as

required by HB 3201; and
- Increases the application fee from $15 to $50.

Commission Authority

The EQC has authority to take this action under ORS 468.020, HB 2172 (2007) and HB 3201 (2007).

Stakeholder Involvement

A broad coalition of stakeholders helped develop HB 2172 and HB 3201, including stakeholders from the trucking industry, health and environmental advocates, construction and farming industries, and school and public employees associations.

The Clean Diesel Incentive Advisory Committee provided recommendations which helped DEQ develop this rulemaking proposal. The advisory committee met in 2007 on November 14th, November 28th, and December 11th to address issues related to the rulemaking and to review the fiscal impact per ORS 183.333. Attachment B provides a list of advisory committee members. An advisory committee report is available upon request.

The public offered input during the 45-day formal public comment period.

Key Issues

Establishing a school bus reduction goal

HB 2172 directs the EQC to set interim targets for reducing diesel emission exposure to children from Oregon school buses. This proposed rulemaking sets the following targets for 2013:
- Replace all diesel school buses 1993 and older with buses 2007 and newer;
- Retrofit half of diesel school buses 1994 – 2006 with best available emissions retrofit technology; and
- Retrofit all appropriate school buses newer than 1993 with closed crankcase ventilation, in order to reduce the exposure of school children to diesel particulate matter within the school bus cabin.

Achieving the school bus target will require DEQ to work with other agencies to replace pre-1994 school buses with lower emitting and safer buses and to retrofit 1994-2006 buses. Meeting the target is contingent on taxpayer access to credits and ongoing funding for grants.

Setting a cost effectiveness threshold for diesel projects

DEQ is recommending a cost effectiveness threshold (as required by statute) which places a limit on the cost of clean diesel upgrades per ton of diesel particulate matter reduced. Projects not meeting the cost effectiveness threshold are ineligible to receive grants, loans or tax credits for the portion of the project cost that exceeds the cost effectiveness threshold. The cost effectiveness threshold is intended to ensure efficient use of money while still including projects important to public health. School buses generally travel fewer miles annually than other commercial vehicles, which results in lower project cost effectiveness. DEQ's proposed cost-effectiveness threshold is based on the level needed to make school bus projects eligible.

After receiving comments and gathering additional information on cost effectiveness, DEQ is recommending tightening the cost-effectiveness threshold from $360,000 to $250,000 per ton of diesel particulate matter reduced.

Next Steps

The proposed rules will become effective upon EQC adoption and filing with the Secretary of State.

The Clean Diesel Grant Coordinator will staff the grant and loan programs. DEQ's tax credit program will implement the tax credit. DEQ is in the process of developing and implementing clean diesel pilot projects for grant funding in July 2008. The projects are intended to be geographically diverse and include sectors such as trucking, school buses, transit buses, construction, refuse haulers, and an Oregon community. DEQ expects the pilot projects will meet grant guidelines and rules. The rule implementation plan is available upon request.

Attachments

A. Proposed Rules
B. Summary of Public Comments and Agency Responses
C. Advisory Committee Membership List
D. Presiding Officer's Report on Public Hearings
E. Relationship to Federal Requirements Questions
F. Statement of Need and Fiscal and Economic Impact
G. Land Use Evaluation Statement

Available Upon Request

1. Written Comments Received
2. Rule Implementation Plan
3. Advisory Committee Report

Approved:

Section: ______________________

Division: Margaret Oliphant for Andy Ginsburg

Report Prepared By: Sue Gries

Phone: 503-229-5215

Proposed Rules: Clean Diesel Incentive Rulemaking

DIVISION 16

Truck Engine Tax Credits

340-016-0210
Purpose

This rule establishes Department of Environmental Quality policies and procedures for issuing tax credits to Oregon taxpayers that purchase qualifying truck engines in accordance with Oregon Law 2003, chapter 618, sections 28 through 32. These rules apply only to purchases made on or after ~~January 1, 2004~~September 27, 2007, and certificates issued on or before December 31, ~~2007~~2011.

Stat. Auth.: OL 2003, Sec. 28 - 32, reprinted in a note following ORS 315.356
Stats. Implemented: OL 2003, Sec. 28 - 32, reprinted in a note following ORS 315.356
Hist.: DEQ 8-2004, f. & cert. ef. 9-17-04

340-016-0220
Definitions

(1) "DEQ" means the Department of Environmental Quality.

(2) "The 2003 ~~Act~~Laws" means Oregon Laws 2003, chapter 618, sections 28 through 32 as reprinted in a note following ORS 315.356.

(3) "Program limitation" means the maximum amount of $~~3 million~~500,000 that DEQ may approve in tax credits for all taxpayers in any one calendar year as provided by section 29(3) of the 2003 ~~Act~~Laws.

(4) "Tax credit" or "credit" means the truck engine tax credit or the amount of the truck engine tax credit.

(5) "Taxpayer limitation" means the maximum amount of $80,000 in tax credits that DEQ may approve for one taxpayer in any one calendar year as provided by section 28(3) of the 2003 ~~Act~~Laws.

Stat. Auth.: OL 2003, Sec. 28 - 32, reprinted in a note following ORS 315.356
Stats. Implemented: OL 2003, Sec. 28 - 32, reprinted in a note following ORS 315.356
Hist.: DEQ 8-2004, f. & cert. ef. 9-17-04

340-016-0230
Application Procedures

(1) Any Oregon taxpayer may submit an application to the DEQ after purchasing a qualifying engine and within the eligibility period provided by OAR 340-016-0210.

(2) The taxpayer must apply for the tax credit on the form prescribed by DEQ.

(3) The taxpayer may submit more than one application in a calendar year.

(4) A single application may include more than one truck engine.

(5) The taxpayer must file a complete application that includes all of the following elements:

(a) The taxpayer's name, contact information, and taxpayer identification number;

(b) The number of trucks owned prior to purchasing the engines claimed on the application;

(c) Proof of purchase for each truck engine claimed on the application. The proof of purchase must include the:

(A) purchase date;

(B) seller's name, address, location of the sale, and contact information;

(C) taxpayer's name that is identical to the name on the application; and

(D) vehicle identification number of the truck with the claimed engine;

(d) A copy of the Oregon Department of Transportation registration cab card;

(e) The engine manufacturer, the engine serial number, and the federal Environmental Protection Agency diesel engine family number;

(f) The taxpayer's signature;

(g) Other information as requested; and

(h) The nonrefundable application fee of $~~15~~ 50 for each engine claimed on the application; and

(i) Other information required on the application form.

(6) An incomplete application is not eligible for an allocation of the limitation provided by ORS 340-016-0240 until the date that the taxpayer completes the application.

(7) The DEQ will notify the taxpayer within 14 days after receiving the application if the application is incomplete. The notification will:

(a) Request the missing information;

(b) Provide the taxpayer with the opportunity to submit additional information or make corrections; and

(c) Inform the taxpayer of the filing and allocation status provided by ORS 340-016-0240.

(8) DEQ may request other information to determine if the engine, the truck, and the applicant qualify for the credit according to the 2003 ~~Act~~Laws.

(9) DEQ will file, but will not process, applications that exceed the program limitation and the taxpayer limitation.

(10) DEQ may not accept an application for a truck engine that has previously been issued a truck engine tax credit.

Stat. Auth.: OL 2003, Sec. 28 - 32, reprinted in a note following ORS 315.356
Stats. Implemented: OL 2003, Sec. 28 - 32, reprinted in a note following ORS 315.356
Hist.: DEQ 8-2004, f. & cert. ef. 9-17-04

340-016-0250
Approval or Rejection Procedures

(1) The DEQ will approve all qualifying truck engines within 45 days of the date that the taxpayer submits an application under the following conditions:

(a) The applicant filed the application within the eligibility period provided by OAR 340-016-0210; and

(b) The taxpayer filed a complete application according to OAR 340-015-0230; and

(c) The taxpayer purchased the truck from a dealer licensed with the Oregon Department of Motor Vehicles as a vehicle dealer on the date of purchase, or from a private party that is an Oregon resident.

(d) The engine, the truck, and the applicant qualify for the credit according to the 2003 ~~Act~~Laws; and

(e) The engine has not previously been awarded a tax credit under OAR 340-016-0210 through 0260; and

(f) The program limitation has not expired for the current calendar year; and

(g) The taxpayer limitation has not expired for the current calendar year.

(2) The DEQ will:

(a) Reject all truck engines that do not qualify for approval under section 1 of this rule~~ and for retention under ORS 340-016-0250(3)~~; and

(b) Provide the taxpayer with a written notice of the reason for the rejection within 45 days of the date that the taxpayer filed a complete application according to OAR 340-015-0230.

Stat. Auth.: OL 2003, Sec. 28 - 32, reprinted in a note following ORS 315.356
Stats. Implemented: OL 2003, Sec. 28 - 32, reprinted in a note following ORS 315.356
Hist.: DEQ 8-2004, f. & cert. ef. 9-17-04

Clean Diesel Repower And Retrofit Tax Credits

340-016-0270

Purpose and Scope

(1) The purpose of the Clean Diesel Repower and Retrofit Tax Credits rule is to provide an incentive for making investments in qualifying projects that reduce diesel emissions from engines used in Oregon by 25 percent or more.

(2) OAR 340-016-0270 through 340-016-0340 apply only to a repower or retrofit that occurs between September 28, 2007 and January 1, 2018.

(3) OAR 340-016-0270 through 340-016-0340 establish the Department's requirements, standards and procedures used to approve tax credits for the certified costs necessary to perform qualified repowers of nonroad Oregon diesel engines and qualified retrofits of Oregon diesel engines.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)), and Oregon Laws 2007, chapter 843 (House Bill 3201 (2007)).
Stats. Implemented: Same as above.

340-016-0280

Definitions

As used in OAR 340-016-0270 through 340-016-0340, unless specifically defined otherwise:

(1) "Applicable local, state or federal pollution or emissions law" means a regulation that requires a diesel engine to meet pollution or emissions standards and has a compliance date before the installation of a repower or retrofit is completed.

(2) "Applicant" means a person that submits a Repower Tax Credit Application or a Retrofit Tax Credit Application.

(3) "Clean Diesel Service Provider" means a person that the Department has certified under OAR-259-0065 to install qualifying repowers or retrofits under the Clean Diesel Repower and Retrofit Tax Credit regulations, OAR 340-016-0270 through 340-016-0340, or the Clean Diesel Grant and Loan regulations, 340-259-0005 through 340-259-0065.

(4) “Cost-effectiveness threshold” means the cost, in dollars, per ton of diesel particulate matter reduced determined pursuant to OAR 340-259-0025.

(5) “Department” means the Department of Environmental Quality.

(6) “Motor vehicle” has the meaning given that term in ORS 825.005.

(7) “Nonroad Oregon diesel engine” means any Oregon diesel engine that was not designed primarily to propel a motor vehicle on public highways of this state.

(8) “Oregon diesel engine” means an engine at least 50 percent of the use of which, as measured by miles driven or hours operated, will occur in Oregon for the three years following the repowering or retrofitting of the engine.

(9) “Program limitation” means the maximum amount that the Department may certify in tax credits during any one calendar year as authorized by the legislature.

(10) “Public highway” has the meaning given that term in ORS 825.005.

(11) “Qualified Installer” means the person that installs the repower or retrofit and is:

- (a) A Clean Diesel Service Provider; or
- (b) An employee of the applicant, if the applicant and vendor verify that the employee:
  - (A) Installed or will install the repower or retrofit to meet the warranty conditions; and
  - (B) Possesses the necessary skill to install the repower or retrofit.

(12) “Repower” means to scrap an old diesel engine and replace it with a new engine, a used engine or a remanufactured engine, or with electric motors, drives or fuel cells, with a minimum useful life of seven years.

(13) “Retrofit” means to equip a diesel engine with new emissions-reducing parts or technology after the manufacture of the original engine. A retrofit must use the greatest degree of emissions reduction available for the particular application of the equipment retrofitted that meets the cost-effectiveness threshold specified in OAR 340-259-0025.

(14) “Scrap” means to destroy and render inoperable.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)), and Oregon Laws 2007, chapter 843 (House Bill 3201 (2007)).
Stats. Implemented: Same as above.

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340-016-0290

Standards for a Qualifying Repower or Retrofit

(1) To qualify for the Clean Diesel Repower and Retrofit Tax Credit, the repower or retrofit must:

- (a) Be either a repower of a nonroad Oregon diesel engine or a retrofit of an Oregon diesel engine;
- (b) For a retrofit, use technologies:
  - (A) Verified by the United States Environmental Protection Agency pursuant to its February 2002 Final Draft Testing Protocol “Generic Verification Protocol for Diesel Catalysts, Particulate Filters and Engine Modifications” or its September 2003 “Generic Verification Protocol for Determination of Emissions Reductions Obtained by Use of Alternative or Reformulated Liquid Fuels, Fuel Additives, Fuel Emulsions, and Lubricants for Highway and Nonroad Use Diesel Engines and Light Duty Gasoline Engines;”

(B) Verified by the California Air Resources Board pursuant to Title 13, California Code of Regulations, Chapter 14, "Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines," as in effect on June 18, 2008; or

(C) Determined by the Department to have been verified through an equivalent emission testing program;

(c) Reduce diesel particulate matter emissions by at least 25 percent compared to baseline emissions for the engine year and specific installation; and

(d) Be installed by a Qualified Installer.

(2) If the Department approved a Clean Diesel Repower and Retrofit Tax Credit application under OAR 340-016-0330 or a grant or loan application under OAR 340-259-0055 to repower or retrofit a vehicle or engine, a subsequent Clean Diesel Repower and Retrofit Tax Credit for the same vehicle or engine is available if the new repower or retrofit reduces diesel particulate matter emissions below the emissions achieved by the previous repower or retrofit.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)), and Oregon Laws 2007, chapter 843 (House Bill 3201 (2007)).
Stats. Implemented: Same as above.

340-016-0300

Application Procedures

(1) Any person may submit an application to the Department for a Clean Diesel Repower and Retrofit Tax Credit after completing a qualifying repower or retrofit that occurred between September 28, 2007 and January 1, 2018, and within one year following the invoice date of the qualifying repower or retrofit. The applicant:

(a) Must apply for the tax credit on the Repower Tax Credit Application or Retrofit Tax Credit Application published by the Department;

(b) May submit more than one application in a calendar year; and

(c) May include more than one repower or retrofit on one application.

(2) For Repower Tax Credit Applications, the applicant must file a complete application including:

(a) Documentation that the repower meets the standards of a qualifying repower pursuant to OAR 340-016-0290;

(b) An invoice for the scrapped engine that includes the name of the scrap yard, scrapping price and date, scrapped engine manufacturer and serial number, and, if available, EPA engine family number;

(c) Documentation that the engine block of the engine scrapped has had a hole drilled in it, or is otherwise destroyed or rendered inoperable; and

(d) The manufacturer name and serial number of the newly installed engine, electric motors, drives or fuel cells.

(3) For Retrofit Tax Credit Applications, the applicant must file a complete application including:

(a) Documentation that the retrofit meets the standards of a qualifying retrofit pursuant to OAR 340-016-0290;

(b) Documentation that the retrofit uses the greatest degree of emissions reduction available for the particular application of the equipment retrofitted that meets the cost-effectiveness threshold specified in OAR 340-259-0025; and

(c) The manufacturer name and serial number of the engine.

(4) For Repower Tax Credit Applications and Retrofit Tax Credit Applications, the applicant must include:

(a) The name, address and taxpayer identification number of the applicant;

(b) The nonrefundable application fee of $50 plus one percent of the potential tax credit;

(c) An itemized invoice for each repower or retrofit claimed on the application that includes:

(A) Installation date;

(B) Qualified Installer name and address;

(C) Location of the sale of the repower or retrofit and contact information for the vendor;

(D) The purchaser's name (which must be identical to the applicant);

(E) The vehicle identification number or serial number for each piece of equipment that is claimed as repowered or retrofitted on the application; and

(F) The plate number for each licensed motor vehicle on which the repower or retrofit was installed.

(d) A statement that the applicant agrees to audits of relevant records and inspection of the repower or retrofit, and will maintain the installed engine or technology in working condition to meet warranty requirements for three years;

(e) A statement by the applicant that at least 50 percent of the use of the engine, as measured by miles driven or hours operated, will occur in Oregon for the three years following the repowering or retrofitting of the engine;

(f) A statement of the amount and source of any existing financial incentives from public funds that directly reduce the cost of the repower or retrofit, including tax credits, grants, loans or any other public financial assistance;

(g) A statement by the Qualified Installer that the repower or retrofit qualifies for the tax credit pursuant to OAR 340-016-0290;

(h) A statement by the applicant that the engine on which the repower or retrofit was performed is owned by the applicant;

(i) The applicant's signature attesting that the application is true and correct; and

(j) Any additional information the Department may require.

(5) Upon determining that it does not require any additional information and that the application is complete, the Department will review the application pursuant to OAR 340-016-0320.

(6) If the Department determines that it requires additional information or that the application is incomplete, the Department will request additional information no later than 60 days after receiving the application.

(7) The applicant must submit the information requested under OAR 340-016-0300(6) within 30 days of the date of the Department's request, or the Department may deny the application.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)), and Oregon Laws 2007, chapter 843 (House Bill 3201 (2007)).
Stats. Implemented: Same as above.

340-016- 0310

Tax Credit Cost Certification Letter

(1) If the Department approves an application pursuant to OAR 340-016-0330, it will issue a letter certifying the cost of a repower or retrofit according to OAR 340-259-0020. The letter may:

(a) Certify costs in a different amount than claimed in the application pursuant to OAR 340-259-0020; and

(b) Impose recordkeeping requirements, or other terms on the applicant and a tax credit transferee.

(2) The applicant must meet the requirements of the letter of certification regardless of any tax credit transfers.

(3) The Department will notify the Oregon Department of Revenue in writing if a certification letter has been revoked or modified.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)), and Oregon Laws 2007, chapter 843 (House Bill 3201 (2007)).
Stats. Implemented: Same as above.

340-016-0320

Allocating the Limitations

(1) The Department will allocate the program limitation among applicants according to the order in which the Department receives applications that it determines to be complete and do not require any additional information pursuant to OAR 340-016-0300.

(2) If the Department receives multiple applications on the same day that it determines to be complete and do not require any additional information, and the total of the Clean Diesel Repower and Retrofit Tax Credits requested on these applications would exceed the program limitation, the Department will allocate the remaining limitation using the following method:

(a) The Department will allocate the remaining program limitation to the application with the earliest postmarked date.

(b) If multiple applications share the earliest postmarked date, the Department will allocate the remaining program limitation to the application with the earliest invoice date.

(c) If multiple applications share the earliest invoiced date, the Department will allocate the remaining program limitation by random selection.

(3) Once the program limitation has been met, the Department will process applications as follows:

(a) If the Department determines that it requires additional information or that the application is incomplete, the Department will request additional information pursuant to OAR 340-016-0300(6); and

(b) Upon determining that it does not require any additional information and that the application is complete, the Department will review the application pursuant to OAR 340-016-0320 during the next calendar year.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)), and Oregon Laws 2007, chapter 843 (House Bill 3201 (2007)).
Stats. Implemented: Same as above.

340-016-0330

Application Approval or Denial Procedures

(1) Within 60 days of determining that it does not require any additional information and that the application is complete pursuant to OAR 340-016-0300, the Department must provide written notice to the applicant of the approval or denial of the application.

(2) The Department will approve an application if:

- (a) The repower or retrofit occurred between September 28, 2007 and January 1, 2018;
- (b) The applicant filed the application within one year following the date of the invoice for the qualifying repower or retrofit; and
- (c) The repower or retrofit meets the standards of a qualifying repower or retrofit pursuant to OAR 340-016-0290.

(3) If the Department approves an application, the Department must issue a tax credit cost certification letter pursuant to OAR 340-016-0310.

(4) If the Department denies an application, the Department must provide the applicant with written notice of the reasons for the denial. The notification will include procedures for reconsideration and review under OAR 340-016-340.

(5) If the Department approves a cost certification in a lesser amount than claimed on the application, the Department must provide the applicant with written notice of the reasons for the different amount. The notification will include procedures for reconsideration and review under OAR 340-016-340.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)), and Oregon Laws 2007, chapter 843 (House Bill 3201 (2007)).
Stats. Implemented: Same as above.

340-016-0340

Procedures for Reconsideration and Review of Denial

(1) The applicant may appeal the Department's denial of an application or approval of a cost certification in a lesser amount than claimed on the application under OAR 340-016-0330(4)-(5) as follows:

- (a) The applicant may request that the Department reconsider the denial if it provides additional information in writing to assist the Department in reconsidering the application, within 60 days of the date of the Department's notice of denial; or
- (b) Appeal the denial as a contested case under ORS Chapter 183.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)), and Oregon Laws 2007, chapter 843 (House Bill 3201 (2007)).
Stats. Implemented: Same as above.

DIVISION 259

CLEAN DIESEL GRANT AND LOAN RULES

340-259-0005

Clean Diesel Initiative Goal

(1) The Environmental Quality Commission establishes the Clean Diesel Initiative Goal to reduce excess lifetime risk of cancer due to exposure to diesel engine emissions to no more than one case per million individuals by 2017.

(2) In order to meet the Clean Diesel Initiative Goal, the Environmental Quality Commission establishes a target to substantially reduce the risk to school children from diesel engine emissions produced by Oregon school buses by the end of 2013. To achieve this target by 2013, the Department will use the grant, loan, and tax credit programs in OAR 340-016-0210 through OAR 340-016-0340 and OAR 340-259-0010 through OAR 340-259-0065 to attempt to:

  (a) Replace all Oregon diesel school buses model year 1993 and older with diesel school buses model year 2007 and newer;

  (b) Retrofit half of Oregon diesel school buses model years 1994 through 2006 with best available emissions retrofit technology pursuant to OAR 340-259-0015 (18); and

  (c) Retrofit all appropriate Oregon diesel school buses model year 1994 and newer with closed crankcase ventilation, in order to reduce the exposure of school children to diesel particulate matter within the school bus cabin.

340-259-0010

Purpose and Scope

(1) The purpose of the clean diesel grant and loan rules is to make grants and loans available to the owners or operators of diesel engines for the retrofit of an Oregon diesel engine, for the repower of a non-road Oregon diesel engine, or for the scrapping of an Oregon truck engine.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).
Stats. Implemented: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).

340-259-0015

Definitions

The definitions in OAR 340-200-0020 and this rule apply to this division. If the same term is defined in this rule and OAR 340-200-0020, the definition in this rule applies to this division.

(1) "Applicable local, state or federal pollution or emissions law" means a regulation that requires a diesel engine to meet pollution or emissions standards and has a compliance date before the installation of a repower or retrofit is completed.

(2) “Applicant” means the owner or operator of an Oregon diesel engine, a nonroad Oregon diesel engine or an Oregon diesel truck engine applying for a grant or loan under this division.

(3) “Clean Diesel Service Provider” means a person that the Department has certified under OAR-259-0065 to install qualifying repowers or retrofits under the Clean Diesel Repower and Retrofit Tax Credit regulations, OAR 340-016-0270 through 340-016-0340, or the Clean Diesel Grant and Loan regulations, 340-259-0005 through 340-259-0065.

(4) “Combined weight” has the meaning given that term in ORS 825.005.

(5) “Cost-effectiveness threshold” means the cost, in dollars, per ton of diesel particulate matter reduced determined pursuant to OAR 340-259-0025.

(6) “Grant Round” means the period of time in which the Department accepts applications for grants and loans and disburses grant or loan awards.

(7) "Heavy-duty truck" means a motor vehicle or combination of vehicles operated as a unit that has a combined weight that is greater than 26,000 pounds.

(8) "Incremental cost" means the cost of a qualifying repower or retrofit less a baseline cost that would otherwise be incurred in the normal course of business.

(9) "Medium-duty truck" means a motor vehicle or combination of vehicles operated as a unit that has a combined weight that is greater than 14,000 pounds but less than or equal to 26,000 pounds.

(10) "Motor vehicle" has the meaning given that term in ORS 825.005.

(11) "Nonroad Oregon diesel engine" means any Oregon diesel engine that was not designed primarily to propel a motor vehicle on public highways of this state.

(12) "Operating condition" means functioning properly without any needed repairs.

(13) "Oregon diesel engine" means an engine at least 50 percent of the use of which, as measured by miles driven or hours operated, will occur in Oregon for the three years following the repowering or retrofitting of the engine.

(14) "Oregon diesel truck engine" means a diesel engine in a truck at least 50 percent of the use of which, as measured by miles driven or hours operated, has occurred in Oregon for the two years preceding the scrapping of the engine.

(15) "Public highway" has the meaning given that term in ORS 825.005.

(16) "Qualified Installer" means a person that installs a repower or retrofit and is:

- (a) A Clean Diesel Service Provider; or
- (b) An employee of the applicant, if the applicant and vendor verify that the employee:
  - (A) Installed or will install the repower or retrofit to meet the warranty conditions; and
  - (B) Possesses the necessary skill to install the repower or retrofit.

(17) "Repower" means to scrap an old diesel engine and replace it with a new engine, a used engine or a remanufactured engine, or with electric motors, drives or fuel cells, with a minimum useful life of seven years.

(18) "Retrofit" means to equip a diesel engine with new emissions-reducing parts or technology after the manufacture of the original engine. A retrofit must use the greatest degree of emissions reduction available for the particular application of the equipment retrofitted that meets the cost-effectiveness threshold specified in OAR 340-259-0025.

(19) "Scrap" means to destroy and render inoperable.

(20) "Truck" means a motor vehicle or combination of vehicles operated as a unit that has a combined weight hat is greater than 14,000 pounds.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).
Stats. Implemented: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).

340-259-0020

Determining the Certified Cost of a Qualifying Repower or Retrofit

(1) The Department must determine the certified cost of a qualifying repower or retrofit pursuant to this rule.

(2) The certified cost of a qualifying repower or retrofit may not exceed:

- (a) The incremental cost of labor and equipment that the Department finds necessary to perform a qualifying repower or retrofit; or

(b) The cost effectiveness threshold.

(3) The Department must reduce the incremental cost of a qualifying repower or retrofit by the value of any existing financial incentive that directly reduces the cost of the qualifying repower or retrofit, including tax credits, other grants or loans, or any other public financial assistance.

(4) The certified cost of a qualifying retrofit of an Oregon diesel engine may include part or all of the reasonable costs of:

(a) The retrofit equipment, including delivery charges;

(b) Supplies directly related to the installation of the retrofit;

(c) Labor, including any re-engineering of the vehicle or retrofit equipment needed to install the retrofit equipment if performed by:

(A) A Clean Diesel Service Provider; or

(B) A Qualified Installer employed by the applicant, and the applicant provides documentation of the employee's work as to specific tasks, hours worked, compensation, and other information requested by the Department; and

(d) Other costs directly related to the retrofit, subject to Department approval.

(5) The certified cost of a qualifying repower of a non-road Oregon diesel engine may include part or all of the reasonable costs of:

(a) The new engine, used engine, remanufactured engine, electric motors, drives or fuel cells, including delivery charges;

(b) Additional equipment that must be installed with the new engine, used engine, remanufactured engine, electric motors, drives or fuel cells;

(c) Supplies directly related to the installation of the new engine, used engine, remanufactured engine, electric motors, drives or fuel cells;

(d) Removing and scrapping the old engine;

(e) Labor, including any re-engineering of the vehicle or repower equipment needed to install the new engine, used engine, remanufactured engine, electric motors, drives or fuel cells if performed by:

(A) A Clean Diesel Service Provider; or

(B) A Qualified Installer employed by the applicant, and the applicant provides documentation of the employee's work as to specific tasks, hours worked, compensation, and other information requested by the Department; and

(f) Other costs directly related to the repower, subject to Department approval.

(6) Ineligible Costs. The Department may not include the following in the certified cost:

(a) Expenses for travel;

(b) Interest and warranty charges;

(c) Costs of ordinary maintenance, operation, repair or replacement, including spare parts;

(d) Legal fees and associated costs;

(e) Fees to finance the project;

(f) Tax credit application and associated fees;

(g) Any labor of the owner or operator's employees not listed in subsections (4)(c) and (5)(e);

(h) The cost of any portion of a repower or retrofit undertaken to comply with any applicable local, state, or federal pollution or emissions law.

(i) Costs incurred after the expiration date of the grant or loan agreement;

(j) Ordinary operating expenses that are not directly related to the project; or

(k) Other costs the Department excludes.

(7) The Department may require documentation of any costs claimed by the applicant and may reduce the certified cost of a qualifying repower or retrofit.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).
Stats. Implemented: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).

340-259-0025

Determining the Cost Effectiveness Threshold for a Repower or Retrofit

(1) Except as adjusted under section (2) of this rule, the cost effectiveness threshold is $250,000 per ton of diesel particulate matter reduced for the calendar year 2008 and thereafter.

(2) On an annual basis, the Department may calculate an adjustment of the Cost Effectiveness Threshold amount specified in section (1) of this rule based upon the increase or decrease (if any) from August of the preceding year to August of the year in which the calculation is made in the U.S. City Average Consumer Price Index for All Urban Consumers for All Items as prepared by the Bureau of Labor Statistics of the United States Department of Labor or its successor.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).
Stats. Implemented: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).

340-259-0030

Standards for Qualifying Repowers and Retrofits

(1) To qualify for a grant or loan under this division, the repower or retrofit must:

(a) Be either a repower of a nonroad Oregon diesel engine or a retrofit of an Oregon diesel engine;

(b) For a retrofit, use technologies:

(A) Verified by the United States Environmental Protection Agency pursuant to its January 22, 2002 Final Draft Testing Protocol “Generic Verification Protocol for Diesel Exhaust Catalysts, Particulate Filters, and Engine Modification Control Technologies for Highway and Nonroad Use Diesel Engines” or its September 2003 “Generic Verification Protocol for Determination of Emissions Reductions Obtained by Use of Alternative or Reformulated Liquid Fuels, Fuel Additives, Fuel Emulsions, and Lubricants for Highway and Nonroad Use Diesel Engines and Light Duty Gasoline Engines and Vehicles;”

(B) Verified by the California Air Resources Board pursuant to Title 13, California Code of Regulations, Chapter 14, "Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines," as in effect on June 18, 2008; or

(C) Determined by the Department to have been verified through an equivalent emission testing program;

(c) Reduce diesel particulate matter emissions by at least 25 percent compared to baseline emissions for the engine year and specific installation; and

(d) Be installed by a Qualified Installer.

(2) If the Department approved a Clean Diesel Repower and Retrofit Tax Credit application under OAR 340-016-0330 or a grant or loan application under OAR 340-259-0055 to repower or retrofit a vehicle or engine, a subsequent grant or loan under this division for the same vehicle or engine is available only if the new repower or retrofit reduces diesel particulate matter emissions below the emissions achieved by the previous repower or retrofit.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).
Stats. Implemented: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).

340-259-0035

Standards for Qualifying Oregon Diesel Truck Engine Scrapping Projects

(1) In order to qualify for an Oregon diesel truck engine scrapping grant, the engine to be scrapped must:

(a) Have been manufactured prior to 1994;

(b) Be in an operating condition at the time of the grant application or, if repairs are needed, the owner must demonstrate to the Department's satisfaction that the engine can be repaired to an operating condition for less than its commercial scrap value;

(c) Have been used in Oregon at least 50 percent of the time, as measured by miles driven or hours operated, for the two years preceding the scrapping of the engine; and

(d) Have been insured for driving for the two years preceding the scrapping.

(2) The engine to be scrapped does not qualify for an Oregon diesel truck engine scrapping grant if the owner or operator of the engine has applied for or received any other tax credit or other public financial assistance concerning emission reductions for the engine.

(3) Except as adjusted under section (6) of this rule, the maximum grant allowed for scrapping a medium-duty truck engine is $2,000 for the calendar year 2008 and thereafter. The Department may allow grants for the maximum amount or a lesser amount.

(4) Except as adjusted under section (6) of this rule, the maximum grant allowed for scrapping a heavy-duty truck engine for a vehicle that has a combined weight under 33,000 pounds is $2,000 for the calendar year 2008 and thereafter. The Department may allow grants for the maximum amount or a lesser amount.

(5) Except as adjusted under section (6) of this rule, the maximum grant allowed for scrapping a heavy-duty truck engine that has a combined weight that is 33,000 pounds or more is $7,000 for the calendar year 2008 and thereafter. The Department may allow grants for the maximum amount or a lesser amount.

(6) On an annual basis, the Department may adjust the maximum grant amounts specified in subsections (3) to (5) of this section based upon the increase or decrease (if any) from August of the preceding year to August of the year in which the calculation is made in the U.S. City Average Consumer Price Index for All Urban Consumers for All Items as prepared by the Bureau of Labor Statistics of the United States Department of Labor or its successor.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).
Stats. Implemented: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).

340-259-0040

Approval Preferences for Grant and Loan Awards

(1) Subject to OAR 340-259-0045 to OAR 340-259-0055, the Department may award grants and loans under this division based on all the following preferences, or may award grants and loans in a simplified year-round process that uses only the preferences in subsections (1)(a) – (c) of this section:

(a) Percent of engine use in Oregon;

(b) Benefit to sensitive populations or areas with elevated concentrations of diesel particulate matter;

(c) Cost effectiveness;

(d) Length of project benefits;

(e) Commitment of funding, expertise, materials, labor or other assistance from third parties;

(f) Commitment to making additional air quality improvements such as, but not limited to participating in Oregon's Clean Fleets Recognition Program, EPA's SmartWay Transport Partnership, having a policy that specifies replacement of old equipment or reduces idling, or conducting a fleet analysis;

(g) Amount of emissions reductions in Oregon;

(h) The applicant's past grant or loan performance, such as maintenance and recordkeeping;

(i) Capacity to complete and maintain the repower, retrofit or scrapping project effectively; and

(j) Other preferences the Department may specify.

(2) The Department may include, in any public notice announcing grant and loan availability, a request for applications for specific repower, retrofit and scrapping projects or project areas that will be given preference. The Department may designate funds to target specific projects or areas.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).
Stats. Implemented: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).

340-259-0045

Grant and Loan Award Process

(1) The Department will determine the amount of grants and loans available, and may:

(a) Allocate funds for specific engine types, geographic areas, or other specific purposes.

(b) Establish and publish public notice of deadlines for submission of applications.

(c) Make funds available for year-round application submissions. When a year-round process is used:

(A) Completed applications will be reviewed in the order they are received; and

(B) Funds will be awarded until they are no longer available.

(d) Make funds available through grant rounds. When grant rounds are used:

(A) Completed applications received by the published deadline will be reviewed without preference for date of receipt;

(B) The Department may rank projects for purposes of grant and loan awards; and

(C) The Department will establish a maximum funding amount for each grant round that is less than the Department's available funding.

(2) The Department will allocate a portion of the funds available for grants and loans for applicants that own or operate 10 or fewer Oregon diesel engines and will provide for simplified access to financial assistance for those applicants.

(3) Beginning on June 25, 2008 and ending on June 30, 2010, the Department must reserve 75 percent of the funds available for grants and loans under this division for Oregon diesel engines that:

(a) Will be used in Oregon for at least 75 percent of the total number of miles that the vehicle is driven during the three years following the repowering or retrofitting of the engine; or

(b) Will be used in Oregon for at least 75 percent of the total number of hours the engine is operated during the three years following the repowering or retrofitting of the engine.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).
Stats. Implemented: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).

340-259-0050

Application Procedures

(1) An application for a grant or loan for a qualifying repower or retrofit must include:

(a) The name and address of the applicant;

(b) A complete budget for the proposed repower or retrofit, including a list of the different costs that comprise the total budget;

(c) A workplan and schedule for completion of the proposed repower or retrofit;

(d) A statement of the amount and source of any existing financial incentives from public funds that directly reduce the cost of the proposed repower or retrofit, including tax credits, grants, loans or any other public financial assistance;

(e) Any information requested by the Department that is necessary to evaluate the proposed repower or retrofit based on the approval preferences for grant and loan awards pursuant to 340-259-0040;

(f) Documentation that the proposed repower or retrofit meets the standards of a qualifying repower or retrofit pursuant to OAR 340-259-0030;

(g) The manufacturer name and serial number of the engine to be retrofitted or the engine, electric motors, drives or fuel cells to be installed as a repower, and, if available, the federal Environmental Protection Agency diesel engine family number;

(h) For the vehicle or equipment on which the repower or retrofit will be performed, the vehicle identification number or identification number, and license plate number for licensed motor vehicles;

(i) For a retrofit, documentation that the retrofit will use the greatest degree of emissions reduction available for the particular application of the equipment retrofitted that meets the cost-effectiveness threshold;

(j) For a repower, documentation that the repower will have a minimum seven-year useful life.

(k) A statement by the applicant that at least 50 percent of the use of the engine, as measured by miles driven or hours operated, will occur in Oregon for the three years following the repowering or retrofitting of the engine;

(l) The applicant's signature attesting that the application is true and correct; and

(m) Any additional information the Department may require.

(2) An application for an Oregon diesel truck engine scrapping project must include:

(a) The name and address of the applicant;

(b) A complete budget for the proposed scrapping project, including a list of the different costs that comprise the total budget;

(c) A statement of the amount and source of any existing financial incentives that directly reduce the cost of the proposed scrapping project, including tax credits, grants, loans or any other public financial assistance;

(d) Any information requested by the Department that is necessary to evaluate the proposed scrapping project;

(e) Documentation that the proposed scrapping project qualifies for an Oregon diesel truck engine scrapping grant pursuant to OAR 340-259-0035;

(f) The vehicle identification number for the vehicle from which the engine will be scrapped, and license plate number for licensed motor vehicles;

(g) Documentation that the engine was used in Oregon at least 50 percent during the last two years as measured by miles driven or hours operated;

(h) Documentation that the engine was insured for driving for the two years preceding the scrapping;

(i) The applicant's signature attesting that the application is true and correct; and

(j) Any additional information the Department may require.

(3) Applications must be submitted on the most current form prescribed by the Department. Current applications forms are available on the Department's website.

(4) Upon determining that it does not require any additional information and that the application is complete, the Department will review the application pursuant to OAR 340-259-0055.

(5) If the Department determines that it requires additional information or that the application is incomplete, the Department will request additional information no later than 30 days after receiving the application.

(6) The applicant must submit the information requested under OAR 340-259-0050(5) within 30 days of the date of the Department's request, or the Department may deny the application.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).
Stats. Implemented: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).

340-259-0055

Review and Approval or Denial

(1) Within 30 days of determining that it does not require any additional information and that the application is complete pursuant to OAR 340-259-0050(4), the Department must provide written notice to the applicant of whether it has approved or denied the application, and if approved, the amount of the grant or loan.

(2) The Department will approve or deny completed applications based on funding availability, application content, whether the project meets the standards of a qualified repower, retrofit or Oregon diesel truck engine scrapping project, and approval preferences for grant and loan awards pursuant to 340-259-0040.

(3) For approved applications, the Department may award grants and loans in amounts less than requested by the applicant. The Department determination the amount of the grant or loan based on funding availability, application content, and approval preferences for grant and loan awards pursuant to 340-259-0040.

(4) Applications that are denied due to lack of funding may be resubmitted if the Department obtains additional funding.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).
Stats. Implemented: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).

340-259-0060

Grant or Loan Agreements and Conditions

(1) Following approval of the application for a repower or retrofit grant or loan pursuant to OAR 340-259-0055, the Department and the applicant will enter into an agreement with the following terms and conditions:

(a) Recordkeeping requirements;

(b) Maintenance requirements;

(c) End date -- term of project;

(d) Method of payment;

(e) Audit by the Department; and

(f) Other terms and conditions necessary to monitor compliance with applicable requirements of the grant or loan.

(2) Following approval of the application for a truck engine scrapping project, the Department will provide the grant money to the applicant within 30 days, provided that the allocation for truck scrapping grants has not been exceeded.

(3) If the repower or retrofit has not been fully completed within one year of the Department approval, funding may be terminated. The money allocated to the grant or loan will be available for reallocation by the Department.

(4) The Department may allow an extension of time for a grant or loan recipient to complete a project, upon receipt from the fund recipient, and Department approval, of acceptable documentation of need.

(5) The Department may at any time review and audit requests for payment and make adjustments due to mathematical errors, items not built or bought, unreasonable costs, lack of progress under the grant or loan, or other reasons.

(6) The Department may require grant and loan recipients to submit records and materials necessary to monitor compliance with applicable requirements and the grant or loan agreement, including but not limited to:

(a) Relevant invoices;

(b) For a repower or truck engine scrapping grant, an invoice for the scrapped engine that includes the name of the scrap yard, scrapping price and date, scrapped engine manufacturer and serial number, and, if available, EPA engine family number; and

(c) For a repower or truck scrapping grant, documentation that the engine block of the scrapped engine has had a hole drilled in it or has otherwise been destroyed or rendered inoperable.

(7) If the recipient does not comply with applicable requirements, including but not limited to the grant or loan agreement, the Department may:

(a) Order the recipient to refund all grants and loans received;

(b) Impose penalties pursuant to ORS 468.140; or

(c) Take any other appropriate legal or enforcement action.

(8) Grants and loans will be disbursed to the recipient within 30 days of receipt by the Department of a completed grant or loan disbursement request form accompanied by receipts, invoices or other documentation required by the grant or loan agreement.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).

Stats. Implemented: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)).

340-259-0065

Certification as a Clean Diesel Service Provider

(1) The Department may certify a person as a Clean Diesel Service Provider.

(2) A Clean Diesel Service Provider must:

- (a) Provide applicants with information about Department tax credit, grant, and loan regulations applicable to the repower or retrofit, and may assist applicants with the tax credit, grant, and loan application forms;
- (b) Install repowers and retrofits according to tax credit, grant, and loan regulations;
- (c) Provide applicants with warranty information, estimated annual maintenance costs, an anticipated maintenance schedule, and any other information needed to maintain performance of the repower or retrofit; and
- (d) Verify the quality and performance of an installation.

(3) The Department may certify a person as a Clean Diesel Service Provider on one or more technologies.

(4) To obtain certification as a Clean Diesel Service Provider, the person must demonstrate:

- (a) One or more employees have technical expertise with repower and retrofit technology;
- (b) Possession of equipment required to analyze a diesel engine to determine appropriate retrofit or repower technology;
- (c) One or more employees are trained in technology selection, installation, and support of exhaust emission devices or repowering engines;
- (d) Professionalism while interacting with the Department and applicants;
- (e) Evidence that the person has been authorized to do warranty work or install devices or engines to maintain warranty; and
- (f) Other qualifications required by the Department.

(5) The Department may revoke the certification of a Clean Diesel Service Provider if the Department finds that the person or one or more of its employees:

- (a) Obtained certification by fraud or misrepresentation;
- (b) Performed an installation that does not meet industry standards. The Department may find that the Clean Diesel Service Provider's performance does not meet industry standards if the person or one of its employees:
  - (A) Does not carry the required level of insurance, licensure or bonding set by the Department;
  - (B) Fails to install the repower or retrofit in compliance with standards adopted under OAR 340-016-0210 through OAR 340-016-0260 and OAR 340-259-0010 through OAR 340-259-0065;
  - (C) Fails to install the repower or retrofit system in a professional manner as determined by the Department;
  - (D) Fails to install the repower or retrofit system to comply with manufacturers' published specifications;
  - (E) Fails to honor contract provisions;
  - (F) Fails to honor a warranty that they are contractually obligated to perform;
  - (G) Fails to make corrections to remedy failure to comply with paragraphs (A) through (G) of this subsection requested by the Department within 30 days of written notification identifying the problem from the Department, unless a time extension is granted by the Department; or

(H) Does not meet eligibility requirements in subsection (4).

(c) Misrepresented to the applicant either the tax credit, grant, or loan program or the nature or quality of the repower or retrofit by:

(A) Providing false or misleading information to the applicant regarding the availability, amount or nature of the tax credit, grant, or loan;

(B) Providing false or misleading information to the applicant regarding the tax credit, grant, or loan application;

(C) Providing false or misleading information to the applicant regarding eligibility standards for the tax credit, grant or loan;

(D) Misrepresenting the nature of the performance of the repower or retrofit or claimed excess emission reductions to the applicant and to the Department;

(E) Misrepresenting the cost of a repower or retrofit;

(F) Misrepresenting a competitor's product or service; or

(G) Failing to make corrections requested in writing by the Department to remedy violations of (A) through (F) of this subsection within 30 days, unless more time is allowed by the Department.

(6) Certification is not a guarantee or warranty of any kind that the Clean Diesel Service Provider will properly install any individual repower or retrofit or perform any other work as certified. As a condition of certification, the Department may require the person to defend, indemnify and hold the Department harmless from any claims related to work performed by the person related to its certification.

Stat. Auth.: Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)), and Oregon Laws 2007, chapter 843 (House Bill 3201 (2007)).
Stats. Implemented: Same as above.

Agenda Item F, Rule Adoption: Clean Diesel Incentives
Attachment B. Summary of Public Comment and Agency Response
June 19-20, 2008 EQC Meeting

Summary of Public Comment and Agency Response

Clean Diesel Incentive Rulemaking

Prepared by: Sue Gries **Date: June 19, 2008**

Comment period

The public comment period opened February 22, 2008 and closed 5 p.m. April 1, 2008. DEQ held a public hearing at 6 p.m. on March 26th, 2008 in Portland. Three people attended, but did not testify or written comments. Four written comments were received outside of the public hearing.

Organization of comments and responses

Summaries of individual comments and the DEQ's responses are provided below. Comments are summarized in categories. The persons who provided each comment are referenced by number. A list of commenters and their reference numbers follows the summary of comments and responses. Comments and responses are organized in the following categories: general comments; comments on tax credit rules, comments on grants and loans

Summary of Comments and Agency Responses

From	Comment	DEQ response & proposed rule change
1	There is no need to restate definitions that are contained in the law in the rule. This only creates redundancy in the rule	For clarity and readability, DEQ has restated statutory definitions in the rule. Restating statutory definitions allows easy reading without frequent reference to the statutes.
1	We would request an additional paragraph be added to OAR 340-016-0310 which states "the will notify the Oregon DEQ of Revenue in writing if a certification letter has been revoked or modified since being initially issued."	The DEQ agrees that an additional paragraph should be added, and proposes to add the following paragraph to the regulation: OAR 340-016-0310 (3) The DEQ will notify the Oregon Department of Revenue in writing if a certification letter has been revoked or modified after the original issue date.
2	Inhaling diesel exhaust is noxious and at times debilitating. I fully support any program that encourages improvement to diesel vehicles to clean up and diminish exhaust. I find noxious diesel fumes from school buses particularly disturbing due to children's repeated and lengthy exposures. While gasoline powered automobiles and many stationary sources have long been required to reduce air emissions known to cause health issues, diesel vehicles have not had a compliance standard. It is time to target diesel vehicles with their high NOx and particulate emissions contributing to air pollution and subsequent health issues.	DEQ thanks the reviewer for supporting the clean diesel program.

3	The proposed rules set a single cost effectiveness threshold of $360,000. A single threshold is not consistent with the intent of the underlying legislation, House Bill 2172. The cost effectiveness filter was intended to guide all decisions regarding the award of grants and tax credits. However, it is recognized that with what is referred to as the "year round program" it will be necessary to certify certain technologies as meeting the cost effectiveness threshold so that installation of these technologies can be expeditiously deployed.	DEQ has proposed a single cost effectiveness threshold in OAR 340-259-025 because the statutes do not appear to allow for multiple cost effectiveness thresholds. The proposed cost-effectiveness threshold is intended to ensure efficient use of money while still including projects important to public health. School buses generally travel fewer miles annually than other commercial vehicles, which results in lower project cost effectiveness. DEQ's proposed cost effectiveness threshold is based on the level needed to make school bus projects eligible. DEQ, as part of its implementation, will give preference to more cost effective projects whenever possible (see OAR 340-259-0040 (1)).
4	The cost-effectiveness threshold of $360,000 set forth in OAR 340-259-0025 should be tightened. ORRA recommends that the threshold amount be reduced to allow only the most cost-effective on-road truck engine projects to be funded, while still allowing funding for non-road equipment and school buses, which generally are not as cost-effective as traditional on-road truck engines.	DEQ agrees and proposes, after further evaluation, that the cost effectiveness threshold set forth in OAR 340-259-0025 (1) should be $250,000 per ton of diesel particulate matter reduced. This is a level that maximizes benefits from projects, while ensuring that a wide variety of engines will qualify, including school buses, trucks, transit buses as well as non highway equipment such as construction and logging equipment.
3, 4	The proposed rules allow DEQ 60 days to review grant applications. It is recommended that this time be shortened to 30 days to provide for more timely decisions on grant requests.	DEQ agrees and has shortened the review time to 30 days in the proposed rule 340-259-0055 (1).
4	Requests for additional information by DEQ for incomplete application (OAR 340-259-0050(5)), currently 28 days under the proposed rule should be changed to 30 days.	DEQ agrees and has modified the requests for additional information for incomplete rules to 30 days in the proposed rule 340-259-0050 (5).
3	The proposed rules address the possibility of a retrofitted engine being destroyed only if DEQ provides a tax credit. It does not address this issue if DEQ provides a grant.	The proposed rules do address this for both tax credits and grants. As specified in 340-259-0060 (6)(c), DEQ may require grant and loan recipients to submit records and materials necessary to monitor compliance with applicable requirements and the grant or loan agreement, including but not limited to the following: "...For a repower or truck scrapping grant, documentation that the engine block of the scrapped engine has had a hole drilled in it or has otherwise been destroyed or rendered inoperable."
3, 4	The proposed rules addressing grants	Removing an old engine from operation and its

	under OAR 340-259-0060 for scrapped engines do not provide parameters for replacement engines. It is recommended that when an applicant replaces a scrapped engine that DEQ require that the replacement engine meet 1994 or newer emission requirements established by the Environmental Protection Agency.	emissions can, by itself, result in significant air quality gains. While requiring the replacement vehicle to comply with the 1994 or newer emission standard would ensure that further emission gains are realized, if scrapped engine grants are tied to the purchase of a 1994 and newer engine, the associated cost of such an engine could exclude appropriate truck owners from participating. This could result in a reduction in the overall effectiveness of the program. In addition, requiring the purchase of a new engine would be difficult to administer and enforce.

List of Commenters and Reference Numbers

Reference Number	Name	Organization	Address	Date on comments
1	Dennis Maurer	Oregon Department of Revenue	955 Center St NE Salem, OR 97301-2555	March 4, 2008
2	Kathy Vejtasa		312 Impala Dr. Roseburg, OR	March 19, 2008
3	Bob Russell, President	Oregon Trucking Associations, Inc.	4005 S.E. Naef Rd. Portland, OR 97267-5617	March 28, 2008
4	Holly Sears Governmental Affairs Director	Oregon Refuse and Recycling Association	680 State Street, Suite 100 P.O. Box 2186 Salem, Oregon 97308-2186	April 1, 2008

Agenda Item F, Rule Adoption: Clean Diesel Incentives
Attachment C, Advisory Committee Membership List
June 19-20, 2008 EQC Meeting

Clean Diesel Incentive Advisory Committee Membership List

Jessica Adamson – Associated General Contractors

Tony Bryant – TriMet

Shawn Cleave – Oregon Farm Bureau

Gordon Griffin – Lane Regional Air Protection Agency

Ralph Groener – American Federation of State, County and Municipal Employees

John Hunt – City of Portland

Dean Kampfer – Oregon Refuse and Recycling Association

Dana Kaye – American Lung Association

Sara Leverette – Oregon Environmental Council

Peter Murchie – Environmental Protection Agency

Bob Russell – Oregon Trucking Association

Tricia Smith – Oregon School Employees Association

State of Oregon
Department of Environmental Quality **Memorandum**

Presiding Officer's Report

Date: March 27, 2008

To: Environmental Quality Commission

From: Sue Gries

Subject: Presiding Officer's Report for Rulemaking Hearing
Title of Proposal: Clean Diesel Incentive Proposed Rules
Hearing Date and Time: March 26, 2008 at 6 PM
Hearing Location: DEQ Headquarters, 811 SW 6th Avenue, Portland, OR

DEQ convened the rulemaking hearing on the proposal referenced above at 6 p.m. and closed it at 6:41 p.m. People were asked to sign registration forms if they wished to present comments, advised that the hearing was being recorded.

Three people attended the hearing; no one testified.

Before taking comments, Kevin Downing briefly explained the rulemaking proposal and procedures for the hearing.

There were no written or oral comments received at the hearing.

Agenda Item F, Rule Adoption: Clean Diesel Incentives
Attachment E, Relationship to Federal Requirements
June 19-20, 2008 EQC Meeting

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Relationship to Federal Requirements

RULE CAPTION

Establishes a voluntary clean diesel upgrade program through grants, loans, and tax credits

Answers to the following questions identify how the proposed rulemaking relates to federal requirements and potential justification for differing from federal requirements. The questions are required by OAR 340-011-0029(1).

1. Are there federal requirements that are applicable to this situation? If so, exactly what are they?

The proposed rule is a voluntary grant, loan and tax credit program to retrofit and repower older diesel engines. There are no federal requirements for retrofitting or repowering diesel engines, scrapping truck engines, replacing or retrofitting school buses, or establishing a clean diesel tax credit or grant program.

A portion of the grant program funding is expected to come from federal grants targeted for retrofitting and repowering existing diesel engines and reducing emissions from school buses. The U.S. Environmental Protection Agency sets emission standards for new diesel engines that may be purchased through the tax credit for new engines. EPA also tracks and promotes engine retrofit technology.

2. Are the applicable federal requirements performance based, technology based, or both with the most stringent controlling?

There are no applicable federal 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?

There are no applicable federal requirements.

4. Will the proposed requirement (rulemaking) 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?

This rulemaking establishes a voluntary clean diesel tax credit, grant and loan program, and . does not establish any new mandates for owners or operators of diesel engines.

5. Is there a timing issue which might justify changing the time frame for implementation of federal requirements?

There are no applicable federal requirements.

6. Will the proposed requirement (rulemaking) assist in establishing and maintaining a reasonable margin for accommodation of uncertainty and future growth?

There are no applicable federal requirements. There are no mandates associated with this rulemaking.

7. Does the proposed requirement (rulemaking) establish or maintain reasonable equity in the requirements for various sources? (level the playing field)

There are no mandates associated with this rulemaking. .

8. Would others face increased costs if a more stringent rule is not enacted?

No.

9. Does the proposed requirement (rulemaking) 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?

There are no applicable federal requirements. There are no mandates associated with this rulemaking.

10. Is demonstrated technology available to comply with the proposed requirement (rulemaking)?

There are no mandates associated with this rulemaking.

11. Will the proposed requirement (rulemaking) contribute to the prevention of pollution or address a potential problem and represent a more cost effective environmental gain?

There are no mandates associated with this rulemaking.

DEPARTMENT OF ENVIRONMENTAL QUALITY
Chapter 340
Proposed Rulemaking
STATEMENT OF NEED AND FISCAL AND ECONOMIC IMPACT

Rule Caption

Establishes a voluntary clean diesel upgrade program through grants, loans, and tax credits

This form accompanies a Notice of Proposed Rulemaking Hearing

Title of Proposed Rulemaking	Clean Diesel Incentive Rulemaking
Statutory Authority or other Legal Authority	Oregon Laws 2003, chapter 618, sections 28 – 32 (reprinted in a note following ORS 315.356), Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)), and Oregon Laws 2007, chapter 843 (House Bill 3201 (2007)).
Statutes Implemented	Same as above.
Need for the Rule(s)	The goal of this rulemaking is to initiate a clean diesel upgrade program through grants, loans and tax credits as provided in HB 2172 and HB 3201and to extend the existing tax credit for new truck purchases in order to reduce excess lifetime cancer risk from diesel exhaust exposure in Oregon to one in a million by 2017. This rulemaking establishes procedures for issuing grants and tax credits, establishes a cost effectiveness threshold and other standards for qualifying projects, establishes project preferences, establishes application fees for tax credits, specifies a simplified application process for applicants with a small number of diesel engines, and specifies a target for school buses. Projects eligible for the tax credits, grants, and loans can include the scrapping of a pre-1994 truck engine, retrofitting a diesel engine, or repowering a non-road diesel engine. This rulemaking describes the process DEQ will use to certify third party Clean Diesel Service Providers, and extends the existing Tax Credit for new truck engine purchases to 2011, increases the application fee from $15 to $50, and decreases the program limitation from $3 million to $500,000.
Documents Relied Upon for Rulemaking	DEQ relied on documents in the following list to prepare this rulemaking and in considering the need for,the program and for estimating the fiscal and economic effects. 1. The U.S. Environmental Protection Agency has prepared benefit-cost analyses for the adoption of federal engine emission certification standards for both highway and nonroad diesel engines. These reviews document the known environmental and public health impacts associated with exposure to diesel exhaust, predict the emissions reductions to be gained from the adoption of the requirements, and based on economic studies project the direct and indirect benefits of reduced diesel emissions. DEQ used these documents to estimate the costs of exposure to diesel exhaust. The analysis for onroad vehicles can be viewed here, http://www.epa.gov/otaq/highway-diesel/regs/ria-vii.pdf. The analysis for nonroad (off-road) vehicles is available here, http://www.epa.gov/otaq/highway-diesel/regs/ria-vii.pdf. EPA's *Regulatory Impact Analysis: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements* is available here, http://www.epa.gov/otaq/highway-diesel/regs/exec-sum.pdf 2. Oregon Laws 2003, chapter 618, sections 28 – 32 (reprinted in a note following ORS

	315.356), available online at: http://www.leg.state.or.us/ors/315.html 3. Oregon Laws 2007, chapter 855 (House Bill 2172 (2007)), available online at: http://www.leg.state.or.us/07reg/measpdf/hb2100.dir/hb2172.en.pdf 4. Oregon Laws 2007, chapter 843 (House Bill 3201 (2007)) , available online at: http://www.leg.state.or.us/07reg/measpdf/hb3200.dir/hb3201.en.pdf 5. DEQ's analysis of this data is in a document entitled "Valuation of Benefits from Diesel Emission Reductions." Copies of these documents are available online as listed above and can also be reviewed at the DEQ office at 811 S.W. 6th Avenue, Portland, Oregon. Please contact **Sue Gries** at **503-229-5215** for times when the documents are available for review.
Requests for Other Options	**Pursuant to ORS 183.335(2)(b)(G), DEQ requests public comment on whether other options should be considered for achieving the rule's substantive goals while reducing negative economic impact of the rule on business.**
Fiscal and Economic Impact, Statement of Cost Compliance	
Overview	House Bills 2172 and 3201 address three clean diesel incentives: 1) HB 2172 establishes the Clean Diesel Engine Fund 2) HB 3201 and HB 2172 establish tax credits for a portion of the certified costs of an Oregon nonroad diesel engine repower or Oregon diesel engine retrofit 3) HB 3201 and HB 2172 extend the existing tax credit for purchase of new trucks that meet emission limits specified in the bills This rulemaking is expected to result in significant net economic benefits to Oregon by reducing health impacts from exposure to diesel engine exhaust. Participation in the grant, loan, or tax credit program for clean diesel is voluntary, and there are no compliance costd. Therefore, DEQ anticipates that there will be no negative fiscal and economic effects from the proposed rules to private entities. Should an individual, business, or government voluntarily apply for and receive a loan, grant or tax credit for a clean diesel project, that entity will incur costs. For example, the entity may have to pay a portion of the project, and there will be recordkeeping and maintenance requirements for the life of the project. DEQ anticipates that there will be negative fiscal and economic effects from the proposed rules to the state of Oregon due to the tax credit, which will reduce state tax revenue by up to $7 million during the 2007 – 2009 biennium. However, in the long run, this may be offset by lower costs to the state for health care. In this biennium DEQ has $7 million available in tax credits and $1.5 million in grant funds. These grant funds and tax credits will be used to offset the purchase price of qualifying diesel exhaust retrofits and engine repowers from 25 percent up to 100 percent of the approved costs.
Impacts to General Public	DEQ estimates that annual exposure to diesel emissions in Oregon results in over $1 billion in direct and indirect public health and environmental costs based on information compiled by the EPA (see reference above). Reducing the diesel emissions through grants and tax credits will reduce these public health costs, creating an overall positive economic impact for the general public. EPA's *Regulatory Impact Analysis: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements* http://www.epa.gov/otaq/highway-diesel/regs/exec-sum.pdf indicates that there is at least a 10 to 1 return in public health and environmental benefits compared to the dollars spent on the equipment.

<table>
<tr>
<td></td>
<td colspan="2">Children riding school buses have more exposure to and are more vulnerable to adverse health impacts from diesel particulate matter inside the bus cabin. A study commissioned by the California Air Resources Board estimated that increased exposures while commuting by school bus increased a child's lifetime cancer risk by approximately 4 percent and increased risk for lower respiratory symptoms by 6% and daily hospitalizations by 4 percent.

The grant funds and tax credits will be used to decrease the emissions from diesel engines in Oregon, and to decrease diesel particulate matter levels inside school buses, thereby decreasing this financial impact on public health and the environment.</td>
</tr>
<tr>
<td>Impacts to Small Business
(50 or fewer employees – ORS183.310(10))</td>
<td colspan="2">DEQ does not anticipate any direct negative fiscal or economic impacts from this proposed rulemaking on small business because participation is voluntary. However, participation requires recordkeeping, following minimum requirements for the maintenance of emission controls and minimum operating time in the state, and might entail matching funds. There will be no fiscal impact on small businesses unless they decide to apply for a grant, loan or tax credit.

HB 2172 calls for reserving a portion of the grant program's total financial assistance to applicants that own or operate a small number of diesel powered equipment and vehicles. A simplified application process will be available to minimize application costs for these businesses.

The grant funds and tax credits will be used to decrease the emissions from diesel engines in Oregon, thereby decreasing the negative fiscal impact on public health and the environment. Some of these costs are associated with lost time at work due to asthma and other illnesses triggered by exposure to diesel exhaust. Small businesses with employees experiencing fewer lost work days due to illness will have positive fiscal benefits.</td>
</tr>
<tr>
<td rowspan="4">Cost of Compliance on Small Business
(50 or fewer employees – ORS183.310(10))</td>
<td>a) Estimated number of small businesses subject to the proposed rule</td>
<td>Participation in the program is voluntary. Therefore, the number of small businesses subject to the proposed rule depends on how many small businesses apply for grant funds, loans or tax credits. In order to encourage small business participation in the grant program, a simplified application will be available, and a portion of the grant funds will be reserved for businesses with a small number of diesel engines.</td>
</tr>
<tr>
<td>b) Types of businesses and industries with small businesses subject to the proposed rule</td>
<td>Some small agricultural operators, trucking companies and general contractors might have diesel engines and decide to apply for a grant or tax credit. Participation is voluntary.</td>
</tr>
<tr>
<td>c) Projected reporting, recordkeeping and other administrative activities required by small businesses for compliance with the proposed rule, including costs of professional services</td>
<td>Participation in this program is voluntary. However, participation requires recordkeeping, following minimum requirements for the maintenance of emission controls and minimum operating time in the state, and might entail matching funds. There will be a simple recordkeeping form for the project life.</td>
</tr>
<tr>
<td>d) The equipment, supplies, labor, and increased administration required by small businesses for compliance with the proposed rule</td>
<td>Participation in this program is voluntary. However, participation requires labor for installation and maintenance of emission control equipment, recordkeeping requirements, and might entail matching funds. There will be no fiscal impact on small businesses unless they decide to apply for a grant, loan or tax credit.</td>
</tr>
</table>

	e) A description of the manner in which DEQ involved small businesses were involved in the development of this rulemaking	The Oregon Farm Bureau, Oregon Trucking Association, and the Associated General Contractors were appointed to the Clean Diesel Incentive Advisory Committee. These membership organizations represent small businesses, as well as large businesses.
Impacts to Large Business (all businesses that are not "small businesses" under ORS183.310(10))	Participation in this voluntary program requires recordkeeping, following minimum requirements for the maintenance of emission controls and minimum operating time in the state, and might entail matching funds. There is no fiscal impact on large businesses unless they decide to apply for a grant, loan or tax credit. The grant funds and tax credits will be used to decrease the emissions from diesel engines in Oregon, thereby decreasing the negative fiscal impact on public health and the environment. Some of these costs are associated with lost time at work due to asthma and other illnesses triggered by exposure to diesel exhaust. Large businesses with employees experiencing fewer lost work days due to illness will have positive fiscal benefits.	
Local Government	Same impacts as for large businesses: there is no fiscal impact on local governments unless they decide to apply for a grant, loan or tax credit. The tax credit includes a "pass through" feature, which allows local governments that have no tax liability to benefit by selling the tax credit to a taxpayer with tax liability. The grant funds and tax credits will be used to decrease the emissions from diesel engines in Oregon, thereby decreasing the negative fiscal impact on public health and the environment. Some of these costs are associated with lost time at work due to asthma and other illnesses triggered by exposure to diesel exhaust. Local government organizations with employees experiencing fewer lost work days due to illness will have positive fiscal benefits.	
State Agencies Other Than DEQ	The Department of Revenue indicates that the bill would result in a need to update forms and publications, and some additional form processing. Related costs are expected to be minimal and assumed within existing resources. The school bus target is not a mandate, therefore DEQ cannot predict if the target will be met. In order to meet the proposed school bus target, 590 buses would need to be replaced over the next five years at an overall cost of $ 14,160,000 annually, of which $ 9,912,000 would come from General Fund support for school transportation expenses. DEQ cannot predict how many school buses will actually be replaced, since DEQ has no authority over school bus replacement. The retrofit component for 1,400 buses would cost $2,240,000 per year of which $1,568,000 would come from the General Fund. This money has not yet been allocated, and DEQ cannot predict how meeting the school bus target would affect funding of individual agencies, however, because that data is unavailable. The grant funds and tax credits will be used to decrease the emissions from diesel engines in Oregon, thereby decreasing the negative fiscal impact on public health and the environment. Some of these costs are associated with lost time at work due to asthma and other illnesses triggered by exposure to diesel exhaust. State agencies with employees experiencing fewer lost work days due to illness will have positive fiscal benefits.	
DEQ	To implement the program, DEQ will need to review, approve and issue grants and tax credits. In addition, DEQ will need to review and update the rules every five years. The bill authorizes the department to charge the Clean Diesel Engine Fund for these administrative expenses associated with the clean diesel grant and loan program. In addition, the Legislatively Approved Budget includes a Natural Resource Specialist 3 position (.88 FTE) to write administrative rules and to develop and administer the grant and loan program. The costs associated with this position are estimated to be $153,689 for 2007-09 and $175,644 for 2009-	

	2011 biennia. The cost is lower in the 2007-09 biennium because the bill does not take effect until three months into the biennium. DEQ's anticipates generating additional Other Fund revenues of $71,815 in 2007-09 and $95,400 in 2009-11 for tax credit application fees. This total assumes receipt of 20 clean diesel engine repower and retrofit tax credits with an average of seven engines on each application during the 2007-2009 biennium, increasing to 50 applications per biennium with more expensive projects during the 2009-2011, and 1030 new truck engine credits per biennium. The bill sets the clean diesel upgrade tax credit application fee at $50 plus a 1percent application processing fee, and the DEQ has increased the existing new engine credit application fee (currently $15) to $50 per engine effective September 27, 2007 per HB 3201. DEQ's estimated costs associated with processing clean diesel tax credit applications will be $83,719 for the 2007-09 biennium and an estimated $95,400 for the 2009-11 biennium. DEQ does not anticipate requesting additional position authority for this work as the agency believes it can be absorbed by existing staff. The grant funds and tax credits will be used to decrease the emissions from diesel engines in Oregon, thereby decreasing the negative fiscal impact on public health and the environment. Much of these costs are associated with lost time at work due to asthma and other illnesses triggered by exposure to diesel exhaust. Employees experiencing fewer lost work days due to illness will have positive fiscal benefits.
Assumptions	Estimates of economic benefits were based on EPA analyses of the cost benefits of requiring clean diesel technology on new engines. These costs were ratioed to Oregon based on average impacts associated on a per gallon of diesel fuel consumed calculated at the national level and proportioned to fuel consumption records in Oregon.
Housing Costs	DEQ has determined that this proposed rulemaking will have no effect on the cost of development of a 6,000 square foot parcel and the construction of a 1,200 square foot detached single family dwelling on that parcel.
Administrative Rule Advisory Committee	The Clean Diesel Incentive Advisory Committee met three times in November and December 2007 in order to provide input on the development of these rules. An advisory committee report was completed and submitted to DEQ. The advisory committee provided input to DEQ on whether the rule will have a fiscal impact, what the extent of that impact will be and whether the rule will have a significant adverse impact on small businesses.

Prepared by ______ Printed name ______ Date ______

Approved by DEQ Budget Office ______ Printed name ______ Date ______

Agenda Item F, Rule Adoption: Clean Diesel Incentives
Attachment G, Land Use Evaluation Statement
June 19-20, 2008 EQC Meeting

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Land Use Evaluation Statement

Rulemaking Proposal
for
Clean Diesel Incentive Rulemaking

Establishes a voluntary clean diesel upgrade program through grants, loans, and tax credits

1. Explain the purpose of the proposed rules.

The goal of this rulemaking is to initiate a clean diesel upgrade program through grants, loans and tax credits as provided in HB 2172 and HB 3201 and to extend the existing tax credit for new truck purchases in order to reduce excess lifetime cancer risk from diesel exhaust exposure in Oregon to one in a million by 2017. This rulemaking establishes procedures for issuing grants and tax credits, establishes a cost effectiveness threshold and other standards for qualifying projects, establishes project preferences, establishes application fees for tax credits, specifies a simplified application process for applicants with a small number of diesel engines, and specifies a target for school buses. Projects eligible for the tax credits, grants, and loans can include the scrapping of a pre-1994 truck engine, retrofitting a diesel engine, or repowering a non-road diesel engine. This rulemaking also describes the process DEQ will use to certify third party Clean Diesel Service Providers. This rulemaking also extends the existing Tax Credit for new truck engine purchases to 2011, increases the application fee from $15 to $50, and decreases the program limitation from 3 million to $500,000.

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_X_ Yes______ No___ (if no, explain):

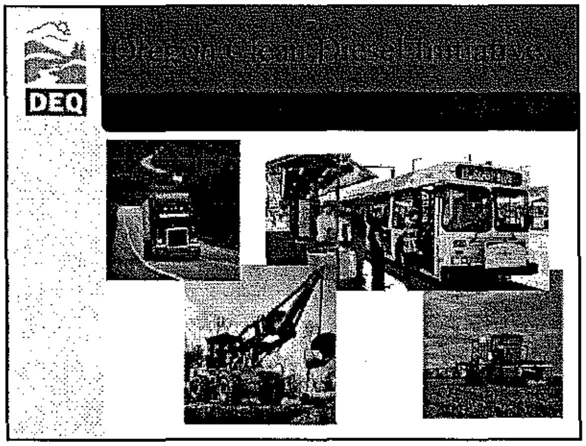
c. If no, apply the following criteria to the proposed rules. In the space below, state if the proposed rules are considered programs affecting land use. State the criteria and reasons for the determination.

The retrofit or repower of a diesel engine or purchase or scrapping of a truck engine is not a land use, is not mentioned under Section III, Subsection 2 of the DEQ State Agency Coordination Program document, is not referenced in the statewide planning goals, and is not expected to have significant effects on present or future land uses.

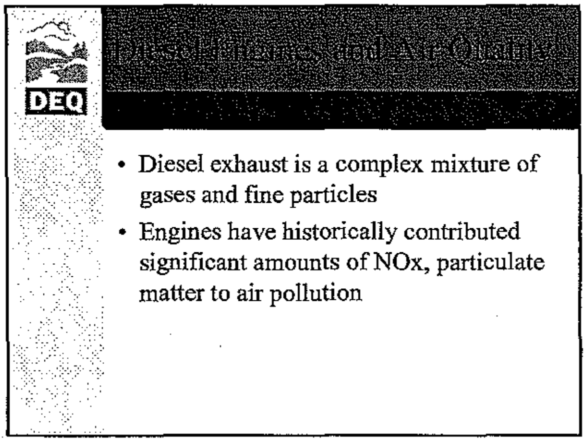
3. If the proposed rules have been determined a land use program under 2. above, but are not subject to existing land use compliance and compatibility procedures, explain the new procedures the Department will use to ensure compliance and compatibility.

N/A

Item F presentation

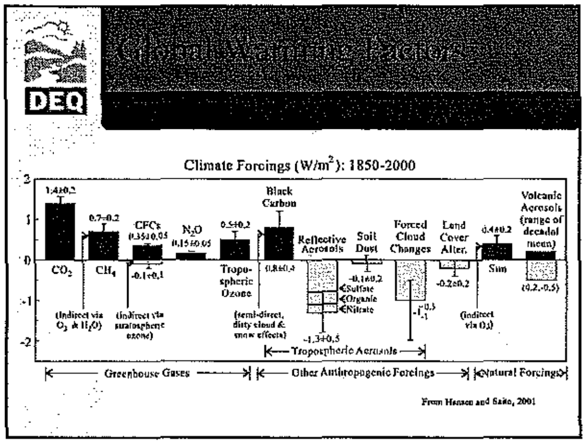


Oregon Clean Diesel Initiative



Diesel Engines and Air Quality

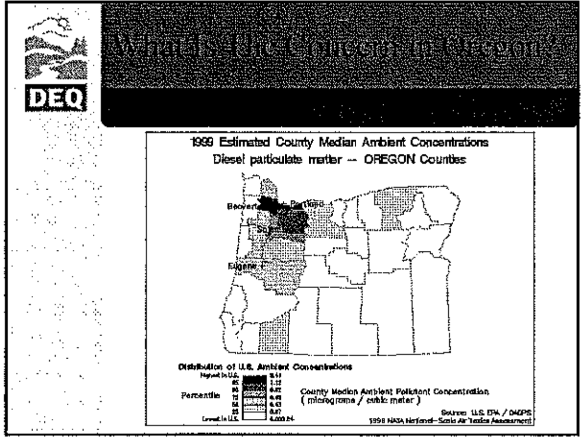
- Diesel exhaust is a complex mixture of gases and fine particles
- Engines have historically contributed significant amounts of NOx, particulate matter to air pollution



Global Warming Factors

Climate Forcings (W/m^2): 1850-2000

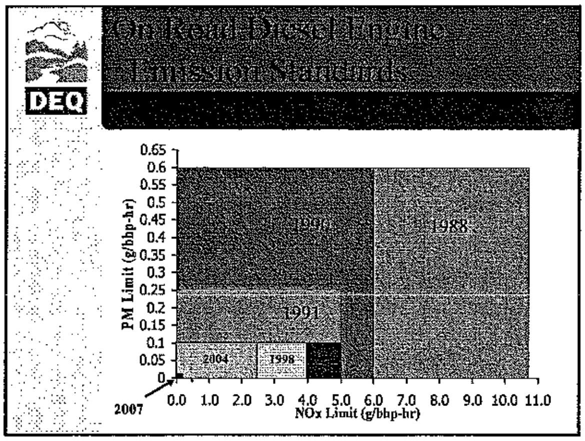
From Hansen and Sato, 2001



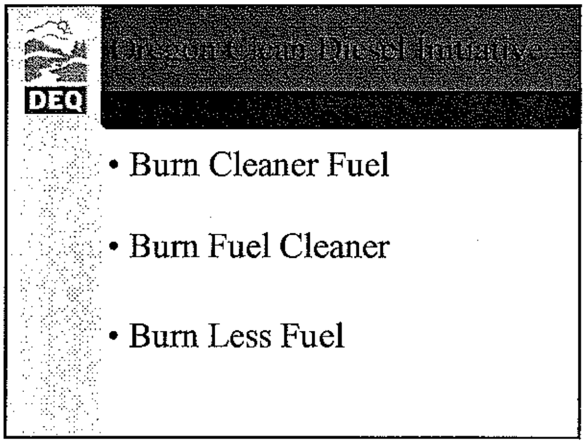
What is The Concern in Oregon?

1999 Estimated County Median Ambient Concentrations
Diesel particulate matter -- OREGON Counties

Source: U.S. EPA / OAQPS
1996 NATA National-Scale Air Toxics Assessment



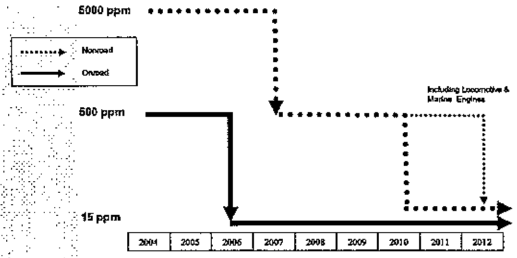
On Road Diesel Engine Emission Standards



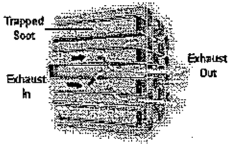
Oregon Clean Diesel Initiative

- Burn Cleaner Fuel
- Burn Fuel Cleaner
- Burn Less Fuel

Transition to Sulfur Control Diesel Fuel

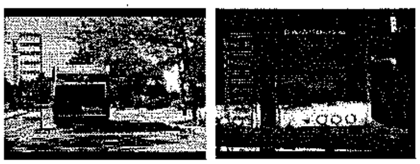


Burn Diesel Cleaner



- Catalyst oxidizes CO, HC to harmless gases
- Trap prevents particulate emissions to open air; catalyst oxidizes the particulate, regenerating the trap
- Can reduce total particulate emissions by up to 95 %
- Better toxic reduction (carbonyl & PAHs) than CNG

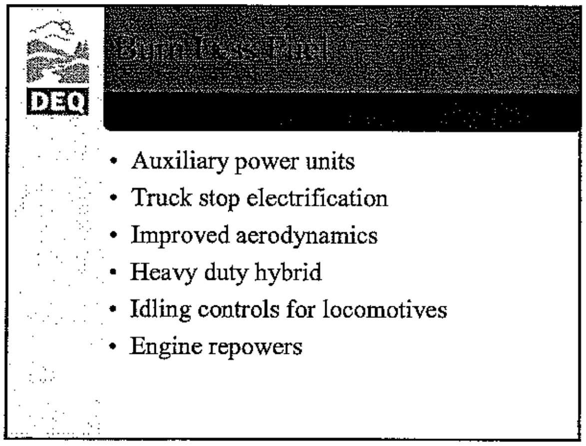
Dirty vs. Clean Diesel



CONVENTIONAL RETROFITTED

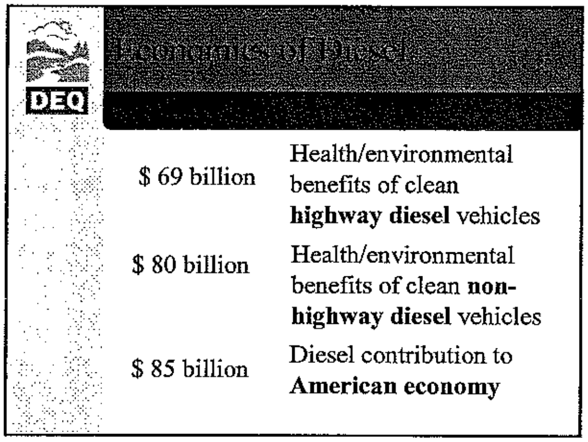
Real time measurements of particulate matter pollution inside a car "chasing" a diesel refuse truck before and after retrofitting.

Courtesy of Clean Air Task Force



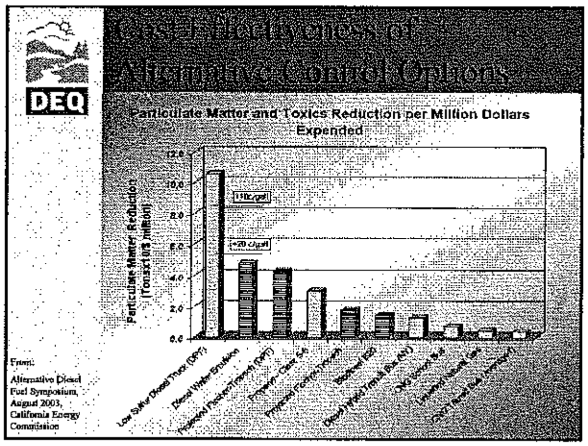
Burn Less Fuel

- Auxiliary power units
- Truck stop electrification
- Improved aerodynamics
- Heavy duty hybrid
- Idling controls for locomotives
- Engine repowers



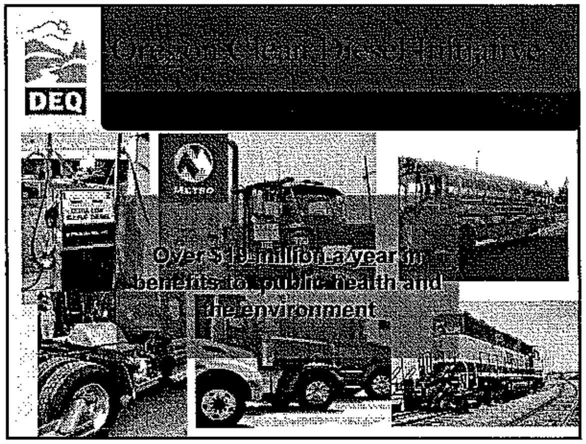
Economics of Diesel

$ 69 billion	Health/environmental benefits of clean **highway diesel** vehicles
$ 80 billion	Health/environmental benefits of clean **non-highway diesel** vehicles
$ 85 billion	Diesel contribution to **American economy**



Cost-Effectiveness of Alternative Control Options

From: Alternative Diesel Fuel Symposium, August 2003, California Energy Commission



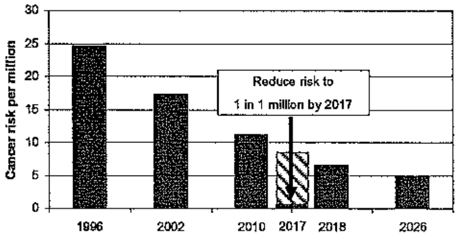
Oregon Clean Diesel Initiative

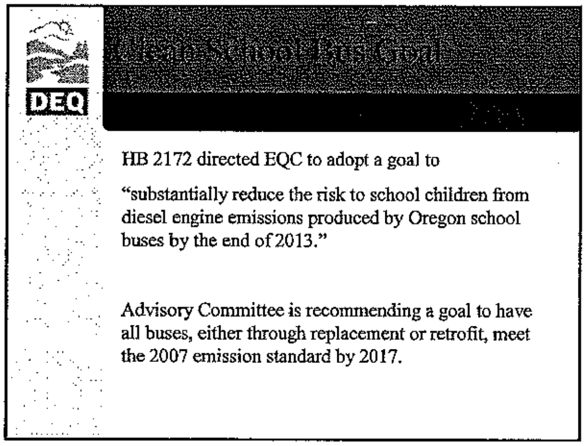
Over $19 million a year in benefits to public health and the environment

Clean Diesel Legislation - HB 2172

- Support for engine upgrades
  - Grant and loan program
  - Tax Credit, with pass-through
  - School district support when competing for federal grants
- Support for engine scrapping
- Extension of Truck Engine Tax Credit
- Partnering with Oregon Trucking Associations, Associated General Contractors, American Lung Assoc, OEC

Projected Diesel PM Risk in Oregon



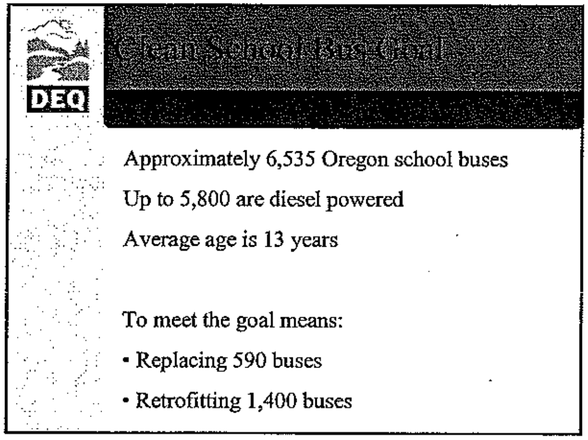


Clean School Bus Goal

HB 2172 directed EQC to adopt a goal to

"substantially reduce the risk to school children from diesel engine emissions produced by Oregon school buses by the end of 2013."

Advisory Committee is recommending a goal to have all buses, either through replacement or retrofit, meet the 2007 emission standard by 2017.



Clean School Bus Goal

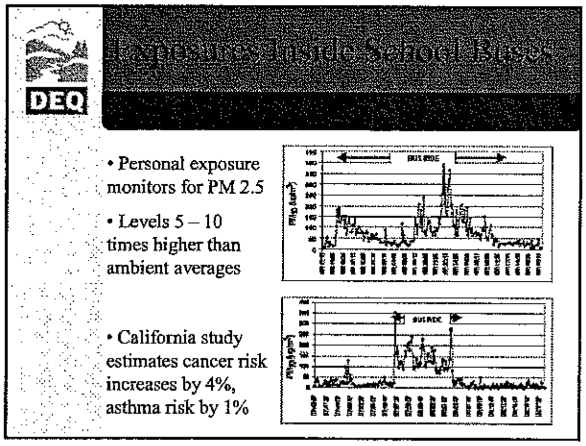
Approximately 6,535 Oregon school buses

Up to 5,800 are diesel powered

Average age is 13 years

To meet the goal means:

- Replacing 590 buses
- Retrofitting 1,400 buses



Exposures Inside School Buses

- Personal exposure monitors for PM 2.5
- Levels 5 – 10 times higher than ambient averages
- California study estimates cancer risk increases by 4%, asthma risk by 1%

Clean Diesel Fund

- For retrofit, nonroad repower, scrapping
  - Preferences for funding
  - Standards for certified costs
  - Clean Diesel Provider guidelines
  - Cost effectiveness threshold
- A simplified process and a fund reserve for small fleets

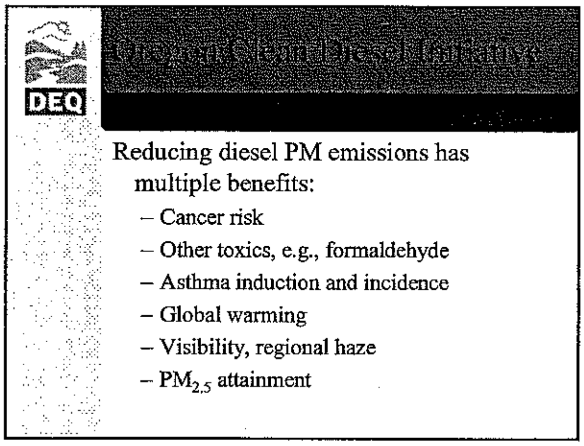
Truck Engine Tax Credit

A Tax Credit between $925 and $400, depending upon size of fleet

- For EPA 2007 compliant engines
- Model years 2007 through 2011
- Truck weight greater than 26000 pounds
- Registered in Oregon
- Purchased in Oregon

Oregon Clean Diesel Incentives

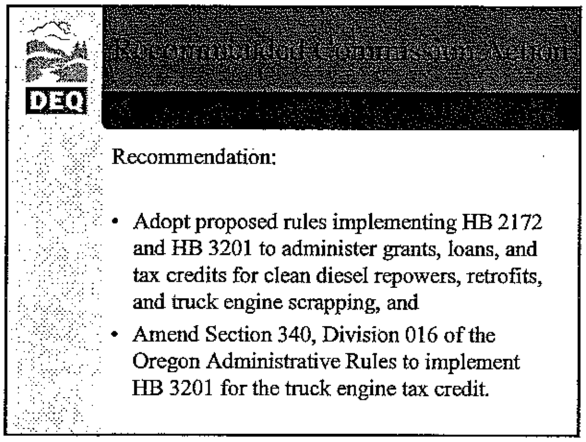
- 50% tax credit for verified exhaust control upgrades
- 25% tax credit for non road repowers
  - Can be combined with 35% tax credit for improved efficiency engines
- Tax credits can be transferred or sold



Oregon Clean Diesel Initiative

Reducing diesel PM emissions has multiple benefits:

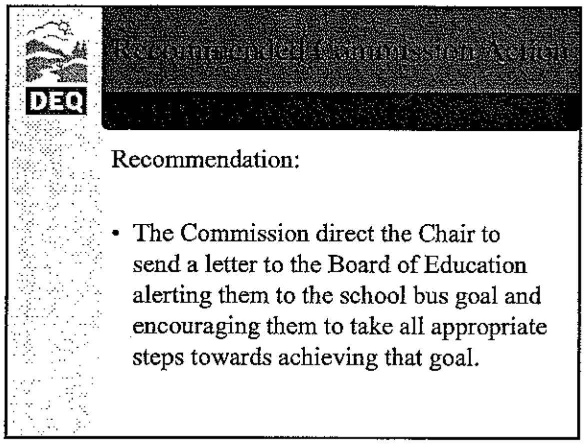
- Cancer risk
- Other toxics, e.g., formaldehyde
- Asthma induction and incidence
- Global warming
- Visibility, regional haze
- $PM_{2.5}$ attainment



Recommended Commission Action

Recommendation:

- Adopt proposed rules implementing HB 2172 and HB 3201 to administer grants, loans, and tax credits for clean diesel repowers, retrofits, and truck engine scrapping, and
- Amend Section 340, Division 016 of the Oregon Administrative Rules to implement HB 3201 for the truck engine tax credit.



Recommended Commission Action

Recommendation:

- The Commission direct the Chair to send a letter to the Board of Education alerting them to the school bus goal and encouraging them to take all appropriate steps towards achieving that goal.

State of Oregon
Department of Environmental Quality Memorandum

Date: June 18, 2008

To: Environment Quality Commission

From: Dick Pedersen, Director

Subject: Agenda Item H, Informational Item: Director's Dialogue
June 19-20, 2008 EQC meeting

Kaizen Event Results in New Enforcement Process

Thirteen staff and managers representing all programs and regions spent most of a week together last month developing a new enforcement process using the Kaizen continuous improvement method. Kaizen is an intense, five-day effort to outline a specific work process, identify waste, and come up with workable solutions that can be put into place immediately while maintaining high quality. In this case, the Kaizen team decided to focus attention on a section of the enforcement process that begins with issuance of a Pre-Enforcement Notice by the regional office, through the issuance of the Formal Enforcement Action from the Office of Compliance and Enforcement.

With the help of a Kaizen facilitator who specializes in working with government agencies, the Kaizen team mapped out the relevant part of the current enforcement process, discovering that the current process had 157 steps and that staff from different programs or offices weren't always aware of what each other added to the process. The team identified which steps in the current process added value and which didn't. The team then mapped a new process that will save time and eliminate steps without compromising the quality of the enforcement actions. The team's goal was to reduce the time it takes to issue a civil penalty assessment by 50 percent, to reduce the number of steps in the process by 50 percent, and to cut down on the number of reviews of draft documents by 50 percent.

On the last day of the event, the team presented the new process to the executive management team, and immediately afterward began implementing the new process. The improvements include fewer review steps, stringent timelines, reviewing documents electronically and a job-shadowing program so that inspectors and environmental law specialists will get a better understanding of each other's jobs.

OCE will be adding a feature to DEQ's internal website that will allow staff to email questions, comments and suggestions. Kaizen is a continuous improvement process, and we expect the enforcement process to get even faster and work even more smoothly as staff make additional suggestions for improvement. In addition, we will have regular follow-ups to ensure agency-wide implementation of the new process, to monitor results of the new process and to make additional changes as needed to sustain and even increase the gains in efficiency from the new process.

Columbia River Total Dissolved Gas Waiver Adaptive Management Update

DEQ is working with the Adaptive Management Team for implementation of the Columbia River Total Dissolved Gas Total Maximum Daily Load. The AMT is currently reviewing the need for the 115 percent forebay TDG limit for fish passage spill.

Since the last EQC meeting, the AMT met in May and focused on modeled spill volume and juvenile salmonid survival with and without 115 percent forebay limits. The Fish Passage Center presented data from 1996 to the present on TDG and gas bubble trauma from the Smolt Monitoring Program.

The results from the joint modeling of the Army Corps of Engineers, Bonneville Power Administration and National Oceanic Atmospheric Administration showed that at most of the dams there was no change in spill volumes with or without the 115 percent TDG limit. However, at Lower Monumental Dam on the Snake River and Bonneville Dam the modeled spill volume increased without the 115 percent TDG forebay limit. NOAA's modeling showed that salmonid survivorship increased less than one percent when the 115 percent forebay TDG limit was removed and fish passage spill increased.

The ACOE identified that fish passage spill is controlled by: the Biological Opinion 76 percent of the time; TDG limits 12 percent of the time; and, involuntary spill due to flooding and minimum power generation control 12 percent of the time.

There were few signs of gas bubble trauma when TDG was below 120 percent based on gas bubble trauma monitoring data collected from 1996 to the present by the Fish Passage Center. When TDG was below 120 percent a maximum incidence of six percent gas bubble trauma was observed during an extremely high flow event. Oregon's TDG waiver has a threshold of 15 percent gas bubble trauma incidence to terminate fish passage spill. This threshold has never been exceeded since the beginning of the TDG waiver process in 1996.

The AMT will meet in June to wrap-up forebay limit discussions. DEQ will synthesize the information and then make a staff recommendation, after which there will be a 30-day public comment period.

The next meeting of the TDG AMT is scheduled for Monday June 23 from 9:30 am to 12:30 pm at National Marine Fisheries Service, 10th floor conference room, in Portland. A call-in number is also available: (503) 326-7672.

AMT information, including notes from the AMT meetings can be found at: http://www.ecy.wa.gov/programs/wq/tmdl/columbia_rvr/columbia_tdg.html

2007 Annual Report on Columbia River Total Dissolved Gas and Spill for Fish Passage

DEQ is providing a summary to the EQC on total dissolved gas levels during the 2007 fish passage spill season, as required annually under the terms of the total dissolved gas waivers. DEQ received the 2007 TDG report from the Army Corps of Engineers and U.S. Fish and Wildlife Service on December 28, 2007.

Total dissolved gas waivers are granted to the U.S. Army Corp of Engineers and the U.S. Fish and Wildlife Service allowing increased TDG levels over the 110 percent state standard for fish passage spill at the lower four Columbia River dams for the period of March to August. The EQC has granted waivers to the TDG water quality standard to the ACOE and USFW to a level of 115 percent in the forebay (behind the dam) and 120 percent in the tailrace (below the dam). There were 50 exceedances of the TDG waiver limits in 2007 typically due to ACOE uncertainty when applying spill guidance criteria such as not properly accounting for water travel time, degassing of TDG, water temperature effects, and spill gate patterns. This compares to 346 exceedances in 2006, when many exceedances were due to involuntary spill because of high runoff. Juvenile salmon and trout monitoring for gas bubble trauma was done at Bonneville and McNary dams two days per week for the duration of fish passage spill. Of the 6,946 juvenile salmonids examined at Bonneville Dam, 50 (0.7 percent) had gas bubble trauma. There were no signs of gas bubble trauma in the fish collected at McNary dam. These findings are within the TDG waiver limits issued by the EQC.

The full 2007 TDG report is available at the following website:
http://www.nwd-wc.usace.army.mil/tmt/wq/tdg_and_temp/2007/

Owens Corning

On May 1, 2008, DEQ sent a letter to the Pacific Environmental Advocacy Center declining its petition for a stay and reconsideration of the ACDP permit for the foam insulation plant in Gresham. We copied Owens Corning on the letter. PEAC has 60 days from May 1 to respond.

Lakeside Landfill

DEQ is currently implementing the closure and post closure permit for Lakeside Landfill, including working through financial assurance issues. Lakeside would like DEQ to approve use of an annuity to cover costs, which is allowable if DEQ can ensure there are adequate funds to back it up. DEQ has asked Lakeside to obtain a secondary mechanism to back up the annuity. In addition, DEQ is reviewing and preparing a response to Lakeside's request to complete a remedial investigation rather than perform a feasibility study to address cleanup issues. DEQ has informed Lakeside that its individual NPDES stormwater permit application is incomplete because it lacks a new Land Use Compatibility Statement and the associated fees. Lastly, DEQ is in the process of evaluating compliance of Lakeside's compost operations in response to a recent inspection.

Update on 401 WQ fee certification

The 2007 Legislature authorized DEQ to increase fees in the Water Quality 401 Certification program. DEQ met with its advisory committee in December of 2007 to review a proposal for the fee increase. At that time, many members of the advisory committee were not supportive of an across-the-board fee increase because the program has had exemptions for certain fee payers since its inception. These exemptions have resulted in approximately 50 percent of projects not paying any type of fee to DEQ. DEQ has been working with this advisory committee over the past six months to develop an equitable and sustainable fee-funded approach that will be protective of water quality and give applicants more certainty for their projects.

DEQ intends to go to the 2008 June E-board to keep the the interim legislative committee informed in anticipation of presenting a full proposal for the 401 program to the 2009 Legislature.

DEQ 401 program staff are working with DEQ Economic Revitalization Team staff to better educate potential 401 certification applicants (e.g., ports and Oregon Solutions participants on the coast) about program timelines and processes. DEQ staff are also meeting with key legislators and local elected officials to ask for their help in communicating to potential applicants how the process works.

Bradwood Landing

In consultation with the Department of Justice, DEQ has crafted a coordinated approach to moving forward with DEQ's permits and actions for the Bradford Landing facility, pending resolution of the legal challenge to Clatsop County's land use decision. DEQ staff have held discussions with the Department of Land Conservation and Development to better understand the coastal zone decision-making process and the land use decision-making process under the current circumstances.

Since Clatsop County's land use decisions related to the facility have been appealed to the Land Use Board of Appeals, DEQ can't rely on the county's Land Use Compatibility Statement for proof of consistency with statewide goals and will wait until LUBA makes a ruling before moving forward.

However, DEQ is moving forward on all aspects of DEQ's regulatory reviews so that we're poised to make decisions on permits and certifications when the land use challenge is resolved. This includes holding a coordinated public information meeting in the Bradwood area in October to seek input on DEQ's air and water discharge permits and

401 certification. DEQ plans to invite DLCD and other agencies to participate as well. DEQ then plans to incorporate public concerns into the development of permits, and go back out for a formal public hearing with 40-day comment periods before developing final proposed permits (likely in late 2008). DEQ plans to hold off on making decisions on the final permits until the land use challenge is resolved or until DLCD has made its own statewide goal findings that DEQ can use in permitting decisions.

DEQ's goals for this process are to,keep the community informed and engaged in the process while being open and transparent with Northern Star. DEQ has sent a letter describing this process and the associated timelines to Northern Star and the Federal Energy Regulatory Commission.

Fish Consumption Rate Project

A fifth public workshop to discuss the Toxic Reductions in the Environment was held in Portland on June 4, 2008. Presenters described national, regional and local toxic reduction efforts undertaken by government, industry, and other groups. Attendees were asked to reflect upon the information presented and offer their thoughts on innovative approaches to toxic reductions. The workshop ended with a panel of policymakers representing DEQ (Neil Mullane), EPA (Mike Gearheard), Tribes (the Umatilla and Klamath), and industry (Rich Gerber of Associated Oregon Industries) reflecting on the presentations and discussing how these efforts and thoughts from the attendees fit in with the overall efforts to revise the fish consumption rate.

Meetings of the Fiscal Impacts and Implementation Advisory Group were held on May 6, May 23 and June 3. The group discussed implementation approaches for revised criteria based on a new fish consumption rate as well as the costs and potential benefits associated with such a revision. A public workshop will be held June 27 in Portland, OR to discuss the work of the FIIAC.

DEQ plans to bring this subject to the EQC at its August meeting as an informational item to prepare members for a decision in October.

MEMO

State of Oregon

Department of Environmental Quality

Date: June 19, 2008

To: Environmental Quality Commission

From: Wendy Simons, Special Assistant to the EQC

Re: Tour of Timber Products facility on Thursday, June 19, 2008, at 2:00 pm

We will take a 12-passenger van to the tour site about 15 minutes from the hotel. Let's plan to gather in the lobby, or just outside the doors if the weather is nice.

Accompanying you from DEQ are the following individuals:
Wendy Simons
Dick Pedersen
Keith Andersen, Acting Administrator, Western Region
John Becker, Air Quality, Medford Office
Byron Peterson, Air Quality, Medford Office (DEQ contact for Timber Products)

The two individuals representing Timber Products who will lead the tour are Erik Vos and Dave Pope.

The company is providing hard hats, goggles and ear plugs for the tour. They are also making an electric cart available in case anyone would care to ride during the tour. Please remember to wear slacks or jeans and close toed shoes.

Background information

- The Clean Air Act (CAA) requires the Environmental Protection Agency (EPA) to identify categories of industrial facilities, or source categories, that emit one or more of the listed 188 hazardous air pollutants.
- Hazardous air pollutants, also known as air toxics, are those pollutants known or suspected to cause cancer and other serious health or developmental problems.
- For major emitting sources within each source category, the CAA requires EPA to develop standards that restrict emissions to levels consistent with the lowest-emitting facilities.

National Air Toxic Standards for Wood Product Facilities and Compliance Deadlines

- On July 30, 2004, the EPA finalized standards to reduce emissions of toxic air pollutants from facilities in the plywood and composite wood products manufacturing source category.
- The Oregon Department of Environmental Quality submitted objections to portions of the standards, including the risk-based exemption.
- Existing facilities were originally required to comply with the standards on October 1, 2007.
- On February 16, 2006, EPA adopted amendments to the standards, including a 1-year extension of the compliance date for existing sources to October 1, 2008.

Risk-Based Compliance Exemption

- To reduce the financial impact of the standards, EPA provided an exemption from the standards for facilities considered to be low-risk.
- To qualify a facility was required to demonstrate that their air toxic emissions would pose risks below certain health effects thresholds.

Court Decision: Compliance Date and Low-Risk Exemption

- On June 19, 2007, the DC Circuit Court of Appeals reset the compliance date from October 1, 2008 to October 1, 2007.
- The court however pointed out that states have the authority to grant up to a 1-year compliance extension on a facility-by-facility basis for the installation of pollution control equipment.
- The result of this ruling is that major emitting facilities must install pollution control equipment by October 1, 2007 or request up to a 1-year extension.
- The court also vacated the low risk-exemption.
- The court ruled that EPA is allowed to exempt a category of facilities, not a subcategory of facilities, based on risk.
- The result of the ruling is that facilities that were planning on demonstrating low-risk must now demonstrate that the facility is not a major emitting source or comply with the standards by installing pollution control equipment.

Oregon's extension requests

- The Department has received eleven compliance extension requests to date.
- In processing these extension requests, the Department is requiring facilities to submit documentation demonstrating that controls cannot be reasonably installed by October 1, 2007.
- In granting compliance extensions, the Department is requiring that facilities meet a defined compliance schedule with extensive permit conditions and timelines with potential enforcement action for noncompliance.

DEQ should grant extensions

Fines for missing changed deadline won't clean the air

December 04, 2007 6:00 AM

Everyone wants cleaner air. Not everyone agrees on the best way to clean it, nor on how quickly it should happen.

That's the basis for the angry words aired in a recent public hearing held by the state Department of Environmental Quality on requests by three local wood-products plants to extend a deadline for installing new pollution controls.

Let's all take a deep breath. The extension requests are reasonable in light of a June federal court ruling, and in any case, denying the requests won't make the air cleaner any faster than granting them.

The federal Environmental Protection Agency adopted the new rules in 2004, setting a deadline of Oct. 1, 2007 for companies that were required to install new pollution-control equipment. Those rules also included an option for companies to avoid installing the equipment if they could show their emissions fell below certain thresholds for toxic emissions.

In 2006, the EPA amended the rules, extending the compliance deadline to Oct. 1, 2008.

The Sierra Club and other groups filed a court challenge to the original 2004 rules, specifically objecting to the low-risk exemption. It's worth noting that DEQ, which came under sharp criticism last week from clean-air advocates, also filed objections to the low-risk exemption because it did not comply with the federal Clean Air Act.

On June 19 of this year, a U.S. Appeals Court in Washington, D.C., invalidated both the low-risk exemption and the 2008 deadline, ruling that the Oct. 1, 2007 deadline must be observed.

Two local companies were working toward qualifying for the low-risk exemption, and it would have been unreasonable to expect them to suddenly order and install new pollution control equipment by Oct. 1. The other firm was working toward the 2008 deadline and likewise would have been hard-pressed to complete the work a year early on less than four months' notice. All three companies have ordered equipment.

The court ruling acknowledged that companies could apply for one-year extensions. Other states have granted these extensions by letter, without public hearings. Oregon's DEQ held a hearing, only to be blasted for "acting like an enabler of polluting industries," in the words of one participant.

We all want to breathe cleaner air. Toxic emissions should be removed from our atmosphere to the greatest extent possible. Companies should be required to install the best available technology to limit emissions. The only question is how quickly that can be accomplished.

The reality is that this equipment is complex and installing it takes time. Given the late date of the court ruling, it will likely take another year to install this equipment regardless of whether DEQ grants extensions. Denying the extensions would result only in fines against local employers who have been working toward complying with the new rules.

Punishing the companies for failing to hit a moving target might provide some satisfaction to clean-air advocates, but it won't make the air cleaner any faster.

State of Oregon
Department of Environmental Quality

Memorandum

Date: June 2, 2008

To: Environmental Quality Commission

From: Dick Pedersen, Acting Director

Subject: Agenda Item J, Rule Adoption: Water Quality Permit Fee Increases
June 19-20, 2008 EQC Meeting

Why this is Important

This proposed rulemaking provides fee revenue for administering the Department of Environmental Quality's National Pollutant Discharge Elimination System and Water Pollution Control Facility permit programs.

Department Recommendation/Motion

DEQ recommends that the Environmental Quality Commission adopt the proposed amendments to OAR Division 45 to increase the permit fees and establish the surcharge, as presented in Attachment A.

Background and Need for Rulemaking

In 2002, DEQ convened the Blue Ribbon Committee, comprised of industry, environmental, and local government representatives, to recommend improvements to DEQ's water quality permit program. In 2004, the BRC published a report containing a variety of recommendations, including annual fee increases of up to three percent to address increasing program costs over time, and a two-phase fee increase to restore and add necessary staff. These fee increases would affect all water quality permit programs, except for suction dredge permittees whose fees are set in statute.

This proposed rulemaking addresses the BRC recommended fee increases for the NPDES and WPCF programs. The rulemaking would also increase stormwater fees by 82 percent. All three of these fee increases have been authorized by the Legislature. The rulemaking also implements a surcharge payment to address toxic pollutants in Oregon's waterways.

In a separate but related rulemaking, Item K addresses the two BRC recommended fee increases for the onsite program, as well as other changes to the onsite program rules.

Annual Fee Increase to Cover Increased Costs - Three Percent

As stated above, in 2004 the BRC recommended increasing water quality permit fee revenue by no more than three percent each year to address increasing program costs. The Legislature adopted the annual fee increase recommendation in 2005, and the EQC approved the first fee increase of three percent in June 2007. In accordance with ORS 468B.051, this proposed rulemaking increases permit fees by three percent for all NPDES and WPCF permit holders, except for suction dredge permittees, as noted below.

In developing the statutory three percent increase provision, it was understood that the three percent increase does not fully cover water quality permit program costs. Keeping staffing levels constant, DEQ anticipates the actual cost increase will be around 12.75 percent over the next year. To help address the funding gap, DEQ will keep some vacant positions unfilled, and will delay hiring for some positions.

Phase Two Recommendations to Increase Staff – Five Percent Fee Increase

The BRC also recommended funding to phase in additional staff for the water quality permit program. The Legislature approved the funding for the positions as a one-time fee increase to be implemented in two phases. In August 2006, the EQC approved the first phase of funding, an 11 percent revenue increase to restore funding for four program staff. This proposed rulemaking would implement phase two, and would increase permit fees for all NPDES and WPCF permit holders, with the exception of WPCF onsite permit holders for whom fee increases are proposed in Item K, by an additional five percent. The additional fee revenue for NPDES and WPCF, along with the increased fee revenue for the onsite program proposed in Item K, would support 2.5 new positions – an effluent toxicity coordinator to assist permit writers with technical permit-related analyses; a position to assist with incorporating water quality-based effluent limits into permits; and one half-time position to address violations discovered during the review of monitoring reports.

Enhance Stormwater Program – 82 Percent Fee Increase

The 2007 Legislature authorized a stormwater fee increase of up to 100 percent to fund 14 new permanent positions. The positions would be phased in from 2008-09. DEQ analyzed stormwater permit fee revenue from FY06-07, and determined that an 82 percent increase, applied to all NPDES stormwater permit holders, would support the approved positions; therefore DEQ is proposing an 82 percent increase in stormwater fees in this rulemaking.

With the current level of resources, the stormwater program is focusing on the highest priority work, but is leaving much important work undone. The additional funds from this proposed fee increase will allow DEQ to:

- conduct more inspections;

- review all stormwater management plans and monitoring reports;
- renew permits in a timely manner;
- interact more with the 25 communities with municipal separate stormwater sewer system (MS4) permits; and
- continue to provide the public with the opportunity to review and comment on permit applications.

Senate Bill 737 Surcharge

This proposed rulemaking implements a surcharge approved by the 2007 Legislature, through the passage of Senate Bill 737. SB 737 requires DEQ to:

- by June 2009, consult with all interested parties to develop a list of priority persistent bioaccumulative toxics ("persistent pollutants") that have a documented effect on human health, wildlife and aquatic life; and
- by June 2010, report to the Legislature detailing the list of priority persistent pollutants, and source reduction and control methods that can reduce discharges of these pollutants.

The bill also authorizes a surcharge on Oregon's 52 largest municipal wastewater treatment plants (facilities with an average dry-weather design flow capacity of one million gallons per day or more) to help support two limited duration positions needed to perform the work outlined above.

Effect of Rule

Fee Increases

As a result of this proposed rulemaking, fees for all water quality permits will increase by eight percent (three percent annual fee increase and five percent "phase two" fee increase) except for suction dredge permits (General Permit 700-PM). Fees for the suction dredge permit are set in statute and therefore can only be changed by the Legislature. Stormwater general and MS4 permit holders will also be assessed an additional 82 percent fee increase, bringing the total stormwater fee increase to 90 percent.

Senate Bill 737 Surcharge

As a result of this rulemaking, Oregon's 52 largest municipal wastewater treatment plants will be assessed a surcharge to help support two limited duration positions needed to perform the work required by the bill. The surcharge will be broken into two payments per municipality, the first in

July 2008 and the second payment in July 2009. Each municipality's payments will be based upon the average amount of wastewater they process each day. The municipalities will also be affected by all other applicable permit fee increases.

Commission Authority

The EQC has authority to take this action under ORS 468.020, 468.065, 468B.035 and 468B.139(6).

Stakeholder Involvement

Fee Increases

DEQ consulted with BRC members during the 2007 legislative session on the five percent and stormwater fee increases. DEQ also met with the BRC on September 25, 2007 and on November 13, 2007 to discuss the fee increases and get input on the rulemaking's fiscal impact statement (Attachment E).

In addition to working with the BRC during the 2007 legislative session, DEQ provided information regarding the fee increases via meetings, phone calls, and written documents to several affected organizations, including environmental groups, homebuilders, local government associations, and Tribes.

To make sure that all permit holders know about the proposed fee increases, DEQ mailed more than 4,000 postcards to all water quality permit holders to inform them of the rulemaking proposal, public hearings, and the opportunity to comment on the proposed rules. DEQ also sent information about the proposed fee increases via email to stakeholders and permit holders who have elected to receive electronic water quality program updates.

In addition to DEQ's efforts, two stakeholders conducted outreach regarding the stormwater fee increases with construction stormwater permit holders. The Oregon Homebuilders Association shared information about the fee increases with its membership through its own publications and website. Clean Water Services, a local government organization which administers the NPDES construction stormwater permit on behalf of DEQ in Washington County, informed local governments and the development community within its jurisdiction of the proposed fee increases during meetings with the various groups.

Senate Bill 737 Surcharge

DEQ consulted with BRC members during the 2007 legislative session on the Senate Bill 737 surcharge. DEQ also worked with the municipalities affected by Senate Bill 737 by holding a meeting with the Association of Clean Water Agencies and the League of Oregon Cities. DEQ provided the municipalities several different options for determining the surcharge payments, and this proposed rulemaking uses the method recommended by the municipalities.

Public Comment

A public comment period extended from January 18 to March 3, 2008 and included public hearings in Eugene, Medford, Portland, Pendleton, and Bend. Results of public input are provided in Attachment B.

Key Issues

To address potential concerns about water quality permit fees increasing for the third year in a row, DEQ sent notice to all water quality permit holders at the beginning of the public comment period to ensure that they had advance notice of the proposed fee increases and were aware of opportunities to comment on the rulemaking.

DEQ was especially concerned about the potential reaction to the 90 percent stormwater fee increase. In addition to sending out notice of the proposed rulemaking to all stormwater permit holders, DEQ held a discussion with the Oregon Homebuilders Association, whose members will be most affected by the stormwater fee increase. DEQ did not receive any negative comments from permit holders about this proposed increase. DEQ also solicited comments from the BRC regarding the fiscal impact statement, and made revisions based on the BRC's comments.

Next Steps

If the EQC approves the proposed changes, DEQ will update its fee tables and web site to reflect the fee increases and staff will inform permit holders of the changes to the fee rules through notices sent out with monthly invoices. Staff will also inform permit coordinators and all water quality staff of the changes to the fee rules.

The work required by Senate Bill 737 will begin in mid-2008, once the surcharge has been implemented and DEQ has hired the limited-duration staff.

Attachments

A. Proposed Rule Revisions
B. Summary of Public Comments and Agency Responses
C. Advisory Committee Membership
D. Presiding Officer's Report on Public Hearings
E. Relationship to Federal Requirements Questions
F. Statement of Need and Fiscal and Economic Impact
G. Land Use Evaluation Statement

Available Upon Request

1. Legal Notice of Hearing
2. Cover Memorandum from Public Notice
3. Written Comment Received
4. Rule Implementation Plan
5. Blue Ribbon Committee Report on Key Enhancements to the Oregon Wastewater Permitting Program (2004)

Approved:

Section:

Division: Neil Mullane

Report Prepared By: Melissa Aerne

Phone: (503) 229-5656

Attachment A

Proposed Rule Revisions to

OAR 340-045-0075: Permit Fee Schedule

Table 70A: Industrial NPDES & WPCF Individual Permit Application and Modification Fees

DEQ Class	New Permit Application Fee[1]	Major Modification at Permit Renewal	Major Modification Prior to Permit Expiration	Minor Modification	Permit Transfer
Tier 1	$~~43,459~~46,936	$~~10,917~~11,791	$~~21,695~~23,431	$~~760~~821	$~~69~~74
Tier 2	$~~8,746~~9,445	$~~2,775~~2,997	$~~4,336~~4,683	$~~760~~821	$~~69~~74
Special WPCF Permits issued pursuant to OAR 340-045-0061	$~~415~~448	N/A	N/A	N/A	$~~69~~74

1. New permit applications must include the annual fee specified in Table 70B in addition to the new permit application fee.

70B: Industrial NPDES & WPCF Individual Permit Annual Fees

Type	Description	NPDES Tier 1	NPDES Tier 2	WPCF Tier 1	WPCF Tier 2
B01	Pulp, paper, or other fiber pulping industry	$~~15,196~~16,412	N/A	$~~14,104~~15,232	N/A
	Food or beverage processing - includes produce, meat, poultry, seafood or dairy for human, pet, or livestock consumption				
B02	Washing or Packing only	N/A	$~~2,113~~2,282	N/A	$~~1,943~~2,098
B03	Processing – small. Flow ≤ 0.1 mgd, or 0.1 < flow < 1 mgd for less than 180 days per year	N/A	$~~3,158~~3,411	N/A	$~~2,988~~3,227
B04	Processing – medium. 0.1 mgd < Flow < 1 mgd for 180 or more days per year, or flow ≥ 1 mgd for less than 180 days per year	N/A	$~~4,456~~4,813	N/A	$~~4,287~~4,630

Type	Description	NPDES Tier 1	NPDES Tier 2	WPCF Tier 1	WPCF Tier 2
B05	Processing – large. Flow ≥ 1 mgd for 180 or more days per year.	$~~15,196~~16,412	$~~13,352~~14,421	$~~14,104~~15,232	$~~13,182~~14,236
	Primary smelting or refining				
B06	Aluminum	$~~15,196~~16,412	$~~13,352~~14,421	$~~14,104~~15,232	$~~13,182~~14,236
B07	Non-ferrous metals utilizing sand chlorination separation facilities	$~~15,196~~16,412	$~~13,352~~14,421	$~~14,104~~15,232	$~~13,182~~14,236
B08	Ferrous and non-ferrous metals not elsewhere classified	$~~8,690~~9,386	$~~6,846~~7,393	$~~7,598~~8,206	$~~6,676~~7,210
B09	Chemical manufacturing with discharge of process wastewater	$~~15,196~~16,412	$~~13,352~~14,421	$~~14,104~~15,232	$~~13,182~~14,236
B10	Cooling water discharges in excess of 20,000 BTU per sec	$~~8,690~~9,386	$~~6,846~~7,393	$~~7,598~~8,206	$~~6,676~~7,210
	Mining Operations – includes aggregate or ore processing				
B11	Large (over 500,000 cubic yards per year or involving chemical leaching)	$~~15,196~~16,412	$~~13,352~~14,421	$~~14,104~~15,232	$~~13,182~~14,236
B12	Medium (100,000 to 500,000 cubic yards per year)	N/A	$~~4,675~~5,049	N/A	$~~4,505~~4,865
B13	Small (less than 100,000 cubic yards per year)	N/A	$~~1,422~~1,536	N/A	$~~1,252~~1,353
	All facilities not elsewhere classified which dispose of process wastewater (includes remediated groundwater)				
B14	Tier 1 sources	$~~15,196~~16,412	N/A	$~~14,104~~15,232	N/A
B15	Tier 2 sources	N/A	$~~2,942~~3,177	N/A	$~~2,772~~2,994
B16	All facilities not elsewhere classified which dispose of non-process wastewaters (for example: small cooling water discharges, boiler blowdown, filter backwash)	N/A	$~~1,969~~2,126	N/A	$~~1,799~~1,943
B17	Dairies, fish hatcheries and other confined feeding operations on individual permits	N/A	$~~1,723~~1,861	N/A	$~~1,553~~1,678
B18	All facilities which dispose of wastewater only by evaporation from watertight ponds or basins	N/A	N/A	N/A	$~~1,143~~1,234

Type	Description	NPDES Tier 1	NPDES Tier 2	WPCF Tier 1	WPCF Tier 2
	Timber and Wood Products				
B19	Sawmills, log storage, instream log storage	$~~4,262~~4,603	$~~2,418~~2,612	$~~3,170~~3,424	$~~2,248~~2,427
B20	Hardboard, veneer, plywood, particle board, pressboard manufacturing, wood products	$~~4,508~~4,868	$~~2,664~~2,877	$~~3,416~~3,689	$~~2,494~~2,694
B21	Wood preserving	$~~3,813~~4,118	$~~1,969~~2,126	$~~2,721~~2,939	$~~1,799~~1,943

Table 70C: Domestic NPDES & WPCF Individual Permits

Description	Type	Classification Criteria (Based on Average Dry Weather Design Flow, or as defined in 40CFR)	Class	New Permit App Fee	Base Annual Fee, 5 year permits	Base Annual Fee, 10 year permits	Additional Annual Fees	Major Modification	Minor Modification
Nondischarging lagoons	E	Not applicable	Tier 2	$~~2,833~~3,060	N/A	$~~905~~977	Additional fees Include population and pretreatment fees. See tables 70D and 70E for determination of these fees.	$~~1,451~~1,568	$~~760~~821
Lagoons that discharge to surface waters[2]	Db	Flow < 1 mgd	Tier 2	$~~5,596~~6,044	$~~1,085~~1,172	N/A		$~~2,833~~3,060	$~~760~~821
	C2b	1 mgd ≤ Flow	Tier 1	$~~27,706~~29,922	$~~2,858~~3,087	N/A		$~~13,887~~14,998	$~~760~~821
	C1b	2 mgd ≤ Flow < 5 mgd	Tier 1	$~~27,706~~29,922	$~~3,918~~4,232	N/A		$~~13,887~~14,998	$~~760~~821
	Bb	5 mgd ≤ Flow < 10 mgd	Tier 1	$~~27,706~~29,922	$~~5,633~~6,084	N/A		$~~13,887~~14,998	$~~760~~821
Treatment systems other than lagoons [2]	Da	Flow < 1 mgd	Tier 2	$~~5,596~~6,044	$~~1,540~~1,663	$~~1,429~~1,543		$~~2,833~~3,060	$~~760~~821
	C2a	1 mgd ≤ Flow	Tier 1	$~~27,706~~29,922	$~~4,862~~5,251	$~~4,164~~4,497		$~~13,887~~14,998	$~~760~~821
	C1a	2 mgd ≤ Flow < 5 mgd	Tier 1	$~~27,706~~29,922	$~~7,165~~7,738	$~~6,467~~6,984		$~~13,887~~14,998	$~~760~~821
	Ba	5 mgd ≤ Flow < 10 mgd	Tier 1	$~~27,706~~29,922	$~~10,654~~11,507	$~~9,956~~10,753		$~~13,887~~14,998	$~~760~~821
	A3	10 mgd ≤ Flow < 25	Tier 1	$~~27,706~~29,922	$~~16,619~~17,949	N/A		$~~13,887~~14,998	$~~760~~821

		mgd							
	A2	25 mgd ≤ Flow < 50 mgd	Tier 1	$~~27,706~~29,922	$~~35,262~~38,083	N/A		$~~13,887~~14,998	$~~760~~821
	A1	≥ 50 mgd	Tier 1	$~~27,706~~29,922	$~~59,998~~64,798	N/A		$~~13,887~~14,998	$~~760~~821
Septage alkaline stabilization facilities	F	Not applicable	Tier 2	$~~760~~821	N/A	$~~311~~336	N/A	N/A	$~~345~~372
Municipal Stormwater Permits: MS4 Phase 1, Phase 2 and UIC Permits	MS4-1	See 40 CFR §122.26	N/A	$~~8,746~~16,617	$~~1,969~~3,741	N/A	N/A	N/A	$~~760~~1,444
	MS4 -2		N/A	$~~392~~745	$~~403~~765	N/A	N/A	N/A	$~~760~~1,444
	UIC	As defined in 40 CFR parts 9, 144, 145 and 146	N/A	$~~8,746~~9,445	N/A	$~~1,799~~1,943	N/A	N/A	$~~760~~821

1. New permit applications must include the annual fee in addition to the new permit application fee.
2. Please refer to Oregon Administrative Rule 340-045-0075 (9) for information on surcharge payments.

Table 70D: Domestic NPDES & WPCF Annual Population Fee

Population range	Annual fee
500,000+	$~~80,608~~87,056
400,000 to 499,999	$~~61,665~~66,598
300,000 to 399,999	$~~42,722~~46,140
200,000 to 299,999	$~~23,779~~25,681
150,000 to 199,999	$~~19,231~~20,770
100,000 to 149,999	$~~12,667~~13,680
50,000 to 99,999	$~~7,946~~8,581
25,000 to 49,999	$~~3,570~~3,856
15,000 to 24,999	$~~2,032~~2,195
10,000 to 14,999	$~~1,324~~1,430
5,000 to 9,999	$~~806~~870
1,000 to 4,999	$~~242~~261

100 to 999	$~~46~~49
0 to 99	$0

Table 70E: Annual Pretreatment Fees

Pretreatment Fee	$~~1,382~~1,492
Significant Industrial User	$~~461per~~ 498 per industry

Table 70F: Technical Activity and Other Fees

Activity	Fee
New or substantially modified sewage treatment facility	$~~6,357~~6,866
Minor sewage treatment facility modifications and pump stations	$~~691~~747
Pressure sewer system or major sewer collection system expansion	$~~484~~523
Minor sewer collection system expansion or modification	$~~138~~149
New or substantially modified water pollution control facilities using alkaline agents to stabilize septage	$~~691~~747
Permit Transfer	$~~69~~74

Table 70G: General NPDES &WPCF Permits

No.	Type	Description	New Permit Application Fee[1]	Annual Fee
100-J	NPDES	Cooling water/heat pumps	$~~178~~192	$~~403~~435
200-J	NPDES	Filter Backwash	$~~178~~192	$~~403~~435
300-J	NPDES	Fish Hatcheries	$~~282~~304	$~~403~~435
400-J	NPDES	Log Ponds	$~~178~~192	$~~403~~435
500-J	NPDES	Boiler blowdown	$~~178~~192	$~~403~~435

600	WPCF	Offstream small scale mining – processing less than 5 cubic yards of material per day, or less than 1500 cubic yards per year	$0	$0
		Offstream small scale mining – processing 1,500 to10,000 cubic yards of material per year	$~~178~~192	$0
700-PM	NPDES	Suction dredges[2]	$0	$25
900-J	NPDES	Seafood processing	$~~178~~192	$~~403~~435
1000	WPCF	Gravel mining	$~~178~~192	$~~403~~435
1200-A	NPDES	Storm Water: Sand, gravel, and other non-metallic mining	$~~392~~745	$~~403~~765
1200-C[3]	NPDES	Storm Water: Construction activities – 1 acre or more	$~~392~~745	$~~403~~765
1200-CA	NPDES	Storm Water: Construction activities performed by public agencies – 1 acre or more	$~~392~~745	$~~403~~765
1200-COLS[3]	NPDES	Stormwater: industrial stormwater discharge to Columbia Slough	$~~392~~745	$~~403~~765
1200-Z[3,4]	NPDES	Storm Water: Industrial	$~~392~~745	$~~403~~765
1400-A	NPDES	Wineries and seasonal fresh pack operations whose wastewater flow does not exceed 25,000 gallons per day and is only disposed of by land irrigation.	$~~178~~192	$~~236~~255
1400-B	WPCF	Wineries and small food processors not otherwise eligible for a 1400A general permit.	$~~282~~304	$~~403~~435
1500-A	NPDES	Petroleum hydrocarbon clean-up	$~~282~~304	$~~403~~435
1500-B	WPCF	Petroleum hydrocarbon clean-up	$~~282~~304	$~~403~~435
1700-A	NPDES	Vehicle & equipment wash water	$~~392~~424	$~~403~~435

1700-B	WPCF	Vehicle & equipment wash water	$~~392~~424	$~~403~~435
1900-J	NPDES	Non-contact geothermal heat exchange	$~~392~~424	$~~403~~435
		Other	$~~392~~424	$~~403~~435

1. New permit applications must include both the new permit application fee and the first year's annual fee.
2. A person registered under the 700-PM permit may pre-pay $100 for 5 years of registration in lieu of the $25 annual fee.
3. Some of these permits are administered by public agencies under contract with DEQ.
4. This permit incorporates the 1300-J permit.

Table 70H: General Permit Activity and Other Fees

Disposal system plan review[1]	$~~432~~467
Site inspection and evaluation[1]	$~~1,082~~1,169
Permit Transfer	$~~69~~75

1. These fees apply when these activities are required for DEQ's review of the application.

DEPARTMENT OF ENVIRONMENTAL QUALITY

DIVISION 45

REGULATIONS PERTAINING TO NPDES AND WPCF PERMITS

340-045-0075

Permit Fee Schedule

(1) The fee schedule for onsite sewage disposal system permits, including WPCF permits, is found in OAR chapter 340, division 071.

(2) The Department has established fees for various industrial, domestic and general permit categories. The industrial and domestic permit categories and fees are listed in Tables 70B and 70C. The general permit categories are defined in OAR 340-045-0033 and the fees are listed in Table 70G.

(3) The Department must consider the following criteria when classifying a facility for determining applicable fees. For industrial sources that discharge to surface waters, discharge flowrate refers to the system design capacity. For industrial sources that do not discharge to surface waters, discharge flow refers to the total annual flow divided by 365:

(a) Tier 1 industry. A facility is classified as a Tier 1 industry if the facility:

(A) Discharges at a flowrate that is greater than or equal to 1 mgd; or

(B) Discharges large biochemical oxygen demand loads; or

(C) Is a large metals facility; or

(D) Has significant toxic discharges; or

(E) Has a treatment system that will have a significant adverse impact on the receiving stream if not operated properly; or

(F) Needs special regulatory control, as determined by the Department.

(b) Tier 1 domestic facility. A facility is classified as a Tier 1 domestic facility if the facility:

(A) Has a dry weather design flow of 1 mgd or greater; or

(B) Serves an industry that can have a significant impact on the treatment system.

(c) Tier 2 industry or domestic facility: does not meet Tier 1 qualifying factors.

(4) New Permit Application Fee. Unless waived by this rule, the applicable new permit application fee listed in Table 70A, 70C or 70G (available on the Department's website or upon request) must be submitted with each application. The amount of the fee is based on the facility category and type of permit (e.g., individual vs. general).

(5) Permit Modification Fee. Permit modification fees are listed in Tables 70A and 70C (available on the Department's website or upon request). They vary with the type of permit, the type of modification and the timing of modification as follows:

(a) Modification at time of permit renewal:

(A) Major Modification -- involves an increase in effluent limitations or any other change that involves significant analysis by the Department;

(B) Minor Modification -- does not involve significant analysis by the Department.

(b) Modification prior to permit renewal:

(A) Major Modification -- involves an increase in effluent limitations or any other change that involves significant analysis by the Department. A permittee requesting a significant modification to their permit may be required by the Department to enter into an agreement to pay for these services according to ORS 468.073. ORS 468.073 allows the Department "to expedite or enhance a regulatory process by contracting for services, hiring additional staff or covering costs of activities not otherwise provided during the ordinary course of Department business;"

(B) Minor Modification -- does not involve significant analysis by the Department.

(6) Annual fees. Applicable annual fees for General and Industrial permit holders may be found in Tables 70G and 70B (available on the Department's website or upon request). Annual fees for domestic sources may also be found in Table 70C (available on the Department's website or upon request), and consist of the following:

(a) Base annual fee. This is based on the type of treatment system and the dry weather design flow;

(b) Population-based fee. A permit holder with treatment systems other than Type F (septage alkaline stabilization facilities) must pay a population-based fee. The applicable fee may be found in Table 70D (available on the Department's website or upon request);

(c) Pretreatment fee. A source required by the Department to administer a pretreatment program pursuant to federal pretreatment program regulations (40CFR, Part 403; January 29, 1981 and amendments thereto) must pay an additional annual fee plus a fee for each significant industrial user specified in their annual report for the previous year. The applicable fee may be found in Table 70E (available on the Department's website or upon request).

(7) Technical Activities Fee. Technical activity fees are listed in Tables 70F and 70H (available on the Department's website or upon request). They are categorized as follows:

(a) All Permits. A permittee must pay a fee for NPDES and WPCF permit-related technical activities. A fee will be charged for initial submittal of engineering plans and specifications. Fees will not be charged for revisions and re-submittals of engineering plans and specifications or for facilities plans, design studies, reports, change orders, or inspections;

(b) General Permits. A permittee must pay the technical activity fee shown in Table 70H (available on the Department's website or upon request) when the following activities are required for application review:

(A) Disposal system plan review;

(B) Site inspection and evaluation.

(8) For permits administered by the Oregon Department of Agriculture, the following fees are applicable until superseded by a fee schedule established by the Oregon Department of Agriculture:

(a) WPCF and NPDES General Permits #800 for Confined Animal Feeding Operations Filing Fee -- $50;

(b) Individual Permits:

(A) Filing Fee -- $50;

(B) New Applications -- $6,280;

(C) Permit Renewals (including request for effluent limit modifications) -- $3,140;

(D) Permit Renewals (without request for effluent limit modifications) -- $1,416;

(E) Permit Modifications (involving increase in effluent limit modifications) -- $3,140;

(F) Permit Modifications (not involving an increase in effluent limitations) -- $500;

(G) Annual Compliance Determination Fee for dairies and other confined feeding operations -- $705;

(H) Annual Compliance Determination Fee for facilities not elsewhere classified with disposal of process wastewater -- $1,885;

(I) Annual Compliance Determination Fee for facilities not elsewhere classified that dispose of non-process wastewater (e.g., small cooling water discharges, boiler blowdown, filter backwash, log ponds) -- $1,180.

(c) Annual Compliance Determination Fee for facilities that dispose of wastewater only by evaporation from watertight ponds or basins -- $705.

(9) A surcharge in the amount listed below is imposed on municipalities that are permittees as defined in 2007 Oregon Laws chapter 696, section 2. The surcharge is imposed to defray the cost of conducting and administering the study of persistent pollutants discharged in the State of Oregon required under 2007 Oregon Laws chapter 696, section 3. A permittee subject to the surcharge must pay one half of the surcharge on or before July 15, 2008 and the other half of the surcharge on or before July 15, 2009.

Each municipality will pay a surcharge based on a dry weather design flow in millions of gallons per day (mgd) as follows:

(a) less than 5 mgd = $6,975
(b) 5 mgd to 9.9 mgd = $13,950
(c) 10 mgd and greater = $20,925

[ED. NOTE: Tables referenced are available from the agency.]

Stat. Auth.: ORS 468.020, 468B.020 & 468B.035
Stats. Implemented: ORS 468.065, 468B.015, 468B.035 & 468B.050
Hist.: DEQ 113, f. & ef. 5-10-76; DEQ 129, f. & ef. 3-16-77; DEQ 31-1979, f. & ef. 10-1-79; DEQ 18-1981, f. & ef. 7-13-81; DEQ 12-1983, f. & ef. 6-2-83; DEQ 9-1987, f. & ef. 6-3-87; DEQ 18-1990, f. & cert. ef. 6-7-90; DEQ 10-1991, f. & cert. ef. 7-1-91; DEQ 9-1992, f. & cert. ef. 6-5-92; DEQ 10-1992, f. & cert. ef. 6-9-92; DEQ 30-1992, f. & cert. ef. 12-18-92; DEQ 20-1994, f. & cert. ef. 10-7-94; DEQ 4-1998, f. & cert. ef. 3-30-98; Administrative correction 10-22-98; DEQ 15-2000, f. & cert. ef. 10-11-00; DEQ 2-2002, f. & cert. ef. 2-12-02; DEQ 7-2004, f. & cert. ef. 8-3-04; DEQ 5-2005, f. & cert. ef. 7-1-05; DEQ 11-2006, f. & cert. ef. 8-15-06; DEQ 5-2007, f. & cert. ef. 7-3-07

Attachment B

Summary of Public Comment and Agency Response

Water Quality Permit Program Fee Increases

Prepared by: Melissa Aerne **Date: March 11, 2008**

Comment period

The public comment period opened January 18, 2008 and closed 5 p.m. on March 3, 2008. DEQ held public hearings at 6 p.m. in Eugene on February 19, Medford on February 20, Portland on February 21, in Pendleton on February 27,and in Bend on February 22, 2008. One person attended the hearings, but did not present an oral comment. One other person submitted a written comment.

Organization of comments and responses

Following is a summary of the comment and DEQ's response. The person who provided each comment is referenced by number. A list of commenters and their reference numbers follows the summary of comments and responses.

Summary of Comments and Agency Responses

From	Comment	DEQ Response
1	DEQ could add a comment in fee table 70C about the Senate Bill 737 surcharge impacts, as the surcharge amount is not clearly apparent without reading the public notice or rule changes. Public agencies need the information for the next year's budget cycle.	DEQ will add a comment on fee table 70C that directs permit holders to OAR 340-045-0075 (9). This section of rule outlines the surcharge amounts that affected municipalities will pay.

List of Commenters and Reference Numbers

Reference Number	Name	Organization	Address	Date on comments
1	Brett Arvidson	Oak Lodge Sanitary District	13750 SE Renton Ave. Milwaukie, OR	February 19, 2008

Attachment C

Blue Ribbon Committee Membership

Name	Organization
Robert Austin, Mayor	City of Estacada
Ed Butts, P.E.	4B Engineering and Consulting LLC
Michael Campbell	Stoel Rives LLP
Jon Chandler	Oregon Homebuilders Association
Dorothy Sperry	Port of Portland
Teresa Huntsinger	Oregon Environmental Council
Charles Logue	Clean Water Services
Kurt Harrington, PE	AMEC Earth & Environmental, Inc.
Craig Smith	Northwest Food Processors Association
Willie Tiffany	League of Oregon Cities
Kathryn Van Natta	Northwest Pulp & Paper
Travis Williams	Willamette Riverkeeper
John Ledger	Associated Oregon Industries

Attachment D
Presiding Officer's Report on Public Hearings

State of Oregon
Department of Environmental Quality **Memorandum**

Date: March 3, 2008
To: Environmental Quality Commission
From: Melissa Aerne, DEQ

Subject: Presiding Officer's Report for Rulemaking Hearing
Title of Proposal: Water Quality Permit Fee Increases

Hearing One

Hearing Date and Time: **February 19, 2008**, 6:00p.m.
Hearing Location: DEQ-Eugene Office, **Eugene, Oregon**

DEQ convened the rulemaking hearing on the proposal referenced above at 6 p.m. and closed it at 6:30 p.m. Three DEQ employees attended the hearing: Melissa Aerne and Annette Liebe as presenters, and David Waltz as the presiding officer. No other persons attended; no testimony was given; and no written comments were submitted at this hearing.

Hearing Two

Hearing Date and Time: **February 20, 2008**, 6:00p.m.
Hearing Location: Community Justice Center, **Medford, Oregon**

The Department convened the rulemaking hearing on the proposal referenced above at 6 p.m. and closed it at 6:30 p.m. Three DEQ employees attended the hearing: Melissa Aerne and Annette Liebe as presenters, and Audrey Eldridge as the Presiding Officer. No other persons attended; no testimony was given; and no written comments were submitted at this hearing.

Hearing Three

Hearing Date and Time: **February 21, 2008**, 6:00p.m.
Hearing Location: DEQ- Northwest Region Office, **Portland, Oregon**

The Department convened the rulemaking hearing on the proposal referenced above at 6:00 p.m. and closed it at 7:00 p.m. Three DEQ employees attended the hearing: Melissa Aerne and

Annette Liebe as presenters, and Lyle Christensen as the Presiding Officer. One other person attended the hearing. No testimony or written comments were submitted.

Hearing Four

Hearing Date and Time: **February 27, 2008**, 6:00p.m.
Hearing Location: City Hall, **Pendleton, Oregon**

The Department convened the rulemaking hearing on the proposal referenced above at 6 p.m. and closed it at 6:30 p.m. Three DEQ employees attended the hearing: Melissa Aerne and Annette Liebe as presenters, and Tonya Dombrowski as the Presiding Officer. No other persons attended; no testimony was given; and no written comments were submitted at this hearing.

Hearing Five

Hearing Date and Time: **February 28, 2008**, 6:00p.m.
Hearing Location: State Health and Human Services Building, **Bend, Oregon**

The Department convened the rulemaking hearing on the proposal referenced above at 6 p.m. and closed it at 6:30 p.m. Three DEQ employees attended the hearing: Melissa Aerne and Annette Liebe as presenters, and Karen Bower as the Presiding Officer. No other persons attended; no testimony was given; and no written comments were submitted at this hearing.

Attachment E

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Relationship to Federal Requirements

RULE CAPTION

This rulemaking increases water quality permit fees and establishes a surcharge on certain municipalities.

Answers to the following questions identify how the proposed rulemaking relates to federal requirements and potential justification for differing from federal requirements. The questions are required by OAR 340-011-0029(1).

1. Are there federal requirements that are applicable to this situation? If so, exactly what are they?

There are no applicable federal requirements.

2. Are the applicable federal requirements performance based, technology based, or both with the most stringent controlling?

Not applicable.

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?

Not applicable.

4. Will the proposed requirement (rulemaking) 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?

No.

5. Is there a timing issue which might justify changing the time frame for implementation of federal requirements?

Not applicable.

6. Will the proposed requirement (rulemaking) assist in establishing and maintaining a reasonable margin for accommodation of uncertainty and future growth?

No.

7. Does the proposed requirement (rulemaking) establish or maintain reasonable equity in the requirements for various sources? (level the playing field)

The proposed three percent and five percent fee increases do not impact the level of equity between sources. The 82 percent stormwater fee revenue increase maintains the commitment to fund 14 new permanent positions 40 percent on General Funds and 60 percent on permit fee revenue.

The surcharge is an additional fee on the 47 municipalties who own treatment facilities with a dry weather design flow of one million gallons per day or more.

8. Would others face increased costs if a more stringent rule is not enacted?

Not applicable.

9. Does the proposed requirement (rulemaking) 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.

10. Is demonstrated technology available to comply with the proposed requirement (rulemaking)?

Not applicable.

11. Will the proposed requirement (rulemaking) contribute to the prevention of pollution or address a potential problem and represent a more cost effective environmental gain?

No.

Attachment F

DEPARTMENT OF ENVIRONMENTAL QUALITY
Chapter 340
Proposed Rulemaking
STATEMENT OF NEED AND FISCAL AND ECONOMIC IMPACT
This form accompanies a Notice of Proposed Rulemaking

Amended version: Corrected a typographical error on the stormwater fee chart on Page 3. Current application fees are $392, and had been represented as $293. (4/24/08).

Rule Caption	This rulemaking increases water quality permit fees and establishes a surcharge on certain municipalities.
Title of Proposed Rulemaking:	2008 Water Quality Permit Fee Increases
Stat. Authority or other Legal Authority:	• ORS 468.020, 468.065, and 468B.035 • 2007 Oregon Laws Chapter 696 (SB 737)
Stat. Implemented:	• ORS 468.065 and 468B.051 • 2007 Oregon Laws Chapter 696 (SB 737)
Need for the Rule(s)	State law (ORS 468.065) authorizes the Environmental Quality Commission to set fee schedules for the Department of Environmental Quality's Water Quality Division by rule. This rulemaking will revise Oregon Administrative Rule (OAR) Chapter 340, Division 45 by increasing the following fees and establishing a surcharge. <ins>Three Percent Annual Fee Increase</ins>. Through this rulemaking, DEQ seeks approval from EQC for an annual fee increase of three percent for DEQ's water quality permit program. In 2002, DEQ convened the Blue Ribbon Committee (BRC) of industry, environmental, and local government representatives to recommend improvements to DEQ's water quality permit program. In 2004, the BRC published a report containing a variety of recommendations, including increasing fee revenue to help cover increasing costs and support existing and new program staff. The 2005 Legislature adopted a recommendation that authorizes the EQC to raise fees annually in an amount not to exceed the anticipated increase in the cost of administering the permit program or three percent, whichever is lower (ORS 468B.051). The annual fee increase, approved by the EQC for the first time in June 2007, helps cover the anticipated increase in program costs. <ins>Five Percent "Phase 2" Fee Increase</ins>. Through this rulemaking, DEQ seeks approval from EQC to implement a five percent fee increase approved by the Legislature in 2007. The BRC recommended two phases of funding to support improved permit program implementation. In 2005, the Legislature approved "phase 1" funding, an 11 percent revenue increase to continue four program staff, which DEQ implemented in August 2006. The 2007 Legislature approved "phase 2" funding, an additional five percent fee increase to support 2.5 new positions – a Whole Effluent Toxicity Coordinator to assist permit writers with permit-related analyses; a position to assist with incorporating water quality-based effluent limits into permits; and one half-time position to address violations that are discovered during DEQ's review of monthly monitoring reports. <ins>82 Percent Stormwater Water Permit Fee Revenue Increase</ins>. Through this rulemaking, DEQ seeks approval from EQC to implement an 82% stormwater permit fee revenue increase to support 14 new permanent positions approved by the 2007 Legislature. The positions, to be phased in during 2008-2009, will be funded 40 percent by General Fund and 60 percent fee revenue. DEQ has prioritized its existing, limited resources to inspect sites only when there has been a complaint indicating a likelihood of environmental harm (during 2006, DEQ inspected 48 sites); review a fraction of stormwater management plans; and provide the public with the

	opportunity to review and comment on many permit applications. The new positions will help DEQ to inspect 270 permitted facilities per year; review all stormwater management plans; review monitoring reports for industrial facilities; and provide the public with the opportunity to review and comment on many permit applications. Senate Bill (SB) 737 Surcharge. Through this rulemaking, DEQ seeks approval from EQC to establish a surcharge to support two limited-duration positions. The 2007 Legislature approved SB 737, which authorizes DEQ to establish a surcharge to support work required by the bill. The bill requires DEQ to: (1) by June 2009, consult with all interested parties to develop a list of priority persistent bioaccumulative toxics ("persistent pollutants") that have a documented effect on human health, wildlife and aquatic life, and (2) by June 2010, report to the Legislature on the list of priority persistent pollutants; point, nonpoint and legacy sources of priority persistent pollutants "from existing data;" and source reduction and control methods that can reduce discharges. This work will begin in mid-2008 and will be performed by two limited-duration positions (two years), to be funded by a surcharge fee on the 52 municipal wastewater treatment plants in Oregon that have a dry weather design flow capacity of one million gallons per day or more.
Documents Relied Upon for Rulemaking	Three Percent Annual, Five Percent "Phase 2", and 82 Percent Stormwater Fee Increases • Cost factors approved through the state's budget process • Compensation plan changes • Fee increase calculations • DEQ 2007-2009 Legislatively Approved Budget • DEQ's water quality permit database • Application and annual fee invoice and revenue records • Oregon Revised Statutes (ORS) 468B.051 SB 737 Surcharge. • Senate Bill 737, enrolled • Memo and spreadsheet outlining surcharge payment options These documents are available and can be reviewed at the DEQ Headquarters office by contacting Melissa Aerne at (800) 452-4011, extension 5656.
Requests for Other Options	**ORS 183.335(2)(b)(G) requests public comment on whether other options should be considered for achieving the rule's substantive goals while reducing negative economic impact of the rule on business.**
Fiscal and Economic Impact, Statement of Cost Compliance	
Overview	The impact of each fee revenue increase and the surcharge is described below. DEQ will notify all permit holders of the proposed fee increases prior to EQC adoption of the changes. Permit holders can incorporate the fee increase information in their annual budget and operations planning. For further information regarding the calculation of the fee increases and surcharge payments, please contact Melissa Aerne at (800) 452-4011, extension 5656. Three Percent Annual Fee Increase. As a result of this rulemaking, fees will increase by three percent for all National Pollution Discharge Elimination System (NPDES) and Water Pollution Control Facility (WPCF) permits, including stormwater permits. Suction dredge and WPCF-onsite permit fees will not increase through this rulemaking. Suction dredge permit fees are set in statute and can only be changed by the Legislature. WPCF-onsite permit fee increases will occur through a separate rulemaking. To establish the amount of the proposed annual increase for 2008-2009, DEQ compared basic

program cost increases for 2005-2007 with projected costs for 2007-2009, keeping staffing levels constant. Basic program costs analyzed include annual salary step increases, benefits, supplies, equipment, rent, Oregon Department of Justice services, and management services. DEQ estimates that program costs for 2005-2007 are $13,388,548, and projected costs for 2007-2009 are $14,968,245, an increase of $1,579,679, or 11.80%, for the 2007-2009 biennium (5.90 percent for 2007-2008 and 5.90 percent for 2008-2009). Additionally, for 2008-2009, DEQ anticipates a negotiated salary cost increase of $1,239,000.00, representing an additional cost increase of 6.84 percent. Overall, total costs for 2008-2009 will increase by 12.74 percent (5.90 percent basic program cost increase plus 6.84 percent salary cost increase) – well over the three percent annual increase allowed by law (ORS 468B.051).

The fee increase will impact approximately 5,870 permit holders. Depending upon the permit, application fee increases will range from $5 to $1,304, and annual fee increases will range from $7 to $1,800.

Five Percent "Phase 2" Fee Increase. As a result of this rulemaking, fees will increase by five percent for all NPDES and WPCF permits, including stormwater permits. As discussed above for the three percent annual fee increase, suction dredge and WPCF-onsite permit fees will not increase through this rulemaking. The fee increase will impact 5,870 permit holders. Depending upon the permit, application fee increases will range from $9 to $2,173, and annual fee increases will range from $12 to $3,000.

82 Percent Stormwater Permit Fee Revenue Increase. To establish the amount of the stormwater permit fee increase, DEQ analyzed stormwater permit application and annual fee revenue for Fiscal Years 2006 and 2007, and compared that data to the revenue needed to support the 14 new permanent positions approved by the Legislature. DEQ estimates that it needs $3,374,184 to support the 14 positions, 60 percent of which will come from fee revenue totaling about $2,025,000 per biennium ($1,012,500 per year). The 82 percent stormwater permit fee increase will raise the fee revenue needed. DEQ applied the stormwater permit fee increase evenly to all of its construction, industrial, and municipal permits, because workload analyses indicate that DEQ staff spend the same amount of time reviewing and administering each of the different stormwater permit types.

Cumulative Stormwater Fee Increases. The total stormwater fee increase will be 90 percent, consisting of the 82 percent stormwater permit fee increase, the 3% annual fee increase, and the 5% permit fee increase. The fee increase will impact approximately 3,300 permit holders. Stormwater permits will increase as follows:

Stormwater Permit Type	DEQ Current Application Fee[1]	DEQ Current Annual Fee[2]	DEQ Proposed Application Fee[1]	DEQ Proposed Annual Fee[2]
Construction	$392	$403	$745	$765
Industrial	$392	$403	$745	$765
MS4-Phase 1	$8,746	$1,969	$16,617	$3,741
MS4-Phase 2	$392	$403	$745	$765

[1] Application fee consists of the application fee and first annual fee.
[2] DEQ invoices for the annual permit starting with the second permit year.

DEQ compared its stormwater annual permit fees to the State of Washington Department of Ecology (DOE) stormwater annual permit fees. DEQ fees are lower than those of DOE in many cases. For example, the DOE annual fee for Municipal Separate Storm Sewer System (MS4)-Phase 1 permits is $36,059, and MS4-Phase 2 permit annual fee payments range from $1,500 to $26,059, depending on the number of housing units in the MS4-Phase 2 service area. The DOE annual construction stormwater permit fee ranges from $409 to $1,526, depending upon the

<table>
<tr><td></td><td colspan="2">number of disturbed acres covered by the permit; disturbed acreage of seven or more acres starts at $900 annually. Industrial stormwater annual permit fees are based on permit holders' gross revenue and range from $100 annually for revenue of less than $100,000 to $1,581 for revenue greater than $10 million.

<u>SB 737 Surcharge</u>. As a result of this rulemaking, 47 municipalities (holding a total of 52 NPDES and WPCF wastewater treatment plant permits) will pay a surcharge based on the dry weather design flow in millions of gallons per day (mgd) outlined in each facility's permit. DEQ estimates that the work required by SB 737 will cost approximately $481,000. Each municipality will make one surcharge payment per year for two years to support the two limited-duration positions needed to perform the work required by SB 737. The surcharge amounts are as follows:
• <5 mgd = $6,975 ($3,488 in 2008 and 2009)
• 5 - 9.9 mgd = $13,950 ($6,975 in 2008 and 2009)
• ≥10 mgd = $20,925 ($10,463 in 2008 and 2009).

In addition to the surcharge, the three percent annual fee and five percent permit fee increases will apply to municipalities' permits; the stormwater permit fee increases will also apply to 12 municipalities.</td></tr>
<tr><td>General public</td><td colspan="2"><u>Three Percent Annual and Five Percent "Phase 2" Fee Increases</u>. Though DEQ cannot determine the extent to which the fee increases will impact each consumer, DEQ expects that these two fee increases, totaling eight percent, will have some impact on the public, primarily through an increase to the costs of good and services offered by permit holders.

<u>82 Percent Stormwater Permit Fee Revenue Increase</u>

• <u>Construction Stormwater</u>. Although DEQ cannot determine the extent to which the fee increase will affect each consumer, DEQ expects that consumers will be impacted by the fee increase, as developers and builders would likely pass on the construction stormwater permit fee increases. While the increased application fee will not likely have significant impact on new projects, the $362 increase for annual fees could impact existing projects by affecting construction costs that have already been agreed upon between a builder or developer and the consumer.

• <u>Industrial Stormwater</u>. Due to the diversity of businesses holding industrial stormwater permits, size of businesses, and types of services and goods provided, DEQ cannot determine the extent to which the fee increase will impact each consumer. However, DEQ recognizes that any increase to the cost of goods and services due to fee increases will likely be passed onto the public.

• <u>Municipal Stormwater</u>. Municipal stormwater annual fee increases — increasing from $1,615 to $3,741 for MS4-1 permits, and from $403 to $765 for MS4-II permits— are small when compared to overall yearly operating costs of permit holders. Municipalities will most likely absorb the fee increases within current municipal programs.

<u>SB 737 Surcharge</u>. DEQ estimates that the affected municipalities will likely pay the surcharge through current programs. It is unlikely that the municipalities will be required to raise local rates to cover the surcharge payments.</td></tr>
<tr><td>Small Business
(50 or fewer employees – ORS183.310(10))</td><td>a) Estimated number and types of businesses impacted</td><td>For this section, DEQ used Oregon Employment Department (OED) information to calculate the impact of the proposed fee increases on small businesses. In 2006, OED found that 96 percent of Oregon businesses were small businesses (<50 employees).</td></tr>
</table>

		Three Percent Annual and Five Percent "Phase 2" Funding Fee Increases. DEQ estimates that about 5,020 of 5,870 wastewater permit holders impacted by the three percent annual fee and five percent permit fee increases are small businesses. The types of businesses/industries holding wastewater permits include, but are not limited to: food processors, mining operations, dairies, fish hatcheries, smelting/refining operations, timber processing, wood products manufacturing, and retail operations. Although DEQ cannot determine the extent to which the fee increases will impact each permit holder, DEQ expects that these two fee increases, totaling eight percent, will have impact on small businesses. 82 Percent Stormwater Permit Fee Revenue Increase. DEQ estimates that about 2,930 of 3,300 stormwater permit holders impacted by the fee increase are small businesses. The types of businesses holding stormwater permits include, but are not limited to: construction firms/developers, mining operations, asphalt and concrete batch plants, food processors, oil and gas extraction, petroleum refining, and transportation operations. The construction and industrial stormwater annual permit fees will increase from $403 to $765. DEQ estimates that for some small businesses, this increase could have significant impact on operating costs. SB 737 Surcharge. None of the municipalities paying the surcharge is considered to be businesses.
	b) Additional reporting requirements	The proposed rules do not require additional reporting requirements.
	c) Additional equipment and administration requirements	The proposed rules do not require additional equipment or administration requirements.
	d) Describe how businesses were involved in development of this rulemaking	The three percent annual and five percent permit fee increases resulted from Blue Ribbon Committee (BRC) recommendations. DEQ worked with BRC members from industry, environment, and local government during the 2007 legislative session on the five percent and stormwater fee increases, and the SB 737 surcharge. DEQ also conducted outreach on the water quality permit fee increases with the following organizations: Willamette Riverkeeper; Association of Oregon Industries; American Federation of State, County, and Municipal Employees; Columbia Riverkeeper; Northwest Pulp & Paper Association; Confederated Tribes of the Umatilla Indian Reservation; Confederated Tribes of the Warm Springs Indian Reservation; Oregon Environmental Council; Oregon Homebuilders Association; Special Districts Association of Oregon; League of Oregon Cities; Association of Clean Water Agencies; Columbia Corridor Association; City of Portland; Port of Portland, and the Oregon Industrial Stormwater Group. DEQ also consulted with the municipalities affected by SB 737 to

		determine surcharge payments, but not with businesses, as businesses will not be affected by the surcharge.
Large Business	<u>Three Percent Annual and Five Percent "Phase 2" Fee Increases</u>. DEQ estimates the annual and "phase 2" fee increases, totaling eight percent, will impact approximately 213 large businesses, and that for these businesses, the fee increase is small compared to the overall yearly operating costs of permit holders. <u>82 Percent Stormwater Permit Fee Revenue Increase</u>. Based on the Oregon Employment Department figures, DEQ estimates that the 82% stormwater permit fee increase will impact about 124 large businesses, and that for these businesses, the fee increase is small compared to the overall yearly operating costs of permit holders. <u>SB 737 Surcharge</u>. None of the municipalities paying the surcharge are considered to be businesses.	
Local Government	For this section, a local government is defined as 1) a group of local government functions within a jurisdiction that each hold water quality permits (e.g., City of Portland – including Portland School District and Port of Portland – is counted as one local government); or 2) a single organization within a jurisdiction, if only one local government function holds a permit (e.g., includes but is not limited to water districts, cities, towns, ports, sanitary districts, library districts, counties, and school districts). <u>Three Percent Annual and Five Percent "Phase 2" Fee Increases.</u> This rulemaking will increase water quality permit fees by three and five percent, totaling eight percent,for 256 local governments that hold about 544 permits. <u>82 Percent Stormwater Permit Fee Revenue Increase</u>. This rulemaking will increase fee revenue by 82 percent from the 95 local government agencies that hold about 214 permits. Depending upon the permit, the application fee increase will range from $353 to $7,871, and the annual fee increase will range from $362 to $1,772. For the following local governments (known as agents), the stormwater permit fee increases will result in increased revenue as part of current memorandum of agreement with DEQ for administering the NPDES stormwater permits within their jurisdictions: City of Hermiston; City of Myrtle Creek; Rogue Valley Sewer System; City of Troutdale; and City of Portland. Three agents – Clackamas County, Clean Water Services, and City of Eugene – use their own locally-established stormwater control fees and would not have increased revenue due to DEQ stormwater permit fee increases. <u>SB 737 Surcharge</u>. All 47 municipalities paying the surcharge will pay a surcharge between $3,487 and $10,462 each year for two years, based on the design flow in millions of gallons per day (mgd) outlined in each facility's permit. The following municipalities have multiple permits: City of Coos Bay (2), Clean Water Services (4), and City of Portland (2). For these municipalities, the design flows for each permit were summed and the total was used to determine which tier was appropriate.	
State Agencies		
DEQ	<u>Three Percent Annual Fee Increase</u>. The proposed three percent annual increase will generate approximately $120,000 to cover increased water quality program costs. <u>Five Percent "Phase 2" Fee Increase</u>. The five percent fee increase will increase annual revenue by about $199,000 to support 2.5 new positions for the water quality permit program. <u>82 Percent Stormwater Permit Fee Increase</u>. The proposed 82 percent stormwater permit fee	

	increase will raise annual revenue of about $1,012,500, representing the 60 percent fee revenue needed to support 14 new positions. SB 737 Surcharge. The proposed surcharge will raise $481,276 over a two-year period to support two limited-duration positions.
Other agencies	Three Percent Annual Fee Increase. Eleven Oregon state agencies hold about 89 water quality permits; additionally, one Washington state agency holds a permit. Annual fee increases range from $12 for the NPDES General 300 fish hatchery permit (29 permits) to $88 for an NPDES-B15 industrial wastewater processing permit (4 permits). Five Percent "Phase 2" Fee Increase. Eleven Oregon state agencies hold about 89 water quality permits; additionally, one Washington state agency holds a permit. The permits primarily support fish hatcheries and wastewater treatment plants. Annual fee increases range from $20 for the NPDES General 300 fish hatchery permit (29 permits) to $147 for an NPDES-B15 industrial wastewater processing permit (4 permits). 82 Percent Stormwater Permit Fee Increase. Nine state agencies hold about 30 stormwater permits, primarily for construction projects. Stormwater permit annual fees will increase by $362 (three percent annual increase of $12, plus five percent increase of $20, plus 82 percent increase of $330 equals $362). For one Oregon state agency, the Department of Geology and Mineral Industries, the fee increase will result in increased revenue as part of a memorandum of agreement with DEQ for administering NPDES stormwater permits within their jurisdiction. SB 737 Surcharge. The proposed surcharge will not affect other agencies.
Assumptions	DEQ assumes that for most businesses, local governments, and state agencies, the cost of obtaining and keeping a water quality permit and/or making two surcharge payments is small compared to overall operating costs.
Housing Costs	DEQ has determined that this proposed rulemaking will have the following effect on the cost of development of a 6,000 square foot parcel and the construction of a 1,200 square foot detached single family dwelling on that parcel. A 90 percent increase for construction stormwater permit fees (82 percent stormwater, three percent annual, and five percent fee increases) will raise the initial fee (application fee plus first year annual fee) from $795 to $1,510, and the annual permit cost (starting with year two of the permit) from $403 to $765. While the increased application fee will not likely have significant impact on new housing projects, increased annual fees could impact existing projects by affecting construction costs that have already been agreed upon between a builder or developer and the buyer. DEQ estimates that many home builders will likely pass the permitting cost increase to home buyers, who would need to pay the additional costs.
Administrative Rule Advisory Committee	The Blue Ribbon Committee (standing committee advising DEQ on the water quality permitting program) received copies of our proposed updated permit fees and the draft Statement of Need and Fiscal and Economic Impact Statement prior to a meeting that was held on November 13, 2007. DEQ solicited comments on all of the documents at that meeting. DEQ made revisions to the Fiscal Impact Statement and fee schedule in response to comments received from the committee.

Prepared by

Printed name

Date

Approved by DEQ Budget Office	Printed name	Date

Agenda Item J
June 19-20, 2008 EQC Meeting

Attachment G

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Land Use Evaluation Statement

Rulemaking Proposal
for
Water Quality Permit Fee Increases and Surcharge

RULE CAPTION

This rulemaking increases water quality permit fees and establishes a surcharge on certain municipalities.

1. Explain the purpose of the proposed rules.

The following proposed fee increases and surcharge will affect National Pollutant Discharge Elimination System (NPDES) and Water Pollution Control Facility (WPCF) permit holders.

<u>3% Annual Fee Increase</u>. The Environmental Quality Commission may raise fees annually in an amount not to exceed the anticipated increase in the cost of administering the permit program or three percent, whichever is lower (ORS 468B.051). DEQ anticipates a 12.74 percent increase in program costs from 2007-2008 to 2008-2009, well above the three percent increase allowed by law (Oregon Revised Statutes, 468B.051). DEQ proposes increasing water quality permit fees by three percent for Fiscal Year 2008 to help cover the increased costs.

<u>5% Fee Increase</u>. The five percent water quality permit fee increase supports 2.5 new positions – a whole effluent toxicity coordinator to assist permit writers with permit-related analyses such as Whole Effluent Toxicity (WET) tests; a position to assist with incorporating water quality-based effluent limits into permits; and one half-time position to address violations that are discovered during DEQ's review of monthly monitoring reports,

<u>82% Stormwater Permit Fee Increase</u>. This 82 percent fee revenue increase will support 14 new permanent positions for DEQ's stormwater permit program. The positions, to be phased in during 2008-2009, will help DEQ to inspect 270 permitted facilities per year; review all stormwater management plans; review monitoring reports for industrial facilities; and provide the public with the opportunity to review and comment on many permit applications.

Senate Bill (SB) 737 Surcharge. The surcharge supports two limited-duration positions to perform work required by SB 737. The bill authorizes the surcharge and requires DEQ to: (1) by June 2009, consult with all interested parties to develop a list of priority persistent bioaccumulative toxics ("persistent pollutants") that have a documented effect on human health, wildlife and aquatic life, and (2) by June 2010, report to the Legislature on the list of priority persistent pollutants; sources of priority persistent pollutants "from existing data;" and reduction and control methods that can reduce discharges. This work will begin in mid-2008, once the first year of surcharge payments have been collected. The surcharge will apply to Oregon's 52 largest municipal wastewater treatment plants (facilities with a dry weather design flow of one million gallons per day or more).

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 X No_______

   a. **If yes, identify existing program/rule/activity:**

      The proposed rules affect Oregon's NPDES and WPCF permitting programs (340-018-0030(d) Issuance of NPDES and WPCF Permits), which regulates wastewater discharges from industrial and municipal sources.

   b. **If yes, do the existing statewide goal compliance and local plan compatibility procedures adequately cover the proposed rules?**

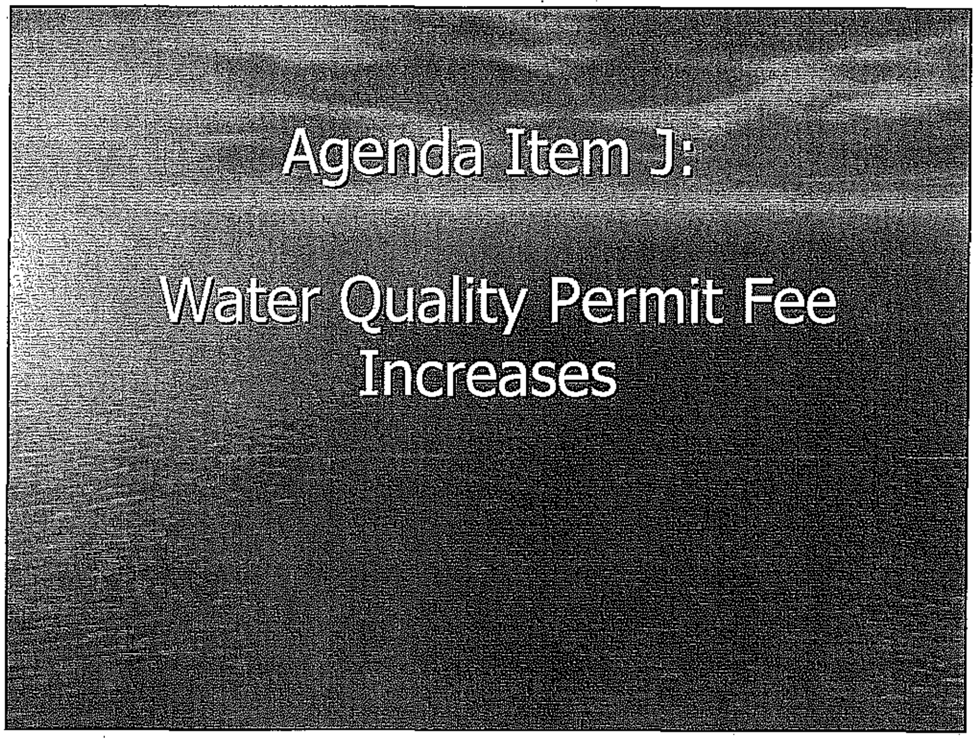
   Yes X No______ (if no, explain):

   DEQ will implement the proposed rules through its water quality permitting program. An approved land use compatibility statement is required from local government before issuance of an NPDES or WPCF permit.

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.**

   Not applicable.

Item J
presentation



Agenda Item J:

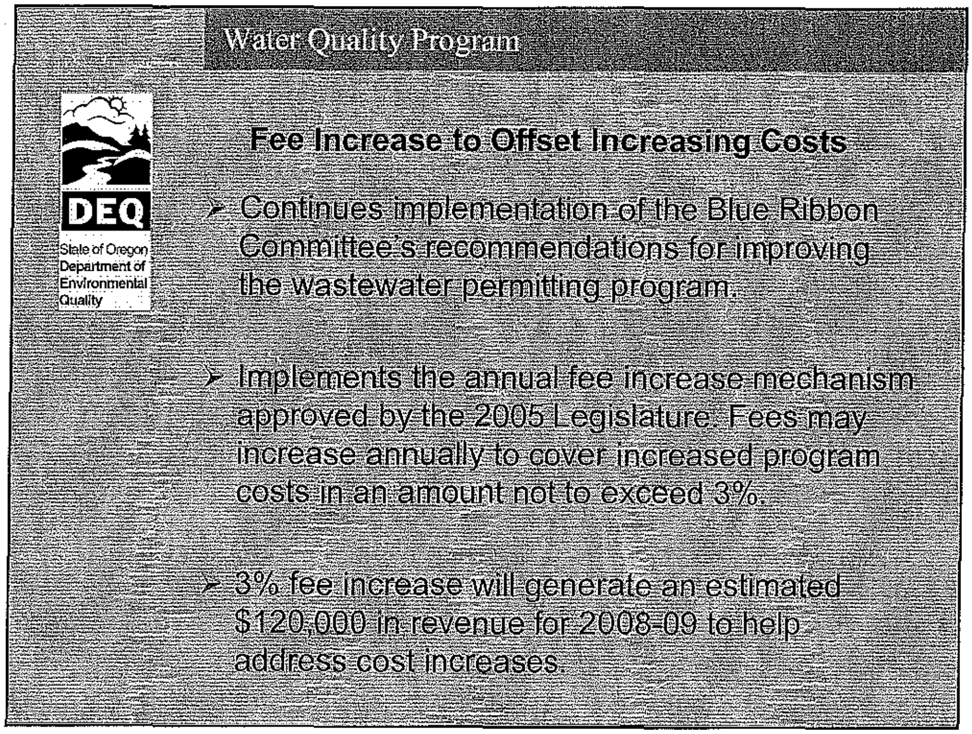
Water Quality Permit Fee Increases

Water Quality Program

DEQ
State of Oregon
Department of
Environmental
Quality

Proposed Rulemaking

- Three separate permit fee increases to improve the water quality permit program.
  - 3% fee increase to address increasing costs.
  - 5% fee increase to add staff.
  - 82% stormwater increase to add staff.
- Surcharge payment to support toxics reduction efforts by municipalities.



Water Quality Program

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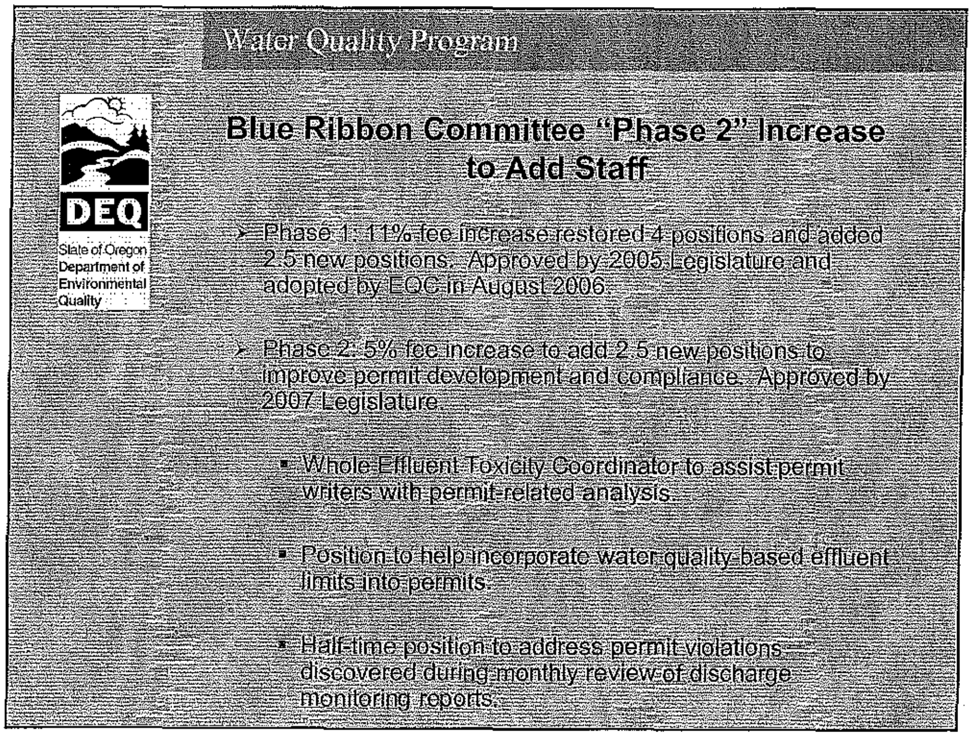
Fee Increase to Offset Increasing Costs

- Continues implementation of the Blue Ribbon Committee's recommendations for improving the wastewater permitting program.
- Implements the annual fee increase mechanism approved by the 2005 Legislature. Fees may increase annually to cover increased program costs in an amount not to exceed 3%.
- 3% fee increase will generate an estimated $120,000 in revenue for 2008-09 to help address cost increases.



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Blue Ribbon Committee "Phase 2" Increase to Add Staff

- Phase 1: 11% fee increase restored 4 positions and added 2.5 new positions. Approved by 2005 Legislature and adopted by EQC in August 2006.
- Phase 2: 5% fee increase to add 2.5 new positions to improve permit development and compliance. Approved by 2007 Legislature.
    - Whole Effluent Toxicity Coordinator to assist permit writers with permit-related analysis.
    - Position to help incorporate water quality-based effluent limits into permits.
    - Half-time position to address permit violations discovered during monthly review of discharge monitoring reports.

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Quality

Fee Increase to Add Stormwater Staff

- 82% stormwater permit fee increase supports 14 new positions for DEQ's stormwater permit program.
- The additional staff will:
  - Conduct more inspections.
  - Review all stormwater management plans and monitoring reports.
  - Renew permits in a timely manner.
  - Interact with MS4 permit holders and local governments who assist with stormwater permit implementation.

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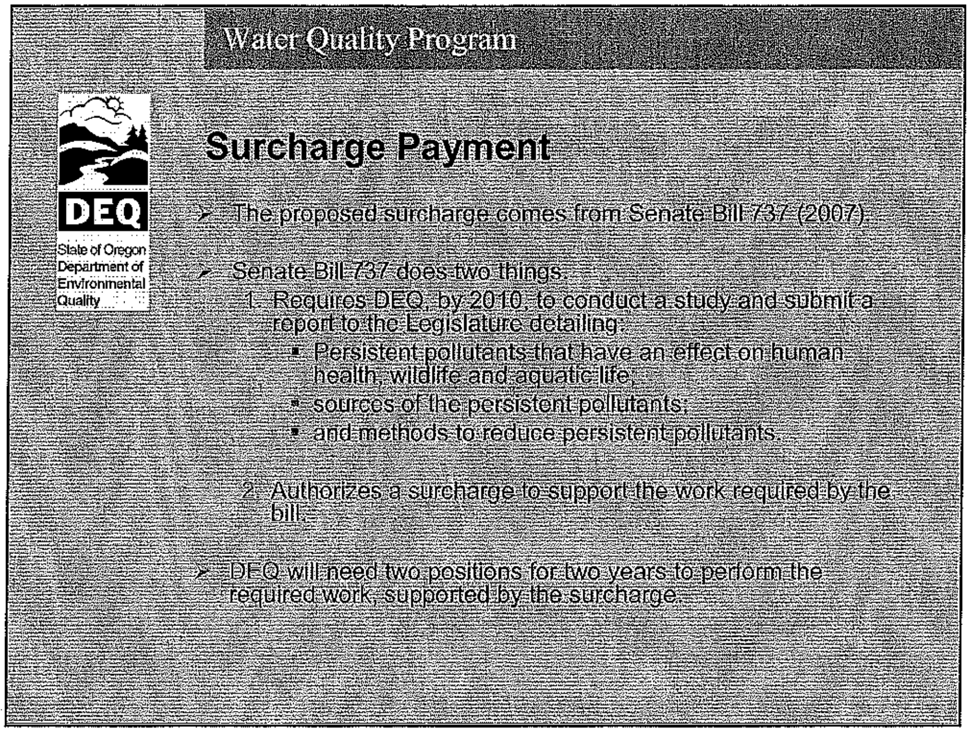
Who will be affected by the fee increases?

- 8% fee increase for all individual and general permit holders.
  - 3% annual plus 5% "phase 2" fee increases.
- 90% fee increase for stormwater permit holders – 3% annual fee, 5% Phase 2 increase, and 82% stormwater fee increase.
  - Annual fees will increase from $403 to $765 for industrial, construction and MS4-II stormwater permit holders
  - Annual fees will increase from $1,969 to $3,741for MS4-I permit holders
- Exceptions:
  - Onsite septic system permit fees (Agenda Item K).
  - Suction dredge permit fees – only Legislature can change.
- DEQ will include explanation of the fee increases with annual fee invoices and send out a press release.



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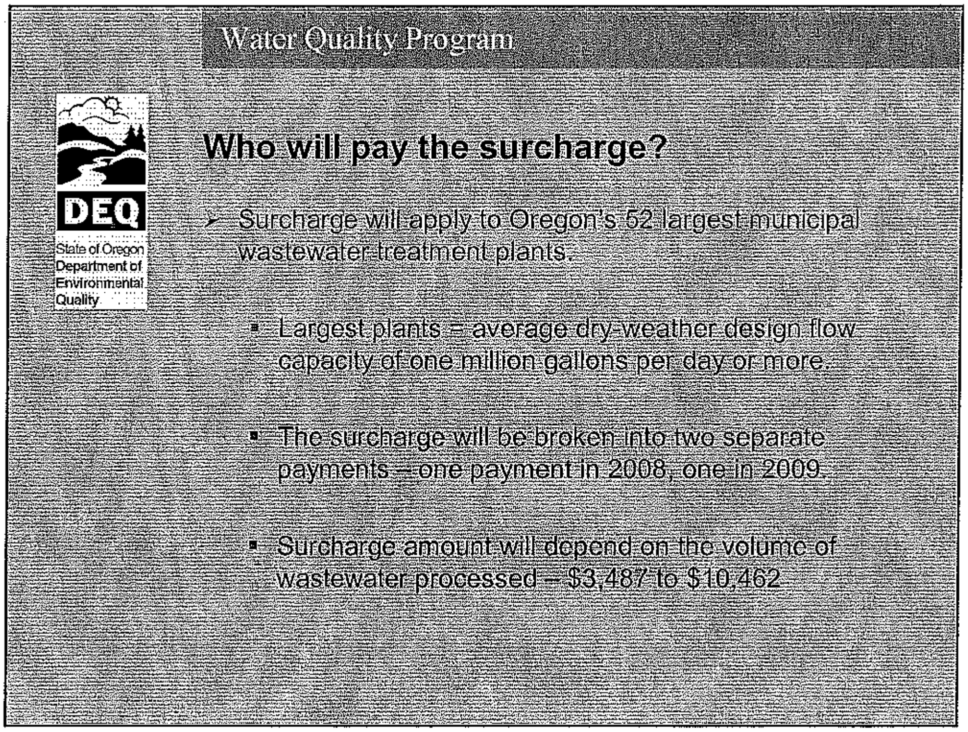
Surcharge Payment

- The proposed surcharge comes from Senate Bill 737 (2007).
- Senate Bill 737 does two things:
  1. Requires DEQ, by 2010, to conduct a study and submit a report to the Legislature detailing:
     - Persistent pollutants that have an effect on human health, wildlife and aquatic life;
     - sources of the persistent pollutants;
     - and methods to reduce persistent pollutants.
  2. Authorizes a surcharge to support the work required by the bill.
- DEQ will need two positions for two years to perform the required work, supported by the surcharge.



Water Quality Program

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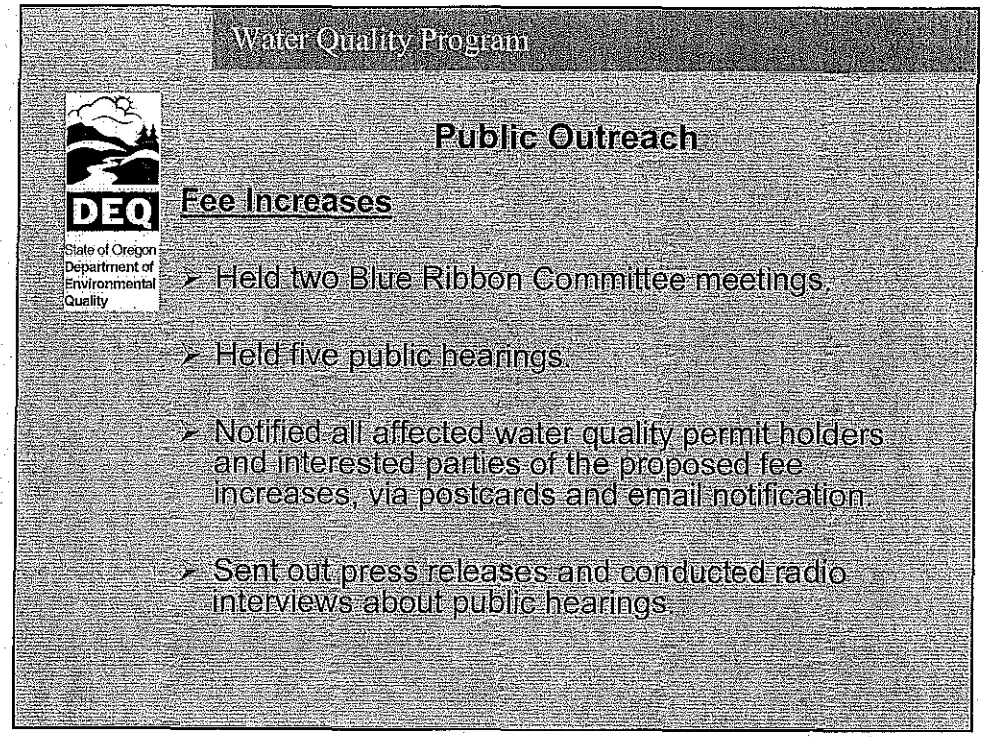
Quality

Who will pay the surcharge?

- Surcharge will apply to Oregon's 52 largest municipal wastewater treatment plants.
  - Largest plants = average dry-weather design flow capacity of one million gallons per day or more.
  - The surcharge will be broken into two separate payments – one payment in 2008, one in 2009.
  - Surcharge amount will depend on the volume of wastewater processed – $3,487 to $10,462.



Water Quality Program

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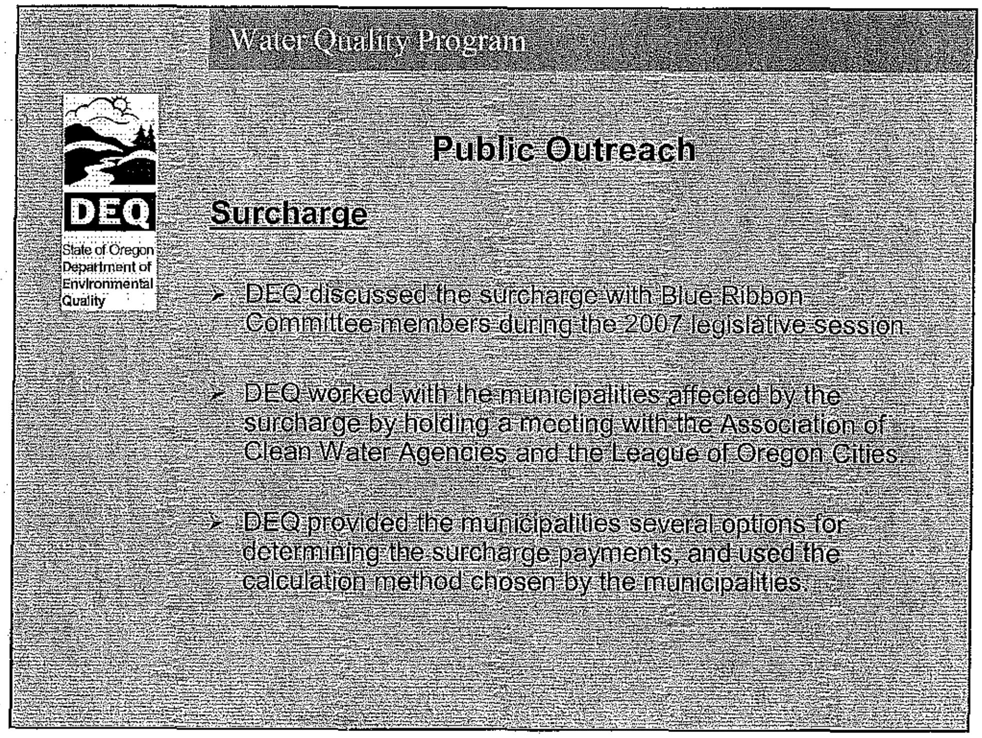
Public Outreach

Fee Increases

- Held two Blue Ribbon Committee meetings.
- Held five public hearings.
- Notified all affected water quality permit holders and interested parties of the proposed fee increases, via postcards and email notification.
- Sent out press releases and conducted radio interviews about public hearings.



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Quality

Public Outreach

Surcharge

- DEQ discussed the surcharge with Blue Ribbon Committee members during the 2007 legislative session.
- DEQ worked with the municipalities affected by the surcharge by holding a meeting with the Association of Clean Water Agencies and the League of Oregon Cities.
- DEQ provided the municipalities several options for determining the surcharge payments, and used the calculation method chosen by the municipalities.

State of Oregon

Department of Environmental Quality Memorandum

Date: June 2, 2008

To: Environmental Quality Commission

From: Dick Pedersen, Acting Director

Subject: Agenda Item K, Rule Adoption: Onsite Fee Increases
June 19-20, 2008 EQC Meeting

Why this is Important

This proposed rulemaking increases fee revenue to administer the Department of Environmental Quality's Water Pollution Control Facility permit program and the onsite wastewater program. This proposed rulemaking also makes some minor changes to the onsite wastewater treatment system rules.

Department Recommendation/Motion

DEQ recommends that the Environmental Quality Commission adopt the proposed amendments to OAR Division 71, to increase the permit fees and establish the surcharge as presented in Attachment A.

Background and Need for Rulemaking

This proposed rulemaking increases the onsite application surcharge by $20 and makes minor changes to onsite program rules. The surcharge would apply to approximately 13,900 onsite septic system applications per year, most of which are for single-family dwellings. In addition, this proposed rulemaking would increase fees for WPCF-Onsite permit holders by a total of eight percent, through a three percent annual fee increase and a five percent fee increase. DEQ administers approximately 700 WPCF-Onsite permits, most of which are held by small businesses.

The three percent annual fee increase and the five percent fee increase for the WPCF-Onsite program were recommended by the Blue Ribbon Committee convened in 2002 by DEQ to recommend improvements to DEQ's water quality permit program. In 2004, the BRC published a report containing a variety of recommendations, including annual fee increases of up to three percent to address increasing program costs over time, and additional fee increases to restore and add necessary staff. These fee increases would affect all water quality permit programs, except for suction dredge permittees whose fees are set in statute. This proposed rulemaking addresses the BRC recommended fee increases for WPCF-Onsite permitting fees.

In a separate but related rulemaking, Item J addresses the two BRC recommended fee increases for the National Pollutant Discharge Elimination System permit program and for the Water Pollution Control Facility permit program for permittees other than those with WPCF-Onsite permits.

Three Percent Annual Fee Increase

As stated above, in 2004, the BRC recommended increasing water quality program fee revenue by no more than three percent each year to address increasing program costs. The Legislature adopted the annual fee increase recommendation in 2005. This proposed rulemaking would increase fees for WPCF-Onsite permit holders by three percent for 2008-09.

In developing the statutory three percent increase provision, it was understood that the three percent increase does not fully cover water quality permit program costs. Keeping staffing levels constant, DEQ anticipates the actual cost increase will be around 12.75 percent over the next year. To help address the funding gap, DEQ will keep some vacant positions unfilled, and will delay hiring for some positions.

Five Percent Fee Increase

The BRC also recommended more funding to improve the water quality permit program, which the Legislature supported. This proposed rulemaking would increase permit fees for WPCF-Onsite permit holders by five percent. This additional fee revenue, along with the increased fee revenue for the NPDES and WPCF programs proposed in Item J, will support 2.5 new positions in the water quality permitting program – an effluent toxicity coordinator to assist permit writers with technical permit-related analyses; a position to assist with incorporating water quality-based effluent limits into permits; and one half-time position to address violations discovered during the review of monitoring reports.

Onsite Surcharge Increase

DEQ regulates the siting and installation of onsite septic systems and administers the program in 13 counties, referred to as "direct service" counties. The remaining 23 counties administer the program under contract with DEQ, referred to as "contract" counties. The goal of the program is to ensure that onsite septic systems are sited and installed to protect land, water and public health.

Currently both direct service and contract county programs collect a $40 surcharge with each application. DEQ uses the revenue collected from surcharges to:

- provide technical assistance and oversight to direct service and contract county programs;

- participate in health hazard surveys;
- provide enforcement and program development such as rule writing; and
- develop guidance documents and fact sheets.

Since 2001, the onsite program has been reduced by 4.60 staff, including both technical and support staff, due to insufficient revenue from applications to cover increasing costs. This reduction has resulted in service reductions, including the elimination of contract county program audits. Audits ensure the contract counties comply with the contracts and apply the onsite rules correctly and consistently.

This proposed rulemaking increases the onsite septic system application surcharge by $20, from $40 to $60. The proposed $20 surcharge increase is needed for three additional staff in the onsite program to conduct audits to ensure proper, consistent implementation of the program among contract counties.

Fee schedule structure

DEQ has received feedback from WPCF-Onsite septic system customers indicating that they have difficulty interpreting the fee schedule, which has resulted in some applications being submitted with the incorrect fee. Since the fee schedule is open for revisions under this proposed rulemaking, DEQ is proposing to change the fee schedule structure from an outline format to a table format that will be easier to read.

Rule language change

DEQ proposes to delete the words "or Structure" from Section 11 of Table 1 of Division 71 of Oregon Administrative Rules. This change would clarify that the intent of the rule is to specify minimum setbacks from buildings, while giving appropriate flexibility to DEQ's agents in the field with regard to onsite system setbacks from other structures.

Effect of Rule

Fee Increases

This proposed rulemaking will increase fees for WPCF-Onsite permits by eight percent (three percent annual fee increase and five percent fee increase). The WPCF-Onsite permit program applies to approximately 700 permits, most of which are held by small businesses, each of which pays an annual fee.

Onsite Surcharge Increase

As a result of this proposed rulemaking, the DEQ surcharge on the onsite permit application will increase from $40 to $60. DEQ estimates that Oregonians submit 13,900 applications per year that will be subject to the surcharge. Most septic system permits are for single-family dwellings.

Fee schedule structure

As a result of this proposed rulemaking, the outline fee schedule will be replaced by a fee schedule in table format,

Rule language change

As a result of this proposed rulemaking, agents will have the appropriate flexibility to allow certain structures to be located closer to an onsite wastewater system. This may allow for land developers or homeowners to place certain structures on their property where they could not have been placed before and will allow for onsite wastewater systems to fit in areas where they previously would not have been permissible.

Commission Authority

The EQC has authority to take this action under ORS 454.605 to 454.755, 468.020, 468.065, 468B.035, 468B.051 .

Stakeholder Involvement

Fee Increases

DEQ consulted with BRC members during the 2007 legislative session on the five percent fee increase. In addition to working with the BRC during the 2007 legislative session, DEQ provided information regarding the fee increases via meetings, phone calls, and written documents to several affected organizations, including environmental groups, homebuilders, local government associations, and Tribes.

To make sure that all permit holders knew about the proposed onsite fee increase rulemaking, DEQ mailed more than 700 letters to all WPCF-Onsite permit holders and 1,000 postcards to all licensed sewage disposal service providers and certified onsite maintenance providers to inform them of the rulemaking proposal, public hearings, and the opportunity to comment on the proposed rules. Information about the proposed fee increases was also sent via email to stakeholders and permit holders who have elected to receive electronic water quality program updates.

DEQ conducted outreach through the Oregon Onsite Wastewater Association (O2WA) regarding the surcharge. At the O2WA annual meeting in March 2007, DEQ presented the proposed surcharge to approximately 250 attendees including many small businesses such as installers, maintenance providers, manufacturers and system designers.

The technical review committee and DEQ also met to discuss the fee increases and to get input on the rulemaking's fiscal impact statement (Attachment F).

Public Comment

A public comment period extended from January 18 to March 3, 2008 and included public hearings in Eugene, Medford, Portland, Pendleton, and Bend. Results of public input are provided in Attachment B.

No changes were made to the proposed rulemaking as a result of the public comment. One change was made to the fee tables due to an internal review of the fee tables that occurred outside of the public comment period. In Table 9B, the fees associated with gray water waste disposal sumps with a design capacity of 600 gallons per day or more were eliminated. Systems of that design are not allowed by rule.

Key Issues

DEQ recognized that WPCF-Onsite permit holders might be concerned with having fees increased when the fee revenue would be spread out over the entire water quality program. DEQ sent notice to all WPCF-Onsite permit holders at the beginning of the public comment period to ensure that they had advance notice of the proposed fee increases and were aware of opportunities to comment on the rulemaking.

DEQ anticipated negative comments from permit holders; however, DEQ received only three comments in opposition to the WPCF-Onsite permit fee increases. DEQ only received one comment in opposition to the surcharge increase.

Next Steps

If the proposed changes are adopted, DEQ will update its rules, fee tables and Web site to reflect the changes. Staff will inform permit holders of the changes to the fee rules through notices sent out with monthly invoices. Staff will also inform permit coordinators and all water quality staff of the changes to the fee rules.

DEQ will hire staff to conduct program reviews after the surcharge has been implemented.

Attachments

A. Proposed Rule Revisions
B. Summary of Public Comments and Agency Responses
C. Advisory Committee Membership
D. Presiding Officer's Report on Public Hearings
E. Relationship to Federal Requirements Questions
F. Statement of Need and Fiscal and Economic Impact
G. Land Use Evaluation Statement

Available Upon Request

1. Legal Notice of Hearing
2. Cover Memorandum from Public Notice
3. Written Comments Received
4. Rule Implementation Plan
5. Blue Ribbon Committee Report on Key Enhancements to the Oregon Wastewater Permitting Program (2004)

Approved:

Section: ____________________

Division: ____________________

Report Prepared By: Zach Loboy

Phone: (541) 687-7425

Attachment A

340-071-0140

Onsite System Fees

(1) This rule establishes the fees for site evaluations, permits, reports, variances, licenses, and other services the department provides under this division.

(2) Site evaluation and existing system evaluation fees~~.~~ are listed in Table 9A.

~~(a) New Site Evaluation fees. Fees in this section apply to each system for which site suitability is evaluated.~~

~~(A) Single family dwelling.~~

~~(i) First lot -- $425.~~

~~(ii) Each additional lot evaluated during initial visit -- $425.~~

~~(B) Commercial facility.~~

~~(i) For systems with a design capacity of 1,000 gpd or less -- $425.~~

~~(ii) For systems with a design capacity greater than 1,000 gpd but not more than 5,000 gpd, the fee is $425 plus $110 for each 500 gallons or part thereof above 1,000 gallons.~~

~~(iii) Facilities with a design flow greater than 5,000 gpd -- $1,440.~~

~~(b) Site Evaluation Report Review fee -- $400.~~

~~(c) Existing System Evaluation Report fee -- $400.~~

~~(d) Site Evaluation Confirmation fee (for WPCF permits) -- $420.~~

(3) Permitting fees for systems not subject to WPCF permits are listed in Table 9B and Table 9C.

~~(a) Construction-Installation Permit fees.~~

~~(A) For systems with a design capacity of 1,000 gpd or less.~~

~~(i) Standard onsite system -- $630.~~

~~(ii) Alternative systems.~~

~~(I) Alternative treatment technologies -- $950.~~

~~(II) Capping fill -- $950.~~

~~(III) Absorption trenches in saprolite -- $630.~~

~~(IV) Evapotranspiration-absorption -- $630.~~

~~(V) Gray water waste disposal sump -- $280.~~

~~(VI) Holding tanks -- $540.~~

~~(VII) Pressure distribution -- $950.~~

~~(VIII) Recirculating gravel filter -- $950.~~

~~(IX) Redundant -- $630.~~

~~(X) Sand filter (commercial or residential) -- $950.~~

~~(XI) Seepage trench -- $630.~~

~~(XII) Steep slope -- $630.~~

~~(XIII) Tile dewatering -- $950.~~

~~(B) For systems with a design capacity greater than 1,000 gpd but not more than 2,500 gpd, the fee is equal to the fee required in paragraph (3)(a)(A) of this rule plus $60 for each 500 gallons or part thereof above 1,000 gallons.~~

~~(b) Reinspection fee -- $235.~~

~~(c) Pump Evaluation fee. For all permits that specify the use of a pump or dosing siphon except for sand filter, ATT, RGF, and pressure distribution systems -- $40.~~

~~(d) Plan Review fees for commercial facility systems.~~

~~(A) For a system with a design capacity of less than 600 gpd, the plan review fee is included in the permit application fee.~~

~~(B) For a system with a design capacity of 600 gpd but not more than 1,000 gpd -- $230.~~

~~(C) For a system with a design capacity greater than 1,000 gpd but not more than 2,500 gpd, the plan review fee is $230, plus $40 for each 500 gallons or part thereof above 1,000 gallons.~~

~~(e) Permit Transfer, Reinstatement, or Renewal fees.~~

~~(A) Field Visit required -- $325.~~

~~(B) No Field Visit required -- $95.~~

~~(f) Alteration Permit fees.~~

~~(A) Major -- $345.~~

~~(B) Minor -- $165.~~

~~(g) Repair Permit fees.~~

~~(A) Single Family Dwelling.~~

~~(i) Major -- $345.~~

~~(ii) Minor -- $165.~~

~~(B) Commercial Facility.~~

~~(i) Major -- $630 or the applicable construction-installation permit fee, whichever is lower.~~

~~(ii) Minor -- $290.~~

~~(h) Permit Denial Review fee -- $220.~~

~~(i) Authorization Notice fees.~~

~~(A) Field Visit required -- $390.~~

~~(B) No Field Visit required -- $100.~~

~~(C) Authorization Notice Denial Review -- $400.~~

~~(D) Renewal of hardship authorization for temporary dwelling, if field visit required -- $330.~~

~~(j) Alternative system inspection fee.~~

~~(A) Holding tanks -- $240.~~

~~(B) Other alternative systems in subsection (3)(a) of this rule -- $330.~~

~~(k) Annual report evaluation fee.~~

~~(A) Holding tanks -- $25.~~

~~(B) Commercial sand filters, recirculating gravel filters, and alternative treatment technology -- $50.~~

~~(l) Variance from onsite system rules -- $1,300.~~

(4) WPCF permit fees. Fees in this section apply to WPCF permits issued pursuant to OAR 340-071-0162. WPCF permit fees are listed in Table 9D.

~~(a) Application filing fee (all systems) -- $60.~~

~~(b) Permit processing fees for onsite systems with a design capacity of 1,200 gpd or less.~~

~~(A) New application -- $480.~~

~~(B) Permit renewal (involving request for effluent limit modifications) -- $240.~~

~~(C) Permit renewal (without request for effluent limit modifications) -- $120.~~

~~(D) Permit modification (involving increase in effluent limitations) -- $180.~~

~~(E) Permit modification (not involving an increase in effluent limits) -- $120.~~

~~(c) Permit processing fees for onsite systems with a design capacity over 1,200 gpd:~~

~~(A) New applications -- $2,400.~~

~~(B) Permit renewals (involving request for effluent limit modifications) -- $1,200.~~

~~(C) Permit renewal (without request for effluent limit modifications) -- $600.~~

~~(D) Permit modification (involving increase in effluent limits) -- $1,200.~~

~~(E) Permit modification (not involving an increase in effluent limits) -- $600.~~

~~(d) Plan Review fee.~~

~~(A) Commercial facilities with a design capacity of less than 2,500 gpd, fees in subsection (3)(d) of this rule.~~

~~(B) For commercial facilities with a design capacity of 2,500 gpd but less than 5,000 gpd, the fee is $370 plus $40 for each 500 gallons or part thereof above 2,500 gallons.~~

~~(C) Commercial facilities with a design capacity of 5,000 gpd or more -- $600.~~

~~(D) Single family dwelling -- $120.~~

~~(e) Annual Compliance Determination fee.~~

~~(A) Onsite sewage lagoon with no discharge -- $720.~~

~~(B) Onsite subsurface systems.~~

~~(i) Systems with design capacities of 20,000 gpd or more and not included in subparagraphs (iii) or (iv) of this paragraph that are permitted to discharge septic tank effluent into an absorption facility -- $600.~~

~~(ii) Systems with design capacities less than 20,000 gpd and not included in subparagraphs (iii) or (iv) of this paragraph that are permitted to discharge septic tank effluent into an absorption facility -- $300.~~

~~(iii) Systems with design capacities of 2,500 gpd or more permitted to discharge effluent meeting at least treatment standard 1 into an absorption facility -- $600.~~

~~(iv) Systems with design capacities of less than 2,500 gpd permitted to discharge effluent meeting at least treatment standard 1 into an absorption facility -- $300.~~

~~(v) Holding tanks, if owners do not comply with subparagraph (vi) of this section -- $240.~~

~~(vi) Holding tanks, if by the date specified by the department, the owner submits written certification to the department that the holding tank has been operated the previous calendar year in full compliance with the permit and that the previous year's service logs for the holdings tanks are available for inspection by the department -- $25.~~

(5) Innovative or Alternative Technology or Material Review fees ~~-- $1,000.~~are listed in Table 9F.

(6) Material Plan Review fees are listed in Table 9F. ~~-- $300.~~

(7) Sewage Disposal Service License and Truck Inspection fees~~.~~ are listed in Table 9E.

~~(a) New 3-year business license -- $355 per year.~~

~~(b) Renewal of business license -- $320 per year.~~

~~(c) Transfer of or amendments to license -- $200.~~

~~(d) Reinstatement of suspended license -- $250.~~

~~(e) Pumper truck inspections.~~

~~(A) First vehicle, each inspection -- $100.~~

~~(B) Each additional vehicle, each inspection -- $50.~~

(8) Contract county fee schedules.

(a) Each county having an agreement with the department under ORS 454.725 must adopt a fee schedule for services rendered and permits issued. The county fee schedule may not include the department's surcharge established in section (9) of this rule unless identified as a department surcharge.

(b) A copy of the fee schedule and any subsequent amendments to the schedule must be submitted to the department.

(c) Fees may not exceed actual costs for efficiently conducted services.

(9) Department surcharge.

(a) To offset a portion of the administrative and program oversight costs of the statewide onsite wastewater management program, the department and contract counties must levy a surcharge ~~of $40~~ for each site evaluation, report permit, and other activity for which an application is required in this division. The surcharge fee is listed in Table 9F. This surcharge does not apply to sewage disposal service license applications, pumper truck inspections, annual report evaluation fees, or certification of installers or maintenance providers.

(b) Proceeds from surcharges collected by the department and contract counties must be accounted for separately. Each contract county must forward the proceeds to the department in accordance with its agreement with the department.

(10) Refunds. The department may refund all or a portion of a fee accompanying an application if the applicant withdraws the application before any field work or other substantial review of the application has been done.

Stat. Auth.: ORS 454.625, 468.020 & 468.065(2)
Stats. Implemented: ORS 454.745, 468.065 & 468B.050
Hist.: DEQ 10-1981, f. & ef. 3-20-81; DEQ 19-1981, f. 7-23-81, ef. 7-27-81; DEQ 5-1982, f. & ef. 3-9-82; DEQ 8-1983, f. & ef. 5-25-83; DEQ 9-1984, f. & ef. 5-29-84; DEQ 13-1986, f. & ef. 6-18-86; DEQ 15-1986, f. & ef. 8-6-86; DEQ 6-1988, f. & cert. ef. 3-17-88; DEQ 11-1991, f. & cert. ef. 7-3-91; DEQ 18-1994, f. 7-28-94, cert. ef. 8-1-94; DEQ 27-1994, f. & cert. ef. 11-15-94; DEQ 12-1997, f. & cert. ef. 6-19-97; Administrative correction 1-28-98; DEQ 8-1998, f. & cert. ef. 6-5-98; DEQ 16-1999, f. & cert. ef. 12-29-99; Administrative correction 2-16-00; DEQ 9-2001(Temp), f. & cert. ef. 7-16-01 thru 12-28-01; DEQ 14-2001, f. & cert. ef. 12-26-01; DEQ 2-2002, f. & cert. ef. 2-12-02; DEQ 11-2004, f. 12-22-04, cert. ef. 3-1-05

TABLE 1
OAR 340-071-0220

MINIMUM SEPARATION DISTANCES

Items Requiring Setback	From Subsurface Absorption Area Including Replacement Area	From Septic Tank and Other Treatment Units, Effluent Sewer and Distribution Units
1. Groundwater Supplies and Wells.	*100'	50'
2. Springs:		
• Upgradient.	50'	50'
• Downgradient.	100'	50'
**3. Surface Public Waters:		
• Year round.	100'	50'
• Seasonal.	50'	50'
4. Intermittent Streams:		
• Piped (watertight not less than 25' from any part of the on-site system).	20'	20'
• Unpiped.	50'	50'
5. Groundwater Interceptors:		
• On a slope of 3% or less.	20'	10'
• On a slope greater than 3%:		
• Upgradient.	10'	5'
• Downgradient.	50'	10'
6. Irrigation Canals:		
• Lined (watertight canal).	25'	25'
• Unlined:		
• Upgradient.	25'	25'
• Downgradient.	50'	50'
7. Cuts Manmade in Excess of 30 Inches (top of downslope cut):		
• Which Intersect Layers that Limit Effective Soil Depth Within 48 Inches of Surface.	50'	25'
• Which Do Not Intersect Layers that Limit Effective Soil Depth.	25'	10'
8. Escarpments:		
• Which Intersect Layers that Limit Effective Soil Depth.	50'	10'
• Which Do Not Intersect Layers that Limit Effective Soil Depth.	25'	10'
9. Property Lines.	10'	5'
10. Water Lines.	10'	10'
11. Foundation Lines of any Building ~~or Structure~~, Including Garages and Out Buildings.	10'	5'
12. Underground Utilities.	10'	—

* 50-foot setback for wells constructed with special standards granted by WRD.
**This does not prevent stream crossings of pressure effluent sewers.

340-071-0140: Onsite System Fee Schedule

Table 9A: Site evaluation and existing system evaluation fees.	
New Site Evaluation fees. Fees in this section apply to each system for which site suitability is evaluated.	
Single family dwelling - First lot	$425
Single family dwelling - Each additional lot evaluated during initial visit	$425
Commercial facility with a design capacity of 1,000 gpd or less	$425
Commercial facility with a design capacity of 1,001-1,500 gpd	$535
Commercial facility with a design capacity of 1,501-2,000 gpd	$645
Commercial facility with a design capacity of 2,001-2,500 gpd	$755
Commercial facility s with a design capacity of 2,501-3,000 gpd	$865
Commercial facility with a design capacity of 3,001-3,500 gpd	$975
Commercial facility with a design capacity of 3,501-4,000 gpd	$1,085
Commercial facility with a design capacity of 4,001-4,500 gpd	$1,195
Commercial facility with a design capacity of 4,501-5,000 gpd	$1,305
Commercial facility with a design flow greater than 5,000 gpd	$1,440
Site Evaluation Report Review fee	$400
Existing System Evaluation Report fee	$400

Table 9B: Permitting fees for systems not subject to WPCF permits.

		Gray water waste disposal sumps	Holding tanks	Standard subsurface, Absorption trenches in saprolite, Evapotranspiration-absorption, Redundant, Seepage trench, Steep slope	Alternative treatment technologies, Capping fill, Pressurized distribution, Recirculating gravel filter, Sand filter (commercial or residential), Tile dewatering	Plan Review fees for commercial facility systems.
Construction-Installation Permit fees.						
For systems with a design capacity of less than 600 gpd		$280	$540	$630	$950	$0
For systems with a design capacity of 600 gpd but not more than 1,000 gpd			$540	$630	$950	$230
For systems with a design capacity of 1,001-1,500 gpd			$600	$690	$1,010	$270
For systems with a design capacity of 1,501-2,000 gpd			$660	$750	$1,070	$310
For systems with a design capacity of 2,001-2,500 gpd			$720	$810	$1,130	$350
Reinspection fee	$235					
Pump Evaluation fee. For all permits that specify the use of a pump or dosing siphon except for sand filter, Alternative treatment technologies, Recirculating gravel filter, and pressurized distribution systems	$40					

Table 9C: Other permitting fees for systems not subject to WPCF permits.

		Field Visit required	No Field Visit required
Minor Alteration Permit	$165	-	-
Major Alteration Permit	$345		
Minor Repair Permit - Single Family Dwelling	$165	-	-
Major Repair Permit - Single Family Dwelling	$345		
Minor Repair Permit - Commercial Facility	$290	-	-
Major Repair Permit - Commercial Facility	$630 or the applicable fee in Table 9B, whichever is lower.		
Permit Denial Review	$220	-	-
Permit Transfer, Reinstatement, or Renewal		$325	$95
Authorization Notice	-	$390	$100
Authorization Notice Denial Review	$400		
Renewal of hardship authorization for temporary dwelling		$330	
Alternative system inspection - Holding tanks	$240	-	-
Alternative system inspection - Other alternative systems listed in Table 9B	$330	-	-
Annual report evaluation - Holding tanks	$25	-	-
Annual report evaluation - Commercial sand filters, recirculating gravel filters, and alternative treatment technology	$50	-	-
Variance from onsite system rules	$1,300	-	-

Table 9D: WPCF permit fees.

		Application filing fee (all systems)	Permit processing fees for onsite systems with a design capacity of 1,200 gpd or less.	Permit processing fees for onsite systems with a design capacity over 1,200 gpd:	Plan Review fee.	Annual Compliance Determination fee.
New application		~~$60~~$65	~~$480~~$518	~~$2400~~$2,592		
Permit renewal (involving request for effluent limit modifications)		~~$60~~$65	~~$240~~$259	~~$1200~~$1,296		
Permit renewal (without request for effluent limit modifications)		~~$60~~$65	~~$120~~$130	~~$600~~$648		
Permit modification (involving increase in effluent limitations)		~~$60~~$65	~~$240~~$259	~~$1200~~$1,296		
Permit modification (not involving an increase in effluent limits)		~~$60~~$65	~~$180~~$194	~~$600~~$648		
For commercial facilities with a design capacity less than 600 gpd					~~$0~~$0	
For commercial facilities with a design capacity of 600 - 1,000 gpd					~~$230~~ $248	
For commercial facilities with a design capacity of 1,001 - 1,500 gpd					~~$270~~ $292	
For commercial facilities with a design capacity of 1,501 - 2,000 gpd					~~$310~~ $335	
For commercial facilities with a design capacity of 2,001 - 2,500 gpd					~~$350~~ $378	
For commercial facilities with a design capacity of 2,501 - 3,000 gpd					~~$410~~ $443	
For commercial facilities with a design capacity of 3,001 - 3,500 gpd					~~$450~~ $486	
For commercial facilities with a design capacity of 3,501 - 4,000 gpd					~~$490~~ $529	
For commercial facilities with a design capacity of 4,001 - 4,500 gpd					~~$530~~ $572	
For commercial facilities with a design capacity of 4,501 - 5,000 gpd					~~$570~~ $616	
Commercial facilities with a design capacity greater than 5,000 gpd					~~$600~~ $648	
Single family dwelling					~~$120~~ $130	
Onsite sewage lagoon with no discharge						~~$720~~$778

Treatment Standard 1 or better systems with design capacities less than 2,500 gpd						~~$300~~$324
Treatment Standard 1 or better systems with design capacities of 2,501 - 20,000 gpd						~~$600~~$648
Holding tanks, if by the date specified by the department, the owner does not submit written certification to the department that the holding tank has been operated the previous calendar year in full compliance with the permit or that the previous year's service logs for the holding tanks are not available for inspection by the department						~~$240~~$259
Holding tanks, if by the date specified by the department, the owner submits written certification to the department that the holding tank has been operated the previous calendar year in full compliance with the permit and that the previous year's service						~~$25~~$27
Other systems with design capacities less than 20,000 gpd						~~$300~~$324
Other systems with design capacities greater than 20,000 gpd						~~$600~~$648
Site Evaluation Confirmation	~~$420~~ $454					

Table 9E: Sewage Disposal Service License and Truck Inspection fees.	
New 3-year business license	$355 per year
Renewal of business license	$320 per year
Transfer of or amendments to license	$200
Reinstatement of suspended license	$250
Pumper truck inspections - First vehicle, each inspection	$100
Pumper truck inspections - Each additional vehicle, each inspection	$50

Table 9F: Other Fees	
Innovative or Alternative Technology or Material Review	$1,000
Material Plan Review	$300
Department surcharge.	~~$40~~$60

Attachment B

Summary of Public Comment and Agency Response

Onsite Program Fee Increases

Prepared by: Zach Loboy **Date: April 29, 2008**

Comment period The public comment period opened on January 18, 2008 and closed at 5:00 p.m. on March 3, 2008. The Department of Environmental Quality (DEQ) held public hearings at 6:00 p.m. in Medford on February 19, 2008; in Bend on February 20, 2008; in Pendleton on February 21, 2008; in Eugene on February 26, 2008; and in Portland on February 27, 2008. Two persons attended the hearings, but did not present oral comments. Outside of the public hearings four persons submitted written comments.

Organization of comments and responses Following is a summary of the comments and DEQ's response. The person who provided each comment is referenced by number. A list of commenters and their reference numbers follows the summary of comments and responses.

Summary of Comments and Agency Responses

From	Comment	DEQ Response
1	Objection to any fee increase. The economy lags badly and we can't afford any more government. Costs for standard septic system evaluation and permit of $1000 seems exorbitant to me. I suggest you re-evaluate your priorities within your current funding levels. I am <u>not</u> in favor of adding $20 to the current surcharge.	We understand your concern of increasing fees and looked for other options before proposing this fee increase. The onsite program is entirely fee supported and without this fee increase we would have to decrease our technical assistance and oversight responsibilities. Stakeholders have been supportive of increasing consistency across the state by increasing technical assistance and oversight. By decreasing technical assistance and oversight, we would be taking a step back and setting ourselves up for a much more costly road to increased consistency in the future

2	We are opposed to further rules or fee increases as government agencies are gradually breaking the backs of small business persons. We are a small low income RV park allowing older units in our park on month to month basis, and guest are straining to pay their current rent payments, and as you may know these costs will have to be passed on to the people who can least afford it.	The WPCF permit fee increases cover the costs of administering the wastewater permit program. The wastewater permit program is necessary to ensure protection of public health and the environment, benefiting all Oregonians and visitors to the state. We try to keep costs as low as possible and only increase fees by the amount necessary to cover our costs.
3	I have a single family home that is required to have a DEQ WPCF permit because the septic system is a Orenco Advantex treatment Unit with Geoflow drip irrigation. I use approximately 1300 gallons of water monthly. I am not a business or industry. I protest the permit fee increase as uncalled for because DEQ's quality of service to me will not increase.	On July 3rd, 2007 the DEQ amended chapter 340 Division 71 to allow many systems that required a WPCF permit to terminate their permits if they meet certain conditions. One reason this rule was amended was to allow single family homeowners the ability to terminate their WPCF permits. The system you described does not meet the conditions of the amended rule because the absorption facility (i.e. drip irrigation system) is not described in Division 71. You may wish to evaluate options for modifying your system so that your WPCF permit will qualify for termination. Please understand that any options you may have will be based on your site's specific characteristics and that we can not guarantee your system will be able to be modified or your WPCF permit terminated but we would be happy to discuss your specific situation to see what options, if any, you have. For a list of DEQ's onsite program contacts, please go to this website: http://www.deq.state.or.us/wq/onsite/contacts.htm
4	We are trying to maintain a very small business that provides a service to the community most especially during the summer and hunting season, about 6 months of the year. Any and all increases in fees of any sort are hard to accept.	The WPCF permit fee increases cover the costs of administering the wastewater permit program. The wastewater permit program is necessary to ensure protection of public health and the environment, benefiting all Oregonians and visitors to the state. We try to keep costs as low as possible and only increase fees by the amount necessary to cover our costs.

List of Commenters and Reference Numbers

Reference Number	Name	Organization	Address	Date on comments
1	Jim Rust	Hoedown Company, Licensed Sewage Disposal Service Provider/Installer #36006	27640 Westside Rd. Klamath Falls, OR 97601	January 25, 2008
2	Judy M. Goleman	Whitehorse Country Store and RV Village	JudyMGoleman@aol.com	January 24, 2008
3	David Olson		2035 Nonpareil Rd. Sutherlin OR, 97479	February 14, 2008
4	John Orueta	Ana Reservoir RV Park	P.O. Box 1494 Redmond OR, 97756	January 30, 2008

Attachment C

Blue Ribbon Committee Membership

Name	Organization
Robert Austin, Mayor	City of Estacada
Ed Butts, P.E.	4B Engineering and Consulting LLC
Michael Campbell	Stoel Rives LLP
Jon Chandler	Oregon Homebuilders Association
Dorothy Sperry	Port of Portland
Teresa Huntsinger	Oregon Environmental Council
Charles Logue	Clean Water Services
Kurt Harrington, PE	AMEC Earth & Environmental, Inc.
Craig Smith	Northwest Food Processors Association
Willie Tiffany	League of Oregon Cities
Kathryn Van Natta	Northwest Pulp & Paper
Travis Williams	Willamette Riverkeeper
John Ledger	Associated Oregon Industries

Attachment D
Presiding Officer's Report on Public Hearings

State of Oregon
Department of Environmental Quality **Memorandum**

Date: March 3, 2008
To: Environmental Quality Commission
From: Zach Loboy, DEQ

Subject: Presiding Officer's Report for Rulemaking Hearing
Title of Proposal: Onsite Fee Increases

Hearing One

Hearing Date and Time: **February 19, 2008**, 6 p.m.
Hearing Location: Community Justice Center, **Medford, Oregon**

DEQ convened the rulemaking hearing on the proposal referenced above from 6 to 7 p.m. Two DEQ employees attended the hearing, Zach Loboy as a presenter, and Dan Wiltse as presiding officer. No other persons attended; no testimony was given; and no written comments were submitted at this hearing.

Hearing Two

Hearing Date and Time: **February 20, 2008**, 6 p.m.
Hearing Location: Oregon DEQ, **Bend, Oregon**

DEQ convened the rulemaking hearing on the proposal referenced from 6 to 7 p.m. Three DEQ employees attended the hearing, Zach Loboy and Bob Baggett as presenters, and Dan Wiltse as presiding officer. Two persons attended and informal discussion was had regarding the rulemaking; no testimony was given; and no written comments were submitted at this hearing.

Hearing Three

Hearing Date and Time: **February 21, 2008**, 6:00p.m.
Hearing Location: City Hall, **Pendleton, Oregon**

DEQ convened the rulemaking hearing on the proposal referenced from 6 to 7 p.m. Two DEQ employees attended the hearing, Zach Loboy as presenter, and Dan Wiltse as presiding officer. No other persons attended; no testimony was given; and no written comments were submitted at this hearing.

Hearing Four

Hearing Date and Time: **February 26, 2008**, 6:00p.m.
Hearing Location: DEQ-Eugene Office, **Eugene, Oregon**

DEQ convened the rulemaking hearing on the proposal referenced above from 6 to 7 p.m. Two DEQ employees attended the hearing, Zach Loboy as presenter, and Dan Wiltse as presiding officer. No other persons attended; no testimony was given; and no written comments were submitted at this hearing.

Hearing Five

Hearing Date and Time: **February 27, 2008**, 6:00p.m.
Hearing Location: DEQ- Headquarters, **Portland, Oregon**

DEQ convened the rulemaking hearing on the proposal referenced above from 6 to 7 p.m. Two DEQ employees attended the hearing, Zach Loboy as presenter, and Dan Wiltse as presiding officer. No other persons attended; no testimony was given; and no written comments were submitted at this hearing.

Attachment E

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Relationship to Federal Requirements

This proposal increases WPCF Onsite Fees by three percent and five percent and the Onsite application surcharge by $20 and makes minor housekeeping changes.

Answers to the following questions identify how the proposed rulemaking relates to federal requirements and potential justification for differing from federal requirements. The questions are required by OAR 340-011-0029(1).

1. Are there federal requirements that are applicable to this situation? If so, exactly what are they?

There are no applicable federal requirements.

2. Are the applicable federal requirements performance based, technology based, or both with the most stringent controlling?

Not applicable.

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?

Not applicable.

4. Will the proposed requirement (rulemaking) 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?

No.

5. Is there a timing issue which might justify changing the time frame for implementation of federal requirements?

Not applicable.

6. Will the proposed requirement (rulemaking) assist in establishing and maintaining a reasonable margin for accommodation of uncertainty and future growth?

No.

7. Does the proposed requirement (rulemaking) establish or maintain reasonable equity in the requirements for various sources? (level the playing field)

The proposed three percent and five percent fee increases do not impact the level of equity between sources. The $20 surcharge increase does not impact the level of equity between sources.

8. Would others face increased costs if a more stringent rule is not enacted?

Not applicable.

9. Does the proposed requirement (rulemaking) 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.

10. Is demonstrated technology available to comply with the proposed requirement (rulemaking)?

Not applicable.

11. Will the proposed requirement (rulemaking) contribute to the prevention of pollution or address a potential problem and represent a more cost effective environmental gain?

No. The proposed onsite program fees will allow DEQ to ensure consistent implementation of the program across the state.

Attachment F

DEPARTMENT OF ENVIRONMENTAL QUALITY
Chapter 340
Proposed Rulemaking
STATEMENT OF NEED AND FISCAL AND ECONOMIC IMPACT
This form accompanies a Notice of Proposed Rulemaking

Rule Caption	This proposal increases WPCF Onsite Fees by three percent and five percent and the Onsite application surcharge by $20 and makes minor housekeeping changes.
Title of Proposed Rulemaking:	Onsite System Fee Increase Changes are proposed to Division 71
Stat. Authority or other Legal Authority:	DEQ has the statutory authority to address this issue under ORS 454.745, ORS 454.755 and ORS 468.065.
Stat. Implemented:	These rules implement ORS 454.605 to 454.755 and ORS 468.065, ORS 468B.035 and ORS 468B.051.
Need for the Rule(s)	State law (ORS 468.065) authorizes the Environmental Quality Commission) to set fee schedules for DEQ's Water Quality Division by rule. This rulemaking will revise Oregon Administrative Rule (OAR) Chapter 340, Division 71 by increasing the following fees and surcharge. <u>Three percent Annual Fee Increase</u>. Through this rulemaking, DEQ seeks approval for an annual fee increase of three percent for DEQ's water quality permit program. In 2002, DEQ convened the Blue Ribbon Committee (BRC) of industry, environmental and local government representatives to recommend improvements to DEQ's water quality permit program. In 2004, the BRC published a report containing a variety of recommendations, including increasing fee revenue to help cover increasing costs and support existing and new program staff. The 2005 Legislature adopted a recommendation that authorizes the EQC to raise fees annually in an amount not to exceed the anticipated increase in the cost of administering the permit program or three percent, whichever is lower (ORS 468B.051). The annual fee increase, approved by the EQC for the first time in June 2007, helps cover the anticipated increase in program costs. <u>Five percent "Phase Two" Fee Increase</u>. Through this rulemaking, DEQ seeks approval to implement a five percent fee increase approved by the Legislature in 2007. The 2007 Legislature approved "phase two" funding, a five percent fee increase to support 2.5 new positions needed to support development of up-to-date and consistent permits, and improve timeliness of compliance and enforcement for permit violations. <u>Onsite Surcharge Increase.</u> The proposed $20 surcharge increase is needed for three additional staff in the onsite program to conduct audits to determine proper, consistent implementation of the program among contract counties. Proper implementation of the onsite program regulations ensures that onsite systems are properly sited and constructed and are protective of public health and the environment. If onsite systems are improperly sited and constructed, there is a potential to adversely impact waters of the state and public health. <u>Fee schedule structure</u>. DEQ proposes to change the structure of the fee schedule from outline format to table format. <u>Strike "or Structure."</u> DEQ proposes to strike the words "or Structure" from section 11 of Table 1 of Division 71. Structure is not defined in Division 71 but is defined by Oregon Building Codes Department as that which is built or constructed. Striking the words "or Structure" is needed to clarify the intent of the rule and give appropriate flexibility to our agents in the field in regards to onsite system setbacks from certain structures
Documents Relied Upon for Rulemaking	<u>Three Percent Annual Fee and Five Percent "Phase Two" Fee Increases</u> • Cost factors for the WQ permit program in the 2005-07 Legislatively Adopted Budget • Cost factors for the WQ permit program in the 2007-09 Agency Requested Budget • DEQ employee compensation plan increases • Fee increases calculations • DEQ 2007-2009 Legislatively Approved Budget • DEQ's water quality permit database • Application and annual fee invoice and revenue records • Oregon Revised Statutes (ORS) 468B.051

	Onsite Surcharge Increase. • DEQ 2007-2009 Legislatively Approved Budget • DEQ's water quality permit database • Contract county surcharge reports • DEQ's onsite program database • Fee increase calculations These documents are available and can be reviewed in the DEQ Eugene office by contacting Zach Loboy at (800)844-8467 x7425.
Requests for Other Options	**ORS 183.335(2)(b)(G) requests public comment on whether other options should be considered for achieving the rule's substantive goals while reducing negative economic impact of the rule on business. The DEQ has been conducting outreach and will be requesting official public comment via public hearings that will be scheduled for February 2008.**
Fiscal and Economic Impact, Statement of Cost Compliance	
Overview	The impact of each fee revenue increase and the Onsite surcharge are described below. DEQ will notify all permit holders of the proposed fee increases prior to EQC adoption of the changes. Permit holders can incorporate the fee increase information in their annual budget and operations planning. For further information regarding the calculation of the fee increases, please contact Zach Loboy at (800) 844-8467, extension 7425. 3% Annual Fee Increase. As a result of this rulemaking, fee revenue will increase by 3% for Water Pollution Control Facility Onsite (WPCF-OS) permits. To establish the amount of the proposed annual increase for 2008-2009, DEQ compared basic water quality program cost increases (includes but is not limited to supplies and rent) for 2005-2007 with projected costs for 2007-2009, keeping staffing levels constant. DEQ estimates that water quality program costs for 2005-2007 are $13,388,548, and projected costs for 2007-2009 are $14,968,245, an increase of $1,579,679, or 11.80%, for the 2007-2009 biennium (5.90% for 2007-2008 and 5.90% for 2008-2009). Additionally, for 2008-2009, DEQ anticipates a salary cost increase of $1,239,000.00, representing an additional cost increase of 6.84%. Overall, total costs for 2008-2009 will increase by 12.74% (5.90% basic program cost increase plus 6.84% salary cost increase) – well over the 3% annual increase allowed by law (ORS 468B.051). The fee increase will impact approximately 700 WPCF-OS permit holders. 5% "Phase 2" Funding. As a result of this rulemaking, fee revenue will increase by 5% for Water Pollution Control Facility Onsite (WPCF-OS) permits. The fee increase will impact approximately 700 permit holders. Onsite Surcharge Increase. The Department surcharge for each site evaluation, report permit, and other activity for which an application is required in Division 71 will increase by $20, (from $40 to $60). The fee increase will impact an estimated 13,900 applications annually. Fee schedule structure. No economic impacts will occur as a result of this rule change as this rule change simply changes the structure of the fee schedule from outline format to table format. Strike "or Structure". This rule change will give agents the appropriate flexibility to allow certain structures to be located closer to the onsite wastewater system. This will allow for a positive economic impact as land developers or homeowners may be able to place certain structures on their property where they could not have been placed before and will allow for onsite wastewater systems to fit in areas where they before would not have been permissible. Data is not available to show what amount of economic impact may occur as a result of this rule change.
General public	3% Annual Fee and 5% "Phase 2" Fee Increases. DEQ does not expect these two fee increases, totaling 8%, to have an effect on the general public. The increase in permitting costs is small when compared to permit holders' overall yearly operating costs. Any increase to the cost of goods and services that is potentially passed on to the public would be negligible. Onsite Surcharge Increase. DEQ does not expect the Onsite Surcharge fee increase to significantly affect the general public. The $20 increase in application cost is small compared to overall application

	costs. DEQ recognizes that home developers may pass the onsite surcharge onto homebuyers however, the $20 increase in the surcharge is small compared to overall cost of housing development. Fee schedule structure. No economic impacts will occur as a result of this rule change as this rule change simply changes the structure of the fee schedule from outline format to table format. Strike "or Structure". This rule change will give agents the appropriate flexibility to allow certain structures to be located closer to the onsite wastewater system. This may allow for a positive economic impact as land developers or homeowners may be able to place certain structures on their property where they could not have been placed before and will allow for onsite wastewater systems to fit in areas where they before would not have been permissible. Data is not available to show what amount of economic impact may occur as a result of this rule change.	
Small Business (50 or fewer employees – ORS183.310(10))	a) Estimated number and types of businesses impacted	3% Annual Fee and 5% "Phase 2" Fee Increases. DEQ estimates that approximately 500 small business WPCF-OS permit holders will be impacted by the annual fee and 5% permit fee increases. The types of businesses/industries holding wastewater permits include, but are not limited to: machine shops, offices, retail stores, RV parks, mobile home parks, private camps, golf courses, churches, resorts, restaurants, gas stations, markets, taverns and industry. Onsite Surcharge Increase. DEQ estimates that relatively few (less than 500) of the 13,900 applications per year are submitted by small business. Most septic system permits are for single family dwellings. Fee schedule structure. No economic impacts to small businesses will occur as a result of this rule change as this rule change simply changes the structure of the fee schedule from outline format to table format. Strike "or Structure". This rule change will give agents the appropriate flexibility to allow certain structures to be located closer to the onsite wastewater system. This may allow for a positive economic impact as small businesses, such as land developers, may be able to place certain structures on their property where they could not have been placed before and will allow for onsite wastewater systems to fit in areas where they before would not have been permissible. Data is not available to show what amount of economic impact may occur as a result of this rule change.
	b) Additional reporting requirements	The proposed rules do not require additional reporting requirements.
	c) Additional equipment and administration requirements	The proposed rules do not require additional equipment or administration requirements.
	d) Describe how businesses were involved in development of this rulemaking	3% Annual Fee and 5% "Phase 2" Fee Increases. The 3% annual and 5% permit fee increases resulted from Blue Ribbon Committee (BRC) recommendations. DEQ worked with BRC members – comprised of industry, environment, and local government representatives – during the 2007 legislative session on the 5% fee increase. The BRC represented the wastewater community as a whole even though WPCF-OS permit holders that are small businesses were not directly represented in the BRC. DEQ also conducted outreach on the water quality permit fee increases with the following organizations: Oregon Onsite Wastewater Association; Willamette Riverkeeper; Association of Oregon Industries; American Federation of State, County, and Municipal Employees; Columbia Riverkeeper; Northwest Pulp & Paper Association; Confederated Tribes of the Umatilla Indian Reservation; Confederated Tribes of the Warm Springs Indian Reservation; Oregon Environmental Council; Oregon Homebuilders Association; Special Districts Association of Oregon; League of Oregon Cities; Association of Clean Water Agencies; Columbia Corridor Association; City of Portland; Port of Portland, and the Oregon Industrial Stormwater Group. Onsite Surcharge Increase. DEQ conducted outreach through the Oregon Onsite Wastewater

<table>
<tr><td></td><td></td><td>Association (O2WA) regarding the surcharge. At the O2WA annual meeting in March 2007 we presented the proposed surcharge to approximately 250 attendees including many small businesses such as installers, maintenance providers, manufacturers and system designers.

<u>Fee schedule structure.</u>
No outreach was conducted to small businesses regarding this rule change as no economic impacts to small businesses will occur as a result of this rule change. This rule change simply changes the structure of the fee schedule from outline format to table format.

<u>Strike "or Structure".</u>
No outreach was conducted to small businesses regarding this rule change as no negative economic impact will result from this rule change.</td></tr>
<tr><td>Large Business</td><td colspan="2"><u>3% Annual Fee and 5% "Phase 2" Fee Increases</u>. DEQ estimates the annual and "phase 2" fee increases will impact approximately 30 large businesses.

<u>Onsite Surcharge Increase.</u>
DEQ estimates that relatively few, if any, of the 13,900 applications per year are submitted by large business. Most septic system permits are for single family dwellings.

<u>Fee schedule structure.</u>
No economic impacts to large businesses will occur as a result of this rule change as this rule change simply changes the structure of the fee schedule from outline format to table format.

<u>Strike "or Structure".</u>
This rule change will give agents the appropriate flexibility to allow certain structures to be located closer to the onsite wastewater system. This may allow for a positive economic impact as large businesses, such as land developers, may be able to place certain structures on their property where they could not have been placed before and will allow for onsite wastewater systems to fit in areas where they before would not have been permissible. Data is not available to show what amount of economic impact may occur as a result of this rule change.</td></tr>
<tr><td>Local Government</td><td colspan="2"><u>3% Annual Fee and 5% "Phase 2" Fee Increases.</u> This rulemaking will increase fees 8% for approximately 50 local government agencies (including cities, towns, ports, sanitary districts, library districts, counties, and school districts) that hold approximately 60 permits. DEQ does not expect the proposed fee increases to have a significant effect on local government operating budgets.

<u>Onsite Surcharge Increase.</u>
DEQ estimates that less than 1% of the 13,900 applications per year are submitted by local governments. Most septic system permits are for single family dwellings.

<u>Fee schedule structure.</u>
No economic impacts to local governments will occur as a result of this rule change as this rule change simply changes the structure of the fee schedule from outline format to table format.

<u>Strike "or Structure".</u>
This rule change will give agents the appropriate flexibility to allow certain structures to be located closer to the onsite wastewater system. This may allow for a positive economic impact to local governments. As businesses, such as land developers may be able to place onsite wastewater systems to fit in areas where they before would not have been permissible property values and tax assessments may rise. Data is not available to show what amount of economic impact may occur as a result of this rule change.</td></tr>
<tr><td>State Agencies</td><td colspan="2"></td></tr>
<tr><td>DEQ</td><td colspan="2"><u>3% Annual Fee Increase</u>. The proposed 3% annual increase will generate approximately $10,000 to cover increased water quality program costs.

<u>5% "Phase 2" Fee Increase</u>. The 5% fee increases will increase annual revenue by about $16,000 to help support 2.5 new positions for the water quality permit program.

<u>Onsite Surcharge Increase.</u> The proposed surcharge will raise approximately $556,000 over a two-year period to support three positions.

<u>Fee schedule structure.</u>
No economic impacts to DEQ will occur as a result of this rule change as this rule change simply changes the structure of the fee schedule from outline format to table format.</td></tr>
</table>

	Strike "or Structure". This rule change will give agents increased flexibility to allow certain structures to be located closer to the onsite wastewater system. This rule change should have no economic effect to the DEQ.
Other agencies	The proposed surcharge will not noticeably affect other agencies.
Assumptions	DEQ assumes that for most businesses, local governments, and state agencies, the cost of obtaining and keeping a water quality permit and/or making a surcharge payment is small compared to overall installation and operating costs.
Housing Costs	The Department has determined that this proposed rulemaking will have the following effects on the cost of development of a 6,000 square foot parcel and the construction of a 1,200 square foot detached single family dwelling on that parcel: - $40 increase in permitting costs for a septic system.
Administrative Rule Advisory Committee	The Technical Review Committee received copies of our proposed updated permit fees and the draft Statement of Need and Fiscal and Economic Impact Statement prior to a meeting that was held on November 8, 2007. DEQ solicited comments on all of the documents at the meeting on November 8, 2007. The Committee reviewed DEQ's draft Statement of Need and Fiscal and Economic Impact and provided comments and recommendations. No revisions were recommended.

Prepared by — Zachary J. Loboy — 12/28/07

Printed name

Date

Approved by DEQ Budget Office — Andree Pollock — 12/26/07

Printed name

Date

Attachment G

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY

Land Use Evaluation Statement

Rulemaking Proposal
for
Onsite System Fee Increases and Surcharge

RULE CAPTION

This proposal increases WPCF Onsite Fees by 3 percent and 5 percent and the Onsite application surcharge by $20 and makes minor housekeeping changes.

1. Explain the purpose of the proposed rules.

The following proposed fee increases will affect Water Pollution Control Facility Onsite (WPCF-OS) permit holders.

Three Percent Annual Fee Increase. The Environmental Quality Commission may raise fees annually in an amount not to exceed the anticipated increase in the cost of administering the permit program or 3 percent, whichever is lower (ORS 468B.051). DEQ anticipates a 12.74 percent increase in program costs from 2007-2008 to 2008-2009, well above the three percent increase allowed by law (Oregon Revised Statutes, 468B.051). DEQ proposes increasing water quality permit fees by 3 percent for Fiscal Year 2008 to help cover the increased costs.

Five Percent Fee Increase. The five percent water quality permit fee increase supports 2.5 new positions – a whole effluent toxicity coordinator to assist permit writers with permit-related analyses such as Whole Effluent Toxicity (WET) tests; a position to assist with incorporating water quality-based effluent limits into permits; and one half-time position to address violations that are discovered during DEQ's review of monthly monitoring reports.

Onsite Surcharge Increase. The proposed $20 surcharge increase supports three additional staff in the onsite program to conduct audits to determine proper, consistent implementation of the program among contract counties. Proper implementation of the onsite program regulations ensures that onsite systems are properly sited and constructed and are protective of public health and the environment. If onsite systems are improperly sited and constructed, there is a potential to adversely impact waters of the State and public health.

Fee schedule structure. DEQ proposes to change the structure of the fee schedule from outline format to table format. The proposed changes to the structure of the fee schedule will make it easier for the regulated community to determine what fee is required for their application.

Strike "or Structure." DEQ proposes to strike the words "or Structure" from section 11 of Table 1 of Division 71. Structure is not defined in Division 71 but is defined by Oregon Building Codes Department as that which is built or constructed. Striking the words "or structure" is needed to clarify the intent of the rule and give appropriate flexibility to our agents in the field in regards to onsite system setbacks from certain structures

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 X No_______

   a. **If yes, identify existing program/rule/activity:**

      The proposed rules affect Oregon's WPCF-OS and Onsite Wastewater permitting programs (340-071 Oregon Administrative Rules for Onsite Wastewater Treatment Systems), which regulates onsite wastewater dispersal from commercial facilities and single-family dwellings.

   b. **If yes, do the existing statewide goal compliance and local plan compatibility procedures adequately cover the proposed rules?**

   Yes X No_______ (if no, explain):

   DEQ will implement the proposed rules through its water quality permitting and onsite wastewater treatment program. An approved land use compatibility statement is required from local government before issuance of a WPCF-OS permit or Construction-Installation permit.

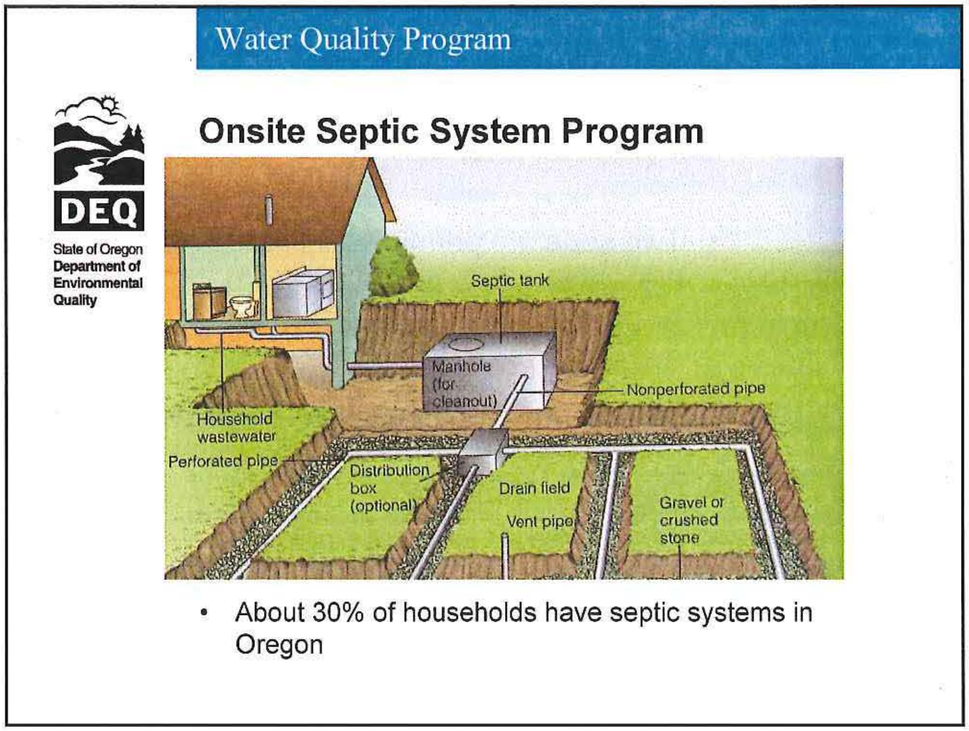
3. **If the proposed rules have been determined a land use program under 2. above, but are not subject to existing land use compliance and compatibility procedures, explain the new procedures the Department will use to ensure compliance and compatibility.**

   Not applicable.

Item K
presentation

Agenda Item K:

Onsite Septic System Fee Increases

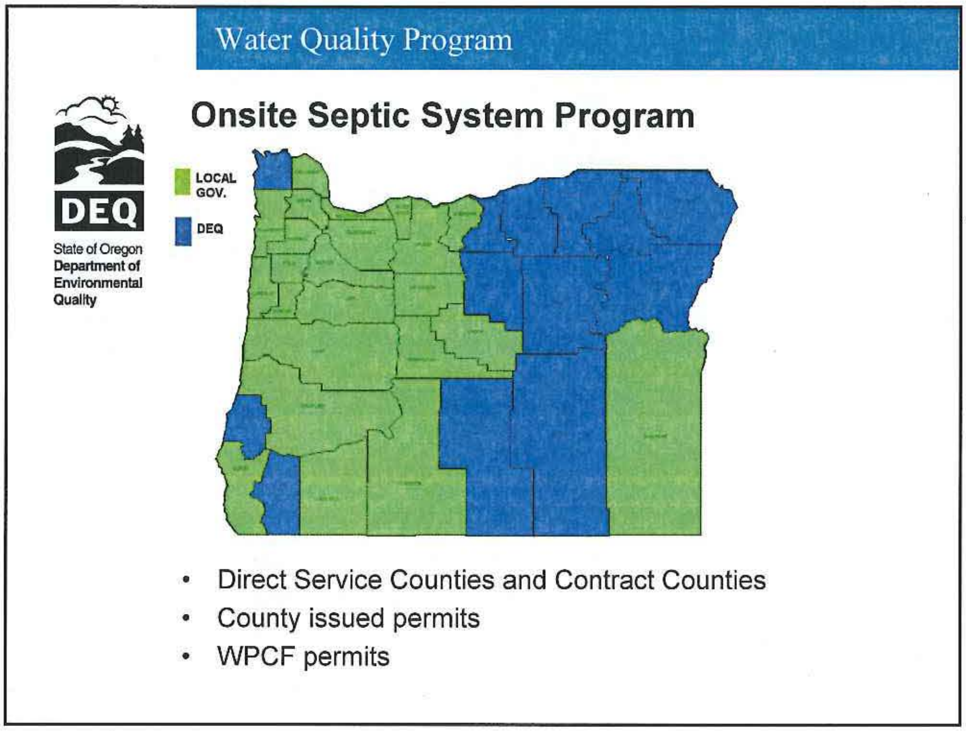


Water Quality Program

DEQ
State of Oregon Department of Environmental Quality

Onsite Septic System Program

- About 30% of households have septic systems in Oregon


Water Quality Program

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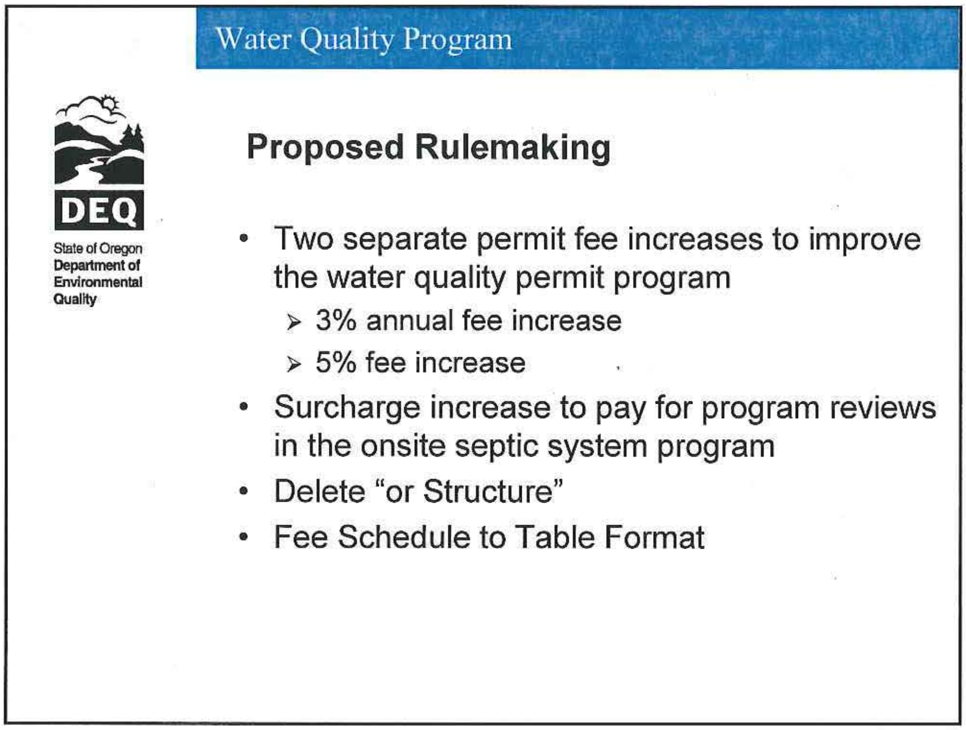
State of Oregon
Department of Environmental Quality

Onsite Septic System Program

- Direct Service Counties and Contract Counties
- County issued permits
- WPCF permits


Water Quality Program

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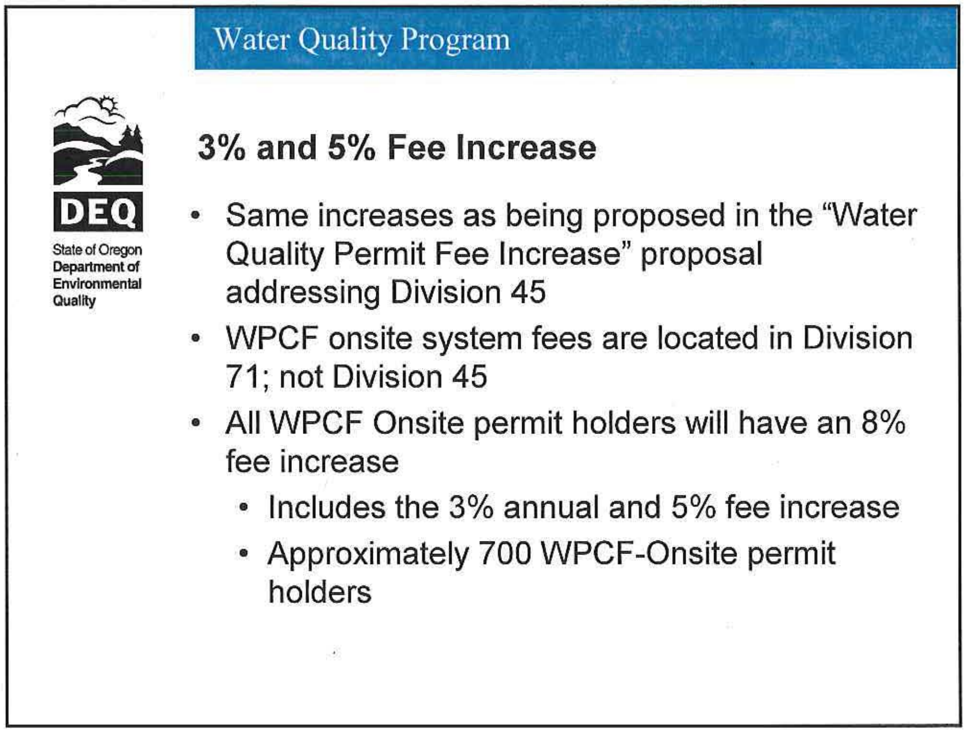
Department of Environmental Quality

Proposed Rulemaking

- Two separate permit fee increases to improve the water quality permit program
  - 3% annual fee increase
  - 5% fee increase
- Surcharge increase to pay for program reviews in the onsite septic system program
- Delete “or Structure”
- Fee Schedule to Table Format



Water Quality Program

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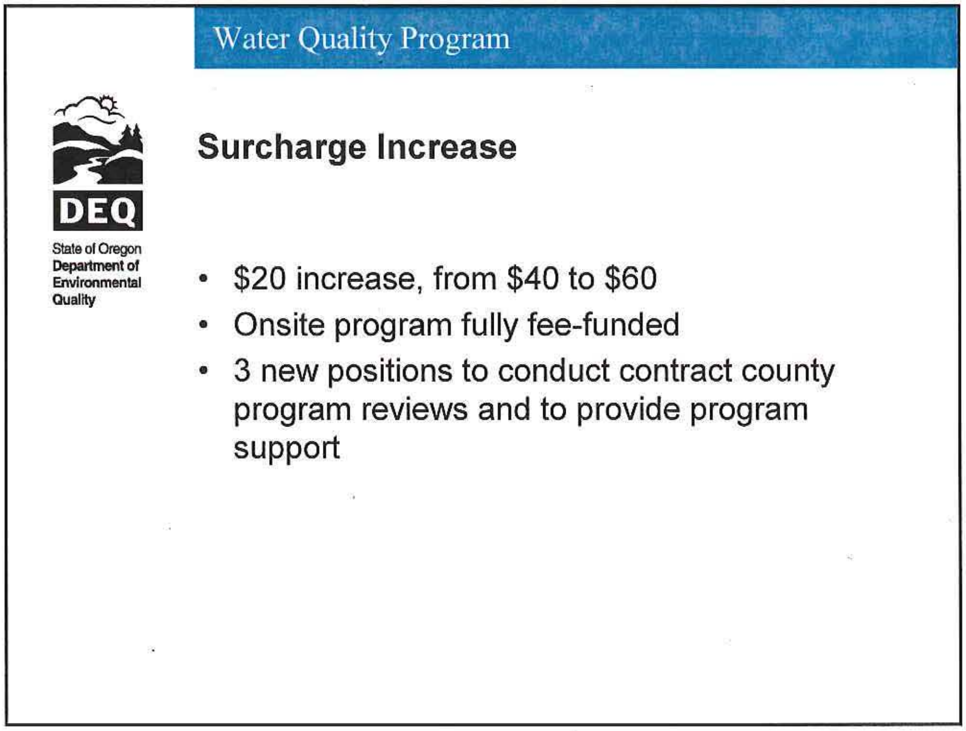
Environmental
Quality

3% and 5% Fee Increase

- Same increases as being proposed in the "Water Quality Permit Fee Increase" proposal addressing Division 45
- WPCF onsite system fees are located in Division 71; not Division 45
- All WPCF Onsite permit holders will have an 8% fee increase
  - Includes the 3% annual and 5% fee increase
  - Approximately 700 WPCF-Onsite permit holders



Water Quality Program

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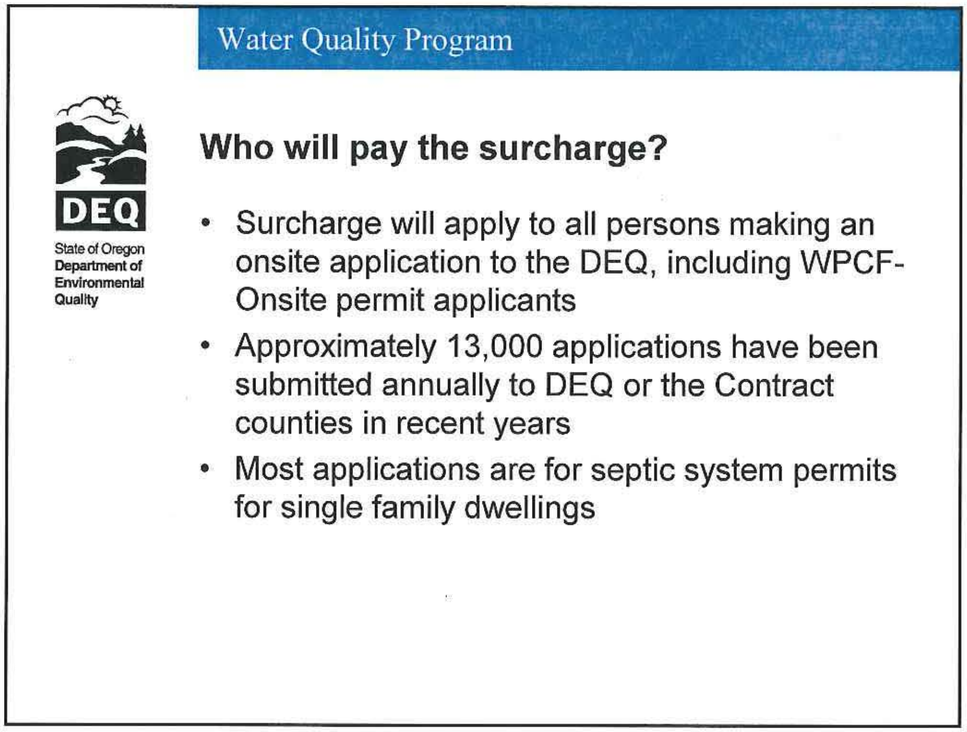
Environmental
Quality

Surcharge Increase

- $20 increase, from $40 to $60
- Onsite program fully fee-funded
- 3 new positions to conduct contract county program reviews and to provide program support

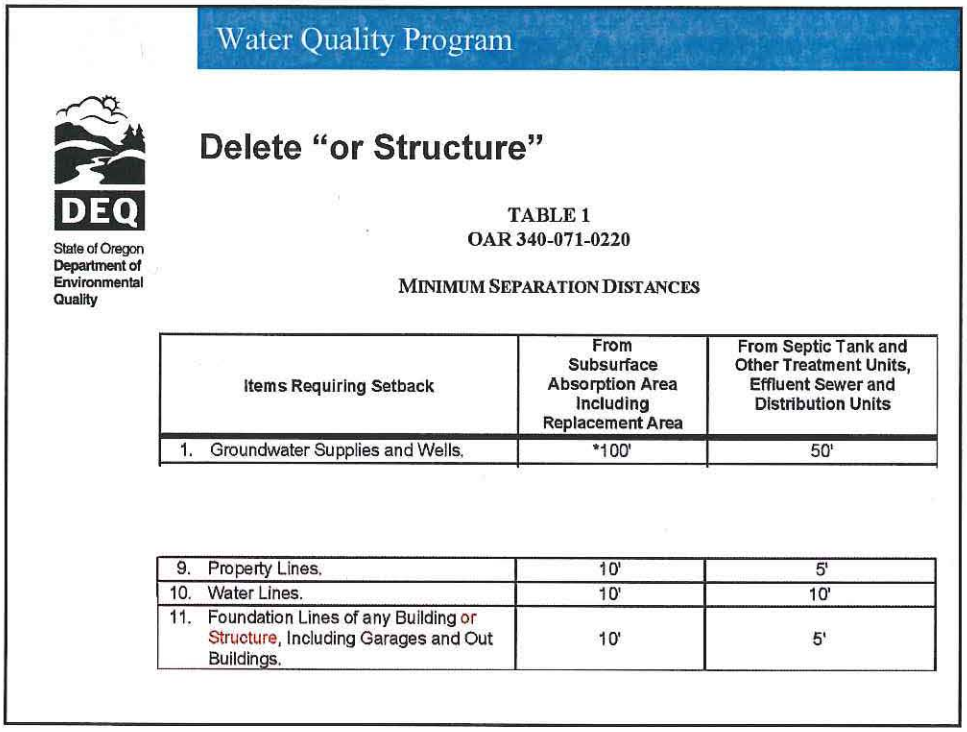


Water Quality Program

State of Oregon
Department of
Environmental
Quality

Who will pay the surcharge?

- Surcharge will apply to all persons making an onsite application to the DEQ, including WPCF-Onsite permit applicants
- Approximately 13,000 applications have been submitted annually to DEQ or the Contract counties in recent years
- Most applications are for septic system permits for single family dwellings



Water Quality Program

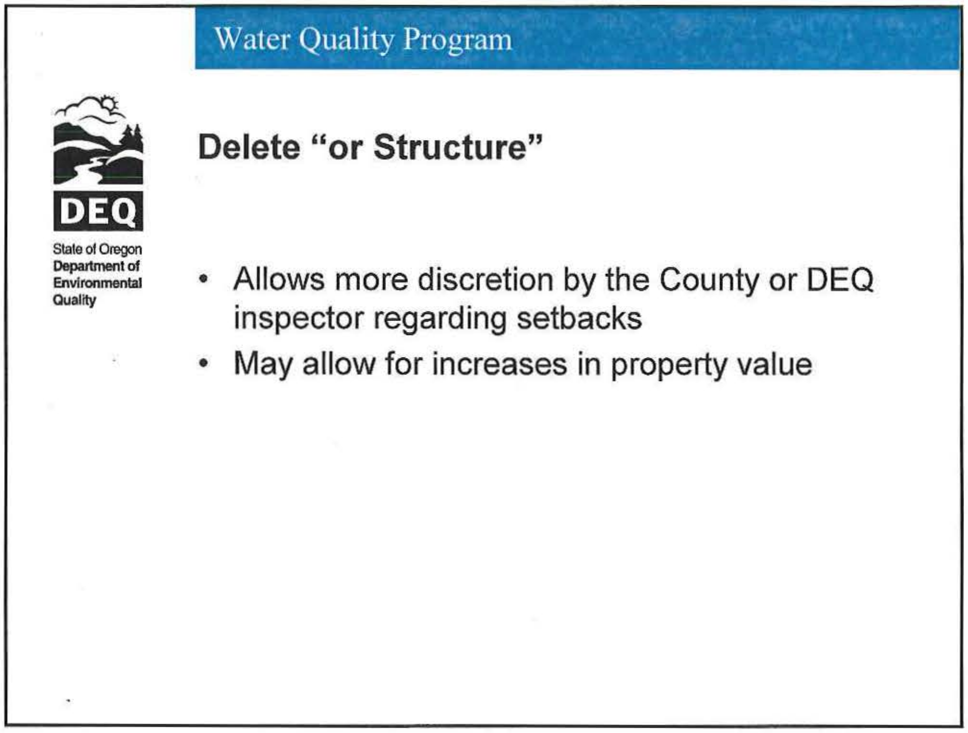
State of Oregon
Department of
Environmental
Quality

Delete "or Structure"

TABLE 1
OAR 340-071-0220

MINIMUM SEPARATION DISTANCES

Items Requiring Setback	From Subsurface Absorption Area Including Replacement Area	From Septic Tank and Other Treatment Units, Effluent Sewer and Distribution Units
1. Groundwater Supplies and Wells.	*100'	50'
9. Property Lines.	10'	5'
10. Water Lines.	10'	10'
11. Foundation Lines of any Building or Structure, Including Garages and Out Buildings.	10'	5'



Water Quality Program

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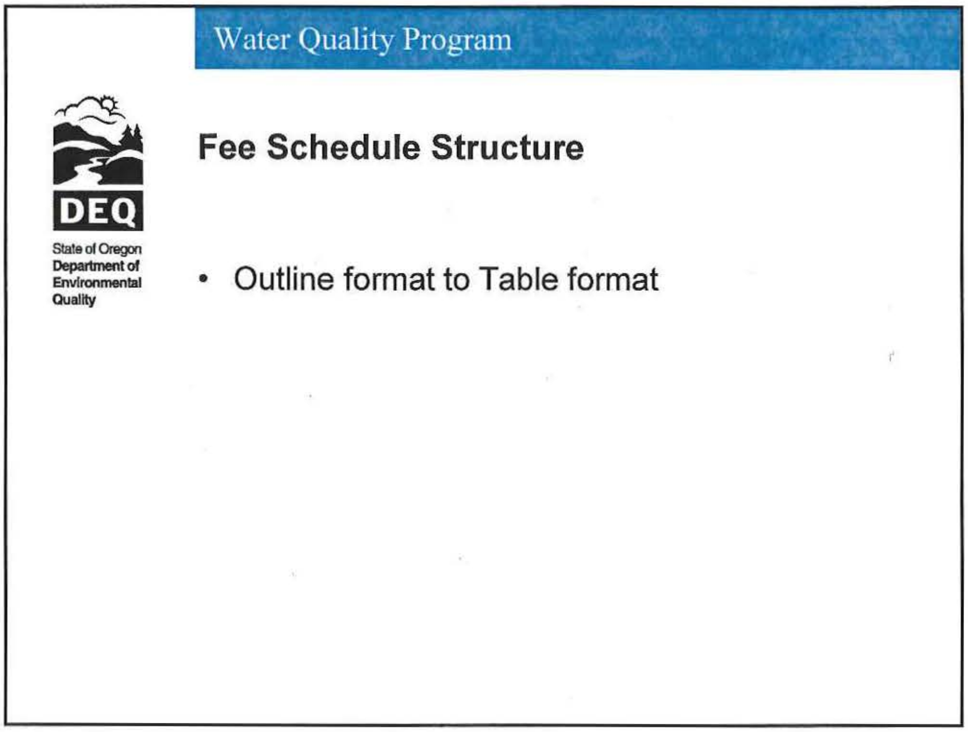
Delete “or Structure”

- Allows more discretion by the County or DEQ inspector regarding setbacks
- May allow for increases in property value



Water Quality Program

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Quality

Fee Schedule Structure

- Outline format to Table format

Water Quality Program

State of Oregon
Department of Environmental Quality

Outreach

- Technical Review Committee meeting
- Oregon Onsite Wastewater Association meeting
- Notified all affected WPCF-Onsite permit holders, all licensed sewage disposal service providers and interested parties of the proposed fee increases, via letters, postcards and email notification
- Five public hearings
- Sent out press releases for each public hearing

Water Quality Program

State of Oregon
Department of Environmental Quality

Public Comments

- Objection to fee increases in general due to lagging economy and already high fees
- Fees will be passed on to those who can least afford it
- DEQ's quality of service to me will not increase
- Small business has a hard time accepting any fee increases

Water Quality Program

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Quality

Recommendation

- The Department of Environmental Quality (DEQ) recommends that the Environmental Quality Commission (EQC) adopt the proposed amendments to OAR Division 71, as presented in Attachment A.

State of Oregon
Department of Environmental Quality Memorandum

Date: June 2, 2008

To: Environmental Quality Commission

From: Dick Pedersen, Acting Director

Subject: Agenda Item L, Informational Item: Electronics Recycling Law
June 19-20, 2008 EQC Meeting

Purpose of Item To inform the Environmental Quality Commission on progress in implementing Oregon's Electronics Recycling Law (House Bill 2626, ORS 495A.300-.365 and ORS 495.247), enacted in June 2007.

Background Oregon's Electronics Recycling Law creates and finances a statewide collection, transportation, and recycling system for desktop computers, portable computers, monitors, and televisions, referred to as covered electronic devices or CEDs. The system will provide free, convenient and environmentally sound recycling options for households, small businesses and nonprofits with 10 or fewer employees, and anyone giving seven or fewer CEDs to a collector at any one time.

Under the new system, beginning December 31, 2007, manufacturers of CEDs sold or offered for sale in Oregon must register with the Department of Environmental Quality and pay an annual registration fee to fund DEQ's administrative costs for the program. Manufacturers choose to manage their own statewide collection programs or participate in a state contractor program that DEQ will establish. Manufacturers cover their own manufacturer-run program costs or pay a recycling fee to participate in the state contractor program. All programs must be in operation by January 1, 2009, and the disposal of CEDs is prohibited in Oregon as of January 1, 2010. Beginning January 1, 2009, only registered brands are eligible for sale in or into Oregon.

DEQ convened the Electronics Recycling Program Advisory Workgroup in October 2007. The workgroup has been meeting regularly to develop procedures and guidelines to ensure the program is operational by January 1, 2009. The following are key implementation dates for the program.

Key Implementation Dates	
October - December '07	Manufacturers register for 2008
May '08	DEQ posts final tier placements for 2008 registration fees on website; sends to manufacturers
May '08	DEQ posts return share/return share by weight obligations for 2009 on website; sends to manufacturers
July '08	DAS/DEQ award contract for state contractor program
July '08	Manufacturers pay annual registration fee for 2008 program administration
July '08	Manufacturers submit manufacturer plans or remain in state contractor program for 2009
September '08	Manufacturers in state contractor program pay recycling fee for 2009
January '09	Electronics recycling programs begin operating ▪ Sales restrictions take effect ▪ Retailers provide recycling information to consumers
January '10	Disposal ban takes effect

Key Issues

As intended by the Legislature, DEQ is working collaboratively with stakeholders to implement the startup program without rules. DEQ and the advisory workgroup have developed procedures and guidelines for the first year of operations. Three issues, which have been resolved, challenged the process:

- Determining the total weight of CEDs to be collected in 2009;
- Collecting computers for reuse; and
- Lack of a process to appeal decisions made by the workgroup or DEQ.

Next Steps

Starting in August 2008, DEQ and the workgroup will focus on ensuring regular reporting and accountability for the state contractor program and manufacturer programs, approving manufacturer plans, developing compliance strategies, and launching a comprehensive education and outreach campaign to promote the new electronics recycling program to the public.

EQC Involvement

DEQ expects to develop rules to support the electronics recycling program based on experience gained during initial operations. Over the next year, DEQ will evaluate the need and timing for that rulemaking. DEQ will continue to update the EQC as the new program develops.

Attachments

A. List of Electronics Recycling Program Advisory Workgroup members
B. Description of Electronics Recycling Program Implementation
C. Schematic of the Electronics Recycling Program

Available Upon Request

The following program information is available at: http://www.deq.state.or.us/lq/electronics.htm.

- Electronics Recycling Law
- Manufacturer Return Shares for 2009
- Manufacture Market Share Tiers for 2008 registration fees

The following program information is available upon request:

- Environmentally Sound Management Practices for Collection, Transportation, and Recycling
- Collection Service Standards
- Manufacturer Plan Guidance
- Education and Outreach Plan

Approved:

Section: Loretta Pickerell

Division: Wendy Wil

Report Prepared By: E-Waste Team

Phone: Kathy Kiwala, 503-229-6103

Attachment A

Oregon DEQ
Electronics Recycling Program Advisory Workgroup

NAME	ENTITY	REPRESENTING
Jeremiah Baumann	Environment Oregon	Environmental Groups
Alison Briggs	Free Geek	Collectors/Reuse
Jim Craven	American Electronics Association (AEA)	National Association
Katy Daily	Recycling Advocates	Environmental Groups
Lee Fortier	Rogue Waste Systems	Oregon Refuse and Recycling Association (ORRA)
Bill Goman	Goodwill Industries	Collectors/Reuse
Becky Jarvis	Electronics Unlimited	Small Retailers
Lorraine Kerwood	NextStep Recycling	Collectors/Reuse
Larry King	Hewlett Packard	Manufacturers
Scott Klag	Metro	Local Governments
Craig Lorch	Total Reclaim	Processors/ Recyclers
Frank Marella	Sharp Electronics	Manufacturers
Bailey Payne	Marion County	Local Governments
Tim Rocak	Garten Services, Inc.	Processors/ Recyclers
Greg Sampson	Consultant	Processors/ Recyclers

Attachment B

Description of Electronics Recycling Program Implementation

Stakeholder involvement

To meet aggressive deadlines for start up, the Legislature intended DEQ to implement the Electronics Recycling Law without first going through rulemaking. This has put a premium on collaboration among stakeholders for first-year implementation.

Since October 2007, DEQ staff have been working closely with a stakeholder workgroup whose members represent electronics manufacturers, collectors, recyclers, reuse organizations, retailers, solid waste disposal industry, environmental groups, and local governments. (A list of the Electronics Recycling Program Advisory Workgroup members is provided in Attachment A). Several other stakeholders have also participated in these meetings. The workgroup has met seven times, and subcommittees of workgroup members and others have worked on environmentally sound management practices, reuse, collection system standards, and other difficult issues. With these stakeholders, DEQ has developed the framework for the program and processes and guidance documents to implement it (e.g., fee billing, accounting, and data management systems; environmentally sound management practices for collection and recycling; guidance for manufacturer plans; and education and outreach). The program is on track to begin collecting and recycling CEDs in January 2009.

Registration

The law requires manufacturers of CEDs sold or offered for sale in Oregon or collected in this program to register with the DEQ and pay an annual registration fee to fund DEQ's costs for administering the program (e.g., program startup, manufacturer registration, return share determinations, outreach and education, and compliance oversight, but not costs associated with the state contractor program). Manufacturers identify their brands as part of their registration. DEQ's first task was to develop a registration process, database, and materials for manufacturers to register by December 2007. To date, 143 manufacturers have registered, and DEQ is pursuing 50 additional manufacturers whom staff believe are required to register.

In March, DEQ assigned manufacturers to registration fee tiers established in the statute based on their market shares of CEDs sold in or into Oregon, and in May sent invoices for the 2008 registration fees due July 1[1]. Registration fee billings are on target with revenue projections.

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[1] Registration fees in the law range from $40 for manufacturers selling less than 0.01% of CEDs sold in Oregon the previous year to $15,000 for manufacturers whose market shares are 1% or more. For 2012 and beyond, the EQC may modify the registration fees so that revenue matches DEQ's administrative costs. Manufacturers' registration tier assignments for 2008 are found at: http://www.deq.state.or.us/lq/electronics.htm.

Beginning in January 2009, only brands of CEDs registered with DEQ can be sold in or into Oregon. DEQ maintains a list of registered brands on its web site so that retailers can easily determine whether a brand is registered.

Collection services

The state contractor and manufacturer programs must provide free and convenient collection service in every county and at least one collection site for any city with 10,000 or more people. Collection sites must be staffed and open to the public at frequencies that meet the needs of the area being served and must collect all types and brands of CEDs. Collection System Standards developed for the program describe minimum service to be provided.

Programs may provide collection service jointly. The state contractor program will use existing sites where possible (e.g., retailers; non-profit organizations; transfer stations; or drop-off centers). Services such as collection events or mail back programs may also be used. To promote reuse, the state contractor program will include reuse organizations as part of the collection system.

Recycling obligations

Each year DEQ determines the minimum amount of CEDs to be recycled the following year. In May, DEQ and the workgroup agreed on the minimum amount of CEDs to be recycled in 2009: 3.3 lbs/Oregonian for a total of 12,210,000 pounds. This estimate is lower than the range DEQ staff and a peer review group had recommended, but in line with first year performance for electronic recycling programs in other states.

DEQ uses the minimum weight of CEDs to be recycled each year to determine each manufacturer's recycling obligation for that year. The recycling obligation is the minimum percentage (return share) and the minimum total weight (return share by weight) of CEDs assigned to each registered manufacturer.[2] Each manufacturer program is responsible for recycling, at minimum, the total return shares by weight of all manufacturers participating in that program. Manufacturer programs not meeting their return share obligations pay fees to DEQ at a rate equal to the costs of recycling the unmet obligation in the state contractor program plus 10%.

Manufacturers in the state contractor program meet their return share obligations by paying recycling fees to cover the costs of the state program. Computer manufacturers in the state program pay fees to cover their collective return share by weight obligation based on their return shares. TV manufacturers in the state program pay fees to cover

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[2] A manufacturer's return share for a given year is the percentage by weight of all brands of CEDs collected the previous year that belong to that manufacturer. The return share by weight is the total weight of all CEDs to be collected the following year that that percentage represents. For 2008 and 2009, DEQ will use the best available recycling data for CEDs in the U.S. to calculate the return share for each manufacturer. Thereafter, DEQ will use annual sampling data from Oregon's program.

their collective return share by weight obligation based on their market shares of TVs sold in Oregon the previous year.[3]

Return share obligations are minimum requirements. Even after return share obligations are met, all programs must continue to provide statewide collection services throughout the year in accordance with their plans and pay for ongoing collection and recycling.

DEQ notified manufacturers of their return share obligations for 2009 in May 2008. By July 1, manufacturers choosing to implement their own programs must submit plans to DEQ for approval or remain in the state contractor program for 2009.[4] In mid-July, DEQ will bill manufacturers participating in the state contractor program for the 2009 recycling program fees

Environmentally sound management practices

CEDs contain toxic materials that can be harmful to human health and the environment. To help ensure CEDs are managed safely, DEQ and the workgroup developed guidelines for environmentally sound management practices (EMPs) for collectors, transporters, and recyclers. The EMPs include procedures for ensuring these service providers, including downstream processors, follow safe management practices. The state contractor program will follow the EMP guidelines. Manufacturers must demonstrate in their plans that they will follow the EMP guidelines or alternative practices that are similarly protective. DEQ will require manufacturers and the state contractor to report on compliance with management practices under their programs.

Managed services contract

DEQ is working with DAS to select a managed-services contractor to establish and manage through subcontracts the collection, transportation, and recycling services for the state contractor program. A Request for Information was issued in July 2007 and a Request for Proposal in February 2008. DEQ expects to award a 3.5 year contract by July 1, 2008. Recycling fees from participating manufacturers will cover the costs of operating the state contractor program, expected to be between $3.5-6 million per year.

In September 2008, DEQ will request the Emergency Board of the Legislature for budget limitation to allow DEQ to spend recycling fees to fund the state contractor program through June 2009. The law did not authorize this limitation when passed because state contractor program costs could not be reasonably estimated at that time.

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[3] A TV manufacturer is any manufacturer that sells more TVs than computers and monitors in a given year. TV manufacturers successfully lobbied to have the recycling fees for their collective share of state contractor program costs allocated among themselves based on their market shares for TVs.

[4] A manufacturer whose return share is less than 5 percent must participate in the state program or join a manufacturer group plan with return shares of participating manufacturers totaling at least 5 percent.

Education and outreach

DEQ has drafted an education and outreach plan for the program and has been developing outreach materials such as the "Digital TV fact sheet," issuing press releases, and informing manufacturers and retailers of their outreach responsibilities. We are participating on the Outreach Campaign Committee for Washington's electronics recycling program to coordinate activities such as messaging and branding as appropriate. Staff will also evaluate the feasibility of a statewide hotline and an interactive web site for locating recycling opportunities around the state. DEQ will also be working with retailers to develop materials they can use to inform consumers about where to recycle CEDs. Retailers are required to provide this information at the point of sale beginning in January 2009.

Reporting and oversight

The state contractor will report monthly and the manufacturer programs annually to DEQ on program status and accomplishments, including:

- Weight of CEDs collected and recycled and locations of collection and recycling
- Monitoring of environmental management practices of service providers
- Outreach activities
- Location and availability of collection sites and services

DEQ will target oversight to ensure uniform compliance and a level playing field for manufacturers and environmentally sound management of CEDs. Oversight will focus on these key areas:

- Manufacturer registration and brand sales in Oregon
- Environmental management practices
- Measurement of returns

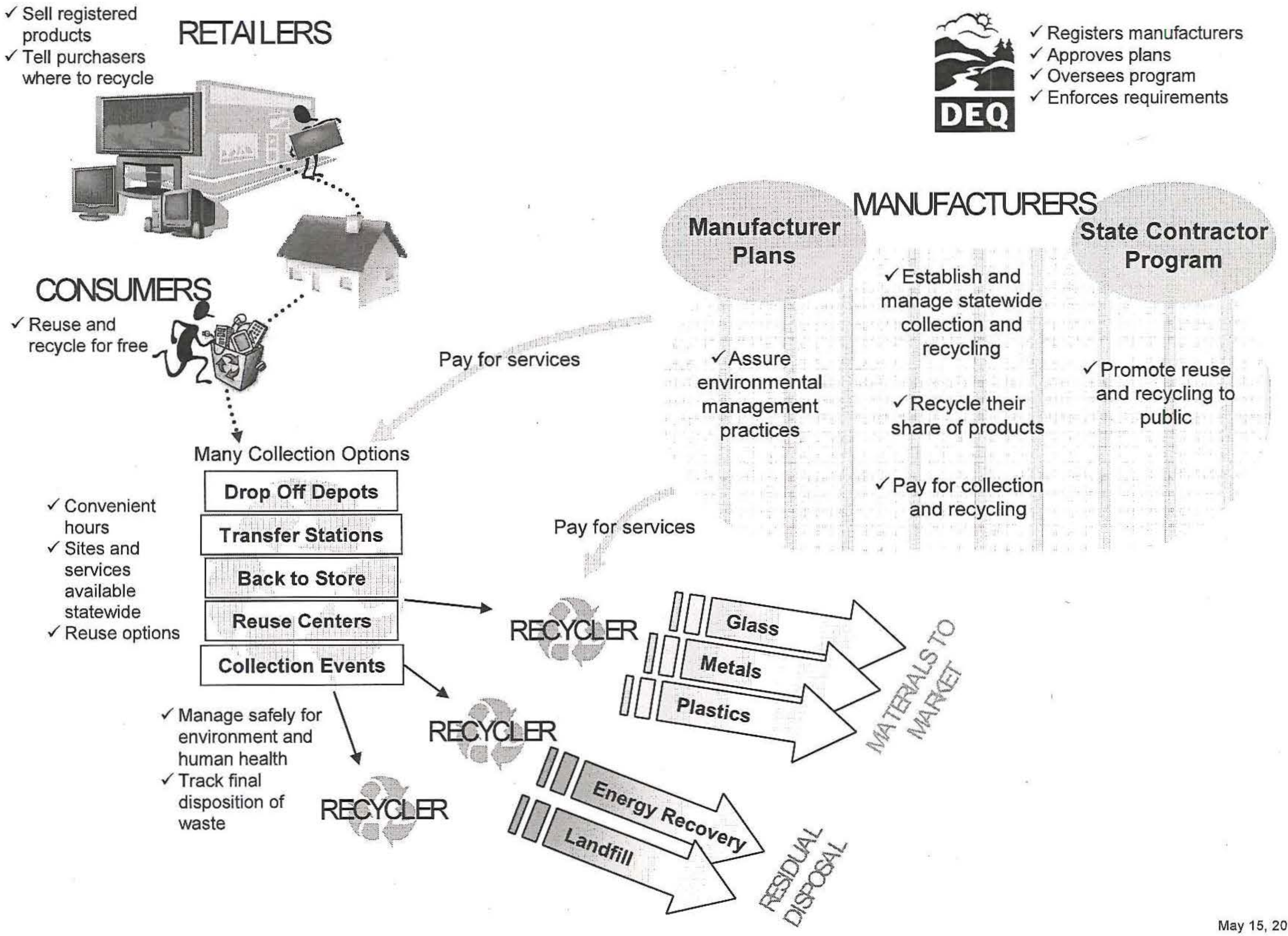
Measuring program outcomes

DEQ will discuss performance measures with the workgroup this fall. Examples of measures being considered include:

- Programs are fully operational and available to the public by January 2009
- Consumers are well informed and collection opportunities meet their needs
- All manufacturers that have return shares or are selling products in Oregon are registered
- Collection and recycling follow environmental sound management practices
- Programs meet total collections targeted for 2009
- Programs meet targeted energy and greenhouse gas emissions reductions.

Attachment C

Oregon Electronics Recycling Program



RETAILERS

✓ Sell registered products
✓ Tell purchasers where to recycle

DEQ

✓ Registers manufacturers
✓ Approves plans
✓ Oversees program
✓ Enforces requirements

MANUFACTURERS

Manufacturer Plans

✓ Assure environmental management practices

✓ Establish and manage statewide collection and recycling

✓ Recycle their share of products

✓ Pay for collection and recycling

State Contractor Program

✓ Promote reuse and recycling to public

CONSUMERS

✓ Reuse and recycle for free

Pay for services

Many Collection Options

- **Drop Off Depots**
- **Transfer Stations**
- **Back to Store**
- **Reuse Centers**
- **Collection Events**

✓ Convenient hours
✓ Sites and services available statewide
✓ Reuse options

Pay for services

RECYCLER

Glass
Metals
Plastics

MATERIALS TO MARKET

RECYCLER

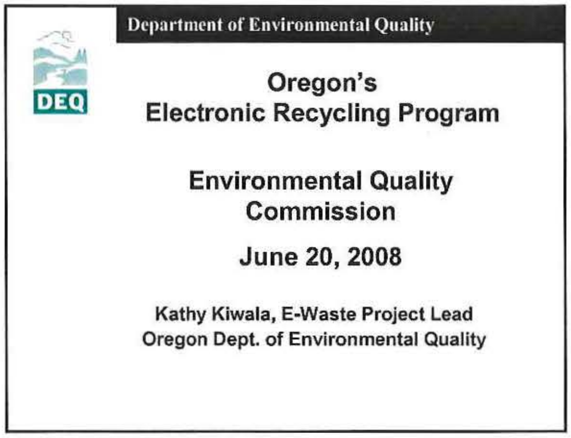
Energy Recovery
Landfill

RESIDUAL DISPOSAL

RECYCLER

✓ Manage safely for environment and human health
✓ Track final disposition of waste

Item L
Presentation


Department of Environmental Quality

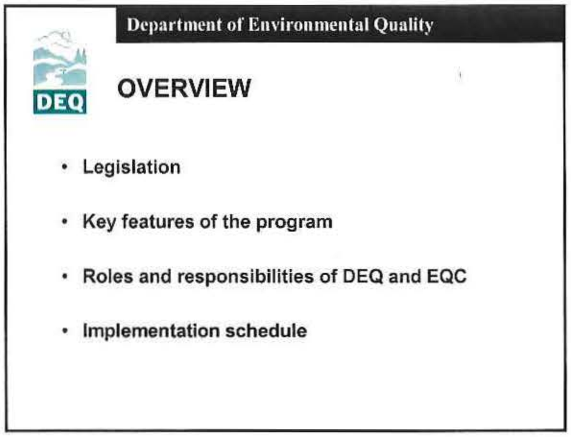
DEQ

Oregon's
Electronic Recycling Program

Environmental Quality Commission

June 20, 2008

Kathy Kiwala, E-Waste Project Lead
Oregon Dept. of Environmental Quality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OVERVIEW

- Legislation
- Key features of the program
- Roles and responsibilities of DEQ and EQC
- Implementation schedule


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LEGISLATION

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The Problem

- Wider variety of products
- Shortened lifespan
- A variety of toxic constituents
- Growing waste stream
- Wasted resources

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DEQ

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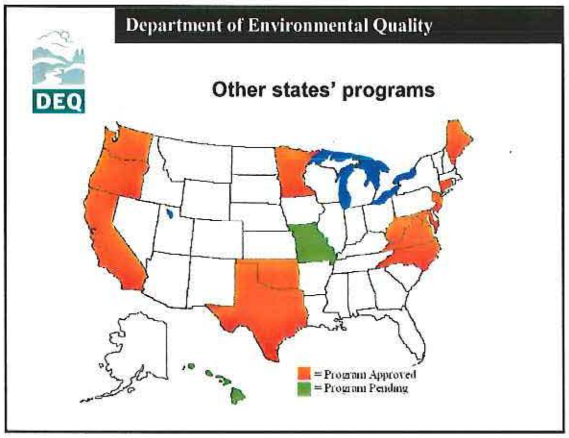
DEQ

The solution: 2007 legislation

- Creates a statewide system for the collection, transportation, and recycling of TVs, monitors & computers
- Uses product stewardship model: manufacturers responsible for system and financing of programs
- Sets standards for environmentally sound management practices
- Requires education of consumers
- Restricts sales and bans disposal



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Other states' programs

🟥 = Program Approved

🟩 = Program Pending

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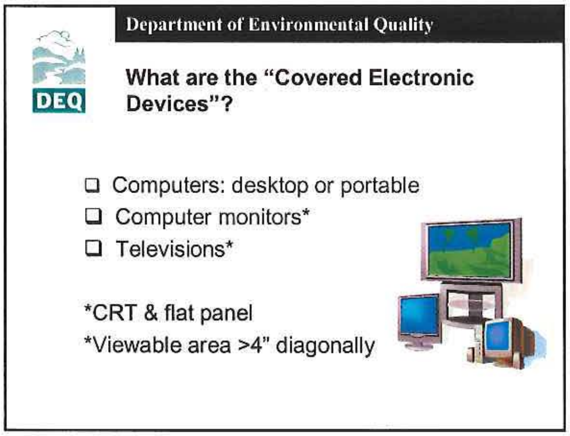
KEY FEATURES OF THE PROGRAM



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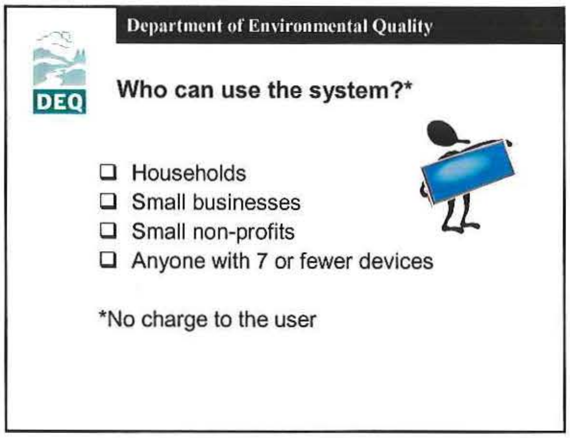
What are the "Covered Electronic Devices"?

- ☐ Computers: desktop or portable
- ☐ Computer monitors*
- ☐ Televisions*

*CRT & flat panel

*Viewable area >4" diagonally



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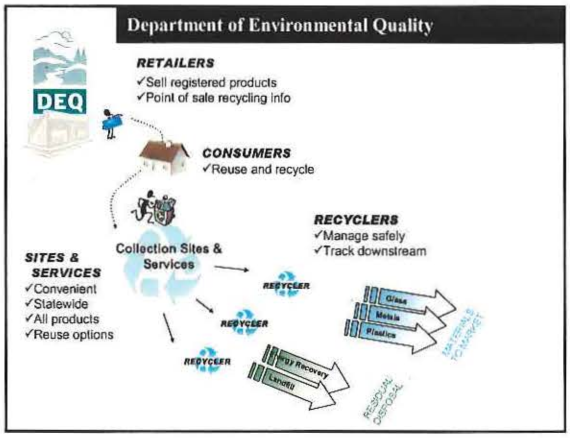
Who can use the system?*

- ☐ Households
- ☐ Small businesses
- ☐ Small non-profits
- ☐ Anyone with 7 or fewer devices

*No charge to the user



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RETAILERS
✓Sell registered products
✓Point of sale recycling info

CONSUMERS
✓Reuse and recycle

RECYCLERS
✓Manage safely
✓Track downstream

SITES & SERVICES
✓Convenient
✓Statewide
✓All products
✓Reuse options

Collection Sites & Services

Department of Environmental Quality

DEQ

Collection sites and services

Collection site—at least one site for any city with population of at least 10,000

Collection service—every county (can be same site for a city in the county)

Collection System Standards include convenient, staffed, frequent hours

Use of existing infrastructure

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DEQ

Environmentally Sound Management Practices*

Examples of recyclers' practices

- Environmental, health, and safety management systems
- Recordkeeping
- Onsite operating practices
- Downstream due diligence
- Data sanitization/destruction
- Closure plan and financial assurance
- Facility security

*For collectors, transporters and recyclers

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Manufacturers

- Manufacturer responsibility
- Sales restrictions
- Portioning of responsibility to manufacturers
- Recycling program options: manufacturer or state contractor
- Performance accountability

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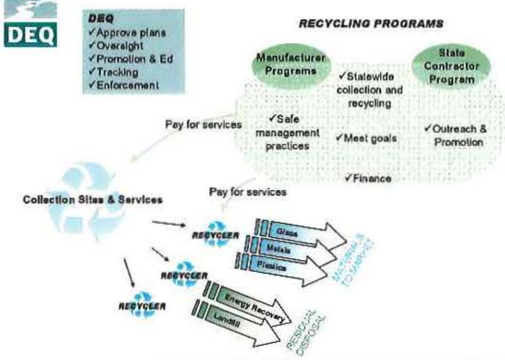

DEQ
- ✓Approve plans
- ✓Oversight
- ✓Promotion & Ed
- ✓Tracking
- ✓Enforcement

RECYCLING PROGRAMS

Manufacturer Programs

State Contractor Program

✓Statewide collection and recycling

✓Safe management practices

✓Meet goals

✓Outreach & Promotion

✓Finance

Pay for services

Pay for services

Collection Sites & Services

Department of Environmental Quality

ROLES OF DEQ AND EQC

Department of Environmental Quality

DEQ

Roles and Responsibilities

- Registers manufacturers & collect fees—DEQ
- Updates brand & manufacturer list monthly—DEQ
- Administers contract for state contractor program—DEQ
- Approves manufacturers' plans and reports—DEQ
- Develops outreach and education—DEQ
- Oversees program & enforcement—DEQ & EQC
- Undertakes (future) rulemaking—DEQ & EQC

Department of Environmental Quality

DEQ

IMPLEMENTATION SCHEDULE

Department of Environmental Quality

DEQ

IMPLEMENTATION: Completed

- Set up registration process & completed first cycle
- Developed Environmental Management Practices
- Established Collection System Standards
- Developed Guide for Manufacturer Plans
- Issued RFP & awarded contract for state contractor
- Set up website and developed materials
- Calculated return share numbers for manufacturers
- Working on reuse opportunities…
- Advisory Work Group, subcommittees…

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IMPLEMENTATION: Coming soon

- Education & outreach:
  website, info line, handouts, templates
- Enforcement strategies
- Disposal ban preparation
- Program plans approved
- Sampling strategy for returns developed
- Work on reuse strategy
- Ongoing Advisory Work Group, subcommittees

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IMPLEMENTATION TIMELINE

☐	July 2008:	Manufacturer decide on program Registration fees due
☐	July 2008	Contract awarded for state program
☐	January 2009:	Collection & recycling launches Only registered brands can be sold
☐	January 2010	Disposal Ban is effective

Department of Environmental Quality

DEQ E-TEAM

- Kathy Kiwala, 503.229.6103
- Jan Whitworth, 503.229.6434
- Amy Roth, 503.229.6303
- Kelly Panciera, 503.229.5830

Website for Electronics Recycling Program
www.oregon.gov/DEQ//lq/electronics.htm

State of Oregon

Department of Environmental Quality Memorandum

Date: June 2, 2008

To: Environmental Quality Commission

From: Dick Pedersen, Acting Director

Subject: Agenda Item N, Informational Item: Draft 2009 Legislative Agenda
June 19-20, 2008 EQC Meeting

Purpose of Item The purpose of this agenda item is to seek concurrence from the Environmental Quality Commission about the Department of Environmental Quality's 2009-11 Agency Request Budget to submit the budget numbers to the Department of Administrative Services for audit by June 30, 2008. This presentation includes updates on the draft legislative concepts and budget policy packages, as well as an overview of the key issues for the base budget (non-policy package components) for 2009-11.

Background DEQ staff presented the draft DEQ budget policy packages and legislative concepts for the 2009 Legislative Agenda at the April EQC meeting. The information included a listing of legislative concepts and budget policy packages and preliminary ranking of General Fund policy packages. Taking into consideration the EQC's comments from the April meeting, staff have further developed these concepts into better-defined packages.

Every two years, state agencies must develop legislative concepts and budget policy packages as part of the legislative and budget development process. The October 2007 Strategic Planning discussion was considered the beginning of the development of the 2009 Legislative agenda. This development process will continue throughout 2008 in preparation for the 2009 Legislative Session. Key deadlines in this process include the following:

- Submittal of draft legislative concepts to DAS on April 4, 2008
- Submittal of the Agency Request Budget on September 1, 2008 to DAS and the Governor's Office. This submittal includes the base budget and the budget policy packages.

EQC Involvement

At each of the 2008 EQC meetings, DEQ plans to bring updates to the EQC and seek its input on the development of the 2009 legislative concepts and agenda budget policy packages and the base budget.

The June meeting will allow the EQC a last chance to review and comment on the budget request before it is submitted to DAS for audit.

At the August 2008 meeting, the EQC chair will need to certify the 2009-11 Agency Request Budget for submittal to DAS and the Governor's Office on September 1, 2008.

Attachments

A. Draft ranking of policy packages in priority order.

Approved:

Section: Gregory K. Aldrich

Report Prepared By: Gregory K. Aldrich

Phone: (503) 229-6345

DRAFT 2009 LEGISLATIVE AGENDA

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Climate Change Theme								
110 Climate Change: Greenhouse Gas Reduction (PP, LC) [AQ-1]	HB 3543 established state Greenhouse Gas (GHG) reduction goals to address severe environmental, health and economic impacts of global warming. The Governor has joined the Western Climate Initiative - which is developing a cap and trade program to reduce GHG emissions - and has asked the Environmental Quality Commission (EQC) to adopt GHG reporting rules as a next step.	The DEQ LC will provide authority for EQC to adopt a cap and trade program, fill gaps in EQC's authority to require GHG emission reporting, add fees to fund the cap and trade and reporting work, and add authority to adopt other GHG emission reduction measures and incentives. While the package requests 10.5 FTE in total, the GF portion is 3.0 FTE. GF would support a manager for the Climate Change section, 1 FTE for GHG reduction planning (beyond cap and trade) and a policy analyst to work with EPA, regional, national and international organizations on policies to meet GHG reduction goals. The GF request would also include funding for dues to the Western Climate Initiative (WCI) and The Climate Registry (TCR) $50-$100K, contract dollars for database development $250K, DOJ resources $50K and $115 K to support similar activities for LRAPA.	N	10.5 (inc WQ & LQ FTE)	7.5 OF, 3.0 GF	GF - $920K, OF - $1,404K	GF/OF	HQ: .5 NRS2, 3 NRS3, 1 NRS 4, 1 OS2, 2 NRS 2, 1 ISS4, 1 OPA4, 1 PEME
162- Water Quality Review for ASR Projects [WQ-6]	Intensive water use in the Umatilla Basin, primarily for high value agriculture, has led to serious depletion of the deep basalt aquifers and declines in water quality in the shallow alluvial aquifers. This area has been declared a Critical Groundwater Area by WRD and is a Groundwater Management Area (established by DEQ). Proposals for Aquifer Storage and Recovery (ASR) projects are being developed. More resources are needed to fully engage in the proactive regional planning of these projects.	The purpose of this package is to allow DEQ to work with WRD, agricultural and other stakeholders to ensure that future ASR and AR projects don't result in further degradation of shallow groundwater quality, but rather restore water quantity in depleted deep aquifers while simultaneously improving shallow aquifer quality.		1	1	GF - $196k	GF	ER: NRS3
LQ-1 Bottle Bill Changes (LC Only)	The task force is currently meeting to discuss further changes to the bottle bill law. Those issues include whether the statute should be expanded for additional items, the amount of the redemption, whether recycling should occur at retail locations or some other place, etc. Given the visibility of this law, DEQ should have a legislative "placeholder" for the 2009 session.	Placeholder for possible 2009 legislation.					TBD	

DRAFT 2009 LEGISLATIVE AGENDA

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Toxics Theme								
121- Ongoing Implementation of Senate Bill 737 [WQ-1]	SB 737, among other elements, requires Oregon's 52 large municipal wastewater treatment plants to develop plans by 2011 to reduce persistent pollutants through pollution prevention and toxics reduction. Through the fiscal impact statement of SB 737, DEQ told the 2007 Legislature and stakeholders that we would need to ask for additional resources during the 2009 Legislative session to support the ongoing work and associated Department of Justice costs for this program. In addition, this package will also include restoration funds to cover the work in year two (July 2009-June 2010) of the project to develop a report to the Legislature on Oregon's priority persistent pollutants that the fees will not cover due to increase in costs.	The purpose of this package is to be able to fully implement SB 737 and cover the cost of project Attorney General costs. DEQ will need a permanent position to conduct the following ongoing work: • Rulemaking • Responding to public inquiries and requests for documents and information about permits and persistent pollutants. • Assisting permit writers in reviewing plans submitted by permittees during the permit renewal or issuance process and incorporating the plans into permits. • Adopting a schedule, developing persistent pollutant report updates, and updating the priority list of persistent pollutants. This will include regular informational updates to the EQC and reporting to the legislature on a schedule to be developed by DEQ. This position will have to consult with interested parties and may lead advisory committees. • $30,000 of projected Attorney Generals costs. • A General Fund "restoration" that covers the increased costs of the LD positions that the surcharge will be short by.		1 FT +2LD/ Part Time	1 + 2 LD	GF - $316k; OF - $178k	GF (LD positions are from OF)	HQ: 1 NRS4, 2 LD NRS4
132 - Producer Responsibility for Waste Products (PP, LC) [LQ-2]	Some products have unique waste management challenges. They contain toxics or multiple materials, making them costly and difficult to recycle or safely dispose of in the traditional waste management system. As a result, the public lacks convenient and safe recycling or disposal options. This increases the risk of mismanagement and human health / environment impacts. Finally, where these products are handled through the current system, local governments and ratepayers bear the fiscal burden.	The legislative concept requires that manufacturers rather than local governments manage specified products so as to enhance the opportunities for recycling or safe disposal. Under this proposal, the Legislature would define the statutory criteria and stakeholder process for DEQ to use to identify the appropriate products or product categories. The EQC would make the final determination on any staff recommendations based on the statutory criteria. Specified products could not be sold unless DEQ approved the manufacturer's plan for the collection, recycling or safe disposal of these products. Initially, existing funding would used to set up the program and support 2 FTEs (i.e., one program lead and one supporting position). Later, manufacturer fees could provide the necessary funding. This proposal could be coupled with pharmaceutical "take-back" legislation currently under discussion.		1.83	1.83	OF - $281	OF (existing fees)	HQ - 1 NRS3, 1 PA1

DRAFT 2009 LEGISLATIVE AGENDA

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
153 - Toxic Chemical Reduction (PP) [CP-1]	Current programs do not address all aspects of toxics control, including the lack of information, the fact that toxics are not "point source" pollutants and thus spread in a diffuse manner, and the significant volume of chemicals entering the marketplace. While all of DEQ's major programs address toxics, there is no agency-wide approach as DEQ lacks the resources to integrate toxics reduction actions across all environmental media (air, water, land). Finally, there are no resources to implement an "upstream" strategy to fill the gaps in the existing regulatory system.	This package proposes to develop and implement an integrated, cross-media toxics reduction strategy with an emphasis on "upstream" measures. One FTE would work to integrate, enhance and prioritize existing toxics reduction efforts (e.g., SB 737, Portland Air Toxics Reduction Plan, etc.). This position would also coordinate DEQ activities with other state agencies and stakeholders. A second FTE would develop and implement an "upstream" strategy to fill the gaps in the current regulatory approaches to toxics. This strategy would likely encompass the following measures to reduce the toxicity of chemicals, fuels, and products used in Oregon: toxic chemical information and data disclosure; evaluation and prioritization of toxics; research and promotion of alternatives; and development of regulatory controls. Upon completion of the "upstream" strategy, the 0.5 FTE would assist in implementation.		2.5	2.5	GF - $485	GF	HQ - 1 NRS4, 2 NRS2s
129- Pesticide Stewardship Partnerships (PP) [WQ-10]	In 2000, DEQ and other organizations initiated a Pesticide Stewardship Partnership (PSP) project, designed to use surface water monitoring data to focus the implementation of voluntary best management practices. This collaborative approach resulted in decreases in average pesticide concentrations over time. Due to the success of the Hood River project, PSPs were launched in five other watersheds in the state. There is growing interest in expanding the PSPs to include more watersheds, pesticides and land uses. However, all of the current projects are funded by small, competitive grants, and a more stable source funding is needed to maintain and expand the projects.	This proposed package would support DEQ's efforts by providing stable resources to implement the following activities: • Collect surface water samples in the 5 watersheds where PSPs are now operating and add 3 new watersheds: 1 focus on surface water, 1 focus groundwater, and the other to target an area that will likely have both surface and groundwater concerns. • Conduct laboratory analyses for an expanded list of pesticides that includes a range of herbicides, insecticides, and fungicides that are commonly used in the selected watersheds. • Interpret and evaluate pesticide data, and develop reports, presentations and outreach materials that facilitate the effective communication of the data results to local stakeholders. • Evaluate and propose best management practices for pesticide users in specific watersheds that are designed to reduce pesticide drift, runoff or toxicity.		5	5	GF - $1,102k	GF	Lab: 1 NRS4, 1 NRS2; 1 Chem1; and 1 Chem3 HQ: 1 NRS3
129 - Continued		• Coordinate and implement outreach and technical assistance activities for pesticide users that lead to the reduction of pesticide concentrations. • Provide appropriate level of Quality Assurance for all surface and groundwater samples taken • Fund 4 Pesticide Collection Events ($80,000).						

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
111 Heat Smart for Clean Air (PP, LC) [AQ-2]	Residential heating with old, uncertified woodstoves releases fine particles and air toxics such as benzene that contribute to a myriad of human health effects. Heat Smart is a critical component of plans to meet and maintain the federal fine particulate standard and meet state air toxics benchmarks.	The LC will establish a grant and loan program to remove old, uncertified woodstoves and replace them with new, cleaner alternatives, require the removal of uncertified woodstoves upon home sale and provide authority for the EQC to update Oregon woodstove standards. Policy package/bill fiscal requests GF for .5 FTE phased-in to implement grant program and $50K to get the grant fund started. The balance of the grant funding, approx $400K would come from open burning and asbestos penalties.	N	0.25	.25 GF	GF- $100K, OF - $400K	GF & OF	HQ - .5 (phase-in) PA 1
117 Smoke Program Coordination (PP, LC) [AQ-9]	Reducing burning is a key strategy to improve air quality in Oregon.	The LC will phase down field burning in the Willamette Valley over several years as new alternatives to burning (such as use of grass straw for fuel or power) are developed. The LC will include a process for EQC to allow more acres to be burned than otherwise permitted in a given year upon a demonstration that viable alternatives are not yet available. The LC would also direct DEQ to provide support and coordination for open burning and smoke management programs. Bill fiscal/policy package adds 2 FTE for the coordination function.	N	2.0	2.0	GF - $345K	GF	Location HQ, 2 NRS2
131 - Emergency Preparedness and Response (PP) [LQ-3]	Currently, DEQ lacks a local presence in each region to engage local governments and other stakeholders in the necessary planning and coordination for effective emergency preparedness. Additionally, the existing DEQ staff available for emergency response has limited capacity for regional outreach.	This policy package improves DEQ's emergency preparedness by placing an FTE in each region (for a total of 3 new FTEs), allowing them to develop relationships with local governments and key stakeholders. Such outreach, training and coordination is essential to effective catastrophic planning and maintaining a high degree of readiness. This package also improves DEQ's emergency response to oil and hazardous substance spills by adding back-up State-on-Scene Coordinators in each region. Funding for these positions would be allocated 2/3 from GF and 1/3 from Hazardous Substance Remedial Action Fund (HSRAF) monies. HSRAF, however, may be legally used for only a portion of these costs.		3	3	GF- $380k; OF - $163k	GF / OF (existing fees)	ER, WR, NWR - 1 NRS3 each
118 Air Quality Assistance to Agriculture (PP) [AQ-10]	SB 235 established a Dairy Task Force, which may make recommendations for legislation or funding related to dairies.	DEQ's policy package would add an agricultural emissions and control technology expert to support DEQ work.	N	1.0	1.0	GF - $173K	GF	Location ER, 1 NRS2
Diesel emission reductions (LC only) [AQ-3]	Diesel engine exhaust is one of the most prevalent toxic air pollutants in Oregon, and contributes significantly to fine particulate pollution, regional haze, smog and global warming.	LC will add authorities to prevent dumping of high-emitting engines from other states into Oregon (high emitting trucks and equipment that can not be used in California). Rules would be developed in 2009-2011 by existing staff, and implementation would be delayed at least two years as required by the CAA. Implementation would not occur until 2013-2015.	N	N	N	N		

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Water Theme								
128- Clean Water Plan Implementation (PP) [WQ-8 & 13]	Nonpoint source pollution is a major water quality problem in OR. DEQ does not have the resources needed to have a collaborative and comprehensive program that works with stakeholders and other agencies needed to effectively and efficiently reduce nonpoint source pollution. In addition, the federal 106 grant appropriation for Oregon is expected to remain flat while our costs have increased.	The purpose of this proposal is to: • Restore the existing TMDL position that is unaffordable in 2009-2011. • Increase staff resources for TMDL implementation and nonpoint source pollution control in Eastern Region for surface and ground water (quality and quantity). • Increase staff resources to evaluate the effectiveness restoration and protection strategies to help stakeholders identify what does and does not work at the project and programmatic levels for restoring and protecting water quality. • Increase staff resources for statewide nonpoint source program coordination and consistency. • Assess success of nonpoint source work and opportunities for additional water quality improvement from all land uses, forestry, urban and agricultural. • Provide stable funding to maintain and operate two mercury wet deposition monitoring stations which will provide data for the Willamette Mercury TMDL ($96,000).	1	3	4	GF- $910k	GF	ER: 2 NRS3, HQ: 1 NRS3
122- Water Quality Program Support (PP) [WQ-2]	The WQ program is currently involved in at least 17 separate legal cases and needs help managing all of it and coordinating all of the rulemakings the program is involved in. The WQ program also needs a full-time Deputy to ensure that internal and external needs are met.	The purpose of this package is to ensure that all of the WQ program's internal and external needs are met, that our rulemaking process is done as efficiently and accurately as possible, and that all of our legal issues are managed and coordinated appropriately. The WQ Administrator needs more time working strategically within DEQ, with other state, local and federal agencies, the regulated community and special interest groups; and promoting awareness of environmental issues and division programs to the public and the regulated community. The deputy will provide oversight for division operations, including internal systems and infrastructure, which will facilitate program integration and communication between policy (headquarters), implementation (regions) and monitoring (laboratory); and will facilitate progress on major WQ projects and initiatives. This package will also include an additional $250,000 for Attorney General costs.		2	2	GF - $715k	GF	HQ: 1 PEMF, 1 OPA3

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
161- Water Quality Program Enhancement (PP) [WQ-9]	The goal of High Priority Outcome 5 is to adopt a Water Quality Strategic Plan for Infrastructure to guide investments to support well-developed and maintained data systems to provide easier, faster access to information.	This proposal will provide the technology resources necessary to improve work methods and make current, accurate information easily accessible to DEQ staff as well as the public. The result will be to: • Necessary upgrades to the UIC, Onsite and SIS Databases (other priorities will follow when these projects are complete). • Initial implementation of the e-Discharge Monitoring Report project (will be a pilot). • Provide necessary resources to fully support WQ's projects in BSD. • Provide dedicated resources for the Water Quality program to develop and maintain tools to conduct water quality assessments for the 303 (d) list, 305 (b) list and use in the TMDL, nonpoint source and permit programs.		5	5	GF - $984k	GF	HQ: 2 ISS4, 1 NRS3, 1 ISS7, Lab: 1 ISS4
133 - Orphan Site Cleanup Operations & Maintenance (PP) [LQ-4]	O&M costs impose a significant and recurring commitment upon limited orphan site cleanup funds. Typically, O&M costs are paid by bond financing, thereby reducing the dollars actually available for cleanup.	This policy package requests General Funds to pay O&M costs associated with orphan site cleanup projects. In 2007, the Legislature authorized a $4.5M bond sale -- an amount insufficient to pay O&M expenses and to continue already-in-progress site work and cleanup in 2009-11. This package would request a $1.5M appropriation to cover the expected O&M expenses for 2009-11.			N/A	$1.5 m.	GF	
166- Restore Onsite Septic System Program [WQ-15]	Fee revenue for this program has declined because: Douglas County took over the onsite program, reducing revenue by the equivalent of >2.0 FTE; and the slow economy is projected to have an adverse effect on fee revenue.	The purpose of this package is to restore the existing positions that we cannot afford for the 2009-11 Biennium. The WQ Program expects to have 2.5 FTE that will be unaffordable next biennium.	2.5 FTE		2.5 FTE	OF- $515k	OF/ Fees	TBD
127- Water Quality 401 Project Certification (PP, LC) [WQ-11]	The 401 Water Quality Certification program is a statewide program that is funded partially by general fund (1FTE) and partially by fees (.75 FTE.) Currently, some applicants (approximately 52%) under the program are exempt from fees. DEQ is working with an advisory committee on a new fee structure that would assess fees for all projects that require a 401 Certification for removal/fill projects. To change the fee structure, we will have to modify/eliminate the existing statutory exemptions.	This proposal includes fully funding existing positions and adding an additional 1.5 FTE for a total of 3.5 FTE plus manager time and funds for needed Information Technology work. Approval of the fee increase will allow us to better protect water quality in the state and provide increased assistance to guide applicants through the 401 certification process through: • Timely review of all project proposals. • Increased participation in pre-application meetings. • Development of guidance documents. • Participation in the state streamlining efforts. • Coordination and integration of other DEQ program requirements when appropriate. • Increase customer service and efficiency.	1.4	1.5	2.9	OF- $515k	OF/ Fees	WR : 1 NRS3 NWR: 0.5 NRS2

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
123- Drinking Water Protection (PP) [WQ-17]	Safe drinking water is important for citizens in Oregon. There are over 3600 public water systems in Oregon that serve 3 million people. Protecting sources of drinking water – rivers, lakes and underground sources – protects people's health and minimizes the treatment costs. DEQ has worked in partnership with the Oregon Department of Human Services (DHS) since 1997 to help communities protect their drinking water sources.	This package continues federally-funded limited duration positions to help carry out the requirements of the 1996 Federal Safe Drinking Water Act Amendments (SDWA) and assist communities with protecting their public water sources.		5.5 LD	5.5 LD	FF (as OF) - $1,107k	FF	HQ: 2 NRS4, 1NRS3, 1 ISS6 WR: 1 NRS3 Lab: 0.25 Chem 2
163- Wave Energy (PP) [WQ-5]	DEQ is involved in settlement discussions for wave energy projects that are unfunded.	This package will provide the resources to cover the work and Attorney General costs associated with the various proposed wave energy projects in Oregon.		0	0	GF - $171k	GF	

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Agency Infrastructure Theme								
140 Information Management Infrastructure (PP) [AM-1]	DEQ's growing demands for modern electronic systems, information asset security, and quick access to information require strategic, integrated planning & agile systems. Management capacity, current systems and related software are inadequate to support e-commerce and public access to data, LAN administrator positions are incomplete, administrative policies are out of date.	Request Chief Information Officer, Information Services Manager, restore GIS services; improve servers, expand system bandwidth & information storage capacity; LAN administrator positions; position for policy coordination & operational work.		7	7 plus $300K one-time capital outlay	$1,579k	Indirect	HQ / regions: 1 PEM F, 1 PEM E, 2 ISS4, 1 ISS5, 1 OPA
152 Public Access to Environmental Information (PP) [CP-4]	DEQ is facing and will continue to face increasing demand to provide more and better environmental information to the public via the internet. DEQ's effort to date has been funded by squeezing existing resources but we lack the capacity to make the considerable changes being demanded. Among these is to convert raw environmental data and scientific reports into easy-to-understand formats, improve upon system limitations to provide reliable, easy access via the internet, and provide permits on line.	The purpose of this package is to provide additional staff and funds to develop the infrastructure and architecture to make significant improvements to DEQ's external web site and the quality of information provided, including easy-to understand explanations of scientific information and interactive maps and graphics depicting air and water quality permitted and monitoring and results. These improvements will require extracting data, producing reports, editing scientific reports into layperson terms, Graphics/GIS specialists to visually represent data, web improvements to support easy public access. The package includes contract money & one supporting analyst to enhance the DEQ Facility Profiler (long overdue), extending the breadth of information provided, as demanded by the public, including facility-associated permits, compliance, and enforcement information. Also adds 1 FTE per program (3 total) as dedicated full-time web technicians.		6	6 plus $700K one-time contracts	$1,327k	GF	HQ, Lab, Divisions: 1 ISS5, 1 scientific editor, I graphic artist, 3 web tech
150 Environmental Information Exchange Network (PP) [CP-2]	EPA grants continue to fund the work to develop the infrastructure to meet EPA's new reporting requirements, and the network requires permanent operations and maintenance support.	Begin next round of EPA funded grant work on Environmental Information Exchange Network (add electronic Discharge Monitoring Reports, Global Climate Change Registry) and fund operations and maintenance of Exchange Network services.	2	1.5	3.5	$662k	3 FTE FF 0.5 FTE GF	HQ: 0.5 ISS5
151 E-Commerce (PP) [CP-3]	Presently the extent of our online permitting options includes the ability to download forms that must be filled out and mailed in.	In 0911 we can begin to develop online permitting/licensing applications that would allow an applicant to submit or complete an application online, pay fees, and receive timely verification of receipt & approval. Start with simpler licenses and permits and work toward more complex permits in following biennia. Also complete development work of consolidated on-line invoicing.		1	1	$208k	GF	HQ: 1 ISS 5

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
141 Human Resources Service Delivery (PP) [AM-2]	HR needs of regional offices are not adequately served, current HR capacity does not allow for focus on regional labor relations; NRS series class review will result in significant class & comp work .	Add 1 HR professional staff to better serve the regional offices on labor relations & an LD to handle class & comp work that will result from DAS class study.		2	2	$351k	Indirect	HQ: 1 HRA3, 1 HRA2 (LD)
124- Clean Water State Revolving Fund Program (PP) [WQ-7]	The Environmental Protection Agency requires the Clean Water State Revolving Fund (CWSRF) program to complete a State Environmental Review process for all projects that receive a CWSRF loan. The new process of conducting reviews for all projects in a consistent manner is additional work for the SRF Program. In addition, there are many small communities in Oregon that need assistance with planning for necessary water and wastewater infrastructure projects. **This package relates to Packages 181 (Clean Water SRF - Loans and Bonds) and Package 191 (Clean Water SRF - Debt Service).**	The purpose of this package is to ensure there are adequate resources to complete the required Environmental Review for all new SRF projects. Additionally, this package will include technical positions to assist municipalities regarding water and wastewater infrastructure and opportunities for reducing their carbon footprints, work associated with the required EPA Clean Watershed Needs Survey, and additional "marketing" of the SRF program that EPA has suggested.		4	4	OF - $677k	OF/ SRF Administrative Account	HQ: 1 OPA1, 2 EE2, 1 PA3

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Monitoring and Assessment Theme								
115 Air Quality Monitoring and Analysis (PP) [AQ-6]	Current air quality monitoring resources are inadequate to meet the needs created by new federal standards and increasing concern about health risks from toxic air pollution. These needs include: determining compliance with standards, assessing health risks, developing and implementing strategies to reduce health risks, and providing information to the public.	Policy package requests new resources that would add air toxics sites, provide for additional data analysis, add fine particulate sites and ozone sites. Resources would support the following work in priority order: an air toxics site - yr 1 St. Helens, yr 2 The Dalles; a position for data analysis, interpretation and presentation; 2 portable PM 2.5 monitors with Ontario, Prineville, St. Helens and Newberg as most likely initial locations; 1 mobile ozone monitor; mobile CAFO fence-line monitor; an air toxics site yr 1 K. Falls, yr 2 Toledo; fixed ozone site, a second mobile CAFO fence-line monitor; add a real-time VOC monitor to a toxics site; an air toxics site - yr 1 Newberg, yr 2 Springfield or Hermiston; 2 PM 2.5 speciation sites with Burns, Lakeview or Hillsboro as possible locations; ozone site with Hermiston, Ontario or southern Willamette Valley as possible locations. Capital needs total $355K.		8.0	8.0	GF $1,919K	GF	Lab-4 NRS1, 2 NRS3, 2 Chem3
413- Monitoring for Climate Change [WQ-3]	DEQ has maintained an ambient monitoring network for conventional pollutants for over 40 years. DEQ, ODF and ODA receive many questions regarding the quality of waters in various land use types. These questions cannot be answered with the information from the current ambient network. Additionally, effectiveness monitoring for the Forest Practice Act Riparian Rules, Senate Bill 1010 and TMDL implementation plans has not occurred, though these programs have been in place for years. To do this efficiently, effectively and consistently, Oregon needs a collaborative interagency effort to monitoring high level indicators across the state. In addition, during the 07-09 bienium, DEQ has not been able to fulfill the cooperative work agreement with the Oregon Department of Fish and Wildlife to implement monitoring activities in compliance with the Coastal Coho Conservation Plan.	The purpose of this proposal is to enhance the existing Oregon Plan monitoring program to additional watersheds in the state and to provide resources for DEQ to meet the agreement with ODFW for the monitoring and analysis work in the Coastal Coho areas. In addition, DEQ will be able to increase the number of ambient monitoring sites primarily in agricultural areas by 21 and primarily in private forested areas by 21. This information will help us further understand the quality of rivers and streams in these land use types. Additionally, the data will include reference sites to allow DEQ to track climate change impacts to Oregon's waterways.This package includes a $94,000 contract for analysis of samples and $20,000 of equipment.		2 PF +12 Seasonal temps	2 PF +12 Seasonal Temps	GF- $1,124K	GF	Lab: 2 NRS1, 2 NRS1 temps, 1 Chem 3 temp, 1 Chem 1 temp
126- Coastal Beach Bacteria Monitoring (PP) [WQ-18]	The Beach Act authorized EPA grants to states and tribes to help develop and implement beach monitoring programs. If states or tribes don't implement a beach monitoring program, the EPA must take over.	This package continues the work we do to monitor beaches in Oregon. This package will increase by .2 FTE from the 2007-09 budget to help out during the busy monitoring times.		1.2 LD	1.2 LD	FF (as OF) - $250k	FF	Lab: 1.2 NRS2

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
125- Marine Reserves (PP) [WQ-4]	The Governor has committed to establishing a limited system of less than ten marine reserves off the Oregon Coast and to ensuring adequate resources be allocated for the scientific assessment of Marine Reserves. To do the requested work, DEQ needs additional resources to conduct monitoring and assessment of the new Marine reserves, to do necessary rule revisions, and provide technical information regarding proposed marine reserves.	The purpose of this proposal is to ensure DEQ has adequate resources dedicated to participate in the selection of the size, scope, and location of the proposed marine reserves and the implementation of those. DEQ will use these resources to monitor water quality, toxics in fish tissue and benthic in-fauna as a biological community condition indicator in the nominated and adopted Marine Reserves, to establish baseline trends over time and identify environmental stressors to the marine organisms within the reserves. In addition, DEQ needs resources to work on agency rule revisions and policy anticipated to be necessary during the selection process and as a result of the creation of marine reserves. This package includes a $42,000 contract for analysis of samples and $150,000 for necessary equipment.		2 + Temps	2 + Temps	GF- $684k	GF	Lab: 1.0 NRS3, 0.5NRS2, 0.5Chem 3 and HQ-0.5NRS3

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Miscellaneous Packages								
113 Maintain Streamlined Vehicle Inspection (PP) [AQ-4]	Vehicle Inspection Program (VIP) fees were last increased in 1999. Through ongoing streamlining and efficiencies, DEQ was able to reduce emission testing staff, control costs and avoid a fee increase for twice as long as originally anticipated. Further efficiencies are no longer available, and by the 2009-2011 biennium, VIP revenue will be insufficient to support the program. Without additional revenue, DEQ will be forced to cut staffing at our stations and have longer customer wait times.	DEQ will request a VIP fee increase to adequately fund the program. As part of the fee increase, DEQ will address the difference in the Portland fee ($21/certificate) and Medford fee ($10/certificate), and the number of free retests. DEQ will also ensure that interagency transfers from DMV for DMV services fully cover the cost of those services.	18.00		18.0	$2,782K	OF	VIP restore 17.63 FTE
157 Compliance & Enforcement Data Management (PP) [Part of Enf-4]	DEQ has a strategic objective to ensure that its enforcement actions are timely, consistent and predictable. As part of its overall enforcement goals, DEQ must improve existing compliance and enforcement databases to reduce the time staff spend entering dulicative data and to ensure that the agency has reliable data to use in assessing the effectiveness of current enforcement strategies and developing future strategies, and to answer questions posed by legislators, by reporters, and by the public.	The purpose of this proposal is to enhance DEQ's compliance and enforcement program by developing necessary data-collection mechanisms and databases and to increase OCE web presence.	0	1	1	$198K for LD ISS5	GF	BSD
154 Environmental crimes prosecution (PP) [Enf-3]	DEQ and OSP invest significant resources investigating violations of environmental law. Some violations are done with criminal intent and these egregious cases should be prosecuted throught the criminal system because administrative penalties are not adequate. Our research shows that criminal prosecutions are stronger motivators than civil penalties in creating deterrence. While county district attorneys generally agree with our recommendations that certain violations should be prosecuted criminally, county resource limitations often make prosecution untimely or impossible. This wastes DEQ and OSP investigation resources, creates an ironic result in which the most signifcant violators are not penalized, and prevents us from creating deterrence which benefits the environment.	Assistant Attorney Generals in the District Attorney Assistance Section of DOJ would supplement the county district attorneys in prosecuting state environmental crimes committed in the DEQ-administered programs. The extent of the AAG involvement would range from advising the county district attorney to handling the case development, supplemental investigation (through the DOJ investigators), and prosecution of the cases. Costs not payable by the District Attorney Assistance fund would be charged to DEQ.	0	0	0	$169K	GF	

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
119 Complete Title V Staffing Phase-in (LC, PP) [AQ-8]	SB 107, adopted in 2007, increased Title V fees and changed the frequency of the rulemaking to adjust the fee for inflation, but failed to make corresponding changes in the calculation of inflation. The net effect is that program revenue will always be behind by one year on inflation adjustments.	The LC will correct the 2007 legislation and provide for inflation increases as intended. Policy Package adds a regional position in 2009-2011 as agreed to in the 2007 fee increase negotiations.	N	1.0	1.0	OF - $180K	OF	Regional - 1 EE2
114 Implement New Federal Air Toxic Requirements (PP, LC) [AQ-5]	EPA is in the process of adopting emission standards for 70 different categories of toxic air pollutants. Most are small businesses (area sources) and include businesses like auto body repair shops, paint strippers and parts coaters. Under current law, these sources must obtain air quality permits.	The LC will authorize EQC to adopt a registration fee for certain source categories. This will enable DEQ to offer registration in lieu of permitting for sources that meet green business certification standards. Since the registration fee would fund program implementation, DEQ would be able to exempt many small businesses from permitting while still ensuring compliance with federal emission standards.	N	5.5 (phase in)	5.5	OF- $808K	OF	Regions - 3 NRS2, 2.25 NRS1, .25 ELS (HQ)
134 - Electronics Recycling Law Implementation (PP) [LQ-5]	Due to a lack of information, DEQ could not provide a complete cost estimate for the 2007 e-waste recycling legislation. As a result, the E-waste program will request that the Legislature's Emergency Board approve contract limitation (probably at the September '08 meeting) to cover the 2007-09 costs of the state contractor portion of the program (recycling fees from manufacturers will cover the estimated costs). When that request goes before the Emergency Board, it will be too late for the Legislatively Approved Budget, which defines the 2009-11 budget. As a result, the 2009-11 request for contract limitation must be in the form of a policy package.	The E-waste program will need a policy package to request contract limitation from the Legislature to cover the 2009-11 costs of the state contractor e-waste recycling program. Again, those costs will be covered by recycling fees from those manufactures choosing to participate in the state contractor program.				Unknown at this time	Manufacturer fees	

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
155 Environmental enforcement (PP) [Part of Enf-4]	(1) Currently, there is no person responsible for gathering and tracking changes to DEQ's internal management directive for enforcement (aka Enforcement Guidance), but such person will be necessary as OCE implements results of its Kaizen process-improvement initiative, develops guidance and processes for expedited enforcement offers, and coordinates with DEQ media program managers about program priorities. (2) "General deterrence" to non-compliance relys on the public perception that there is a high probablity that violations will recieve penalty and that the penalty will be applied soon after the violation. The additional ELS resource will prosecute DEQ administrative enforcement actions and assist in improving timeliness of enforcement actions.	The purpose of this proposal is to add additional staff resource to DEQ's compliance and enforcement program by developing and implementing new enforcement processes resulting from the Kaizen process-improvement initiative and adoption of expedited enforcement offer rules, to assist programs in rule and permit development, to advise inspectors in developing enforcement referrals, and to prosecute enforcement cases.	0	1	1	$210K for ELS	GF	OCE
156 Environmental crimes investigation (PP) [Enf-2]	Currently there is only one Oregon State Police trooper assigned to investigate envionmental crimes in cooperation with DEQ. For lack of resource, some environmental crimes leads are not followed up with investigation and some inefficiencies exist with the one trooper having to travel the whole state and handling interviews alone.	Add one additional OSP trooper to investigate environmental crimes in the DEQ-administered programs so that fewer leads of potential environmental crimes are not investigated. The trooper likely would be positioned in an area of the state distant to Portland to cut down on travel time to investigation sites but would be available as necessary to assist in investigations throughout the state.	0	0	0	230K	GF	Medford
116 Clean Air Transportation Collaboration (PP) [AQ-7]	Transportation system decisions can have significant air quality impacts, including violations of air quality standards, exposure to toxic air pollutants and increases in greenhouse gas emissions. DEQ does not have resources to help transportation planning agencies address these issues during the planning stages, which can lead to delays in road construction projects and downstream costs to address air quality impacts.	Policy package requests new resources for DEQ and Lane Regional Air Protection Agency (LRAPA) to assist local, regional and state transportation agencies in planning, constructing and operating transportation infrastructure to avoid or minimize air quality impacts. This includes participation in metropolitan planning organizations, technical analyses of system impacts and alternatives, developing air quality performance standards for transportation projects, and addressing public concerns about air quality during project review. Funding would be provided from new transportation funding proposals through an interagency agreement with ODOT.	N	4 + 115K for LRAPA	4.0	OF-$718K	OF	Region, 3 NRS2, HQ 1.0 NRS3, LRAPA

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Enf-1 Penalty maximum enhancement (LC Only)	(1) The $10,000 per day statutory maximum penalty applicable to most DEQ penalties, and the $20,000 per day maximum penalty applicable to negligent spills of oil into waters of the state, were set in 1973. Because of inflation, these penalties in today's dollars are only worth 20% to 25% of their original potency. Certain other less-often used penalties are also low. (2) Economic benefit is part of the minimum requirements for federal delegation, but some believe the penalty authority in ORS 468.130 is not clear that the EQC has authority to assess it. (3) The criminal code inadvertently sets misdemeanor and felony penalties for corporate perpetrators of environmental crime at less than the penalties that a natural person, trust, partnership, or other entity would be liable for when committing the same crime.	(1) Increase the statutory maximum penalties. (2) Add economic benefit to the list of factors the EQC must consider when assessing a civil penalty. (3) Eliminate the inadvertent protection for corporate criminals.	0	0	0	$0	likely addn'l rev. for GF, UST, spills	
Definitions								
N=No	TBD=Unknown at this time							
X=Yes	PP=Policy Package							
P=Possible	LC=Legislative Concept							
	*Restoration means existing FTE that is no longer affordable.							

DEQ DRAFT 2009 LEGISLATIVE CONCEPTS

Agency Number	Name	Problem Statement	Brief Description of Proposal	PP	Fund Type	Relates to Toxics(T), Water(W), Climate Chg(C), Infrast(I)
34000/1	**AQ-1 GHG Cap and Trade and Other Emission Reduction Programs**	HB 3543 established Greenhouse Gas (GHG) reduction goals for the state, and the Governor asked the EQC to adopt mandatory GHG reporting rules. The next step is to develop market based programs to reduce GHG emissions.	The DEQ LC will fill gaps in GHG reporting authority, add authority for a cap and trade program, add fees for reporting and cap and trade and add authority to adopt other GHG emission reduction measures and incentives.	Y	GF/OF	C
34000/2	**AQ-2 Heat Smart**	Residential heating with old, uncertified woodstoves releases fine particles and air toxics such as benzene that contribute to a myriad of human health effects. Heat Smart is a critical component of plans to meet and maintain the federal fine particulate standard and meet state air toxics benchmarks.	The LC will establish a grant and loan program to remove old, uncertified woodstoves and replace them with new, cleaner alternatives, require the removal of uncertified woodstoves upon home sale and provide authority for the EQC to update OR woodstove standards.	Y	GF and Penalties	T
34000/3	**AQ-3 Clean Emission Standards for Nonroad Vehicles**	Diesel engine exhaust is one of the most prevalent toxic air pollutants in Oregon, and contributes significantly to fine particulate pollution, regional haze, smog and global warming.	The LC will address a gap (non-road engines) in the Environmental Quality Commission's (EQC) authority to establish emission standards for diesel engines that could lead to "dumping" of older, dirtier, vehicles from California into Oregon.	Y	GF, FF, OF	T
34000/4	**AQ-5 Alternative to Permitting**	EPA is about to adopt national air toxics standards (National Emissions Standards for Hazardous Air Pollutants -NESHAP) for 70 different source categories. Most are small businesses (area sources) and include businesses like auto body repair shops, paint strippers and parts coaters. They would like compliance options other than a permit.	The LC will authorize a registration fee (lower than a permit fee) for source categories that choose compliance options beyond compliance required by a permit.	Y	OF	T
34000/5	**AQ-8 Title V Fee Technical Correction**	SB 107, adopted in 2007, increased Title V fees and changed the frequency of the Consumer Price Index (CPI) rulemaking but failed to make corresponding changes in the CPI calculation. The net effect is a loss of one CPI increase each biennia.	The LC will correct the 2007 legislation and provide for CPI increases as intended.	N	OF	
34000/6	**AQ-9 Burning Phase Down and Smoke Management Coordination**	Reducing burning is a key strategy to improve air quality in Oregon.	The LC will phase down field burning in the Willammette Valley over several years as new alternatives to burning are developed and include a process for EQC to allow more acres to be burned than otherwise permitted in a given year upon a demonstration that viable alternatives are not yet available. The LC would also direct DEQ to provide support and coordination for open burning and smoke management programs.	P	TBD	T

DEQ DRAFT 2009 LEGISLATIVE CONCEPTS

Agency Number	Name	Problem Statement	Brief Description of Proposal	PP	Fund Type	Relates to Toxics(T), Water(W), Climate Chg(C), Infrast(I)
34000/7	**LQ-1 Bottle Bill Changes**	The task force is currently meeting to discuss further changes to the bottle bill law. Those issues include whether the statute should be expanded for additional items, the amount of the redemption, whether recycling should occur at retail locations or some other place, etc. Given the visibility of this law, DEQ should have a legislative "placeholder" for the 2009 session.	Placeholder for possible 2009 legislation.	TBD	TBD/OF	C
34000/8	**LQ-2 Producer Responsibility for Difficult-to-Manage Products**	Some products have unique waste management challenges. They contain toxics or multiple materials, making them costly and difficult to recycle or safely dispose of in the traditional waste management system. As a result, the public lacks convenient and safe recycling or disposal options. This increases the risk of mismanagement and human health / environment impacts. Finally, where these products are handled through the current system, local governments and ratepayers bear the fiscal burden.	The LC requires manufacturers rather than local governments to manage specified products so as to enhance their recycling or safe disposal. Through this LC, the Legislature would define the process/criteria for DEQ to identify the appropriate products or categories. The EQC would make the final determination under the statute. Specified products could not be sold unless DEQ approved the manufacturer's plan for the collection, recycling or safe disposal of these products.	Y	OF	C, T
34000/9	**WQ-11 401 Water Quality Fee Revision**	The 401 Water Quality Certification (fill and removal projects) program's fee structure exempts approximately 52% of applicants from fees. Many of these dredge and fill projects in rivers, lakes, streams, and wetlands are complex and take a great deal of time.	The purpose of this proposal is to remove/modify the exemptions and have a equitable fee structure that will provide sustainable funding for the program.	Y	OF/fees	W
34000/10	**Enf-1 Penalty maximum enhancement**	The $10,000 per day statutory maximum penalty applicable to most DEQ penalties, and the $20,000 per day maximum penalty applicable to negligent spills of oil into waters of the state, were set in 1973. Because of inflation, today's penalties are only worth 20% to 25% of their original potency.	Increase the statutory maximum penalties.	N		T, W
	Definitions					
	N=No					
	X=Yes					
	P=Possible					
	TBD=Unknown at this time					
	PP=Policy Package					
	LC=Legislative Concept					

State of Oregon
Department of Environmental Quality

MEMO

To: Environmental Quality Commission

From: Greg K Aldrich, DEQ Government Relationship Coordinator

Subject: Agenda Item N – Supplemental Information
Attachment A of the Agenda Item N Staff Report

Dear Commissioners,

This package includes Attachment A of the Agenda Item N Staff Report for the Draft 2009 Legislative Agenda. It is a draft ranking of policy packages in priority order. The rest of this staff report is included in your binder. However, this priority ranking was not available at the time the binder was compiled. Also attached are the updated draft 2009 Legislative Agenda matrix and the current list of DEQ legislative concepts. These are for your review and then they will be part of the discussion at your meeting on June 20.

At your April meeting, you asked that we flag the changes that have occurred to the draft 2009 Legislative Agenda since the document you saw in April. Many changes have occurred in the past two months and this memo will highlight the significant changes. I am not flagging minor text changes, changes in classifications of positions (e.g. from a Natural Resources Specialist 3 to a 2) or changes in costs for any single policy package that is under $50,000.

DEQ Package Priority List – (Attachment A of the Agenda Item N Staff Report)

In April you saw an earlier version of this that included all the potential General Fund packages at the time. Since then, the Executive Management Team (EMT) has made some minor changes in the General Fund ranking order. The bigger change is that this list now includes all 39 policy packages, regardless of funding type. This is required by the Department of Administrative Services (DAS) as part of the budget development process. The EMT developed a draft priority list to recommend to Dick for his consideration. Dick reviewed the list and concurred with the priority ranking as presented. Please note at the bottom of the list, there are totals for costs by fund types and total positions. This list is now before you for your review. We need to include a final priority ranking when we submit the budget numbers to DAS for audit on June 30.

Draft 2009 Legislative Agenda Matrix

A number of changes have occurred since April. Budgeting cost estimates have been sharpened, package titles have changed to be more precise, and a number of position classifications have changed as part of the Human Resource position review process. Also packages have been renumbered to reflect the official budget book numbering system. The old package identifier numbers are shown in brackets [AQ-1, WQ-17, etc.]; these are provided as a cross reference should you want to refer back to the information provided in April.

The matrix is still presented by the major themes:

- climate change
- toxics

- water
- agency infrastructure
- monitoring and assessment
- miscellaneous packages.

Under each theme, the packages now reflect the priority ranking of the individual packages. For those legislative concepts that do not have a companion budget request, the legislative concept is presented at the end of the policy packages in the theme grouping.

Below is a listing of significant changes that have occurred for a number of the policy packages. Only those packages that have been significantly modified are included. There have been many less significant changes since April, but we want to focus your attention on the bigger changes. Significant changes for any policy package have been defined as:

- Changes in costs greater than $50,000. In many cases, the reduction of costs can be attributed to better cost estimating and reduction in the PERS rate for staff positions
- Difference of one or more positions
- New or deleted packages.

Packages are listed in the order they are found in the legislative matrix, not in numerical order. This should be helpful as you page through the document.

Packages with Significant Changes:

- Package 110 – added 1.0 Full Time Equivalent Position (FTE); costs reduced by $923,000. This represents a refinement of the package which has been evolving over the past few months.
- Package 153 – costs reduced by $55,000
- Package 129 – costs reduced by $62,000
- Package 131 – costs reduced by $75,000
- Package 128 – former packages WQ-8 and WQ-13 have been combined into one new package. Also, WQ-13 was a request for a restoration of 3 FTEs. Revised budget numbers indicate that 2 of the 3 positions will still be affordable in 2009-11, thus a restoration is needed for only one FTE. The combined costs have been reduced by $355,000.
- Package 161 – costs reduced by $75,000
- Package 166 – This package is for the restoration of Onsite positions that are not affordable in 2009-11. Revised budget numbers indicate that the program will be able to afford up to 2.5 FTE that did not appear affordable in early April. The costs have decreased by $531,000.
- Package 127 – the matrix better reflects the 1.5 FTE that is not affordable going into 2009-11, which means the total FTE request is now 2.9. Total package costs have actually decreased by $81,000.
- Package 123 – costs reduced by $169,000.
- Package 140 – an additional position has been added, though costs have not changed significantly (down about $21,000)
- Package 152 – increased costs by $127,000; no change in FTE
- Package151 – decreased staffing by 2 FTE and costs reduced by over $1 million. This package has been restructured to reflect that most of the work will actually occur in 2011-13. This is because other infrastructure improvements are needed prior to fully implementing the E-commerce work.
- Package 124 – costs reduced by $150,000.
- Package 115 – costs reduced by $303,000, which represents a scaling back of the proposed work activities.
- Package 413 – this package has grown by 2 permanent FTE and 2 seasonal FTEs, with an associated cost increase of $521,000. The original water quality monitoring and assessment package has been augmented to include work on behalf of ODA and ODF.

- Package 125 – this package has decreased by 1 FTE and there are reduced costs of $169,000. This represents the use of seasonal employees and the resulting reduction of staffing costs.
- Package 113 – refined budgeting has moved this from a "TBD" stage to a restoration request of 18 FTE for $2,782,000.
- Packages 157 and 155 – these two packages make up the former package Enf-4. The package was divided as the work components represent separate activities which are better packaged individually.
- Package 114 – this package was restructured from 7 FTE (permanent and limited duration) to 5.5 permanent FTE. There is a reduction in costs of $319,000.
- Package 116 – costs reduced by $72,000.
- Two packages that were shown in the April matrix have been deleted. These were WQ-16 Restoration of the Underground Injection Control Program and AM-3 Agency Management Restorations. At the time, the initial budget numbers indicated that we would not be able to afford several positions 2009-11 in both program areas, thus restoration packages would be needed to provide new funding and maintain the positions. Additional budget refinement has indicated that these positions are affordable and a restoration package is not needed.

We will be able to provide more details about these significant changes at your June EQC meeting.

DEQ Draft 2009 Legislative Concepts

There have not been any significant changes with the 10 legislative concepts that were submitted to DAS in April. All 10 have been approved by DAS and the Governor's Office to go forward to Legislative Counsel for drafting. The drafting process will occur during the summer and fall.

Should you have any questions about this information and would like to discuss it prior to the meeting on June 20, please call me at 503-229-6345.

Attachments:

- Draft DEQ Package Priority Rankings (Attachment A of the Agenda Item N staff report)
- Draft 2009 Legislative Agenda
- DEQ Draft 2009 Legislative Concepts

PKG NO	Package Title	New Ranking	Limitation	FTE	GENERAL	OTHER	FEDERAL	Notes
110	Climate Change: Greenhouse Gas Reduction	1	2,323,230	10.50	919,561	1,403,669		
128	Clean Water Plan Implementation	2	910,962	4.00	910,962			
113	Maintain Streamlined Vehicle Inspection	3	2,781,777	17.63		2,781,777		
121	Ongoing Implementation of Senate Bill 737	4	494,496	2.00	316,181	178,315		
132	Producer Responsibility for Waste Products	5	281,263	1.83		281,263		
153	Toxic Chemical Reduction	6	484,588	2.50	484,588			
122	Water Quality Program Support	7	714,981	2.00	714,981			
140	Information Management Infrastructure	8	1,578,575	7.00		1,578,575		
152	Public Access to Environmental Information	9	1,327,471	6.00	1,327,471			
129	Pesticide Stewardship Partnerships	10	1,102,179	5.00	1,102,179			
150	Environmental Information Exchange Network	11	662,548	3.50	98,979		563,569	
111	Heat Smart for Clean Air	12	499,968	0.25	99,968	400,000		
161	Water Quality Program Enhancement	13	983,901	5.00	983,901			
157	Compliance & Enforcement Data Management	14	197,957	1.00	197,957			
117	Smoke Program Coordination	15	345,366	2.00	345,366			
133	Orphan Site Cleanup Operations & Maintenance	16	1,500,000		1,500,000			
154	Environmental Crimes Prosecution	17	169,000		169,000			
166	Restore Onsite Septic System Program	18	514,801	2.50		514,801		
127	Water Quality 401 Project Certification	19	515,132	2.90		515,132		
151	E-Commerce	20	207,587	1.00	207,587			
115	Air Quality Monitoring & Analysis	21	1,919,434	8.00	1,919,434			
131	Emergency Preparedness and Response	22	543,192	3.00	380,368	162,824		
119	Complete Title V Staffing Phase-in	23	179,464	1.00		179,464		
413	Monitoring for Climate Change	24	1,124,515	2.00	1,124,515			
114	Implement New Federal Air Toxics Requirements	25	808,382	5.50		808,382		
141	Human Resource Service Delivery	26	351,015	2.00		351,015		
181	Clean Water SRF - Loans & Bonds	27	30,060,000			30,060,000		Non-Limited Budget
191	Clean Water SRF - Debt Service	27	10,020,000			10,020,000		Non-Limited Budget
134	Electronics Recycling Law Implementation	28	-					Contract amount TBD
155	Environmental Enforcement Enhancement	29	210,156	1.00	210,156			
124	Clean Water State Revolving Fund Program	30	676,573	4.00		676,573		
123	Drinking Water Protection	31	1,107,204	5.50		1,107,204		
156	Environmental Crimes Investigation	32	230,000		230,000			
162	Water Quality Review for ASR Projects	33	196,471	1.00	196,471			
116	Clean-Air Transportation Collaboration	34	717,530	4.00		717,530		
126	Coastal Beach Bacteria Monitoring	35	250,293	1.25		250,293		
125	Marine Reserves	36	684,552	2.00	684,552			
163	Wave Energy	37	170,677		170,677			
118	Air Quality Assistance to Agriculture	38	172,683	1.00	172,683			

TOTAL POLICY PACKAGES		67,017,923	117.86	14,467,537	51,986,817	563,569	

DRAFT 2009 LEG ATIVE AGENDA

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Climate Change Theme								
110 Climate Change: Greenhouse Gas Reduction (PP, LC) [AQ-1]	HB 3543 established state Greenhouse Gas (GHG) reduction goals to address severe environmental, health and economic impacts of global warming. The Governor has joined the Western Climate Initiative - which is developing a cap and trade program to reduce GHG emissions - and has asked the Environmental Quality Commission (EQC) to adopt GHG reporting rules as a next step.	The DEQ LC will provide authority for EQC to adopt a cap and trade program, fill gaps in EQC's authority to require GHG emission reporting, add fees to fund the cap and trade and reporting work, and add authority to adopt other GHG emission reduction measures and incentives. While the package requests 10.5 FTE in total, the GF portion is 3.0 FTE. GF would support a manager for the Climate Change section, 1 FTE for GHG reduction planning (beyond cap and trade) and a policy analyst to work with EPA, regional, national and international organizations on policies to meet GHG reduction goals. The GF request would also include funding for dues to the Western Climate Initiative (WCI) and The Climate Registry (TCR) $50-$100K, contract dollars for database development $250K, DOJ resources $50K and $115 K to support similar activities for LRAPA.	N	10.5 (inc WQ & LQ FTE)	7.5 OF, 3.0 GF	GF - $920K, OF - $1,404K	GF/OF	HQ: .5 NRS2, 3 NRS3, 1 NRS 4, 1 OS2, 2 NRS 2, 1 ISS4, 1 OPA4, 1 PEME
162- Water Quality Review for ASR Projects [WQ-6]	Intensive water use in the Umatilla Basin, primarily for high value agriculture, has led to serious depletion of the deep basalt aquifers and declines in water quality in the shallow alluvial aquifers. This area has been declared a Critical Groundwater Area by WRD and is a Groundwater Management Area (established by DEQ). Proposals for Aquifer Storage and Recovery (ASR) projects are being developed. More resources are needed to fully engage in the proactive regional planning of these projects.	The purpose of this package is to allow DEQ to work with WRD, agricultural and other stakeholders to ensure that future ASR and AR projects don't result in further degradation of shallow groundwater quality, but rather restore water quantity in depleted deep aquifers while simultaneously improving shallow aquifer quality.		1	1	GF - $196k	GF	ER: NRS3
LQ-1 Bottle Bill Changes (LC Only)	The task force is currently meeting to discuss further changes to the bottle bill law. Those issues include whether the statute should be expanded for additional items, the amount of the redemption, whether recycling should occur at retail locations or some other place, etc. Given the visibility of this law, DEQ should have a legislative "placeholder" for the 2009 session.	Placeholder for possible 2009 legislation.					TBD	

DRAFT 2009 LEGISLATIVE AGENDA

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Toxics Theme								
121- Ongoing Implementation of Senate Bill 737 [WQ-1]	SB 737, among other elements, requires Oregon's 52 large municipal wastewater treatment plants to develop plans by 2011 to reduce persistent pollutants through pollution prevention and toxics reduction. Through the fiscal impact statement of SB 737, DEQ told the 2007 Legislature and stakeholders that we would need to ask for additional resources during the 2009 Legislative session to support the ongoing work and associated Department of Justice costs for this program. In addition, this package will also include restoration funds to cover the work in year two (July 2009-June 2010) of the project to develop a report to the Legislature on Oregon's priority persistent pollutants that the fees will not cover due to increase in costs.	The purpose of this package is to be able to fully implement SB 737 and cover the cost of project Attorney General costs. DEQ will need a permanent position to conduct the following ongoing work: • Rulemaking • Responding to public inquiries and requests for documents and information about permits and persistent pollutants. • Assisting permit writers in reviewing plans submitted by permittees during the permit renewal or issuance process and incorporating the plans into permits. • Adopting a schedule, developing persistent pollutant report updates, and updating the priority list of persistent pollutants. This will include regular informational updates to the EQC and reporting to the legislature on a schedule to be developed by DEQ. This position will have to consult with interested parties and may lead advisory committees. • $30,000 of projected Attorney Generals costs. • A General Fund "restoration" that covers the increased costs of the LD positions that the surcharge will be short by.		1 FT +2LD/ Part Time	1 + 2 LD	GF - $316k; OF - $178k	GF (LD positions are from OF)	HQ: 1 NRS4, 2 LD NRS4
132 - Producer Responsibility for Waste Products (PP, LC) [LQ-2]	Some products have unique waste management challenges. They contain toxics or multiple materials, making them costly and difficult to recycle or safely dispose of in the traditional waste management system. As a result, the public lacks convenient and safe recycling or disposal options. This increases the risk of mismanagement and human health / environment impacts. Finally, where these products are handled through the current system, local governments and ratepayers bear the fiscal burden.	The legislative concept requires that manufacturers rather than local governments manage specified products so as to enhance the opportunities for recycling or safe disposal. Under this proposal, the Legislature would define the statutory criteria and stakeholder process for DEQ to use to identify the appropriate products or product categories. The EQC would make the final determination on any staff recommendations based on the statutory criteria. Specified products could not be sold unless DEQ approved the manufacturer's plan for the collection, recycling or safe disposal of these products. Initially, existing funding would used to set up the program and support 2 FTEs (i.e., one program lead and one supporting position). Later, manufacturer fees could provide the necessary funding. This proposal could be coupled with pharmaceutical "take-back" legislation currently under discussion.		1.83	1.83	OF - $281k	OF (existing fees)	HQ - 1 NRS3, 1 PA1

DRAFT 2009 LEG ATIVE AGENDA

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
153 - Toxic Chemical Reduction (PP) [CP-1]	Current programs do not address all aspects of toxics control, including the lack of information, the fact that toxics are not "point source" pollutants and thus spread in a diffuse manner, and the significant volume of chemicals entering the marketplace. While all of DEQ's major programs address toxics, there is no agency-wide approach as DEQ lacks the resources to integrate toxics reduction actions across all environmental media (air, water, land). Finally, there are no resources to implement an "upstream" strategy to fill the gaps in the existing regulatory system.	This package proposes to develop and implement an integrated, cross-media toxics reduction strategy with an emphasis on "upstream" measures. One FTE would work to integrate, enhance and prioritize existing toxics reduction efforts (e.g., SB 737, Portland Air Toxics Reduction Plan, etc.). This position would also coordinate DEQ activities with other state agencies and stakeholders. A second FTE would develop and implement an "upstream" strategy to fill the gaps in the current regulatory approaches to toxics. This strategy would likely encompass the following measures to reduce the toxicity of chemicals, fuels, and products used in Oregon: toxic chemical information and data disclosure; evaluation and prioritization of toxics; research and promotion of alternatives; and development of regulatory controls. Upon completion of the "upstream" strategy, the 0.5 FTE would assist in implementation.		2.5	2.5	GF - $485k	GF	HQ - 1 NRS4, 2 NRS2s
129- Pesticide Stewardship Partnerships (PP) [WQ-10]	In 2000, DEQ and other organizations initiated a Pesticide Stewardship Partnership (PSP) project, designed to use surface water monitoring data to focus the implementation of voluntary best management practices. This collaborative approach resulted in decreases in average pesticide concentrations over time. Due to the success of the Hood River project, PSPs were launched in five other watersheds in the state. There is growing interest in expanding the PSPs to include more watersheds, pesticides and land uses. However, all of the current projects are funded by small, competitive grants, and a more stable source funding is needed to maintain and expand the projects.	This proposed package would support DEQ's efforts by providing stable resources to implement the following activities: • Collect surface water samples in the 5 watersheds where PSPs are now operating and add 3 new watersheds: 1 focus on surface water, 1 focus groundwater, and the other to target an area that will likely have both surface and groundwater concerns. • Conduct laboratory analyses for an expanded list of pesticides that includes a range of herbicides, insecticides, and fungicides that are commonly used in the selected watersheds. • Interpret and evaluate pesticide data, and develop reports, presentations and outreach materials that facilitate the effective communication of the data results to local stakeholders. • Evaluate and propose best management practices for pesticide users in specific watersheds that are designed to reduce pesticide drift, runoff or toxicity.		5	5	GF - $1,102k	GF	Lab: 1 NRS4, 1 NRS2; 1 Chem1; and 1 Chem3 HQ: 1 NRS3
129 - Continued		• Coordinate and implement outreach and technical assistance activities for pesticide users that lead to the reduction of pesticide concentrations. • Provide appropriate level of Quality Assurance for all surface and groundwater samples taken • Fund 4 Pesticide Collection Events ($80,000).						

DRAFT 2009 LEGISLATIVE AGENDA

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
111 Heat Smart for Clean Air (PP, LC) [AQ-2]	Residential heating with old, uncertified woodstoves releases fine particles and air toxics such as benzene that contribute to a myriad of human health effects. Heat Smart is a critical component of plans to meet and maintain the federal fine particulate standard and meet state air toxics benchmarks.	The LC will establish a grant and loan program to remove old, uncertified woodstoves and replace them with new, cleaner alternatives, require the removal of uncertified woodstoves upon home sale and provide authority for the EQC to update Oregon woodstove standards. Policy package/bill fiscal requests GF for .5 FTE phased-in to implement grant program and $50K to get the grant fund started. The balance of the grant funding, approx $400K would come from open burning and asbestos penalties.	N	0.25	.25 GF	GF- $100K, OF - $400K	GF & OF	HQ - .5 (phase-in) PA 1
117 Smoke Program Coordination (PP, LC) [AQ-9]	Reducing burning is a key strategy to improve air quality in Oregon.	The LC will phase down field burning in the Willamette Valley over several years as new alternatives to burning (such as use of grass straw for fuel or power) are developed. The LC will include a process for EQC to allow more acres to be burned than otherwise permitted in a given year upon a demonstration that viable alternatives are not yet available. The LC would also direct DEQ to provide support and coordination for open burning and smoke management programs. Bill fiscal/policy package adds 2 FTE for the coordination function.	N	2.0	2.0	GF - $345K	GF	Location HQ, 2 NRS2
131 - Emergency Preparedness and Response (PP) [LQ-3]	Currently, DEQ lacks a local presence in each region to engage local governments and other stakeholders in the necessary planning and coordination for effective emergency preparedness. Additionally, the existing DEQ staff available for emergency response has limited capacity for regional outreach.	This policy package improves DEQ's emergency preparedness by placing an FTE in each region (for a total of 3 new FTEs), allowing them to develop relationships with local governments and key stakeholders. Such outreach, training and coordination is essential to effective catastrophic planning and maintaining a high degree of readiness. This package also improves DEQ's emergency response to oil and hazardous substance spills by adding back-up State-on-Scene Coordinators in each region. Funding for these positions would be allocated 2/3 from GF and 1/3 from Hazardous Substance Remedial Action Fund (HSRAF) monies. HSRAF, however, may be legally used for only a portion of these costs.		3	3	GF- $380k; OF - $163k	GF / OF (existing fees)	ER, WR, NWR - 1 NRS3 each
118 Air Quality Assistance to Agriculture (PP) [AQ-10]	SB 235 established a Dairy Task Force, which may make recommendations for legislation or funding related to dairies.	DEQ's policy package would add an agricultural emissions and control technology expert to support DEQ work.	N	1.0	1.0	GF - $173K	GF	Location ER, 1 NRS2
Diesel emission reductions (LC only) [AQ-3]	Diesel engine exhaust is one of the most prevalent toxic air pollutants in Oregon, and contributes significantly to fine particulate pollution, regional haze, smog and global warming.	LC will add authorities to prevent dumping of high-emitting engines from other states into Oregon (high emitting trucks and equipment that can not be used in California). Rules would be developed in 2009-2011 by existing staff, and implementation would be delayed at least two years as required by the CAA. Implementation would not occur until 2013-2015.	N	N	N	N		

DRAFT 2009 LEGISLATIVE AGENDA

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Water Theme								
128- Clean Water Plan Implementation (PP) [WQ-8 & 13]	Nonpoint source pollution is a major water quality problem in OR. DEQ does not have the resources needed to have a collaborative and comprehensive program that works with stakeholders and other agencies needed to effectively and efficiently reduce nonpoint source pollution. In addition, the federal 106 grant appropriation for Oregon is expected to remain flat while our costs have increased.	The purpose of this proposal is to: • Restore the existing TMDL position that is unaffordable in 2009-2011. • Increase staff resources for TMDL implementation and nonpoint source pollution control in Eastern Region for surface and ground water (quality and quantity). • Increase staff resources to evaluate the effectiveness restoration and protection strategies to help stakeholders identify what does and does not work at the project and programmatic levels for restoring and protecting water quality. • Increase staff resources for statewide nonpoint source program coordination and consistency. • Assess success of nonpoint source work and opportunities for additional water quality improvement from all land uses, forestry, urban and agricultural. • Provide stable funding to maintain and operate two mercury wet deposition monitoring stations which will provide data for the Willamette Mercury TMDL ($96,000).	1	3	4	GF- $910k	GF	ER: 2 NRS3, HQ: 1 NRS3
122- Water Quality Program Support (PP) [WQ-2]	The WQ program is currently involved in at least 17 separate legal cases and needs help managing all of it and coordinating all of the rulemakings the program is involved in. The WQ program also needs a full-time Deputy to ensure that internal and external needs are met.	The purpose of this package is to ensure that all of the WQ program's internal and external needs are met, that our rulemaking process is done as efficiently and accurately as possible, and that all of our legal issues are managed and coordinated appropriately. The WQ Administrator needs more time working strategically within DEQ, with other state, local and federal agencies, the regulated community and special interest groups; and promoting awareness of environmental issues and division programs to the public and the regulated community. The deputy will provide oversight for division operations, including internal systems and infrastructure, which will facilitate program integration and communication between policy (headquarters), implementation (regions) and monitoring (laboratory); and will facilitate progress on major WQ projects and initiatives. This package will also include an additional $250,000 for Attorney General costs.		2	2	GF - $715k	GF	HQ: 1 PEMF, 1 OPA3

DRAFT 2009 LEGISLATIVE AGENDA

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
161- Water Quality Program Enhancement (PP) [WQ-9]	The goal of High Priority Outcome 5 is to adopt a Water Quality Strategic Plan for Infrastructure to guide investments to support well-developed and maintained data systems to provide easier, faster access to information.	This proposal will provide the technology resources necessary to improve work methods and make current, accurate information easily accessible to DEQ staff as well as the public. The result will be to: • Necessary upgrades to the UIC, Onsite and SIS Databases (other priorities will follow when these projects are complete). • Initial implementation of the e-Discharge Monitoring Report project (will be a pilot). • Provide necessary resources to fully support WQ's projects in BSD. • Provide dedicated resources for the Water Quality program to develop and maintain tools to conduct water quality assessments for the 303 (d) list, 305 (b) list and use in the TMDL, nonpoint source and permit programs.		5	5	GF - $984k	GF	HQ: 2 ISS4, 1 NRS3, 1 ISS7, Lab: 1 ISS4
133 - Orphan Site Cleanup Operations & Maintenance (PP) [LQ-4]	O&M costs impose a significant and recurring commitment upon limited orphan site cleanup funds. Typically, O&M costs are paid by bond financing, thereby reducing the dollars actually available for cleanup.	This policy package requests General Funds to pay O&M costs associated with orphan site cleanup projects. In 2007, the Legislature authorized a $4.5M bond sale – an amount insufficient to pay O&M expenses and to continue already-in-progress site work and cleanup in 2009-11. This package would request a $1.5M appropriation to cover the expected O&M expenses for 2009-11.			N/A	$1.5 m.	GF	
166- Restore Onsite Septic System Program [WQ-15]	Fee revenue for this program has declined because: Douglas County took over the onsite program, reducing revenue by the equivalent of >2.0 FTE; and the slow economy is projected to have an adverse effect on fee revenue.	The purpose of this package is to restore the existing positions that we cannot afford for the 2009-11 Biennium. The WQ Program expects to have 2.5 FTE that will be unaffordable next biennium.	2.5 FTE		2.5 FTE	OF- $515k	OF/ Fees	TBD
127- Water Quality 401 Project Certification (PP, LC) [WQ-11]	The 401 Water Quality Certification program is a statewide program that is funded partially by general fund (1FTE) and partially by fees (.75 FTE.) Currently, some applicants (approximately 52%) under the program are exempt from fees. DEQ is working with an advisory committee on a new fee structure that would assess fees for all projects that require a 401 Certification for removal/fill projects. To change the fee structure, we will have to modify/eliminate the existing statutory exemptions.	This proposal includes fully funding existing positions and adding an additional 1.5 FTE for a total of 3.5 FTE plus manager time and funds for needed Information Technology work. Approval of the fee increase will allow us to better protect water quality in the state and provide increased assistance to guide applicants through the 401 certification process through: • Timely review of all project proposals. • Increased participation in pre-application meetings. • Development of guidance documents. • Participation in the state streamlining efforts. • Coordination and integration of other DEQ program requirements when appropriate. • Increase customer service and efficiency.	1.4	1.5	2.9	OF- $515k	OF/ Fees	WR : 1 NRS3 NWR: 0.5 NRS2

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
123- Drinking Water Protection (PP) [WQ-17]	Safe drinking water is important for citizens in Oregon. There are over 3600 public water systems in Oregon that serve 3 million people. Protecting sources of drinking water – rivers, lakes and underground sources – protects people's health and minimizes the treatment costs. DEQ has worked in partnership with the Oregon Department of Human Services (DHS) since 1997 to help communities protect their drinking water sources.	This package continues federally-funded limited duration positions to help carry out the requirements of the 1996 Federal Safe Drinking Water Act Amendments (SDWA) and assist communities with protecting their public water sources.		5.5 LD	5.5 LD	FF (as OF) - $1,107k	FF	HQ: 2 NRS4, 1NRS3, 1 ISS6 WR: 1 NRS3 Lab: 0.25 Chem 2
163- Wave Energy (PP) [WQ-5]	DEQ is involved in settlement discussions for wave energy projects that are unfunded.	This package will provide the resources to cover the work and Attorney General costs associated with the various proposed wave energy projects in Oregon.		0	0	GF - $171k	GF	

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Agency Infrastructure Theme								
140 Information Management Infrastructure (PP) [AM-1]	DEQ's growing demands for modern electronic systems, information asset security, and quick access to information require strategic, integrated planning & agile systems. Management capacity, current systems and related software are inadequate to support e-commerce and public access to data, LAN administrator positions are incomplete, administrative policies are out of date.	Request Chief Information Officer, Information Services Manager, restore GIS services; improve servers, expand system bandwidth & information storage capacity; LAN administrator positions; position for policy coordination & operational work.		7	7 plus $300K one-time capital outlay	$1,579k	Indirect	HQ / regions: 1 PEM F, 1 PEM E, 2 ISS4, 1 ISS5, 1 OPA
152 Public Access to Environmental Information (PP) [CP-4]	DEQ is facing and will continue to face increasing demand to provide more and better environmental information to the public via the internet. DEQ's effort to date has been funded by squeezing existing resources but we lack the capacity to make the considerable changes being demanded. Among these is to convert raw environmental data and scientific reports into easy-to-understand formats, improve upon system limitations to provide reliable, easy access via the internet, and provide permits on line.	The purpose of this package is to provide additional staff and funds to develop the infrastructure and architecture to make significant improvements to DEQ's external web site and the quality of information provided, including easy-to understand explanations of scientific information and interactive maps and graphics depicting air and water quality permitted and monitoring and results. These improvements will require extracting data, producing reports, editing scientific reports into layperson terms, Graphics/GIS specialists to visually represent data, web improvements to support easy public access. The package includes contract money & one supporting analyst to enhance the DEQ Facility Profiler (long overdue), extending the breadth of information provided, as demanded by the public, including facility-associated permits, compliance, and enforcement information. Also adds 1 FTE per program (3 total) as dedicated full-time web technicians.		6	6 plus $700K one-time contracts	$1,327k	GF	HQ, Lab, Divisions: 1 ISS5, 1 scientific editor, I graphic artist, 3 web tech
150 Environmental Information Exchange Network (PP) [CP-2]	EPA grants continue to fund the work to develop the infrastructure to meet EPA's new reporting requirements, and the network requires permanent operations and maintenance support.	Begin next round of EPA funded grant work on Environmental Information Exchange Network (add electronic Discharge Monitoring Reports, Global Climate Change Registry) and fund operations and maintenance of Exchange Network services.	2	1.5	3.5	$662k	3 FTE FF 0.5 FTE GF	HQ: 0.5 ISS5
151 E-Commerce (PP) [CP-3]	Presently the extent of our online permitting options includes the ability to download forms that must be filled out and mailed in.	In 0911 we can begin to develop online permitting/licensing applications that would allow an applicant to submit or complete an application online, pay fees, and receive timely verification of receipt & approval. Start with simpler licenses and permits and work toward more complex permits in following biennia. Also complete development work of consolidated on-line invoicing.		1	1	$208k	GF	HQ: 1 ISS 5

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
141 Human Resources Service Delivery (PP) [AM-2]	HR needs of regional offices are not adequately served, current HR capacity does not allow for focus on regional labor relations; NRS series class review will result in significant class & comp work .	Add 1 HR professional staff to better serve the regional offices on labor relations & an LD to handle class & comp work that will result from DAS class study.		2	2	$351k	Indirect	HQ: 1 HRA3, 1 HRA2 (LD)
124- Clean Water State Revolving Fund Program (PP) [WQ-7]	The Environmental Protection Agency requires the Clean Water State Revolving Fund (CWSRF) program to complete a State Environmental Review process for all projects that receive a CWSRF loan. The new process of conducting reviews for all projects in a consistent manner is additional work for the SRF Program. In addition, there are many small communities in Oregon that need assistance with planning for necessary water and wastewater infrastructure projects. **This package relates to Packages 181 (Clean Water SRF - Loans and Bonds) and Package 191 (Clean Water SRF - Debt Service).**	The purpose of this package is to ensure there are adequate resources to complete the required Environmental Review for all new SRF projects. Additionally, this package will include technical positions to assist municipalities regarding water and wastewater infrastructure and opportunities for reducing their carbon footprints, work associated with the required EPA Clean Watershed Needs Survey, and additional "marketing" of the SRF program that EPA has suggested.		4	4	OF - $677k	OF/ SRF Administrative Account	HQ: 1 OPA1, 2 EE2, 1 PA3

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Monitoring and Assessment Theme								
115 Air Quality Monitoring and Analysis (PP) [AQ-6]	Current air quality monitoring resources are inadequate to meet the needs created by new federal standards and increasing concern about health risks from toxic air pollution. These needs include: determining compliance with standards, assessing health risks, developing and implementing strategies to reduce health risks, and providing information to the public.	Policy package requests new resources that would add air toxics sites, provide for additional data analysis, add fine particulate sites and ozone sites. Resources would support the following work in priority order: an air toxics site - yr 1 St. Helens, yr 2 The Dalles; a position for data analysis, interpretation and presentation; 2 portable PM 2.5 monitors with Ontario, Prineville, St. Helens and Newberg as most likely initial locations; 1 mobile ozone monitor; mobile CAFO fence-line monitor; an air toxics site yr 1 K. Falls, yr 2 Toledo; fixed ozone site, a second mobile CAFO fence-line monitor; add a real-time VOC monitor to a toxics site; an air toxics site - yr 1 Newberg, yr 2 Springfield or Hermiston; 2 PM 2.5 speciation sites with Burns, Lakeview or Hillsboro as possible locations; ozone site with Hermiston, Ontario or southern Willamette Valley as possible locations. Capital needs total $355K.		8.0	8.0	GF $1,919K	GF	Lab-4 NRS1, 2 NRS3, 2 Chem3
413- Monitoring for Climate Change [WQ-3]	DEQ has maintained an ambient monitoring network for conventional pollutants for over 40 years. DEQ, ODF and ODA receive many questions regarding the quality of waters in various land use types. These questions cannot be answered with the information from the current ambient network. Additionally, effectiveness monitoring for the Forest Practice Act Riparian Rules, Senate Bill 1010 and TMDL implementation plans has not occurred, though these programs have been in place for years. To do this efficiently, effectively and consistently, Oregon needs a collaborative interagency effort to monitoring high level indicators across the state. In addition, during the 07-09 bienium, DEQ has not been able to fulfill the cooperative work agreement with the Oregon Department of Fish and Wildlife to implement monitoring activities in compliance with the Coastal Coho Conservation Plan.	The purpose of this proposal is to enhance the existing Oregon Plan monitoring program to additional watersheds in the state and to provide resources for DEQ to meet the agreement with ODFW for the monitoring and analysis work in the Coastal Coho areas. In addition, DEQ will be able to increase the number of ambient monitoring sites primarily in agricultural areas by 21 and primarily in private forested areas by 21. This information will help us further understand the quality of rivers and streams in these land use types. Additionally, the data will include reference sites to allow DEQ to track climate change impacts to Oregon's waterways.This package includes a $94,000 contract for analysis of samples and $20,000 of equipment.		2 PF +12 Seasonal temps	2 PF +12 Seasonal Temps	GF- $1,124K	GF	Lab: 2 NRS1, 2 NRS1 temps, 1 Chem 3 temp, 1 Chem 1 temp
126- Coastal Beach Bacteria Monitoring (PP) [WQ-18]	The Beach Act authorized EPA grants to states and tribes to help develop and implement beach monitoring programs. If states or tribes don't implement a beach monitoring program, the EPA must take over.	This package continues the work we do to monitor beaches in Oregon. This package will increase by .2 FTE from the 2007-09 budget to help out during the busy monitoring times.		1.2 LD	1.2 LD	FF (as OF) - $250k	FF	Lab: 1.2 NRS2

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
125- Marine Reserves (PP) [WQ-4]	The Governor has committed to establishing a limited system of less than ten marine reserves off the Oregon Coast and to ensuring adequate resources be allocated for the scientific assessment of Marine Reserves. To do the requested work, DEQ needs additional resources to conduct monitoring and assessment of the new Marine reserves, to do necessary rule revisions, and provide technical information regarding proposed marine reserves.	The purpose of this proposal is to ensure DEQ has adequate resources dedicated to participate in the selection of the size, scope, and location of the proposed marine reserves and the implementation of those. DEQ will use these resources to monitor water quality, toxics in fish tissue and benthic in-fauna as a biological community condition indicator in the nominated and adopted Marine Reserves, to establish baseline trends over time and identify environmental stressors to the marine organisms within the reserves. In addition, DEQ needs resources to work on agency rule revisions and policy anticipated to be necessary during the selection process and as a result of the creation of marine reserves. This package includes a $42,000 contract for analysis of samples and $150,000 for necessary equipment.		2 + Temps	2 + Temps	GF- $684k	GF	Lab: 1.0 NRS3, 0.5NRS2, 0.5Chem 3 and HQ-0.5NRS3

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Miscellaneous Packages								
113 Maintain Streamlined Vehicle Inspection (PP) [AQ-4]	Vehicle Inspection Program (VIP) fees were last increased in 1999. Through ongoing streamlining and efficiencies, DEQ was able to reduce emission testing staff, control costs and avoid a fee increase for twice as long as originally anticipated. Further efficiencies are no longer available, and by the 2009-2011 biennium, VIP revenue will be insufficient to support the program. Without additional revenue, DEQ will be forced to cut staffing at our stations and have longer customer wait times.	DEQ will request a VIP fee increase to adequately fund the program. As part of the fee increase, DEQ will address the difference in the Portland fee ($21/certificate) and Medford fee ($10/certificate), and the number of free retests. DEQ will also ensure that interagency transfers from DMV for DMV services fully cover the cost of those services.	18.00		18.0	$2,782K	OF	VIP restore 17.63 FTE
157 Compliance & Enforcement Data Management (PP) [Part of Enf-4]	DEQ has a strategic objective to ensure that its enforcement actions are timely, consistent and predictable. As part of its overall enforcement goals, DEQ must improve existing compliance and enforcement databases to reduce the time staff spend entering dulicative data and to ensure that the agency has reliable data to use in assessing the effectiveness of current enforcement strategies and developing future strategies, and to answer questions posed by legislators, by reporters, and by the public.	The purpose of this proposal is to enhance DEQ's compliance and enforcement program by developing necessary data-collection mechanisms and databases and to increase OCE web presence.	0	1	1	$198K for LD ISS5	GF	BSD
154 Environmental crimes prosecution (PP) [Enf-3]	DEQ and OSP invest significant resources investigating violations of environmental law. Some violations are done with criminal intent and these egregious cases should be prosecuted throught the criminal system because administrative penalties are not adequate. Our research shows that criminal prosecutions are stronger motivators than civil penalties in creating deterrence. While county district attorneys generally agree with our recommendations that certain violations should be prosecuted criminally, county resource limitations often make prosecution untimely or impossible. This wastes DEQ and OSP investigation resources, creates an ironic result in which the most signifcant violators are not penalized, and prevents us from creating deterrence which benefits the environment.	Assistant Attorney Generals in the District Attorney Assistance Section of DOJ would supplement the county district attorneys in prosecuting state environmental crimes committed in the DEQ-administered programs. The extent of the AAG involvement would range from advising the county district attorney to handling the case development, supplemental investigation (through the DOJ investigators), and prosecution of the cases. Costs not payable by the District Attorney Assistance fund would be charged to DEQ.	0	0	0	$169K	GF	

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
119 Complete Title V Staffing Phase-in (LC, PP) [AQ-8]	SB 107, adopted in 2007, increased Title V fees and changed the frequency of the rulemaking to adjust the fee for inflation, but failed to make corresponding changes in the calculation of inflation. The net effect is that program revenue will always be behind by one year on inflation adjustments.	The LC will correct the 2007 legislation and provide for inflation increases as intended. Policy Package adds a regional position in 2009-2011 as agreed to in the 2007 fee increase negotiations.	N	1.0	1.0	OF - $180K	OF	Regional - 1 EE2
114 Implement New Federal Air Toxic Requirements (PP, LC) [AQ-5]	EPA is in the process of adopting emission standards for 70 different categories of toxic air pollutants. Most are small businesses (area sources) and include businesses like auto body repair shops, paint strippers and parts coaters. Under current law, these sources must obtain air quality permits.	The LC will authorize EQC to adopt a registration fee for certain source categories. This will enable DEQ to offer registration in lieu of permitting for sources that meet green business certification standards. Since the registration fee would fund program implementation, DEQ would be able to exempt many small businesses from permitting while still ensuring compliance with federal emission standards.	N	5.5 (phase in)	5.5	OF-$808K	OF	Regions - 3 NRS2, 2.25 NRS1, .25 ELS (HQ)
134 - Electronics Recycling Law Implementation (PP) [LQ-5]	Due to a lack of information, DEQ could not provide a complete cost estimate for the 2007 e-waste recycling legislation. As a result, the E-waste program will request that the Legislature's Emergency Board approve contract limitation (probably at the September '08 meeting) to cover the 2007-09 costs of the state contractor portion of the program (recycling fees from manufacturers will cover the estimated costs). When that request goes before the Emergency Board, it will be too late for the Legislatively Approved Budget, which defines the 2009-11 budget. As a result, the 2009-11 request for contract limitation must be in the form of a policy package.	The E-waste program will need a policy package to request contract limitation from the Legislature to cover the 2009-11 costs of the state contractor e-waste recycling program. Again, those costs will be covered by recycling fees from those manufactures choosing to participate in the state contractor program.				Unknown at this time	Manufacturer fees	

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
155 Environmental enforcement (PP) [Part of Enf-4]	(1) Currently, there is no person responsible for gathering and tracking changes to DEQ's internal management directive for enforcement (aka Enforcement Guidance), but such person will be necessary as OCE implements results of its Kaizen process-improvement initiative, develops guidance and processes for expedited enforcement offers, and coordinates with DEQ media program managers about program priorities. (2) "General deterrence" to non-compliance relys on the public perception that there is a high probablity that violations will recieve penalty and that the penalty will be applied soon after the violation. The additional ELS resource will prosecute DEQ administrative enforcement actions and assist in improving timeliness of enforcement actions.	The purpose of this proposal is to add additional staff resource to DEQ's compliance and enforcement program by developing and implementing new enforcement processes resulting from the Kaizen process-improvement initiative and adoption of expedited enforcement offer rules, to assist programs in rule and permit development, to advise inspectors in developing enforcement referrals, and to prosecute enforcement cases.	0	1	1	$210K for ELS	GF	OCE
156 Environmental crimes investigation (PP) [Enf-2]	Currently there is only one Oregon State Police trooper assigned to investigate envionmental crimes in cooperation with DEQ. For lack of resource, some environmental crimes leads are not followed up with investigation and some inefficiencies exist with the one trooper having to travel the whole state and handling interviews alone.	Add one additional OSP trooper to investigate environmental crimes in the DEQ-administered programs so that fewer leads of potential environmental crimes are not investigated. The trooper likely would be positioned in an area of the state distant to Portland to cut down on travel time to investigation sites but would be available as necessary to assist in investigations throughout the state.	0	0	0	230K	GF	Medford
116 Clean Air Transportation Collaboration (PP) [AQ-7]	Transportation system decisions can have significant air quality impacts, including violations of air quality standards, exposure to toxic air pollutants and increases in greenhouse gas emissions. DEQ does not have resources to help transportation planning agencies address these issues during the planning stages, which can lead to delays in road construction projects and downstream costs to address air quality impacts.	Policy package requests new resources for DEQ and Lane Regional Air Protection Agency (LRAPA) to assist local, regional and state transportation agencies in planning, constructing and operating transportation infrastructure to avoid or minimize air quality impacts. This includes participation in metropolitan planning organizations, technical analyses of system impacts and alternatives, developing air quality performance standards for transportation projects, and addressing public concerns about air quality during project review. Funding would be provided from new transportation funding proposals through an interagency agreement with ODOT.	N	4 + 115K for LRAPA	4.0	OF- $718K	OF	Region, 3 NRS2, HQ 1.0 NRS3, LRAPA

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Enf-1 Penalty maximum enhancement (LC Only)	(1) The $10,000 per day statutory maximum penalty applicable to most DEQ penalties, and the $20,000 per day maximum penalty applicable to negligent spills of oil into waters of the state, were set in 1973. Because of inflation, these penalties in today's dollars are only worth 20% to 25% of their original potency. Certain other less-often used penalties are also low. (2) Economic benefit is part of the minimum requirements for federal delegation, but some believe the penalty authority in ORS 468.130 is not clear that the EQC has authority to assess it. (3) The criminal code inadvertently sets misdemeanor and felony penalties for corporate perpetrators of environmental crime at less than the penalties that a natural person, trust, partnership, or other entity would be liable for when committing the same crime.	(1) Increase the statutory maximum penalties. (2) Add economic benefit to the list of factors the EQC must consider when assessing a civil penalty. (3) Eliminate the inadvertent protection for corporate criminals.	0	0	0	$0	likely addn'l rev. for GF, UST, spills	
Definitions								
N=No	TBD=Unknown at this time							
X=Yes	PP=Policy Package							
P=Possible	LC=Legislative Concept							
	*Restoration means existing FTE that is no longer affordable.							

DEQ DRAFT 2009 LEG LATIVE CONCEPTS

Agency Number	Name	Problem Statement	Brief Description of Proposal	PP	LC	Fund Type	Relates to Toxics(T), Water(W), Climate Chg(C), Infrast(I)
34000/1	**AQ-1 GHG Cap and Trade and Other Emission Reduction Programs**	HB 3543 established Greenhouse Gas (GHG) reduction goals for the state, and the Governor asked the EQC to adopt mandatory GHG reporting rules. The next step is to develop market based programs to reduce GHG emissions.	The DEQ LC will fill gaps in GHG reporting authority, add authority for a cap and trade program, add fees for reporting and cap and trade and add authority to adopt other GHG emission reduction measures and incentives.	Y	Y	GF/OF	C
34000/2	**AQ-2 Heat Smart**	Residential heating with old, uncertified woodstoves releases fine particles and air toxics such as benzene that contribute to a myriad of human health effects. Heat Smart is a critical component of plans to meet and maintain the federal fine particulate standard and meet state air toxics benchmarks.	The LC will establish a grant and loan program to remove old, uncertified woodstoves and replace them with new, cleaner alternatives, require the removal of uncertified woodstoves upon home sale and provide authority for the EQC to update OR woodstove standards.	Y	Y	GF and Penalties	T
34000/3	**AQ-3 Clean Emission Standards for Nonroad Vehicles**	Diesel engine exhaust is one of the most prevalent toxic air pollutants in Oregon, and contributes significantly to fine particulate pollution, regional haze, smog and global warming.	The LC will address a gap (non-road engines) in the Environmental Quality Commission's (EQC) authority to establish emission standards for diesel engines that could lead to "dumping" of older, dirtier, vehicles from California into Oregon.	Y	Y	GF, FF, OF	T
34000/4	**AQ-5 Alternative to Permitting**	EPA is about to adopt national air toxics standards (National Emissions Standards for Hazardous Air Pollutants -NESHAP) for 70 different source categories. Most are small businesses (area sources) and include businesses like auto body repair shops, paint strippers and parts coaters. They would like compliance options other than a permit.	The LC will authorize a registration fee (lower than a permit fee) for source categories that choose compliance options beyond compliance required by a permit.	Y	Y	OF	T
34000/5	**AQ-8 Title V Fee Technical Correction**	SB 107, adopted in 2007, increased Title V fees and changed the frequency of the Consumer Price Index (CPI) rulemaking but failed to make corresponding changes in the CPI calculation. The net effect is a loss of one CPI increase each biennia.	The LC will correct the 2007 legislation and provide for CPI increases as intended.	N	Y	OF	
4000/6	**AQ-9 Burning Phase Down and Smoke Management Coordination**	Reducing burning is a key strategy to improve air quality in Oregon.	The LC will phase down field burning in the Willammette Valley over several years as new alternatives to burning are developed and include a process for EQC to allow more acres to be burned than otherwise permitted in a given year upon a demonstration that viable alternatives are not yet available. The LC would also direct DEQ to provide support and coordination for open burning and smoke management programs.	P	Y	TBD	T
4000/7	**LQ-1 Bottle Bill Changes**	The task force is currently meeting to discuss further changes to the bottle bill law. Those issues include whether the statute should be expanded for additional items, the amount of the redemption, whether recycling should occur at retail locations or some other place, etc. Given the visibility of this law, DEQ should have a legislative "placeholder" for the 2009 session.	Placeholder for possible 2009 legislation.	TBD	TBD	TBD/OF	C
4000/8	**LQ-2 Producer Responsibility for Difficult-to-Manage Products**	Some products have unique waste management challenges. They contain toxics or multiple materials, making them costly and difficult to recycle or safely dispose of in the traditional waste management system. As a result, the public lacks convenient and safe recycling or disposal options. This increases the risk of mismanagement and human health / environment impacts. Finally, where these products are handled through the current system, local governments and ratepayers bear the fiscal burden.	The LC requires manufacturers rather than local governments to manage specified products so as to enhance their recycling or safe disposal. Through this LC, the Legislature would define the process/criteria for DEQ to identify the appropriate products or categories. The EQC would make the final determination under the statute. Specified products could not be sold unless DEQ approved the manufacturer's plan for the collection, recycling or safe disposal of these products.	Y	Y	OF	C, T

DEQ DRAFT 2009 LEGISLATIVE CONCEPTS

Agency Number	Name	Problem Statement	Brief Description of Proposal	PP	LC	Fund Type	Relates to Toxics(T), Water(W), Climate Chg(C), Infrast(I)
34000/9	**WQ-11 401 Water Quality Fee Revision**	The 401 Water Quality Certification (fill and removal projects) program's fee structure exempts approximately 52% of applicants from fees. Many of these dredge and fill projects in rivers, lakes, streams, and wetlands are complex and take a great deal of time.	The purpose of this proposal is to remove/modify the exemptions and have a equitable fee structure that will provide sustainable funding for the program.	Y	Y	OF/fees	W
34000/10	**Enf-1 Penalty maximum enhancement**	The $10,000 per day statutory maximum penalty applicable to most DEQ penalties, and the $20,000 per day maximum penalty applicable to negligent spills of oil into waters of the state, were set in 1973. Because of inflation, today's penalties are only worth 20% to 25% of their original potency.	Increase the statutory maximum penalties.	N	Y		T, W
	Definitions						
	N=No						
	X=Yes						
	P=Possible						
	TBD=Unknown at this time						
	PP=Policy Package						
	LC=Legislative Concept						

Item N
presentation

DEQ's 2009-11 Legislative Agenda/Budget Request

June 20, 2008 EQC Talking Points - Greg Aldrich and Jim Roys

Brief Presentation Outline

- Legislative agenda timeline update
- Stakeholder involvement
- Legislative concepts update
- Review of policy packages
- Budget overview
- Next steps

Legislative Agenda Timeline Update:

- Review timeline **handout**
    - Review of June and July activities
    - DEQ internal process
    - Key DAS deadlines
    - Key EQC dates

Stakeholder Outreach:

- E-mail to key stakeholders with a budget overview and leg concept summary sheet
- Group and individual meetings
    - Some meetings focused on overview of entire budget
    - Some meetings focused on specific packages and fee increases
    - Summary of key groups
- Overall theme of comments – generally supportive, but concerned with affordability
- Ongoing outreach through summer, fall and into 2009 Session

Legislative Concepts (LC):

- **Package Item/Handout**
    - DAS has approved all DEQ leg concepts for drafting
    - List of LCs – indicate significant changes
    - Non-DEQ legislative concepts of great interest
        - ODA agricultural emissions LC

- June 27 – deadline for placeholder leg concepts
- July 14 – deadline for agencies to submit major revisions to Leg Counsel
- Dec. 16 – deadline for the Governor to pre-file draft bills prior to Session

Policy Packages:

Key Deadlines:

- June 30 submittal to DAS for audit; focus on positions
- August 20-21 EQC Meeting
- September 1 – Agency Request Budget submittal

Policy Package Context

- Recap of major budget drivers:
  - 2007 was very positive; however, we have not been fully restored from previous loss of General Fund (GF) from 2002-2005 during the regular and Special Sessions
  - Declining or flat federal funding (FF)
    - No inflationary increases for FF

- Policy packages have been built around the 5 main themes along with several miscellaneous packages.
    - Many packages support core work
    - Some allow DEQ to take on new high priority work
  - Climate change – directive from the Governor
  - Toxics – emerging work and further supporting some core work
  - Water – essentially to support core work
  - Agency infrastructure – focus on rebuilding or restoring agency support efforts that are needed to build capacity and improve service delivery both within and outside of DEQ
  - Monitoring and assessment – supporting core work and expanding into assessing the effectiveness of some nonpoint source programs
  - Miscellaneous – a large restoration for the core work of the Vehicle Inspection Program; efforts to better support enforcement efforts

Policy Packages

- Review of significant changes that have occurred since April **(Memo and Handout)**
  - Walk through structure and intent of handout; brief overview
  - Walk through individual packages
    - Focus on more significant changes

  - Please feel free to contact me if you have questions or would like a more detailed briefing

Draft DEQ Package Priority Rankings

- April – list of policy packages that were partially or fully funded by GF
- Since April
  - Executive Management Team added all other packages
  - Ranked all packages; recommended the ranking to Dick
  - Dick concurred with this package priority ranking

- Now – do you have thoughts or concerns?
  - Do you concur?
  - Do you propose to make modifications?

Budget Overview – Jim

Begin with where DEQ is today, with the 2007-09 Legislative Adopted Budget, shown in Figure 1. DEQ experienced a very successful 2007 legislative budget session, restoring many position that were lost over the 3 prior biennia.

Figure 1

- Note 5 program areas make up the "Operating Budget"
- Program areas comprised of subprograms with limits on fungibility
- Non-limited (Clean Water SRF loans) not subject to legislative limitation
- Debt Service for bonds issued for Orphans, Clean Water SRF

Figure 2

Moving into the upcoming budget period (2009-11), DEQ implemented negotiated salary adjustments, COLAs, inflation on other costs. DEQ must then balance a budget, called the Modified Essential Budget Level (MEBL) prior to legislative actions. The result is shown in Figure 2, the 2009-11 "Affordable Budget".

- AQ lower due to 17.6 FTE reduction in Vehicle Inspection
- WQ lower due to
  - Positions authorized only for 2007-09:
    - 4.5 FTE, Drinking Water Protection
    - 1.0 FTE, SB 737 Toxics position
    - 1.0 FTE, Beach Monitoring
  - Position not affordable in 2009-11:
    - 4.5 FTE, On-Site Septic Systems
    - 1.5 FTE, 401 Dredge and Fill
    - 1.0 FTE, TMDL

- Cross Program lower due to
    - Information Network Exchange
    - Tax Credits
    - Liquefied Natural Gas (LNG)
    - Bio-Terrorism
- Policy Packages request to restore or continue many on these.

Figure 3

In addition to the restoration or continuation of current work into the 2009-11 biennium, DEQ has proposed an aggressive expansion of its environmental protection efforts in the Policy Packages previously discussed. Figure 3 provides a summary of the Policy Package Budget and FTE totals.

- 39 Policy Packages, $67 Million, 119 FTE
    - $14.5M General Fund
    - $12.0M Other Fund
    - $ 0.6M Federal Fund
    - $40.1M Non-limited, expands Clean Water SRF loans
- Electronic Recycling Law Implementation Package $$$ not included

Figure 4

The DEQ 2009-11 Agency Request Budget (ARB) is comprised of the "Affordable" budget plus the Policy Packages, effectively adding Figure 3 to Figure 2 to create Figure 4

- Total AR Budget is $359M, 881 FTE.
- Operating Budget comprises roughly 2/3 ($228M) of total budget
    - $ 49.7M General Fund
    - $ 5.6M Lottery Fund
    - $141.6M Other Fund
    - $ 31.5M Federal Fund
- Figure 5 provides the summary of FTE, by Program area

Figure 5

2009-11 Agency Budget Request

Figure 6

The proposed expansion of environmental services is funded mainly on General Fund, resulting in a net increase in the percentage of General and Lottery Funds for the Operating Portion of DEQ's budget, as shown in Figure 6.

Figure 7

The DEQ Agency Request Budget continues the restoration and growth of environmental services, as shown in Figure 7.

- Recovery started with the 2007-09 budget.
- 2009-11 MEBL (Affordable Budget) is lower than 2007-09
- Biennium 2001-03 through 2005-07 FTE include Limited Duration Vehicle Inspectors for enhanced testing, now discontinued.

Next Steps:

Next EQC meeting – August 21-22 – focus on final budget development

- Update of the Agency Budget Request (ARB)
- EQC certifies the agency budget request for September 1 submittal
- Update on legislative concepts

Moving Forward/EQC Involvement – Seeking your feedback

1. Given the information you've heard today, does the Commission see any red flags? If so, what are they?
2. Do you concur with DEQ submitting this budget request to DAS for their audit on June 30?
3. What types of information does the Commission need between now and the August meeting?
4. Do you have any guidance about the August EQC meeting briefing – what do you need to know so the Chair can sign the budget certification?

Item N
presentation

DEQ's 2009-11 Legislative Agenda Development Timeline

June 2007

- DEQ's 2007-09 Budget was adopted

October 2007

- 18-19 EQC Strategic Planning Session and Discussion

December 2007

- 14 – EQC meeting to share preliminary concepts for the legislative agenda

Late 2007 through February 2008

- Development begins on 2009-11 Budget
    - Determine cost of currently approved programs adjusting for 2009-11 costs
    - Estimate future revenues
    - Determine "restorations" needed to cover future costs
    - Develop budget package proposals for new work that DEQ anticipates doing
    - Develop legislative concepts

February 2008

- 22 - EQC Meeting – focus on draft legislative concepts and budget policy packages

March 2008

- 6– Budget and Legislative Concept Instructions are released by DAS
- Ongoing legislative concept and budget policy package proposal development

April 2008

- Stakeholder Outreach
- Ongoing legislative concept and budget policy package proposal development
- 4 – Legislative concepts are due to DAS
- 24-25 – EQC Meeting – focus on budget development

May 2008

- Stakeholder Outreach
- Ongoing budget development

June 2008

- **2– DAS submits approved legislative concepts to Legislative Counsel**
- **19-20 – EQC Meeting – update on legislative agenda and approval of initial budget submittal to DAS on 6/30**
- **30 – Budget request submitted to DAS for audit**

July 2008

- Budget narrative development
- 14 – Last day to modify legislative concepts

August 2008

- Budget narrative development
- 21-22 – EQC Meeting – legislative agenda update and Chair signs the Budget Certification Form (part of the agency of budget request document)

September 2008

- 1 – Agency Request Budget due to DAS and Governor

Fall 2008

- DEQ works with Legislative Counsel on draft bills (legislative concepts)
- DAS and Governor review DEQ budget request
- Governor's Recommended Budget submitted to the Legislature
- Governor pre-session files approved bills

January 2009

- 12 – 2009 Legislative Session begins

6/16/08

DEQ DRAFT 2009 LEGISLATIVE CONCEPTS

Agency Number	Name	Problem Statement	Brief Description of Proposal	PP	Fund Type	Relates to Toxics(T), Water(W), Climate Chg(C), Infrast(I)
34000/1	**AQ-1 GHG Cap and Trade and Other Emission Reduction Programs**	HB 3543 established Greenhouse Gas (GHG) reduction goals for the state, and the Governor asked the EQC to adopt mandatory GHG reporting rules. The next step is to develop market based programs to reduce GHG emissions.	The DEQ LC will fill gaps in GHG reporting authority, add authority for a cap and trade program, add fees for reporting and cap and trade and add authority to adopt other GHG emission reduction measures and incentives.	Y	GF/OF	C
34000/2	**AQ-2 Heat Smart**	Residential heating with old, uncertified woodstoves releases fine particles and air toxics such as benzene that contribute to a myriad of human health effects. Heat Smart is a critical component of plans to meet and maintain the federal fine particulate standard and meet state air toxics benchmarks.	The LC will establish a grant and loan program to remove old, uncertified woodstoves and replace them with new, cleaner alternatives, require the removal of uncertified woodstoves upon home sale and provide authority for the EQC to update OR woodstove standards.	Y	GF and Penalties	T
34000/3	**AQ-3 Clean Emission Standards for Nonroad Vehicles**	Diesel engine exhaust is one of the most prevalent toxic air pollutants in Oregon, and contributes significantly to fine particulate pollution, regional haze, smog and global warming.	The LC will address a gap (non-road engines) in the Environmental Quality Commission's (EQC) authority to establish emission standards for diesel engines that could lead to "dumping" of older, dirtier, vehicles from California into Oregon.	Y	GF, FF, OF	T
34000/4	**AQ-5 Alternative to Permitting**	EPA is about to adopt national air toxics standards (National Emissions Standards for Hazardous Air Pollutants -NESHAP) for 70 different source categories. Most are small businesses (area sources) and include businesses like auto body repair shops, paint strippers and parts coaters. They would like compliance options other than a permit.	The LC will authorize a registration fee (lower than a permit fee) for source categories that choose compliance options beyond compliance required by a permit.	Y	OF	T
34000/5	**AQ-8 Title V Fee Technical Correction**	SB 107, adopted in 2007, increased Title V fees and changed the frequency of the Consumer Price Index (CPI) rulemaking but failed to make corresponding changes in the CPI calculation. The net effect is a loss of one CPI increase each biennia.	The LC will correct the 2007 legislation and provide for CPI increases as intended.	N	OF	
34000/6	**AQ-9 Burning Phase Down and Smoke Management Coordination**	Reducing burning is a key strategy to improve air quality in Oregon.	The LC will phase down field burning in the Willammette Valley over several years as new alternatives to burning are developed and include a process for EQC to allow more acres to be burned than otherwise permitted in a given year upon a demonstration that viable alternatives are not yet available. The LC would also direct DEQ to provide support and coordination for open burning and smoke management programs.	P	TBD	T

DEQ DRAFT 2009 LEGISLATIVE CONCEPTS

Agency Number	Name	Problem Statement	Brief Description of Proposal	PP	Fund Type	Relates to Toxics(T), Water(W), Climate Chg(C), Infrast(I)
34000/7	**LQ-1 Bottle Bill Changes**	The task force is currently meeting to discuss further changes to the bottle bill law. Those issues include whether the statute should be expanded for additional items, the amount of the redemption, whether recycling should occur at retail locations or some other place, etc. Given the visibility of this law, DEQ should have a legislative "placeholder" for the 2009 session.	Placeholder for possible 2009 legislation.	TBD	TBD/OF	C
34000/8	**LQ-2 Producer Responsibility for Difficult-to-Manage Products**	Some products have unique waste management challenges. They contain toxics or multiple materials, making them costly and difficult to recycle or safely dispose of in the traditional waste management system. As a result, the public lacks convenient and safe recycling or disposal options. This increases the risk of mismanagement and human health / environment impacts. Finally, where these products are handled through the current system, local governments and ratepayers bear the fiscal burden.	The LC requires manufacturers rather than local governments to manage specified products so as to enhance their recycling or safe disposal. Through this LC, the Legislature would define the process/criteria for DEQ to identify the appropriate products or categories. The EQC would make the final determination under the statute. Specified products could not be sold unless DEQ approved the manufacturer's plan for the collection, recycling or safe disposal of these products.	Y	OF	C, T
34000/9	**WQ-11 401 Water Quality Fee Revision**	The 401 Water Quality Certification (fill and removal projects) program's fee structure exempts approximately 52% of applicants from fees. Many of these dredge and fill projects in rivers, lakes, streams, and wetlands are complex and take a great deal of time.	The purpose of this proposal is to remove/modify the exemptions and have a equitable fee structure that will provide sustainable funding for the program.	Y	OF/fees	W
34000/10	**Enf-1 Penalty maximum enhancement**	The $10,000 per day statutory maximum penalty applicable to most DEQ penalties, and the $20,000 per day maximum penalty applicable to negligent spills of oil into waters of the state, were set in 1973. Because of inflation, today's penalties are only worth 20% to 25% of their original potency.	Increase the statutory maximum penalties.	N		T, W
	Definitions					
	N=No					
	X=Yes					
	P=Possible					
	TBD=Unknown at this time					
	PP=Policy Package					
	LC=Legislative Concept					

State of Oregon
Department of Environmental Quality

MEMO

To: Environmental Quality Commission

From: Greg K Aldrich, DEQ Government Relationship Coordinator

Subject: Agenda Item N – Supplemental Information
Attachment A of the Agenda Item N Staff Report

Dear Commissioners,

This package includes Attachment A of the Agenda Item N Staff Report for the Draft 2009 Legislative Agenda. It is a draft ranking of policy packages in priority order. The rest of this staff report is included in your binder. However, this priority ranking was not available at the time the binder was compiled. Also attached are the updated draft 2009 Legislative Agenda matrix and the current list of DEQ legislative concepts. These are for your review and then they will be part of the discussion at your meeting on June 20.

At your April meeting, you asked that we flag the changes that have occurred to the draft 2009 Legislative Agenda since the document you saw in April. Many changes have occurred in the past two months and this memo will highlight the significant changes. I am not flagging minor text changes, changes in classifications of positions (e.g. from a Natural Resources Specialist 3 to a 2) or changes in costs for any single policy package that is under $50,000.

DEQ Package Priority List – (Attachment A of the Agenda Item N Staff Report)

In April you saw an earlier version of this that included all the potential General Fund packages at the time. Since then, the Executive Management Team (EMT) has made some minor changes in the General Fund ranking order. The bigger change is that this list now includes all 39 policy packages, regardless of funding type. This is required by the Department of Administrative Services (DAS) as part of the budget development process. The EMT developed a draft priority list to recommend to Dick for his consideration. Dick reviewed the list and concurred with the priority ranking as presented. Please note at the bottom of the list, there are totals for costs by fund types and total positions. This list is now before you for your review. We need to include a final priority ranking when we submit the budget numbers to DAS for audit on June 30.

Draft 2009 Legislative Agenda Matrix

A number of changes have occurred since April. Budgeting cost estimates have been sharpened, package titles have changed to be more precise, and a number of position classifications have changed as part of the Human Resource position review process. Also packages have been renumbered to reflect the official budget book numbering system. The old package identifier numbers are shown in brackets [AQ-1, WQ-17, etc.]; these are provided as a cross reference should you want to refer back to the information provided in April.

The matrix is still presented by the major themes:

- climate change
- toxics

- water
- agency infrastructure
- monitoring and assessment
- miscellaneous packages.

Under each theme, the packages now reflect the priority ranking of the individual packages. For those legislative concepts that do not have a companion budget request, the legislative concept is presented at the end of the policy packages in the theme grouping.

Below is a listing of significant changes that have occurred for a number of the policy packages. Only those packages that have been significantly modified are included. There have been many less significant changes since April, but we want to focus your attention on the bigger changes. Significant changes for any policy package have been defined as:

- Changes in costs greater than $50,000. In many cases, the reduction of costs can be attributed to better cost estimating and reduction in the PERS rate for staff positions
- Difference of one or more positions
- New or deleted packages.

Packages are listed in the order they are found in the legislative matrix, not in numerical order. This should be helpful as you page through the document.

Packages with Significant Changes:

- Package 110 – added 1.0 Full Time Equivalent Position (FTE); costs reduced by $923,000. This represents a refinement of the package which has been evolving over the past few months.
- Package 153 – costs reduced by $55,000
- Package 129 – costs reduced by $62,000
- Package 131 – costs reduced by $75,000
- Package 128 – former packages WQ-8 and WQ-13 have been combined into one new package. Also, WQ-13 was a request for a restoration of 3 FTEs. Revised budget numbers indicate that 2 of the 3 positions will still be affordable in 2009-11, thus a restoration is needed for only one FTE. The combined costs have been reduced by $355,000.
- Package 161 – costs reduced by $75,000
- Package 166 – This package is for the restoration of Onsite positions that are not affordable in 2009-11. Revised budget numbers indicate that the program will be able to afford up to 2.5 FTE that did not appear affordable in early April. The costs have decreased by $531,000.
- Package 127 – the matrix better reflects the 1.5 FTE that is not affordable going into 2009-11, which means the total FTE request is now 2.9. Total package costs have actually decreased by $81,000.
- Package 123 – costs reduced by $169,000.
- Package 140 – an additional position has been added, though costs have not changed significantly (down about $21,000)
- Package 152 – increased costs by $127,000; no change in FTE
- Package151 – decreased staffing by 2 FTE and costs reduced by over $1 million. This package has been restructured to reflect that most of the work will actually occur in 2011-13. This is because other infrastructure improvements are needed prior to fully implementing the E-commerce work.
- Package 124 – costs reduced by $150,000.
- Package 115 – costs reduced by $303,000, which represents a scaling back of the proposed work activities.
- Package 413 – this package has grown by 2 permanent FTE and 2 seasonal FTEs, with an associated cost increase of $521,000. The original water quality monitoring and assessment package has been augmented to include work on behalf of ODA and ODF.

- Package 125 – this package has decreased by 1 FTE and there are reduced costs of $169,000. This represents the use of seasonal employees and the resulting reduction of staffing costs.
- Package 113 – refined budgeting has moved this from a "TBD" stage to a restoration request of 18 FTE for $2,782,000.
- Packages 157 and 155 – these two packages make up the former package Enf-4. The package was divided as the work components represent separate activities which are better packaged individually.
- Package 114 – this package was restructured from 7 FTE (permanent and limited duration) to 5.5 permanent FTE. There is a reduction in costs of $319,000.
- Package 116 – costs reduced by $72,000.
- Two packages that were shown in the April matrix have been deleted. These were WQ-16 Restoration of the Underground Injection Control Program and AM-3 Agency Management Restorations. At the time, the initial budget numbers indicated that we would not be able to afford several positions 2009-11 in both program areas, thus restoration packages would be needed to provide new funding and maintain the positions. Additional budget refinement has indicated that these positions are affordable and a restoration package is not needed.

We will be able to provide more details about these significant changes at your June EQC meeting.

DEQ Draft 2009 Legislative Concepts

There have not been any significant changes with the 10 legislative concepts that were submitted to DAS in April. All 10 have been approved by DAS and the Governor's Office to go forward to Legislative Counsel for drafting. The drafting process will occur during the summer and fall.

Should you have any questions about this information and would like to discuss it prior to the meeting on June 20, please call me at 503-229-6345.

Attachments:

- Draft DEQ Package Priority Rankings (Attachment A of the Agenda Item N staff report)
- Draft 2009 Legislative Agenda
- DEQ Draft 2009 Legislative Concepts

K:\EQC\EQC Meetings\2008\June\Item N Memo of Chgs btw April & June 2008.doc

DRAFT 2009 LEGISLATIVE AGENDA

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Climate Change Theme								
110 Climate Change: Greenhouse Gas Reduction (PP, LC) [AQ-1]	HB 3543 established state Greenhouse Gas (GHG) reduction goals to address severe environmental, health and economic impacts of global warming. The Governor has joined the Western Climate Initiative - which is developing a cap and trade program to reduce GHG emissions - and has asked the Environmental Quality Commission (EQC) to adopt GHG reporting rules as a next step.	The DEQ LC will provide authority for EQC to adopt a cap and trade program, fill gaps in EQC's authority to require GHG emission reporting, add fees to fund the cap and trade and reporting work, and add authority to adopt other GHG emission reduction measures and incentives. While the package requests 10.5 FTE in total, the GF portion is 3.0 FTE. GF would support a manager for the Climate Change section, 1 FTE for GHG reduction planning (beyond cap and trade) and a policy analyst to work with EPA, regional, national and international organizations on policies to meet GHG reduction goals. The GF request would also include funding for dues to the Western Climate Initiative (WCI) and The Climate Registry (TCR) $50-$100K, contract dollars for database development $250K, DOJ resources $50K and $115 K to support similar activities for LRAPA.	N	10.5 (inc WQ & LQ FTE)	7.5 OF, 3.0 GF	GF - $920K, OF - $1,404K	GF/OF	HQ: .5 NRS2, 3 NRS3, 1 NRS 4, 1 OS2, 2 NRS 2, 1 ISS4, 1 OPA4, 1 PEME
162- Water Quality Review for ASR Projects [WQ-6]	Intensive water use in the Umatilla Basin, primarily for high value agriculture, has led to serious depletion of the deep basalt aquifers and declines in water quality in the shallow alluvial aquifers. This area has been declared a Critical Groundwater Area by WRD and is a Groundwater Management Area (established by DEQ). Proposals for Aquifer Storage and Recovery (ASR) projects are being developed. More resources are needed to fully engage in the proactive regional planning of these projects.	The purpose of this package is to allow DEQ to work with WRD, agricultural and other stakeholders to ensure that future ASR and AR projects don't result in further degradation of shallow groundwater quality, but rather restore water quantity in depleted deep aquifers while simultaneously improving shallow aquifer quality.		1	1	GF - $196k	GF	ER: NRS3
LQ-1 Bottle Bill Changes (LC Only)	The task force is currently meeting to discuss further changes to the bottle bill law. Those issues include whether the statute should be expanded for additional items, the amount of the redemption, whether recycling should occur at retail locations or some other place, etc. Given the visibility of this law, DEQ should have a legislative "placeholder" for the 2009 session.	Placeholder for possible 2009 legislation.					TBD	

DRAFT 2009 LEGISLATIVE AGENDA

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Toxics Theme								
121- Ongoing Implementation of Senate Bill 737 [WQ-1]	SB 737, among other elements, requires Oregon's 52 large municipal wastewater treatment plants to develop plans by 2011 to reduce persistent pollutants through pollution prevention and toxics reduction. Through the fiscal impact statement of SB 737, DEQ told the 2007 Legislature and stakeholders that we would need to ask for additional resources during the 2009 Legislative session to support the ongoing work and associated Department of Justice costs for this program. In addition, this package will also include restoration funds to cover the work in year two (July 2009-June 2010) of the project to develop a report to the Legislature on Oregon's priority persistent pollutants that the fees will not cover due to increase in costs.	The purpose of this package is to be able to fully implement SB 737 and cover the cost of project Attorney General costs. DEQ will need a permanent position to conduct the following ongoing work: • Rulemaking • Responding to public inquiries and requests for documents and information about permits and persistent pollutants. • Assisting permit writers in reviewing plans submitted by permittees during the permit renewal or issuance process and incorporating the plans into permits. • Adopting a schedule, developing persistent pollutant report updates, and updating the priority list of persistent pollutants. This will include regular informational updates to the EQC and reporting to the legislature on a schedule to be developed by DEQ. This position will have to consult with interested parties and may lead advisory committees. • $30,000 of projected Attorney Generals costs. • A General Fund "restoration" that covers the increased costs of the LD positions that the surcharge will be short by. Note: The 2 LP positions are not funded by GF but by the		1 FT +2LD/Part Time	1 + 2 LD	GF - $316k; OF - $178k	GF (LD positions are from OF)	HQ: 1 NRS4, 2 LD NRS4
132 - Producer Responsibility for Waste Products (PP, LC) [LQ-2]	Some products have unique waste management challenges. They contain toxics or multiple materials, making them costly and difficult to recycle or safely dispose of in the traditional waste management system. As a result, the public lacks convenient and safe recycling or disposal options. This increases the risk of mismanagement and human health / environment impacts. Finally, where these products are handled through the current system, local governments and ratepayers bear the fiscal burden.	The legislative concept requires that manufacturers rather than local governments manage specified products so as to enhance the opportunities for recycling or safe disposal. Under this proposal, the Legislature would define the statutory criteria and stakeholder process for DEQ to use to identify the appropriate products or product categories. The EQC would make the final determination on any staff recommendations based on the statutory criteria. Specified products could not be sold unless DEQ approved the manufacturer's plan for the collection, recycling or safe disposal of these products. Initially, existing funding would used to set up the program and support 2 FTEs (i.e., one program lead and one supporting position). Later, manufacturer fees could provide the necessary funding. This proposal could be coupled with pharmaceutical "take-back" legislation currently under discussion.		1.83	1.83	OF - $281	OF (existing fees)	HQ - 1 NRS3, 1 PA1

DRAFT 2009 LEGISLATIVE AGENDA

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
153 - Toxic Chemical Reduction (PP) [CP-1]	Current programs do not address all aspects of toxics control, including the lack of information, the fact that toxics are not "point source" pollutants and thus spread in a diffuse manner, and the significant volume of chemicals entering the marketplace. While all of DEQ's major programs address toxics, there is no agency-wide approach as DEQ lacks the resources to integrate toxics reduction actions across all environmental media (air, water, land). Finally, there are no resources to implement an "upstream" strategy to fill the gaps in the existing regulatory system.	This package proposes to develop and implement an integrated, cross-media toxics reduction strategy with an emphasis on "upstream" measures. One FTE would work to integrate, enhance and prioritize existing toxics reduction efforts (e.g., SB 737, Portland Air Toxics Reduction Plan, etc.). This position would also coordinate DEQ activities with other state agencies and stakeholders. A second FTE would develop and implement an "upstream" strategy to fill the gaps in the current regulatory approaches to toxics. This strategy would likely encompass the following measures to reduce the toxicity of chemicals, fuels, and products used in Oregon: toxic chemical information and data disclosure; evaluation and prioritization of toxics; research and promotion of alternatives; and development of regulatory controls. Upon completion of the "upstream" strategy, the 0.5 FTE would assist in implementation.		2.5	2.5	GF - $485	GF	HQ - 1 NRS4, 2 NRS2s
129- Pesticide Stewardship Partnerships (PP) [WQ-10]	In 2000, DEQ and other organizations initiated a Pesticide Stewardship Partnership (PSP) project, designed to use surface water monitoring data to focus the implementation of voluntary best management practices. This collaborative approach resulted in decreases in average pesticide concentrations over time. Due to the success of the Hood River project, PSPs were launched in five other watersheds in the state. There is growing interest in expanding the PSPs to include more watersheds, pesticides and land uses. However, all of the current projects are funded by small, competitive grants, and a more stable source funding is needed to maintain and expand the projects.	This proposed package would support DEQ's efforts by providing stable resources to implement the following activities: • Collect surface water samples in the 5 watersheds where PSPs are now operating and add 3 new watersheds: 1 focus on surface water, 1 focus groundwater, and the other to target an area that will likely have both surface and groundwater concerns. • Conduct laboratory analyses for an expanded list of pesticides that includes a range of herbicides, insecticides, and fungicides that are commonly used in the selected watersheds. • Interpret and evaluate pesticide data, and develop reports, presentations and outreach materials that facilitate the effective communication of the data results to local stakeholders. • Evaluate and propose best management practices for pesticide users in specific watersheds that are designed to reduce pesticide drift, runoff or toxicity.		5	5	GF - $1,102k	GF	Lab: 1 NRS4, 1 NRS2; 1 Chem1; and 1 Chem3 HQ: 1 NRS3
129 - Continued		• Coordinate and implement outreach and technical assistance activities for pesticide users that lead to the reduction of pesticide concentrations. • Provide appropriate level of Quality Assurance for all surface and groundwater samples taken • Fund 4 Pesticide Collection Events ($80,000).						

DRAFT 2009 LEGISLATIVE AGENDA

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
111 Heat Smart for Clean Air (PP, LC) [AQ-2]	Residential heating with old, uncertified woodstoves releases fine particles and air toxics such as benzene that contribute to a myriad of human health effects. Heat Smart is a critical component of plans to meet and maintain the federal fine particulate standard and meet state air toxics benchmarks.	The LC will establish a grant and loan program to remove old, uncertified woodstoves and replace them with new, cleaner alternatives, require the removal of uncertified woodstoves upon home sale and provide authority for the EQC to update Oregon woodstove standards. Policy package/bill fiscal requests GF for .5 FTE phased-in to implement grant program and $50K to get the grant fund started. The balance of the grant funding, approx $400K would come from open burning and asbestos penalties.	N	0.25	.25 GF	GF- $100K, OF - $400K	GF & OF	HQ - .5 (phase-in) PA 1
117 Smoke Program Coordination (PP, LC) [AQ-9]	Reducing burning is a key strategy to improve air quality in Oregon.	The LC will phase down field burning in the Willamette Valley over several years as new alternatives to burning (such as use of grass straw for fuel or power) are developed. The LC will include a process for EQC to allow more acres to be burned than otherwise permitted in a given year upon a demonstration that viable alternatives are not yet available. The LC would also direct DEQ to provide support and coordination for open burning and smoke management programs. Bill fiscal/policy package adds 2 FTE for the coordination function.	N	2.0	2.0	GF - $345K	GF	Location HQ, 2 NRS2
131 - Emergency Preparedness and Response (PP) [LQ-3]	Currently, DEQ lacks a local presence in each region to engage local governments and other stakeholders in the necessary planning and coordination for effective emergency preparedness. Additionally, the existing DEQ staff available for emergency response has limited capacity for regional outreach.	This policy package improves DEQ's emergency preparedness by placing an FTE in each region (for a total of 3 new FTEs), allowing them to develop relationships with local governments and key stakeholders. Such outreach, training and coordination is essential to effective catastrophic planning and maintaining a high degree of readiness. This package also improves DEQ's emergency response to oil and hazardous substance spills by adding back-up State-on-Scene Coordinators in each region. Funding for these positions would be allocated 2/3 from GF and 1/3 from Hazardous Substance Remedial Action Fund (HSRAF) monies. HSRAF, however, may be legally used for only a portion of these costs.		3	3	GF- $380k; OF - $163k	GF / OF (existing fees)	ER, WR, NWR - 1 NRS3 each
118 Air Quality Assistance to Agriculture (PP) [AQ-10]	SB 235 established a Dairy Task Force, which may make recommendations for legislation or funding related to dairies.	DEQ's policy package would add an agricultural emissions and control technology expert to support DEQ work.	N	1.0	1.0	GF - $173K	GF	Location ER, 1 NRS2
Diesel emission reductions (LC only) [AQ-3]	Diesel engine exhaust is one of the most prevalent toxic air pollutants in Oregon, and contributes significantly to fine particulate pollution, regional haze, smog and global warming.	LC will add authorities to prevent dumping of high-emitting engines from other states into Oregon (high emitting trucks and equipment that can not be used in California). Rules would be developed in 2009-2011 by existing staff, and implementation would be delayed at least two years as required by the CAA. Implementation would not occur until 2013-2015.	N	N	N	N		

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Water Theme								
128- Clean Water Plan Implementation (PP) [WQ-8 & 13]	Nonpoint source pollution is a major water quality problem in OR. DEQ does not have the resources needed to have a collaborative and comprehensive program that works with stakeholders and other agencies needed to effectively and efficiently reduce nonpoint source pollution. In addition, the federal 106 grant appropriation for Oregon is expected to remain flat while our costs have increased.	The purpose of this proposal is to: • Restore the existing TMDL position that is unaffordable in 2009-2011. • Increase staff resources for TMDL implementation and nonpoint source pollution control in Eastern Region for surface and ground water (quality and quantity). • Increase staff resources to evaluate the effectiveness restoration and protection strategies to help stakeholders identify what does and does not work at the project and programmatic levels for restoring and protecting water quality. • Increase staff resources for statewide nonpoint source program coordination and consistency. • Assess success of nonpoint source work and opportunities for additional water quality improvement from all land uses, forestry, urban and agricultural. • Provide stable funding to maintain and operate two mercury wet deposition monitoring stations which will provide data for the Willamette Mercury TMDL ($96,000).	1	3	4	GF- $910k	GF	ER: 2 NRS3, HQ: 1 NRS3
122- Water Quality Program Support (PP) [WQ-2]	The WQ program is currently involved in at least 17 separate legal cases and needs help managing all of it and coordinating all of the rulemakings the program is involved in. The WQ program also needs a full-time Deputy to ensure that internal and external needs are met.	The purpose of this package is to ensure that all of the WQ program's internal and external needs are met, that our rulemaking process is done as efficiently and accurately as possible, and that all of our legal issues are managed and coordinated appropriately. The WQ Administrator needs more time working strategically within DEQ, with other state, local and federal agencies, the regulated community and special interest groups; and promoting awareness of environmental issues and division programs to the public and the regulated community. The deputy will provide oversight for division operations, including internal systems and infrastructure, which will facilitate program integration and communication between policy (headquarters), implementation (regions) and monitoring (laboratory); and will facilitate progress on major WQ projects and initiatives. This package will also include an additional $250,000 for Attorney General costs.		2	2	GF - $715k	GF	HQ: 1 PEMF, 1 OPA3

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
161- Water Quality Program Enhancement (PP) [WQ-9]	The goal of High Priority Outcome 5 is to adopt a Water Quality Strategic Plan for Infrastructure to guide investments to support well-developed and maintained data systems to provide easier, faster access to information.	This proposal will provide the technology resources necessary to improve work methods and make current, accurate information easily accessible to DEQ staff as well as the public. The result will be to: • Necessary upgrades to the UIC, Onsite and SIS Databases (other priorities will follow when these projects are complete). • Initial implementation of the e-Discharge Monitoring Report project (will be a pilot). • Provide necessary resources to fully support WQ's projects in BSD. • Provide dedicated resources for the Water Quality program to develop and maintain tools to conduct water quality assessments for the 303 (d) list, 305 (b) list and use in the TMDL, nonpoint source and permit programs.		5	5	GF - $984k	GF	HQ: 2 ISS4, 1 NRS3, 1 ISS7, Lab: 1 ISS4
133 - Orphan Site Cleanup Operations & Maintenance (PP) [LQ-4]	O&M costs impose a significant and recurring commitment upon limited orphan site cleanup funds. Typically, O&M costs are paid by bond financing, thereby reducing the dollars actually available for cleanup.	This policy package requests General Funds to pay O&M costs associated with orphan site cleanup projects. In 2007, the Legislature authorized a $4.5M bond sale -- an amount insufficient to pay O&M expenses and to continue already-in-progress site work and cleanup in 2009-11. This package would request a $1.5M appropriation to cover the expected O&M expenses for 2009-11.			N/A	$1.5 m.	GF	
166- Restore Onsite Septic System Program [WQ-15]	Fee revenue for this program has declined because: Douglas County took over the onsite program, reducing revenue by the equivalent of >2.0 FTE; and the slow economy is projected to have an adverse effect on fee revenue.	The purpose of this package is to restore the existing positions that we cannot afford for the 2009-11 Biennium. The WQ Program expects to have 2.5 FTE that will be unaffordable next biennium.	2.5 FTE		2.5 FTE	OF- $515k	OF/ Fees	TBD
127- Water Quality 401 Project Certification (PP, LC) [WQ-11]	The 401 Water Quality Certification program is a statewide program that is funded partially by general fund (1FTE) and partially by fees (.75 FTE.) Currently, some applicants (approximately 52%) under the program are exempt from fees. DEQ is working with an advisory committee on a new fee structure that would assess fees for all projects that require a 401 Certification for removal/fill projects. To change the fee structure, we will have to modify/eliminate the existing statutory exemptions.	This proposal includes fully funding existing positions and adding an additional 1.5 FTE for a total of 3.5 FTE plus manager time and funds for needed Information Technology work. Approval of the fee increase will allow us to better protect water quality in the state and provide increased assistance to guide applicants through the 401 certification process through: • Timely review of all project proposals. • Increased participation in pre-application meetings. • Development of guidance documents. • Participation in the state streamlining efforts. • Coordination and integration of other DEQ program requirements when appropriate. • Increase customer service and efficiency.	1.4	1.5	2.9	OF- $515k	OF/ Fees	WR : 1 NRS3 NWR: 0.5 NRS2

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
123- Drinking Water Protection (PP) [WQ-17]	Safe drinking water is important for citizens in Oregon. There are over 3600 public water systems in Oregon that serve 3 million people. Protecting sources of drinking water – rivers, lakes and underground sources – protects people's health and minimizes the treatment costs. DEQ has worked in partnership with the Oregon Department of Human Services (DHS) since 1997 to help communities protect their drinking water sources.	This package continues federally-funded limited duration positions to help carry out the requirements of the 1996 Federal Safe Drinking Water Act Amendments (SDWA) and assist communities with protecting their public water sources.		5.5 LD	5.5 LD	FF (as OF) - $1,107k	FF	HQ: 2 NRS4, 1NRS3, 1 ISS6 WR: 1 NRS3 Lab: 0.25 Chem 2
163- Wave Energy (PP) [WQ-5]	DEQ is involved in settlement discussions for wave energy projects that are unfunded.	This package will provide the resources to cover the work and Attorney General costs associated with the various proposed wave energy projects in Oregon.		0	0	GF - $171k	GF	

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Agency Infrastructure Theme								
140 Information Management Infrastructure (PP) [AM-1]	DEQ's growing demands for modern electronic systems, information asset security, and quick access to information require strategic, integrated planning & agile systems. Management capacity, current systems and related software are inadequate to support e-commerce and public access to data, LAN administrator positions are incomplete, administrative policies are out of date.	Request Chief Information Officer, Information Services Manager, restore GIS services; improve servers, expand system bandwidth & information storage capacity; LAN administrator positions; position for policy coordination & operational work.		7	7 plus $300K one-time capital outlay	$1,579k	Indirect	HQ / regions: 1 PEM F, 1 PEM E, 2 ISS4, 1 ISS5, 1 OPA
152 Public Access to Environmental Information (PP) [CP-4]	DEQ is facing and will continue to face increasing demand to provide more and better environmental information to the public via the internet. DEQ's effort to date has been funded by squeezing existing resources but we lack the capacity to make the considerable changes being demanded. Among these is to convert raw environmental data and scientific reports into easy-to-understand formats, improve upon system limitations to provide reliable, easy access via the internet, and provide permits on line.	The purpose of this package is to provide additional staff and funds to develop the infrastructure and architecture to make significant improvements to DEQ's external web site and the quality of information provided, including easy-to understand explanations of scientific information and interactive maps and graphics depicting air and water quality permitted and monitoring and results. These improvements will require extracting data, producing reports, editing scientific reports into layperson terms, Graphics/GIS specialists to visually represent data, web improvements to support easy public access. The package includes contract money & one supporting analyst to enhance the DEQ Facility Profiler (long overdue), extending the breadth of information provided, as demanded by the public, including facility-associated permits, compliance, and enforcement information. Also adds 1 FTE per program (3 total) as dedicated full-time web technicians.		6	6 plus $700K one-time contracts	$1,327k	GF	HQ, Lab, Divisions: 1 ISS5, 1 scientific editor, I graphic artist, 3 web tech
150 Environmental Information Exchange Network (PP) [CP-2]	EPA grants continue to fund the work to develop the infrastructure to meet EPA's new reporting requirements, and the network requires permanent operations and maintenance support.	Begin next round of EPA funded grant work on Environmental Information Exchange Network (add electronic Discharge Monitoring Reports, Global Climate Change Registry) and fund operations and maintenance of Exchange Network services.	2	1.5	3.5	$662k	3 FTE FF 0.5 FTE GF	HQ: 0.5 ISS5
151 E-Commerce (PP) [CP-3]	Presently the extent of our online permitting options includes the ability to download forms that must be filled out and mailed in.	In 0911 we can begin to develop online permitting/licensing applications that would allow an applicant to submit or complete an application online, pay fees, and receive timely verification of receipt & approval. Start with simpler licenses and permits and work toward more complex permits in following biennia. Also complete development work of consolidated on-line invoicing.		1	1	$208k	GF	HQ: 1 ISS 5

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
141 Human Resources Service Delivery (PP) [AM-2]	HR needs of regional offices are not adequately served, current HR capacity does not allow for focus on regional labor relations; NRS series class review will result in significant class & comp work .	Add 1 HR professional staff to better serve the regional offices on labor relations & an LD to handle class & comp work that will result from DAS class study.		2	2	$351k	Indirect	HQ: 1 HRA3, 1 HRA2 (LD)
124- Clean Water State Revolving Fund Program (PP) [WQ-7]	The Environmental Protection Agency requires the Clean Water State Revolving Fund (CWSRF) program to complete a State Environmental Review process for all projects that receive a CWSRF loan. The new process of conducting reviews for all projects in a consistent manner is additional work for the SRF Program. In addition, there are many small communities in Oregon that need assistance with planning for necessary water and wastewater infrastructure projects. **This package relates to Packages 181 (Clean Water SRF - Loans and Bonds) and Package 191 (Clean Water SRF - Debt Service).**	The purpose of this package is to ensure there are adequate resources to complete the required Environmental Review for all new SRF projects. Additionally, this package will include technical positions to assist municipalities regarding water and wastewater infrastructure and opportunities for reducing their carbon footprints, work associated with the required EPA Clean Watershed Needs Survey, and additional "marketing" of the SRF program that EPA has suggested.		4	4	OF - $677k	OF/ SRF Administrative Account	HQ: 1 OPA1, 2 EE2, 1 PA3

Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Monitoring and Assessment Theme								
115 Air Quality Monitoring and Analysis (PP) [AQ-6]	Current air quality monitoring resources are inadequate to meet the needs created by new federal standards and increasing concern about health risks from toxic air pollution. These needs include: determining compliance with standards, assessing health risks, developing and implementing strategies to reduce health risks, and providing information to the public.	Policy package requests new resources that would add air toxics sites, provide for additional data analysis, add fine particulate sites and ozone sites. Resources would support the following work in priority order: an air toxics site - yr 1 St. Helens, yr 2 The Dalles; a position for data analysis, interpretation and presentation; 2 portable PM 2.5 monitors with Ontario, Prineville, St. Helens and Newberg as most likely initial locations; 1 mobile ozone monitor; mobile CAFO fence-line monitor; an air toxics site - yr 1 K. Falls, yr 2 Toledo; fixed ozone site, a second mobile CAFO fence-line monitor; add a real-time VOC monitor to a toxics site; an air toxics site - yr 1 Newberg, yr 2 Springfield or Hermiston; 2 PM 2.5 speciation sites with Burns, Lakeview or Hillsboro as possible locations; ozone site with Hermiston, Ontario or southern Willamette Valley as possible locations. Capital needs total $355K.		8.0	8.0	GF $1,919K	GF	Lab-4 NRS1, 2 NRS3, 2 Chem3
413- Monitoring for Climate Change [WQ-3]	DEQ has maintained an ambient monitoring network for conventional pollutants for over 40 years. DEQ, ODF and ODA receive many questions regarding the quality of waters in various land use types. These questions cannot be answered with the information from the current ambient network. Additionally, effectiveness monitoring for the Forest Practice Act Riparian Rules, Senate Bill 1010 and TMDL implementation plans has not occurred, though these programs have been in place for years. To do this efficiently, effectively and consistently, Oregon needs a collaborative interagency effort to monitoring high level indicators across the state. In addition, during the 07-09 bienium, DEQ has not been able to fulfill the cooperative work agreement with the Oregon Department of Fish and Wildlife to implement monitoring activities in compliance with the Coastal Coho Conservation Plan.	The purpose of this proposal is to enhance the existing Oregon Plan monitoring program to additional watersheds in the state and to provide resources for DEQ to meet the agreement with ODFW for the monitoring and analysis work in the Coastal Coho areas. In addition, DEQ will be able to increase the number of ambient monitoring sites primarily in agricultural areas by 21 and primarily in private forested areas by 21. This information will help us further understand the quality of rivers and streams in these land use types. Additionally, the data will include reference sites to allow DEQ to track climate change impacts to Oregon's waterways.This package includes a $94,000 contract for analysis of samples and $20,000 of equipment.		2 PF +12 Seasonal temps	2 PF +12 Seasonal Temps	GF- $1,124K	GF	Lab: 2 NRS1, 2 NRS1 temps, 1 Chem 3 temp, 1 Chem 1 temp
126- Coastal Beach Bacteria Monitoring (PP) [WQ-18]	The Beach Act authorized EPA grants to states and tribes to help develop and implement beach monitoring programs. If states or tribes don't implement a beach monitoring program, the EPA must take over.	This package continues the work we do to monitor beaches in Oregon. This package will increase by .2 FTE from the 2007-09 budget to help out during the busy monitoring times.		1.2 LD	1.2 LD	FF (as OF) - $250k	FF	Lab: 1.2 NRS2

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
125- Marine Reserves (PP) [WQ-4]	The Governor has committed to establishing a limited system of less than ten marine reserves off the Oregon Coast and to ensuring adequate resources be allocated for the scientific assessment of Marine Reserves. To do the requested work, DEQ needs additional resources to conduct monitoring and assessment of the new Marine reserves, to do necessary rule revisions, and provide technical information regarding proposed marine reserves.	The purpose of this proposal is to ensure DEQ has adequate resources dedicated to participate in the selection of the size, scope, and location of the proposed marine reserves and the implementation of those. DEQ will use these resources to monitor water quality, toxics in fish tissue and benthic in-fauna as a biological community condition indicator in the nominated and adopted Marine Reserves, to establish baseline trends over time and identify environmental stressors to the marine organisms within the reserves. In addition, DEQ needs resources to work on agency rule revisions and policy anticipated to be necessary during the selection process and as a result of the creation of marine reserves. This package includes a $42,000 contract for analysis of samples and $150,000 for necessary equipment.		2 + Temps	2 + Temps	GF- $684k	GF	Lab: 1.0 NRS3, 0.5NRS2, 0.5Chem 3 and HQ- 0.5NRS3

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
Miscellaneous Packages								
113 Maintain Streamlined Vehicle Inspection (PP) [AQ-4]	Vehicle Inspection Program (VIP) fees were last increased in 1999. Through ongoing streamlining and efficiencies, DEQ was able to reduce emission testing staff, control costs and avoid a fee increase for twice as long as originally anticipated. Further efficiencies are no longer available, and by the 2009-2011 biennium, VIP revenue will be insufficient to support the program. Without additional revenue, DEQ will be forced to cut staffing at our stations and have longer customer wait times.	DEQ will request a VIP fee increase to adequately fund the program. As part of the fee increase, DEQ will address the difference in the Portland fee ($21/certificate) and Medford fee ($10/certificate), and the number of free retests. DEQ will also ensure that interagency transfers from DMV for DMV services fully cover the cost of those services.	18.00		18.0	$2,782K	OF	VIP restore 17.63 FTE
157 Compliance & Enforcement Data Management (PP) [Part of Enf-4]	DEQ has a strategic objective to ensure that its enforcement actions are timely, consistent and predictable. As part of its overall enforcement goals, DEQ must improve existing compliance and enforcement databases to reduce the time staff spend entering dulicative data and to ensure that the agency has reliable data to use in assessing the effectiveness of current enforcement strategies and developing future strategies, and to answer questions posed by legislators, by reporters, and by the public.	The purpose of this proposal is to enhance DEQ's compliance and enforcement program by developing necessary data-collection mechanisms and databases and to increase OCE web presence.	0	1	1	$198K for LD ISS5	GF	BSD

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
154 Environmental crimes prosecution (PP) [Enf-3]	DEQ and OSP invest significant resources investigating violations of environmental law. Some violations are done with criminal intent and these egregious cases should be prosecuted throught the criminal system because administrative penalties are not adequate. Our research shows that criminal prosecutions are stronger motivators than civil penalties in creating deterrence. While county district attorneys generally agree with our recommendations that certain violations should be prosecuted criminally, county resource limitations often make prosecution untimely or impossible. This wastes DEQ and OSP investigation resources, creates an ironic result in which the most signifcant violators are not penalized, and prevents us from creating deterrence which benefits the environment.	Assistant Attorney Generals in the District Attorney Assistance Section of DOJ would supplement the county district attorneys in prosecuting state environmental crimes committed in the DEQ-administered programs. The extent of the AAG involvement would range from advising the county district attorney to handling the case development, supplemental investigation (through the DOJ investigators), and prosecution of the cases. Costs not payable by the District Attorney Assistance fund would be charged to DEQ.	0	0	0	$169K	GF	
119 Complete Title V Staffing Phase-in (LC, PP) [AQ-8]	SB 107, adopted in 2007, increased Title V fees and changed the frequency of the rulemaking to adjust the fee for inflation, but failed to make corresponding changes in the calculation of inflation. The net effect is that program revenue will always be behind by one year on inflation adjustments.	The LC will correct the 2007 legislation and provide for inflation increases as intended. Policy Package adds a regional position in 2009-2011 as agreed to in the 2007 fee increase negotiations.	N	1.0	1.0	OF - $180K	OF	Regional - 1 EE2
114 Implement New Federal Air Toxic Requirements (PP, LC) [AQ-5]	EPA is in the process of adopting emission standards for 70 different categories of toxic air pollutants. Most are small businesses (area sources) and include businesses like auto body repair shops, paint strippers and parts coaters. Under current law, these sources must obtain air quality permits.	The LC will authorize EQC to adopt a registration fee for certain source categories. This will enable DEQ to offer registration in lieu of permitting for sources that meet green business certification standards. Since the registration fee would fund program implementation, DEQ would be able to exempt many small businesses from permitting while still ensuring compliance with federal emission standards.	N	5.5 (phase in)	5.5	OF- $808K	OF	Regions - 3 NRS2, 2.25 NRS1, .25 ELS (HQ)

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
134 - Electronics Recycling Law Implementation (PP) [LQ-5]	Due to a lack of information, DEQ could not provide a complete cost estimate for the 2007 e-waste recycling legislation. As a result, the E-waste program will request that the Legislature's Emergency Board approve contract limitation (probably at the September '08 meeting) to cover the 2007-09 costs of the state contractor portion of the program (recycling fees from manufacturers will cover the estimated costs). When that request goes before the Emergency Board, it will be too late for the Legislatively Approved Budget, which defines the 2009-11 budget. As a result, the 2009-11 request for contract limitation must be in the form of a policy package.	The E-waste program will need a policy package to request contract limitation from the Legislature to cover the 2009-11 costs of the state contractor e-waste recycling program. Again, those costs will be covered by recycling fees from those manufactures choosing to participate in the state contractor program.				Unknown at this time	Manufacturer fees	
155 Environmental enforcement (PP) [Part of Enf-4]	(1) Currently, there is no person responsible for gathering and tracking changes to DEQ's internal management directive for enforcement (aka Enforcement Guidance), but such person will be necessary as OCE implements results of its Kaizen process-improvement initiative, develops guidance and processes for expedited enforcement offers, and coordinates with DEQ media program managers about program priorities. (2) "General deterrence" to non-compliance relys on the public perception that there is a high probablity that violations will recieve penalty and that the penalty will be applied soon after the violation. The additional ELS resource will prosecute DEQ administrative enforcement actions and assist in improving timeliness of enforcement actions.	The purpose of this proposal is to add additional staff resource to DEQ's compliance and enforcement program by developing and implementing new enforcement processes resulting from the Kaizen process-improvement initiative and adoption of expedited enforcement offer rules, to assist programs in rule and permit development, to advise inspectors in developing enforcement referrals, and to prosecute enforcement cases.	0	1	1	$210K for ELS	GF	OCE
156 Environmental crimes investigation (PP) [Enf-2]	Currently there is only one Oregon State Police trooper assigned to investigate envionmental crimes in cooperation with DEQ. For lack of resource, some environmental crimes leads are not followed up with investigation and some inefficiencies exist with the one trooper having to travel the whole state and handling interviews alone.	Add one additional OSP trooper to investigate environmental crimes in the DEQ-administered programs so that fewer leads of potential environmental crimes are not investigated. The trooper likely would be positioned in an area of the state distant to Portland to cut down on travel time to investigation sites but would be available as necessary to assist in investigations throughout the state.	0	0	0	230K	GF	Medford

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Name	Problem Statement	Brief Description of Proposal	Restore Existing FTE	New FTE	Total FTE	Cost	Fund Type	Position Location
116 Clean Air Transportation Collaboration (PP) [AQ-7]	Transportation system decisions can have significant air quality impacts, including violations of air quality standards, exposure to toxic air pollutants and increases in greenhouse gas emissions. DEQ does not have resources to help transportation planning agencies address these issues during the planning stages, which can lead to delays in road construction projects and downstream costs to address air quality impacts.	Policy package requests new resources for DEQ and Lane Regional Air Protection Agency (LRAPA) to assist local, regional and state transportation agencies in planning, constructing and operating transportation infrastructure to avoid or minimize air quality impacts. This includes participation in metropolitan planning organizations, technical analyses of system impacts and alternatives, developing air quality performance standards for transportation projects, and addressing public concerns about air quality during project review. Funding would be provided from new transportation funding proposals through an interagency agreement with ODOT.	N	4 + 115K for LRAPA	4.0	OF-$718K	OF	Region, 3 NRS2, HQ 1.0 NRS3, LRAPA
Enf-1 Penalty maximum enhancement (LC Only)	(1) The $10,000 per day statutory maximum penalty applicable to most DEQ penalties, and the $20,000 per day maximum penalty applicable to negligent spills of oil into waters of the state, were set in 1973. Because of inflation, these penalties in today's dollars are only worth 20% to 25% of their original potency. Certain other less-often used penalties are also low. (2) Economic benefit is part of the minimum requirements for federal delegation, but some believe the penalty authority in ORS 468.130 is not clear that the EQC has authority to assess it. (3) The criminal code inadvertently sets misdemeanor and felony penalties for corporate perpetrators of environmental crime at less than the penalties that a natural person, trust, partnership, or other entity would be liable for when committing the same crime.	(1) Increase the statutory maximum penalties. (2) Add economic benefit to the list of factors the EQC must consider when assessing a civil penalty. (3) Eliminate the inadvertent protection for corporate criminals.	0	0	0	$0	likely addn'l rev. for GF, UST, spills	
Definitions								
N=No	TBD=Unknown at this time							
X=Yes	PP=Policy Package							
P=Possible	LC=Legislative Concept							
	*Restoration means existing FTE that is no longer affordable.							

Item N DEQ Packages in priority order.xls
rankings

PKG NO	Package Title	New Ranking	Limitation	FTE	GENERAL	OTHER	FEDERAL	Notes
110	Climate Change: Greenhouse Gas Reduction	1	2,323,230	10.50	919,561	1,403,669		
128	Clean Water Plan Implementation	2	910,962	4.00	910,962			
113	Maintain Streamlined Vehicle Inspection	3	2,781,777	17.63		2,781,777		
121	Ongoing Implementation of Senate Bill 737	4	494,496	2.00	316,181	178,315		
132	Producer Responsibility for Waste Products	5	281,263	1.83		281,263		
153	Toxic Chemical Reduction	6	484,588	2.50	484,588			
122	Water Quality Program Support	7	714,981	2.00	714,981			
140	Information Management Infrastructure	8	1,578,575	7.00		1,578,575		
152	Public Access to Environmental Information	9	1,327,471	6.00	1,327,471			
129	Pesticide Stewardship Partnerships	10	1,102,179	5.00	1,102,179			
150	Environmental Information Exchange Network	11	662,548	3.50	98,979		563,569	
111	Heat Smart for Clean Air	12	499,968	0.25	99,968	400,000		
161	Water Quality Program Enhancement	13	983,901	5.00	983,901			
157	Compliance & Enforcement Data Management	14	197,957	1.00	197,957			
117	Smoke Program Coordination	15	345,366	2.00	345,366			
133	Orphan Site Cleanup Operations & Maintenance	16	1,500,000		1,500,000			
154	Environmental Crimes Prosecution	17	169,000		169,000			
166	Restore Onsite Septic System Program	18	514,801	2.50		514,801		
127	Water Quality 401 Project Certification	19	515,132	2.90		515,132		
151	E-Commerce	20	207,587	1.00	207,587			
115	Air Quality Monitoring & Analysis	21	1,919,434	8.00	1,919,434			
131	Emergency Preparedness and Response	22	543,192	3.00	380,368	162,824		
119	Complete Title V Staffing Phase-in	23	179,464	1.00		179,464		
413	Monitoring for Climate Change	24	1,124,515	2.00	1,124,515			
114	Implement New Federal Air Toxics Requirements	25	808,382	5.50		808,382		
141	Human Resource Service Delivery	26	351,015	2.00		351,015		
181	Clean Water SRF - Loans & Bonds	27	30,060,000			30,060,000		Non-Limited Budget
191	Clean Water SRF - Debt Service	27	10,020,000			10,020,000		Non-Limited Budget
134	Electronics Recycling Law Implementation	28	-					Contract amount TBD
155	Environmental Enforcement Enhancement	29	210,156	1.00	210,156			
124	Clean Water State Revolving Fund Program	30	676,573	4.00		676,573		
123	Drinking Water Protection	31	1,107,204	5.50		1,107,204		
156	Environmental Crimes Investigation	32	230,000		230,000			
162	Water Quality Review for ASR Projects	33	196,471	1.00	196,471			
116	Clean-Air Transportation Collaboration	34	717,530	4.00		717,530		
126	Coastal Beach Bacteria Monitoring	35	250,293	1.25		250,293		
125	Marine Reserves	36	684,552	2.00	684,552			
163	Wave Energy	37	170,677		170,677			
118	Air Quality Assistance to Agriculture	38	172,683	1.00	172,683			
	TOTAL POLICY PACKAGES		67,017,923	117.86	14,467,537	51,986,817	563,569	

Figure 1
2007-2009 Legislative Adopted Budget Budget, By Program
$297,999,944

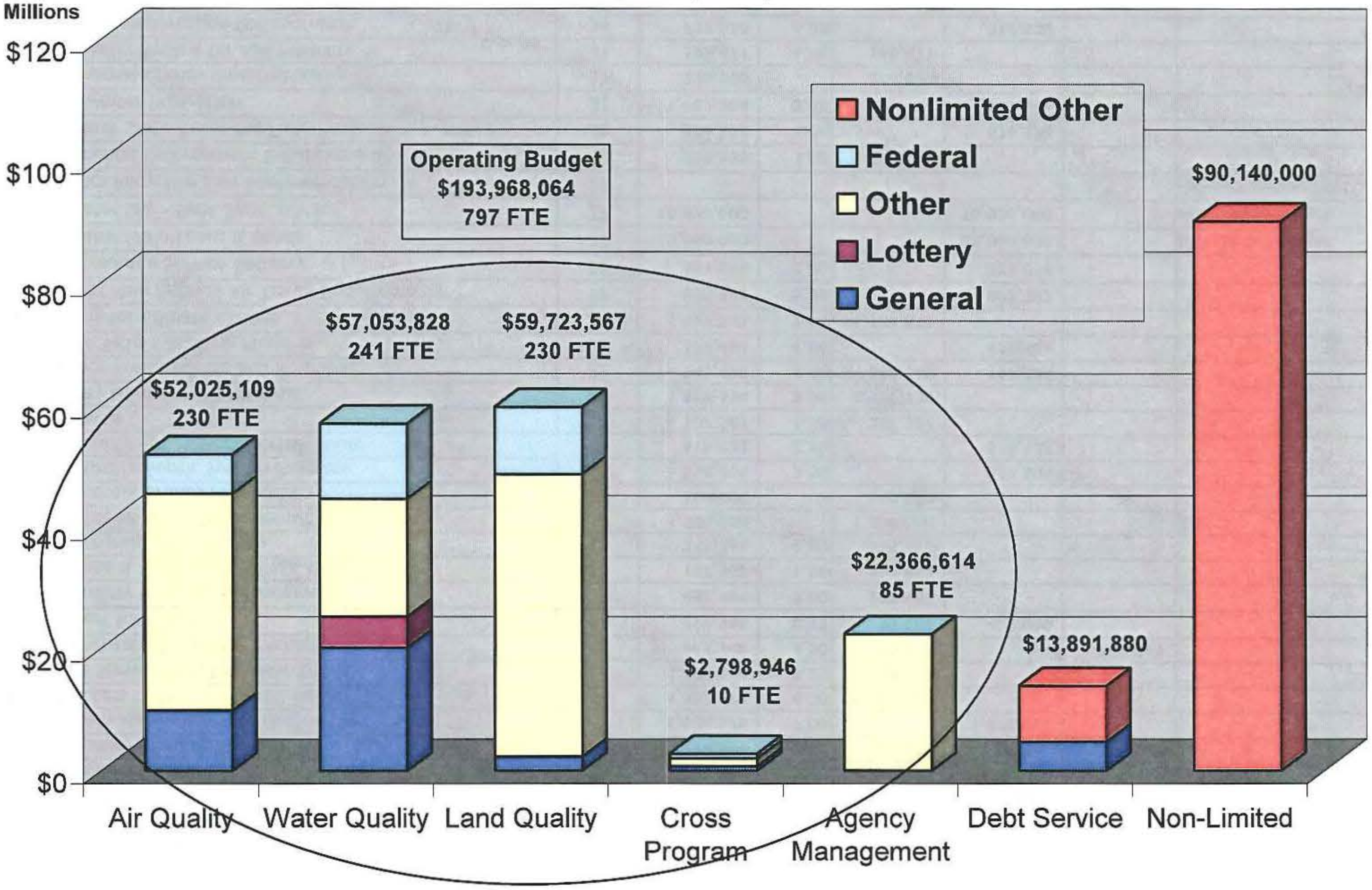


Figure 2
2009-2011 Affordable Budget, By Program
$291,307,497

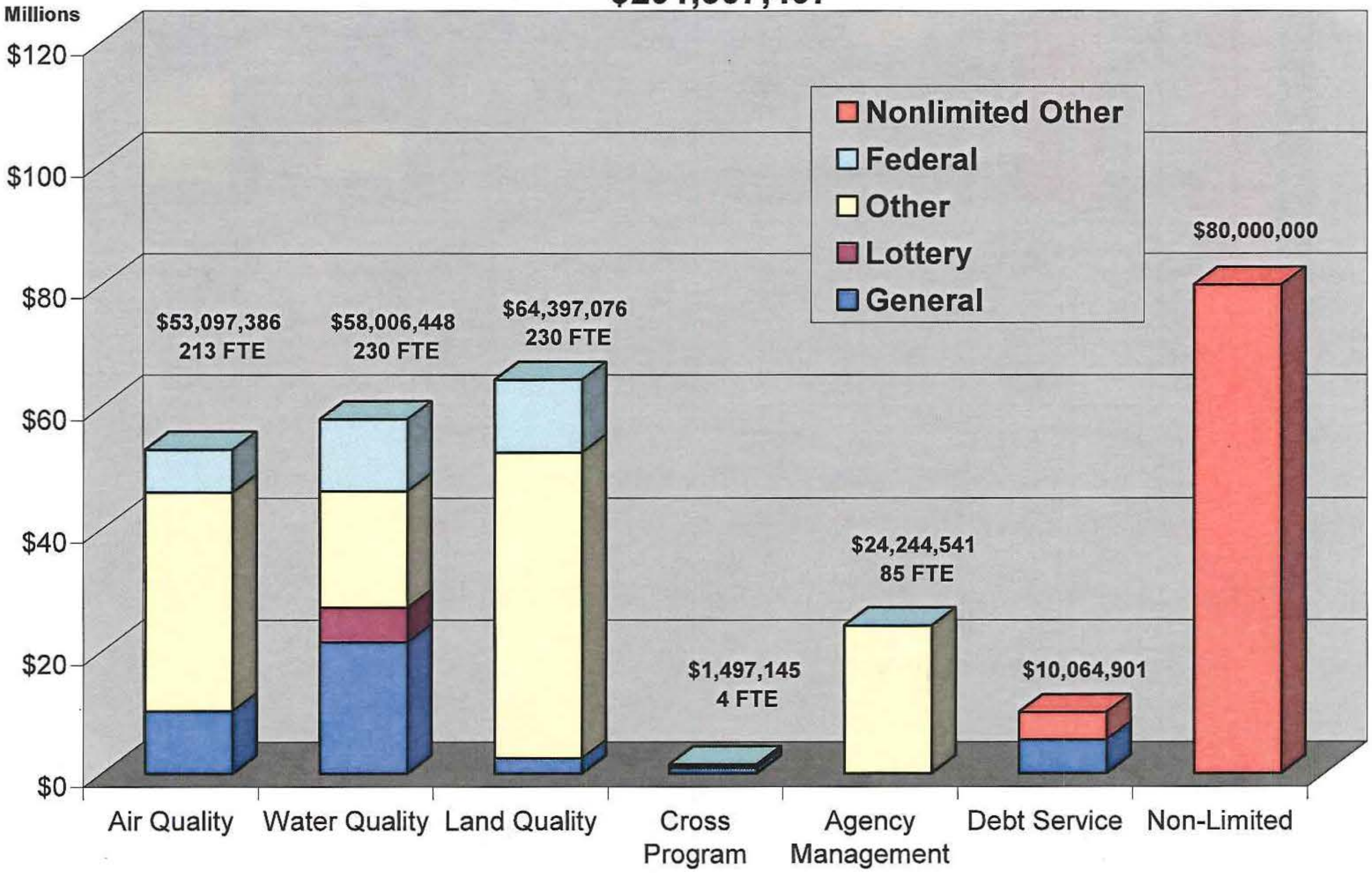


Figure 3
2009-2011 Policy Package Budget, By Program
$67,017,923

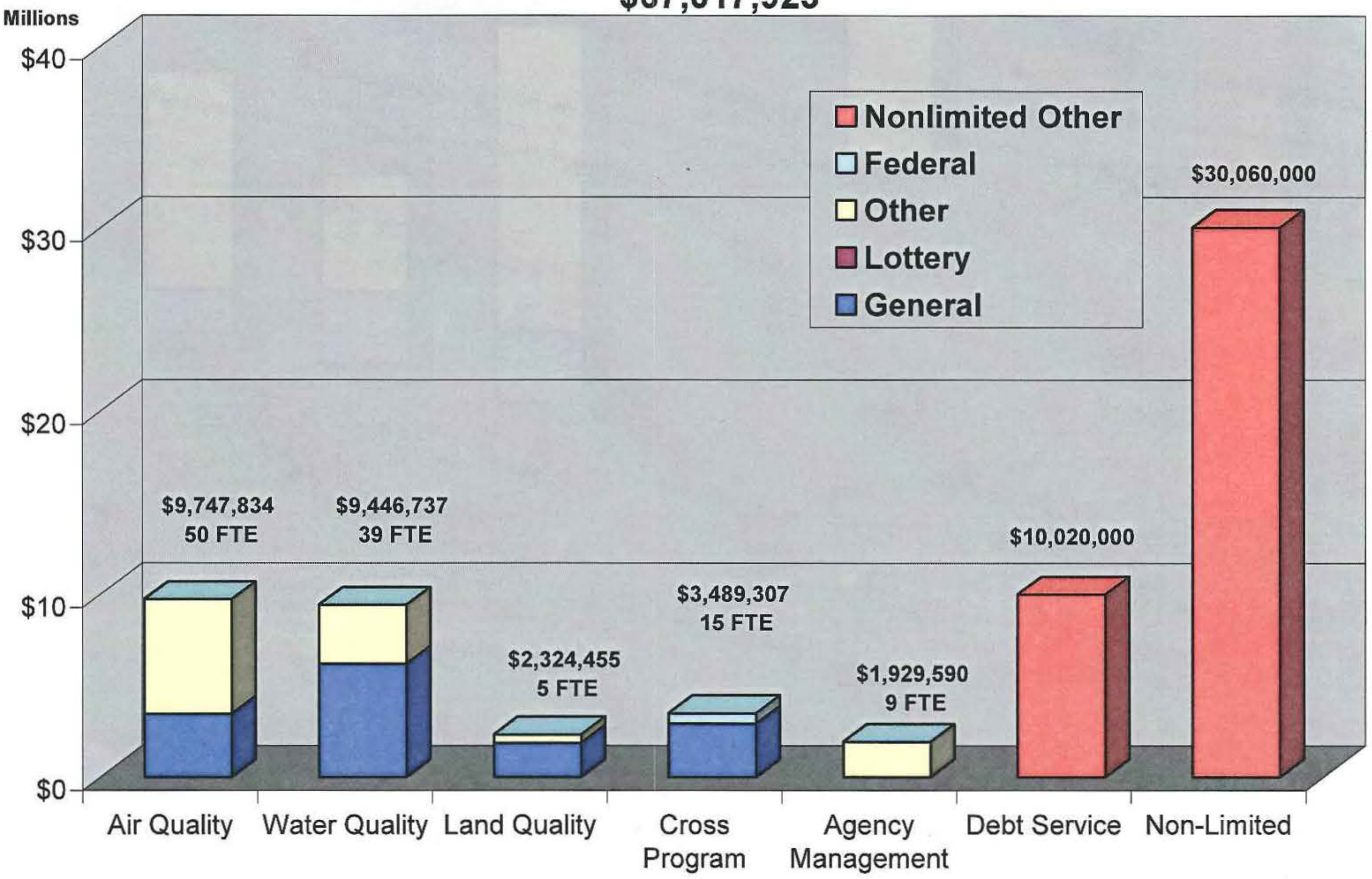


Figure 4
2009-2011 Agency Request Budget, By Program
$358,488,242

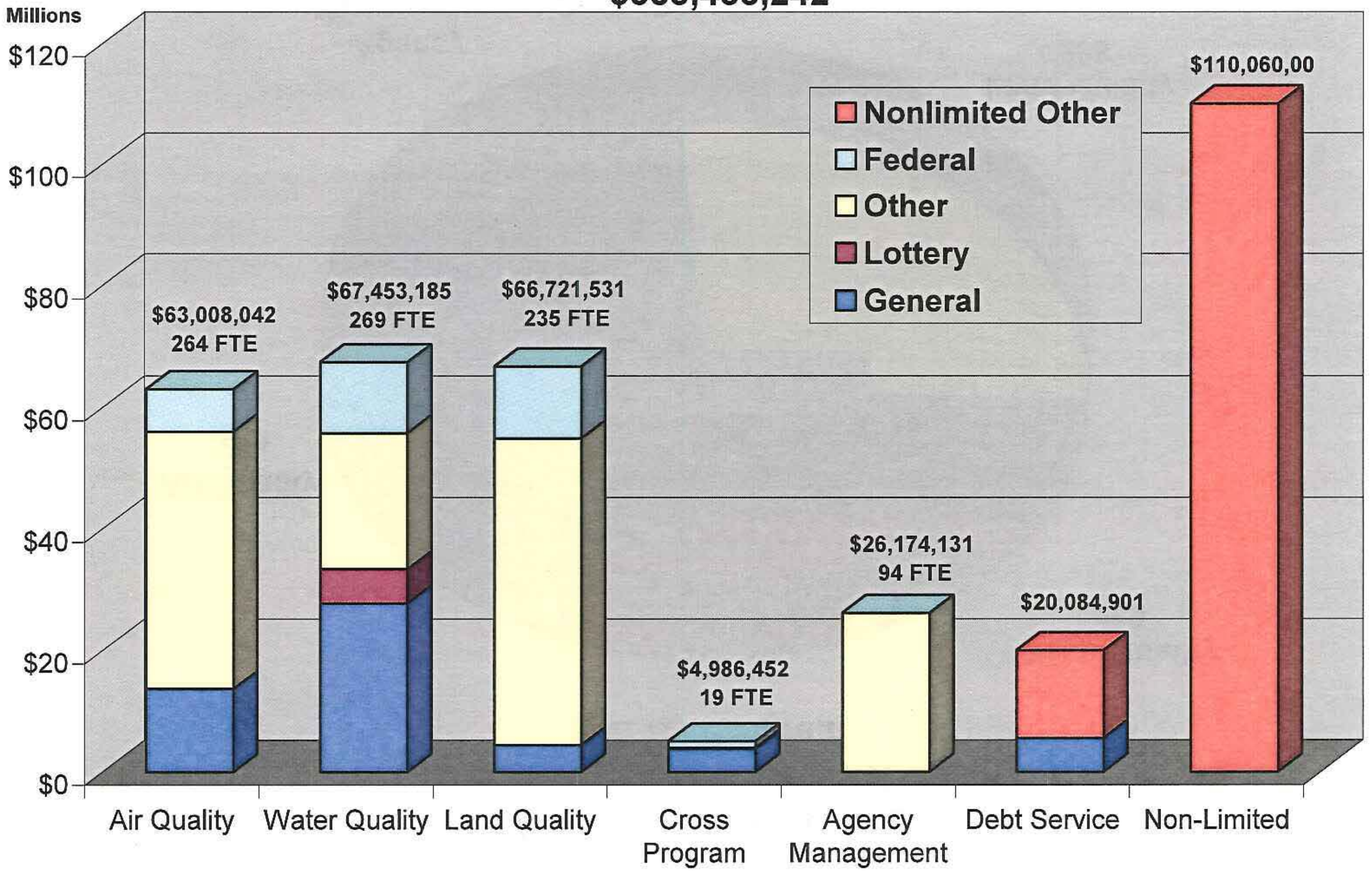


Figure 5
2009-2011 Agency Request Budget
Department of Environmental Quality
FTE By Program

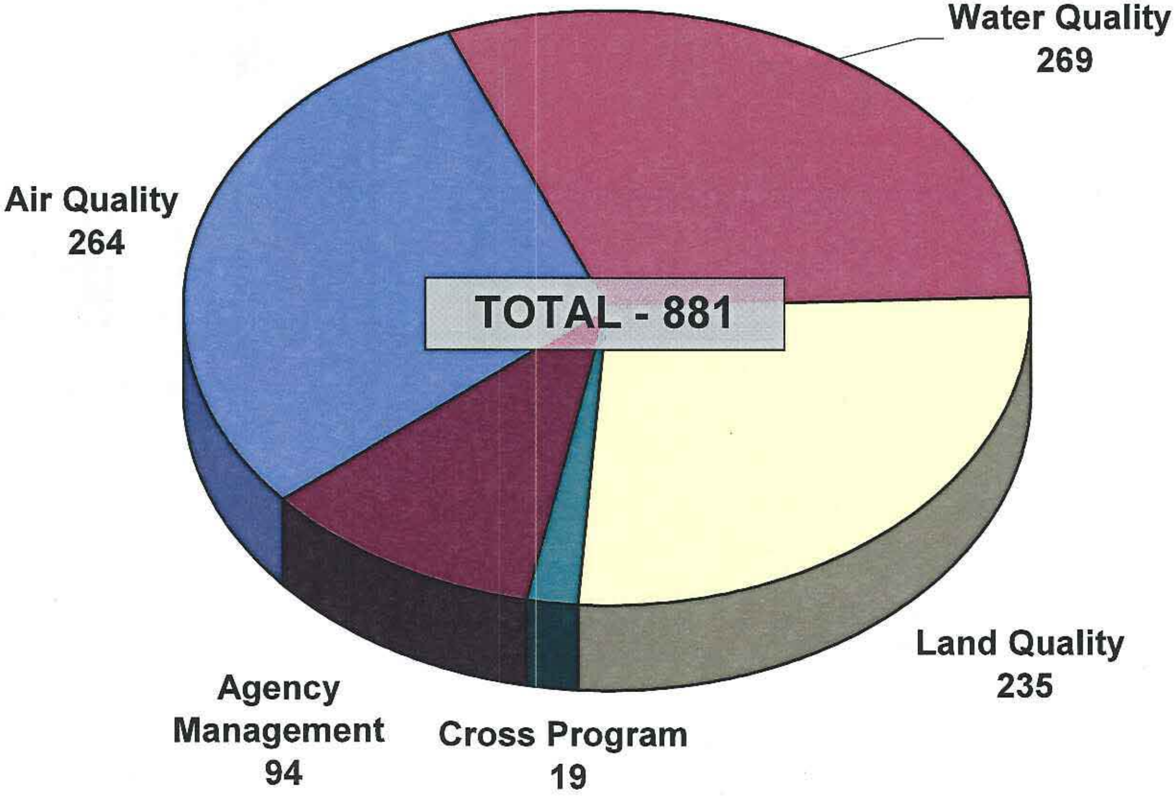
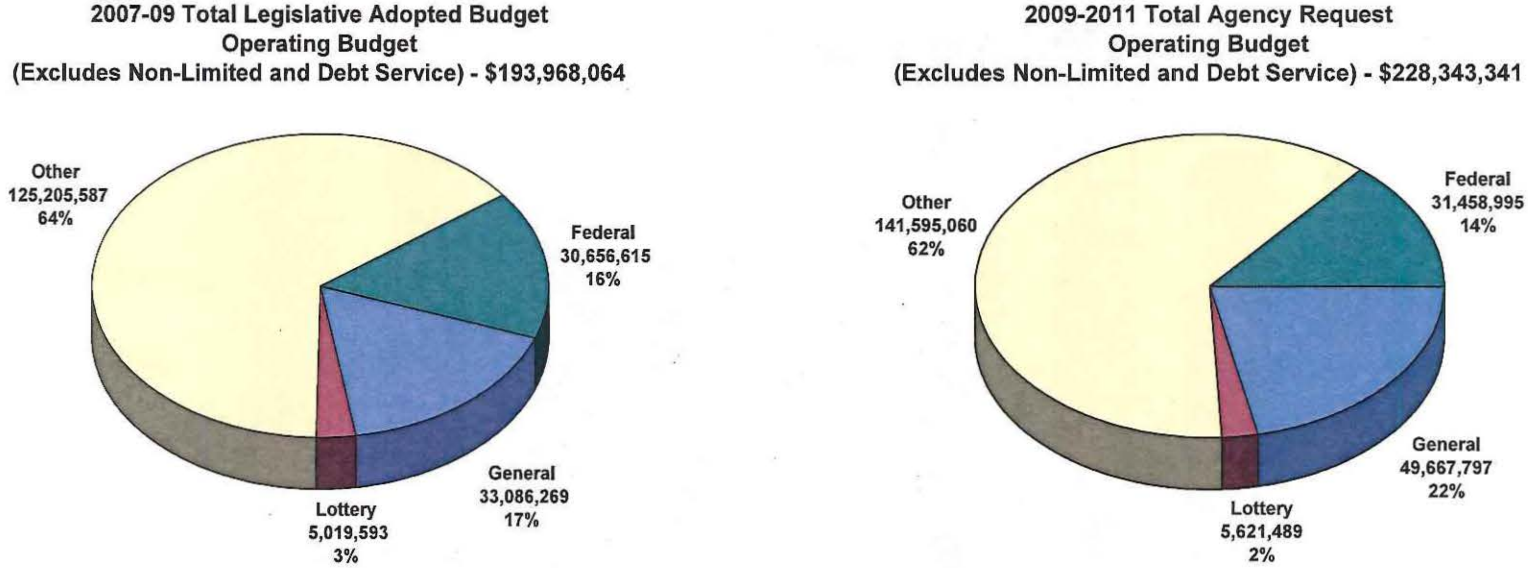


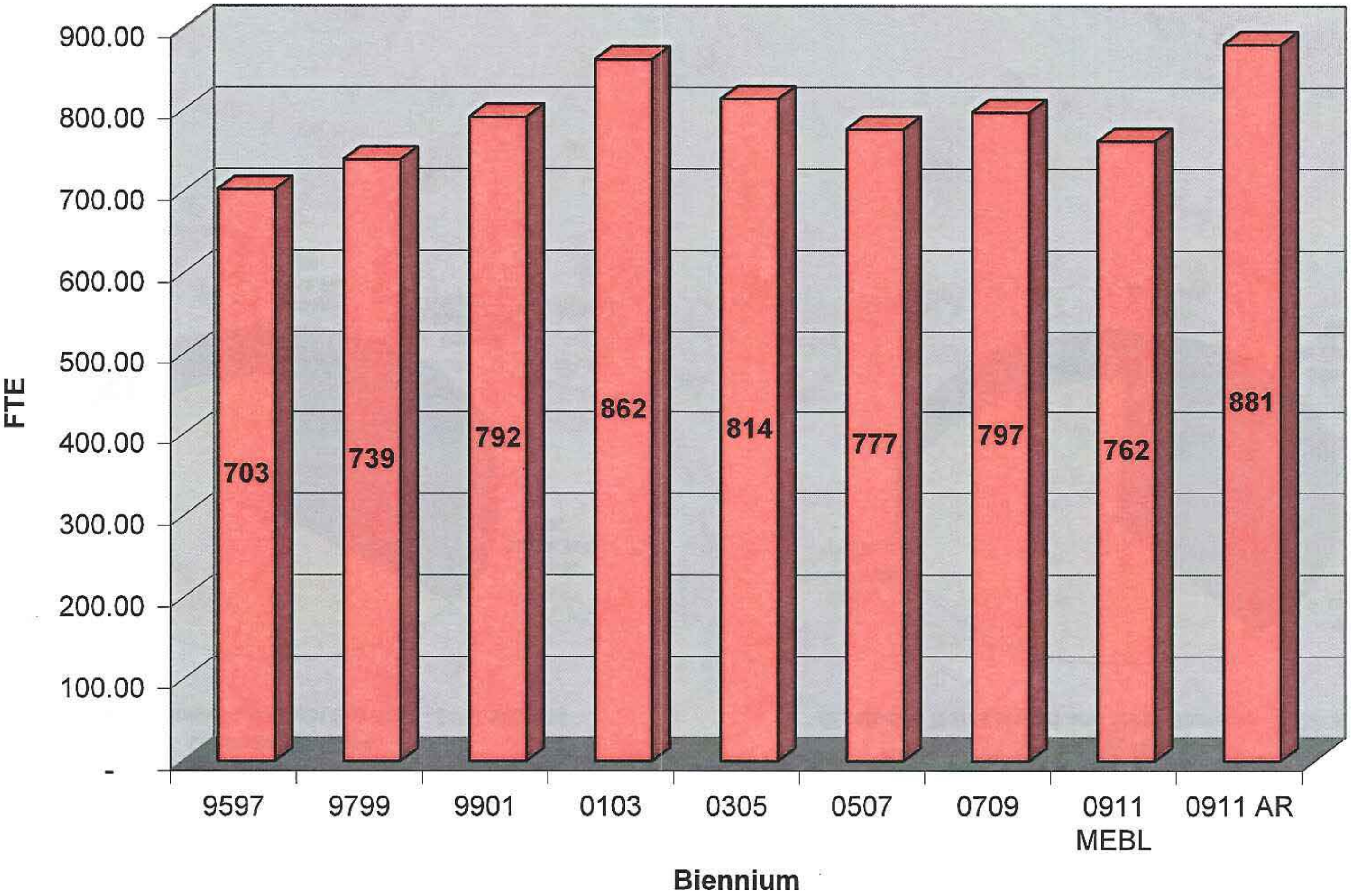
Figure 6 – Comparison of Funding Sources 2007-09 to 2009-11



2007-09 Total Legislative Adopted Budget
Operating Budget
(Excludes Non-Limited and Debt Service) - $193,968,064

2009-2011 Total Agency Request
Operating Budget
(Excludes Non-Limited and Debt Service) - $228,343,341

Figure 7
DEQ STAFFING OVER TIME



The Oregon EQC wants to hear from you about environmental priorities in your community.

Please join us for a town hall event:

"A Conversation with the Environmental Quality Commission"

Featuring members of Oregon's Environmental Quality Commission (EQC) including Commissioner Judy Uherbelau of Ashland.

The "EQC" is a five-member citizen panel appointed by the Governor to serve for four-year terms as the Oregon Department of Environmental Quality's (DEQ) policy and rulemaking board. In addition to adopting rules, the EQC also establishes policies, issues orders, judges appeals of fines or other department actions, and appoints the DEQ director.

Thursday, June 19
7:00 p.m. to 9:00 p.m.

Rogue Regency Inn
Banquet Room
2300 Biddle Road
Medford, OR

DEQ
State of Oregon
Department of Environmental Quality

For directions contact the Rogue Regency Inn at 1-800-535-5805 or visit online at:
www.rogueregency.com

Town Hall
meeting
6/19/08

TO: **Environmental Quality Commission**
FROM: **Robin Hartmann**
DATE: **June 19, 2008**
RE: **State's authority to deny permits for Jordan Cove LNG Terminal and Pacific Connector Pipeline**

As members of Oregon's Environmental Quality Commission, you have significant responsibility and authority to protect the interest of Oregonians and our special natural assets in the state – including our coastline, air and water. Please consider the following key points as you make your decisions regarding the Jordan Cove LNG Terminal and Pacific Connector Pipeline in the coming months. We respectfully urge you to act boldly to protect the interest of Oregon citizens and the special natural assets – our clean air and our beautiful coastline, rivers and forests -- that make our state such a treasure.

1. Oregon State Agencies – including DEQ – have the authority to deny LNG projects and their related pipelines. Under the Clean Water Act, Clean Air Act, and Coastal Zone Management Act, Oregon agencies can deny permits that LNG developers must obtain to construct their projects. ***We ask that EQC support DEQ if and when it moves to deny key Clean Water Act and Clean Air Act permits.***

2. FERC is dropping the ball – Oregon agencies can't afford to do the same.

- FERC is planning to issue permits for all three LNG terminals and their pipelines, in all likelihood. FERC is also failing to follow the law and is conducting a haphazard, incomplete review of the projects. Multiple state agencies, for instance, have blasted the Bradwood EIS process as inadequate.

- DEQ must assert Oregon's role in the LNG evaluation process and protect Oregon's air and water. FERC will not – and Oregonians are relying on DEQ to protect Oregon from FERC's arrogant, dismissive approach to the State's concerns.

3. No need for LNG.

- Oregon Dept. of Energy (ODOE) recently concluded that many alternatives to LNG terminals and their related pipelines remain available for meeting energy demands.

- Oregon is aggressively pursuing renewable energy goals and reductions in greenhouse gas emissions that would be threatened by buying a large amount of LNG-sourced gas.

- The 1-1.5 bcf/d facilities proposed by LNG developers like Jordan Cove are massive and excessive for Oregon's market. Oregon - which only uses 0.9 bcf/d during high-demand months (Jan 2007) and closer to 0.65 bcf/d on an average month - does not need these huge facilities.

- FERC does not evaluate need. There is no demonstrated public benefit for these projects. In fact, the Oregon Department of Energy report concludes that the projects are more expensive and environmentally destructive than alternatives.

- Oregon State agencies should undertake a moratorium on all permitting for LNG projects, given the lack of need for these projects documented in the ODOE report.

3. All of the proposed projects – including Jordan Cove and the Pacific Connector – will have huge water quality impacts.

- FERC, the lead federal agency reviewing these projects, is abdicating its authority to do accurate analysis of the impacts of the LNG terminals and their pipelines. DEQ must use its authority to undertake a broad, accurate review of the projects.

- DEQ should look at the project as a whole when considering the 401 certification for the LNG projects. For instance, the Jordan Cove terminal may use extensive dredging and may also route the pipeline running through streams, rivers, and through Coos Bay itself. DEQ should consider both aspects of the project, both of which are likely to harm water quality and existing uses.

- DEQ should evaluate the cumulative impacts of multiple projects proposed to come into the Klamath area – including proposed pipelines from Wyoming that would not carry LNG and would approach the Klamath area from the East.

- Massive dredging of Coos Bay will do a huge amount of damage to these estuaries. Listed salmon in both areas will be threatened by diminished water quality and loss of habitat. Due to the lack of demonstrated need for any of these projects (as documented in ODOE's study), DEQ should deny all permits for these projects.

- Pipelines will have serious water quality impacts, such as potential water quality impacts on the Rogue River from the Pacific Connector. ODFW has stated that current plans for this river crossing are inadequate. Additionally, plans for crossing many streams and rivers, such as the Klamath, Coquille, Umpqua, Coos, Columbia, Nehalem, Clackamas, Pudding and Willamette (to name a few) are similarly inadequate. Dozens of major streams and rivers are now implicated by one or more of these projects.

- FERC has allowed LNG and pipeline developers to make significant changes in their designs for both pipelines and terminals. Plans for the Jordan Cove terminal and pipeline are shifting, and DEQ should not issue permits for any project for which the project description is unclear, inaccurate, and likely to change.

- ***EQC should support DEQ in denying Clean Water Act certification and other permits for these projects.***

4. All of the proposed projects – including Jordan Cove and the Pacific Connector – will have huge air quality impacts.

- Each LNG terminal and pipeline represents a huge commitment to greenhouse gas-emitting fossil fuels. The life-cycle carbon dioxide emissions of LNG that is imported and burned for electricity generation approach the emissions of coal, and significantly exceed conventional natural gas.

- The lengthy supply chain necessary for importation of LNG adds a significant "carbon penalty" over domestic natural gas sources. DEQ should evaluate the full life-cycle emissions of the projects.

- Oregon Dept. of Energy has concluded that LNG would be significantly more polluting than domestic natural gas, and as bad as coal for LNG cargoes that come from very distant sources – such as the Middle East.

- DEQ should consider emissions from LNG vessels, tugboats, and pipeline compressor stations alongside emissions from the regasification process itself. The regasification terminal, alone, will emit over 100,000 tons of CO_2 per year.

- In addition to carbon dioxide, the LNG terminals in Coos Bay will be a significant source of NOx, SOx, CO, and other pollutants.

- ***EQC should support DEQ in denying air permits for these projects.***

We have asked DEQ to withhold permits for LNG and pipeline projects that are clearly contrary to the public interest. Oregonians are relying on the State of Oregon to do what FERC will not – to take a measured, reasonable approach and not permit LNG and pipeline developments that are unnecessary and destructive.

We ask that EQC back up DEQ in asserting Oregon's control over protecting our streams, rivers, and air quality from unnecessary, destructive LNG and pipeline projects.

Town Hall
meeting
6/19/08

Statement to the Oregon Environmental Quality Commissioners Regarding the Pacific Connector Natural Gas Pipeline

By

FREDRIC L. "Fred" FLEETWOOD
(a.k.a, "waterrat1")
4261 Hwy. 227
Trail, OR 97541
Ph#: 1-541-878-3278
E-mail: waterrat1@earthlink.net

Thursday, June 19, 2008

My name is Fred Fleetwood. I live at 4261 Hwy. 227, Trail, Oregon.

I am concerned about adverse environmental impacts that will undoubtedly result from the proposed Pacific Connector Natural Gas Pipeline.

My concerns are based on the following considerations:

> The pipeline **would cross five major rivers** - the Coos, Coquille (twice), South Umpqua (twice), the Rogue, and Klamath, in addition to numerous smaller streams. These crossings cannot avoid adversely impacting salmon habitat by increasing water temperature (through loss of streamside vegetation) and would increase stream turbidity.
>
> A question was asked (during an April 1, 2008 presentation to the Jackson County Commissioners by the Williams Pipeline Company) about corrosion of the pipe. The response was that both a coating and use of low dose electric current would diminish the corrosion.
>
> To rely on such simple reassuring rhetoric is naïve.
>
> That simple response begs the further questions of:
>
>> Just how effective is that anti-corrosion method regarding the underwater river crossings?
>>
>> And what happens if those anti-corrosion methods are not sufficiently effective **<u>in the long term</u>** for the underwater crossings?
>
> Another concern is Williams Company's Horizontal Directional Drilling failure rate (or "frac-out" rate) – i.e., the loss of drilling lubrication fluid

into stream waters during under-river drilling operations, which causes significant problems for fish. (To see just what a nightmare the leaking of that drill lubrication fluid is for the fish, I suggest you read the Company's contingency plan for that event.)

Williams's frac-out rate, according to Williams's own information, is a 1 in 3 rate on 36-inch pipelines in the Pacific Northwest.

Sediment deposited in streams **will undoubtedly be increased**. Salmonid reproduction is certain to be adversely affected, and recent efforts to restore salmon through restrictions on logging and fishing would be diminished. **That should be unacceptable to you commissioners.**

Therefore, I appeal to you – on behalf of the environment -- to **deny** Williams Company a Clean Water Act "Compliance Certification" for its Pacific Connector Pipeline (See http://www.epa.gov/OWOW/wetlands/regs/sec401.html).

Town Hall
meeting 6/19/08

Oregon DEQ Commission ~~Council~~ Issue Paper

19, June, 2008

We live in an unincorporated rural community in the O & C checkerboard ownership with federal and industrial timber, as well as private residential neighbors. Federal land use actions have been planned for a private timber company to build a forest road that will have a negative effect on our irrigation and domestic water supplies, local Steelhead and listed Coho fisheries populations, and has a significant potential to cause large landslides (the worst case scenario would bury our and a neighbor's homes, completely block Wolf Creek, and county road). Neighboring landowners to this project weren't informed by BLM that this project was going to happen. The federal employees involved have lied about site conditions and effects. Expert analysis of the local soil instability by a Registered Engineering Geologist we hired to analyze the issue was disregarded by BLM.

Appeal of this case through US Dept. of Interior is not expected to bring any change to agency plans. With a very limited income, it is unlikely that we would be bring a successful court case against this action. Even if counsel could be obtained, the federal District Court for Southern Oregon will perceive us as environmentalists and most likely rule against us.

When we realized the risk of a shallow, rapidly moving landslides to our property assets, the neighbor, and the county transportation corridor, we went to the Oregon Dept. of Fish and Wildlife, we were told there was nothing we could do because they had an agreement with the U.S. land management agencies not to interfere on each other's ground. Likewise, the Oregon Dept. of Forestry wouldn't even believe me, and cited the same sort of agreement not to even look at what was going on each other's ground, that BLM had agreed to "meet or exceed" state environmental operating rules. The proposed road construction project does not come close to compliance with the Oregon Forest Practices Act, and Shallow, Rapidly Moving Landslide Rules therein. After more calls to ODF, one FPF* forester at least was willing to look at the BLM documents and our slide hazard report, but will not do anything about the problem.

Neither agency had staff who could tell me where these Memoranda of Agreement/Understanding were kept for me to look up.

Neither agency was willing to even discuss or question the project's effects with BLM, even in a capacity of investigating the veracity of our concern.

Neither agency could refer us to any regulatory agency that could influence BLM's choices in this matter. ODFW told us all we could do was monitor the damage when it occurred. ODF told us all they could do was look at any plan the timber/logger company submitted if they even notified them of their associated harvest plan on private land. The Department of State Lands only seems to deal with crop agriculture and wetland conservation issues.

Medford EQC Meeting, June 19-20, 2008: Local Issues
Compiled by DEQ Western Region staff

Water Quality:

- **Ashland WWTP enforcement** recently assessed a civil penalty $12K+ for failing to meet permit requirements for phosphorus and temperature. They are working on a Supplemental Environmental Project to settle part of the penalty.
    - LOCAL MEDIA COVERAGE: The city of Ashland improperly discharged treated wastewater into Ashland Creek over the past three years, leading to a $12,900 fine from DEQ. "They haven't achieved the level of pollutant removal they are required to do," said DEQ enforcement spokesman Jeff Bachman. The city's wastewater treatment plant, which is considered state-of-the-art and began operations in 2002, has a permit to discharge highly treated water into the creek but it has to be closely monitored. Andy Ullrich, compliance engineer in DEQ's Medford office, said it's unusual to have these kinds of problems with a fairly modern facility. He said added that many of the city's problems were in insufficient monitoring and reporting of monitoring results. DEQ will allow the city to use a portion of the fine for restoration of habitat on a portion of Ashland Creek above the plant.
      The Mail Tribune, (Medford), 4/18/08

- **Ashland WWTP permit** is scheduled for renewal this year. There will be limits for temperature the City will have to meet related to the TMDL waste load allocations in Bear Creek. Permit staff and City are working on the issue.

- **Ashland WWTP and ODOT plans for an I-5 rest area**. There is some opposition locally, questions have been raised relative to the capability of the WWTP to handle the additional flow. Preliminary calculations based on ODOT estimates of flow indicate the plant has adequate capacity.

- **Town of Butte Falls** is significantly upgrading their WWTP at a cost of nearly $1 Million. They have received a $750,000 grant from OECDD, but the balance is still a significant undertaking for a town of around 400 citizens.

- **City of Medford:** The Medford Regional Wastewater Treatment Facility is the largest point source discharge to the Rogue River. The Rogue Basin TMDL will address temperature and bacteria listings, is in development, and is scheduled to be completed by the end of 2008. At this time it is uncertain what, if any, thermal reductions will be required by the Medford Facility. Medford had proposed a recycled water project several years ago, which was put on hold pending completion of the TMDL. That project will be reevaluated once the thermal waste load allocations are finalized.

- **Almeda mine**: DEQ is working with BLM on resolution of acid mind drainage. The August 2007 EQC meeting had a presentation from Larry Tuttle of the Center for Environmental Equity to address this issue. We have made progress with BLM on plans for moving forward with clean up actions. **(Note: BLM's most recent letter to DEQ is attached.)**

- **LNG pipeline** proposal does transverse the Southern Oregon area. There is substantial local opposition to the project.
    - Approx 324 stream crossings between Coos Bay and Malin. One for the Rogue, two for the South Umpqua.
    - DEQ is at the table with environmental issues
    - We have DEQ 401 Certification, 1200C Stormwater permit, and TMDL programs to address our concerns.

- **Local interested parties** with focused specific issues.
    - Fred Fleetwood – Trail Creek water issues, overall water quality issues
    - Roger King – Shady Cove area, concerns about new housing development impacts on general water quality and stormwater protections, pollution prevention in the Rogue River.
    - Mr. Morey – Shady Cove area, development pressures, stormwater issues, water quality.

- **Grants Pass on-site office will be moving** out of Josephine County space within the next few months. Extensive efforts to find suitable co-location space with County Planning and Building Departments did not pan out; the County was unable to meet our needs within time constraints.

- **Roseburg DEQ office will be closing** July 31st of this year. Two WQ staff will be transferred to Eugene. Office closure is a result of Douglas County taking over the on-site program.

- **Umpqua Gravel Mine**: Permit application denied twice, but more based on NOAA fisheries issues than DEQ. Also on the coastal systems (John Blanchard thinks Chetco is first) there are efforts to identify a gravel budget. The goal is to find out how much gravel is moved in each year so that harvest levels can be identified that would not impact the habitat.

- **ODFW fish hatcheries** – concerns have been raised about pollutants and process used for wastewater discharge.

- **Groups desiring to begin logging.** What are the roles of the counties and DEQ? Concerns are expressed in the federal planning process, DEQ has riparian concerns re: BLM's WOPR process and proposal.

Air Quality:

We currently have **air monitors** that measure four air pollutant groups in the Rogue Valley. We monitor for carbon monoxide, ozone, particulate, and air toxics. We are in "attainment" with all federal standards for CO, ozone, and PM2.5 ("criteria" pollutants). Our air toxics monitoring sites were installed in December of 2007 (primary sampler) and in April of 2008 (background sampler). Initially we are sampling four groups of pollutants with our new air toxics monitors; volatile organics, semi-volatile organics, carbonyls, and metals. The initial results for the air toxic monitors will be forthcoming from the Lab during the middle of 2008, with the first annual averages in the spring of 2009. Our air toxic results will be based upon annual averages (as that is the time frame required by the Oregon Air Toxics Benchmarks). Several sources are asking for measurements now, but since they are yearly readings, don't want to give out inaccurate/skewed data based on less than a year.

> During 2007 (our latest available data), we were fairly close to the federal standard on two of our three criteria pollutants measured in the Rogue Valley, PM2.5 and ozone:
>
> Our PM2.5 monitor daily average result was 30 ug/cubic meter at the 98th percentile. The federal daily standard is 35 ug/cubic meter at the 98th percentile. Our maximum average daily reading in 2007 was 38 ug/cubic meter.
>
> Our ozone monitor's 4th highest (using a 3-year average) 8 hr average was 0.067 ppm. The federal standard (4th highest (using a 3-year average) 8 hr average) is 0.075 ppm. Our maximum 8 hr average in 2007 was 0.067 ppm.
>
> Our carbon monoxide levels were measured at 4.7 ppm for a 1 hr reading (federal standard of 35 ppm) and our 8 hr average reading was 2.7 ppm (federal standard of 9.0 ppm).

There has been misinformation on clean air days in the Medford area in the past – media has worked on clearing this up over the past year.

- **Population growth:** talk about what DEQ is doing about climate change issues. AQ transport specialist, no one in the area to work on transportation emissions.
- **MACT issue:** Most recent big public hearing, comments at the hearing were strongly against extension.
- **Panel Products White City facility criminal case:** OCO issued a press release earlier this month. Possible concern about different treatment between this case and another case regarding White Salmon facility.

Other issues:

- **Measure 37/49 claims:** DEQ position
- **E-waste event:** Jennifer Boudin has put something together for Kathy Kiwala and the local media at a site in the Medford area on Friday. (Do we know that this is accurate?)

EQC Thursday June 19, 2008

	Name	Organization	Contact
day mtg	Maynard Flohaug	Rogue Valley Sewer Servic	Maynard Flohaug
town hall	Olivia Schmidt	Columbia River Clean Energy Coalition	326-7662
	Daniel Serres	Columbia Riverkeeper & F.L.O.W.	(503) 890-2441
	DON OYLER	Resident	878-3232
	JOHN ROBERTS		878-7809
	Bea Frederickson	resident	878-5342
	ROGER KING	Resident Shady Cove	830-4170
	Larry & Nancy Olson	residents Trail	878-4238
	Richard Harrington		865-3711
	Linda CRAIG	TRAIL, OR	
	THADDEUS GALA	TRAIL, OR	941-2409
	Megan Jones	Shady Cove, OR	538-8227
	Linda Henderson	Trail, OR	8782114
	BETTY Goodboe	TRAIL Or.	878-2794
	JAMES GOODBOE	TRAIL, OR	878-2794
	Michelle Stockton	Trail, OR resident	878-2315
	Barbara Falcy	Trail, OR	878-4394
	MARCIE LAUDANI	Trail, OR	878 3370
	Marilyn Weygand	Trail, OR	878-2378
		Medford, OR	245-9665
✓	Fred Fleetwood	Trail, OR	541-878-3278 waterral1@earthink.net
	Michael & Blenda Stemac	Trail, Or	541-878-4996
	ROBIN HARTMANN	OR Chapter Sierra Club. OR Shores Conservation Coalition	541 672.3694
	Regna Chichizola	Klamath Riverkeeper	541 951 0126
	George Gilman	OR Leg	858-1726
	MATT & TARA MATTIS	RESIDENTS/UPTHECREEK RANCH, WOLF CREEK	(541) 866-2464

6/19/08
Town
Hall

	NAME	ORGANIZATION	E-MAIL
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	Suzy Evans	OR CITIZENS AGAINST the Pipeline	
✓	Nancy Olson	resident of Trail, OR	lolson999@juno.com
✓	Marcie LAUDANI	" "	MEOWLINE@NetZ~~[illegible]~~evo.com
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✓	Megan Jones	American	mountaingirl.85@hotmail.com
✓	Curt Chaneler	Repoter	CJChaneler@sprintmail.com

Oregon
Theodore R. Kulongoski, Governor

Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204-1390
503-229-5696
TTY: 503-229-6993

June 10, 2008

Rodney S. Skeen, Ph.D., P.E.
Manager, CTUIR-EMP
Department of Science and Engineering (DOSE)
P. O. Box 638
Pendleton, OR 97801

Dear Dr. Skeen:

Thank you for your April 28, 2008, letter to me and the Oregon Environmental Quality Commission regarding the Umatilla Chemical Agent Disposal Facility post-trial burn human health and ecological risk assessment (postRA). We greatly appreciate the partnership of the Confederated Tribes of the Umatilla Indian Reservation in this important work.

I would like to thank you (and your representative) for your thoughtful presentations at the April 24 Environmental Quality Commission meeting, the May 15 Citizen's Advisory Committee Meeting, and the Department of Environmental Quality's (DEQ) May 29 Public Information Session and Hearing. My understanding is that discussions between yourself, the Army, and DEQ's toxicologist, Dr. Bruce Hope, have lead to an understanding that risk and hazard posed by UMCDF are generally within acceptable levels. I also know that a few issues, such as residual risk on Depot lands near the incinerator and ecological impacts in general, are still under discussion, but I am confident that we can work effectively with you and the Army to help resolve these in a satisfactory manner.

The DEQ intends to respond to all of the CTUIR postRA submittals and comments and we appreciate your valuable contributions. We also thank you for your continued partnership with DEQ in oversight of the UMCDF and other projects to protect and restore Oregon's environment.

Sincerely,

Dick Pedersen
Acting Director

cc: William Blosser, EQC
Donalda Dodson, EQC
Lynn Hampton, EQC
Judy Uherbelau, EQC
Ken Williamson, EQC
Bruce Hope, DEQ
Richard C. Duval, DEQ Hermiston
Joni Hammond, DEQ
Stuart Harris, Director, CTUIR DOSE