EQC Meeting 1 of 1 DOC 1996 1122

OREGON
ENVIRONMENTAL QUALITY
COMMISSION MEETING
MATERIALS 11/22/1996

DEQ

State of Oregon
Department of Environmental Quality

AGENDA

ENVIRONMENTAL QUALITY COMMISSION MEETING
November 22, 1996

Little Vert Theatre
345 SW Fourth, Lower Level
Pendleton, Oregon 97801

Notes:
Because of the uncertain length of time needed for each agenda item, the Commission may deal with any item at any time in the meeting. If a specific time is indicated for an agenda item, an effort will be made to consider that item as close to that time as possible. However, scheduled times may be modified if agreeable with participants. Anyone wishing to listen to the discussion on any item should arrive at the beginning of the meeting to avoid missing the item of interest.
This is a single issue Commission Meeting. **No public form will be provided.**

November 22, 1996

Beginning at 8:30 a.m.

Action Item: Decision on Findings and Permits for Umatilla Chemical Depot

The Commission has set aside January 9-10, 1997, for their next meeting. The meeting will be held in Portland, Oregon.

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

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

October 23, 1996

AGENDA

ENVIRONMENTAL QUALITY COMMISSION MEETING
November 22, 1996

Little Vert Theater
345 SW Fourth, Lower Level
Pendleton, Oregon 97801

1. Introduction of the agenda items by DEQ.

2. Follow up presentations by the Army on the following:

    a) Impact on the overall project if mustard (HD) is removed from the proposed permit. (I believe that Decker will present this item)

    b) What are the water quality impacts on consumption of ground water and the quality of a discharge effluent for the neutralization technology. How would the process effluents be managed with regards to discharges . (Someone from Army Alt Tech will be prepared to present this item)

    c) What changes in the QRA results would either reverse assembly, or reconfiguration on the stockpile have on the overall storage risk for the Depot. (Army will have Gary Boyd from SAIC present)

3. DEQ presents a summary of the comments received and the Department's recommendations for responding to the comments.

    a) Comments received on the findings.
    b) Comments received on corrections to the permit and pre-trial burn R.A.
    c) Comments received on general issues, including emergency response, EOC, carbon filters, etc.

4. Commission response to the proposal made by the CTUIR concerning reverse assembly and forming a joint committee to evaluate alternative technology.

5. DEQ presents the final report to the Commission on the findings, each finding is reviewed by the commission and accepted (with any changes) acceptance of the findings for those items identified as tend to support, is done so in response to public comment.

*Note: For findings 7 & 8, the Commission needs to be briefed that the operator has not yet been identified, and when identified, the operator will be required to both sign the Part A application for the Hazardous Waste permit, and proceed with a class three permit modification for adding the operator as a co-signature to the permit. In order to process the class three permit modification, the operator will be required to submit information to the Commission in order to have findings 7 & 8 approved before the modification. The modification for adding the operator to the permit is a Commission decision as specified in OAR 340-105-041 (2).

5. DEQ presents a summary of the technical corrections made to the permit in response to comments received, and recommends that the Commission accept the technical changes as described and direct the Department to make those changes.

6. DEQ presents to the commission the general issues (revised staff report on permit conditions, which recommends that in response to comments received, the Commission accept the proposed changes to the permit to address each of the issues.)

*Note: Agenda items 5 and 6 will only occur if the Commission is able to work their way through agenda items 1-4.

State of Oregon

Department of Environmental Quality — Memorandum

Date: November 22, 1996

To: **The Environmental Quality Commission**

From: **Brett McKnight, Manager**
Hazardous Materials Program
Eastern Region

Subject: **Summary and Conclusions of Public Comments Received Regarding the Proposed Umatilla Demilitarization Facility**

Attached to this memorandum is a matrix that shows a summary of the number and types of submittals that have been received in writing or in oral testimony. The matrix is interpreted as follows:

1) Findings 1- 8 and other key issues are listed across the top of the matrix, and comments received are listed numerically down the left hand side of the matrix.

2) If the comment about a particular Finding indicates that the submittal is either for or against the proposed facility, then either an "yes" or "no," respectively, appears for that submittal and that Finding.

3) If a submittal wants a permit condition changed, or does not agree with the risk assessment, wants the permit denied, etc., a "✓" appears for that submittal and that Finding.

4) The code for reading the "Other Policy Issues" and "Other" columns is:

   ND = No delay in permitting
   OS = Import of waste from off-site is of concern
   EJ = Environmental Justice; issues of concern to Native Americans
   HN = Issues of concern about Hanford
   EIS = Dissatisfaction with Environmental Impact Statement
   FS = Oregon should follow the lead of other states who are stopping permitting, and/or are pursuing alternative technologies
   PF = Proximity factor. Submittals objected to people from outside the area trying to stop the project.
   WC = Submittals want to stop or limit operation in adverse weather conditions.
   NA = The comment was not about the proposed facility

5) The far right columns of the matrix indicate whether the submittal is an "immediate" resident of nearby communities (Hermiston, Irrigon, Umatilla, Stanfield, etc.); a "regional" resident of a community on the perimeter of the 50 kilometer boundary

used in the risk assessment (Pendleton, Tri-Cities, Umatilla Indian Reservation, etc.); or "out of region" as outside the Mid-Columbia Basin.

In addition to the matrix, the bulleted items below list the key issues received on each of the Findings:

	Identified Issues
Finding One: *Intent of Rules Regarding Community Participation Have Been Met By the Department*	• The State has not engaged in a government-to-government relationship with the Confederated Tribes of the Umatilla Indian Reservation [CTUIR]. • DEQ has acted as an advocate of incineration, or, not as an advocate for the environment. • Commission and Department decision-makers were not at some public forums. • There is too much information to review and not enough time for people to understand all the issues.
Finding Two: *The location of the proposed incineration facility is suitable.*	• Federal law prohibits transportation so the stockpile must stay and be destroyed. • The stockpile should be moved elsewhere, maybe Tooele or JACADS
Finding Three: *The design of the proposed incineration facility allows for the range of hazardous wastes.*	*Note: Because this Finding is akin to Finding Four (best available technology), there are no comments noted for Finding Three.*

Finding Four: *Incineration is best available technology*	
	• Incineration has been found by independent experts to be an acceptable technology. • JACADS and Tooele are operating effectively and efficiently. • Currently, incineration is best available technology. • Alternative technologies are immature for chemical agent. • There are no viable alternative technology for metal parts and energetics except incineration. • EPA and Department of Health and Human Services contends that incineration is a safe and proven method. • Continued storage is not a technology. • Incineration has more control than similar industrial applications. • Incineration is unsafe and costly. • JACADS and Tooele have had experiences of upsets and operational problems. • Incineration emits toxic chemicals and would/could effect human health, the ecology, and agricultural crops. • "Closed-loop" technologies are better because they do no emit toxic chemicals. • Reconfiguration and storage, or continued storage alone, and then wait for a better treatment technology is preferable. • Other countries are using alternative technologies. • Some alternative technologies have commercial scale applications. • Need more time to develop information on alternative technologies.

Finding Five: *The proposed incineration facility is needed.*	• The risk of storage, and storage operations are more than the risk of incineration. • Risk of storage is exaggerated and there is no need to rush to incinerate. • The risk of storage can be lessened by reconfiguration.
Finding Six: *The proposed incineration facility will not cause an adverse effect to human health or the environment.*	• .Testing at JACADS has shown no adverse effects to the surrounding environment. • Review of the Pre-Trial Burn Risk Assessment was appropriately done and shows acceptable risk. • A comparative assessment between incineration and alternative technologies is necessary to reach a decision. • Incineration will emit dioxins and other toxins which at low dosages will create human health and environmental harm. • The Pre-Trial Burn Risk Assessment is flawed because it omitted issues such as not evaluating certain pathways, not evaluating synergistic effects, not accounting for all the potential chemical emissions, etc.,.
Finding Seven: *The applicant has demonstrated financial and technical capability.*	• Tooele and JACADS are built and operated well. • The Army has not been able to operate the JACADS and Tooele facilities adequately

Finding Eight: *The applicant has demonstrated the ability and willingness to operate the facility in compliance.*	For:	• There is trust in the government that they have the expertise and care to insure safe operation. • The Army has had a history of misrepresentation, misinformation, and deceit. • The Army has been fined at JACADS by EPA for non-compliance.

In addition to the matrix, the bulleted items below list the specific issues of the draft hazardous waste and air quality permits, and, the Pre-Trial Burn Risk Assessment.

Document	*Issues*
<u>Draft Hazardous Waste Permit</u>	• Issue of essential elements for off-site emergency response were raised. The Department will insure that there are permit conditions to incorporate essential elements. • Comments were received to include permit conditions to study, improve, and negotiate civic improvements at the Depot and Morrow County. Also study and mitigate ground water issues at the Depot. • Submittal identified permit issue that upon closure the facility should fall under the aegis of the Land Use Commission. • A submittal had comments regarding the proposed permit conditions that the Department presented to the Commission on September 27, 1996. The Submittal had concerns with the conditions regarding CSEPP readiness, closure of structures, and EOC refit. They had no adverse positions on PAS carbon filter unit, emergency shut-down, and liability issues. • Submittal identified various essential elements needed in the CSEPP program for off-site emergency response equipment that should be made part of the permit. The Department will review this permit condition request to insure that essential elements are part of the permit. • One submittal contained many permit condition changes based on a thorough review of the draft permit. Major issues includes intensive inspection of sumps, carbon change out schedules at the HVAC unit, and difficult and unnecessary waste sampling and analysis. • One submittal, while in favor of permit denial, offered five suggestions for permit changes including quicker permit expiration date, monitoring equipment validation, more timely notification of non-compliance. • Issue of essential elements for off-site emergency response were raised. The Department will insure that there are permit conditions to incorporate essential elements • Comments were received to include permit conditions to study, improve, and negotiate civic improvements at the Depot and Morrow County. Also study and mitigate ground water issues at the Depot.

Document	*Issues*
	• Submittal identified permit issue that upon closure the facility should fall under the aegis of the Land Use Commission. • A submittal had comments regarding the proposed permit conditions that the Department presented to the Commission on September 27, 1996. The Submittal had concerns with the conditions regarding CSEPP readiness, closure of structures, and EOC refit. They had no adverse positions on PAS carbon filter unit, emergency shut-down, and liability issues. • Submittal identified various essential elements needed in the CSEPP program for off-site emergency response equipment that should be made part of the permit. The Department will review this permit condition request to insure that essential elements are part of the permit. • One submittal contained many permit condition changes based on a thorough review of the draft permit. Major issues includes intensive inspection of sumps, carbon change out schedules at the HVAC unit, and difficult and unnecessary waste sampling and analysis. • One submittal, while in favor of permit denial, offered five suggestions for permit changes including quicker permit expiration date, monitoring equipment validation, more timely notification of non-compliance. • Issues of fence line monitoring, trial burns, and liability were raised. DEQ reviewed the comments and recommends no changes to the permit conditions based on these comments.
Draft Air Quality Permit	• Comments were noted of a minor nature. Based on the Department review to date, many of the comments will be incorporated into the final permit.
Pre-Trial Burn Risk Assessment	• A submittal identified issues of: Ecological data gaps should be identified before operation, identify receptors in Washington, assess present water quality in the Colombia. • A submittal remarked on the limitation on using JACADS data and provided suggestions for the Post-Trial Burn Risk Assessment.

Document	*Issues*
	• Failure to account for many other chemicals suspected of being emitted. • Failure to account for critical pathways such as breast-fed infants. • Failure to account for non-cancer effects of dioxins/furans. • Failure to account for background and current body burdens.

Attachments

TALLY OF PUBLIC COMMENTS RECEIVED ● PROPOSED UMATILLA CHEMICAL DEMILITIRZATION FACILITY

ORS 466.055 & 466.060 Criteria										Corrections to Permits & PreRA			General Issues					Origin of Submittal		
Submittals Received	Finding 1	Finding 2	Finding 3	Finding 4	Finding 5	Finding 6	Finding 7	Finding 8	Other Policy Issues	HW	AQ	PreRA	Issue	Deny	Delay	CSEPP Readiness	Other	Immediate	Region	Out-of-Region
1				NO										✓						✓
2				NO										✓						✓
3														✓						✓
4				NO															✓	
5				NO										✓				✓		
6																✓			✓	
7				NO										✓						✓
8				YES	YES				ND				✓					✓		
9				NO										✓			✓	✓		
10				NO					OS					✓						✓
11	NO									✓					✓				✓	
12				NO	NO									✓						✓
13						NO						✓		✓						✓
14												✓			✓				✓	
15						NO						✓							✓	
16						NO			OS			✓		✓						
17				NO										✓						✓
18				NO	NO															✓
19				NO					OS					✓						✓
20				NO										✓						✓
21				NO										✓						✓
22				NO	NO				OS											✓
23				NO		NO								✓						✓
24				NO		NO								✓						✓
25	NO			NO										✓						✓
26				NO		NO						✓		✓						✓
27				NO										✓						✓
28	NO			NO										✓						✓
29	NO			NO		NO								✓						✓
30				NO										✓						✓
31	NO			NO				NO						✓			HN			✓

EIS = Dissatisfaction with Environmental Impact Statement   HN = Issues of concern about Hanford   OS = Import of waste from off site is of concern

TALLY OF PUBLIC COMMENTS RECEIVED ● PROPOSED UMATILLA CHEMICAL DEMILITIRZATION FACILITY																				
ORS 466.055 & 466.060 Criteria										Corrections to Permits & PreRA?			General Issues					Origin of Submittal		
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32	NO			NO		NO								✓						✓
33	NO			NO										✓			HN			✓
34	NO					NO											HN			✓
35				NO		NO								✓			EJ			✓
36				NO	NO	NO								✓						✓
37					NO				FS					✓						✓
38				NO										✓						✓
39				NO										✓						✓
40				NO										✓			EJ			✓
41				NO		NO			OS					✓			HN			✓
42	NO					NO			OS					✓						✓
43				NO	NO	NO		NO						✓		✓				
44	OPTED NOT TO PROVIDE TESTIMONY																			
45	OPTED NOT TO PROVIDE TESTIMONY																	✓		
46				YES									✓			✓				✓
47	NO			NO		NO								✓				✓		
48																✓			✓	
49	NO																	✓		
50				YES														✓		
51						NO	NO	NO	OS					✓		✓				✓
52				NO		NO												✓		
53				YES					ND				✓						✓	
54				YES	YES		YES	YES					✓					✓		
55				YES					ND				✓							✓
56				NO	NO	NO		NO						✓				✓		
57	NO													✓		✓		✓		
58				YES	YES				ND				✓					✓		
59				YES	YES	YES			ND				✓					✓		
60				NO	NO	NO								✓				✓		
61				YES					ND,PF				✓					✓		
62	NO													✓						✓

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63				NO										✓						✓
64				YES					ND				✓					✓		
65				NO										✓						✓
66														✓			HN		✓	
67	NO													✓					✓	
68									WC										✓	
69	NO			YES		YES							✓						✓	
70	NO			NO	NO									✓		X	EIS			✓
71				NO											✓				✓	
72				NO										✓					✓	
73																	NA		✓	
74				YES					ND,OS				✓					✓		
75						YES			ND,OS				✓						✓	
76	NO			NO											✓				✓	
77				YES	YES				ND				✓						✓	
78				YES									✓				HN		✓	
79				NO										✓			HN			✓
80				YES	YES				ND				✓			✓		X		
81										✓			✓			X				✓
82										✓	✓		✓						✓	
83						NO								✓			HN.	✓		
84				NO		NO								✓						✓
85				NO											✓				✓	
86				YES									✓						✓	
87						NO		NO						✓				✓		
88				NO		NO							✓						✓	
89				NO		NO		NO						✓				✓		
90				YES	YES				ND				✓					✓		
91				YES	YES								✓						✓	
92				YES									✓					✓		
93				NO		NO									✓				✓	

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94																	NA	✓		
95				NO		NO								✓		✓		✓		
96				YES	YES	YES							✓					✓		
97				YES	YES								✓					✓		
98						NO									✓	✓			✓	
99				YES	YES	YES							✓					✓		
100								YES					✓					✓		
101				YES					ND				✓					✓		
102				YES	YES								X					X		
103					YES								✓					✓		
104		NO		NO										✓		✓		✓		
105				YES					PF				✓					✓		
106	YES			YES					ND				✓					✓		
107				YES				NO	ND,OS				✓			✓		✓		
108				NO					ND								HN		✓	
109		YES		YES	YES				ND				✓					✓		
110				YES					ND				✓				HN	✓		
111	NO								ND									✓		
112				YES				YES					✓			✓		✓		
113				NO				NO	OS									✓		
114																✓		✓		
115													✓			✓		✓		
116				NO										✓		✓		✓		
117				NO		NO		NO	OS										✓	
118				NO		NO		NO						✓				✓		
119				NO		NO								✓				✓		
120				YES	YES				ND				✓					✓		
121				NO	NO	NO	NO	NO				✓		✓						✓
122				NO		NO						✓		✓				✓		
123				NO					ND				✓					✓		
124				YES	YES	YES							✓			✓		✓		

EIS = Dissatisfaction with Environmental Impact Statement
EJ = Environmental Justice; issues of conern to Native Americans
HN = Issues of concern about Hanford
NA = The comment was not about the proposed facility
OS = Import of waste from off site is of concern
PF = Proximity factor. Commentors objected to people from outside the area

TALLY OF PUBLIC COMMENTS RECEIVED ● PROPOSED UMATILLA CHEMICAL DEMILITIRZATION FACILITY																				
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125				YES		YES							✓			✓		✓		
126				NO		NO									✓					✓
127					YES				ND,PF				✓					✓		
128					YES								✓			✓		✓		
129				YES	YES								✓					✓		
130				NO		NO						✓		✓						✓
131					YES	YES							✓					✓		
132						NO	NO													✓
133							YES	YES	PF				✓					✓		
134				YES									✓					✓		
135										✓			✓					✓		
136												✓						✓		
137				NO											✓					✓
138					YES								✓					✓		
139										✓			✓							✓
140	NO													✓						✓
141	YES	YES	YES	YES	YES	YES			ND,PF				✓					✓		
142				NO	NO	NO								✓						✓
143										✓	✓	✓	✓							✓
144										✓			✓			✓		✓		
145						NO	NO	NO							✓				✓	
146										✓			✓						✓	
147	NO			NO		NO		NO						✓					✓	
148				NO										✓						✓
149										✓			✓			✓		✓		
150						YES						✓	✓							✓
151						NO								✓						✓
152				NO		NO	NO			✓		✓		✓				✓		
153				NO										✓						✓
154				YES	YES	YES							✓						✓	
155				NO	NO	NO								✓						✓

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156	NO			NO		NO	NO							✓						✓
157				NO																✓
158				NO		NO								✓						✓
159	NO			NO	NO									✓						✓
160				NO		NO								✓		✓				✓
161	NO			NO										✓						✓
162						NO								✓						✓
163						NO			OS					✓						✓
164				NO										✓						✓
165				NO										✓						✓
166				NO										✓						✓
167						NO								✓						✓
168				NO										✓						✓
169				NO		NO								✓						✓
170				NO		NO								✓						✓
171				NO										✓						✓
172				NO										✓						✓
173				NO										✓						✓
174				NO		NO								✓						✓
175				NO		NO								✓						✓
176				NO										✓						✓
177				NO										✓						✓
178				NO	NO									✓						✓
179	NO			NO	NO		NO		OS,FS					✓		✓				✓
180																	NA			✓
181				YES	YES								✓						✓	
182	NO			NO	NO	NO									✓	✓			✓	
183					NO		NO	NO	OS					✓		✓		✓		
184				NO		NO								✓						✓
185				NO			NO			✓				✓				✓		
186						NO						✓		✓				✓		

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TALLY OF PUBLIC COMMENTS RECEIVED ● PROPOSED UMATILLA CHEMICAL DEMILITIRZATION FACILITY																				
ORS 466.055 & 466.060 Criteria										Corrections to Permits & PreRA?			General Issues					Origin of Submittal		
Submittals Received	Finding 1	Finding 2	Finding 3	Finding 4	Finding 5	Finding 6	Finding 7	Finding 8	Other Policy Issues	HW	AQ	PreRA	Issue	Deny	Delay	CSEPP Readiness	Other	Immediate	Region	Out-of-Region
187										✓			✓							✓
188										✓			✓							✓

EIS = Dissatisfaction with Environmental Impact Statement
HN = Issues of concern about Hanford
OS = Import of waste from off site is of concern

DEPARTMENT OF
CHEMICAL ENGINEERING

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UNIVERSITY

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Oregon Department of Environmental Quality
Eastern Region, Bend Office
Brett McKnight, Manager
2146 NE 4th Street
Suite 104
Bend, OR 97701

Corvallis, October 29, 1996

Enclosed is a report containing my answers to the questions on dioxin formation in the proposed Umatilla Chemical Demilitarization Facility. The questions were presented to me in letters from the Department of Environmental Quality dated August 8, 1996 and September 6, 1996. My findings can be summarized as:

1) Sulfur inhibits dioxin formation.
2) Other factors are more important in setting dioxin emissions than the chlorine content in the feed.
3) The dioxin emissions from the proposed facility will be less than 1 ng/m^3 during normal operation and not significantly different than emissions from similar plants burning natural gas only.
4) The design of the incinerator is not important as long as proper combustion conditions are maintained.
5) The most important features of a pollution abatement system for minimization of dioxin emissions are rapid cooling of the flue gases and removal of dioxin by e.g. carbon filters. Both of the methods are employed in the proposed facility.
6) No other method offers better dioxin removal than activated carbon filters.

If you have any questions regarding the report or wish further clarification of information, please, feel free to contact me. I apologize for being so slow in writing the report and wish that it can be of assistance to you.

Sincerely

Kristiina Lisa

Kristiina Iisa
Assistant professor

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY
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Answers to the four questions presented by the Department of Environmental Quality in their request dated August 8, 1996 and additionally to the fifth question presented in a separate letter dated September 6, 1996.

1. Sulfur and Dioxin Formation

a. The DEQ has received technical information indicating that sulfur is an inhibitor to the formation of dioxins. Does sulfur act as an inhibitor to the formation of dioxins and will the sulfur present in mustard (HD) act as an inhibitor for dioxin formation in the proposed incineration process for the UAD incinerators?

Yes, the presence of sulfur in sufficient quantities in a fuel inhibits dioxin formation, and yes, sulfur in mustard is likely to act as an inhibitor for dioxin formation during its incineration in the proposed plant.

The inhibiting effect of sulfur on the formation of dioxins has been confirmed by several studies. /1-6/ Both laboratory and full scale plants experiments have shown that the addition of sulfur decreases the formation of dioxins. The presence of sulfur in coal is believed to be the reason for negligible dioxin emissions in coal combustion.

The form in which the sulfur has been added in the experiments has been sulfur dioxide or sulfur in coal that has been added to municipal solid waste incinerators. During combustion all sulfur regardless of source is oxidized to sulfur dioxide. Thus the sulfur in the mustard gas will behave in exactly the same manner as sulfur dioxide added to the incinerators in the tests or sulfur in coal and the results are applicable to combustion of mustard in the incinerators.

Reductions in the formation of dioxin by factors of up to thousand have been measured. With the addition of coal there seems to be a critical sulfur to chlorine molar ratio above which the reduction is considerable but below which there is little reduction. With the addition of sulfur dioxide, there seems to be reduction regardless of the sulfur to chlorine ratio though the extent varies with the amount of sulfur added. In the tests with natural gas combustion that seem most applicable to the incinerator proposed here, two levels of sulfur to chlorine ratios were used: 0.64 and 1.34. At these levels the dioxin emissions were less than one tenth of those that were obtained without any sulfur in the gases./4/ In coal combustion tests the ad~~dition of sulfur di~~oxide to increase the sulfur to chlorine ratio from 0.36 to 0.78 decreased the dioxin and furan yields by a factor of ten. In another study sulfur to chlorine ratios as low as 0.1 were sufficient to reduce dioxin concentrations by a factor of one hundred./5/

The molar ratio of sulfur to chlorine in mustard agent HD is 0.69. It seems safe to assume that the sulfur in mustard inhibits dioxin formation. Reductions in the amount of dioxins by at least a factor of ten could be expected.

2. Chlorine and Dioxin Formation

a. Can dioxins be formed in a combustion process when chlorine is not an ingredient in the waste feed (i.e. chlorine in trace amounts as combustion air)?

Yes, any chlorine in the incinerator regardless of the source of the chlorine can contribute to dioxin formation. Even trace amounts of chlorine can lead to dioxin formation.

Laboratory and pilot scale studies done in well controlled conditions usually indicate that increasing the amount of chlorine by e.g. addition of hydrogen chloride increases the yield of dioxins/4,7-8/. Full scale studies on the other hand have failed to show any trends with the chlorine concentration./8-10/

The discrepancy between the two findings can be explained by the extreme complexity of the processes leading to dioxin formation. There are several routes for dioxin formation: *de novo* synthesis in which carbon in ash or soot reacts with chlorine to dioxin and formation via precursor mechanism in which chlorinated products of incomplete combustion are transformed to dioxins. Both may occur at short time scales in flight or over extended periods on deposits and other surfaces. Both are affected by the presence of several impurities.

Overall, factors other than the chlorine content are more important in setting the level of dioxin emissions during gas combustion in an incinerator./11-12/ The form at which chlorine is present in the flue gases is believed to influence dioxin formation more than the total amount of chlorine in the gas phase: elemental chlorine is more reactive than hydrogen chloride for dioxin formation./13/ During gas combustion factors such as sooting (formation of small particles consisting mainly of carbon) may have a greater impact on dioxin formation than the chlorine content./7,14/ Metals such as copper and iron catalyze dioxin formation, and the presence of them in the flue gases greatly increases dioxin formation. /15-17/

In general the existing data on the effect of chlorine concentration can be concluded to imply that at relatively high concentrations of chlorine in the feed, of the order of percents, the dioxin emissions are independent of the chlorine content of the feed. At low chlorine concentrations at otherwise identical conditions an increase in the chlorine content may increase dioxin emissions. Factors other than the chlorine content have a greater impact on the formation of dioxins and it is impossible to predict dioxin concentrations solely based on the chlorine content of the feed.

It is important to bear in mind that the dioxin concentrations are so low that even minute amounts of chlorine may lead to substantial dioxin formation if the conditions are right. With a chlorine content of 1 ppb (0.0000001 volume %) in the flue gases and a conversion of one percent of the chlorine to dioxins we could produce more than 5 ng/m^3 of dioxin.

b. **Because the UAD incinerators are natural gas fired, would one expect other natural gas fired combustion facilities such as the Co-Gen facilities in the area, to form dioxin if chlorine was not a key component? If so at what mass emission rate would dioxin be produced?**

Yes, there may be formation of dioxins from the Co-Gen facilities due to trace impurities of chlorine in the combustion air or the natural gas. However, without measurements it is impossible to quantify the dioxin emissions. Generally, natural gas fired combustion facilities are deemed not to produce significant amounts of dioxins. Significant dioxin emissions could be defined for example as emissions above 1 ng/m^3. Measurements in the literature have indicated, however, dioxin concentration well above 30 ng/m^3 during gas combustion without other chlorine sources except impurities in the fuel and combustion air. These measurements come from small scale experimental facilities and they are probably not applicable to large scale applications such as the Co-Gen facility.

c. **How would the dioxin mass emission rate for the UAD incinerators while operating on natural gas compare to when mustard (HD) is introduced into the incinerators versus not introduced into the incinerators? What is the dioxin reduction for the UAD incinerators if HD is not burned? In calculating the dioxin emissions, the calculations should include: start up, shut down, normal operations, and upset conditions.**

Some increase in the dioxin emissions may occur when mustard is introduced in the incinerator compared to the incineration of the nerve agent VX. However, the emissions from the proposed system both with and without mustard addition are expected to be below 1 ng/m^3 and thus it is impossible to give an estimate for the increase. The emissions during start up or shut down or upset conditions are not either expected to exceed 30 ng/m^3.

Mustard contains 41 % chlorine by weight which makes it seem like a strong candidate for dioxin formation. However, as stated in the answer for the first question it contains sulfur at a sulfur to chlorine molar ratio of 0.46, and sulfur inhibits dioxin formation. Based on studies in full scale plants there is no direct proportionality of dioxin formation with the input chlorine concentration, at least at high concentrations. Further, dioxin formation is normally greatly increased by the presence of certain metals, notably copper and iron. The concentrations of these metals are relatively low in mustard. This would make the dioxin emissions low ~~when compared~~ to e.g. incineration of municipal solid waste at similar chlorine concentrations. Overall the expectation is that despite the high chlorine content of mustard the dioxin emissions will be low.

The nerve agent GB contains 0.1 weight % hydrogen chloride as impurity. This makes the amount of chlorine in GB about one four hundredth of that in mustard. However, GB does not contain any significant amounts of sulfur. One way of comparing the emissions during combustion of mustard or GB is to assume that the dioxin emissions are directly proportional to the chlorine concentration until up to 1 weight % and that above this concentration the dioxin emissions are independent of the input concentration. This seems a reasonable assumption based on the data available. Further, based on the data presented in the answer to the first question it is safe to assume that the sulfur in mustard decreases the dioxin emissions by at least a factor of ten. This would make the dioxin emissions during combustion of mustard the same as during destruction of GB.

The nerve agent VX does not contain any significant chlorine impurities. The chlorine source during VX incineration is then any trace impurity in the agent, natural gas or combustion air. In addition VX contains sulfur, at about half the concentration of that in mustard. These two factors make it likely that the dioxin emissions during destruction of VX in the incinerator are lower than during destruction of mustard.

The dioxin emissions from the proposed plant could be best estimated based on the trial burns at Johnston Atoll. Table 1 shows the reported dioxin and furan emissions during different sets of trial burns. Included in the table are only values that were actually detected. The results of the five sets with three to four experiments in each are shown. The values for each run in the sets as well as the average for each set is given.

Table 1. Sum of the detected concentrations of dioxins (PCDD) and furans (PCDF) in ng/m^3 during the experiments at Johnston Atoll. LIC refers to liquid incinerator, DFS to deactivation furnace system, MPF to metal parts furnace, and DUN to dunnage furnace. Source: Appendix G (JADACS Emission Test Summaries and ANCDF Emission Estimates) of the Final SRA, RCRA Part B, RA No. 39-26-1399-95, Revision No. 1, 14 July 1995.

agent	run 1	run 2	run 3	run 4	average
HD, LIC	0.1	0.04	0.09	0.33	0.14
VX, LIC	0.06	0	0	0	0.01
GB, LIC	0.13	.02	0.18	-	0.13
VX, DFS	0.64	0.31	0.1	0	0.26
HD, MPF	0.18	0.04	1.21	0.21	0.41
GB, DUN	7.25	6.97	4.02	7.66	6.47

The average emissions vary from 0.01 ng/m^3 for the liquid incinerator tests with VX to 6.5 ng/m^3 for the dunnage furnace tests with GB. The liquid incinerator test runs show the expected trends: higher and approximately equal emissions for mustard and GB and lower emissions for VX. The comparatively high emissions from the deactivation furnace with VX and the dunnage furnace with GB may seem surprising at first.

The source of chlorine in the VX experiments could be trace impurities in the combustion air or natural gas or the feed (energetics and small metals parts). Johnston Atoll is situated in the Pacific Ocean at a relatively warm climate. This makes the air contain considerable quantities of chlorine. This could raise the chlorine concentration to a level high enough to explain the dioxin formation. The feed to the deactivation furnace contains metals, and the flue gases contained higher concentrations of metals than those from the liquid furnace. The presence of metals in the flue gases enhances dioxin formation. This may easily explain the relatively high emissions from the deactivation furnace.

Another interesting feature in the data for VX destruction in the deactivation furnace is the decrease in dioxin concentration from experiment to experiment. It has been demonstrated that contamination of incinerators by soot or metals affects dioxin emissions and that the dioxin emissions may be slow to respond to changes in the feed conditions, e.g. changes in sulfur concentration./7,18/ Response times of several days have been reported. It is possible that there may have been some incident that had rendered the furnace highly active for dioxin formation and that the activity was slowly decreasing.

The GB that was added in the dunnage incineration test contains some chlorine. Thus the chlorine sources are GB and impurities in air and natural gases plus possibly in the waste. One difference between the dunnage furnace and the other incinerators is that the pollution abatement system contains no quench tower for quickly cooling the flue gases. Dioxin formation occurs at high rates only at temperatures in a relatively narrow range of 250-400°C. The longer residence times at these critical temperatures increases the formation of dioxin. The flue gases contained higher concentrations of metals than those in the liquid incinerator tests. In particular copper concentrations seem to have been high. As stated for the emissions from VX destruction in the metals parts furnace, metals , in particular copper, enhance the formation of dioxins. A further factor may be that the material burned in the dunnage incinerator includes wooden pallets and packing materials. They form ash, and ash also promotes the formation of dioxins. The concentrations of volatile products of incomplete combustion were also somewhat higher than those in the tests in the liquid incinerator. The combustion may not have been as complete as in the liquid incinerator. GB does not contain sulfur that would have inhibited dioxin formation. All of these factors contributed to the higher dioxin emissions even though the chlorine content of GB is low compared to mustard and the amount of the agent is smaller in the incinerator is smaller than in the liquid incinerator.

The data from the deactivation and dunnage furnaces clearly demonstrate that other factors are more important for dioxin formation than the concentration of chlorine in the feed.

The dioxin and furan emissions taking into account the detected amounts and undetected ones at the detection limit were all below 7 ng/m^3, and with the exception of the dunnage furnace below 1.5 ng/m^3. With the addition of carbon filters the emissions from the proposed Umatilla incinerator will be considerably lower than this. With the carbon filters it is possible to decrease the dioxin emissions by several orders of magnitude. Thus an estimate of actual emissions below 0.1 ng/m^3 is reasonable and below 1 ng/m^3 conservative.

The above applies to operation at normal considerations. The emissions during start-up, shut-down or upset conditions could be higher. However, with the safety procedures proposed for the plant I do not expect them to be exceed 30 ng/m^3.

Some conditions that would increase the dioxin emissions include:

- Improper combustion conditions in the incinerator. This would result in increased formation of products of incomplete combustion. In extreme cases dioxins could be formed in the incinerator. However, a more likely and greater effect of improper combustion is increased soot formation and the formation of precursors for dioxin formation. The presence of excess amounts of soot greatly increases the formation of dioxin. The proposed plant contains primary and secondary chambers or primary burners and afterburners for all incinerators to ensure proper combustion.

  A good indicator for improper combustion conditions is the carbon monoxide level in the incinerator. If the carbon monoxide concentration exceeds 100 ppm in the incinerators the agent feeds to the furnaces will be cut off. The agent feed will also be cut off if the oxygen concentration becomes lower than 3 %, or if the temperature becomes lower than set values. Also if the combustion air pressure decreases below a set limit, the incinerators will be shut down. All of these precautions should ensure that proper combustion conditions are maintained and that there will not be increased dioxin emissions. Even if there were improper combustion conditions, the carbon filters still provide a buffer against increased concentrations of dioxin, and the dioxin emissions are not expected to exceed 30 ng/m^3.

- Lack of cooling in the quench tower. If the cooling liquid flow to the quench towers decreases or ceases, the temperature of the flue gases may remain high. This would lead to increased exposure of the gases to temperatures in the window 250-400°C (480-750°F) that is critical for dioxin formation and thus increase dioxin emissions. All feed will stopped if the temperature of the gases leaving the quench tower exceed 250°F. This seems adequate for ensuring that no sustained temperatures above 480°F will be encountered. The carbon filters still provide extra security, and the emissions are not expected to exceed 30 ng/m^3.

- Unavailability of a carbon filter. If the carbon filters were not operational the dioxin emissions would increase. In this case, the dioxin emissions are expected to be comparable to those measured at Johnston Atoll and they would still be below the limit 30 ng/m^3. There are two spare carbon filters that are common to all of the incineration units. This should be adequate for ensuring that the gases can be switched over to one of them in case of an unavailability of a filter.
- Formation of hot spots in the filter. The formation of hot spots may cause fires and release of adsorbed dioxins from the filter. The carbon monoxide concentrations before and after the carbon filters are measured and used as an indication of possible hot spots in the filters. The carbon filters are also taken off line if the temperature of the inlet gas exceeds 130°F.

All of the precautions seem adequate to ensure that the dioxin emissions during upset conditions do not exceed 30 ng/m^3.

3. **Combustion technology and dioxin.**

a. **What is considered state of the art design technology for preventing dioxin formation in a combustion process?**

Most of the dioxin formation occurs at the low temperatures downstream of the combustion chambers at temperatures 250-400°C. Hence the incineration technology is not nearly as crucial as the design of the pollution abatement system for formation of dioxin. As long as conditions are maintained for destruction of the agents at the desired level the design of the incinerator in not crucial.

For proper combustion a sufficient residence time at high temperatures with good mixing is required. Non-proper conditions increase the formation of products of incomplete combustion. This includes formation of precursors for dioxin formation or dioxin itself though the latter is usually not of great importance. Further, improper combustion produces soot. The formation of dioxins increases considerably when the combustion produces higher amounts of soot.

4. **Pollution Control Technology and Dioxin**

a. **What are the essential design elements of a pollution abatement system for controlling dioxin emissions from a combustion process?**

The essential elements of a pollution abatement system for controlling dioxin emissions from combustion processes are: a) rapid cooling of the gases in a quench system to prevent dioxin formation and b) adsorption of dioxin once it has been formed. Both of these processes are employed here, the former as quench towers for the liquid incinerators, deactivations furnaces and metal parts furnaces and the latter as the carbon filters for all of the systems. Due to the low concentration of the agents in the dunnage furnace the dioxin emissions are expected to be lower than from the other furnaces, and no quench cooling is provided for this stream.

In principle there are two different ways of addressing the minimization of dioxin emissions. The first is to prevent the formation of dioxin and the second is destruction or removal of dioxin once it has been formed.

The formation of dioxin occurs in a relatively narrow temperature window of 250-400°C. Above 400°C and below 250°C the net rates of dioxin formation are negligible. The minimization of the exposure to these temperatures is one of the most efficient methods of preventing dioxin formation. By this method the formation of dioxins is easily decreased by factors of ten to hundred./19/ Other suggested methods for the prevention of dioxin formation include the removal of precursors of dioxin formation. An example is the removal of hydrogen chloride by use of limestone./20/

The addition of compounds containing sulfur to inhibit dioxin formation has been suggested and demonstrated as well. Good results have been obtained with the addition of high sulfur coal or lignite to municipal solid waste incinerators./3/ Mustard and the agent VX have high sulfur contents and sulfur is naturally present in the incinerators in these cases.

Several methods have been developed for removal of dioxin. Activated carbon is the most common candidate for adsorption of dioxin. The injection of activated carbon as a final step to remove dioxin emissions after scrubbers is used extensively in Europe. In this method activated carbon or a mixture of carbon with limestone is injected into flue gases after scrubbers or other flue gas cleaning equipment. The carbon is then captured in fabric filters. Some of the removal of the dioxin occurs in flight on the activated carbon particles, the rest on the activated carbon collected on the filters. Removal efficiencies of more than 95 % and emissions below 5 ng/m^3 are easily achieved.

Another way of using activated carbon for the capture of dioxin are static or dynamic carbon filter beds. The flue gases are led through beds of activated carbon and dioxin and other impurities are adsorbed onto the carbon granules. This is the method chosen for the Umatilla facility. The efficiency of the carbon filters depends on the quality of the activated carbon. With a proper selection of this very high reduction efficiencies can be obtained. The efficiency of activated carbon filters is unsurpassed by other methods. An activated carbon filter used in the incineration of solid radioactive waste in Germany was reported to decrease the dioxin emissions by factors ranging from 250 to 5700 with an average reduction by a factor of 1700 in nine tests/23/. These correspond to reduction efficiencies of 99.6 to 99.98 %.

The activated carbon filters have two distinct advantages. The use of activated carbon in method gives the ability to simultaneously reduce the concentrations of other pollutants as well. Thus they offer added security against accidental releases of the agents or other products of incomplete combustion. Another benefit of using carbon filters is that they contain large quantities of the filter bed material. This offers buffering capacity in cases of accidental high concentrations of pollutants, whether they are dioxins or agents. This feature is unique to the carbon beds.

The use of activated carbon together with limestone in the equipment for sulfur dioxide removal has been proposed. The ability of dry, semi-dry and wet processes to reduce the toxic equivalent to values of less than 0.1 ng/m^3 has been demonstrated in Europe./21/ A disadvantage of these methods is that the wastes are mixtures of the carbon that has been contaminated by dioxins and other pollutants together with the limestone and possibly ash from the combustion process. The disposal of the waste mixture creates a problem.

Mixtures of sodiumbicarbonate and carbon have been used as well in the dry method with good success./22/

Several other methods for the reduction of dioxin emissions are being developed./24/An example is the application of selective catalytic reduction for oxidation of dioxin. The selective catalytic reduction is used for nitrogen oxides removal. High destruction efficiencies can be obtained if the temperature in the catalyst is high enough. /21,25/ Other catalysts for dioxin oxidation are being developed as well.

In many cases the methods of reducing the amount of dioxin formation may be sufficient for achieving low dioxin concentrations. With high dioxin emissions, removal or destruction of dioxin is needed as well.

5. **Design of the carbon filters and best available control technology. My opinion on the pollution abatement system (PAS) carbon filter design and comment as to the carbon filter system applicability as being the best available technology for incineration design was asked.**

As expressed in the answer to the fourth question, activated carbon filters together with rapid quenching of the flue gases is the most efficient methods of reducing dioxin emissions. No other method seems to be able to offer higher reduction efficiencies. The carbon filters have the advantage of being able to reduce concentrations of other pollutants as well and of offering added security against accidental high releases during upset conditions.

The use of carbon filters contains some risks. There is a possibility for the formation of local hot spots that could lead to fires and release of the adsorbed compounds from the carbon. Also, condensation of water in the filters might render the filters unusable. The preventive actions proposed for the carbon filters at the Umatilla facility seem adequate for reducing the risks associated with the use of the carbon filters.

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Perspectives on the Umatilla Quantitative Risk Assessment Results

Prepared by
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September 1996

Introduction

A risk assessment has been completed for the Umatilla Chemical Agent Disposal Facility (UMCDF). A summary of the methods and results is provided in *Umatilla Chemical Agent Disposal Facility Phase 1 Quantitative Risk Assessment* (SAIC, 1996). The study provides estimates of the public risks of accidental agent release from the chemical stockpile and from proposed disposal facility operations.

The risk assessment document includes some comparisons of risks of storage and processing. The risk assessment is only an assessment of risks and does not include conclusions regarding acceptability of risk. Acceptability of risk is determined by society, generally through the elected or appointed officials.

In deliberating the permits for the disposal process, the State of Oregon Environmental Quality Commission and Department of Environmental Quality have expressed a desire to have additional explanation of risk through comparisons to other risks that society and individuals face in everyday life. Comparisons need to be carefully selected and considered by the decision makers. Society, individuals, and decision makers have perceptions of risk that are the controlling factor in risk decision making. To aid the State officials in their understanding of risks, some risk comparisons are provided in this paper. Again, conclusions regarding acceptability are not made.

Risk comparison is a difficult endeavor because of varying risk perceptions. Several different ways of viewing the risks are provided here. More detailed comparisons can be done, and there is substantial literature on risk comparison (e.g., Covello, 1990; Okrent, 1980; and Cohen, 1991). Additional information that could be used to compare risks is also provided in Section 2 of the QRA (SAIC, 1996).

Societal Risk Results

Figure 1 is one summary of the findings of the study. It illustrates the risk of disposal processing at the UMCDF, the risk of munition storage at the Umatilla Chemical Depot (UMCD) during the approximate 3-year disposal period, and the risk of continued storage for 20 years (if no processing were undertaken). The storage risk during the disposal period accounts for the reduction in the inventory of munitions as they are processed at the facility. This is termed *societal risk* because it indicates the impact on the affected population (e.g., the society surrounding UMCD). Figure 1 illustrates, on the vertical scale, the probability of exceeding the number of fatalities shown on the horizontal scale. The scales on this graph are logarithmic, that is they are evenly divided in factors of 10, enabling the illustration of large changes on a single figure. The risk curves in the figure are specifically designed to provide the user with an understanding not only of the probability of accidents, but the probability of different size accidents. From Figure 1, it is seen that the probability of incurring one or more public fatalities is approximately:

1 in 300,000 for 3.3 years of disposal processing at UMCDF
1 in 6,000 for 3.3 years of stockpile storage at UMCD during processing
1 in 400 for continued stockpile storage at UMCD for 20 years with no processing.

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

0.00002 for 3.3 years of disposal processing at UMCDF
0.04 for 3.3 years of stockpile storage at UMCD during processing
0.6 for continued stockpile storage at UMCD for 20 years with no processing.

The actual risk during the disposal process is the sum of the disposal processing risk and the risk of storage during the disposal process. During the 3.3 years of disposal processing, the risk is therefore the sum of the bottom two curves in Figure 1. From the values in the figure it is clear that the risk of the disposal process is a very small addition to the storage risk during disposal.

Figure 1 provides some other insights for decision makers. Typically decision makers consider not only the overall risk but also the risk of different size accidents, reflecting society's concern with large accidents. For example, in 1990 in the U. S. there were 46,814 deaths in motor vehicle accidents and 941 deaths due to air transport (National Safety Council, 1993). Airline crashes, however, gather the attention of media and society because they typically involve many deaths, whereas the automobile statistic, which equates to over

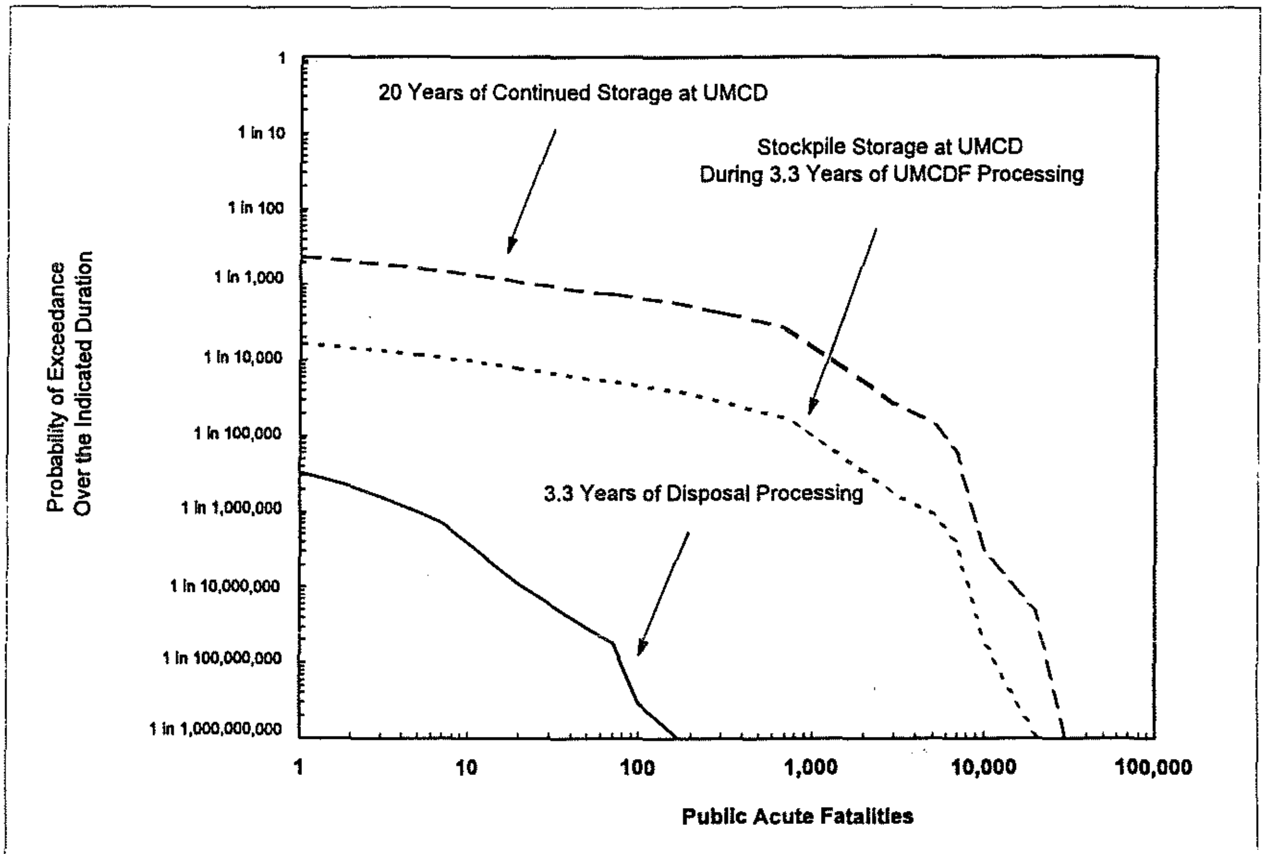

Figure 1. Summary of Umatilla Risk Results

100 people killed in motor vehicle accidents per day, appears to be more readily accepted by society because each accident typically involves a few deaths. It can be seen from Figure 1 that the risk of processing is less than storage but, perhaps more importantly, the risk of accidents with large numbers of deaths is much lower. There are an estimated 200 deaths at a 1-in-a-billion probability for the disposal processing, while at the same probability there is the potential for more than 10,000 deaths due to a storage accident.

In terms of the magnitude of the consequences, disposal processing accidents are estimated to have average consequences ranging up to 14 deaths, with an average across all accident sequences of approximately 1 death (SAIC, 1996, Table 13-1). On the other hand, accidents associated with continued storage are estimated to have average consequences up to 235 deaths with an average of 85 deaths across all scenarios (SAIC, 1996, Table 15-5).

Perspective on Societal Risk

Comparison of societal risks is problematic for a single facility. The risks associated with UMCD are limited to a specific population, whereas societal risks generally result from all endeavors over a large population. A representative list of societal risks in terms of expected deaths per year is provided in Table 1. As indicated, the accidents associated with UMCD are estimated to be very small compared to other societal risks in Oregon. This comparison may be of limited value since it does not indicate the impact on people closest to UMCD, which is captured in the estimate of the individual risks discussed in the next section.

Table 1. Some Societal Risks in Oregon (Expected Deaths per Year)

No. of Deaths in Oregon Per Year	Cause[a]
1,293	All accidental deaths
678	Motor vehicle
56	Drownings
33	Machinery (including farm equip.)
25	Fires
6	Railway
4	Electric current
0.03	Stockpile storage[b]
0.000006	Disposal processing[c]

a All except the last two entries based on actuarial data from 1989 from the National Safety Council, 1993. The last two entries from the Phase 1 QRA for Umatilla (SAIC, 1996).
b. In other words, one death every 33 years.
c. In other words, one death every 160,000 years.

Individual Risk Results

Risks have also been calculated on a per-person basis. This is typically referred to as individual risk, although it is calculated for groups of people living various distances from UMCD, not for specific individuals. Individual risk is an estimate of the probability of death for potentially exposed persons. For the most exposed people, living between 1 to 3 miles from

Table 3 provides some additional comparisons of the estimated values from the QRA to other individual risks. (Oregon-specific results were not readily available, so U.S. averages are listed.) The results enable consideration of the estimated risks compared to other risks an individual might be exposed to. Society's perception of the need to be protected from various risks can then be factored into decision making.

Table 3. Average Individual Risks in the United States

Risk of Death to an Average Person in the U. S.	Percent of Total Accidental Death Risk	Description
370 in a million	100%	All accidental causes
200 in a million	54%	All motor vehicle accidents
32 in a million	9%	Pedestrian death due to motor vehicle
20 in a million	5%	Accidental poisoning
5 in a million	1%	Choking on food
3 in a million	**~1%**	**Continued storage at UMCD for individuals living closest (1-3 miles) to the facility**
0.4 in a million	0.1%	Lightning
0.1 in a million	0.03%	Dog bites
0.04 in a million	**0.01%**	**Disposal operations at UMCDF for individuals living closest (1-3 miles) to the facility**
0.04 in a million	0.01%	Venomous snakes, lizards, and spiders
0.02 in a million	0.005%	Fireworks accidents

Cancer Risk

The QRA included an estimate of risk of cancer due to accidental release of mustard agents (only mustard is a carcinogen). The cancer risk due to accidental release was estimated to be very small. Table 4 lists the individual risk of induced cancer compared to other individual risks of death. This comparison includes several limitations. First, the estimated values in the QRA are for cancer induced over a llifetime, not necessarily death due to cancer; the other entries are for death. Second, the death rate information is based on the U.S. population as a

Table 4. Individual Risk of Death (Average of U. S. Population) Compared to QRA Estimates of Cancer Incidence.

Annual Individual Risk of Death[a]	% of Total	Cause
8,630 in a million	100%	All causes of death
2,895 in a million	34%	Heart disease
2,030 in a million	24%	Cancer
570 in a million	7%	Stroke
370 in a million	4%	Accidents
120 in a million	1%	Suicide
2,645 in a million	30%	All other causes
10 in a million	—	USEPA upper bound screening for lifetime cancer incidence due to facility emissions[b]
0.00001 in a million	10^{-7} %[c]	Cancer incidence risk for accidental releases during 20 years of storage for people closest to UMCD[b]
0.000002 in a million	10^{-10} %[c]	Cancer incidence risk for accidental releases during 3.3 years of disposal processing for people closest to UMCD[b]

a. Death rates are values for an average individual in the population as a whole. There are substantial differences in death rates and causes among different age groups.

b. These items are listed for convenience, but they represent cancer incidence in a lifetime, not annual risk of death, as the other items in the table.

c. $10^{-7} = 0.0000001$, $10^{-10} = 0.0000000001$

whole. There are substantial differences among age groups as to death rates and causes. However, the table is useful for indicating the small values calculated in the QRA.

There is one other consideration regarding cancer risk. A human health risk assessment is also being completed for UMCDF to meet the requirements of the Resource Conservation and Recovery Act (RCRA) Part B permit. As part of that process, the screening risk assessment involves evaluating the cancer risk to individuals from incinerator emissions using a screening method. That is, a conservative assessment of the cancer risk is estimated and the result is compared to a threshold predetermined to be below regulatory concern (1 in 100,000 chance of lifetime induced cancer). The screening risk assessment is therefore not intended to provide a best estimate, only to show attainment of a goal that is judged to protect the public from any undue cancer risk. The cancer risk due to emissions is therefore part of the decision makers input. However, the methodology is established so that if the individual risk to the most exposed individuals are below the threshold of regulatory concern, no additional analysis is performed. The threshold is provided in Table 4 as a point of reference.

Other Perspectives on Risk

Risk values are sometimes difficult to comprehend because they are a combination of how often something happens and how many people are affected. Another consideration useful for understanding risks is how often the accidents that could lead to public health effect could be expected to occur. In the risk assessment thousands of potential accidents were analyzed, ranging from those that might be expected to occur during the facility lifetime to accidents that are extremely rare. Tables 13-1 and 15-1 in the Phase 1 QRA (SAIC, 1996) list the accidents that contribute most to risk. Table 5 repeats some of that information and lists some other events for perspective.

Table 5. Comparison of Accident Frequencies

Recurrence Intervals	Description of Event	% Contr. to Risk
Disposal Processing		
30,000-500,000 yrs	Earthquake causes large release at UMCDF	71%
5,000 yrs	Handling accident causes igloo fire	14%
Storage		
1,500 yrs	Richter 5.5 earthquake causes large release	14%
3,800 yrs	Richter 6.5 earthquake causes large release	27%
11,000 yrs	Richter 6.8 earthquake causes large release	22%
32,000- 500,000 yrs	Richter 6.8 - 7.5 earthquake causes large release	35%
2,500,000 yrs	Aircraft crash into mustard storage	<1%
Other Rare Events		
164 yrs	Lightning strike to an acre of land near Umatilla	—
55,000 yrs	Greater than 1 pound meteorite strike per square mile	—
800,000 yrs	Lightning strike to a square yard of land near Umatilla	—
35,000,000 yrs	Greater than 1 pound meteorite strike per acre	—

For example, for disposal processing, the most frequent accident that contributes significantly has an average recurrence interval of about 5,000 years. (This is a handling accident that leads to an igloo fire.) Essentially, this can be taken as meaning that if that plant were to operate for 5,000 years, this accident would likely occur. It is difficult to gain perspective on these types of events because the time frames are outside the human range of experience. Lightning is one familiar phenomenon. For the area of Oregon around Umatilla, the lightning strike recurrence interval for an acre of land is about 164 years (based on area alone, does not account for conductors, lightning protection, or other phenomena that make some areas more likely to be struck than others.) However, to a single square yard of land, the lightning recurrence interval is 800,000 years. Meteorites striking the earth is another infrequent phenomena; for example, the recurrence interval for a 1 pound meteorite per acre is 35 million years.

Considering the fact that earthquakes are an important part of the risk, another viewpoint is gained by examining the historical record. Table 5-2 of the QRA (SAIC, 1996) lists two earthquakes that have occurred within 50 miles of the site.

Date	Approximate Richter Magnitude	Distance from UMCD
July 6, 1936	6 - 7.5	48 mi
March 7, 1893	6 - 7.5	7 mi

In earthquakes of this size, masonry is damaged, chimneys fall, etc. Thus, although not frequent, significant earthquakes do occur in this area. Generally, earthquakes that could result in releases from the facility or stockpile would be of Richter 5.5 or greater.

Finally, there has been some concern about the risk due to airplane crashes. As indicated, the recurrence interval for a crash (medium to large airplane) into the mustard storage area is about 2,500,000 years, a very rare event. Also shown in table 15-5 of the QRA (SAIC, 1996) is the average agent-related deaths associated with the crash—60 deaths. The mustard storage area covers about an acre. The air traffic over the depot is not heavy and is not higher than others areas such as Hermiston or Pasco. The average school, office building, or hospital is roughly the size of the mustard storage area. An airplane crash into any of those facilities might very well cause 60 or more deaths. Attempts to reduce the risk of airline crash to citizens in the area would require examining a broader scope than just the chemical storage area.

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DEPARTMENT RECOMMENDED PERMIT CONDITIONS IN RESPONSE TO PUBLIC COMMENT AND TO ISSUES RAISED AT COMMISSION MEETINGS

INTRODUCTION

The following permit conditions primarily come from discussions with the Commission. These are important issues, and as such, it seems that within the broad authority and scope of the criteria under ORS 466.055, the Commission members would feel that these permit conditions are integral to the findings they must make and in response to public comments received. Therefore, it must be remembered that if the Commission wants to include the following permit conditions, they should be explicitly stated as part of their findings and response to public comment, ergo part of their decision with the hazardous waste permit. For each proposed permit condition, the 466.055 criteria that best fits the condition is listed.

DEPARTMENT RECOMMENDED PERMIT MODIFICATIONS

1) CSEPP Readiness

Issue	Concerns have been expressed over the emergency readiness of the CSEPP program. Public comment has been received citing inadequate emergency preparedness and response for the surrounding population. In addition, the Commission has expressed a desire to be involved (or the Governor) in approval of the emergency response plans. Is Department approval sufficient?
Recommended New Permit Condition	II.H.3. <u>Contingency Plan - Construction</u> The Permittee shall not commence any construction activities for the UMCDF facility until the Permittee submits to the Department, for approval, a written certification that the essential elements addressing off site emergency preparedness and

Response To Comments And Applicable Finding	*ORS 466.055(3)* *The proposed facility uses the best available technology for treating or disposing of hazardous waste or PCB as determined by the department or the United States Environmental Protection Agency*

4) EOC Positive Pressure

Issue	The Commission has expressed concerns that the existing Emergency Operations Center (EOC) isn't positive pressurized, thus causing workers inside to wear gas masks while operating under time-critical tasks. In addition, the EOC is not staffed 24 hours/day, 7 days/week, potentially causing communication delays between the EOC and the emergency responders.
Recommended New Permit Condition	II.H.7. Contingency Plan For any Emergency Operations Center (EOC) used to respond to off-Depot releases, the Permittee shall have a positive pressurized Emergency Operations Center (EOC) that is staffed 24 hours a day, 7 days a week. For this permit condition, "positive pressurized" shall mean that ambient non-air vapors may not enter during times of emergency training, in the case of an actual emergency, or when tested on request by a Department inspector. The EOC must be pressurized within 360 days of the effective date of the permit, and the EOC is to comply with the staffing requests within 180 days of the effective date of the permit..
Response to Comments and Applicable Finding	*466.055(4)(b):* *The need for the facility is demonstrated by: ... (b) A finding that operation of the proposed facility would result in a higher level of protection of the pubic health and safety or environment; ...*

5) Army Assurance of Independent Oversight

Issue	The Commission expressed a desire for independent oversight of all demilitarization operations at the UMCDF. The public also commented on the need for independent oversight.
Recommended New Permit Conditions	II.E.5. <u>General Inspection Requirements</u> Permittee shall propose and the Department shall approve a plan to independently inspect demilitarization building, testing, and operations at the UMCDF. The Permittee shall provide for such oversight in accordance with a signed agreement between the Permittee and the Department. Absence of such an agreement, or failure of the Permittee to comply with the agreement, shall be a permit violation of this condition.
Response To Comments and Applicable Finding	*ORS 466.055(4)(b):* *The need for the facility is demonstrated by:* *(b) A finding that operation of the proposed facility would result in a higher level of protection of the pubic health and safety or environment...*

6) Shutdown of Facility in Case of "Something Going Wrong" or Permittee Non-compliance

Issue	The Commission asked if the Department has the authority to compel the facility to cease operations in case "something goes wrong" or if non-compliance.

Recommended New Permit Conditions	I.C.2.	Permit Actions In accordance with ORS 466.170, the Commission may revoke this permit after public hearing upon a finding that the Permittee has violated any provision of ORS 466.005 to 466.385 and 466.890 or rules adopted pursuant thereto or any material condition of the permit, subject to review under ORS 183.310 to 183.550.
	I.C.3.	Permit Actions In accordance with ORS 466.200, if the Department finds that there is a reasonable cause to believe that a clear and immediate danger to the public health, welfare or safety or to the environment exists from the continued operation of the site, the Department may halt demilitarization operations at the UMCDF. Non-compliance with the Department's written notification shall be a violation of this permit condition. Resumption of operations shall only be initiated upon written approval of the Department.
	I.L.2	Proper Operation and Maintenance In accordance with ORS 466.180(1), the Department may limit, prohibit, or otherwise restrict storage and treatment operations at the UMCDF upon receipt of information that documents non-compliance with permit condition I.L.1. *(Note: Currently, permit condition 'I.L.1.' is I.L. in the draft permit).* The Department shall invoke such restrictions by written notification which specifies actions that the Permittee must take to comply. Non-compliance with the Department's written notification shall be a violation of this permit condition.
Response To Comments and Applicable Finding	~~Inclusion~~ of these permit conditions come from <u>other</u> ORS 466 authorities other than the ORS 466.055 findings.	

7) Liability Issue

Issue	The Commission and the public have asked who is liable if damage occurs from unpermitted releases from the UMCDF.
Current Permit Condition	II.M. Liability Requirements The Permittee is exempt from the liability coverage for sudden and accidental occurrence requirements, as specified in 40 CFR § 264.140(c). If any Permittee is not a federal or state agency, the Permittee must provide liability insurance in accordance with ORS 466.105(5). The liability insurance will be reviewed and approved by the Department.
Discussion Points	• The Attorney General, through informal discussion, has opined that ORS 466.105(5) could apply to the Army's contractor who would be a co-permittee. The Department has included this permit condition to address this issue that someone be held accountable in case of unpermitted releases. The Army is exempt from liability in accordance with federal law exemption, except in cases of the Federal Tort Exemption. The Army is currently looking into whether the Federal Tort Exemption could be applied to chemical demilitarization accidents. The Oregon Attorney General doesn't believe the federal government (Army) could be held liable in case of accident. However, because of ORS 466.105(5), the contractor may be liable.
Response To Comments and Applicable Finding	The Commission finds that liability (ORS 466.150(5) is an essential element of the permit per ORS 466.035, therefore in response to comment, the existing permit condition shall remain in the proposed permit.

8) Bad Weather Conditions

Issue	The Commission and the public have commented that the facility should cease or decrease demilitarization activities during times of 'bad weather.' Ideas of what bad weather is has ranged from inversions, to dust storms, to blizzards. The concerns regarding bad weather have ranged from abilities to respond in emergencies to concentration effects of pollutants.

Recommended New Permit Condition	II.A.3. <u>Design and Operations of Facility</u> The Permittee shall submit to the Department a request for a Class II permit modification, within 180 days of the effective date of this permit, concerning the standard operating procedures that will be followed by UMCDF personnel for handling and transporting munitions from the storage igloos to the UMCDF facility during inclement weather conditions.
Response To Comments and Applicable Finding	*ORS 466.055(1)(b):* *Provide the maximum protection possible to the public health and safety and the Environment of Oregon from release of the hazardous waste or PCB stored, treated, or disposed of at the facility.*

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ATTACHMENT A
DEPARTMENT CONCLUSIONS ON ENVIRONMENTAL QUALITY COMMISSION FINDINGS

STAFF REPORT ON THE PROPOSED
UMATILLA CHEMICAL DEMILITARIZATION FACILITY
NOVEMBER, 1996

PAGE

Introduction.. A-2

Before issuing a hazardous waste treatment permit the Commission must Find that:

1. The intent of the statutory and regulatory provisions concerning community participation have been met. **{ORS 466.050}** A-3

2. The proposed facility location is a) suitable for the type and amount of hazardous waste intended for treatment at the facility; b) provides the maximum protection possible to the public health and safety and to the environment; and c) is situated sufficient distance from urban growth boundaries, parks, wilderness, and recreation areas. **{ORS 466.055(1)(a)–(c)}**... A-7

3. The design of the proposed facility allows for treatment of the range of hazardous waste as required by the Commission. **{ORS 466.055(2)(a)–(b)}** A-11

4. The proposed facility uses the best available technology. **{ORS 466.055(3)}**...... A-13

5. The need for the facility has been demonstrated. **{ORS 466.055(4)(a)–(c)}**....... A-14

6. The proposed facility will not have an adverse effect on either public health and safety or to the environment of adjacent lands. **{ORS 466.055(5)(a)–(b)}**......... A-19

7. The owner and operator of the facility have demonstrated adequate financial and technical capability to ~~properly construct~~ and operate the facility. **{ORS 466.060(1)(a)}**.. A-24

8. The owner and operator of the facility have demonstrated ability and willingness to operate the proposed facility in compliance with statutory and regulatory provisions. **{ORS 466.060(1)(b)}**... A-28

INTRODUCTION

In 1985 the Oregon Legislature specifically gave the Environmental Quality Commission (Chapter 466 of the Oregon Revised Statutes) both the responsibility and the authority to act on applications for permits for disposal and treatment of hazardous waste and PCBs. Oregon Administrative Rules (specifically, Chapter 340, Division 120) were adopted by the Commission pursuant to Chapter 466 of the statute to more clearly define the siting criteria for both on-site and off-site hazardous waste facilities. The proposed Umatilla Chemical Demilitarization Facility is considered a new on-site hazardous waste treatment facility under state law.

The proposed Umatilla facility is subject to only those parts of Division 120 that apply to new on-site facilities. Not every Finding required by ORS 466 is specifically addressed by a corresponding rule. In one case (related to advisory commissions and community participation) there is a rule that specifically applies to new on-site facilities, but the corresponding statute does not strictly require a "Finding" by the Commission. Because the rule in Division 120 clearly applies to the Umatilla facility, the issue is included here as "Finding 1" on Page A-3.

This Attachment covers seven of the eight findings that the Commission must make before issuing a hazardous waste permit for the proposed Umatilla hazardous waste treatment facility. A report concerning finding #4 ("Best Available Technology") is being provided under separate cover, although the criteria being used to evaluate BAT are listed in this Attachment. The determination of which specific sections of applicable statutes and/or related rules require findings by the Commission were made in consultation with the Oregon Department of Justice. The complete text of the referenced Oregon Revised Statutes and Oregon Administrative Rules is contained in Attachments C and D, respectively.

FINDING 1: Has the intent of the statutory and regulatory provisions concerning community participation been met?

Applicable Statute

ORS 466.050 Citizen advisory committees.

Authorizes the Director to establish a citizens advisory committee to review applications and advise the Department and the Commission in the selection of a hazardous waste treatment or disposal facility or the site for such a facility. The establishment of a citizens advisory committee is left to the discretion of the Director.

Full text of ORS 466.050 is located on Page C-2.

Related Rule

OAR 340-120-020 (1) –(6) Community participation.

Describes the appointment procedure and specifies the composition of an advisory committee to review the siting, design, construction, and operation of a hazardous waste treatment or disposal facility. Gives suggestions of issues to be considered, such as emergency response capabilities, changes in property values, etc.. Grants the Commission authority to impose additional requirements to address community-related impact issues.

Full text of OAR 340-120-020(1)–(6) is located on Pages D-6–D-7.

{Although ORS 466.050 was primarily intended to ensure community participation in the siting of an off-site hazardous waste facility, this part of the statute and related rule are included here because OAR 340-120-001(4) (see text on Page D-2) specifically states that on-site treatment facilities are subject to the requirements of Division 120 concerning community participation.}

In relation to Finding 1, the following **tend to support the conclusion** that the intent of the statutory and regulatory provisions concerning community participation for the proposed facility has been met:

1. The Chemical Demilitarization Citizens Advisory Commission (CDCAC) was appointed by Governor Barbara Roberts in 1993 (Executive Order EO-93-10, dated August 6, 1993).

2. The CDCAC held 21 meetings from January 18, 1994 through October 7, 1996.

3. The Department of Environmental Quality ("Department") opened an office (dedicated solely to the Umatilla project) in Hermiston in April, 1994. The Hermiston office is staffed by the Department's Umatilla Permits Coordinator.

4. The Department developed a mailing list of persons interested in the Umatilla project that now contains approximately 600 entries.

5. The Department has distributed Umatilla-specific fact sheets and other information to persons on the mailing list and at public meetings and presentations.

6. The Department has given briefings to:

   - the City Councils of Boardman, Umatilla, Stanfield, Echo, Hermiston, and Pendleton, in addition to the City Councils of Kennewick, Pasco, and Richland in the state of Washington.

   - the County Commissioners of Umatilla and Morrow Counties in Oregon and Benton County in Washington.

   - local groups including the Chambers of Commerce of Hermiston, Boardman, and Irrigon, and the Hermiston Kiwanis Club.

7. The Department has held Open Houses and conducted presentations in the local area for members of the public.

8. The public comment period was held open for over seven months (April 5-November 15, 1996).

9. The Department held three public hearings in the local area (Pendleton, Kennewick, and Hermiston), and one public hearing in Portland.

10. The Environmental Quality Commission ("Commission") heard public testimony in Hermiston on August 22, 1996, and during their regular meetings in Portland on January 11, April 12, and September 27, 1996. Time for public testimony has also been scheduled for the EQC worksession to be held on November 15, 1996.

11. During 1996 the Commission held worksessions and/or heard informational presentations about the proposed facility on January 11, April 12, May 16 and 17, July 11, August 22 and 23, September 27, and October 11. A presentation to the EQC by the Confederated Tribes of the Umatilla Indian Reservation is scheduled for November 14, and a Umatilla worksession (with opportunity for public testimony) will be conducted on November 15, 1996.

12. The Department conducted a random telephone survey of 400 persons in the Hermiston area in 1994 that showed 87% of the respondents had seen or heard news or information about the proposed facility.[1]

13. The Department conducted a random telephone survey of 300 persons in the Hermiston area in 1996 that showed 90% of the respondents had seen or heard news or information about the proposed facility. (2)

14. The Department conducted a random telephone survey of 100 persons each in Pendleton and the Tri-City (Washington) area in 1996 that showed 82% of respondents Pendleton, and 77% of respondents in the Tri-Cities, had seen or heard news or information about the proposed facility. (2)

15. Media coverage in the local area has been extensive.

16. The permit applicant maintains a public outreach office in Hermiston, has participated in DEQ-sponsored events, and conducted numerous presentations for community groups.

In relation to Finding 1, the following **tend not to support the conclusion** that the intent of the statutory and regulatory provisions concerning community participation for the proposed facility has been met:

1. A Citizens Advisory Committee was not appointed to directly advise the Department.

   {The Chemical Demilitarization Citizens Advisory Commission (CDCAC) appointed by Governor Roberts is charged with providing input to the Army, not to the Department. The CDCAC has, however, provided input directly to the Department, and Department staff has been present at all of the CDCAC meetings.}

2. An Army survey conducted in 1996(3) indicated that 51% of 1000 respondents in a random telephone survey of Umatilla, Morrow and Benton (Washington) Counties were unaware that a military base or installation was located in their county or a nearby county.

3. Of the 49% of the respondents in the Army survey(3) who indicated awareness of a nearby military installation only 55% of respondents in Umatilla County, 41% in Morrow County, and 16% in Benton County were aware of the chemical stockpile.

   {The Department believes that the Army's survey methodology was flawed and that the community surveys conducted by the Department more accurately represent community awareness.}

4. Public comment ~~was received stating~~ that the public hearing process in the Portland area was inadequate.

   {The Department acknowledges that the public hearing in Portland did not go smoothly; however, all those present who signed witness registration forms had the opportunity to testify and the transcript of the testimony was provided to the Commission. Additional public forums in Portland were provided at numerous Commission meetings during 1996 (see #'s "10" and "11" on Page A1-2).}

5. A report recently released by the National Research Council [4] is critical of the Army's public involvement efforts related to the Chemical Stockpile Disposal Program (CSDP) and concludes that "the Army's current public affairs program does not adequately involve citizens in the affected communities in the CSDP decision-making process or oversight of the program."

{The Department notes the NRC criticism of the Army's public involvement program and acknowledges that the Department has also received criticism of it's public involvement efforts (although not from the NRC). The Department does not agree with at least one commenter's assertion that the Department has not established a "meaningful" public involvement process.}

DEPARTMENT CONCLUSION ON FINDING 1:

Notwithstanding the recent National Research Council report, which criticizes the Army's public involvement process, the Department believes that there is significant community awareness of the proposed facility and that there has been ample opportunity for public input to the state's permitting process, the health and ecological risk assessment, and the Commission findings. Oregon's unique statutory obligation for the Environmental Quality Commission to make a finding regarding best available technology has provided an opportunity for dialogue about alternative technologies which has not occurred in other states.

The Department concludes that the intent of ORS 466.050 and OAR 340-120-020 concerning community participation has been met for the proposed Umatilla facility.

References, Finding 1:

(1) *Umatilla Army Depot Community Assessment Survey*, Intercept Research Corporation *for* Oregon Department of Environmental Quality, July, 1994.

(2) *Umatilla Army Depot Community Assessment Tracking Survey*, Intercept Research Corporation *for* Oregon Department of Environmental Quality, July, 1996.

(3) *Chemical Demilitarization Public Outreach: Umatilla Area Baseline Survey,* Innovative Emergency Management and Rowan & Blewitt Incorporated *for* U.S. Army Program Manager for Chemical Demilitarization Public Affairs Office, April, 1996.

(4) *Public Involvement and the Army Chemical Stockpile Disposal Program*, Letter Report from the Committee on the Review and Evaluation of the Army Chemical Stockpile Disposal Program, Board on Army Science and Technology, Commission on Engineering and Technical Systems, National Research Council, October, 1996.

FINDING 2: The Commission must find that the proposed facility location:

(a) is suitable for the type and amount of hazardous waste intended for treatment at the facility;

(b) provides the maximum protection possible to the public health and safety and to the environment; and

(c) is situated sufficient distance from urban growth boundaries, parks, wilderness, and recreation areas.

Applicable Statute **466.055(1)(a)–(c) Criteria for new facility (as related to location)**

Requires the Commission to Find that the proposed location a) is suitable for the type and amount of hazardous waste intended for treatment; b) provides the maximum protection possible to the public health and safety and environment of Oregon from release of hazardous waste; and c) is situated sufficient distance from urban growth boundaries to protect the public health and safety and sufficient distance from recreation areas to prevent adverse impacts to public use of those areas.

Full text of ORS 466.055(1)(a)–(c) is located on Page C-2.

Related Rule **OAR 340-120-010(2)(d) Location**

Gives specific siting criteria for off-site facilities. Requires the facility to be located a minimum of one mile from urban growth boundaries, wilderness, parks, recreation areas, residences, schools, churches, hospitals (and other similar community facilities). This paragraph does not actually apply to on-site facilities.

OAR 340-120-010(2)(e) Property Line Setback

Requires a 250 foot property line setback for on-site facilities.

Full text of OAR 340-120-010(2)(d)–(e) is located on Page D-5.

In relation to Finding 2, the following **tend to support the conclusion** that the proposed facility location is suitable for the type and amount of hazardous waste intended for treatment at the facility; provides the maximum protection possible to the public health and safety and to the environment; and is situated sufficient distance from urban growth boundaries, parks, wilderness, and recreation areas:

1. The proposed facility location is immediately adjacent to "K-Block," where the chemical weapon stockpile has been stored for over 30 years. The proposed location will minimize the distance the munitions must be transported.

2. Although OAR 340-120-010(2)(d) was intended to apply only to off-site facilities, the proposed facility does meet the one-mile minimum distance specified for distance from urban growth boundaries, recreation areas, and community facilities and residences.

3. The proposed facility meets the requirement of OAR 340-120-010(2)(e) for on-site facilities to maintain a minimum of a 250 foot setback from the property line (the proposed facility is two miles from the nearest Umatilla Depot boundary).

4. In addition to being well within the fenced confines of a federal facility, the proposed facility will itself be secured by additional controlled access security measures.

5. The Department's Draft Pre–Trial Burn Risk Assessment(1) concluded that except for a location well within the Depot fenceline, emissions from the proposed facility would not result in an unacceptable level of health risk (defined as a 1 in 100,000 chance of an excess cancer case, or a "hazard index" over 0.25 for non-cancer effects on an exposed individual).

6. Except for a location well within the Depot fenceline (where mercury effects exceeded regulatory benchmarks), there is a low likelihood of potential ecological effects(1).

7. The permit applicant has met Department requirements that the permit application reasonably demonstrate the ability to meet federal and/or state emission standards for a hazardous waste treatment facility.

8. Successful operation of the proposed facility will permanently remove the chemical stockpile hazard from the local area.

In relation to Finding 2, the following **tend not to support the conclusion** that the proposed facility location is suitable for the type and amount of hazardous waste intended for treatment at the facility; provides the maximum protection possible to the public health and safety and to the environment; and is situated sufficient distance from urban growth boundaries, parks, wilderness, and recreation areas:

1. Hazardous waste treatment facilities pose an inherent risk of handling and/or processing accidents that can result in uncontrolled releases that could pose a risk to the public.

    {The Department believes that the proposed facility is designed with sufficient engineering controls as to minimize the risk of a release. Controls include, but are not limited to, transport of munitions in explosion-proof containers, robotic processing, cascaded ventilation (and carbon filter) systems in the container handling building, explosive containment rooms for critical process operations, automatic waste feed cut-offs, waste feed limitations, and state of the art pollution control systems, to include carbon filtration of stack emissions.}

2. There are approximately 53,000 people living within a 30-mile radius around the proposed facility, and a population of approximately 204,000 within a 36-mile radius[(2)].

3. The Columbia River, Umatilla River, and the Irrigon Wildlife Refuge are located within five miles of the proposed facility. The Umatilla National Wildlife Refuge and the Cold Springs Reservoir National Wildlife Refuge are located within 10 miles of the proposed facility.

    {The location of the proposed facility is as close as feasibly possible to the on-site waste it is intended to treat and is over two miles from the nearest property boundary. The Pre-Trial Burn Risk Assessment indicated that risks to the public and to the environment from facility emissions do not exceed regulatory benchmarks. Additional risk assessments will be completed after the facility completes its trial burn process. If necessary, operational parameters and/or permit conditions can be modified to reflect the new information.}

4. The effects of many chemicals, including products of incomplete combustion, on human health and the environment are unknown, or must be extrapolated from animal studies. The potential for synergistic effects of stack emissions, and the impacts of other emission sources in the area, are also unknown.

    {Data and risk assessment methodologies are not available (and are unlikely to be available in the near future) to determine the synergistic effects of chemicals in stack emissions, or the potential impacts from multiple emission sources. The Department believes that the risk assessment process takes this into account by the use of conservative assumptions. See Finding 6 for further discussion of the assumptions used in the risk assessment.}

DEPARTMENT CONCLUSION ON FINDING 2:

The proposed facility location meets all of the Oregon regulations concerning minimum distances from population centers, recreation areas, and property lines, and is as close as practicable to the on-site waste it is intended to treat. The results of the human health and ecological risk assessment indicate that the proposed facility location will not pose an unacceptable risk to public health or to the environment. The Department concludes that the facility location is suitable and provides the maximum protection possible to the public health and safety and to the environment.

References, Finding 2:

(1) *Draft Pre-Trial Burn Risk Assessment–Proposed Umatilla Chemical Demilitarization Facility–Hermiston, Oregon*, Ecology and Environment *for* Oregon Department of Environmental Quality, Volumes 1 and 2, April, 1996.

(2) *Umatilla Chemical Agent Disposal Facility–Phase 1 Quantitative Risk Assessment*, Science Applications International Corporation *for* U.S. Army Program Manager for Chemical Demilitarization, September, 1996.

FINDING 3: Does the design of the proposed facility allow for treatment of the range of hazardous waste as required by the Commission?

Applicable Statute **ORS 466.055(2)(a)–(b) Criteria for new facility (as related to design)**

Requires the Commission to Find that the design of the proposed facility allows for treatment of the range of hazardous waste as required by the Commission. Requires that the facility significantly add to the range of waste handled, or the type of technology employed, at a facility previously permitted.

Full text of ORS 466.055(2)(a)–(b) is located on Page C-2.

Related Rule (There is no section in the Oregon Administrative Rules that applies to this Statute.)

In relation to Finding 3, the following **tend to support the conclusion** that Oregon Revised Statutes 466.055(2)(a) and (b) do not apply to the proposed Umatilla Facility:

1. ORS 466.055(2)(a) is applicable only to commercial facilities (off-site or on-site) that have applied for a hazardous waste facility permit in response to the Commission's determination that there is need for additional hazardous waste treatment or disposal capacity in Oregon.

2. The Commission has not determined that there is a need for additional hazardous waste treatment or disposal capacity in Oregon. The proposed facility will treat only waste already stored at the Umatilla Chemical Depot, and will not be accepting any off-site waste.

3. ORS 466.055(2)(b) applies only to previously permitted facilities that want to expand their capacity.

In relation to Finding 3, the following **tend not to support the conclusion** that Oregon Revised Statutes 466.055(2)(a) and (b) do not apply to the proposed Umatilla Facility:

1. Because there is not currently a permitted hazardous waste facility in the state of Oregon suitable for the treatment and disposal of lethal chemical agents and munitions, the proposed facility could be considered an expansion of current capacity.

   {Due to the specialized design of the proposed facility the "expansion" would apply only to Oregon's capacity to treat chemical warfare material.}

DEPARTMENT CONCLUSION ON FINDING 3:

The Commission has not determined a need for additional treatment capacity, nor opened an "Application Period" as described in ORS 466.040. The proposed facility will treat only on-site waste and is not a commercial facility. The Department concludes that Oregon Revised Statutes 466.055(2)(a) and (b) do not apply to the proposed facility.

FINDING 4: Does the proposed facility use the best available technology?

Applicable Statute **ORS 466.055(3) Criteria for new facility (as related to technology)**

Requires the Commission to Find that the proposed facility uses the best available technology for treating hazardous waste as determined by the Department or the United States Environmental Protection Agency.

Full text of ORS 466.055(3) is located on Page C-3.

Related Rule **OAR 340-120-010(2)(c) Technology and Design**

Requires that the facility use the best available technology as determined by the Department for treatment of hazardous waste and to protect public health and safety and the environment.

Full text of OAR 340-120-010(2)(c) is located on Page D-4.

The discussion of Best Available Technology is contained in Attachment B, provided under separate cover. The following criteria are being used to evaluate the proposed technology (incineration) and five alternative technologies being considered by the permit applicant for use at other chemical stockpile sites:

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

FINDING 5: Has the need for the facility been demonstrated?

Applicable Statute **ORS 466.055(4)(a)–(c) Criteria for new facility (related to need for facility)**

Paragraph (4) requires the Commission to Find that the need for a new facility is demonstrated by (a) lack of treatment capacity in the Northwest; (b) the operation of the proposed facility would result in a higher level of protection of the public health and safety or environment; or (c) significantly lower treatment or disposal costs to Oregon companies.

Full text of ORS 466.055(4)(a)–(c) is located on Page C-3.

Related Rule **OAR 340-120-010(2)(a) Need**

Requires the applicant to demonstrate that the proposed facility is needed because of selected factors related to lack of treatment capacity for hazardous waste generated by Oregon companies; public health and safety; and cost reduction to Oregon companies.

Full text of OAR 340-120-010(2)(a) is located on Pages D-3–D-4.

OAR 340-120-010(2)(b) Capacity

Describes the required size of a facility based on the need for additional hazardous waste treatment capacity within the Northwest.

Full text of OAR 340-120-010(2)(b) is located on Page D4.

In relation to Finding 5, the following **tend to support the conclusion** that ORS 466.055(4)(a) and (4)(c) do not apply to the proposed facility, and that the need for the facility has been demonstrated because the operation of the proposed facility would result in a higher level of protection for the public and the environment:

1. The construction of the proposed facility will not affect the hazardous waste treatment capacity in the Northwest, except for the capacity to treat chemical warfare munitions and agents.

2. The permitted hazardous waste disposal facility in Arlington, Oregon, is currently experiencing a decrease in the amount of hazardous waste it is receiving. Selection of the Arlington facility by the

permit applicant for disposal of hazardous waste generated by the operation of the proposed facility is not expected to affect disposal costs for other hazardous waste generators.

3. The proposed facility will not lower treatment costs for Oregon companies because it is a non-commercial facility designed to treat only on-site wastes at the Umatilla Chemical Depot.

4. The Department of Justice[1] (See Attachment E), has determined that the requirements of 466.055(4)(a) are not applicable to a new on-site facility.

5. The Department of Justice[1] (See Attachment E), has determined that the requirements 466.055(4)(c) apply only to commercial facilities.

6. The Department has conducted a Human Health and Ecological Risk Assessment[2] and found that operation of the proposed facility will not pose unacceptable risks to either human health or the environment.

7. The Quantitative Risk Assessment conducted by the U.S. Army[3] concluded that the risk of fatalities from storage of the chemical weapons stockpile is far greater than the risk of fatalities from processing operations.

8. The National Research Council[4] concluded that the annual storage risk to the public is greater than the annual risk due to disposal and that total risk to the public will be reduced by prompt disposal of the stockpile.

9. The Department conducted a random telephone survey of 400 persons in the Hermiston area in 1994[5] that showed 87% of the respondents agreed with the statement "There is a need to build a facility of this type so that we may safely dispose of Umatilla Army Depot's aging stockpile of chemical weapons." When the Department repeated this survey (with 300 respondents) in 1996[6], 84% of the respondents agreed with the statement.

10. The Department conducted a random telephone survey of 400 persons in the Hermiston area in 1994[5] that showed 78% of the respondents agreed with the statement "The process for destroying this chemical weapons stockpile should move ahead because leaving the weapons in place endangers the environment and public safety." When the Department repeated this survey (with 300 respondents) in 1996[6], 80% of the respondents agreed with the statement.

11. Numerous public comments (provided directly to the Commission, or to the Commission through the Department) have been received urging the Department and the Commission to move ahead with granting a permit for the proposed facility.

12. Approximately 106,000 M-55 rockets are stored at the Umatilla Chemical Depot. Although there is less than one chance in a million that a rocket will "auto-ignite" before the year 2013 (some estimates range to the year 2064)[7], studies have been limited to non-leaking munitions. The presence of

agent (especially GB) can accelerate the degradation of the propellant stabilizer[7][8]. The leakage rate of GB-filled M-55 rockets has been increasing over the last four years[9]. The Umatilla stockpile includes 91,375 GB-filled rockets, including 54 identified as "leakers." [10]

13. Successful operation of the proposed facility will permanently remove the chemical stockpile hazard from the local area.

In relation to Finding 5, the following **tend not to support the conclusion** that the need for the facility has been demonstrated because the operation of the proposed facility would result in a higher level of protection for the public and the environment:

1. The chemical weapons stockpile has been stored at the Umatilla Depot for over thirty years without serious incident. There is one chance in 300,000 (per year of storage) of a fatality among the population living one to three miles from the proposed facility. The greatest contributor (71%) to the risk of a fatality during storage is the unlikely occurrence of a major earthquake.[3][11]

   {In comparison, there is one chance in 27 million (per year of disposal processing) of a fatality among the population living one to three miles from the proposed facility. Thus the annual risk to individuals closest to the facility is about 90 times greater per year for continued storage versus disposal operations.[11]}

2. Hazardous waste treatment facilities pose an inherent risk of handling and/or processing accidents. The nature of the chemical weapons stockpile (chemical agents that are lethal in minute quantities, in some cases stored in deteriorating, explosively configured munitions) is such that an accident occurring during the handling required for processing could result in an uncontrolled release.

   {The Department believes that the proposed facility is designed with sufficient engineering controls as to minimize the risk of a release. Controls include the use of explosion-proof containers to transport munitions from the igloos to the container handling building, automated processing operations, cascaded ventilation (and carbon filter) systems in the processing building, explosive containment rooms for critical process operations, automatic waste feed cut-offs, waste feed limitations, and pollution control systems that include carbon filtration of stack emissions.}

3. Even with the basic uncertainties associated with estimates of M-55 rocket storage life, it is very unlikely that a non-leaking rocket will auto-ignite before the year 2013, and possibly not before the year 2064.[7] Insufficient studies have been conducted to determine the actual likelihood of auto-ignition of a "leaker" rocket.[7][8]

   {The Department believes that there are enough indications (albeit in some cases preliminary and/or confined to non-leaking rockets), of M-55 rocket instability that this should be a matter of serious concern in any decision that might further delay disposal of the chemical weapons stockpile at the Umatilla Chemical Depot.}

4. Numerous public comments (provided to the Commission) have been received indicating that there is no need for haste and urging the Department and the Commission to delay the granting of a permit for the proposed facility until further information is available concerning alternatives to the proposed incineration technology.

DEPARTMENT CONCLUSION ON FINDING 5:

The proposed facility is a non-commercial, on-site treatment facility. The Department concludes that the requirements of Oregon Revised Statute 466.055(4)(a) and (4)(c) do not apply to the proposed facility.

The operation of the proposed facility will reduce, and eventually eliminate, the risk to surrounding communities from continued storage of the chemical agents and munitions. The Department concludes that the need for the facility has been demonstrated because operation of the proposed facility will result in a higher level of protection for public health and safety and for the environment (as compared to continued storage of the chemical weapons stockpile).

While it is possible that the Umatilla stockpile could be stored for many more years without incident, no one really knows when, or if, a catastrophic event will occur. Therefore, the Department recommends that the stockpile be destroyed as quickly as possible to remove the threat.

References, Finding 5:

(1) *Memorandum* (DOJ File No. 340-420-GNE0399-95) from Larry Edelman, Department of Justice, to Stephanie Hallock, Department of Environmental Quality, dated January 29, 1996 (See Attachment E of this report for a copy of the complete text).

(2) *Draft Pre-Trial Burn Risk Assessment–Proposed Umatilla Chemical Demilitarization Facility–Hermiston, Oregon*, Ecology and Environment *for* Oregon Department of Environmental Quality, Volumes 1 and 2, April, 1996.

(3) *Umatilla Chemical Agent Disposal Facility–Phase 1 Quantitative Risk Assessment*, Science Applications International Corporation *for* U.S. Army Program Manager for Chemical Demilitarization, September, 1996.

(4) *Recommendations for the Disposal of Chemical Agents and Munitions*, National Research Council (Committee on Review and Evaluation of the Army Chemical Stockpile Disposal Program), 1994.

(5) *Umatilla Army Depot Community Assessment Survey*, Intercept Research Corporation *for* Oregon Department of Environmental Quality, July, 1994.

(6) *Umatilla Army Depot Community Assessment Tracking Survey,* Intercept Research Corporation *for* Oregon Department of Environmental Quality, July, 1996.

(7) *M55 Rocket Storage Life Evaluation,* U.S. Army Chemical Demilitarization and Remediation Activity, December, 1994.

(8) *Evaluation of Potential Hazards of Chemical Agent-Contaminated M55 Rocket Explosive Components,* U.S. Army Program Manager for Chemical Demilitarization, January, 1996.

(9) *Department of Defense's Interim Status Assessment for the Chemical Demilitarization Program,* Department of Defense, April, 1996.

(10) *Quarterly Leaker Report, Umatilla Chemical Activity,* Letter Report from Ronald Lamoreaux, Civilian Executive Assistant, Umatilla Chemical Depot, August 6, 1996.

(11) *Perspectives on the Umatilla Quantitative Risk Assessment Results,* Science Applications International Corporation *for* U.S. Army Program Manager for Chemical Demilitarization, September, 1996.

FINDING 6: Will the proposed facility have an adverse effect on either public

health and safety or to the environment of adjacent lands?

Applicable Statute **ORS 466.055(5)(a)–(b) Criteria for new facility (related to adverse effects)**

Paragraph (5) requires the Commission to Find that the proposed hazardous waste treatment facility will have no major adverse effect on either (a) public health and safety or (b) to the environment of adjacent lands.

Full text of ORS 466.055(5)(a)–(b) is located on Page C-3.

Related Rule (There is no section in the Oregon Administrative Rules that applies to this Statute.)

In relation to Finding 6, the following **tend to support the conclusion** that the proposed facility will not have an adverse effect on public health and safety or the environment of adjacent lands:

1. The Department's Draft Pre–Trial Burn Risk Assessment[(1)] concluded that:

    - Except for a location well within the Depot fenceline, emissions from the proposed facility would not result in an unacceptable level of health risk, (defined as a 1 in 100,000 chance of an excess cancer case, or a "hazard index" over 0.25 for non-cancer effects on an exposed individual).

    - Emissions from the proposed facility will be within current state regulatory limits.

    - Except for a location well within the Depot fenceline (where mercury effects exceeded regulatory benchmarks), there is a low likelihood of potential ecological effects.

2. The Draft Pre–Trial Burn Risk Assessment[(1)] used a series of conservative assumptions, such as:

    - The proposed facility would produce stack emissions for 3.2 years, when in actuality the facility will be processing for only about one year of that time. The remainder of the time the facility is conducting maintenance and/or re-configuring for different munition types;

- A person would be exposed directly to stack emissions for 3.2 years (through inhalation, even though the facility would actually be processing less than 1/3 of that time), and then be exposed indirectly (through food or water intake) for a total of 30 years. For cancer-causing substances a person was expected to be exposed indirectly for an entire lifetime (70 years);

- The proposed facility would always operate at the "high-end" of emission rates;

- Concentrations of chemicals deposited in the soil are constant over time, when in actuality soil concentrations of most chemicals diminish over time;

- There was no emission reduction "credit" given as a result of the carbon filtration system on the common stack;

- Estimated emissions of organics were increased by 280%, and metals by 146%, to account for potential "upset" conditions; and

- Emissions of chemicals not detected during JACADS trial burns were assumed to be emitted at one-half of the level of detection, and in some cases at the detection level.

3. Another risk assessment will be conducted after the facility has undergone its trial burn testing and site-specific emissions data are available.

4. The proposed facility equipment and facility emissions will be thoroughly tested with surrogate chemicals before being allowed to conduct live agent tests.

5. The proposed facility will be required to conduct extensive emissions testing during agent trial burns to ensure systems are performing as expected.

6. The permit applicant has met Department requirements that the permit application demonstrate the ability to meet federal and/or state emission standards for a hazardous waste treatment facility.

7. The Department has the authority to require the permit applicant to immediately cease operations if the Department finds that there is reasonable cause to believe that a clear and immediate danger to the public health and safety or to the environment exists from operations at the proposed facility.

8. The Department will have full-time compliance staff to oversee construction and operation of the facility.

9. Automatic Waste Feed Cut-Offs are an integral part of the facility design and will be triggered if process parameters exceed acceptable ranges, or if agent is detected at the allowable stack concentration in the common stack.

10. Since 1990 the permit applicant has operated a prototype demilitarization facility in the South Pacific known as "JACADS." Although operations have not been entirely without incident (to

include two releases of nerve agent outside engineering controls during maintenance procedures), as of October 18, 1996, JACADS has processed 2.2 million pounds of agent from over 165,000 individual munitions or containers (including 72,300 M-55 rockets). There have been no adverse effects identified either to the workers living on the island, or to the environment of Johnston Atoll.

11. The permit applicant recently started operation of "TOCDF," a demilitarization facility located in Tooele, Utah, and very similar in design to the proposed Umatilla facility. TOCDF has successfully completed surrogate trial burns, and as of October 20, 1996 had processed 3,371 M-55rockets (34,520 pounds of nerve agent GB) in preparation for live agent trial burns. No adverse effects on either human health or the environment have been identified.

12. The permit applicant is required to have all elements of the on-site facility Contingency Plan (as identified in the RCRA Part B Application) in place before start of operations.

13. Chemical agent monitoring equipment will be installed at the immediate boundary of the demilitarization facility for early detection of any uncontrolled release.

14. The Depot boundary will also be equipped with agent monitoring equipment for detection of agent at the Depot property line.

In relation to Finding 6, the following **tend not to support the conclusion** that the proposed facility will not have an adverse effect on public health and safety or the environment of adjacent lands:

1. The effects of many chemicals, including products of incomplete combustion, on human health and the environment are unknown, or must be extrapolated from animal studies.

2. The synergistic effects of the chemicals from stack emissions are unknown.

3. Department assessments of emission impacts from the proposed facility do not take into account emissions from existing permitted facilities, or previous population exposures to radioactive emissions from the Hanford facility.

    {In relation to 1, 2, and 3 (above), the Department believes that the conservative assumptions used in the human health risk assessment are sufficient to account for missing data and/or unknown effects.}

4. Exposure assessments for some segments of the population (i.e. Native Americans, breast-feeding infants) were not included in the Pre–Trial Burn Risk Assessment.

    {The Department will be conducting another risk assessment after the proposed facility undergoes its trial burns. If new information becomes available it could be incorporated in the new risk assessment.}

5. The issue of dioxin exposure, and the effect of such exposure on the population (especially sensitive populations, such as breast-feeding infants) is currently undergoing a regulatory review by the U.S. Environmental Protection Agency.

{The Department acknowledges the controversy surrounding the issue of dioxin emissions from combustion sources, and will continue to monitor developments in the scientific and regulatory community concerning sources and control of dioxins and effects of human exposure. Testing during trial burns of the proposed facility will serve to confirm estimates of dioxin emissions that were used in the health risk assessment.}

{During normal operations of the proposed facility the monitoring of critical process parameters (such as combustion chamber temperatures and oxygen and carbon monoxide levels) will serve to maximize combustion efficiency and minimize dioxin formation. The presence of the carbon filters downstream from the standard pollution abatement systems has been shown in other cases to be highly effective in capturing any dioxin compounds that are formed during the combustion process. In the case of mustard agent (over 60% of the Umatilla chemical stockpile, by agent weight) the presence of sulfur in the waste stream is also an inhibitor to dioxin formation.[(2)] }

6. Emissions data from the Tooele Chemical Demilitarization Facility (most similar in design to the proposed Umatilla facility) were not available at the time of the Department's risk assessment.

{The Department used what data were available at the time. The risk assessment will be repeated when Umatilla-specific data are available (after the trial burn process).}

7. Hazardous waste treatment facilities pose an inherent risk of handling and/or processing accidents that can result in uncontrolled releases that could pose a risk to the public.

{The Department believes that the proposed facility is designed with sufficient engineering controls as to minimize the risk of a release. Controls include the use of explosion-proof containers to transport munitions from the igloos to the container handling building, automated processing operations, cascaded ventilation (and carbon filter) systems in the processing building, explosive containment rooms for critical process operations, automatic waste feed cut-offs, waste feed limitations, and pollution control systems that include carbon filtration of stack emissions.}

8. Surveys[(3) (4)] conducted by the Department showed that over half of the respondents in the local area were concerned about the potential for leaks or accidents related to the proposed facility.

{The same surveys showed that respondents in the local area were very concerned about the risk of continued storage, and about 80% of the respondents saw a need for the facility (See Finding 5 for statements concerning survey results).}

DEPARTMENT CONCLUSION ON FINDING 6:

The human health and ecological risk assessment results did not show that the proposed facility will present an unacceptable risk to either human health or the environment. The proposed facility uses engineering process controls and state of the art pollution abatement systems which will undergo extensive testing before operations commence. The Department concludes that the proposed facility, if operated as designed and in accordance with the proposed permit, will not have any adverse effect on public health and safety, or to the environment of adjacent lands.

References, Finding 6:

(1) *Draft Pre-Trial Burn Risk Assessment–Proposed Umatilla Chemical Demilitarization Facility–Hermiston, Oregon*, Ecology and Environment *for* Oregon Department of Environmental Quality, Volumes 1 and 2, April, 1996.

(2) Memorandum of Response (to Department questions concerning dioxin issues), by Kristiina Iisa, Ph.D., Assistant Professor, Oregon State University, Chemical Engineering Department, October 29, 1996.

(2) *Umatilla Army Depot Community Assessment Tracking Survey*, Intercept Research Corporation *for* Oregon Department of Environmental Quality, July, 1996.

(3) *Umatilla Army Depot Community Assessment Survey*, Intercept Research Corporation *for* Oregon Department of Environmental Quality, July, 1994.

FINDING 7: Have the owner and operator of the facility demonstrated adequate financial and technical capability to properly construct and operate the facility?

Applicable Statute

466.060(1)(a) Criteria to be met by owner and operator before issuance of permit (as related to financial and technical capability)

Paragraph (1)(a) requires the Commission to Find that the owner and operator of the proposed facility have the financial and technical capability to properly construct and operate the facility.

Full text of ORS 466.060(1)(a) is located on Page C-3.

Related Rule

OAR 340-120-010(2)(g) Owner and Operator Capability

Paragraph (2)(g) defines the required information that must be submitted by the owner and operator of the proposed facility to demonstrate adequate financial capability to properly construct and operate the facility.

Full text of OAR 340-120-010(2)(g) is located on Pages D-5–D-6.

{The permit applicant is a federal agency and as such is exempt from the requirement to demonstrate financial capability in accordance with CFR 264.140(c) (Adopted as Oregon Rule).}

In relation to Finding 7, the following **tend to support the conclusion** that the owner and operator of the proposed Umatilla facility have demonstrated the technical capability to properly construct and operate the facility:

1. The Department has reviewed the RCRA(1) and Air Contaminant Discharge(2) Permit applications for the proposed facility ~~(and the appli~~cant's response to the five Notices of Deficiency issued during the RCRA technical review process) and has found that the applicant has demonstrated the technical capability to construct and operate the facility.

2. In addition to the Department's review, the permit applications have also been reviewed by the technical staff of the U.S. Environmental Protection Agency. The Department also actively participates in a national working group composed of staff from EPA regional offices and state

environmental staff (those states with chemical stockpiles) to exchange information and discuss technical matters related to chemical demilitarization facilities.

3. The Department believes that the proposed facility will be protective of human health and the environment if constructed and operated in accordance with the application, and the permit issued by the Commission. (3)

4. The permit applicant operates a demilitarization facility in the south Pacific known as the Johnston Atoll Chemical Agent Disposal System (JACADS). As of October 18, 1996, JACADS has successfully processed 165,417 individual munitions and 134,961 pounds of VX nerve agent; 196,348 pounds of HD blister agent; and 1,860,895 pounds of GB nerve agent; for a total of 2,192,204 pounds of chemical agents. No measurable human health or environmental impacts have been observed.(4)

5. The permit applicant operates a demilitarization facility in Tooele, Utah, known as the Tooele Chemical Disposal Facility (TOCDF). As of November 4, 1996, the TOCDF facility has successfully processed 4,253 M55 rockets (GB) through the deactivation furnace and 40,656 pounds of GB nerve agent and 196,564 pounds of spent decontamination solution through the liquid incinerator. No measurable human health or environmental impacts have been observed. (5)

6. The permit applicant has utilized extensive outside engineering expertise in the design of the proposed facility, and maintains a "lessons learned" program to insure that design changes and/or revisions to operating practices are incorporated into other proposed facilities (including Umatilla) to reflect the experience gained at JACADS and TOCDF.

In relation to Finding 7, the following **tend not to support the conclusion** that the owner and operator of the proposed Umatilla facility have demonstrated the technical capability to properly construct and operate the facility:

1. The JACADS facility has experienced numerous delays and operating problems since the beginning of demilitarization operations. Many of the delays have been related to inadequate design (i.e., an explosion in the deactivation furnace penetrated the kiln wall, conveyor systems were not adequate for the waste being processed requiring workers to manually clear conveyors, an important indicator gauge was located in an area inaccessible to workers in protective ensemble, excessive slag build-up in the liquid incinerators required manual removal), workers not following established maintenance procedures, or improper operating procedures.

   {The JACADS facility was the permit applicant's prototype facility. The purpose of a prototype facility is to test equipment systems and operating practices. The permit applicant has made design changes to the proposed Umatilla facility as a result of operating experience at JACADS. For example, the thickness of the kiln walls in the deactivation furnace was increased from ½ inch to 2 inches to prevent penetration of the kiln wall in the event of another explosion. Conveyor belts have been re-designed with finer mesh to prevent jamming, instruments were re-located to insure accessibility, and slag removal systems have been incorporated into the liquid incinerator designs. The Department is satisfied that the permit applicant responds with appropriate design improvements when necessary. None of the above noted incidents resulted in uncontrolled agent release or worker injury.

The Department acknowledges the ever-present possibility of equipment failure, human error, or failure of workers to follow established maintenance and operation procedures. The proposed facility incorporates numerous redundant safety systems and extensive requirements for operator training and certification.}

2. Before the Tooele facility even started operations a former safety manager of TOCDF made allegations of numerous safety violations and design flaws that he considered serious enough to pose a risk to the public.

   {The Department reviewed the allegations of safety deficiencies at the Tooele facility, and the follow-up inspection reports, and was satisfied that most of the allegations were of a minor nature, and that the permit applicant was adequately addressing those that appeared to be more serious. Ultimately a lawsuit was filed in federal court to prevent operation of TOCDF. After several months of court proceedings the lawsuit was dismissed as unfounded by a federal judge.[6] An appeal to the decision has been filed.}

3. The JACADS facility has had three confirmed releases of nerve agent outside of engineering controls, and TOCDF has also detected a nerve agent vapor leak.

   {The confirmed releases from the JACADS facility involved very minute amounts of nerve agent, but the fact that there were any releases at all is of course very serious. None of the three releases occurred during processing operations (two were related to maintenance operations and the third involved gasket leaks around a filter unit) and none resulted in any worker injury or harm to the environment. The Tooele vapor leak also involved a minor leak around a filter unit. The Department has reviewed the reports related to each of the releases, and is satisfied with the modifications to design and/or operating practices that were put into place to prevent recurrences.}

DEPARTMENT CONCLUSION ON FINDING 7:

The permit applicant is successfully operating two facilities similar to the proposed Umatilla facility. Although operations at the other facilities have not been entirely without incident, the Department concludes that the permit applicant has adequately demonstrated the technical capability to properly construct and operate the facility.

References, Finding 7:

(1) *Resource Conservation and Recovery Act Hazardous Waste Permit Application for the Department of the Army Umatilla Depot Activity Chemical Stockpile Disposal Program,* Umatilla Depot Activity, *submitted to* the Oregon Department of Environmental Quality, February, 1996 (revised March 21, 1996).

(2) *Air Permit Application for the Department of the Army Umatilla Chemical Agent Disposal Facility,* Umatilla Depot Activity, *submitted to* the Oregon Department of Environmental Quality, August, 1995 (revised March 21, 1996).

(3) *Draft Pre-Trial Burn Risk Assessment–Proposed Umatilla Chemical Demilitarization Facility–Hermiston, Oregon,* Ecology and Environment *for* Oregon Department of Environmental Quality, Volumes 1 and 2, April, 1996.

(4) Communication from the U.S. Army Program Manager for Chemical Demilitarization, October 25, 1996.

(5) Communication from Carl Daly, U.S. Environmental Protection Agency, November 5, 1996.

(6) *Memorandum Decision and Order, Civil No. 2:96-CV-425C,* Chemical Weapons Working Group, Inc., et al., Plaintiffs, *vs.* United States Department of the Army, et al., Defendants, Tena Campbell, United States District Judge, August 13, 1996.

FINDING 8: Have the owner and operator of the facility demonstrated ability and willingness to operate the proposed facility in compliance with statutory and regulatory provisions?

Applicable Statute **ORS 466.060(1)(b) Criteria to be met by owner and operator before issuance of permit (as related to technical capability)**

Paragraph (1)(b) requires the Commission to make a Finding that the compliance history of the owner and operator with similar facilities indicates an ability and willingness to operate the proposed facility in compliance with the statutory provisions.

Full text of ORS 466.060(1)(b) is located on Page C-3.

Related Rule **OAR 340-120-010(2)(h) Compliance History**

Paragraph (2)(h) defines the required information (i.e. compliance history of similar facilities owned or operated by permittee) that must be submitted by the owner and operator of the proposed facility to demonstrate an ability and willingness to operate the proposed facility in compliance with statutory and regulatory provisions.

Full text of OAR 340-120-010(2)(h) is located on Page D-6.

In relation to Finding 8, the following **tend to support the conclusion** that the owner and operator of the proposed Umatilla facility have demonstrated the ability and willingness to operate the proposed facility in compliance with statutory and regulatory provisions:

1. The permit applicant has submitted the information required by OAR 340-120-010 concerning compliance histories at similar facilities owned and operated by the applicant. The Department has reviewed the compliance histories of the Johnston Atoll Chemical Agent Disposal System (JACADS) and the Tooele Chemical Disposal Facility (TOCDF). The Department has reviewed the reports related to violations and is satisfied with the permittee's response to non-compliance issues.

2. The Utah Department of Environmental Quality has informed the Department that the TOCDF has successfully completed surrogate trial burns for the Deactivation Furnace, the Metal Parts Furnace, and a Liquid Incinerator, and is currently conducting "shakedown" operations for live agent trial burns for a Liquid Incinerator and the Deactivation Furnace. The Utah DEQ maintains compliance

staff on-site at TOCDF and is satisfied that any identified compliance issues have been quickly addressed and that automatic waste feed cutoffs have been reliable.(1)

3. In addition to the regulatory oversight by outside agencies, the applicant maintains a vigorous internal self-audit program to review safety and environmental management issues, and has willingly provided the results of such audits to the regulatory agencies involved.

4. The Department will maintain significant oversight authority during the construction, testing, and operation of the proposed facility, and will have compliance staff to ensure the permit applicant adheres to the requirements of the permit concerning construction certification, performance testing, operator training, monitoring and reporting, and management of all permitted hazardous waste management units.

In relation to Finding 8, the following **tend not to support the conclusion** that the owner and operator of the proposed Umatilla facility have demonstrated the ability and willingness to operate the proposed facility in compliance with statutory and regulatory provisions:

1. Normal regulatory oversight by state and federal environmental agencies at similar facilities operated by the applicant have identified violations in the management and storage of hazardous waste resulting in Notices of Non-Compliance and on at least one occasion, monetary fines.

2. On April 15, 1996 the Utah Department of Environmental Quality issued a Notice of Violation (NOV) to TOCDF based on compliance inspections during surrogate trial burns and Toxic Substance and Control Act (TSCA) Research and Development tests conducted from June, 1995, through February, 1996. The NOV listed 11 violations, including record-keeping errors, delayed notification to the Utah DEQ of permit modifications, and handling of hazardous waste. (2)

   {The TOCDF permit is voluminous and complex, and although non-compliance with hazardous waste permits is not to be taken lightly, most of the violations were of a relatively minor nature. It should also be noted that the permit applicant "self-reported" most of the violations and no monetary fines were issued by the Utah DEQ.}

3. The U.S. Environmental Protection Agency (EPA) issued a Determination of Violation (a civil administrative enforcement action) to the JACADS facility in March, 1995. (3) The Determination of Violation was based on a compliance inspection conducted in August, 1994, and on information supplied by the permittee (the U.S. Army). The Army was fined a total of $122,300. Over half of the fine ($68,300) resulted from waste storage in an unpermitted area. $4,000 of the fine was imposed for failure to maintain adequate aisle space, and the remaining $50,000 was for a failure to maintain the facility that resulted in a release of nerve agent.

   {The violations noted in EPA enforcement action were serious, and in the case of the nerve agent release, posed a potentially serious threat of harm to human health and the environment. Of most concern to the Department is that the circumstances of the nerve agent release in March, 1994, were essentially identical to a release that took place in December, 1990. Although new equipment was installed and maintenance procedures revised after the 1990 incident, a second release occurred in 1994 (while conducting exactly the same maintenance operation) when the new equipment failed to operate, and the operators failed to note there was a problem. The design of the ventilation system at the Umatilla facility is different than JACADS and the particular circumstances of the JACADS 1990 and 1994 releases could not occur at Umatilla.}

4. The JACADS 1995 Annual Report of RCRA Noncompliances was submitted by the U.S. Army to the EPA on March 15, 1996.[4] The Annual Report included numerous violations of the RCRA permit self-reported by the Army.

   {The Department has reviewed the noncompliance report and found most of the reported violations to be minor in nature. Of those violations more serious in nature the Department is satisfied that the Army's corrective actions were appropriate and that the same corrective actions will be applied to the proposed Umatilla facility, where applicable.}

5. The Department maintains authority over the chemical storage areas at the Umatilla Chemical Depot (UCD) through interim status hazardous waste storage rules. An inspection of the facility was conducted by the Department in June, 1996. Although the inspection report has not yet been completed, a Notice of Non-Compliance is expected to be issued.

DEPARTMENT CONCLUSION ON FINDING 8:

The regulations pertaining to the management of hazardous waste are voluminous and complex. Although this does not excuse non-compliance, it is not unusual for a hazardous waste facility undergoing a compliance inspection to have violations, especially in the area of record-keeping. The permit applicant has often self-reported permit violations. The Department concludes that the owner and operator of the proposed Umatilla facility have demonstrated an ability and willingness to operate the proposed facility in compliance with statutory and regulatory provisions.

<u>References, Finding 8:</u>

(1) *Letter* from Martin Gray, Section Manager, Utah ~~Department of~~ Environmental Quality, Division of Solid and Hazardous Waste, *to* Brett McKnight, Oregon DEQ, November 1, 1996.

(2) *Notice of Violation No. 9601005*, issued by the Utah Department of Environmental Quality *to* the Tooele Chemical Disposal Facility, April 16, 1996.

(3) *Determination of Violation/Compliance Order*, issued by the United States Environmental Protection Agency *to* the United States Army, U.S. EPA Docket No. RCRA 09-95-0001, March 13, 1995.

(4) *The Johnston Atoll Chemical Agent Disposal System 1995 Annual Report of RCRA Noncompliances*, U.S. Army, March, 1996.

ATTACHMENT B

FINDING 4: BEST AVAILABLE TECHNOLOGY

NOVEMBER, 1996

Draft Best Available Technology Findings Report
Umatilla Chemical Depot
Umatilla, Oregon

Prepared by

Ecology and Environment
Seattle, Washington

for

Oregon Department of Environmental Quality

November, 1996.

(Provided under separate cover.)

ATTACHMENT C
OREGON REVISED STATUTES

STAFF REPORT ON THE PROPOSED
UMATILLA CHEMICAL DEMILITARIZATION FACILITY
SEPTEMBER, 1996

Chapter 466 of the Oregon Revised Statutes contains numerous Sections related to the permitting of hazardous waste treatment, storage, or disposal facilities. Chapter 466.015 through 466.065 contain the administrative requirements for hazardous waste facilities such as the proposed Umatilla facility. A listing of all sections of the Administrative portion of Chapter 466 are provided below for reference, but only those that are directly related to the Umatilla facility and the Findings required by the Commission (listed in **bold** print) are provided in their entirety.

OREGON REVISED STATUTES
HAZARDOUS WASTE AND HAZARDOUS MATERIALS II
PUBLIC HEALTH AND SAFETY
STORAGE, TREATMENT AND DISPOSAL OF HAZARODUS WASTE AND PCB
(Partial Listing)

STORAGE, TREATMENT AND DISPOSAL OF HAZARDOUS WASTE AND PCB

466.005 Definitions for ORS 453.635 and 466.005 to 466.385
466.010 Purpose

(Administration)

466.015 Powers and duties of department
466.020 Rules and orders
466.025 Duties of commission
466.030 Designation of classes of facilities subject to certain provisions
466.035 Commission authority to impose standards for hazardous waste or PCB at Oregon facility
466.040 Application period for PCB or hazardous waste permit
466.045 Application form; contents; fees; renewal application
466.050 Citizen advisory committees
466.055 Criteria for new facility
466.060 Criteria to be met by owner and operator before issuance of permit
466.065 Applicant for renewal to comply with ORS 466.055

ORS 466.050 Citizen advisory committees.

(1) To aid and advise the director and the commission in the selection of a hazardous waste or PCB treatment or disposal facility or the site of such facility, the director shall establish citizen advisory committees as the director considers necessary. The director shall determine the representation, membership, terms and organization of the committees and shall appoint their members. The director or a designee shall be a nonvoting member of each committee.

(2) The advisory committees appointed under subsection (1) of this section shall review applications during an application period established under ORS 466.040 and make recommendations on the applications to the commission.

ORS 466.055 Criteria for new facility.

Before issuing a permit for a new facility designed to dispose of or treat hazardous waste or PCB, the Commission must find, on the basis of information submitted by the applicant, the Department or any other interested party, that the proposed facility meets the following criteria:

(1) The proposed facility location:

(a) Is suitable for the type and amount of hazardous waste or PCB intended for treatment or disposal at the facility;

(b) Provides the maximum protection possible to the public health and safety and environment of Oregon from release of the hazardous waste or PCB stored, treated or disposed of at the facility; and

(c) Is situated sufficient distance from urban growth boundaries, as defined in ORS 197.295, to protect the public health and safety, accessible by transportation routes that minimize the threat to the public health and safety and to the environment and sufficient distance from parks, wilderness and recreation areas to prevent adverse impacts on the public use and enjoyment of those areas.

(2) Subject to any applicable standards adopted under ORS 466.035,[1] the design of the proposed facility:

(b) Allows for treatment or disposal of the range of hazardous waste or PCB as required by the Commission; and

[1] ORS 466.035 states that "The commission may impose specific standards for the range and type of hazardous waste or PCB treated or disposed of at a facility in order to protect the public health and safety and environment of Oregon."

(b) Significantly adds to:

(B) The range of hazardous waste or PCB handled at a treatment or disposal facility currently permitted under ORS 466.005 to 466.385; or

(C) The type of technology employed at a treatment or disposal facility currently permitted under ORS 466.005 to 466.385.

(2) The proposed facility uses the best available technology for treating or disposing of hazardous waste or PCB as determined by the Department or the United States Environmental Protection Agency.

(4) The need for the facility is demonstrated by:

(d) Lack of adequate current treatment or disposal capacity in Oregon, Washington, Idaho and Alaska to handle hazardous waste or PCB generated by Oregon companies;

(e) A finding that operation of the proposed facility would result in a higher level of protection of the public health and safety or environment; or

(f) Significantly lower treatment or disposal costs to Oregon companies.

(5) The proposed hazardous waste or PCB treatment or disposal facility has no major adverse effect on either:

(a) Public health and safety; or

(b) Environment of adjacent lands

466.060 Criteria to be met by owner and operator before issuance of permit.

(1) Before issuing a permit for a facility designed to treat or dispose of hazardous waste or PCB, the permit applicant must demonstrate, and the Commission must find, that the owner and operator meet the following criteria:

(a) The owner, any parent company of the owner and the operator have adequate financial and technical capability to properly construct and operate the facility; and

(b) The compliance history of the owner including any parent company of the owner and the operator in owning and operating other similar facilities, if any, indicates an ability and willingness to operate the proposed facility in compliance with the provisions of ORS 466.005 to 466.385 and 466.890 or any condition imposed on the permittee by the Commission.

(1) If requested by the permit applicant, information submitted as confidential under paragraph (a) of subsection (1) of this section shall be maintained confidential and exempt from public disclosure to the extent provided by Oregon law.

ATTACHMENT D
OREGON ADMINISTRATIVE RULES

STAFF REPORT ON THE PROPOSED
UMATILLA CHEMICAL DEMILITARIZATION FACILITY
SEPTEMBER, 1996

Chapter 340 of the Oregon Administrative Rules contains numerous Divisions related to the permitting of hazardous waste treatment, storage, or disposal facilities. Division 120 covers additional siting and permitting requirements for hazardous waste treatment and disposal facilities such as the proposed Umatilla facility. A listing of all sections of Division 120 are provided below for reference, but only those that are directly related to the Umatilla facility and the Findings required by the Commission (listed in **bold** print) are provided in their entirety.

DIVISION 120
HAZARDOUS WASTE MANAGEMNT
Additional Siting and Permitting Requirements for Hazardous Waste and PCB Treatment and Disposal Facilities

340-120-001 Purpose and Applicability

340-120-005 Permitting Procedure

340-120-010 Contents of an Authorization to Proceed Request

340-120-015 Land Use Compatibility Findings

340-120-020 Community Participation

340-120-025 Off-Site Transportation Emergencies

OAR 340-120-001 Purpose and Applicability

(1) To protect the public health and safety and the environment, the Commission finds that it is in the state's best interest to more fully regulate and review proposals to treat or dispose of hazardous waste and PCB. The purpose of this Division is to establish a supplemental siting and permitting procedure for most types of hazardous waste and PCB treatment and disposal facilities.

(Comment: Under Federal law hazardous waste incineration and other treatment techniques are considered "treatment" and PCB incineration and other treatment techniques are considered "disposal." To be consistent, Division 120 utilizes the same definitions).

(2) All parts of this Division apply to new:

(b) Hazardous waste and PCB treatment and disposal facilities located off the site of waste generation (off-site); and

(b) Hazardous waste and PCB land disposal facilities located on the site of waste generation (on-site).

(3) Facilities described in section (2)(a) of this rule that receive less than 50% of waste on a weekly basis from off the site may be located inside urban growth boundaries as defined by ORS 197.295 and therefore do not have to meet rules 340-120-010(d)(A)(i) and 340-120-015(1)(a).

(4) New hazardous waste and PCB treatment and disposal facilities, other than land disposal facilities, located on the site of waste generation (on-site), are only subject to these parts of Division 120:

(a) 340-120-010(2)(c) Technology and Design;

(b) 340-120-010(2)(e) Property Line Setback;

(c) 340-120-010(2)(g) Owner and Operator Capability;

(d) 340-120-010(2)(h) Compliance History;

(e) 340-120-020 Community Participation;

(f) 340-120-030 Permit Application Fee. **(Note: repealed)**

(5) For the purposes of this Division, a facility can receive, with the Department approval, as much as 10% of waste on a weekly basis from off the site and be an on-site facility.

(6) For the purposes of this Division, a new facility means:

(a) A facility for which an original permit application was submitted after the effective date of this Division, or

(b) A facility where a different type of treatment or disposal is being proposed (i.e., adding incineration at a facility utilizing disposal, or changing from chemical treatment to biological treatment at a facility).

(7) This Division does not apply to:

(a) Portable hazardous waste and PCB treatment and disposal facilities that are located on a single site of generation (on-site) less than 15 days each year;

(b) Hazardous waste and PCB treatment or disposal sites involved in remedial action under ORS 466 or closing under Divisions 100 through 110 of this chapter;

(c) Facilities treating hazardous waste pursuant to the recycling requirements of 40 CFR 261.6;

(d) Emergency permits issued by the Director according to 40 CFR 270.61; and

(e) Facilities permitted by the Department to manage municipal or industrial solid waste, if the hazardous waste the facilities treat or dispose of is excluded from regulation by 40 CFR 261.5.

(8) The requirements of this Division are supplemental to those of Divisions 100 through 110 of this Chapter. The definitions of 340-100-010 and 340-110-003 apply to this Division.

OAR 340-120-010 Contents of an Authorization to Proceed Request

(1) An Authorization to Proceed request shall demonstrate that the proposed facility meets the criteria presented in section (2) of this rule. If the facility does not meet all of the criteria, the Department shall deny the request.

(2) Criteria that must be met to obtain an Authorization to Proceed:

(b) Need

(A) The facility is needed because:

(i) Of a lack of adequate current treatment or disposal capacity to handle hazardous waste or PCB generated by Oregon companies; or
(ii) Its operation would result in a higher level of protection of the public health and safety or environment; or

(iii)Its operation will significantly lower treatment or disposal costs to Oregon companies, excluding transportation costs within state that are parties to the Northwest Interstate Compact on Low-Level Radioactive Waste Management as set forth in ORS 469.930.

(A) The facility shall significantly add to the range of the hazardous waste or PCB handled or to the type of technology already employed at a permitted treatment or disposal facility in states that are parties to the Northwest Interstate Compact on Low-Level Radioactive Waste Management.

(B) Notwithstanding the provision of Section (2)(a)(A) of this rule, the Department may deny an Authorization to Proceed request if the Department finds that capacity at other treatment or disposal facilities negate the need for a particular facility in Oregon.

(b) Capacity.

(B) The facility shall not be sized less than what is needed, in conjunction with existing facilities in the Northwest Compact States, to treat or dispose of all hazardous waste or PCB generated, or reasonably projected to be generated over the next 10 years, in Oregon.

(C) The facility shall not be sized greater than needed to treat or dispose of all hazardous waste or PCB generated, or reasonably projected to be generated over the next 10 years, in states that are parties to the Northwest Interstate Compact on Low-Level Radioactive Waste Management.

(D) If the facility is sized to treat or dispose of more hazardous waste or PCB generated outside Oregon than hazardous waste or PCB generated in Oregon, the applicant must demonstrate to the Department that the additional size is needed to make the proposed facility economically feasible.

(E) If all of the criteria of 340-120-010(2) are met, the Commission may give preference to a proposed facility which is sized more closely to what is needed to treat or dispose of hazardous waste or PCB generated in Oregon.

(c) Technology and Design.

The facility shall use the best available technology 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.

(d) Location.

(C) The facility shall be sited at least one mile from:

(i) Areas within urban growth boundaries as defined by ORS 197.295;

(ii) Wilderness, parks, and recreation as designated or identified (if appropriate) in the applicable local comprehensive plan or zoning maps;

(iii) Schools, churches, hospitals, nursing homes, retail centers, stadiums, auditoriums and residences except those owned by the applicant and necessary for the operation of the facility.

(A) The Department may consider a lesser distance for subparagraphs (2)(d)(A)(ii) and (2)(d)(A)(iii) if the applicant demonstrates that the lesser distance adequately protects the public health and safety and the environment.

(b) Property Line Setback.

(E) Hazardous waste and PCB treatment and disposal facilities, other than land disposal facilities, on the site of waste generation shall have at least a 250 foot separation between active waste management areas and facilities, and property boundaries.

(F) Hazardous waste and PCB treatment and disposal facilities off the site of waste generation and land disposal facilities on the site of waste generation shall have at least a 1,000 foot separation between active waste management areas and facilities, and property boundaries.

(f) Groundwater Protection. (Does not apply to this facility.)

(g) Owner and Operator Capability.

The owner, any parent company of the owner and the operator must demonstrate adequate financial and technical capability to properly construct and operate the facility. As evidence of financial capability, the following shall be submitted:

(A) Financial statements of the owner, any parent company of the owner, and the operator audited by an independent certified public accountant for three years immediately prior to the application;

(B) The estimated cost of construction and a plan detailing how the construction will be funded; and

(C) A three year projection, from the date the facility is scheduled to begin operating, of revenues and expenditures related to operating the facility. The projection should have sufficient detail to determine the financial capability of the owner, any parent company of the owner and the operator to properly operate the facility.

(h) Compliance History

(H) The compliance history in owning and operating other similar facilities, if any, must indicate that the owner, any parent company of the owner and the operator have an ability and willingness to operate the proposed facility in compliance with the provisions of ORS 466 and any permit conditions that may be issued by the Department or Commission. As evidence of ability and willingness, the following shall be submitted:

(i) A listing of all responses to past actual violations identified by EPA or the appropriate state regulatory agency within the five years immediately preceding the filing of the request for an Authorization to Proceed at any similar facility owned or operated by the applicant, owner, any parent company of the owner or operator during the period when the actions causing the violations occurred; and

(ii) Any written correspondence from EPA and the appropriate state regulatory agency which discusses the present compliance status of any similar facility owned or operated by the applicant, owner, any parent company of the owner or operator.

(B) Upon request of the Department, the applicant shall also provide responses to the past violations identified prior to the five years preceding the filing of an authorization to Proceed and the specific compliance history for a particular facility owned or operated by the applicant, any parent company of the owner or operator.

OAR 340-120-020

(1) The Commission finds that local community participation is important in the siting and in reviewing the design, construction and operation of hazardous waste and PCB treatment and disposal facilities.

(2) To encourage local participation in the siting of a proposed facility described in rule 340-120-001(2), the Director shall appoint and utilize a committee comprised at least partly of residents living near to, or along transportation routes to, the facility site. The committee shall be appointed as soon as feasible after the Department receives an Authorization to Proceed request. At least one half of the appointments shall be from a list of nominees submitted by the local government with land-use jurisdiction. The Director shall appoint the chairperson of the committee.

(3) The Director may appoint a committee to review a proposed facility described in rule 340-120-001(4).

(4) The Director may continue a committee authorized in section (2) and (3) of this rule or appoint a new committee to review the operation of a facility once it is located and constructed.

(Comment: The committee shall provide a forum for citizen comments, questions and concerns about the site and facility and promote a dialogue between the community of the proposed facility and the company interested in siting the facility. The committee shall prepare a written report summarizing local citizen concerns and the manner in which the company is addressing these concerns. The report shall be considered by the Department and the Commission and local government during the consideration of the proposed facility.)

(5) The Department recommends that the local government and applicant consider negotiating an agreement appropriate for the proposed facility's potential local impact. The agreement might consider these and other issues:

(e) Training and equipping local fire, police and health department personnel to respond to accidents, spills and other emergencies;

(f) Special monitoring both on and off-site for worker and community health status;

(g) Road improvements and maintenance to assure safe transportation of waste to the site;

(h) Possible changes in property values near the site due to the proposed facility;

(i) A plan to resolve conflicts or disagreements that might develop between the facility operator and the community.

(1) When issuing a treatment or disposal permit pursuant to Divisions 105, 106, and 110 of this Chapter, the Department, or as applicable, the Commission, may impose requirements addressing the issues described in section (5) of this rule or other similar issues to protect the public health and safety and the environment.

ATTACHMENT E

STAFF REPORT ON THE PROPOSED
UMATILLA CHEMICAL DEMILITARIZATION FACILITY
SEPTEMBER, 1996 (****DRAFT****)

Memorandum from Larry Edelman, Assistant Attorney General, to Stephanie Hallock, Division Administrator, dated January 29, 1996.

THEODORE R. KULONGOSKI
ATTORNEY GENERAL

THOMAS A. BALMER
DEPUTY ATTORNEY GENERAL

4

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DEPARTMENT OF JUSTICE
PORTLAND OFFICE

MEMORANDUM

DATE: January 29, 1996

TO: Stephanie Hallock
Division Administrator
DEQ — Eastern Region

FROM: Larry Edelman *LE.*
Assistant Attorney General
Natural Resources Section

SUBJECT: Umatilla Army Incinerators Permitting
DOJ File No. 340-420-GNE0399-95

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY
RECEIVED
JAN 31 1996
EASTERN REGION
BEND

You asked that in follow-up to my advice memo to you of January 8, 1996 I discuss which of the findings in ORS 466.055 and ORS 466.060 the Environmental Quality Commission (EQC) must address for new on-site treatment facilities such as the proposed Umatilla Depot nerve agent incinerators.

Your question is posed because OAR 340 Division 120, the implementing regulation, distinguishes between new *off-site* disposal and treatment facilities and *on-site* facilities. The regulation exempts new on-site facilities from some of the statutory findings enumerated in ORS 466.055.[1]

OAR 340 Division 120 comprises the siting and permitting requirements for hazardous waste and PCB treatment and disposal facilities. OAR 340-120-001(2) provides, in part:

> (2) All parts of th[i]s Division apply to new:
> (a) Hazardous waste and PCB treatment and disposal facilities located off the site of waste generation (off-site); and
> (b) Hazardous waste and PCB land disposal facilities located on the site of waste generation (on-site)....

---

[1]OAR 340 Division 120 was promulgated pursuant to authority in ORS 466.030 which provides broad authority for the EQC to designate classes of treatment or disposal facilities subject to the statutory requirements, and by implication, those exempt from certain of the

OAR 340-120-00(4) provides:

> (4) New hazardous waste and PCB treatment and disposal facilities, other than land disposal facilities, located on the site of waste generation (on-site), are only subject to these parts of Division 120:
> (a) 340-120-010(2)(c) — Technology and Design;
> (b) 340-120-010(2)(e) — Property Line Setback;
> (c) 340-120-010(2)(g) — Owner and Operator Capability;
> (d) 340-120-010(2)(h) — Compliance History;
> (e) 340-120-020 — Community Participation;
> (f) 340-120-030 — Permit Application Fee.

The criteria in paragraph 4 of the regulation were adopted by the EQC as the siting requirements applicable to *on-site* facilities for purposes of ORS 466.055 and, therefore, were intended to specify the findings the EQC must make with respect to proposals such as the Umatilla Army incinerators under ORS 466.055 and 466.060.[2]

While Division 120 addresses most criteria in ORS 466.055, it does not clearly address paragraph 5 of the statute with respect to either on-site or off-site facilities, nor does it cover paragraph 4(a) which was a 1989 amendment to the capacity finding. Paragraph 5 of the statute provides:

> (5) The proposed hazardous waste or PCB treatment or disposal facility has no major adverse effect on either:
> (a) Public health and safety; or
> (b) Environment of adjacent lands. ...

Because the statutory finding required in paragraph 5 is not expressly covered in Division 120, it appears that it applies to both on-site and off-site facilities. In other words, there does not appear to be any regulatory exemption with respect to this finding for off-site facilities.[3]

---

[2]Staff reports dated March 14, 1986 and April 25, 1986 discuss the rationale for distinguishing between on-site and off-site facilities under Division 120.

[3]One might argue that under authority of ORS 466.030 the Commission intended to subsume the requirements of paragraph 5 within OAR 340-120-001(1) and OAR 340-120-010(2)(c). There is, however, no clear support for this argument one way or the other.

Paragraph 4(a) requires a finding that:

> (4) The need for the facility is demonstrated by:
> (a) Lack of adequate current treatment or disposal capacity in Oregon, Washington, Idaho and Alaska to handle hazardous waste or PCB generated by Oregon companies; ...

This finding must also, in theory, be made for all new treatment or disposal facilities whether on-site or off-site since this requirement was imposed by a 1989 statutory amendment which has not been the subject of rulemaking.[4] This specific capacity finding, however, would not appear to have any direct relevance to the proposed Umatilla incinerators.

In summation, the findings the EQC must make with respect to the proposed Umatilla incinerators appear to include those specified in OAR 340-120-4(a) – (f) and ORS 466.005(5).

LE:kt/LHE0261.MEM

[4]In practice, it is doubtful that paragraph 4(a) has relevance to on-site facilities of any type.

DEPARTMENT RECOMMENDED PERMIT CONDITIONS IN RESPONSE TO PUBLIC COMMENT AND TO ISSUES RAISED AT COMMISSION MEETINGS

INTRODUCTION

The following permit conditions primarily come from discussions with the Commission. These are important issues, and as such, it seems that within the broad authority and scope of the criteria under ORS 466.055, the Commission members would feel that these permit conditions are integral to the findings they must make and in response to public comments received. Therefore, it must be remembered that if the Commission wants to include the following permit conditions, they should be explicitly stated as part of their findings and response to public comment, ergo part of their decision with the hazardous waste permit. For each proposed permit condition, the 466.055 criteria that best fits the condition is listed.

DEPARTMENT RECOMMENDED PERMIT MODIFICATIONS

1) *CSEPP Readiness*

Issue	Concerns have been expressed over the emergency readiness of the CSEPP program. Public comment has been received citing inadequate emergency preparedness and response for the surrounding population. In addition, the Commission has expressed a desire to be involved (or the Governor) in approval of the emergency response plans. Is Department approval sufficient?
Recommended New Permit Condition	II.H.3. <u>Contingency Plan - Construction</u> The Permittee shall not commence any construction activities for the UMCDF facility until the Permittee submits to the Department, for approval, a written certification that the essential elements addressing off site emergency preparedness and

Relax conditions to apply to only operation response are either in place or an acceptable schedule for securing the essential elements has been accepted by Oregon Emergency Management Division (OEM). Identification of the **essential elements** for off site emergency response shall be determined by OEM, consistent with the State and Local emergency response planning efforts.

Modified Permit Condition	II.H.4. Contingency Plan The Permittee shall not commence any shakedown period activities as defined in Module VI of the UMCDF site pursuant to this permit until the Department has received written notification from the Governor of the State of Oregon or his designee that the required elements of the appropriate Chemical Stockpile Emergency Preparedness and Prevention (CSEPP) plans for the State of Oregon are in place. The Governor's (or his designee's) determination shall be written and placed in the Administrative Record and will be addressed to the Permittee.
Response To Comments and Applicable Finding	*466.055(4)(b):* *The need for the facility is demonstrated by: ... (b) A finding that operation of the proposed facility would result in a higher level of protection of the pubic health and safety or environment; ...*

2) Removal of the UMCDF Structures at Closure

Issue	The Commission has expressed a desire to see the structures at the UMCDF removed at closure, in part due to landscape aesthetics and not leaving behind a concrete building shell. The public, on several occasions, has stated a concern that hazardous waste operations will continue at the UMCDF after stockpile destruction.
Recommended New Permit Condition	II.J.9. Closure Following submittal of all successful closure decontamination certifications in accordance with permit condition II.J.6., the Permittee shall remove all man-made structures (e.g., buildings, parking areas, underground structures, fences, etc.,.) within the boundary of the UMCDF. If a public or private entity identifies a use for any, or all, of the man-made structures after UMCDF closure decontamination, then the Permittee may submit a closure

	modification request as a class two modification in accordance with 40 CFR 270.42(b). The reuse of any man-made structure must be in accordance with recognized general principles of the Umatilla Chemical Depot Base Realignment and Closure Plan.
Response To Comments and Applicable Finding	*ORS 466.055(1)(c):* *The proposed facility location:* *(c) Is situated sufficient distance ... from parks, wilderness and recreation areas to prevent adverse impacts on the public use and enjoyment of those areas.* - and - *ORS 466.055(5)(b):* *The proposed hazardous waste or PCB treatment or disposal facility has no major adverse effect on either:* *(b) Public Health and safety...*

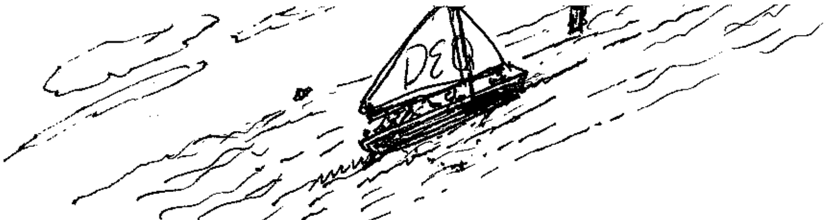
3) PAS Carbon Filter Unit

Issue	The Pollution Abatement System (PAS) Carbon Filter Unit, first conceived as an additional protection from agent release, but now recognized as an additional way to reduce dioxin emissions, is a unit that the Commission wishes to insure will be built.
Recommended New Permit Condition	II.Q. PAS Filter System Permittee shall build and operate the PAS Filter Systems in accordance with the appropriate drawings of Volume 5, and of Section D-8B-05, Attachment D-3, Volume VII of the application. Any future modification request that includes removal of the PAS Filter System shall be decided by the Commission. The Commission must make a finding of the two criteria at ORS 466.055(3) and 466.055(5), and then decide on the modification request as a class three modification.

Response To Comments And Applicable Finding	*ORS 466.055(3)* *The proposed facility uses the best available technology for treating or disposing of hazardous waste or PCB as determined by the department or the United States Environmental Protection Agency*

4) EOC Positive Pressure

Issue	The Commission has expressed concerns that the existing Emergency Operations Center (EOC) isn't positive pressurized, thus causing workers inside to wear gas masks while operating under time-critical tasks. In addition, the EOC is not staffed 24 hours/day, 7 days/week, potentially causing communication delays between the EOC and the emergency responders.
Recommended New Permit Condition	II.H.7. <u>Contingency Plan</u> For any Emergency Operations Center (EOC) used to respond to off-Depot releases, the Permittee shall have a positive pressurized Emergency Operations Center (EOC) that is staffed 24 hours a day, 7 days a week. For this permit condition, "positive pressurized" shall mean that ambient non-air vapors may not enter during times of emergency training, in the case of an actual emergency, or when tested on request by a Department inspector. The EOC must be pressurized within 360 days of the effective date of the permit, and the EOC is to comply with the staffing requests within 180 days of the effective date of the permit..
Response to Comments and Applicable Finding	*466.055(4)(b):* *The need for the facility is demonstrated by: ... (b) A finding that operation of the proposed facility would result in a higher level of protection of the pubic health and safety or environment; ...*



5) *Army Assurance of Independent Oversight*

Issue	The Commission expressed a desire for independent oversight of all demilitarization operations at the UMCDF. The public also commented on the need for independent oversight.
Recommended New Permit Conditions	II.E.5. <u>General Inspection Requirements</u> Permittee shall propose and the Department shall approve a plan to independently inspect demilitarization building, testing, and operations at the UMCDF. The Permittee shall provide for such oversight in accordance with a signed agreement between the Permittee and the Department. Absence of such an agreement, or failure of the Permittee to comply with the agreement, shall be a permit violation of this condition. DEQ help develop 3rd party oversight plan
Response To Comments and Applicable Finding	*ORS 466.055(4)(b):* *The need for the facility is demonstrated by:* *(b) A finding that operation of the proposed facility would result in a higher level of protection of the pubic health and safety or environment...*

6) *Shutdown of Facility in Case of "Something Going Wrong" or Permittee Non-compliance*

Issue	The Commission asked if the Department has the authority to compel the facility to cease operations in case "something goes wrong" or if non-compliance.

Recommended New Permit Conditions	I.C.2.	Permit Actions In accordance with ORS 466.170, the Commission may revoke this permit after public hearing upon a finding that the Permittee has violated any provision of ORS 466.005 to 466.385 and 466.890 or rules adopted pursuant thereto or any material condition of the permit, subject to review under ORS 183.310 to 183.550.
	I.C.3.	Permit Actions In accordance with ORS 466.200, if the Department finds that there is a reasonable cause to believe that a clear and immediate danger to the public health, welfare or safety or to the environment exists from the continued operation of the site, the Department may halt demilitarization operations at the UMCDF. Non-compliance with the Department's written notification shall be a violation of this permit condition. Resumption of operations shall only be initiated upon written approval of the Department.
	I.L.2	Proper Operation and Maintenance In accordance with ORS 466.180(1), the Department may limit, prohibit, or otherwise restrict storage and treatment operations at the UMCDF upon receipt of information that documents non-compliance with permit condition I.L.1. (*Note: Currently, permit condition 'I.L.1.' is I.L. in the draft permit).* The Department shall invoke such restrictions by written notification which specifies actions that the Permittee must take to comply. Non-compliance with the Department's written notification shall be a violation of this permit condition.
Response To Comments and Applicable Finding	Inclusion of these permit conditions come from other ORS 466 authorities other than the ORS 466.055 findings.	

7) *Liability Issue*

Issue	The Commission and the public have asked who is liable if damage occurs from unpermitted releases from the UMCDF.
Current Permit Condition	II.M. Liability Requirements The Permittee is exempt from the liability coverage for sudden and accidental occurrence requirements, as specified in 40 CFR § 264.140(c). If any Permittee is not a federal or state agency, the Permittee must provide liability insurance in accordance with ORS 466.105(5). The liability insurance will be reviewed and approved by the Department.
Discussion Points	• The Attorney General, through informal discussion, has opined that ORS 466.105(5) could apply to the Army's contractor who would be a co-permittee. The Department has included this permit condition to address this issue that someone be held accountable in case of unpermitted releases. The Army is exempt from liability in accordance with federal law exemption, except in cases of the Federal Tort Exemption. The Army is currently looking into whether the Federal Tort Exemption could be applied to chemical demilitarization accidents. The Oregon Attorney General doesn't believe the federal government (Army) could be held liable in case of accident. However, because of ORS 466.105(5), the contractor may be liable.
Response To Comments and Applicable Finding	The Commission finds that liability (ORS 466.150(5) is an essential element of the permit per ORS 466.035, therefore in response to comment, the existing permit condition shall remain in the proposed permit.

8) *Bad Weather Conditions*

Issue SOP's	The Commission and the public have commented that the facility should cease or decrease demilitarization activities during times of 'bad weather.' Ideas of what bad weather is has ranged from inversions, to dust storms, to blizzards. The concerns regarding bad weather have ranged from abilities to respond in emergencies to concentration effects of pollutants.

Recommended New Permit Condition	II.A.3. <u>Design and Operations of Facility</u> The Permittee shall submit to the Department a request for a Class II permit modification, within 180 days of the effective date of this permit, concerning the standard operating procedures that will be followed by UMCDF personnel for handling and transporting munitions from the storage igloos to the UMCDF facility during inclement weather conditions.
Response To Comments and Applicable Finding	*ORS 466.055(1)(b):* *Provide the maximum protection possible to the public health and safety and the Environment of Oregon from release of the hazardous waste or PCB stored, treated, or disposed of at the facility.*

file: EQCPRMTD.DOC

ATTACHMENT A
DEPARTMENT CONCLUSIONS ON ENVIRONMENTAL QUALITY COMMISSION FINDINGS

STAFF REPORT ON THE PROPOSED
UMATILLA CHEMICAL DEMILITARIZATION FACILITY
NOVEMBER, 1996

	PAGE
Introduction..	A-2
Before issuing a hazardous waste treatment permit the Commission must Find that:	
1. The intent of the statutory and regulatory provisions concerning community participation have been met. **{ORS 466.050}**	A-3
2. The proposed facility location is a) suitable for the type and amount of hazardous waste intended for treatment at the facility; b) provides the maximum protection possible to the public health and safety and to the environment; and c) is situated sufficient distance from urban growth boundaries, parks, wilderness, and recreation areas. **{ORS 466.055(1)(a)–(c)}**...	A-7
3. The design of the proposed facility allows for treatment of the range of hazardous waste as required by the Commission. **{ORS 466.055(2)(a)–(b)}**	A-11
4. The proposed facility uses the best available technology. **{ORS 466.055(3)}**......	A-13
5. The need for the facility has been demonstrated. **{ORS 466.055(4)(a)–(c)}**.......	A-14
6. The proposed facility will not have an adverse effect on either public health and safety or to the environment of adjacent lands. **{ORS 466.055(5)(a)–(b)}**.........	A-19
7. The owner and operator of the facility have demonstrated adequate financial and technical capability to ~~properly construct~~ and operate the facility. **{ORS 466.060(1)(a)}**...	A-24
8. The owner and operator of the facility have demonstrated ability and willingness to operate the proposed facility in compliance with statutory and regulatory provisions. **{ORS 466.060(1)(b)}**..	A-28

INTRODUCTION

In 1985 the Oregon Legislature specifically gave the Environmental Quality Commission (Chapter 466 of the Oregon Revised Statutes) both the responsibility and the authority to act on applications for permits for disposal and treatment of hazardous waste and PCBs. Oregon Administrative Rules (specifically, Chapter 340, Division 120) were adopted by the Commission pursuant to Chapter 466 of the statute to more clearly define the siting criteria for both on-site and off-site hazardous waste facilities. The proposed Umatilla Chemical Demilitarization Facility is considered a new on-site hazardous waste treatment facility under state law.

The proposed Umatilla facility is subject to only those parts of Division 120 that apply to new on-site facilities. Not every Finding required by ORS 466 is specifically addressed by a corresponding rule. In one case (related to advisory commissions and community participation) there is a rule that specifically applies to new on-site facilities, but the corresponding statute does not strictly require a "Finding" by the Commission. Because the rule in Division 120 clearly applies to the Umatilla facility, the issue is included here as "Finding 1" on Page A-3.

This Attachment covers seven of the eight findings that the Commission must make before issuing a hazardous waste permit for the proposed Umatilla hazardous waste treatment facility. A report concerning finding #4 ("Best Available Technology") is being provided under separate cover, although the criteria being used to evaluate BAT are listed in this Attachment. The determination of which specific sections of applicable statutes and/or related rules require findings by the Commission were made in consultation with the Oregon Department of Justice. The complete text of the referenced Oregon Revised Statutes and Oregon Administrative Rules is contained in Attachments C and D, respectively.

FINDING 1: Has the intent of the statutory and regulatory provisions
concerning community participation been met?

Applicable Statute

ORS 466.050 Citizen advisory committees.

Authorizes the Director to establish a citizens advisory committee to review applications and advise the Department and the Commission in the selection of a hazardous waste treatment or disposal facility or the site for such a facility. The establishment of a citizens advisory committee is left to the discretion of the Director.

Full text of ORS 466.050 is located on Page C-2.

Related Rule

OAR 340-120-020 (1) –(6) Community participation.

Describes the appointment procedure and specifies the composition of an advisory committee to review the siting, design, construction, and operation of a hazardous waste treatment or disposal facility. Gives suggestions of issues to be considered, such as emergency response capabilities, changes in property values, etc.. Grants the Commission authority to impose additional requirements to address community-related impact issues.

Full text of OAR 340-120-020(1)–(6) is located on Pages D-6–D-7.

{Although ORS 466.050 was primarily intended to ensure community participation in the siting of an off-site hazardous waste facility, this part of the statute and related rule are included here because OAR 340-120-001(4) (see text on Page D-2) specifically states that on-site treatment facilities are subject to the requirements of Division 120 concerning community participation.}

In relation to Finding 1, the following **tend to support the conclusion** that the intent of the statutory and regulatory provisions concerning community participation for the proposed facility has been met:

1. The Chemical Demilitarization Citizens Advisory Commission (CDCAC) was appointed by Governor Barbara Roberts in 1993 (Executive Order EO-93-10, dated August 6, 1993).

2. The CDCAC held 21 meetings from January 18, 1994 through October 7, 1996.

3. The Department of Environmental Quality ("Department") opened an office (dedicated solely to the Umatilla project) in Hermiston in April, 1994. The Hermiston office is staffed by the Department's Umatilla Permits Coordinator.

4. The Department developed a mailing list of persons interested in the Umatilla project that now contains approximately 600 entries.

5. The Department has distributed Umatilla-specific fact sheets and other information to persons on the mailing list and at public meetings and presentations.

6. The Department has given briefings to:

   - the City Councils of Boardman, Umatilla, Stanfield, Echo, Hermiston, and Pendleton, in addition to the City Councils of Kennewick, Pasco, and Richland in the state of Washington.

   - the County Commissioners of Umatilla and Morrow Counties in Oregon and Benton County in Washington.

   - local groups including the Chambers of Commerce of Hermiston, Boardman, and Irrigon, and the Hermiston Kiwanis Club.

7. The Department has held Open Houses and conducted presentations in the local area for members of the public.

8. The public comment period was held open for over seven months (April 5-November 15, 1996).

9. The Department held three public hearings in the local area (Pendleton, Kennewick, and Hermiston), and one public hearing in Portland.

10. The Environmental Quality Commission ("Commission") heard public testimony in Hermiston on August 22, 1996, and during their regular meetings in Portland on January 11, April 12, and September 27, 1996. Time for public testimony has also been scheduled for the EQC worksession to be held on November 15, 1996.

11. During 1996 the Commission held worksessions and/or heard informational presentations about the proposed facility on January 11, April 12, May 16 and 17, July 11, August 22 and 23, September 27, and October 11. A presentation to the EQC by the Confederated Tribes of the Umatilla Indian Reservation is scheduled for November 14, and a Umatilla worksession (with opportunity for public testimony) will be conducted on November 15, 1996.

12. The Department conducted a random telephone survey of 400 persons in the Hermiston area in 1994 that showed 87% of the respondents had seen or heard news or information about the proposed facility.(1)

13. The Department conducted a random telephone survey of 300 persons in the Hermiston area in 1996 that showed 90% of the respondents had seen or heard news or information about the proposed facility. [2]

14. The Department conducted a random telephone survey of 100 persons each in Pendleton and the Tri-City (Washington) area in 1996 that showed 82% of respondents Pendleton, and 77% of respondents in the Tri-Cities, had seen or heard news or information about the proposed facility. [2]

15. Media coverage in the local area has been extensive.

16. The permit applicant maintains a public outreach office in Hermiston, has participated in DEQ-sponsored events, and conducted numerous presentations for community groups.

In relation to Finding 1, the following **tend not to support the conclusion** that the intent of the statutory and regulatory provisions concerning community participation for the proposed facility has been met:

1. A Citizens Advisory Committee was not appointed to directly advise the Department.

   {The Chemical Demilitarization Citizens Advisory Commission (CDCAC) appointed by Governor Roberts is charged with providing input to the Army, not to the Department. The CDCAC has, however, provided input directly to the Department, and Department staff has been present at all of the CDCAC meetings.}

2. An Army survey conducted in 1996[3] indicated that 51% of 1000 respondents in a random telephone survey of Umatilla, Morrow and Benton (Washington) Counties were unaware that a military base or installation was located in their county or a nearby county.

3. Of the 49% of the respondents in the Army survey[3] who indicated awareness of a nearby military installation only 55% of respondents in Umatilla County, 41% in Morrow County, and 16% in Benton County were aware of the chemical stockpile.

   {The Department believes that the Army's survey methodology was flawed and that the community surveys conducted by the Department more accurately represent community awareness.}

4. Public comment ~~was received stating~~ that the public hearing process in the Portland area was inadequate.

   {The Department acknowledges that the public hearing in Portland did not go smoothly; however, all those present who signed witness registration forms had the opportunity to testify and the transcript of the testimony was provided to the Commission. Additional public forums in Portland were provided at numerous Commission meetings during 1996 (see #'s "10" and "11" on Page A1-2).}

5. A report recently released by the National Research Council [4] is critical of the Army's public involvement efforts related to the Chemical Stockpile Disposal Program (CSDP) and concludes that "the Army's current public affairs program does not adequately involve citizens in the affected communities in the CSDP decision-making process or oversight of the program."

{The Department notes the NRC criticism of the Army's public involvement program and acknowledges that the Department has also received criticism of it's public involvement efforts (although not from the NRC). The Department does not agree with at least one commenter's assertion that the Department has not established a "meaningful" public involvement process.}

DEPARTMENT CONCLUSION ON FINDING 1:

Notwithstanding the recent National Research Council report, which criticizes the Army's public involvement process, the Department believes that there is significant community awareness of the proposed facility and that there has been ample opportunity for public input to the state's permitting process, the health and ecological risk assessment, and the Commission findings. Oregon's unique statutory obligation for the Environmental Quality Commission to make a finding regarding best available technology has provided an opportunity for dialogue about alternative technologies which has not occurred in other states.

The Department concludes that the intent of ORS 466.050 and OAR 340-120-020 concerning community participation has been met for the proposed Umatilla facility.

References, Finding 1:

(1) *Umatilla Army Depot Community Assessment Survey*, Intercept Research Corporation *for* Oregon Department of Environmental Quality, July, 1994.

(2) *Umatilla Army Depot Community Assessment Tracking Survey*, Intercept Research Corporation *for* Oregon Department of Environmental Quality, July, 1996.

(3) *Chemical Demilitarization Public Outreach: Umatilla Area Baseline Survey,* Innovative Emergency Management and Rowan & Blewitt Incorporated *for* U.S. Army Program Manager for Chemical Demilitarization Public Affairs Office, April, 1996.

(4) *Public Involvement and the Army Chemical Stockpile Disposal Program*, Letter Report from the Committee on the Review and Evaluation of the Army Chemical Stockpile Disposal Program, Board on Army Science and Technology, Commission on Engineering and Technical Systems, National Research Council, October, 1996.

Broader public context
Gone beyond statu[illegible]
obligation

List all of the materials
Public testimony and comments + documents
Basis for conclusion

FINDING 2: The Commission must find that the proposed facility location:

(a) is suitable for the type and amount of hazardous waste intended for treatment at the facility;

(b) provides the maximum protection possible to the public health and safety and to the environment; and

(c) is situated sufficient distance from urban growth boundaries, parks, wilderness, and recreation areas.

Applicable Statute **466.055(1)(a)–(c) Criteria for new facility (as related to location)**

Requires the Commission to Find that the proposed location a) is suitable for the type and amount of hazardous waste intended for treatment; b) provides the maximum protection possible to the public health and safety and environment of Oregon from release of hazardous waste; and c) is situated sufficient distance from urban growth boundaries to protect the public health and safety and sufficient distance from recreation areas to prevent adverse impacts to public use of those areas.

Full text of ORS 466.055(1)(a)–(c) is located on Page C-2.

Related Rule **OAR 340-120-010(2)(d) Location**

Gives specific siting criteria for off-site facilities. Requires the facility to be located a minimum of one mile from urban growth boundaries, wilderness, parks, recreation areas, residences, schools, churches, hospitals (and other similar community facilities). This paragraph does not actually apply to on-site facilities.

OAR 340-120-010(2)(e) Property Line Setback

Requires a 250 foot property line setback for on-site facilities.

Full text of OAR 340-120-010(2)(d)–(e) is located on Page D-5.

In relation to Finding 2, the following **tend to support the conclusion** that the proposed facility location is suitable for the type and amount of hazardous waste intended for treatment at the facility; provides the maximum protection possible to the public health and safety and to the environment; and is situated sufficient distance from urban growth boundaries, parks, wilderness, and recreation areas:

1. The proposed facility location is immediately adjacent to "K-Block," where the chemical weapon stockpile has been stored for over 30 years. The proposed location will minimize the distance the munitions must be transported.

2. Although OAR 340-120-010(2)(d) was intended to apply only to off-site facilities, the proposed facility does meet the one-mile minimum distance specified for distance from urban growth boundaries, recreation areas, and community facilities and residences.

3. The proposed facility meets the requirement of OAR 340-120-010(2)(e) for on-site facilities to maintain a minimum of a 250 foot setback from the property line (the proposed facility is two miles from the nearest Umatilla Depot boundary).

4. In addition to being well within the fenced confines of a federal facility, the proposed facility will itself be secured by additional controlled access security measures.

5. The Department's Draft Pre–Trial Burn Risk Assessment[(1)] concluded that except for a location well within the Depot fenceline, emissions from the proposed facility would not result in an unacceptable level of health risk (defined as a 1 in 100,000 chance of an excess cancer case, or a "hazard index" over 0.25 for non-cancer effects on an exposed individual).

6. Except for a location well within the Depot fenceline (where mercury effects exceeded regulatory benchmarks), there is a low likelihood of potential ecological effects[(1)].

7. The permit applicant has met Department requirements that the permit application reasonably demonstrate the ability to meet federal and/or state emission standards for a hazardous waste treatment facility.

8. Successful operation of the proposed facility will permanently remove the chemical stockpile hazard from the local area.

In relation to Finding 2, the following **tend not to support the conclusion** that the proposed facility location is suitable for the type and amount of hazardous waste intended for treatment at the facility; provides the maximum protection possible to the public health and safety and to the environment; and is situated sufficient distance from urban growth boundaries, parks, wilderness, and recreation areas:

1. Hazardous waste treatment facilities pose an inherent risk of handling and/or processing accidents that can result in uncontrolled releases that could pose a risk to the public.

   {The Department believes that the proposed facility is designed with sufficient engineering controls as to minimize the risk of a release. Controls include, but are not limited to, transport of munitions in explosion-proof containers, robotic processing, cascaded ventilation (and carbon filter) systems in the container handling building, explosive containment rooms for critical process operations, automatic waste feed cut-offs, waste feed limitations, and state of the art pollution control systems, to include carbon filtration of stack emissions.}

2. There are approximately 53,000 people living within a 30-mile radius around the proposed facility, and a population of approximately 204,000 within a 36-mile radius[2].

3. The Columbia River, Umatilla River, and the Irrigon Wildlife Refuge are located within five miles of the proposed facility. The Umatilla National Wildlife Refuge and the Cold Springs Reservoir National Wildlife Refuge are located within 10 miles of the proposed facility.

   {The location of the proposed facility is as close as feasibly possible to the on-site waste it is intended to treat and is over two miles from the nearest property boundary. The Pre-Trial Burn Risk Assessment indicated that risks to the public and to the environment from facility emissions do not exceed regulatory benchmarks. Additional risk assessments will be completed after the facility completes its trial burn process. If necessary, operational parameters and/or permit conditions can be modified to reflect the new information.}

4. The effects of many chemicals, including products of incomplete combustion, on human health and the environment are unknown, or must be extrapolated from animal studies. The potential for synergistic effects of stack emissions, and the impacts of other emission sources in the area, are also unknown.

   {Data and risk assessment methodologies are not available (and are unlikely to be available in the near future) to determine the synergistic effects of chemicals in stack emissions, or the potential impacts from multiple emission sources. The Department believes that the risk assessment process takes this into account by the use of conservative assumptions. See Finding 6 for further discussion of the assumptions used in the risk assessment.}

DEPARTMENT CONCLUSION ON FINDING 2:

The proposed facility location meets all of the Oregon regulations concerning minimum distances from population centers, recreation areas, and property lines, and is as close as practicable to the on-site waste it is intended to treat. The results of the human health and ecological risk assessment indicate that the proposed facility location will not pose an unacceptable risk to public health or to the environment. The Department concludes that the facility location is suitable and provides the maximum protection possible to the public health and safety and to the environment.

References, Finding 2:

(1) *Draft Pre-Trial Burn Risk Assessment–Proposed Umatilla Chemical Demilitarization Facility–Hermiston, Oregon*, Ecology and Environment *for* Oregon Department of Environmental Quality, Volumes 1 and 2, April, 1996.

(2) *Umatilla Chemical Agent Disposal Facility–Phase 1 Quantitative Risk Assessment*, Science Applications International Corporation *for* U.S. Army Program Manager for Chemical Demilitarization, September, 1996.

Address distance from UGB
- note location of materials to be destroyed
Comm has adopted rules on OFF-SITE disposal
- Round peg in Sq hole

FINDING 3: Does the design of the proposed facility allow for treatment of the range of hazardous waste as required by the Commission?

Applicable Statute **ORS 466.055(2)(a)–(b) Criteria for new facility (as related to design)**

Requires the Commission to Find that the design of the proposed facility allows for treatment of the range of hazardous waste as required by the Commission. Requires that the facility significantly add to the range of waste handled, or the type of technology employed, at a facility previously permitted.

Full text of ORS 466.055(2)(a)–(b) is located on Page C-2.

Related Rule (There is no section in the Oregon Administrative Rules that applies to this Statute.)

In relation to Finding 3, the following **tend to support the conclusion** that Oregon Revised Statutes 466.055(2)(a) and (b) do not apply to the proposed Umatilla Facility:

1. ORS 466.055(2)(a) is applicable only to commercial facilities (off-site or on-site) that have applied for a hazardous waste facility permit in response to the Commission's determination that there is need for additional hazardous waste treatment or disposal capacity in Oregon.

2. The Commission has not determined that there is a need for additional hazardous waste treatment or disposal capacity in Oregon. The proposed facility will treat only waste already stored at the Umatilla Chemical Depot, and will not be accepting any off-site waste.

3. ORS 466.055(2)(b) applies only to previously permitted facilities that want to expand their capacity.

Desire of Comm that all agent be destroyed
Restrict ONLY TO agent
No outside materials unless contam by stockpile

In relation to Finding 3, the following **tend not to support the conclusion** that Oregon Revised Statutes 466.055(2)(a) and (b) do not apply to the proposed Umatilla Facility:

1. Because there is not currently a permitted hazardous waste facility in the state of Oregon suitable for the treatment and disposal of lethal chemical agents and munitions, the proposed facility could be considered an expansion of current capacity.

   {Due to the specialized design of the proposed facility the "expansion" would apply only to Oregon's capacity to treat chemical warfare material.}

DEPARTMENT CONCLUSION ON FINDING 3:

The Commission has not determined a need for additional treatment capacity, nor opened an "Application Period" as described in ORS 466.040. The proposed facility will treat only on-site waste and is not a commercial facility. The Department concludes that Oregon Revised Statutes 466.055(2)(a) and (b) do not apply to the proposed facility.

AC Filters are integral to finding

FINDING 4: Does the proposed facility use the best available technology?

Applicable Statute **ORS 466.055(3) Criteria for new facility (as related to technology)**

Requires the Commission to Find that the proposed facility uses the best available technology for treating hazardous waste as determined by the Department or the United States Environmental Protection Agency.

Full text of ORS 466.055(3) is located on Page C-3.

Related Rule **OAR 340-120-010(2)(c) Technology and Design**

Requires that the facility use the best available technology as determined by the Department for treatment of hazardous waste and to protect public health and safety and the environment.

Full text of OAR 340-120-010(2)(c) is located on Page D-4.

The discussion of Best Available Technology is contained in Attachment B, provided under separate cover. The following criteria are being used to evaluate the proposed technology (incineration) and five alternative technologies being considered by the permit applicant for use at other chemical stockpile sites:

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

Add findings re No outside material destruction of facility

FINDING 5: Has the need for the facility been demonstrated?

Applicable Statute **ORS 466.055(4)(a)–(c) Criteria for new facility (related to need for facility)**

Paragraph (4) requires the Commission to Find that the need for a new facility is demonstrated by (a) lack of treatment capacity in the Northwest; (b) the operation of the proposed facility would result in a higher level of protection of the public health and safety or environment; or (c) significantly lower treatment or disposal costs to Oregon companies.

Full text of ORS 466.055(4)(a)–(c) is located on Page C-3.

Related Rule **OAR 340-120-010(2)(a) Need**

Requires the applicant to demonstrate that the proposed facility is needed because of selected factors related to lack of treatment capacity for hazardous waste generated by Oregon companies; public health and safety; and cost reduction to Oregon companies.

Full text of OAR 340-120-010(2)(a) is located on Pages D-3–D-4.

OAR 340-120-010(2)(b) Capacity

Describes the required size of a facility based on the need for additional hazardous waste treatment capacity within the Northwest.

Full text of OAR 340-120-010(2)(b) is located on Page D4.

In relation to Finding 5, the following **tend to support the conclusion** that ORS 466.055(4)(a) and (4)(c) do not apply to the proposed facility, and that the need for the facility has been demonstrated because the operation of the proposed facility would result in a higher level of protection for the public and the environment:

1. The construction of the proposed facility will not affect the hazardous waste treatment capacity in the Northwest, except for the capacity to treat chemical warfare munitions and agents.

2. The permitted hazardous waste disposal facility in Arlington, Oregon, is currently experiencing a decrease in the amount of hazardous waste it is receiving. Selection of the Arlington facility by the

permit applicant for disposal of hazardous waste generated by the operation of the proposed facility is not expected to affect disposal costs for other hazardous waste generators.

3. The proposed facility will not lower treatment costs for Oregon companies because it is a non-commercial facility designed to treat only on-site wastes at the Umatilla Chemical Depot.

4. The Department of Justice[1] (See Attachment E), has determined that the requirements of 466.055(4)(a) are not applicable to a new on-site facility.

5. The Department of Justice[1] (See Attachment E), has determined that the requirements 466.055(4)(c) apply only to commercial facilities.

6. The Department has conducted a Human Health and Ecological Risk Assessment[2] and found that operation of the proposed facility will not pose unacceptable risks to either human health or the environment.

7. The Quantitative Risk Assessment conducted by the U.S. Army[3] concluded that the risk of fatalities from storage of the chemical weapons stockpile is far greater than the risk of fatalities from processing operations.

8. The National Research Council[4] concluded that the annual storage risk to the public is greater than the annual risk due to disposal and that total risk to the public will be reduced by prompt disposal of the stockpile.

9. The Department conducted a random telephone survey of 400 persons in the Hermiston area in 1994[5] that showed 87% of the respondents agreed with the statement "There is a need to build a facility of this type so that we may safely dispose of Umatilla Army Depot's aging stockpile of chemical weapons." When the Department repeated this survey (with 300 respondents) in 1996[6], 84% of the respondents agreed with the statement.

10. The Department conducted a random telephone survey of 400 persons in the Hermiston area in 1994[5] that showed 78% of the respondents agreed with the statement "The process for destroying this chemical weapons stockpile should move ahead because leaving the weapons in place endangers the environment and public safety." When the Department repeated this survey (with 300 respondents) in 1996[6], 80% of the respondents agreed with the statement.

11. Numerous public comments (provided directly to the Commission, or to the Commission through the Department) have been received urging the Department and the Commission to move ahead with granting a permit for the proposed facility.

12. Approximately 106,000 M-55 rockets are stored at the Umatilla Chemical Depot. Although there is less than one chance in a million that a rocket will "auto-ignite" before the year 2013 (some estimates range to the year 2064)[7], studies have been limited to non-leaking munitions. The presence of

agent (especially GB) can accelerate the degradation of the propellant stabilizer(7) (8). The leakage rate of GB-filled M-55 rockets has been increasing over the last four years(9). The Umatilla stockpile includes 91,375 GB-filled rockets, including 54 identified as "leakers." (10)

13. Successful operation of the proposed facility will permanently remove the chemical stockpile hazard from the local area.

In relation to Finding 5, the following **tend not to support the conclusion** that the need for the facility has been demonstrated because the operation of the proposed facility would result in a higher level of protection for the public and the environment:

1. The chemical weapons stockpile has been stored at the Umatilla Depot for over thirty years without serious incident. There is one chance in 300,000 (per year of storage) of a fatality among the population living one to three miles from the proposed facility. The greatest contributor (71%) to the risk of a fatality during storage is the unlikely occurrence of a major earthquake. (3) (11)

   {In comparison, there is one chance in 27 million (per year of disposal processing) of a fatality among the population living one to three miles from the proposed facility. Thus the annual risk to individuals closest to the facility is about 90 times greater per year for continued storage versus disposal operations.(11)}

2. Hazardous waste treatment facilities pose an inherent risk of handling and/or processing accidents. The nature of the chemical weapons stockpile (chemical agents that are lethal in minute quantities, in some cases stored in deteriorating, explosively configured munitions) is such that an accident occurring during the handling required for processing could result in an uncontrolled release.

   {The Department believes that the proposed facility is designed with sufficient engineering controls as to minimize the risk of a release. Controls include the use of explosion-proof containers to transport munitions from the igloos to the container handling building, automated processing operations, cascaded ventilation (and carbon filter) systems in the processing building, explosive containment rooms for critical process operations, automatic waste feed cut-offs, waste feed limitations, and pollution control systems that include carbon filtration of stack emissions.}

3. Even with the basic uncertainties associated with estimates of M-55 rocket storage life, it is very unlikely that a non-leaking rocket will auto-ignite before the year 2013, and possibly not before the year 2064. (7) Insufficient studies have been conducted to determine the actual likelihood of auto-ignition of a "leaker" rocket. (7) (8)

   {The Department believes that there are enough indications (albeit in some cases preliminary and/or confined to non-leaking rockets), of M-55 rocket instability that this should be a matter of serious concern in any decision that might further delay disposal of the chemical weapons stockpile at the Umatilla Chemical Depot.}

4. Numerous public comments (provided to the Commission) have been received indicating that there is no need for haste and urging the Department and the Commission to delay the granting of a permit for the proposed facility until further information is available concerning alternatives to the proposed incineration technology.

DEPARTMENT CONCLUSION ON FINDING 5:

The proposed facility is a non-commercial, on-site treatment facility. The Department concludes that the requirements of Oregon Revised Statute 466.055(4)(a) and (4)(c) do not apply to the proposed facility.

The operation of the proposed facility will reduce, and eventually eliminate, the risk to surrounding communities from continued storage of the chemical agents and munitions. The Department concludes that the need for the facility has been demonstrated because operation of the proposed facility will result in a higher level of protection for public health and safety and for the environment (as compared to continued storage of the chemical weapons stockpile).

While it is possible that the Umatilla stockpile could be stored for many more years without incident, no one really knows when, or if, a catastrophic event will occur. Therefore, the Department recommends that the stockpile be destroyed as quickly as possible to remove the threat.

References, Finding 5:

(1) *Memorandum* (DOJ File No. 340-420-GNE0399-95) from Larry Edelman, Department of Justice, to Stephanie Hallock, Department of Environmental Quality, dated January 29, 1996 (See Attachment E of this report for a copy of the complete text).

(2) *Draft Pre-Trial Burn Risk Assessment–Proposed Umatilla Chemical Demilitarization Facility–Hermiston, Oregon*, Ecology and Environment *for* Oregon Department of Environmental Quality, Volumes 1 and 2, April, 1996.

(3) *Umatilla Chemical Agent Disposal Facility–Phase 1 Quantitative Risk Assessment*, Science Applications International Corporation *for* U.S. Army Program Manager for Chemical Demilitarization, September, 1996.

(4) *Recommendations for the Disposal of Chemical Agents and Munitions*, National Research Council (Committee on Review and Evaluation of the Army Chemical Stockpile Disposal Program), 1994.

(5) *Umatilla Army Depot Community Assessment Survey*, Intercept Research Corporation *for* Oregon Department of Environmental Quality, July, 1994.

(6) *Umatilla Army Depot Community Assessment Tracking Survey*, Intercept Research Corporation *for* Oregon Department of Environmental Quality, July, 1996.

(7) *M55 Rocket Storage Life Evaluation,* U.S. Army Chemical Demilitarization and Remediation Activity, December, 1994.

(8) *Evaluation of Potential Hazards of Chemical Agent-Contaminated M55 Rocket Explosive Components,* U.S. Army Program Manager for Chemical Demilitarization, January, 1996.

(9) *Department of Defense's Interim Status Assessment for the Chemical Demilitarization Program,* Department of Defense, April, 1996.

(10) *Quarterly Leaker Report, Umatilla Chemical Activity,* Letter Report from Ronald Lamoreaux, Civilian Executive Assistant, Umatilla Chemical Depot, August 6, 1996.

(11) *Perspectives on the Umatilla Quantitative Risk Assessment Results,* Science Applications International Corporation *for* U.S. Army Program Manager for Chemical Demilitarization, September, 1996.

FINDING 6: Will the proposed facility have an major adverse effect on either public health and safety or to the environment of adjacent lands?

Applicable Statute **ORS 466.055(5)(a)–(b) Criteria for new facility (related to adverse effects)**

Paragraph (5) requires the Commission to Find that the proposed hazardous waste treatment facility will have no major adverse effect on either (a) public health and safety or (b) to the environment of adjacent lands.

Full text of ORS 466.055(5)(a)–(b) is located on Page C-3.

Related Rule (There is no section in the Oregon Administrative Rules that applies to this Statute.)

In relation to Finding 6, the following **tend to support the conclusion** that the proposed facility will not have an adverse effect on public health and safety or the environment of adjacent lands:

1. The Department's Draft Pre–Trial Burn Risk Assessment[(1)] concluded that:

   - Except for a location well within the Depot fenceline, emissions from the proposed facility would not result in an unacceptable level of health risk, (defined as a 1 in 100,000 chance of an excess cancer case, or a "hazard index" over 0.25 for non-cancer effects on an exposed individual).

   - Emissions from the proposed facility will be within current state regulatory limits.

   - Except for a location well within the Depot fenceline (where mercury effects exceeded regulatory benchmarks), there is a low ~~likelihood of~~ potential ecological effects.

2. The Draft Pre–Trial Burn Risk Assessment[(1)] used a series of conservative assumptions, such as:

   - The proposed facility would produce stack emissions for 3.2 years, when in actuality the facility will be processing for only about one year of that time. The remainder of the time the facility is conducting maintenance and/or re-configuring for different munition types;

- A person would be exposed directly to stack emissions for 3.2 years (through inhalation, even though the facility would actually be processing less than 1/3 of that time), and then be exposed indirectly (through food or water intake) for a total of 30 years. For cancer-causing substances a person was expected to be exposed indirectly for an entire lifetime (70 years);

- The proposed facility would always operate at the "high-end" of emission rates;

- Concentrations of chemicals deposited in the soil are constant over time, when in actuality soil concentrations of most chemicals diminish over time;

- There was no emission reduction "credit" given as a result of the carbon filtration system on the common stack;

- Estimated emissions of organics were increased by 280%, and metals by 146%, to account for potential "upset" conditions; and

- Emissions of chemicals not detected during JACADS trial burns were assumed to be emitted at one-half of the level of detection, and in some cases at the detection level.

3. Another risk assessment will be conducted after the facility has undergone its trial burn testing and site-specific emissions data are available.

4. The proposed facility equipment and facility emissions will be thoroughly tested with surrogate chemicals before being allowed to conduct live agent tests.

5. The proposed facility will be required to conduct extensive emissions testing during agent trial burns to ensure systems are performing as expected.

6. The permit applicant has met Department requirements that the permit application demonstrate the ability to meet federal and/or state emission standards for a hazardous waste treatment facility.

7. The Department has the authority to require the permit applicant to immediately cease operations if the Department finds that there is reasonable cause to believe that a clear and immediate danger to the public health and safety or to the environment exists from operations at the proposed facility.

8. The Department will have full-time compliance staff to oversee construction and operation of the facility.

9. Automatic Waste Feed Cut-Offs are an integral part of the facility design and will be triggered if process parameters exceed acceptable ranges, or if agent is detected at the allowable stack concentration in the common stack.

10. Since 1990 the permit applicant has operated a prototype demilitarization facility in the South Pacific known as "JACADS." Although operations have not been entirely without incident (to

include two releases of nerve agent outside engineering controls during maintenance procedures), as of October 18, 1996, JACADS has processed 2.2 million pounds of agent from over 165,000 individual munitions or containers (including 72,300 M-55 rockets). There have been no adverse effects identified either to the workers living on the island, or to the environment of Johnston Atoll.

11. The permit applicant recently started operation of "TOCDF," a demilitarization facility located in Tooele, Utah, and very similar in design to the proposed Umatilla facility. TOCDF has successfully completed surrogate trial burns, and as of October 20, 1996 had processed 3,371 M-55rockets (34,520 pounds of nerve agent GB) in preparation for live agent trial burns. No adverse effects on either human health or the environment have been identified.

12. The permit applicant is required to have all elements of the on-site facility Contingency Plan (as identified in the RCRA Part B Application) in place before start of operations.

13. Chemical agent monitoring equipment will be installed at the immediate boundary of the demilitarization facility for early detection of any uncontrolled release.

14. The Depot boundary will also be equipped with agent monitoring equipment for detection of agent at the Depot property line.

In relation to Finding 6, the following **tend not to support the conclusion** that the proposed facility will not have an adverse effect on public health and safety or the environment of adjacent lands:

1. The effects of many chemicals, including products of incomplete combustion, on human health and the environment are unknown, or must be extrapolated from animal studies.

2. The synergistic effects of the chemicals from stack emissions are unknown.

3. Department assessments of emission impacts from the proposed facility do not take into account emissions from existing permitted facilities, or previous population exposures to radioactive emissions from the Hanford facility.

   {In relation to 1, 2, and 3 (above), the Department believes that the conservative assumptions used in the human health risk assessment are sufficient to account for missing data and/or unknown effects.}

4. Exposure assessments for some segments of the population (i.e. Native Americans, breast-feeding infants) were not included in the Pre–Trial Burn Risk Assessment.

   {The Department will be conducting another risk assessment after the proposed facility undergoes its trial burns. If new information becomes available it could be incorporated in the new risk assessment.}

5. The issue of dioxin exposure, and the effect of such exposure on the population (especially sensitive populations, such as breast-feeding infants) is currently undergoing a regulatory review by the U.S. Environmental Protection Agency.

   {The Department acknowledges the controversy surrounding the issue of dioxin emissions from combustion sources, and will continue to monitor developments in the scientific and regulatory community concerning sources and control of dioxins and effects of human exposure. Testing during trial burns of the proposed facility will serve to confirm estimates of dioxin emissions that were used in the health risk assessment.}

   {During normal operations of the proposed facility the monitoring of critical process parameters (such as combustion chamber temperatures and oxygen and carbon monoxide levels) will serve to maximize combustion efficiency and minimize dioxin formation. The presence of the carbon filters downstream from the standard pollution abatement systems has been shown in other cases to be highly effective in capturing any dioxin compounds that are formed during the combustion process. In the case of mustard agent (over 60% of the Umatilla chemical stockpile, by agent weight) the presence of sulfur in the waste stream is also an inhibitor to dioxin formation.(2) }

6. Emissions data from the Tooele Chemical Demilitarization Facility (most similar in design to the proposed Umatilla facility) were not available at the time of the Department's risk assessment.

   {The Department used what data were available at the time. The risk assessment will be repeated when Umatilla-specific data are available (after the trial burn process).}

7. Hazardous waste treatment facilities pose an inherent risk of handling and/or processing accidents that can result in uncontrolled releases that could pose a risk to the public.

   {The Department believes that the proposed facility is designed with sufficient engineering controls as to minimize the risk of a release. Controls include the use of explosion-proof containers to transport munitions from the igloos to the container handling building, automated processing operations, cascaded ventilation (and carbon filter) systems in the processing building, explosive containment rooms for critical process operations, automatic waste feed cut-offs, waste feed limitations, and pollution control systems that include carbon filtration of stack emissions.}

8. Surveys(3) (4) conducted by the Department showed that over half of the respondents in the local area were concerned about the potential for leaks or accidents related to the proposed facility.

   {The same surveys showed that respondents in the local area were very concerned about the risk of continued storage, and about 80% of the respondents saw a need for the facility (See Finding 5 for statements concerning survey results).}

DEPARTMENT CONCLUSION ON FINDING 6:

The human health and ecological risk assessment results did not show that the proposed facility will present an unacceptable risk to either human health or the environment. The proposed facility uses engineering process controls and state of the art pollution abatement systems which will undergo extensive testing before operations commence. The Department concludes that the proposed facility, if operated as designed and in accordance with the proposed permit, will not have any adverse effect on public health and safety, or to the environment of adjacent lands.

References, Finding 6:

(1) *Draft Pre-Trial Burn Risk Assessment–Proposed Umatilla Chemical Demilitarization Facility–Hermiston, Oregon*, Ecology and Environment *for* Oregon Department of Environmental Quality, Volumes 1 and 2, April, 1996.

(2) Memorandum of Response (to Department questions concerning dioxin issues), by Kristiina Iisa, Ph.D., Assistant Professor, Oregon State University, Chemical Engineering Department, October 29, 1996.

(2) *Umatilla Army Depot Community Assessment Tracking Survey*, Intercept Research Corporation *for* Oregon Department of Environmental Quality, July, 1996.

(3) *Umatilla Army Depot Community Assessment Survey*, Intercept Research Corporation *for* Oregon Department of Environmental Quality, July, 1994.

FINDING 7: Have the owner and operator of the facility demonstrated adequate financial and technical capability to properly construct and operate the facility?

Applicable Statute **466.060(1)(a) Criteria to be met by owner and operator before issuance of permit (as related to financial and technical capability)**

Paragraph (1)(a) requires the Commission to Find that the owner and operator of the proposed facility have the financial and technical capability to properly construct and operate the facility.

US Army

Full text of ORS 466.060(1)(a) is located on Page C-3.

Related Rule **OAR 340-120-010(2)(g) Owner and Operator Capability**

Paragraph (2)(g) defines the required information that must be submitted by the owner and operator of the proposed facility to demonstrate adequate financial capability to properly construct and operate the facility.

Full text of OAR 340-120-010(2)(g) is located on Pages D-5–D-6.

{The permit applicant is a federal agency and as such is exempt from the requirement to demonstrate financial capability in accordance with CFR 264.140(c) (Adopted as Oregon Rule).}

In relation to Finding 7, the following **tend to support the conclusion** that the owner and operator of the proposed Umatilla facility have demonstrated the technical capability to properly construct and operate the facility:

1. The Department has reviewed the RCRA[(1)] and Air Contaminant Discharge[(2)] Permit applications for the proposed facil~~ity (and the applic~~ant's response to the five Notices of Deficiency issued during the RCRA technical review process) and has found that the applicant has demonstrated the technical capability to construct and operate the facility.

2. In addition to the Department's review, the permit applications have also been reviewed by the technical staff of the U.S. Environmental Protection Agency. The Department also actively participates in a national working group composed of staff from EPA regional offices and state

environmental staff (those states with chemical stockpiles) to exchange information and discuss technical matters related to chemical demilitarization facilities.

3. The Department believes that the proposed facility will be protective of human health and the environment if constructed and operated in accordance with the application, and the permit issued by the Commission. [3]

4. The permit applicant operates a demilitarization facility in the south Pacific known as the Johnston Atoll Chemical Agent Disposal System (JACADS). As of October 18, 1996, JACADS has successfully processed 165,417 individual munitions and 134,961 pounds of VX nerve agent; 196,348 pounds of HD blister agent; and 1,860,895 pounds of GB nerve agent; for a total of 2,192,204 pounds of chemical agents. No measurable human health or environmental impacts have been observed.[4]

5. The permit applicant operates a demilitarization facility in Tooele, Utah, known as the Tooele Chemical Disposal Facility (TOCDF). As of November 4, 1996, the TOCDF facility has successfully processed 4,253 M55 rockets (GB) through the deactivation furnace and 40,656 pounds of GB nerve agent and 196,564 pounds of spent decontamination solution through the liquid incinerator. No measurable human health or environmental impacts have been observed. [5]

6. The permit applicant has utilized extensive outside engineering expertise in the design of the proposed facility, and maintains a "lessons learned" program to insure that design changes and/or revisions to operating practices are incorporated into other proposed facilities (including Umatilla) to reflect the experience gained at JACADS and TOCDF.

In relation to Finding 7, the following **tend not to support the conclusion** that the owner and operator of the proposed Umatilla facility have demonstrated the technical capability to properly construct and operate the facility:

1. The JACADS facility has experienced numerous delays and operating problems since the beginning of demilitarization operations. Many of the delays have been related to inadequate design (i.e., an explosion in the deactivation furnace penetrated the kiln wall, conveyor systems were not adequate for the waste being processed requiring workers to manually clear conveyors, an important indicator gauge was located in an area inaccessible to workers in protective ensemble, excessive slag build-up in the liquid incinerators required manual removal), workers not following established maintenance procedures, or improper operating procedures.

   {The JACADS facility was the permit applicant's prototype facility. The purpose of a prototype facility is to test equipment systems and operating practices. The permit applicant has made design changes to the proposed Umatilla facility as a result of operating experience at JACADS. For example, the thickness of the kiln walls in the deactivation furnace was increased from ½ inch to 2 inches to prevent penetration of the kiln wall in the event of another explosion. Conveyor belts have been re-designed with finer mesh to prevent jamming, instruments were re-located to insure accessibility, and slag removal systems have been incorporated into the liquid incinerator designs. The Department is satisfied that the permit applicant responds with appropriate design improvements when necessary. None of the above noted incidents resulted in uncontrolled agent release or worker injury.

The Department acknowledges the ever-present possibility of equipment failure, human error, or failure of workers to follow established maintenance and operation procedures. The proposed facility incorporates numerous redundant safety systems and extensive requirements for operator training and certification.}

2. Before the Tooele facility even started operations a former safety manager of TOCDF made allegations of numerous safety violations and design flaws that he considered serious enough to pose a risk to the public.

   {The Department reviewed the allegations of safety deficiencies at the Tooele facility, and the follow-up inspection reports, and was satisfied that most of the allegations were of a minor nature, and that the permit applicant was adequately addressing those that appeared to be more serious. Ultimately a lawsuit was filed in federal court to prevent operation of TOCDF. After several months of court proceedings the lawsuit was dismissed as unfounded by a federal judge.[6] An appeal to the decision has been filed.}

3. The JACADS facility has had three confirmed releases of nerve agent outside of engineering controls, and TOCDF has also detected a nerve agent vapor leak.

   {The confirmed releases from the JACADS facility involved very minute amounts of nerve agent, but the fact that there were any releases at all is of course very serious. None of the three releases occurred during processing operations (two were related to maintenance operations and the third involved gasket leaks around a filter unit) and none resulted in any worker injury or harm to the environment. The Tooele vapor leak also involved a minor leak around a filter unit. The Department has reviewed the reports related to each of the releases, and is satisfied with the modifications to design and/or operating practices that were put into place to prevent recurrences.}

DEPARTMENT CONCLUSION ON FINDING 7:

The permit applicant is successfully operating two facilities similar to the proposed Umatilla facility. Although operations at the other facilities have not been entirely without incident, the Department concludes that the permit applicant has adequately demonstrated the technical capability to properly construct and operate the facility.

References, Finding 7:

(1) *Resource Conservation and Recovery Act Hazardous Waste Permit Application for the Department of the Army Umatilla Depot Activity Chemical Stockpile Disposal Program,* Umatilla Depot Activity, *submitted to* the Oregon Department of Environmental Quality, February, 1996 (revised March 21, 1996).

(2) *Air Permit Application for the Department of the Army Umatilla Chemical Agent Disposal Facility,* Umatilla Depot Activity, *submitted to* the Oregon Department of Environmental Quality, August, 1995 (revised March 21, 1996).

(3) *Draft Pre-Trial Burn Risk Assessment–Proposed Umatilla Chemical Demilitarization Facility–Hermiston, Oregon*, Ecology and Environment *for* Oregon Department of Environmental Quality, Volumes 1 and 2, April, 1996.

(4) Communication from the U.S. Army Program Manager for Chemical Demilitarization, October 25, 1996.

(5) Communication from Carl Daly, U.S. Environmental Protection Agency, November 5, 1996.

(6) *Memorandum Decision and Order, Civil No. 2:96-CV-425C*, Chemical Weapons Working Group, Inc., et al., Plaintiffs, *vs.* United States Department of the Army, et al., Defendants, Tena Campbell, United States District Judge, August 13, 1996.

FINDING 8:	Have the owner and operator of the facility demonstrated ability and willingness to operate the proposed facility in compliance with statutory and regulatory provisions?

Applicable Statute **ORS 466.060(1)(b) Criteria to be met by owner and operator before issuance of permit (as related to technical capability)**

Paragraph (1)(b) requires the Commission to make a Finding that the compliance history of the owner and operator with similar facilities indicates an ability and willingness to operate the proposed facility in compliance with the statutory provisions.

Full text of ORS 466.060(1)(b) is located on Page C-3.

Related Rule **OAR 340-120-010(2)(h) Compliance History**

Paragraph (2)(h) defines the required information (i.e. compliance history of similar facilities owned or operated by permittee) that must be submitted by the owner and operator of the proposed facility to demonstrate an ability and willingness to operate the proposed facility in compliance with statutory and regulatory provisions.

Full text of OAR 340-120-010(2)(h) is located on Page D-6.

In relation to Finding 8, the following **tend to support the conclusion** that the owner and operator of the proposed Umatilla facility have demonstrated the ability and willingness to operate the proposed facility in compliance with statutory and regulatory provisions:

1. The permit applicant has submitted the information required by OAR 340-120-010 concerning compliance histories at similar facilities owned and operated by the applicant. The Department has reviewed the compliance histories of the Johnston Atoll Chemical Agent Disposal System (JACADS) and the Tooele Chemical Disposal Facility (TOCDF). The Department has reviewed the reports related to violations and is satisfied with the permittee's response to non-compliance issues.

2. The Utah Department of Environmental Quality has informed the Department that the TOCDF has successfully completed surrogate trial burns for the Deactivation Furnace, the Metal Parts Furnace, and a Liquid Incinerator, and is currently conducting "shakedown" operations for live agent trial burns for a Liquid Incinerator and the Deactivation Furnace. The Utah DEQ maintains compliance

staff on-site at TOCDF and is satisfied that any identified compliance issues have been quickly addressed and that automatic waste feed cutoffs have been reliable.[(1)]

3. In addition to the regulatory oversight by outside agencies, the applicant maintains a vigorous internal self-audit program to review safety and environmental management issues, and has willingly provided the results of such audits to the regulatory agencies involved.

4. The Department will maintain significant oversight authority during the construction, testing, and operation of the proposed facility, and will have compliance staff to ensure the permit applicant adheres to the requirements of the permit concerning construction certification, performance testing, operator training, monitoring and reporting, and management of all permitted hazardous waste management units.

In relation to Finding 8, the following **tend not to support the conclusion** that the owner and operator of the proposed Umatilla facility have demonstrated the ability and willingness to operate the proposed facility in compliance with statutory and regulatory provisions:

1. Normal regulatory oversight by state and federal environmental agencies at similar facilities operated by the applicant have identified violations in the management and storage of hazardous waste resulting in Notices of Non-Compliance and on at least one occasion, monetary fines.

2. On April 15, 1996 the Utah Department of Environmental Quality issued a Notice of Violation (NOV) to TOCDF based on compliance inspections during surrogate trial burns and Toxic Substance and Control Act (TSCA) Research and Development tests conducted from June, 1995, through February, 1996. The NOV listed 11 violations, including record-keeping errors, delayed notification to the Utah DEQ of permit modifications, and handling of hazardous waste.[(2)]

   {The TOCDF permit is voluminous and complex, and although non-compliance with hazardous waste permits is not to be taken lightly, most of the violations were of a relatively minor nature. It should also be noted that the permit applicant "self-reported" most of the violations and no monetary fines were issued by the Utah DEQ.}

3. The U.S. Environmental Protection Agency (EPA) issued a Determination of Violation (a civil administrative enforcement action) to the JACADS facility in March, 1995.[(3)] The Determination of Violation was based on a compliance inspection conducted in August, 1994, ~~and on information~~ supplied by the permittee (the U.S. Army). The Army was fined a total of $122,300. Over half of the fine ($68,300) resulted from waste storage in an unpermitted area. $4,000 of the fine was imposed for failure to maintain adequate aisle space, and the remaining $50,000 was for a failure to maintain the facility that resulted in a release of nerve agent.

   {The violations noted in EPA enforcement action were serious, and in the case of the nerve agent release, posed a potentially serious threat of harm to human health and the environment. Of most concern to the Department is that the circumstances of the nerve agent release in March, 1994, were essentially identical to a release that took place in December, 1990. Although new equipment was installed and maintenance procedures revised after the 1990 incident, a second release occurred in 1994 (while conducting exactly the same maintenance operation) when the new equipment failed to operate, and the operators failed to note there was a problem. The design of the ventilation system at the Umatilla facility is different than JACADS and the particular circumstances of the JACADS 1990 and 1994 releases could not occur at Umatilla.}

4. The JACADS 1995 Annual Report of RCRA Noncompliances was submitted by the U.S. Army to the EPA on March 15, 1996.[4] The Annual Report included numerous violations of the RCRA permit self-reported by the Army.

   {The Department has reviewed the noncompliance report and found most of the reported violations to be minor in nature. Of those violations more serious in nature the Department is satisfied that the Army's corrective actions were appropriate and that the same corrective actions will be applied to the proposed Umatilla facility, where applicable.}

5. The Department maintains authority over the chemical storage areas at the Umatilla Chemical Depot (UCD) through interim status hazardous waste storage rules. An inspection of the facility was conducted by the Department in June, 1996. Although the inspection report has not yet been completed, a Notice of Non-Compliance is expected to be issued.

DEPARTMENT CONCLUSION ON FINDING 8:

The regulations pertaining to the management of hazardous waste are voluminous and complex. Although this does not excuse non-compliance, it is not unusual for a hazardous waste facility undergoing a compliance inspection to have violations, especially in the area of record-keeping. The permit applicant has often self-reported permit violations. The Department concludes that the owner and operator of the proposed Umatilla facility have demonstrated an ability and willingness to operate the proposed facility in compliance with statutory and regulatory provisions.

References, Finding 8:

(1) *Letter* from Martin Gray, Section Manager, Utah ~~Department of~~ Environmental Quality, Division of Solid and Hazardous Waste, *to* Brett McKnight, Oregon DEQ, November 1, 1996.

(2) *Notice of Violation No. 9601005*, issued by the Utah Department of Environmental Quality *to* the Tooele Chemical Disposal Facility, April 16, 1996.

(3) *Determination of Violation/Compliance Order*, issued by the United States Environmental Protection Agency *to* the United States Army, U.S. EPA Docket No. RCRA 09-95-0001, March 13, 1995.

(4) *The Johnston Atoll Chemical Agent Disposal System 1995 Annual Report of RCRA Noncompliances*, U.S. Army, March, 1996.

ATTACHMENT B

FINDING 4: BEST AVAILABLE TECHNOLOGY

NOVEMBER, 1996

Draft Best Available Technology Findings Report
Umatilla Chemical Depot
Umatilla, Oregon

Prepared by

Ecology and Environment
Seattle, Washington

for

Oregon Department of Environmental Quality

November, 1996.

(Provided under separate cover.)

ATTACHMENT C
OREGON REVISED STATUTES

STAFF REPORT ON THE PROPOSED
UMATILLA CHEMICAL DEMILITARIZATION FACILITY
SEPTEMBER, 1996

Chapter 466 of the Oregon Revised Statutes contains numerous Sections related to the permitting of hazardous waste treatment, storage, or disposal facilities. Chapter 466.015 through 466.065 contain the administrative requirements for hazardous waste facilities such as the proposed Umatilla facility. A listing of all sections of the Administrative portion of Chapter 466 are provided below for reference, but only those that are directly related to the Umatilla facility and the Findings required by the Commission (listed in **bold** print) are provided in their entirety.

OREGON REVISED STATUTES
HAZARDOUS WASTE AND HAZARDOUS MATERIALS II
PUBLIC HEALTH AND SAFETY
STORAGE, TREATMENT AND DISPOSAL OF HAZARODUS WASTE AND PCB
(Partial Listing)

STORAGE, TREATMENT AND DISPOSAL OF HAZARDOUS WASTE AND PCB

466.005 Definitions for ORS 453.635 and 466.005 to 466.385
466.010 Purpose

(Administration)

466.015 Powers and duties of department
466.020 Rules and orders
466.025 Duties of commission
466.030 Designation of classes of facilities subject to certain provisions
466.035 Commission authority to impose standards for hazardous waste or PCB at Oregon facility
466.040 Application period for PCB or hazardous waste permit
466.045 Application form; contents; fees; renewal application
466.050 Citizen advisory committees
466.055 Criteria for new facility
466.060 Criteria to be met by owner and operator before issuance of permit
466.065 Applicant for renewal to comply with ORS 466.055

ORS 466.050 Citizen advisory committees.

(1) To aid and advise the director and the commission in the selection of a hazardous waste or PCB treatment or disposal facility or the site of such facility, the director shall establish citizen advisory committees as the director considers necessary. The director shall determine the representation, membership, terms and organization of the committees and shall appoint their members. The director or a designee shall be a nonvoting member of each committee.

(2) The advisory committees appointed under subsection (1) of this section shall review applications during an application period established under ORS 466.040 and make recommendations on the applications to the commission.

ORS 466.055 Criteria for new facility.

Before issuing a permit for a new facility designed to dispose of or treat hazardous waste or PCB, the Commission must find, on the basis of information submitted by the applicant, the Department or any other interested party, that the proposed facility meets the following criteria:

(1) The proposed facility location:

(a) Is suitable for the type and amount of hazardous waste or PCB intended for treatment or disposal at the facility;

(b) Provides the maximum protection possible to the public health and safety and environment of Oregon from release of the hazardous waste or PCB stored, treated or disposed of at the facility; and

(c) Is situated sufficient distance from urban growth boundaries, as defined in ORS 197.295, to protect the public health and safety, accessible by transportation routes that minimize the threat to the public health and safety and to the environment and sufficient distance from parks, wilderness and recreation areas to prevent adverse impacts on the public use and enjoyment of those areas.

(2) Subject to any applicable standards adopted under ORS 466.035,[1] the design of the proposed facility:

(b) Allows for treatment or disposal of the range of hazardous waste or PCB as required by the Commission; and

[1] ORS 466.035 states that "The commission may impose specific standards for the range and type of hazardous waste or PCB treated or disposed of at a facility in order to protect the public health and safety and environment of Oregon."

(b) Significantly adds to:

(B) The range of hazardous waste or PCB handled at a treatment or disposal facility currently permitted under ORS 466.005 to 466.385; or

(C) The type of technology employed at a treatment or disposal facility currently permitted under ORS 466.005 to 466.385.

(2) The proposed facility uses the best available technology for treating or disposing of hazardous waste or PCB as determined by the Department or the United States Environmental Protection Agency.

(4) The need for the facility is demonstrated by:

(d) Lack of adequate current treatment or disposal capacity in Oregon, Washington, Idaho and Alaska to handle hazardous waste or PCB generated by Oregon companies;

(e) A finding that operation of the proposed facility would result in a higher level of protection of the public health and safety or environment; or

(f) Significantly lower treatment or disposal costs to Oregon companies.

(5) The proposed hazardous waste or PCB treatment or disposal facility has no major adverse effect on either:

(a) Public health and safety; or

(b) Environment of adjacent lands

466.060 Criteria to be met by owner and operator before issuance of permit.

(1) Before issuing a permit for a facility designed to treat or dispose of hazardous waste or PCB, the permit applicant must demonstrate, and the Commission must find, that the owner and operator meet the following criteria:

(a) The owner, any parent company of the owner and the operator have adequate financial and technical capability to properly construct and operate the facility; and

(b) The compliance history of the owner including any parent company of the owner and the operator in owning and operating other similar facilities, if any, indicates an ability and willingness to operate the proposed facility in compliance with the provisions of ORS 466.005 to 466.385 and 466.890 or any condition imposed on the permittee by the Commission.

(1) If requested by the permit applicant, information submitted as confidential under paragraph (a) of subsection (1) of this section shall be maintained confidential and exempt from public disclosure to the extent provided by Oregon law.

ATTACHMENT D
OREGON ADMINISTRATIVE RULES

STAFF REPORT ON THE PROPOSED
UMATILLA CHEMICAL DEMILITARIZATION FACILITY
SEPTEMBER, 1996

Chapter 340 of the Oregon Administrative Rules contains numerous Divisions related to the permitting of hazardous waste treatment, storage, or disposal facilities. Division 120 covers additional siting and permitting requirements for hazardous waste treatment and disposal facilities such as the proposed Umatilla facility. A listing of all sections of Division 120 are provided below for reference, but only those that are directly related to the Umatilla facility and the Findings required by the Commission (listed in **bold** print) are provided in their entirety.

DIVISION 120
HAZARDOUS WASTE MANAGEMNT
Additional Siting and Permitting Requirements for Hazardous Waste and PCB Treatment and Disposal Facilities

340-120-001 Purpose and Applicability

340-120-005 Permitting Procedure

340-120-010 Contents of an Authorization to Proceed Request

340-120-015 Land Use Compatibility Findings

340-120-020 Community Participation

340-120-025 Off-Site Transportation Emergencies

OAR 340-120-001 Purpose and Applicability

(1) To protect the public health and safety and the environment, the Commission finds that it is in the state's best interest to more fully regulate and review proposals to treat or dispose of hazardous waste and PCB. The purpose of this Division is to establish a supplemental siting and permitting procedure for most types of hazardous waste and PCB treatment and disposal facilities.

(Comment: Under Federal law hazardous waste incineration and other treatment techniques are considered "treatment" and PCB incineration and other treatment techniques are considered "disposal." To be consistent, Division 120 utilizes the same definitions).

(2) All parts of this Division apply to new:

(b) Hazardous waste and PCB treatment and disposal facilities located off the site of waste generation (off-site); and

(b) Hazardous waste and PCB land disposal facilities located on the site of waste generation (on-site).

(3) Facilities described in section (2)(a) of this rule that receive less than 50% of waste on a weekly basis from off the site may be located inside urban growth boundaries as defined by ORS 197.295 and therefore do not have to meet rules 340-120-010(d)(A)(i) and 340-120-015(1)(a).

(4) New hazardous waste and PCB treatment and disposal facilities, other than land disposal facilities, located on the site of waste generation (on-site), are only subject to these parts of Division 120:

(a) 340-120-010(2)(c) Technology and Design;

(b) 340-120-010(2)(e) Property Line Setback;

(c) 340-120-010(2)(g) Owner and Operator Capability;

(d) 340-120-010(2)(h) Compliance History;

(e) 340-120-020 Community Participation;

(f) 340-120-030 Permit Application Fee. **(Note: repealed)**

(5) For the purposes of this Division, a facility can receive, with the Department approval, as much as 10% of waste on a weekly basis from off the site and be an on-site facility.

(6) For the purposes of this Division, a new facility means:

(a) A facility for which an original permit application was submitted after the effective date of this Division, or

(b) A facility where a different type of treatment or disposal is being proposed (i.e., adding incineration at a facility utilizing disposal, or changing from chemical treatment to biological treatment at a facility).

(7) This Division does not apply to:

(a) Portable hazardous waste and PCB treatment and disposal facilities that are located on a single site of generation (on-site) less than 15 days each year;

(b) Hazardous waste and PCB treatment or disposal sites involved in remedial action under ORS 466 or closing under Divisions 100 through 110 of this chapter;

(c) Facilities treating hazardous waste pursuant to the recycling requirements of 40 CFR 261.6;

(d) Emergency permits issued by the Director according to 40 CFR 270.61; and

(e) Facilities permitted by the Department to manage municipal or industrial solid waste, if the hazardous waste the facilities treat or dispose of is excluded from regulation by 40 CFR 261.5.

(8) The requirements of this Division are supplemental to those of Divisions 100 through 110 of this Chapter. The definitions of 340-100-010 and 340-110-003 apply to this Division.

OAR 340-120-010 Contents of an Authorization to Proceed Request

(1) An Authorization to Proceed request shall demonstrate that the proposed facility meets the criteria presented in section (2) of this rule. If the facility does not meet all of the criteria, the Department shall deny the request.

(2) Criteria that must be met to obtain an Authorization to Proceed:

(b) Need

(A) The facility is needed because:

(i) Of a lack of adequate current treatment or disposal capacity to handle hazardous waste or PCB generated by Oregon companies; or
(ii) Its operation would result in a higher level of protection of the public health and safety or environment; or

(iii)Its operation will significantly lower treatment or disposal costs to Oregon companies, excluding transportation costs within state that are parties to the Northwest Interstate Compact on Low-Level Radioactive Waste Management as set forth in ORS 469.930.

(A) The facility shall significantly add to the range of the hazardous waste or PCB handled or to the type of technology already employed at a permitted treatment or disposal facility in states that are parties to the Northwest Interstate Compact on Low-Level Radioactive Waste Management.

(B) Notwithstanding the provision of Section (2)(a)(A) of this rule, the Department may deny an Authorization to Proceed request if the Department finds that capacity at other treatment or disposal facilities negate the need for a particular facility in Oregon.

(b) Capacity.

(B) The facility shall not be sized less than what is needed, in conjunction with existing facilities in the Northwest Compact States, to treat or dispose of all hazardous waste or PCB generated, or reasonably projected to be generated over the next 10 years, in Oregon.

(C) The facility shall not be sized greater than needed to treat or dispose of all hazardous waste or PCB generated, or reasonably projected to be generated over the next 10 years, in states that are parties to the Northwest Interstate Compact on Low-Level Radioactive Waste Management.

(D) If the facility is sized to treat or dispose of more hazardous waste or PCB generated outside Oregon than hazardous waste or PCB generated in Oregon, the applicant must demonstrate to the Department that the additional size is needed to make the proposed facility economically feasible.

(E) If all of the criteria of 340-120-010(2) are met, the Commission may give preference to a proposed facility which is sized more closely to what is needed to treat or dispose of hazardous waste or PCB generated in Oregon.

(c) Technology and Design.

The facility shall use the best available technology 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.

(d) Location.

(C) The facility shall be sited at least one mile from:

(i) Areas within urban growth boundaries as defined by ORS 197.295;

(ii) Wilderness, parks, and recreation as designated or identified (if appropriate) in the applicable local comprehensive plan or zoning maps;

(iii) Schools, churches, hospitals, nursing homes, retail centers, stadiums, auditoriums and residences except those owned by the applicant and necessary for the operation of the facility.

(A) The Department may consider a lesser distance for subparagraphs (2)(d)(A)(ii) and (2)(d)(A)(iii) if the applicant demonstrates that the lesser distance adequately protects the public health and safety and the environment.

(b) Property Line Setback.

(E) Hazardous waste and PCB treatment and disposal facilities, other than land disposal facilities, on the site of waste generation shall have at least a 250 foot separation between active waste management areas and facilities, and property boundaries.

(F) Hazardous waste and PCB treatment and disposal facilities off the site of waste generation and land disposal facilities on the site of waste generation shall have at least a 1,000 foot separation between active waste management areas and facilities, and property boundaries.

(f) Groundwater Protection. (Does not apply to this facility.)

(g) Owner and Operator Capability.

The owner, any parent company of the owner and the operator must demonstrate adequate financial and technical capability to properly construct and operate the facility. As evidence of financial capability, the following shall be submitted:

(A) Financial statements of the owner, any parent company of the owner, and the operator audited by an independent certified public accountant for three years immediately prior to the application;

(B) The estimated cost of construction and a plan detailing how the construction will be funded; and

(C) A three year projection, from the date the facility is scheduled to begin operating, of revenues and expenditures related to operating the facility. The projection should have sufficient detail to determine the financial capability of the owner, any parent company of the owner and the operator to properly operate the facility.

(h) Compliance History

(H) The compliance history in owning and operating other similar facilities, if any, must indicate that the owner, any parent company of the owner and the operator have an ability and willingness to operate the proposed facility in compliance with the provisions of ORS 466 and any permit conditions that may be issued by the Department or Commission. As evidence of ability and willingness, the following shall be submitted:

(i) A listing of all responses to past actual violations identified by EPA or the appropriate state regulatory agency within the five years immediately preceding the filing of the request for an Authorization to Proceed at any similar facility owned or operated by the applicant, owner, any parent company of the owner or operator during the period when the actions causing the violations occurred; and

(ii) Any written correspondence from EPA and the appropriate state regulatory agency which discusses the present compliance status of any similar facility owned or operated by the applicant, owner, any parent company of the owner or operator.

(B) Upon request of the Department, the applicant shall also provide responses to the past violations identified prior to the five years preceding the filing of an authorization to Proceed and the specific compliance history for a particular facility owned or operated by the applicant, any parent company of the owner or operator.

OAR 340-120-020

(1) The Commission finds that local community participation is important in the siting and in reviewing the design, construction and operation of hazardous waste and PCB treatment and disposal facilities.

(2) To encourage local participation in the siting of a proposed facility described in rule 340-120-001(2), the Director shall appoint and utilize a committee comprised at least partly of residents living near to, or along transportation routes to, the facility site. The committee shall be appointed as soon as feasible after the Department receives an Authorization to Proceed request. At least one half of the appointments shall be from a list of nominees submitted by the local government with land-use jurisdiction. The Director shall appoint the chairperson of the committee.

(3) The Director may appoint a committee to review a proposed facility described in rule 340-120-001(4).

(4) The Director may continue a committee authorized in section (2) and (3) of this rule or appoint a new committee to review the operation of a facility once it is located and constructed.

(Comment: The committee shall provide a forum for citizen comments, questions and concerns about the site and facility and promote a dialogue between the community of the proposed facility and the company interested in siting the facility. The committee shall prepare a written report summarizing local citizen concerns and the manner in which the company is addressing these concerns. The report shall be considered by the Department and the Commission and local government during the consideration of the proposed facility.)

(5) The Department recommends that the local government and applicant consider negotiating an agreement appropriate for the proposed facility's potential local impact. The agreement might consider these and other issues:

(e) Training and equipping local fire, police and health department personnel to respond to accidents, spills and other emergencies;

(f) Special monitoring both on and off-site for worker and community health status;

(g) Road improvements and maintenance to assure safe transportation of waste to the site;

(h) Possible changes in property values near the site due to the proposed facility;

(i) A plan to resolve conflicts or disagreements that might develop between the facility operator and the community.

(1) When issuing a treatment or disposal permit pursuant to Divisions 105, 106, and 110 of this Chapter, the Department, or as applicable, the Commission, may impose requirements addressing the issues described in section (5) of this rule or other similar issues to protect the public health and safety and the environment.

ATTACHMENT E

STAFF REPORT ON THE PROPOSED
UMATILLA CHEMICAL DEMILITARIZATION FACILITY
SEPTEMBER, 1996 (****DRAFT****)

Memorandum from Larry Edelman, Assistant Attorney General, to Stephanie Hallock, Division Administrator, dated January 29, 1996.

4

THEODORE R. KULONGOSKI
ATTORNEY GENERAL

THOMAS A. BALMER
DEPUTY ATTORNEY GENERAL

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DEPARTMENT OF JUSTICE
PORTLAND OFFICE

MEMORANDUM

DATE: January 29, 1996

TO: Stephanie Hallock
Division Administrator
DEQ — Eastern Region

FROM: Larry Edelman LE.
Assistant Attorney General
Natural Resources Section

SUBJECT: Umatilla Army Incinerators Permitting
DOJ File No. 340-420-GNE0399-95

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY
RECEIVED
JAN 31 1996
EASTERN REGION
BEND

You asked that in follow-up to my advice memo to you of January 8, 1996 I discuss which of the findings in ORS 466.055 and ORS 466.060 the Environmental Quality Commission (EQC) must address for new on-site treatment facilities such as the proposed Umatilla Depot nerve agent incinerators.

Your question is posed because OAR 340 Division 120, the implementing regulation, distinguishes between new *off-site* disposal and treatment facilities and *on-site* facilities. The regulation exempts new on-site facilities from some of the statutory findings enumerated in ORS 466.055.[1]

OAR 340 Division 120 comprises the siting and permitting requirements for hazardous waste and PCB treatment and disposal facilities. OAR 340-120-001(2) provides, in part:

> (2) All parts of th[i]s Division apply to new:
> (a) Hazardous waste and PCB treatment and disposal facilities located off the site of waste generation (off-site); and
> (b) Hazardous waste and PCB land disposal facilities located on the site of waste generation (on-site)....

---

[1]OAR 340 Division 120 was promulgated pursuant to authority in ORS 466.030 which provides broad authority for the EQC to designate classes of treatment or disposal facilities subject to the statutory requirements, and by implication, those exempt from certain of the

OAR 340-120-00(4) provides:

(4) New hazardous waste and PCB treatment and disposal facilities, other than land disposal facilities, located on the site of waste generation (on-site), are only subject to these parts of Division 120:
(a) 340-120-010(2)(c) — Technology and Design;
(b) 340-120-010(2)(e) — Property Line Setback;
(c) 340-120-010(2)(g) — Owner and Operator Capability;
(d) 340-120-010(2)(h) — Compliance History;
(e) 340-120-020 — Community Participation;
(f) 340-120-030 — Permit Application Fee.

The criteria in paragraph 4 of the regulation were adopted by the EQC as the siting requirements applicable to *on-site* facilities for purposes of ORS 466.055 and, therefore, were intended to specify the findings the EQC must make with respect to proposals such as the Umatilla Army incinerators under ORS 466.055 and 466.060.[2]

While Division 120 addresses most criteria in ORS 466.055, it does not clearly address paragraph 5 of the statute with respect to either on-site or off-site facilities, nor does it cover paragraph 4(a) which was a 1989 amendment to the capacity finding. Paragraph 5 of the statute provides:

(5) The proposed hazardous waste or PCB treatment or disposal facility has no major adverse effect on either:
(a) Public health and safety; or
(b) Environment of adjacent lands. ...

Because the statutory finding required in paragraph 5 is not expressly covered in Division 120, it appears that it applies to both on-site and off-site facilities. In other words, there does not appear to be any regulatory exemption with respect to this finding for off-site facilities.[3]

[2]Staff reports dated March 14, 1986 and April 25, 1986 discuss the rationale for distinguishing between on-site and off-site facilities under Division 120.

[3]One might argue that under authority of ORS 466.030 the Commission intended to subsume the requirements of paragraph 5 within OAR 340-120-001(1) and OAR 340-120-010(2)(c). There is, however, no clear support for this argument one way or the other.

Paragraph 4(a) requires a finding that:

> (4) The need for the facility is demonstrated by:
> (a) Lack of adequate current treatment or disposal capacity in Oregon, Washington, Idaho and Alaska to handle hazardous waste or PCB generated by Oregon companies; ...

This finding must also, in theory, be made for all new treatment or disposal facilities whether on-site or off-site since this requirement was imposed by a 1989 statutory amendment which has not been the subject of rulemaking.[4] This specific capacity finding, however, would not appear to have any direct relevance to the proposed Umatilla incinerators.

In summation, the findings the EQC must make with respect to the proposed Umatilla incinerators appear to include those specified in OAR 340-120-4(a) - (f) and ORS 466.005(5).

LE:kt/LHE0261.MEM

[4] In practice, it is doubtful that paragraph 4(a) has relevance to on-site facilities of any type.

DEQ DIRECTOR'S RECOMMENDATIONS TO EQC ON BEST AVAILABLE TECHNOLOGY FOR UMATILLA CHEMICAL DEMILITARIZATION FACILITY

11/22/96 BAT not safety, CSEPP

1. Very important decision - unavoidable, difficult

Challenge: Need to weigh risks of storage of munitions and agent against risks of emission and residues from destruction of agent

Dealing in probabilities - low risks of extremely catastrophic events
arcane

2. Context is important
   - Is not an application for a commerical facility
   - If no stockpile, a different decision - search for lowest possible risk, no matter how long it took

3. BAT must be defined in terms of risks which currently exist
N

4. Time is a critical factor
   QRA - storage risk far outweighs disposal processing risk
   - non-treatment risks far outweigh risks of treatment even in process disposal

   Therefore: Even if assume QRA is off Any delay must be justified on the basis of weighing the risks of delay v. risks reduced by choosing an alternative course of action

I have weighed this, over + over, and have concluded that

5. From what we know today, no alternative technology nor any reconfiguration and/or reverse assembly option provides assurance that overall risks will be reduced SAIC enough to justify a delay - * CHANGED MY MIND OVER TIME

6. None of the technologies provide the promise of substantial reduction of processing risks
   - All reach six "9's" or better destruction removal efficiency
   - Facility dioxin emission lower than other allowable dioxin emissions (NSPS)

6.A Reverse assembly / reconfiguration only makes sense if you conclude delay to await new technology to be developed (worker risk)

7. Nonetheless, dioxin/furans are bad actors
   - Any technology which reduces or eliminates them reduces a burden to the environment which is already too high, however
   - Dioxin emissions are very small in relation to other sources on a worldwide or regional basis
   - even on a local basis, there are other sources from motor vehicles, wood and other fuel burning, pesticides applications
   - Dioxin emissions from the facility would be temporary (3.2 years)
   - Bioaccumlation of dioxin and other chemicals is within acceptable risk levels and will be substantially contained in the local area
   - Risk was assessed using standard methodologies and very conservative assumptions
   - Carbon filters will further reduce risks by reducing emissions
   - HD contains sulfur to offset higher Cl concentrations

8. All technologies which would arguably reduce or eliminate dioxin emissions are years away or have technical uncertainties, except neutralization

from info available, appears
• that none of the alt techs can treat all of the wastestreams

- Matrix, in E+E report, shows problems with each of them in treating agent
- ready to discuss each technology (E+E report on agent)

9. Hard to conclude that the small risk of dioxin outweighs the very much larger risk of doing nothing

So...why not store it, and wait for neutralization since risk of storage of HD is much lower than munitions?

10. ANSWERS

- Will result in more delay - pilot scale, permitting, etc.
- Up to 4 more years of delay possible 2003 vs. 2010
- Involves potential risk to Columbia ecosystem from wastewater discharges
- effect on fish and wildlife unknown - needs ecological assessment
- delays plus uncertainties make it unclear what the overall comparative impacts on health and ecosystem will be if we choose to wait for neutralization
- might be worthwhile if we had assessed risks and faced no delays - not where we are today
- HD probably least risky to burn because of sulfur effect

THEREFORE, Recommend:

1. BAT defined in terms of what's available today
2. Other technologies not available today
3. Benefits of waiting are not compelling enough to accept any additional risk of a catastrophic happening, however remote the risk
4. Incineration is BAT for all agent and munitions, including HD

Public opinion
relevant factor
divided in both local area + region/state

State of Oregon
Department of Environmental Quality — Memorandum

Date: November 22, 1996

To:	**The Environmental Quality Commission**
From:	**Brett McKnight, Manager** **Hazardous Materials Program** **Eastern Region**
Subject:	**Summary and Conclusions of Public Comments Received Regarding the Proposed Umatilla Demilitarization Facility**

Attached to this memorandum is a matrix that shows a summary of the number and types of submittals that have been received in writing or in oral testimony. The matrix is interpreted as follows:

1) Findings 1- 8 and other key issues are listed across the top of the matrix, and comments received are listed numerically down the left hand side of the matrix.
2) If the comment about a particular Finding indicates that the submittal is either for or against the proposed facility, then either an "yes" or "no," respectively, appears for that submittal and that Finding.
3) If a submittal wants a permit condition changed, or does not agree with the risk assessment, wants the permit denied, etc., a "✓" appears for that submittal and that Finding.
4) The code for reading the "Other Policy Issues" and "Other" columns is:

   ND = No delay in permitting
   OS = Import of waste from off-site is of concern
   EJ = Environmental Justice; issues of concern to Native Americans
   HN = Issues of concern about Hanford
   EIS = Dissatisfaction with Environmental Impact Statement
   FS = Oregon should follow the lead of other states who are stopping permitting, and/or are pursuing alternative technologies
   PF = Proximity factor. Submittals objected to people from outside the area trying to stop the project.
   WC = Submittals want to stop or limit operation in adverse weather conditions.
   NA = The comment was not about the proposed facility

5) The far right columns of the matrix indicate whether the submittal is an "immediate" resident of nearby communities (Hermiston, Irrigon, Umatilla, Stanfield, etc.); a "regional" resident of a community on the perimeter of the 50 kilometer boundary

used in the risk assessment (Pendleton, Tri-Cities, Umatilla Indian Reservation, etc.); or "out of region" as outside the Mid-Columbia Basin.

In addition to the matrix, the bulleted items below list the key issues received on each of the Findings:

	Identified Issues
Finding One: *Intent of Rules Regarding Community Participation Have Been Met By the Department*	• The State has not engaged in a government-to-government relationship with the Confederated Tribes of the Umatilla Indian Reservation [CTUIR]. • DEQ has acted as an advocate of incineration, or, not as an advocate for the environment. • Commission and Department decision-makers were not at some public forums. • There is too much information to review and not enough time for people to understand all the issues.
Finding Two: *The location of the proposed incineration facility is suitable.*	• Federal law prohibits transportation so the stockpile must stay and be destroyed. • The stockpile should be moved elsewhere, maybe Tooele or JACADS
Finding Three: *The design of the proposed incineration facility allows for the range of hazardous wastes.*	*Note: Because this Finding is akin to Finding Four (best available technology), there are no comments noted for Finding Three.*

Finding Four: *Incineration is best available technology*	• Incineration has been found by independent experts to be an acceptable technology. • JACADS and Tooele are operating effectively and efficiently. • Currently, incineration is best available technology. • Alternative technologies are immature for chemical agent. • There are no viable alternative technology for metal parts and energetics except incineration. • EPA and Department of Health and Human Services contends that incineration is a safe and proven method. • Continued storage is not a technology. • Incineration has more control than similar industrial applications. • Incineration is unsafe and costly. • JACADS and Tooele have had experiences of upsets and operational problems. • Incineration emits toxic chemicals and would/could effect human health, the ecology, and agricultural crops. • "Closed-loop" technologies are better because they do no emit toxic chemicals. • Reconfiguration and storage, or continued storage alone, and then wait for a better treatment technology is preferable. • Other countries are using alternative technologies. • Some alternative technologies have commercial scale applications. • Need more time to develop information on alternative technologies.

Finding Five: *The proposed incineration facility is needed.*	• The risk of storage, and storage operations are more than the risk of incineration. • Risk of storage is exaggerated and there is no need to rush to incinerate. • The risk of storage can be lessened by reconfiguration.
Finding Six: *The proposed incineration facility will not cause an adverse effect to human health or the environment.*	• .Testing at JACADS has shown no adverse effects to the surrounding environment. • Review of the Pre-Trial Burn Risk Assessment was appropriately done and shows acceptable risk. • A comparative assessment between incineration and alternative technologies is necessary to reach a decision. • Incineration will emit dioxins and other toxins which at low dosages will create human health and environmental harm. • The Pre-Trial Burn Risk Assessment is flawed because it omitted issues such as not evaluating certain pathways, not evaluating synergistic effects, not accounting for all the potential chemical emissions, etc.,.
Finding Seven: *The applicant has demonstrated financial and technical capability.*	• Tooele and JACADS are built and operated well. • The Army has not been able to operate the JACADS and Tooele facilities adequately

Finding Eight: *The applicant has demonstrated the ability and willingness to operate the facility in compliance.*	For:	• There is trust in the government that they have the expertise and care to insure safe operation. • The Army has had a history of misrepresentation, misinformation, and deceit. • The Army has been fined at JACADS by EPA for non-compliance.

In addition to the matrix, the bulleted items below list the specific issues of the draft hazardous waste and air quality permits, and, the Pre-Trial Burn Risk Assessment.

Document	*Issues*

Draft Hazardous Waste Permit

- Issue of essential elements for off-site emergency response were raised. The Department will insure that there are permit conditions to incorporate essential elements.
- Comments were received to include permit conditions to study, improve, and negotiate civic improvements at the Depot and Morrow County. Also study and mitigate ground water issues at the Depot.
- Submittal identified permit issue that upon closure the facility should fall under the aegis of the Land Use Commission.
- A submittal had comments regarding the proposed permit conditions that the Department presented to the Commission on September 27, 1996. The Submittal had concerns with the conditions regarding CSEPP readiness, closure of structures, and EOC refit. They had no adverse positions on PAS carbon filter unit, emergency shut-down, and liability issues.
- Submittal identified various essential elements needed in the CSEPP program for off-site emergency response equipment that should be made part of the permit. The Department will review this permit condition request to insure that essential elements are part of the permit.
- One submittal contained many permit condition changes based on a thorough review of the draft permit. Major issues includes intensive inspection of sumps, carbon change out schedules at the HVAC unit, and difficult and unnecessary waste sampling and analysis.
- One submittal, while in favor of permit denial, offered five suggestions for permit changes including quicker permit expiration date, monitoring equipment validation, more timely notification of non-compliance.
- Issue of essential elements for off-site emergency response were raised. The Department will insure that there are permit conditions to incorporate essential elements
- Comments were received to include permit conditions to study, improve, and negotiate civic improvements at the Depot and Morrow County. Also study and mitigate ground water issues at the Depot.

Document	*Issues*
	• Submittal identified permit issue that upon closure the facility should fall under the aegis of the Land Use Commission. • A submittal had comments regarding the proposed permit conditions that the Department presented to the Commission on September 27, 1996. The Submittal had concerns with the conditions regarding CSEPP readiness, closure of structures, and EOC refit. They had no adverse positions on PAS carbon filter unit, emergency shut-down, and liability issues. • Submittal identified various essential elements needed in the CSEPP program for off-site emergency response equipment that should be made part of the permit. The Department will review this permit condition request to insure that essential elements are part of the permit. • One submittal contained many permit condition changes based on a thorough review of the draft permit. Major issues includes intensive inspection of sumps, carbon change out schedules at the HVAC unit, and difficult and unnecessary waste sampling and analysis. • One submittal, while in favor of permit denial, offered five suggestions for permit changes including quicker permit expiration date, monitoring equipment validation, more timely notification of non-compliance. • Issues of fence line monitoring, trial burns, and liability were raised. DEQ reviewed the comments and recommends no changes to the permit conditions based on these comments.
<u>Draft Air Quality Permit</u>	• Comments were noted of a minor nature. Based on the Department review to date, many of the comments will be incorporated into the final permit.
<u>Pre-Trial Burn Risk Assessment</u>	• A submittal identified issues of: Ecological data gaps should be identified before operation, identify receptors in Washington, assess present water quality in the Colombia. • A submittal remarked on the limitation on using JACADS data and provided suggestions for the Post-Trial Burn Risk Assessment.

Document	*Issues*
	• Failure to account for many other chemicals suspected of being emitted. • Failure to account for critical pathways such as breast-fed infants. • Failure to account for non-cancer effects of dioxins/furans. • Failure to account for background and current body burdens.

Attachments

TALLY OF PUBLIC COMMENTS RECEIVED ● PROPOSED UMATILLA CHEMICAL DEMILITIRZATION FACILITY

	ORS 466.055 & 466.060 Criteria									Corrections to Permits & PreRA			General Issues					Origin of Submittal		
Submittals Received	Finding 1	Finding 2	Finding 3	Finding 4	Finding 5	Finding 6	Finding 7	Finding 8	Other Policy Issues	HW	AQ	PreRA	Issue	Deny	Delay	CSEPP Readiness	Other	Immediate	Region	Out-of-Region
1				NO										✓						✓
2				NO										✓						✓
3														✓						✓
4				NO															✓	
5				NO										✓				✓		
6																✓			✓	
7				NO										✓						✓
8				YES	YES				ND				✓					✓		
9				NO										✓			✓	✓		
10				NO					OS					✓						✓
11	NO									✓					✓				✓	
12				NO	NO									✓						✓
13						NO						✓		✓						✓
14												✓			✓				✓	
15						NO						✓							✓	
16						NO			OS			✓		✓						
17				NO										✓						✓
18				NO	NO															✓
19				NO					OS					✓						✓
20				NO										✓						✓
21				NO										✓						✓
22				NO	NO				OS											✓
23				NO		NO								✓						✓
24				NO		NO								✓						✓
25	NO			NO										✓						✓
26				NO		NO						✓		✓						✓
27				NO										✓						✓
28	NO			NO										✓						✓
29	NO			NO		NO								✓						✓
30				NO										✓						✓
31	NO			NO				NO						✓			HN			✓

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32	NO			NO		NO								✓						✓
33	NO			NO										✓			HN			✓
34	NO					NO											HN			✓
35				NO		NO								✓			EJ			✓
36				NO	NO	NO								✓						✓
37					NO				FS					✓						✓
38				NO										✓						✓
39				NO										✓						✓
40				NO										✓			EJ			✓
41				NO		NO			OS					✓			HN			✓
42	NO					NO			OS					✓						✓
43				NO	NO	NO		NO						✓		✓				
44	OPTED NOT TO PROVIDE TESTIMONY																			
45	OPTED NOT TO PROVIDE TESTIMONY																	✓		
46				YES									✓			✓				✓
47	NO			NO		NO								✓				✓		
48																✓			✓	
49	NO																	✓		
50				YES														✓		
51						NO	NO	NO	OS					✓		✓				✓
52				NO		NO												✓		
53				YES					ND				✓						✓	
54				YES	YES		YES	YES					✓					✓		
55				YES					ND				✓							✓
56				NO	NO	NO		NO						✓				✓		
57	NO													✓		✓		✓		
58				YES	YES				ND				✓					✓		
59				YES	YES	YES			ND				✓					✓		
60				NO	NO	NO								✓				✓		
61				YES					ND,PF				✓					✓		
62	NO													✓						✓

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63				NO										✓						✓
64				YES					ND				✓					✓		
65				NO										✓						✓
66														✓			HN		✓	
67	NO													✓					✓	
68									WC										✓	
69	NO			YES		YES							✓						✓	
70	NO			NO	NO									✓		X	EIS			✓
71				NO											✓				✓	
72				NO										✓					✓	
73																	NA		✓	
74				YES					ND,OS				✓					✓		
75						YES			ND,OS				✓						✓	
76	NO			NO											✓				✓	
77				YES	YES				ND				✓						✓	
78				YES									✓				HN		✓	
79				NO										✓			HN			✓
80				YES	YES				ND				✓			✓		X		
81										✓			✓			X				✓
82										✓	✓		✓						✓	
83						NO								✓			HN	✓		
84				NO		NO								✓						✓
85				NO											✓				✓	
86				YES									✓						✓	
87						NO		NO						✓				✓		
88				NO		NO							✓						✓	
89				NO		NO		NO						✓				✓		
90				YES	YES				ND				✓					✓		
91				YES	YES								✓						✓	
92				YES									✓					✓		
93				NO		NO									✓				✓	

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94																	NA	✓		
95				NO		NO								✓		✓		✓		
96				YES	YES	YES							✓					✓		
97				YES	YES								✓					✓		
98						NO									✓	✓			✓	
99				YES	YES	YES							✓					✓		
100								YES					✓					✓		
101				YES					ND				✓					✓		
102				YES	YES								X					X		
103					YES								✓					✓		
104		NO		NO										✓		✓		✓		
105				YES					PF				✓					✓		
106	YES			YES					ND				✓					✓		
107				YES				NO	ND,OS				✓			✓		✓		
108				NO					ND								HN		✓	
109		YES		YES	YES				ND				✓					✓		
110				YES					ND				✓				HN	✓		
111	NO								ND									✓		
112				YES				YES					✓			✓		✓		
113				NO				NO	OS									✓		
114																✓		✓		
115													✓			✓		✓		
116				NO										✓		✓		✓		
117				NO		NO		NO	OS										✓	
118				NO		NO		NO						✓				✓		
119				NO		NO								✓				✓		
120				YES	YES				ND				✓					✓		
121				NO	NO	NO	NO	NO				✓		✓						✓
122				NO		NO						✓		✓				✓		
123				NO					ND				✓					✓		
124				YES	YES	YES							✓			✓		✓		

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125				YES		YES							✓			✓		✓		
126				NO		NO									✓					✓
127					YES				ND,PF				✓					✓		
128					YES								✓			✓		✓		
129				YES	YES								✓					✓		
130				NO		NO						✓		✓						✓
131					YES	YES							✓					✓		
132						NO	NO													✓
133							YES	YES	PF				✓					✓		
134				YES									✓					✓		
135										✓			✓					✓		
136												✓						✓		
137				NO											✓					✓
138					YES								✓					✓		
139										✓			✓							✓
140	NO													✓						✓
141	YES	YES	YES	YES	YES	YES			ND,PF				✓					✓		
142				NO	NO	NO								✓						✓
143										✓	✓	✓	✓							✓
144										✓			✓			✓		✓		
145						NO	NO	NO							✓				✓	
146										✓			✓						✓	
147	NO			NO		NO		NO						✓					✓	
148				NO										✓						✓
149										✓			✓			✓		✓		
150						YES						✓	✓							✓
151						NO								✓						✓
152				NO		NO	NO			✓		✓		✓				✓		
153				NO										✓						✓
154				YES	YES	YES							✓						✓	
155				NO	NO	NO								✓						✓

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156	NO			NO		NO	NO							✓						✓
157				NO																✓
158				NO		NO								✓						✓
159	NO			NO	NO									✓						✓
160				NO		NO								✓		✓				✓
161	NO			NO										✓						✓
162						NO								✓						✓
163						NO			OS					✓						✓
164				NO										✓						✓
165				NO										✓						✓
166				NO										✓						✓
167						NO								✓						✓
168				NO										✓						✓
169				NO		NO								✓						✓
170				NO		NO								✓						✓
171				NO										✓						✓
172				NO										✓						✓
173				NO										✓						✓
174				NO		NO								✓						✓
175				NO		NO								✓						✓
176				NO										✓						✓
177				NO										✓						✓
178				NO	NO									✓						✓
179	NO			NO	NO		NO		OS,FS					✓		✓				✓
180																	NA			✓
181				YES	YES								✓						✓	
182	NO			NO	NO	NO									✓	✓			✓	
183					NO		NO	NO	OS					✓		✓		✓		
184				NO		NO								✓						✓
185				NO			NO			✓				✓				✓		
186						NO						✓		✓				✓		

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187										✓			✓							✓
188										✓			✓							✓

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ORS 466.055 & 466.060 Criteria										Corrections to Permits & PreRA?			General Issues					Origin of Submittal		
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187										✓			✓							✓
188										✓			✓							✓

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State of Oregon

Department of Environmental Quality

Memorandum

Date: 21 November 1996

To: **Environmental Quality Commission**

From: **Brett McKnight**
Manager, Hazardous Waste, Eastern Region

Subject: Questions about the proposed Umatilla Chemical Demilitarization Facility (UMCDF)

Enclosed are five working papers that discuss specific answers to questions raised at the November 15, 1996 EQC meeting and Work Session. The questions are summarized as follows:

1. How does the Pre-Trial Burn Risk Assessment account for the contaminant uptake in the fish tissue? How do dioxin emissions change with increasing distance from the UMCDF?

2. What potential impacts will result from the emission of sulfur compounds while burning mustard (HD)?

3. Can the quench temperature in the dunnage incinerator pollution abatement system be reduced to further prevent the formation of dioxins and furans?

4. What is the mass emission rate of chemical agent that will be discharged from the UMCDF? And how does the agent emission rate used in the pre-trial burn risk assessment compare to "actual" agent emission rates that are expected from the UMCDF after passing through the carbon filter unit?

5. How will the incinerators be operated to reduce the formation of products of incomplete combustion (PICs)?

MEMORANDUM

To: Brett McKnight, DEQ

From: Julie Wroble, E & E

Date: November 20, 1996

Subj: Additional Information on PreRA Issues

DEQ requested that E & E address the two issues below that relate to the risk assessment.

- Explain how duration of exposure was factored into calculation of fish tissue concentrations; and
- Describe how dioxin concentrations change with increasing distance from the proposed UMCDF.

The approach used to calculate fish tissue concentrations was based on the Implementation Guidance (EPA 1994). The concentrations modeled in fish tissue and used in the pre-trial burn risk assessment (PreRA, E & E 1996) likely overestimate actual fish tissue concentrations for the reasons described below. Fish tissue concentrations were based on concentrations in other environmental media (e.g., surface water, sediment, soil) and were assumed to remain constant after UMCDF operations cease. In other words, even though the UMCDF is expected to operate for only 3.2 years, the concentrations in fish tissue were assumed to remain constant for 30 years (i.e., the exposure duration of the subsistence fisher). Furthermore, even though some fish may exist in the Umatilla River for a relatively short period of time (e.g., a salmon swimming upstream to spawn), the tissue concentrations in these fish were assumed to be the same as tissue concentrations in resident species.

Figures 3-11, 3-12, and 3-13 from the PreRA show how vapor concentrations, particulate concentrations, and deposition rates, respectively, change with increasing distance from the UMCDF stack. In general, these concentrations decrease with increasing distance from the stack. Local topography and annual average wind direction influence the shape of the isopleths. These figures indicate that concentrations at the facility boundary are between one to two orders of magnitude (10 to 100 times) lower than at the stack. Additionally, concentrations at the edge of the 50-km boundary are expected to be between three and four orders of magnitude (1,000 to 10,000 times) lower than at the stack.

These decreases in concentration with increasing distance from the stack have significant implications for risk. In the PreRA, risk estimates for human health were generated for three locations, 100 meters northeast of the stack, on the facility fenceline northeast of the stack, and on the Umatilla River northeast of the stack. The risks to human health were below regulatory benchmarks at the fenceline and Umatilla River locations. These locations represent plausible future receptor locations. Receptors that are located further from the facility would have correspondingly lower risks. For example, if a receptor lived in downtown Hermiston, their risks would be about 10 times lower than the fenceline receptor. If a receptor lived in Stanfield, their risks would be between 100 and 1,000 times lower than the fenceline receptor. Figure 1 illustrates how concentrations decrease with increasing distance from the stack. Three of the locations presented on this figure correspond to receptor locations evaluated in the PreRA. Three additional locations were added to show the magnitude of decrease in concentrations, and thereby risks, with increasing distance from the stack.

References:

Ecology and Environment, Inc. (E & E), April 1996, Draft Pre-Trial Burn Risk Assessment, Proposed Umatilla Chemical Demilitarization Facility, Hermiston, Oregon, prepared for Oregon Department of Environmental Quality, Contract No. 64-93, Task No. 64-93-10, Seattle, Washington.

United States Environmental Protection Agency (EPA), April 22, 1994, *Implementation Guidance for Conducting Indirect Exposure Analysis at RCRA Combustion Units*, Draft, Waste Management Branch, Office of Solid Waste and Emergency Response, Washington, D.C.

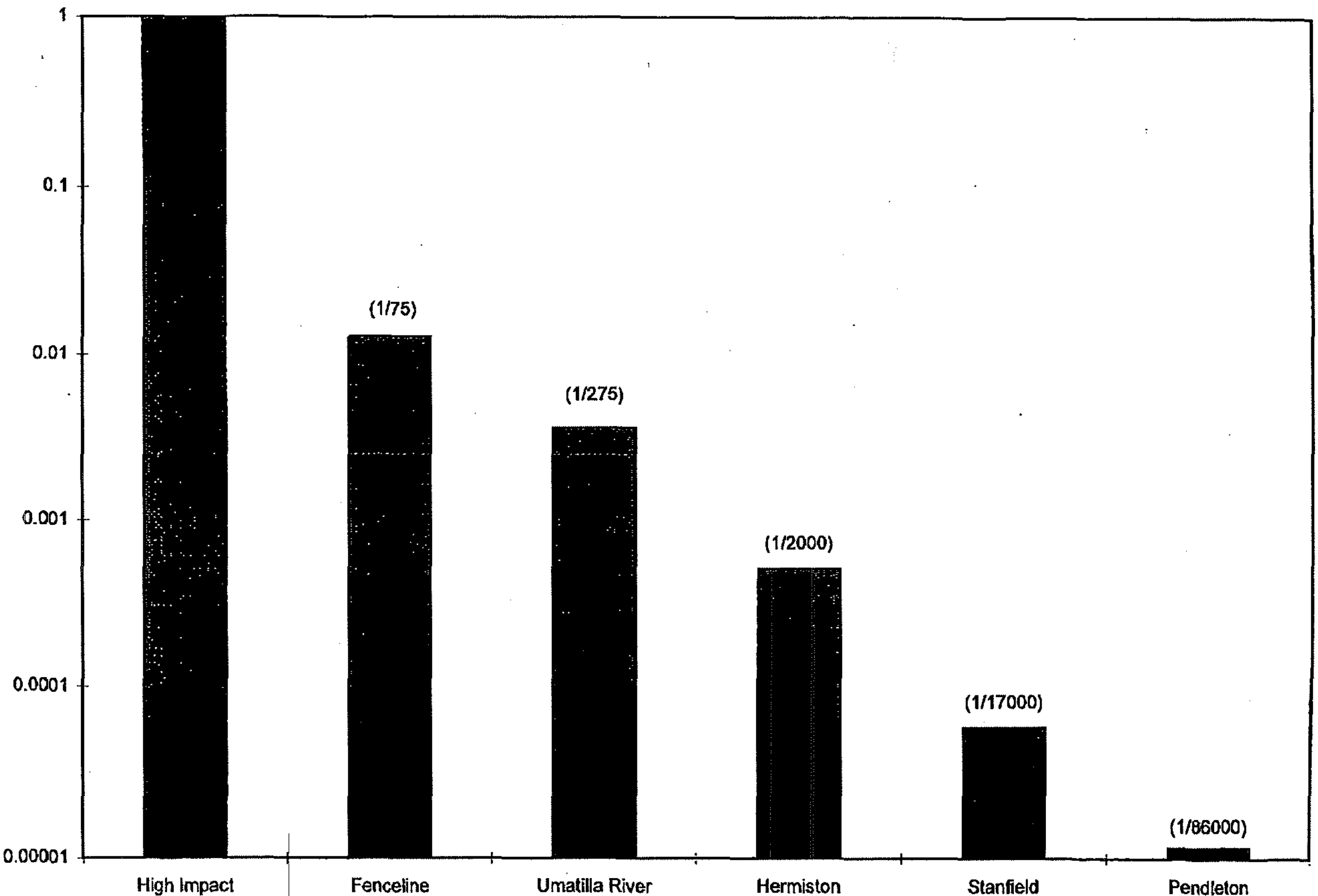

Figure 1

RELATIVE CONCENTRATIONS BASED ON UNITIZED DEPOSITION RATES FROM THE COMMON STACK

Potential emissions of dioxins and furans were among the primary contributors to risks in the risk assessments performed for proposed and operating chemical demilitarization incinerators. However, the risks calculated for these incinerators can be attributed in large part to a series of conservative assumptions used in the calculation of emission rates and media concentrations.

The draft pre-trial burn risk assessment for the proposed Umatilla Chemical Demilitarization Facility (UMCDF) in Hermiston, Oregon demonstrates some of the ways exposure to dioxin is overestimated. Because the incinerator has not yet been built, the risk assessment was performed using surrogate data from trial burns at the Johnston Atoll Chemical Agent Disposal System (JACADS). Emissions from JACADS were scaled based on expected UMCDF operating conditions and number of munitions to be processed. Dispersion modeling was then performed, and concentrations of emitted constituents were calculated in soil, water, and food, according to USEPA's *Guidance for Performing Risk Analyses at Combustion Facilities Burning Hazardous Wastes.*

Following is a brief discussion of some of the sources of overestimation of dioxin emissions or media concentrations and the effects on the overall risks:

1. **JACADS trial burns were performed at suboptimal operating conditions.** Temperatures in the incinerators were lower than standard, which tends to increase production of dioxins and other products of incomplete combustion. Also, the munitions destroyed in the trial burns were those which were expected to be the "most challenging" for the incinerators, such as M55 rockets. Therefore, it is likely that emissions for the stockpile as a whole were overestimated during the JACADS trial burns.

2. **Maximum concentrations of constituents detected in any trial burn were used to represent the entire operation of the facility.** Each of the furnaces at JACADS was tested repeatedly during the trial burns. The liquid incinerators were tested a total of eleven times, four times each with the chemical agents HD and VX and three times with the agent GB. The maximum concentration detected in any of these tests was assumed to be emitted continuously from the facility, regardless of the type of agent being destroyed. A recalculation of emission rates using average dioxin concentrations from all trial burns indicates that dioxin emissions from the liquid incinerators are overestimated by about a factor of 2.1. (Other furnaces have varying results.)

3. **Use of detection limits to represent nondetected dioxin and furan congeners.** The majority of dioxins and furans were not detected in most trial burns at JACADS. In ~~some tests,~~ no dioxins or furans were detected whatsoever. In cases where a congener was not detected, the congener was assumed to be present in the emissions at the detection limit. Use of detection limits overestimated dioxin emissions from the liquid incinerators by about a factor of 3.6. (Other furnaces have varying results.)

4. **Upset conditions were exaggerated.** Because emissions of dioxins and other products of incomplete combustion are generally higher when incinerators are in "upset", a scaling factor was included which assumed that dioxin emissions were ten times normal for 20% of the time of facility operations. However, data from JACADS operations in 1995 indicate that upset

conditions at that facility occurred less than 2% of the time. Assuming similar operations at UMCDF, the use of the higher factor for upset conditions would overestimate emissions by a factor of about 2.4.

5. **All incinerators were assumed to operate constantly for the entire lifetime of the facility.** The incinerators at the UMCDF would actually be operating infrequently during the facility's lifespan of slightly over three years; if the munitions were actually being processed round-the-clock the stockpile would be destroyed in about ten months. Furthermore, most munitions do not require use of all furnaces at the facility. For example, processing ton containers of HD (mustard) requires the liquid incinerators and the metal parts furnace, but the deactivation furnace and the dunnage incinerator are not used. Historically, the furnaces at JACADS have all operated at under 15% of their capacity. By assuming constant operations of all furnaces at UMCDF, emissions are overestimated by at least a factor of three, and are likely overestimated by as much as a factor of eight.

6. **Dioxins (and other constituents) were assumed to remain in soil without any loss.** Typically, dioxin concentrations in the environment will decrease over time, through degradation, volatilization, runoff, or other sources. If dioxins are on the soil surface, as would be expected with deposited emissions, photodegradataion may be significant. By assuming that soil concentrations remain constant for the length of time that receptors are exposed (as high as 40 years for subsistence farmers), exposure to dioxins may be significantly overestimated. The magnitude of the overestimation is difficult to quantify.

7. **Overestimation of the dry deposition velocity of vapor phase of dioxin.** Transfer of vapors to soil was modeled for dioxin and other constituents present as in vapor phase. One term used in this equation is the dry deposition velocity of vapor phase. No chemical-specific values could be found for this term, so a default value of 3 cm/sec was assumed. More recent data indicates that a value of 0.2 cm/sec is appropriate for dioxins. Use of the default value overestimates concentrations; the magnitude of this overestimation varies at different locations as air concentrations and deposition rates vary, but at the fenceline of the Umatilla Chemical Depot (the closest location at which residents could be expected to live) dioxin concentrations are overestimated by about a factor of 3.

8. **Deposition and vapor transfer into plants was assumed to continue well beyond the operating duration of the facility.** Because the equations presented in the USEPA guidance do not consider facility operating time when calculating above-ground plant concentrations, transfer of constituents from air to plants was assumed to continue for the duration of residence for receptors. For the subsistence farmer receptor (the receptor with the highest calculated cancer risks), dioxin transfer into beef and milk through plants was the most significant route of exposure. By making the more reasonable assumption that deposition to plants and vapor transfer to plants would end shortly after the facility ceases operations, risks to the subsistence farmer associated with consumption of beef, milk, and vegetables would be lowered by a factor of about 12. (Deposition to waterbodies, and therefore transfer to fish for the subsistence fisher receptor, also was overestimated in a similar manner.)

9. **The addition of activated carbon filters was not considered when modeling emissions.** The proposed facility plans for Umatilla to include activated carbon filters to reduce potential emissions from the stacks. These filters are not present at JACADS, and no data is currently available to directly estimate the effectiveness of these filters. However, the Army has estimated that dioxin emissions would be reduced by about a factor of seven; this estimate may significantly underestimate the effectiveness of the filters. Filters used at other incinerators have been shown to reduce dioxin emissions by over a factor of 1,000.

Overall effects: Each of the above issues contributes to the overestimation of dioxin risks for the proposed UMCDF. Most effects mentioned above are multiplicative, and lead to a total overestimation of risks by at least a factor of 1,000. This factor may be even higher for the subsistence farmer receptor or if the activated carbon filters remove more emissions than the Army has estimated.

Summary of effects of conservative assumptions in emission modeling on risk calculations	
Cause	**Effect on dioxin emission rates or risk calculations**
Trial burns at suboptimal conditions	Likely to overestimate (by unknown amount)
Use of maximum concentrations for all operations	Overestimates by factor of about 2.1
Use of detection limits	Overestimates by factor of about 3.6
Upset condition modifiers	Overestimates by factor of about 2.4
Assumed full-time operations of all incinerators	Overestimates by at least a factor of 3; possibly as much as a factor of 8
Assumed no loss from soil	Overestimates by unknown amount
Dry deposition velocity	Overestimates soil concentrations by factor of about 3
Plant deposition/vapor transfer	Overestimates above-ground plant, beef, and milk concentrations by factor of about 12
Carbon filters	Overestimates; probably by factor of at least 7, possibly as much as factor of 1,000
Overall effects:	**Most media concentrations probably overestimated by factor of over 1,000; plant, beef, and milk concentrations probably overestimated by factor of over 10,000**

State of Oregon
Department of Environmental Quality — Memorandum

Date: 17 November 1996

To: **Umatilla File**

From: Peter Brewer, P.E., Air Quality, ER-Bend

Subject: Emissions sulfur dioxide from the proposed Umatilla Chemical Demilitarization Facility (UMCDF)

QUESTION: What potential impacts will result from the emission of sulfur compounds from the burning of mustard (HD)?

Discussion

Emissions:

The sulfur in fuel or waste is oxidized to sulfur dioxide in the combustion chamber. The maximum emissions of sulfur compounds emitted from the common incinerator stack, as sulfur dioxide, is predicted to be 26 pounds per hour. This occurs only when the liquid incinerator burning mustard (HD) from the ton containers at the maximum capacity. The Air Quality permit allows the Depot a total of 64 pounds per hour and 51 tons per year of sulfur dioxide emissions. This amount includes the use of diesel fuel, which contains sulfur, in many of the small boilers that are located at the Depot but are not a part of the Chemical Demilitarization activity..

Impact:

Sulfur dioxide emissions can cause impacts if the amount and concentration of sulfur dioxide in the gaseous exhaust stream are large. During the review of a permit application, the maximum potential emissions are compared to regulatory thresholds to determine if a detailed analysis is necessary. For the sulfur dioxide emissions in question, the amount is below the regulatory threshold and no further analysis was needed. In addition, the sulfur dioxide in the stack gas will be present in concentrations below 1 part per million. At the point of highest impact downwind from a stack, the concentration would range from 50 to 1000 times lower due to dispersion in the ambient air. Although a comparison with the ambient air health standards would not be necessary unless the sulfur dioxide emissions were larger, the Oregon 3-hour average health standard for sulfur dioxide is 0.5 parts per million, and the 24-hour standard is 0.14 ppm. Using a dispersion factor of 50, the maximum downwind concentration would be approximately 0.02 ppm.

As another comparison, the emission level will be similar to the emissions from a medium sized industrial boiler burning diesel fuel, which historically do not have any impacts to the community or neighbors nearby. In general, only large boilers that burn residual fuel oil, which has almost 4 times the sulfur content of diesel fuel, cause nuisance conditions or are capable of impacting the health of the nearby community or the environment.

Summary

The emissions of sulfur dioxide, either from the combustion of HD or the burning of diesel fuel, are not anticipated to cause any odor or health impacts. The level of emissions are well below any regulatory threshold that would require a review of potential impacts, and the quantity and nature of the sulfur dioxide emissions are such that minimal or no odors would be detected at the Depot itself.

State of Oregon

Department of Environmental Quality — Memorandum

Date: 18 November 1996

To: **Umatilla File**

From: Peter Brewer, P.E., Air Quality, ER-Bend PMB

Subject: Design of the Dunnage Incinerator (DUN) pollution abatement system at the proposed Umatilla Chemical Demilitarization Facility (UMCDF)

QUESTION: Can the quench temperature in the DUN pollution abatement system be reduced to further prevent the formation of dioxins and furans?

Discussion

Description:

The DUN is designed to incinerate miscellaneous materials that have come in contact with the chemical munitions or agent and mustard itself. Typical dunnage material includes the wood pallets on which some munitions are stored, spent laboratory solids, mops, spent filter material and other clean-up materials that may have come in contact with agent or mustard. Actual amounts of agent or mustard entering the DUN will be very small compared to the liquid incinerators. The pollution abatement system for the DUN more closely resembles that of a solid waste incinerator, where the control of acid gases and particulate matter, after proper combustion, are a high concern. The DUN pollution abatement system consists of:

- an afterburner to ensure complete combustion;
- a quench tower where a caustic solution is sprayed and mixed with the hot combustion gases to both cool the gas and neutralize any acid gases;
- a baghouse system to filter the air of particulate matter; and
- a carbon filter system to capture any trace organic gases, such as agent or dioxins.

Data and Operation Discussion:

Data from trial burn emissions testing at the Johnston Island facility (JACADS) showed dioxin concentrations in the DUN exhaust stream to be higher than the concentrations in the other incinerator exhaust streams (an average of 6.47 nanograms per cubic meter (ng/m^3) of exhaust air compared to 0.01 to 0.41 ng/m^3 of air). The pollution abatement systems at JACADS did not have carbon filters as are required in the UMCDF permits. Important information that was not considered is the fact that the DUN system has an exhaust flowrate that is 6.5 times lower than the other incinerator systems which results in lower overall emissions of dioxin on a mass basis than one would initially believe. The DUN is also not scheduled to be in full operation until well into the munition destruction campaign, at which time enough dunnage material will exist to operate the DUN. Initially during the M55 rocket campaigns there will be little dunnage material and the DUN will not be in operation.

Control Technology Discussion:

As discussed by Professor Iisa from the Chemical Engineering Department at OSU, the control of temperature in the pollution abatement system is important in the control of dioxin and furan formation. The quench system is designed to reduce the temperature of the exhaust stream to a minimum level that will still allow for the gas stream to pass through the baghouse system. If the moist airstream is too cool, then the moisture can condense on the filters and cause a pressure buildup and potential failure of the baghouse. The DUN design quench temperature is 350°F, or 177°C. Dioxin formation generally occurs in the range of 250 to 400°C. Therefore the quench system is designed to quench the gas stream below the dioxin formation range, but also allowing the gas to remain hot enough to prevent condensation on the baghouse filters. The gas stream will also be hot enough to pass through the carbon filter system without condensing any moisture onto the carbon. The other incinerator systems are designed to reduce the gas temperatures to approximately 100°C. However, these systems are designed to also reduce the level of acid gases and metals potentially present in the gas stream through the use of an additional scrubber and a packed tower prior to exhausting through a carbon filter system. In these systems, the gas stream must be reheated before passing through the carbon filter to prevent condensation of moisture on the carbon.

Also noted in the October 29, 1996, OSU report by Professor Iisa, in response to the question of carbon filters as best available control technology, "activated carbon filters together with rapid quenching of the flue gases is the most efficient methods of reducing dioxin emissions. No other method seems to be able to offer higher reduction efficiencies." The report also discussed the success on a carbon filter system in Germany which showed dioxin reduction efficiencies of 99.6% to 99.98%.

Summary

The DUN pollution abatement system is designed to reduce the opportunity of dioxin formation through the use of proper combustion and a quench system. The quench system is not designed to reduce the gas temperatures as low as in the other incinerators because of the need and use of a baghouse filter system to reduce particulate emissions. However, with the addition of the carbon adsorption filter system, any dioxin emissions from the DUN will be reduced further than the emissions testing data from JACADS would suggest. The carbon filter system is capable of reducing dioxin emissions by a factor of 99% or more. For these reasons, the dioxin emissions from the DUN are anticipated to be measured below the 1 ng/m3 level, even though the permit analysis and Human Health Risk Assessment reviewed emissions and concentrations at higher levels.

State of Oregon
Department of Environmental Quality Memorandum

Date: 20 November 1996

To: **Umatilla File**

From: Peter Brewer, P.E., Air Quality, ER-Bend PMB

Subject: Potential emissions of chemical agent from the proposed incinerators at the Umatilla Chemical Demilitarization Facility (UMCDF)

STATEMENT: The proposed incinerators will emit one tenth of an ounce (1/10 oz) of agent every day.

CONCERN: Is this statement correct? Were the impacts of these emissions evaluated? What is the mass emission rate of chemical agent that will be discharged from the UMCDF? How does the agent emission rate used in the Pre-Trial Burn Risk Assessment compare to "actual" agent emission rates that are expected from the UMCDF after passing through the carbon filter unit?

Discussion

Emissions:

The Hazardous Waste and Air Quality permitting process attempted to evaluate the maximum possible emissions from the proposed UMCDF. The emissions levels of chemical agent (GB, VX, and HD) from the incinerators that were evaluated for regulatory and risk purposes are higher than the 0.1 ounce per day level that was mentioned in the public testimony. The equivalent emission of chemical agent, at the 0.1 ounce per day emission rate, would be 25 ounces per year, and 80 ounces over the lifetime of the facility. The maximum estimated amount of GB, VX, and HD emitted from the facility, **for permitting and risk assessment**, is 0.013, 0.013 and 1.3 ounces per day respectively, and 15, 15, and 1530 ounces, respectively, over the facility lifetime. The estimated emissions of chemical agent from the incinerator, based on actual operating conditions, **but not used in the risk assessment**,for GB, VX, and HD are as follows: 0.5, 0.2, and 25 ounces over the lifetime of the facility. Note: The difference between agent and HD emission levels is because the Allowable Stack Gas Concentration (ASC), as established by the Surgeon General, is higher for HD than it is for agent. These facility estimates include the potential emissions from the 5 incinerators (2 LIC, MPF, DFS, ~~and DUN~~).

The following are the underlying assumptions for the chemical agent emissions estimates for the incinerators and the HVAC stack:

- For purposes of regulatory (permitting) and risk evaluation, it was assumed that all incinerators and the HVAC will emit the maximum allowed concentrations of chemical agent every hour of the year for the duration of the project. A secondary assumption is that the carbon filters on the incinerators would provide no emission reduction of chemical agent.

Discussion of assumption:
Hours of operation and incinerator operating schedules: An important fact is that only individual munition types or agent types will be processed at one time. HD will not be emitted from the stack during a GB or VX campaign, as no HD will be present in the system. As an example, during a campaign involving GB, the maximum amount of GB released from the common stack, based on all of the assumptions, is 0.013 ounces per day. The incinerators are permitted to operate for 6,000 hours per year, less than the 8,760 hours per year used in the risk evaluation. As each incinerator will not operate all of the time, the actual operating time of each incinerator will be less than 6,000 hours per year.

Carbon filter system: Although the permit conditions do not allow the release of agent over the ASC, the incinerator and HVAC system are controlled with carbon filters that offer further protection from releases. The carbon filter system consists of multiple filters, each with six (6) banks of individual filters. The air stream between select filters will be analyzed for chemical agent. The operating procedure for the filters calls for replacing specific banks of the carbon filters after agent has been detected at the ASC (e.g. when chemical agent is detected at the ASC between the third and fourth carbon banks, the first three carbon banks will be changed promptly). The operating procedure is designed to never allow emissions of chemical agent out of the exhaust stack. Because of this preventative approach, actual emissions from the processes will be well below the ASC. Average emissions will be below the quantification limit of chemical agent, which is at 20% of the ASC. Also, if any chemical agent is detected at concentrations near the ASC, the air stream to that filter can be immediately switched to one of two spare carbon filter banks.

- Maximum amounts of chemical agent emissions per day are based on maximum emission rate and the exhaust flow rate of the incinerators and HVAC.

Discussion of assumption:
The actual flowrates of the processes depends on the specific munitions campaign and the actual utilized capacity of the process. When an incinerator process is operating at less than capacity, then less agent, fuel and combustion air is used which results in a lower exhaust flowrate. As the emission estimates were based on the ~~maximum allowable~~ stack concentration (the ASC), the mass emission rate depends directly on the size of the flowrate. A lower flowrate will result in lower estimated emissions of chemical agent. The different processes will operate frequently below their maximum capacity and accordingly have lower exhaust flowrates.

Summary

The maximum emissions, based on the assumptions outlined above, were evaluated against the hazardous waste and air quality regulations, as well as used in the Pre-Trial Burn Risk Assessment. Even at these conservative emission levels, which are 13 times more than the level suggested in the public comment, the review processes found that the potential risks to locations off site were below levels of potential regulatory concern. Considering the actual munitions destruction schedule and the addition of carbon filters on the incinerator stacks, the actual emissions from the UMCDF will be lower than the maximum estimates used in the evaluation, and are estimated to be at a minimum of 3 times lower than the 0.1 ounce per day suggested in the public comment session. The resulting impacts from these lower emissions will only reduce the potential risks to both on site and off site locations.

State of Oregon
Department of Environmental Quality — Memorandum

Date: 20 November 1996

To: **Umatilla File**

PMB

From: Peter Brewer, P.E., Air Quality, ER-Bend

Subject: Potential emissions of products of incomplete combustion from the proposed Umatilla Chemical Demilitarization Facility (UMCDF)

QUESTION: How will the incinerators operate to reduce the conditions in which products of incomplete combustion could potentially form?
The question was raised at the Nov. 15, 1996 EQC worksession.

Discussion

Products of incomplete combustion (PICs) can form during the combustion of fuels and/or waste materials when some of the organic compounds present are not fully oxidized. Some familiar PICs include formaldehyde and benzene. The formation of PICs is best prevented with proper combustion controls. The incinerators at the proposed UMCDF have been designed to have adequate temperature in the combustion zones and afterburner section, as well as adequate residence time of the combustion gases. The proper design of the incinerators has been specified in he Hazardous Waste (HW) and Air Quality (AQ) permits. The main permit conditions concerning the design and operation of the incinerators are in the Hazardous Waste permit, modules VI.

The primary concern over potential PICs is during the combustion of the chemical agents and the energetics in some of the munitions. Through proper operation of the incinerator components, through permit conditions, the formation of PICs can be kept to a minimum. The HW permit contains many such requires specifically for that purpose. An example of these type of conditions are the Automatic Waste Feed Cut-off conditions (AWFCO). If the temperature of the incinerator chambers are not at the required set points, then though a corresponding electronic link, the chemical agent containing waste feed cannot enter the combustion chamber. Also, while a unit is in operation, if the proper temperature (or carbon monoxide level in the exhaust, the amount of agent detected in the exhaust, the oxygen level in the combustion chamber etc.) is not maintained, then ~~the waste feed~~ stream to the unit is automatically cut-off. Through these permit and actual operational requirements, the conditions in which PICs commonly form are reduced to a minimal level.

Summary

The formation of PICs can be reduced through the control of the conditions in which the waste material is combusted. The HW permit contains many specific conditions which address the potential situations in which PICs are likely to form. The UMCDF incinerators are designed to be equipped with the necessary controls to comply with the permit conditions and control the combustion parameters such that the formation of PICs are kept to a minimum.

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November 19, 1996

Ms. Stephanie Hallock
Eastern Region Administrator
Oregon Department of Environmental Quality
67265 Bass Lane
Bend, OR 97701

RE: Umatilla Army Depot, Best Available Technology Findings Report
Task Order No. 64-93-10

Dear Ms. Hallock:

Enclosed please find one copy of the Best Available Technology Findings Report for the Umatilla Army Depot site in Hermiston, Oregon. Note that the only significant changes as compared to the draft report relate to (1) proposed treatment and diposal of carbon filters; and (2) additional explanation about Oregon's solid waste regulations in the molten metal catalytic extraction section (Section 7). Additional changes were minor.

If you have any questions regarding this deliverable, please call me at 206/624-9537.

Sincerely,

ECOLOGY AND ENVIRONMENT, INC.

for

Sheila Fleming, P.E.
Program/Project Manager

cc: Sue Oliver, DEQ (1 copy)

recycled paper

Best Available Technology Findings Report Umatilla Chemical Depot Hermiston, Oregon

November 1996

Prepared for:

STATE OF OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY
2146 NE FOURTH STREET, SUITE 104
BEND, OREGON 97701

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Attachment A - Tables for Comparison of Alternative Technologies

ACRONYMS

AMSAA	United States Army Materiel Systems Analysis Activity
Army	United States Army
BAT	Best available technology
BDAT	Best demonstrated available technology
Btu/h	British thermal units per hour
CHB	Container handling building
Chem Waste	Chemical Waste Management, Inc.
CSR	Catalytic steam reformer
DEQ	Department of Environmental Quality
DRE	Destruction removal efficiency
E&E	Ecology and Environment, Inc.
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
EQC	Environmental Quality Commission
FPEIS	Final Programmatic Environmental Impact Statement
gal	Gallon
GB	Nerve agent (sarin)
HD	Distilled mustard
HVAC	Heating, ventilation, and air conditioning
JACADS	Johnston Atoll Chemical Agent Disposal System
kJ	Kilojoule
km	Kilometer
kW	Kilowatt
lb	Pound
LDR	Land disposal restriction
LD50	Lethal dose for 50% of the population
MPF	Metal parts furnace
MW	Megawatt
NO_x	Oxides of nitrogen
NRC	National Research Council
OAR	Oregon Administrative Rules
ORS	Oregon Revised Statutes
OVT	Operational verification testing
PAS	Pollution abatement system
PCB	Polychlorinated biphenyl
PreRA	Pre-trial burn risk assessment
QRA	Quantitative risk assessment
RCRA	Resource Conservation and Recovery Act
SAIC	Science Applications International Corporation
SBV	Sequencing batch vaporizer
TSDF	Treatment, storage, and disposal facility
UMAD	Umatilla Army Depot
UMCD	Umatilla Chemical Depot
UMDA	Umatilla Depot Activity

UMCDF	Umatilla Chemical Disposal Facility
UPA	Unpack area
VOC	Volatile organic compound
VX	Nerve agent

1. INTRODUCTION

Ecology and Environment, Inc., (E&E) was tasked to provide technical assistance to the Department of Environmental Quality (DEQ) relating to the use of disposal technologies to destroy the chemical munitions stockpile at the Umatilla Chemical Depot (UMCD). The purpose of this review is to prepare background for review by the Environmental Quality Commission (EQC) to facilitate their findings about best available technology (BAT) in accordance with ORS 466.055(3) for destruction of the stockpile of chemical weapons stored at Umatilla.

As part of this review, E&E has performed a comparative analysis of several disposal technologies, including:

- Baseline incineration (current proposed disposal technology),
- Neutralization,
- Neutralization followed by biodegradation,
- Molten metal catalytic extraction,
- Silver II electrochemical oxidation, and
- Gas-phase chemical reduction.

These technologies were evaluated by utilizing criteria identified by the EQC and DEQ as outlined below.

1. Types/quantities/toxicity of discharges to the environment by operation of the proposed facility or any alternative technology;
2. Risks of discharge from a catastrophic event or breakdown in operation of the proposed facility or any alternative technology;
3. Safety of the operation of the proposed facility or any alternative technology;
4. The rapidity with which the technology can destroy the stockpile;
5. Impacts of the proposed technology on consumption of natural resources;
6. Period of time to test out the technology and have it fully operational and how that impacts the overall risk of the stockpile program; and
7. Cost.

These criteria were addressed based on information contained in the following documents and on E & E 's institutional knowledge of the proposed baseline incineration facility.

- *Review and Evaluation of Alternative Chemical Disposal Technologies* (NRC 1996);
- *Army Material Systems Analysis Activity Summary Report, Special Publication No. 75, Technical and Economic Analysis comparing Alternative Chemical Demilitarization Technologies to the Baseline, Vol. I* (AMSAA 1996);
- *U.S. Army Demilitarization Technology Report for Congress* (Army 1994b);
- *U.S. Army Alternative Technology Program Evaluation Report* (Army 1996a);
- *Umatilla Chemical Agent Disposal Facility Phase I Quantitative Risk Assessment* (SAIC 1996);
- *Draft Pre-Trial Burn Risk Assessment, Proposed Umatilla Chemical Demilitarization Facility* (E&E 1996);
- *Preliminary Risk Assessment of Alternative Technologies for Chemical Demilitarization* (Mitretek 1996);
- *The Promise of Alternative Technologies* (Brown 1996);
- Information provided by vendors of alternative technologies (i.e., AEA Technology -- Silver II electrochemical oxidation, M4 Environmental L.P. -- molten metals catalytic extraction, Eco Logic -- gas-phase chemical reduction);
- Letter to Members of the Oregon Environmental Quality Commission (Wilkinson 1996); and
- Others as noted.

The results of this evaluation are summarized in a matrix (see Table 4-1). Detailed information supporting the matrix is included in Sections 5 through 9.

An August 8, 1996, memorandum prepared by Langdon Marsh, Director of the DEQ, to the EQC, describes the statutes by which the EQC is bound to make its findings on the proposed technology for the Umatilla facility. These statutes address the use of best available technology (ORS 455.055(3)) and the human health and environmental risks posed by the proposed facility (ORS 455.055(5)).

The best available technology determination requires that a minimum technology standard is applied; however, the EQC can make the standard more stringent. Under different environmental regulations, various applications of BAT are applied which account for cost, technical feasibility, maximum reduction of pollutant levels, energy and environmental impacts. The Resource Conservation and Recovery Act (RCRA), which provides the regulatory framework for the hazardous waste permit, best demonstrated available technology (BDAT) definition states that "determinations should not be based on emerging and innovative technologies."

One of the specific concerns for the BAT determination at Umatilla is the availability of newly emerging technologies. RCRA BDAT defines "available" three ways: (1) the technology does not present a greater total risk than land disposal; (2) if the technology is a proprietary or patented process, it can be purchased from the proprietor; and (3) the technology provides substantial treatment. This last criterion can be further defined as substantially diminishing the toxicity or substantially reducing the likelihood of migration of hazardous constituents. Definitions of BAT under the Clean Water Act (CWA) and the Clean Air Act (CAA) are not as restrictive as RCRA BDAT in defining availability. The EQC is not limited by the RCRA BDAT definition of "available."

2. SUMMARY OF AVAILABLE RISK INFORMATION

This section provides an overview of the various risks associated with the stockpile of munitions at UMCD. Section 2.1 summarizes the risks associated with storage of the munitions compared to disposal processing, and Section 2.2 compares risks associated with the alternative technologies. Conclusions from these sections are presented in Section 2.3.

2.1 Quantitative Risk Assessment Findings

Science Applications International Corporation (SAIC), under contract with the Army, completed a quantitative risk assessment (QRA) for the Umatilla Chemical Agent Disposal Facility (UMCDF), the baseline incineration process. The purpose of the QRA is to support a risk management program designed to ensure safe disposal of the chemical weapons stockpile while minimizing risks to the public, site workers, and the environment. The QRA consists of two phases. The first phase, which has been completed, estimated public health risk based on: (1) current chemical agent disposal facility design and planned operations; (2) relevant data collected since the final programmatic environmental impact statement (FPEIS) study was performed; (3) improvements in QRA methodology; and (4) declassification of the U.S. chemical weapons stockpile. The second phase of the QRA will incorporate site-specific design information and include a comprehensive assessment of risks, including worker risks associated with agent operations and explicit evaluation of uncertainty. The Phase 2 QRA is expected to be completed after construction of the facility is complete.

A summary of results presented in the QRA is presented in Table 2-1.

Table 2-1

COMPARISON OF RISKS AT UMCDF BASED ON INFORMATION PRESENTED IN THE QUANTITATIVE RISK ASSESSMENT

Stockpile Scenario	Expected Fatalities	Chance of at Least One Public Fatality
Disposal Processing (assumes baseline incineration - 3.3 Years)	0.00002	1 in 300,000
Stockpile Storage During Disposal Processing (assumes baseline incineration - 3.3 Years)	0.04	1 in 6,000
20 Years of Continued Storage	0.6	1 in 400

Source: SAIC 1996.

Expected fatalities account for both the chance of an accident occurring and the consequences of these accidents in the local population. For example, 0.5 expected fatalities could mean a 50% chance of one death or a 5% chance of ten deaths in the local population (and not that half of one person would die). The expected fatalities presented in the QRA consider a variety of possible events and the results of each.

The chance of at least one public fatality measures the chance of a catastrophic accident, but does not account for the magnitude of these accidents. In other words, this statistic does not differentiate between potential events that cause one death and potential events that cause thousands of deaths.

For both statistics presented in Table 2-1, the risks associated with 20 years of continued storage are greater than the risks associated with storage during disposal processing (3.3 years), which, in turn, are greater than the risks associated with disposal processing.

2.1.1 Munitions Processing

As shown in Table 2-1, the estimated fatalities associated with accidents during disposal processing is 0.00002 (page ii, SAIC 1996). This risk is dominated by the following potential events (page 13-7, SAIC 1996):

- Collapse of the container handling building (CHB) during a seismic event - 71% of total risk;
- Rocket igloo fire due to handling accident - 14% of total risk; and
- Aircraft crash into facility - 13% of total risk.

Although the QRA was written to assess the risks associated with the proposed baseline incineration facility, the significant disposal risks are associated with external events that may occur during handling of munitions or during reverse assembly. This means that all alternative technologies would, at a minimum, have the same disposal risks as the baseline system. Furthermore, risks associated with reverse assembly and storage of the stockpile would also be at least as high, since the same risks would be incurred through the reverse assembly process.

The risk percentages associated with each of the chemical agents stored at UMCD are as follows:

- GB - 84% of total risk
- VX - 11% of total risk
- HD - 5% of total risk

The increased risk associated with GB processing is due primarily to the fact that GB is more volatile than the other agents; consequently, following a release, it can be dispersed over a much larger area and thereby impact more people (page 13-20, SAIC 1996). This is true despite the fact that a greater volume of HD than GB is stored at Umatilla. Risk of fatality is more dependent on the chemical properties of GB and munition configuration (i.e., M55 rockets pose a greater risk than bulk agent due to the potential for explosion) than on the quantity of agent stored on site.

2.1.2 Stockpile Storage

The estimated fatalities associated with stockpile storage during the disposal period (i.e., 3.3 years) is 0.04 (page ii, SAIC 1996). The estimated fatalities for 20 years of continued storage is 0.6.

Factors contributing to the risk associated with storage include the following:

- Seismic risk (such as ignition of M55 rockets following falls in storage igloos) - 97% of total risk
- Lightning triggering ignition of M55 rockets - 2% of total risk
- Aircraft crashes into mustard storage shed - less than 1% of total risk
- Handling accident - less than 1% of total risk

The igloos in which the munitions are stored are robust to seismic events; however, munition stacks within them may fall and leak during an earthquake (page 15-10, SAIC 1996). Similar to the processing risk, release of GB contributes a greater percentage to the total risk estimate because of its higher volatility as compared with VX and HD.

The QRA does not specifically address two scenarios that are potentially relevant to UMCD. These are destruction of all munitions except for the HD ton containers and reverse assembly and long-term storage of the munitions. Risks associated with these two scenarios may still be assessed qualitatively through further examination of the details in the results of the QRA. These risks and the rationales for each are presented in the following sections.

2.1.2.1 Storage of HD Ton Containers

The HD ton containers have a much smaller storage risk than munitions containing energetics. The most significant causes of storage risk (seismic risks and lightning) do not apply to ton containers, which would not explode after falls in igloos or after lightning strikes. The only remaining significant event is a potential airplane crash into a mustard storage shed; however, the storage risk for the ton containers still exceeds the risk associated with disposal processing of the HD. A summary of these risks is presented in Table 2-2.

Table 2-2 COMPARISON OF RISKS FOR HD TON CONTAINERS AT UMCDF BASED ON INFORMATION PRESENTED IN THE QUANTITATIVE RISK ASSESSMENT	
Stockpile Scenario	**Expected Fatalities**
Disposal Processing (assumes baseline incineration - approximately 0.5 years)	0.000001
Stockpile Storage During Disposal Processing (assumes baseline incineration - approximately 0.5 years)	0.000023
Risk Per Year of Continued Storage	0.000034

Source: SAIC 1996.

This table shows that the fatalities expected during processing of HD ton containers is still over 20 times higher for storage than for disposal. The total risk would increase as the length of storage increases, and, unless some new technology is developed that eliminates handling risks, the processing risks would still be incurred when the HD is eventually destroyed. If the ton containers are stored for five additional years, which is approximately the development time of some alternative technologies, the storage risk would be about 170 times higher than the disposal risk.

It also should be noted that while the fatality risk associated with HD ton containers is relatively low compared to the remainder of the stockpile, this is due in large part to the low chance of an aircraft crash occurring compared to the chance of a catastrophic seismic event. The consequences of an aircraft crash, however, are extremely severe and would have significant effects beyond risk of fatalities. The Environmental Impact Statement (EIS) (Army 1996b) describes some of these potential effects:

> During continued storage, an aircraft crash into the mustard storage warehouse at UMDA would create an accident with the potential for significant impacts on surface water quality in the vicinity of UMDA (U.S. Army 1988a, Vol. 3, Appendix N). If a fire did not follow the aircrash, this accident could spill as much as 154,000 kg (340,000 lb) [or 130,500 L (34,500 ~~gal)] of liquid mustard~~ agent if all containers stored within the warehouse were involved. The amount of agent spilled during this accident would substantially exceed quantities associated with corresponding accidents under on-site disposal (page 4-54, Army 1996b).

The EIS also describes the potential fate of such a spill. These effects include seepage of mustard into the water table, persistence of mustard for years in water, and the preclusion of the use of the Columbia River for drinking water or for agricultural purposes (page 4-55, Army 1996b).

2.1.2.2 Reverse Assembly and Storage

Reverse assembly of the stockpile could potentially reduce risks associated with storage. However, these risks would still exceed risks associated with disposal processing, and could cause other potential problems. As noted above, the disposal processing risks are dominated by external events, such as the collapse of the container handling building during an earthquake or an igloo fire during a handling accident. All of these risks would still be incurred during the reverse assembly process. In addition, extra handling risk would be added as the disassembled munitions are returned to their storage locations. Furthermore, significant storage risks would still be associated with the disassembled munitions; the consequences of an airplane crash into a storage shed with bulk GB potentially could be greater than the consequences of a similar accident with HD due to the greater volatility of GB. Also, the reverse assembly process is not perfect; a small amount of agent typically remains on/in munitions following draining, and in cases where the agent has crystallized or gelled, significant amounts of agent may remain. This agent could still cause fatalities in the event of an accident involving the dismantled munitions. Finally, the reverse assembly process can generate significant amounts of materials that are potentially contaminated with agent, such as spent decontamination solution (SDS). These materials presumably would have to be stored along with the munitions, greatly increasing the volume of agent-related matter stored at UMCD.

2.2 Comparison of Risks for Alternative Technologies

Mitretek performed a comparison of risks associated with several alternative technologies for the bulk agent sites at Newport, Indiana and Aberdeen, Maryland. Three tables from the Mitretek report are included in Attachment A. Other Mitretek tables are referenced but not included. At Newport and Aberdeen, incineration was not considered to be an option due to public opposition; therefore, incineration was not considered in the Mitretek report (1996). Based on the assumptions that all of the alternative technologies can be operated safely, the risk results presented in the Mitretek report (page 10-1, Mitretek 1996) are based on inherent factors (i.e., relating to chemicals used in processes and operating parameters [temperature, pressure, flow rate, equipment complexity, etc.]). Unlike the pre-trial burn risk assessment (prepared by E & E for the hazardous waste permit) and the QRA, risks presented in the Mitretek report are not quantitative results; actual values were not calculated. Rather, the risks are qualitative based on the best available information. Also, because the alternative technologies are in various stages of development, risks described in the Mitretek report are impacted by the completeness of design for each respective alternative technology (page 9-1, Mitretek 1996).

Inherent processing risks associated with the various alternative technologies were evaluated. Operating temperatures are significantly higher for gas-phase chemical reduction and molten metal catalytic extraction (Tables 10-1 and 10-2, Mitretek 1996). Gas pressure is significantly higher for molten metal catalytic extraction (Table 10-2, Mitretek 1996). Process volume is large for both types of neutralization, and medium for Silver II electrochemical oxidation (Table 10-2, Mitretek 1996).

For external events, unique areas of concern were identified for electrochemical oxidation and molten metal catalytic extraction. For electrochemical oxidation, unique concerns are associated with the capacity to hold large quantities of agent within the agent batch feed tanks and also with the lack of design documentation for the use of stricter seismic standards. Stricter seismic standards are needed to achieve parity with the baseline system. For molten metals, unique concerns are associated with having large quantities of agent in the plant at any one time and also with the lack of design documentation for the use of stricter seismic standards. This issue has been addressed by the respective vendors by limiting the amount of agent in the facility to 500 gallons. This type of control is not as "safe" as limiting the amount of agent in the system through design constraints (pages 10-15 and 10-16, Mitretek).

Tables 10-6, 10-7 and 10-8 from the Mitretek report (1996) are included here as Attachment A. These tables clearly summarize the major findings of this report. The following paragraphs provide additional details regarding the information presented in the tables.

Table 10-6 (Attachment A) is a summary of the hazardous chemicals associated with each of the alternative technologies. Given the lack of operational experience of the alternative technologies, it is neither possible nor appropriate to conduct a quantitative health or environmental risk assessment at this time (page 10-18, Mitretek 1996). With neutralization, the post-treatment design must ensure containment or destruction of carcinogenic compounds in the hydrolysate. Electrochemical oxidation requires the use of silver and nitrates, which may pose potential chronic noncarcinogenic risks. Gas-phase chemical reduction and molten metal catalytic extraction likely would not present chronic health effects, but the potential for acute effects from hydrogen sulfide, hydrogen cyanide, or carbon monoxide gas are possible. Molten metal catalytic extraction also uses nickel, a carcinogen and reproductive toxicant.

Table 10-7 (Attachment A) presents highlights of the alternative technologies by major risk evaluation parameters. For example, inherent risks associated with gas-phase chemical reduction and molten metal catalytic extraction are high operating temperatures and generation of large quantities of several flammable gases. Major failure modes associated with these two technologies are the potential for fire and explosion if hot process gases are released in the chemical demilitarization building (CDB). External risks for each of the alternative technologies at Aberdeen and Newport are relatively similar for each technology. Health risks associated with the alternative technologies vary considerably depending on the compounds generated/used in processes. Carcinogenic compounds are present in the hydrolysate generated by neutralization. Chronic health effects may be associated with the silver and nitrate compounds used in the electrochemical oxidation process. Finally, acute effects may be associated with the process gases generated by gas-phase chemical reduction and molten metal catalytic extraction. Table 10-7 also summarizes the major uncertainties for each of the alternative technologies.

Table 10-8 (Attachment A) provides a qualitative evaluation of several parameters associated with each of the alternative technologies. The values presented were arrived at subjectively by Mitretek based on available information. These parameters relate to the completeness of information provided, the quality of the engineering design and process information presented, the support systems, level of automation, system redundancy, level of experience for agent processing, and the level of commercial experience. Two additional issues are presented including degree of recycling and commercial viability of waste streams. These two issues have no impact on the BAT finding, but rather are additional considerations for a few alternative technologies and were only evaluated after it was determined that the technology met all other criteria for disposing of the stockpile safely.

2.3 Risk Evaluation Conclusions

The greatest risk associated with the scenarios evaluated is presented by continued storage of chemical weapons (see Table 2-1). Expected fatalities are about 1,500 times higher per year of storage than for disposal processing; storage for 20 years would result in expected fatalities 300,000 times higher than for disposal processing. Consequently, rapid destruction of these munitions provides the greatest overall reduction in risk, and meets the goal of stockpile destruction. As concluded by SAIC, continued storage is the riskiest option; consequently, it is not considered to be a viable long-term option for the purposes of the BAT analysis. Furthermore, storage of HD ton containers or reverse assembly of the stockpile with continued storage of the dismantled munitions would still have higher risks than disposal processing; therefore, neither of these options are considered viable technologies.

The highest risks associated with disposal processing are related to accidents during handling and the reverse assembly process. These risks would be expected regardless of the technology used to dispose of the munitions. No specific comparison of risks associated with the technologies is possible because facility designs for the alternate technologies have not been completed. A number of potential issues have been identified for each alternate technology that would need to be resolved before these technologies could be used to destroy agent on a full-scale basis.

3. UMATILLA STOCKPILE COMPONENTS

Table 3-1 presents a list of the specific munitions stored at UMCD. For all scenarios considered in this BAT evaluation, except long-term storage, the munitions must be separated into components (i.e., reverse assembly) prior to further processing. This is reflected in Figure 3-1. The four waste streams resulting from separation are agent (HD, VX, and GB), energetics (bursters, fuzes, and propellent), metal parts, and dunnage (i.e., general miscellaneous handling wastes). The non-agent waste streams would contain residual agent due to cross contamination and, in the case of metal parts, not all of the agent would be expected to readily drain from the munitions. For this reason, these waste streams also will need to be processed to ensure that residual agent is destroyed.

Some of the alternative technology vendors indicate that their technologies are capable of destroying the non-agent components of the stockpile; however, little or no data exist to support use of these technologies for energetics, metal parts, and dunnage. Consequently, each technology's potential ability to handle the non-agent waste streams was evaluated based on limited information. Figure 3-1 illustrates which technologies can be evaluated for which parts of the stockpile, based on vendor information and other reports. Proper disposal of non-agent waste streams requires monitoring to ensure that agent is not released during the processing. This factor prevents use of more conventional methods of disposal, such as open burning/open detonation for energetics.

Table 3-2 summarizes information available regarding the ability of each alternative technology to handle each waste stream. "Yes" indicates that available data support use of this technology for a particular waste stream. "No" indicates that available data do not support use of a technology for a particular waste stream or that the technology is fundamentally not appropriate for that waste stream. "Maybe" indicates that no data were available to support a vendor's claim that the waste stream could be handled by a particular alternative technology. "Incomplete Information" is used to indicate that the alternative technology could possibly handle the waste stream; however, no information was available.

Table 3-1

QUANTITIES AND TYPES OF MUNITIONS STORED AT
UMATILLA CHEMICAL DEPOT
HERMISTON, OREGON

Agent	Munition	Number	Pounds Agent/Munition	Total pounds	Percent of Stockpile
GB	115mm Rocket, M55	91,442	10.7	978,433	13.2%
GB	155mm Projectile, M121/A1	47,406	6.5	308,139	4.1%
GB	8-inch Projectile, M426	14,246	14.5	206,567	2.8%
GB	500-pound Bomb, MK-94	27	108	2,916	0.04%
GB	750-pound Bomb, MC-1	2,418	220	531,960	7.2%
Total				**2,028,015**	27.3%
VX	115mm Rocket, M55	14,519	10	145,190	2.0%
VX	Mine, M23	11,685	10.5	122,693	1.7%
VX	155mm Projectile, M121/A1	32,313	6	193,878	2.6%
VX	8-inch Projectile, M426	3,752	14.5	54,404	0.7%
VX	Spray Tank, TMU-28B	156	1356	211,536	2.8%
Total				**727,701**	9.8%
HD	Ton Containers	2,635	1775	4,677,125	62.9%
Total				**4,677,125**	62.9%
Total All Agent				**7,432,841**	100.0%

Source: SAIC 1996.

Table 3-2

DESTRUCTION OF STOCKPILE WASTE STREAMS
UMATILLA CHEMICAL DEPOT
HERMISTON, OREGON

Waste Stream	Baseline Incineration	Neutralization (HD)	Neutralization (VX, GB)	Molten Metal Catalytic Extraction	Silver II Electrochemical Oxidation	Gas-Phase Chemical Reduction
Agent	Yes	Yes	Yes	Yes	Yes	Yes
Energetics with Residual Agent	Yes	No	No	Maybe	Incomplete Information	Incomplete Information
Metal Parts with Residual Agent	Yes, 5X[a]	No, 3X[b]	No, 3X[b]	Maybe, 5X[a]	No, 3X[b]	Yes, 5X[a]
Dunnage with Residual Agent	Yes	No	No	Maybe	No	Incomplete Information

[a] Decontamination to "5X" indicates that the material is sufficiently free from agent to be released to the public.

[b] Decontamination to "3X" indicates that no agent is detectable by air monitoring above the material. Material decontaminated to 3X may not be released to the public and likely would be transported to Rock Island Arsenal, Illinois, for further treatment.

Key:

Yes =	Available data support use of this disposal technology for a particular waste stream.
No =	Available data do not support use of this disposal technology for a given waste stream or the technology is not designed to handle the given waste stream.
Maybe =	No data were available to support a vendor's claim that the disposal technology could process the waste stream.
Incomplete Information =	The disposal technology could possibly handle the waste stream, but no information was available.

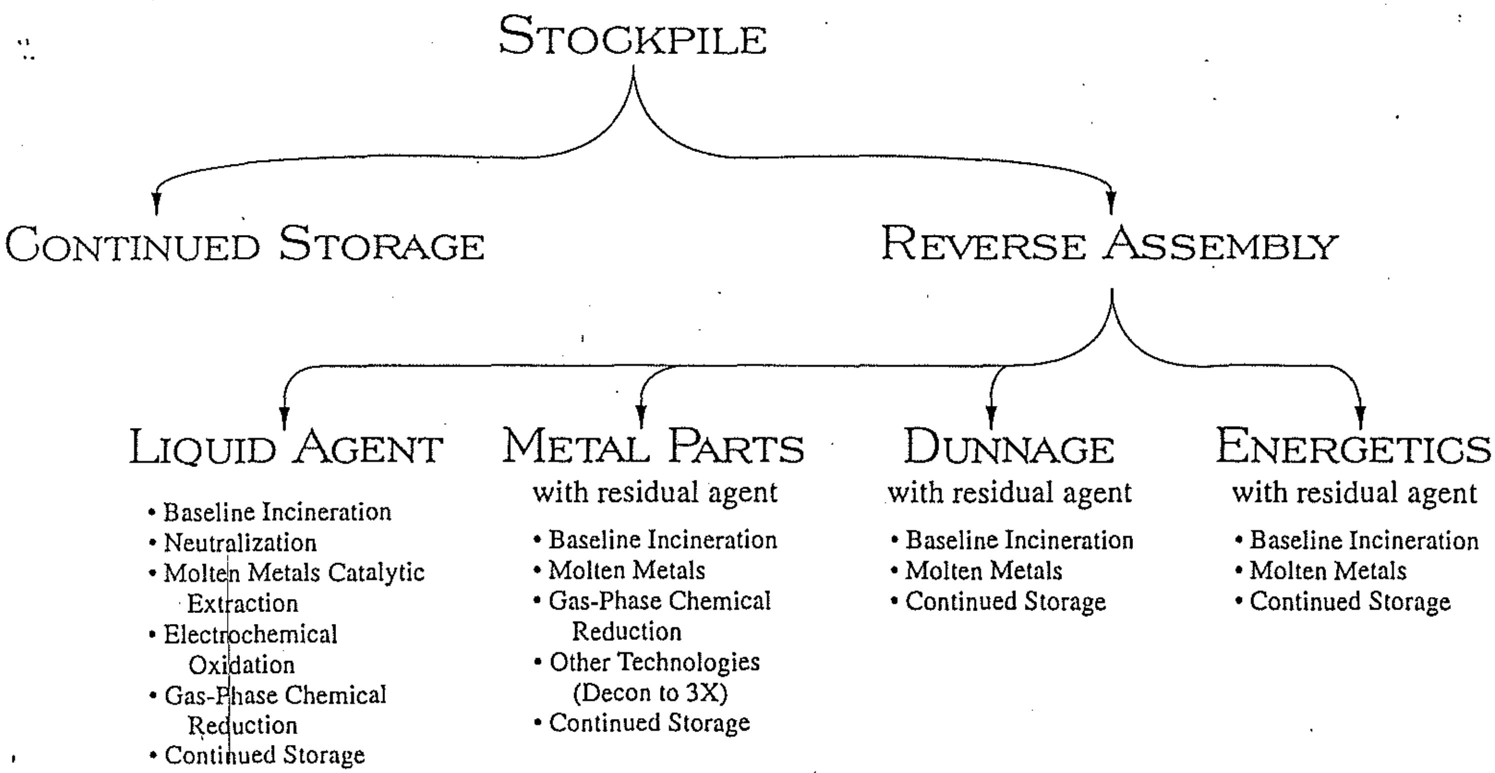

Figure 3-1

STOCKPILE WASTE STREAMS
UMATILLA CHEMICAL DEPOT
HERMISTON, OREGON

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4. MATRIX FOR COMPARISON OF TECHNOLOGIES

The seven BAT criteria discussed in the Introduction were developed by DEQ staff and approved by the EQC to evaluate the available information on disposal technologies. These criteria are presented in the left column of Table 4-1. A summary of the available information with respect to each criterion for each technology is presented in Table 4-1. The supporting information, including references to available reports is provided in Sections 5 through 9.

In general, there is a lack of data for several of the alternative technologies, especially with respect to the nerve agent GB. Based primarily on data presented for HD and VX (from Aberdeen and Newport, respectively), the criteria were addressed for each alternative technology. In cases where data were unavailable for GB, best professional judgment was used to determine if the technology could meet the criteria. Limited data are available for neutralization of GB from the Rocky Mountain Arsenal.

Because different technologies vary in capability to treat different portions of the waste streams created by reverse assembly of the munitions, no complete comparison of the technologies is possible for processing of energetics, metal parts, or dunnage. As a result, the comparisons presented in these sections are for treatment of liquid agent, the only waste stream for which research has been performed for all of the technologies. For the baseline incineration process, this essentially means that the comparison evaluates only the Liquid Incinerators, and excludes the other three furnace types for the proposed facility. This limitation on the scope of the comparisons does limit the overall usefulness of the comparison; however, there are simply no data available to make any more comprehensive quantitative comparisons of the technologies.

The estimates of resources, wastes, time, and costs presented in Table 4-1 and in Sections 5 through 9 are intended to be used as rough estimates only. The data used to compile these estimates were taken from several reports, which frequently presented information in different ways and, for a variety of reasons, were sometimes contradictory. As a result, the exact figures should be viewed with some skepticism and be used only to make qualitative judgements about the relative ranking of the technologies.

Table 4-1

SUMMARY OF DISPOSAL METHODS
UMATILLA CHEMICAL DEPOT
HERMISTON, OREGON

Issue	Baseline Incineration (LIC Only)	HD Neutralization	GB/VX Neutralization	Catalytic Extraction Process	Electrochemical Oxidation	Gas-Phase Chemical Reduction
5. Impacts on consumption of natural resources	• Process requires moderate amounts of water, natural gas, fuel oil, and electricity; all resource demands identified and accounted for in EIS (Army 1996b)	Water: 51×10^6 gal Electricity: 5×10^7 kW-hr	• Data for VX: Water: 700,000 gal Electricity: 3.9×10^6 kW-hr • Data not available for GB. specific consumption may be similar to VX. Ratio of masses of GB to VX is ~2.8	• Relatively inefficient electric heating process (2.7×10^7 kW-hr) • Very low water usage (1.1×10^7 gal) • Requires constant feed of iron	• An energy intensive process: Water: 3.8×10^7 gal Electricity: 3.2×10^8 kW-hr	• Vendor did not provide a complete energy balance • Resource usage (all agents): Water: 9.7×10^7 gal Electricity: 1.7×10^7 kW-hr
6. Time before technology is operational and impacts to overall risks	• Immediate; no further time required for permitting, design, research, or impact studies	• At least an additional 4-5 years to develop prior to permitting	• At least an additional 4-5 years to develop prior to permitting	• At least an additional 6-7 years to develop prior to permitting • Performance has not been demonstrated at full scale	• At least an additional 6-7 years to develop prior to permitting • Only limited laboratory/pilot testing has been performed • Full performance hasn't been demonstrated	• At least an additional 7-8 years to develop prior to permitting • The Army predicts this process would take the longest time to complete at both Aberdeen and Newport
7. Cost	• Moderate process costs • Maturity of technology reduces uncertainty in costs and minimizes cost of further design and research	• Costs will increase over the baseline system if a neutralization system is constructed for HD while another technology is constructed for the other agents, compared to using a single technology to treat all agent	• Cost data not available in reviewed documents	• Lowest life cost among all alternatives • Produces salable byproducts: iron, elemental sulfur, hydrochloric acid • Uses offgas to generate power for inplant uses	• The second most expensive technology among all five technologies	• Potentially the most expensive technology among all five technologies

Table 4-1

SUMMARY OF DISPOSAL METHODS
UMATILLA CHEMICAL DEPOT
HERMISTON, OREGON

Issue	Baseline Incineration (LIC Only)	HD Neutralization	GB/VX Neutralization	Catalytic Extraction Process	Electrochemical Oxidation	Gas-Phase Chemical Reduction
3. Safety of operation	• Incineration process essentially completely automated; negligible opportunity for human contact • Extensive JACADS experience demonstrates process safety • Automatic waste feed cutoff prevents large releases of agent	• Extensive industrial experience with all components of the treatment system • Safety issues have been adequately addressed	• Extensive industrial experience with all components of the treatment system • Safety issues have been adequately addressed	• Extreme hazards from high temperature, explosion or fires, and toxic chemicals used or produced • Other hazards from leaks, corrosion, and material compatibility • Relatively high gas pressure • Limited commercial experience with other wastes, no commercial experience with agent	• Low temperature, low pressure process • Chemicals used such as sodium hydroxide create worker hazard • Because of strong electric currents, possibility of short circuit generates fire/ explosion hazard • Limited commercial experience with other wastes, no commercial experience with agent	• System operates at low pressure. • Loss of key utilities would not result in hazardous operating conditions. • Process uses high temperature, H_2, steam/hot water, and corrosives (in scrubber water). • Potential concerns with maintenance and control of gas flow through the system • Limited commercial experience with other wastes, no commercial experience with agent
4. Rapidity of destruction	• Agent completely destroyed almost immediately upon introduction into incinerator • Baseline process designed to meet 2004 destruction deadline • Stockpile could theoretically be destroyed in about 10 months of full-time processing; actual operations would last about 3.3 years	• To estimate rapidity, used the unit rate of destruction given for the proposed Aberdeen facility; presumably, greater rates could be achieved with further parallel systems • At 7000 lb of HD destruction per day, 670 days of treatment would be required	• To estimate rapidity, used the unit rate of destruction given for the VX destruction at the proposed Newport facility. This rate is assumed for both GB and VX, which have similar residence time requirements • At 7300 lb of nerve agent destruction per day, 100 days of treatment would be required to treat VX and 280 days to treat GB	• Very complex treatment process, leading to potential difficulty in control and operations • Significantly longer startup/shutdown times than other technologies, leading to greater downtime and longer time to treat stockpile • Because of high degree of process control needed, possibly more maintenance time required • 742 days of agent processing required to destroy entire stockpile	• Process difficult to monitor and control • 7 years of agent processing required to destroy entire stockpile	• At 5.5 tons of agent destruction per day and 20% downtime (based on vendor estimate), 811 days of treatment would be required

Table 4-1

SUMMARY OF DISPOSAL METHODS
UMATILLA CHEMICAL DEPOT
HERMISTON, OREGON

Issue	Baseline Incineration (LIC Only)	HD Neutralization	GB/VX Neutralization	Catalytic Extraction Process	Electrochemical Oxidation	Gas-Phase Chemical Reduction
1. Types/quantities/toxicity of discharges to the environment	• Provides a DRE of at least six nines* • Air emissions without significant toxicity; all constituent concentrations below regulatory benchmarks • No liquid process wastes • Negligible solid wastes from incinerator; brine salts and agent-free activated carbon filters with low toxicity shipped to off-site waste disposal facility; any carbon filters with agent would be treated on-site	• Should provide a DRE of at least six nines*; currently only reaches five nines because of detection limits • Offgas emissions from bioreactor (3.3×10^8 lb) with little to no toxicity • Biotreated hydrolysate discharge to Umatilla or Columbia River (4.9×10^7 gal) with "low toxicity" primarily from salts; assumes destruction of toxic contaminants including carcinogenic chemicals mixed with agent • Solid wastes consisting of biomass filter cake (4.7×10^6 lb) and activated carbon (28,000 lb) with low toxicity	• Should provide a DRE of at least six nines* • Some venting of reactors during agent hydrolysis • Liquid hydrolysate requires additional treatment to destroy neutralization products at offsite treatment facility - none have been identified for the Umatilla site; risk of release during transport • An estimated 660,000 gal of hydrolysate would be produced treating VX • No specific liquid generation rates were presented for GB treatment. • No solid wastes would be generated from agent treatment	• Provides a DRE of at least six nines* in laboratory-scale tests • Air emissions considered controllable and can be tested prior to release, but potentially contain iron and nickel fumes, hydrogen cyanide, hydrogen sulfide, carbon monoxide, or other gases • No wastewater discharges • Slag must be handled/ disposed as hazardous waste	• Uncertain whether it could provide a DRE of six nines* • Generates fewer air emissions than baseline incineration; emissions would be controllable and moderate • No major toxic discharges are expected; mostly salt solutions • 7.5×10^6 gallons wastewater discharged to Umatilla or Columbia River • Very little solid waste likely to be generated	• Should provide a DRE of at least six nines* • Quantities predicted only for HD, not nerve agents • For HD treatment, no total water or air discharge rates provided; only total amounts of certain constituents within these waste streams • HD treatment releases: - 4.6×10^6 lb CO_2 (gas) - 146,000 lb soot (solid) - 960,000 lb sulfur (solid) - 2.2×10^6 lb HCl (dissolved in wastewater)
2. Risks of discharge from a catastrophic event	• Extensive tests of baseline system at JACADS demonstrated insignificant risks related to catastrophic failure • Extremely low quantities of agent present in incinerators at any time • Automatic waste feed cutoff prevents large releases of agent	• Components reliable and extensively used • Cooling system failure would not cause catastrophic failure • Little agent present in reactor at any time, so consequences of release are low	• Components reliable and extensively used • Cooling system failure would not cause catastrophic failure • Larger amounts of agent present in reactor than for HD treatment, so consequences of release may be greater	• Small amount of agent processed at one time, but larger quantities in plant • Additional research needed to evaluate several potential failure modes • Stricter seismic standards needed • Potential for release of toxic process gasses	• Rather severe hazard due to concentrated nitric acid used throughout the process • Stricter seismic standards needed • Potential for release of silver or nitrates	• No failure scenario identified that would lead to of-site release of agent • Secondary containment systems must be designed to avoid hydrogen buildup that would cause combustible situations; a large detonation or fire may result in release of agent • Potential releases of hydrogen sulfide, hydrogen cyanide, or carbon monoxide

*DRE = Destruction removal efficiency. The "nines" indicates the number of nines in the percentage of agent destroyed; i.e., six nines equals at least 99.9999% destruction.

5. BASELINE INCINERATION

5.1 Types/quantities/toxicity of discharges to the environment by operation of the proposed baseline incineration facility

Treatment efficiency. The baseline incineration process has been demonstrated to destroy agent beyond the required destruction removal efficiency (DRE) in full-scale operations at Johnston Atoll Chemical Agent Disposal System (JACADS). Agent in all forms (i.e., liquid, solidified, crystallized) has been successfully treated, as well as all agent-contaminated energetics, metal parts, and dunnage. There is no evidence that agent will reform following treatment. The proposed facility would decontaminate metal parts to "5X," the Army's classification for material which has been decontaminated to a level that allows release to the public.

Air Emissions. Low levels of a number of different pollutants may be discharged from the facility stacks. These include sulfur dioxide, nitrogen oxides, particulates, and a variety of products of incomplete combustion, potentially including dioxins and furans. A study of the air quality impacts is presented in Section 4.1.2.2 of the Environmental Impact Statement (EIS) (Army 1996b), which concludes that all constituents of concern are expected to be present at concentrations well below their applicable standards. These results are summarized in Table 4-5 of the EIS (page 4-18, Army 1996b). The Pre-Trial Burn Risk Assessment (PreRA) assessed potential adverse effects to human health and the environment, based on expected emissions from the proposed facility and from results of JACADS Operational Verification Testing (OVT). All risks presented in this report indicate that emissions from the proposed facility are at acceptable levels as defined by the DEQ and by the EPA.

Wastewater Discharges. "No process liquid wastes, hazardous or otherwise, would be released by the incineration process or incinerator support facilities. There would be no impact to surface water or groundwater quality during routine, incident-free operation" (page 4-21, Army 1996b).

Solid Wastes. Based on Oregon regulations, all solid wastes (except for metals) generated from demilitarization, treatment, and testing of blister (F998) or nerve agents (F999) are considered listed hazardous wastes. Ash residue from the furnaces and dried salts would be considered hazardous wastes and shipped to a permitted waste disposal facility. Based on permit conditions, the contaminated activated carbon filters would be treated on site. A large amount of the solid wastes would consist of nonhazardous (i.e., decontaminated to 5X) scrap metal from munitions and bulk containers. Section 2.2.2.3 of the EIS (Army 1996b) provides details on the solid wastes that are expected to be generated. A summary of these wastes is provided in the following table.

Table 5-1 SUMMARY OF SOLID PROCESS WASTE FOR THE PROPOSED DISPOSAL FACILITY Source: Table 2.5, page 2-21, Army 1996b		
Source	**Type**	**Generation rate kg/hr (lb/hr)**
Metal parts furnace	Metal scrap	4,580 (10,100)
Deactivation furnace	Scrap/ash	630 (1,400)
Dunnage incinerator	Scrap/ash	80 (180)
Brine reduction	Brine salts	2,860 (6,300)
Liquid incinerator	Solids	Negligible

5.2 Risks of discharge from a catastrophic event or breakdown in operation of the baseline incineration facility

Evaluations of emergency situations have been performed during JACADS systemization. These tests indicated that the baseline incineration system reliably prevents the release of agent within the facility in the event of an emergency. Furthermore, changes for facilities proposed in the continental United States have been made based on JACADS experience to eliminate or mitigate accidents (page 4-47, Army 1996a).

While a variety of situations have been evaluated in the QRA (SAIC 1996) and the EIS (Army 1996b) related to emergencies at the facility, it is important to note that the most significant emergencies (such as earthquakes collapsing the unpack area or airplane crashes into the facility) are related to the reverse assembly process or temporary storage of agent prior to processing. These risks would be incurred by any technology, and are not specific to the baseline incineration system.

5.3 Safety of the operation of the baseline incineration facility

The actual operation of the incinerators (as opposed to handling of munitions and the reverse assembly process) involves minimal human contact. Facility operations are not abnormally complex; all personnel working at the proposed facility would undergo training at the Chemical Demilitarization Training Facility at Aberdeen Proving Ground prior to facility operations (pages 4-60 - 4-67, Army 1996b). Chemical agent is segregated from facility workers at all times. Monitoring systems in the facility would detect any chemical agent in the event of a release to the facility (pages 4-67 to 4-70, Army 1996b). The incinerators are "designed to be easily controlled and to fail in a safe condition" (page 4-47, Army 1996a), and the process "employs few industrial chemicals and gases" (page 4-47, Army 1996a). Furthermore, the Army notes that "at least some hazards associated with a complex system will only be discovered by operating that system. The incineration technology has accumulated 6 years of chemical demilitarization experience and the lessons learned during that time have led to design improvements that enhance the safety of the incineration facilities" (page 4-46, Army 1996a).

5.4 The rapidity with which the baseline incineration facility can destroy the stockpile

The baseline incineration facility is designed to destroy the entire stockpile (including metal parts, energetics, and dunnage) before the 2004 deadline. The actual rates of agent destruction would be limited in the hazardous waste permit. The liquid incinerators would be limited to processing an average of 680 lb/hr VX, 1,030 lb/hr GB, and 1,305 lb/hr HD each, plus associated decontamination solution and other liquid wastes. The processing rates allowed in the permit would allow the entire stockpile to theoretically be destroyed in approximately ten months of constant operations, but the actual campaign schedules are much longer and there are significant changeover periods between campaigns. For example, the campaign duration for destruction of HD in ton containers is expected to be 26 weeks preceded by a changeover period of 6 weeks (page 3-29, SAIC 1996), but the LICs could theoretically destroy the HD in just over 10 weeks of continuous operation.

5.5 Impacts of the baseline incineration facility on consumption of natural resources

The proposed facility will require the use of a variety of resources, including water (for the incineration process, for personnel needs, and for fire prevention), fuels (including natural gas, diesel fuel, and fuel oils), and electrical power. These requirements are identified in the EIS, along with plans for obtaining these resources. These requirements are summarized in the following table. Note that these requirements are presented for the entire proposed facility, including all incinerators, reverse assembly systems, and support facilities, and do not represent the requirements of the liquid incinerators alone; therefore, these figures are not directly comparable to the requirements presented for the other technologies, which only consider actual agent processing resources.

Table 5-2 SUMMARY OF UTILITY DEMANDS FOR THE PROPOSED DISPOSAL FACILITY Source: Table 2.4, pages 2-14 to 2-22, 4-21 to 4-22, Army 1996b		
Utility	**Usage**	**Source of Utility**
Process water Average Peak	 984 m^3/day (260,000 gal/day) 1.8 m^3/min (470 gal/min)	Current UMCD wells 3, 6, and 7 would be upgraded by installing new, deeper pumps.
Potable water Average Peak	 104 m^3/day (27,500 gal/day) 1.1 m^3/min (285 gal/min)	Current UMCD wells 3, 6, and 7 would be upgraded by installing new, deeper pumps; truck deliveries possible if contamination detected in wells.
Fire water Peak	 11.4 m^3/min (3,000 gal/min)	Current UMCD wells 3, 6, and 7 would be upgraded by installing new, deeper pumps.
Sanitary sewer Average Peak	 119 m^3/day (31,500 gal/day) 1.1 m^3/min (285 gal/min)	Current UMCD wells 3, 6, and 7 would be upgraded by installing new, deeper pumps.
Natural gas Average Peak	 4950 m^3/hr (175,000 scfh) 6120 m^3/hr (216,000 scfh)	New pipeline to the facility would be built from existing main near Columbia River.
Fuel oil	14.4 m^3/day (3,800 gal/day)	Delivered by tank truck.
Electricity	5,500 kVA projected demand 8,050 kVA available	Two new service connections would be made to existing power lines; new electrical substation would be constructed to service facility.

The EIS concludes that all resource requirements may be met without significant difficulty.

5.6 Period of time to test out the baseline incineration technology and have it fully operational and how that impacts the overall risk to the stockpile

The baseline incineration system is designed and tested in full-scale operations at JACADS. The proposed facility could begin construction immediately following issuance of the permit. Risks associated with storage of the stockpile would be minimized through the selection of the baseline technology because it is ready to go on-line relatively quickly.

5.7 Cost

Operations of the baseline incineration facility would not be expected to be significantly more or less expensive than the other technologies. The Army concluded that the baseline process would be the second lowest cost overall (page 4-100, Army 1996a). However, due to the maturity of the baseline technology, selection of this system would minimize design and permitting costs associated with Umatilla as well as research costs for the chemical demilitarization program as a whole. The cost associated with using the proposed facility to treat the entire stockpile would be lower than use of this facility for part of the stockpile, plus an alternate technology for another portion of the stockpile.

6. NEUTRALIZATION

There are several different ways to configure neutralization treatment trains for chemical weapons agents. It is first important to note that a separate technology configuration would be required for each type of agent (HD, VX, and GB). Not only would the configuration of the technology vary depending on the agent treated, but the effectiveness and impacts of the technology, as measured by the seven criteria, would vary from agent to agent. Thus, each agent is addressed separately in the following sections. Secondly, for each agent, the technology could be further configured along several optional lines. These options are presented below, and the configuration serving as the basis of evaluation is described.

HD

HD would be first hydrolyzed with hot water, then the hydrolysate biodegraded. The NRC Report (1996) describes four potential arrangements for this technology train. Essentially the factors differentiating the possible approaches were:

- Whether or not water was recycled within the process;
- Whether or not volatile organic compounds (VOCs) in reactor offgas were treated onsite or not; and
- Whether or not the biodegradation step was performed onsite.

The 1996 NRC report assumes a treatment train configuration that treats VOCs on site, and biodegrades the hydrolysate onsite, but does not recycle water. This is the configuration recommended by the Army for the Aberdeen site. This configuration is appropriate for evaluation for the Umatilla site. Although it does not include the water recycling component, it is believed that the sequencing batch reactor (the bioreactor) would be capable of treating the aqueous effluent to levels required for surface water discharge to the Umatilla or Columbia Rivers.

Based on an inventory of 2,635 ton containers, each containing 1,775 pounds of HD, approximately 4.7 million pounds of HD would be treated.

VX

The neutralization process for VX is different than for HD. VX is more difficult to chemically degrade and thus the process is not as well developed as it is for HD or GB. Furthermore, the hydrolysate produced, while biodegradable, is not capable of being biodegraded without considerable additional carbon substrate. Thus, unlike the HD system, the hydrolysate could not be treated in a standalone biological treatment unit, but rather would require off-site treatment in a separate wastewater treatment system, degrading other carbon substrates. The technology configuration for VX hydrolysis would thus consist of hydrolysis by aqueous sodium hydroxide. The hydrolysate is then shipped offsite for biological treatment. None of the reports reviewed provided any information regarding potential offsite treatment plants that would be capable of accepting and treating the hydrolysate. Hypochlorite may be added prior to shipment to reduce potential odor problems with the hydrolysate, although recent findings indicate that this may lead to some VX reformation. Alternatively, isopropanol may be added to homogenize the hydrolysate (which otherwise would be present as a two-phase system) and act as a carbon substrate supplement in the eventual biotreatment process. Whether either of these options is employed has little influence on the evaluations presented below.

Based on an inventory of 14,519 M55 rockets, 32,313 M121/A1 Projectiles, 3,752 M426 Projectiles, 156 Spray Tanks, and 11,685 landmines, approximately 730,000 pounds of VX would be treated.

GB

Like VX, GB would be hydrolyzed with an alkaline solution. This process has been carried out on a large scale by the Army to destroy GB at the Rocky Mountain Arsenal between 1973 and 1976. Problems with analytical techniques available at the time led to the incorrect conclusion that adequate treatment was difficult to achieve, and thus this program was discontinued. No further discussion of this process is presented in the 1996 NRC report, the 1996 AMSAA report (AMSAA 1996), or the Army's Alternative Technology Program Evaluation Report (Army 1996a) , as these reports focus on the Aberdeen and Newport stockpiles which do not contain GB. The Army's Alternative Technologies Report (Army 1994) discusses this technology briefly, providing very few facts. For the purposes of this evaluation, it is assumed that the GB neutralization would proceed like VX, where the agent would be hydrolyzed under alkaline conditions, then shipped offsite for biological degradation. As for VX treatment, none of the reports reviewed provided any information regarding potential offsite treatment plants that would be capable of accepting and treating the hydrolysate.

Based on an inventory of 91,442 M55 rockets, 47,406 M121/A1 projectiles, 14,246 M426 projectiles, 2,418 MC-1 bombs, and 27 MK-94 bombs, an estimated 2.03 million pounds of GB would be treated.

6.1 **Types/quantities/toxicity of discharges to the environment by operation of the neutralization facility**

6.1.1 **HD** (Absolute quantities presented are based on the mass of agent present at Umatilla, using the unit generation rates [mass of product per mass of agent] presented for operation at Aberdeen.)

Discharge to atmosphere: 3.3×10^8 lbs. This would consist entirely of air discharges from the aerobic bioreactor degrading the hydrolysate (page 7-30, NRC 1996). All agent would be destroyed (at least five 9's destruction, page 7-4, NRC 1996) prior to entering the bioreactor. This offgas would be passed through activated carbon to remove organic compounds. Thus, this offgas would be essentially air, with little to no toxicity (page 7-30, NRC 1996).

Discharge to surface water: 4.9×10^7 gals. This would consist of biotreated hydrolysate (page 7-30, NRC 1996). As stated above, all agent would be removed prior to biotreatment, so no agent toxicity would be present in any aqueous discharges. Effluent generated from bench scale testing was characterized as "low toxicity" (page 7-17, NRC 1996). This remaining low toxicity in the effluent would result primarily from salts in the water. It is unknown whether this toxicity would adversely impact ecological receptors, such as the Columbia or Umatilla Rivers.

Solid wastes: Based on Oregon regulations, all solid wastes (except for metals) generated from demilitarization, treatment, and testing of blister (F998) or nerve agents (F999) are considered listed hazardous wastes. In this process, 4.7×10^6 lbs of biomass filter cake and 28,000 lbs of activated carbon would be generated. No specific data on the toxicity of these wastes are presented in the reviewed reports. However, these wastes would be similar to wastes produced by other biological treatment processes, and would be of low toxicity. Typically, toxicity from biomass sludge is from heavy metals. However, no significant quantities of metals other than the relatively low toxicity iron are reported to be present in the feed to this system. If these wastes are disposed to landfills as planned, little to no exposure would be expected, and thus any possible toxicity would not present a risk. Dunnage, energetics, and some metal parts would not be treated by this technology.

6.1.2 **VX** (Absolute quantities presented are based on the mass of agent present at Umatilla, using the unit generation rates ~~[mass of product~~ per mass of agent] presented for operation at Newport.)

Discharge to atmosphere: Some venting to the atmosphere would occur during treatment. No data are provided for this stream in Appendix H of the NRC report (VX treatment mass balance, NRC 1996).

Liquid Effluents: Unlike HD neutralization (which is followed by on-site biological treatment), VX neutralization produces a detoxified effluent that requires additional carbon substrate to be biologically destroyed. To accomplish, this, it must be shipped off site to an existing treatment, storage and disposal

(TSDF) facility treating other organic wastes. This neutralized product would act as a phosphorus source for biological activity in that facility. A total of 660,000 gallons (page H-4, NRC 1996) of hydrolysate (stabilized with hypochlorite, significantly less would be generated without hypochlorite stabilization) would be generated. Toxicity data are limited to LD_{50} testing on mice. Such testing showed a 42,000-fold decrease in toxicity to an LD_{50} value of 0.6 mL per kg of body weight (page 8-17, NRC 1996).

The reviewed reports do not address the availability of suitable TSDFs to accept this waste within a reasonable distance of the Umatilla facility. Based on their current RCRA permit conditions, the Chemical Waste Management, Inc. (Chem Waste) facility in Arlington, Oregon can accept this type of liquid waste stream. However, to meet the Land Disposal Restrictions (LDRs), Chem Waste would have to remove the liquid from the respective surface impoundment(s) at the end of each year or permanently close the surface impoundment(s) in which the liquid wastes were placed. To date, Chem Waste in Arlington has chosen not to accept this type of liquid waste stream.

Solid Wastes: None related to treatment of liquid agent; however, based on Oregon regulations, all solid wastes (except for metals) generated from demilitarization, treatment, and testing of blister (F998) or nerve agents (F999) are considered listed hazardous wastes. Dunnage, energetics, and some metal parts would not be treated by this technology.

6.1.3 GB (all data based on results published for VX by the NRC [1996]; however, the Army [1994] states that lower amounts of reagent would be needed to treat GB compared to VX)

Discharge to atmosphere: None.

Liquid Effluents: As with VX hydrolysis, the product from treatment would have to be shipped to an offsite facility for biological treatment. An estimated 1.8×10^6 gallons of hydrolyzed product would have to be shipped offsite. The reviewed reports do not address the availability of suitable TSDF facilities to accept this waste within a reasonable distance of the Umatilla facility. No toxicity data are available in the reviewed documents for this hydrolysate. As with VX hydrolysate, Chem Waste in Arlington, Oregon may be able to accept this waste stream, however, there are similar concerns (see Section 6.1.2).

Solid Wastes: None related to treatment of liquid agent; however, based on Oregon regulations, all solid wastes (except for metals) generated from demilitarization, treatment, and testing of blister (F998) or nerve agents (F999) are considered listed hazardous wastes. Dunnage, energetics, and some metal parts would not be treated by this technology.

6.2 Risks of discharge from a catastrophic event or breakdown in operation of the neutralization facility

6.2.1 HD

- "The system will use standard industrial components that have been used extensively in conventional applications" (page 7-21, NRC 1996).

- Cooling system failure would cause temperatures to rise to about 108°C or 1.4 atm gauge, whereas the design pressure would be 6.8 atm gauge. "There should be no catastrophic thermal excursions" (page 7-21, NRC 1996).

- Excessive heat could also be generated by the inadvertent introduction of concentrated caustic solution. No maximum temperature or pressure from such an event were provided in the reports reviewed. However, the system meters in HD near its rate of treatment, so that at any time there would be little HD present in the reactor (page 7-21, NRC 1996).

6.2.2 VX

- "The system will use standard industrial components for which there is extensive good industrial experience." (page 8-13, NRC 1996)

- Cooling system failure would cause temperatures to rise to about 98°C or 1.1 atm gauge, whereas the design pressure would be 6.8 atm gauge. "Thus there should be no catastrophic thermal excursions" (page 8-13, NRC 1996)

- The NRC (1996) does not provide any comment on possible temperature excursions due to excessive caustic addition; however, comments made for HD would be expected to apply to this technology as well. However, unlike HD treatment, VX is not added at the rate of treatment, and thus non-negligible quantities of agent would be present during the treatment process.

- Gases are vented from the reactor during treatment. Condensible portions are condensed and returned to the reactor. The noncondensible gases pass through a dual scrubbing system (page 8-9, NRC 1996). No comment is made in the reports reviewed about possible consequences of vent gas scrubber failures.

6.2.3 GB

No facts were provided in the reviewed reports concerning risks of discharge from a catastrophic event or breakdown in operation. However, as the treatment process for this agent would be similar to that for VX, the risks would be assumed to be similar.

6.3 Safety of the operation of the neutralization facility

Treatment systems for all three agents are presented together as they employ similar equipment. The exception is HD which also employs on-site biological treatment. However, this stage of treatment is after the destruction of HD to below acceptable levels, and would thus not pose any safety problems from an agent-exposure perspective.

Safety aspects are adequately addressed in the previous section discussing discharge risks from catastrophic events. For routine industrial risks, it is again remarked that the treatment systems would use standard industrial components for which there is extensive good industrial experience. Such experience would allow adequate handling of all inherent industrial risks.

6.4 The rapidity with which neutralization can destroy the stockpile

6.4.1 HD

For application of this technology at Aberdeen, the Army proposed operating three neutralization process lines (each including two neutralization reactors designed to work in parallel). These lines would be operated 24 hours per day, 7 days per week, for a throughput of about 7,000 pounds of HD per day. At this rate, it would take approximately 670 days to treat the HD stockpile at Umatilla (page 7-22, NRC 1996). The configuration of the trains could be adjusted (i.e., addition of an additional treatment train) should additional capacity be required to accelerate the treatment process.

The biological treatment component of this technology would operate independently of the neutralization step. however, these steps would be closely coupled to ensure that hydrolyzed agent need not be stored for any appreciable length of time prior to biological treatment.

6.4.2 VX

For application of this technology at Newport, the Army proposed operating two neutralization process lines (page 8-8, NRC 1996). These lines would be operated 24 hours per day, 7 days per week, for a throughput of about 7,300 pounds of VX per day. At this rate, it would take approximately 100 days to treat the VX stockpile at Umatilla (page 8-12, NRC 1996). The configuration could be adjusted should less or additional capacity be required.

6.4.3 GB

No data is provided for GB treatment rates. However, it is assumed that treatment rates could be obtained for this agent as for VX. As there is more GB than VX present at Umatilla, a treatment train similar to that proposed for Newport's VX would take 280 days to treat ~~all the GB. The~~ configuration could be adjusted should less or additional capacity be required.

6.5 Impacts of neutralization on consumption of natural resources

6.5.1 **HD** (all data from the 1996 NRC report, pages 7-31 and G-12. Total usage quantities presented are based on the mass of agent present at Umatilla, using the unit usage rates [quantity of resource per mass of agent] presented for operation at Aberdeen.)

Resource	Unit Usage (per lb HD)	Total Usage
Water	10.8 gal	51×10^6 gal
Steam	4.7 kW-hr	2.2×10^7 kW-hr
Cooling	1.8 kW-hr	8.4×10^6 kW-hr
Electricity	4.2 kW-hr	2.0×10^7 kW-hr
Total Electricity		5.0×10^7 kW-hr

6.5.2 **VX** (all data from the 1996 NRC report, page 8-7. Total usage quantities presented are based on the mass of agent present at Umatilla, using the unit usage rates [quantity of resource per mass of agent] presented for operation at Newport.)

Resource	Unit Usage (per lb VX)	Total Usage
Water	0.96 gal	700,000 gal
Steam	3.6 kW-hr	2.6×10^6 kW-hr
Cooling	0.64 kW-hr	4.7×10^5 kW-hr
Electricity	1.2 kW-hr	8.6×10^5 kW-hr
Total Electricity		3.9×10^6 kW-hr

6.5.3 GB

No resource consumption data are provided in the reviewed reports. Resource consumption estimates are made using the data provided in the 1996 NRC report for VX. The data are scaled for the estimated quantity of GB present at the Umatilla Stockpile.

Resource	Unit Usage (per lb VX)	Total Usage
Water	0.96 gal	1.9×10^6 gal
Steam	3.6 kW-hr	7.3×10^6 kW-hr
Cooling	0.64 kW-hr	1.3×10^6 kW-hr
Electricity	1.2 kW-hr	2.4×10^6 kW-hr
Total Electricity		1.1×10^7 kW-hr

6.6 Period of time to test out neutralization technology and have it fully operational and how that impacts the overall risk of the stockpile

Schedule information presented below was taken from the reviewed reports, and address implementation at the Aberdeen or Newport facilities. No adjustments were made for different quantities at Umatilla, or for possible differences in the permitting procedures.

6.6.1 HD

The 1996 NRC report indicates that for treatment at Aberdeen, 90% design for this technology could be achieved presently. Subsequent scheduling for Aberdeen was estimated as follows (page 7-27, NRC 1996):

Permit acquisition:	12 months from present
Contractor procurement:	20 months from present
Construction completion:	48 months from present
Systemization completed:	57 months from present
Pilot test completed:	64 months from present
Full scale completed:	79 months from present

The Army projects full scale completion at Aberdeen within 95 months, with a "risk adjusted" duration of 108 months (i.e., 9 years, page 4-85, Army 1996a). DEQ estimates that development and permitting for neutralization/biodegradation for HD only at UMCD could be completed in approximately 84 months. DEQ based this estimate on a 30-month permitting process which would begin after neutralization/ biodegradation had been demonstrated (at least at pilot scale) at the Aberdeen or Newport facilities.

The Army compared the schedules for the alternative technologies and incineration. The 95/108 month estimate presented above compares to an estimated schedule of incineration of 84/108 months (Army 1996a). Thus, under a non-risk-adjusted schedule, neutralization/biodegradation would extend the treatment schedule by about a year, thus extending the risks inherent from storage. All other alternative technologies would take even more time to be developed. The overall risk of the process is governed principally by the duration of storage prior to and during treatment.

AMSAA projects full scale completion within 86 months, with a "risk adjusted" duration of 132 months (page 31, AMSAA 1996).

AMSAA compared the schedules for the alternative technologies and incineration. The 86/132 month estimate presented above compares to an estimated schedule of incineration of 84/124 months. Thus, under a non-risk-adjusted schedule, neutralization/biodegradation would extend the treatment schedule from the baseline incineration system by about two months (and about eight months under the risk-corrected schedules), thus extending the risks inherent from storage.

6.6.2 VX

The NRC estimated the following schedule for implementation at Newport (page 8-16, NRC 1996):

Pilot plant design:	2 months from present
Permit acquisition:	30 months from present
Construction completed:	64 months from present
Systemization completed:	73 months from present
Pilot test completed:	80 months from present
Full scale operation start:	84 months from present
Full scale completed:	93 months from present

The Army projects full scale completion within 101 months, with a "risk adjusted" duration of 105 months (i.e., about 9 years, page 4-85, Army 1996a).

The Army compares the schedules of the alternative technologies and incineration (Army 1996a). The 101/105 month estimate presented above compares to an estimated schedule of incineration of 84/108 months. Thus, under a non-risk-adjusted schedule, neutralization/biodegradation would extend the treatment schedule by about a year and a half, thus extending the risks inherent from storage. All other alternative technologies would take even more time to be developed. The overall risk of the process is governed principally by the duration of storage prior to and during treatment.

AMSAA projects full scale completion at Newport within 98 months, with a "risk adjusted" duration of 144 months (page 31, AMSAA 1996).

AMSAA compares the schedules of the alternative technologies and incineration (AMSAA 1996). The 98/144 month estimate presented above compares to an estimated schedule of incineration of 95/130 months. Thus, under a non-risk-adjusted schedule, neutralization/biodegradation would extend the treatment schedule by about 3 months (and about 14 months under the risk-corrected schedules), thus extending the risks inherent from storage. Overall risk of the process is governed principally by the duration of storage prior to and during treatment.

6.6.3 GB

The available information does not provide schedule information on GB neutralization. It is expected that the schedule would be longer than for the other agents because the specific treatment process for neutralization of GB has not been designed.

6.7 Cost

Cost data were not provided in the reviewed documents; however, some subjective comments can be made. Neutralization technology is developed to varying degrees depending on the type of agent to be treated. Furthermore, the end products of the processes vary tremendously, from relatively clean biotreated wastewater from the HD treatment process to waste waters with concentrated hydrolysate requiring offsite treatment from the VX and GB treatment processes. Because of these differences, it may make sense to use neutralization for only one type of agent (*e.g.* HD) and another technology for other agents. However, the other alternative technologies considered are not agent specific like neutralization. Thus, any treatment system built to treat those agents could also be used to treat HD. The incremental additional treatment costs to treat HD in the systems used to treat the VX and the GB would most likely be less than the costs to develop and implement a completely separate technology to treat just the HD.

7. MOLTEN METAL CATALYTIC EXTRACTION PROCESS

7.1 Types /quantities/toxicity of discharges to the environment from molten metal catalytic extraction

Treatment Efficiency. This technology is capable of meeting the six nines destruction removal efficiency (DRE); based on bench-scale test results, up to eight nines DRE may be reached (page 4-11, NRC 1996). There is a low likelihood that HD or VX would reform (page 4-13, NRC 1996). Reformation of GB is also unlikely. However, there is no industry experience or proven record of performance in complete reaction of injected gases within a molten metal bath to the very low level of residuals required for agent destruction (page 4-5, NRC 1996).

Air Emissions. Because the process operates at low oxygen potential, and decomposes all feed molecules, no pathways would exist for the formation of oxides of nitrogen or sulfur; formation of dioxins or furans are also not likely (page 4-3, NRC 1996). If nitrogen was used for the inert gas there would be a potential for formation of hydrogen cyanide (page 4-7, NRC 1996). The potential for formation of this highly toxic gas would be unique to this technology. Air emissions should be controllable; however, they may contain iron and nickel fumes, hydrogen cyanide, hydrogen sulfide, carbon monoxide, and other gases (Table 10-6, Mitretek 1996).

The off gas could be held for testing and recycling back into the molten metal bath if needed, prior to discharge, resulting in a very low likelihood that off-specification gases are discharged (page 4-13, NRC 1996) or that permit violations would occur. Other technologies may not include, or easily accommodate, similar holding/testing of offgas prior to discharge.

Wastewater Discharges. All spent decontamination solutions, scrubbing and spent liquors, would go to into the molten metal bath (page 4-18, NRC 1996). This process produces no liquid waste streams.

Solid Wastes. A ceramic slag, estimated to be in the range of 60 metric tons/yr for the Aberdeen/Newport projects, would be produced (page 4-17, NRC 1996). Based on Oregon regulations, all solid wastes (except for metals) generated from demilitarization, treatment, and testing of blister (F998) or nerve agents (F999) are considered listed hazardous wastes. The metal melted in the process would not be a solid waste, but rather a re-useable (and salable) product.

7.2 Risks of discharge from a catastrophic event or breakdown in operation of molten metal catalytic extraction

There are no identified process mechanisms under normal operating conditions that could lead to a catastrophic failure of equipment; nevertheless, equipment or operator error could lead to an accident (page 4-24, NRC 1996). Some aspects of the design tend to mitigate the possibility for operating systems failure. For example, the metal mass in the reactor, having a high "thermal inertia," would prevent variations in temperature ("excursions" from design levels) even if the feed materials varied in temperature (page 4-24, NRC 1996). Similarly, the molten bath quickly dissipates the agent and reduces the potential for downstream contamination (page 4-32, NRC 1996). Also, the molten metal would solidify quickly and not travel far, reducing the possibility of the most severe type of accident, a reaction with coolant and resulting steam explosion (page 4-42, NRC 1996). The treatment system would also provide several levels of containment to limit the potential for offsite release: three containment shells within the reactor and two additional containment shells within the process building (page 4-32, NRC 1996). The seismic design standards need to be stricter to minimize damage in the event of an earthquake (page 10-16, Mitretek 1996).

There are, however, a number of failure modes that are of concern: coolant loss, solidifying in carryover gas, and corrosion in the offgas equipment (page 4-32, NRC 1996); possible dissociation of water and increase in oxygen content, resulting in and formation of flammable process gas within the reactor (page 8-16, Mitretek 1996). Because of the high temperature involved, a great deal of additional research and development is needed to evaluate key safety issues (page 4-41, NRC 1996). For example the integrity of the refractory liner and possible piping component failure due to thermal attack need to be studied (page 4-41, NRC 1996). Also, the possibility of buildup of combustible gases within one of the outer containment layers presents enough of a possible hazard to require additional research (page 4-41, NRC 1996).

7.3 Safety of the operation of the molten metal facility

There are a number of identified risks to worker health and safety. The molten metal baths would be maintained at very high temperatures (2600 to 3000 degrees F). Because the reactors cannot be easily or quickly cooled down, workers could be exposed to heat stress during routine instrument calibration and maintenance in the reactor rooms (page 8-25, Mitretek 1996). Flammable gases would be present within the reactors, including: hydrogen, carbon monoxide, and methane (Table 10-7, Mitretek 1996). These gases could accumulate within the processing building, presenting a hazard to workers (page 4-42, NRC 1996). Any release of materials such as flammable gases (e.g., hydrogen or carbon monoxide) and vapors of partly oxidized agent would likely be ignited and result in fire or explosion. Thus, accidental release of reactor contents or exposure of personnel to the reactors could result in fire or explosion, serious burns, or inhalation hazards (page 8-25, Mitretek 1996).

Contact of water with molten metal could result in an explosion hazard as a result of explosive vaporization of the liquid and violent dispersion of the molten metal; there have been at least two such incidents in the past 21 years (page 8-25, Mitretek 1996). Exposure to iron and nickel fumes from the reactor could be toxic (page 8-22, Mitretek).

Use of the process for melting metal and containers would present additional hazards. Failure to purge combustible agent vapors from the pre-melter before opening the airlock door could produce an explosion. Failure to volatilize liquids from the ton containers before they entered the reactor could also produce an explosion (page 4-50, Army 1996a).

The front-end equipment is similar to incineration and is as reliable (page 8-14, Mitretek 1996). The compatibility of materials, specifically chlorine and HD, could pose a problem (page 4-20, Army 1996a). Calcium hypochlorite used in the scrubbers and hydrocarbon solvent could present chemical hazards to workers if used or stored improperly (page 8-21, Mitretek 1996).

From the standpoint of treatment process, there are no insurmountable risks from refractory containment, proximity of molten metal bath to the cooling system, monitoring of containment conditions, loss of power, or over pressure (page 4-41, NRC 1996). There are approaches identified to mitigate the hazards to worker safety, such as monitoring equipment for off gases (page 4-22, NRC 1996); remote operations of all process operations once ton containers are unpacked (page 4-5, Army 1996a); and low maintenance equipment so that worker exposure during maintenance or replacement would be minimized (page 4-5, Army 1996a).

Despite these possible measures to reduce the risks, the key limitation of this technology, compared to the baseline, is that many safety issues still need to be researched, evaluated and tested, with workable and reliable safety features incorporated into the design, before the technology can be operated at commercial scale with minimal potential for risk to workers. Some of the most immediate issues needing to be addressed are high temperature hazards, corrosives in the scrubbers, and possible leaks from containment (page 4-42, NRC 1996).

7.4 The rapidity with which the molten metal technology can destroy the stockpile

The estimated processing rate for Aberdeen/Newport would be about 200 kg/hr for HD and 170 kg/hr for VX (page 4-15, NRC 1996). GB is assumed to be processed at the same rate as VX. Based on the processing rates for Aberdeen and Newport and the quantities of agent stored at UMCD, it would take 433 days to process HD, 227 days to process GB, and 82 days to process VX. These numbers include agent processing time only and do not account for processing of other stockpile components (e.g., dunnage or energetics), normal operations and maintenance activities, other shutdowns, or any equipment change out.

The molten metal process is quite complicated and may have potential problems (page 4-19, Army 1996a). A high degree of integrated process control and safety interlocking would be needed (page 10-7, NRC 1996). The control systems could be problematic (page 4-17, Army 1996a). Adjusting oxygen and carbon levels may not be adequate for process control (page 4-20, Army 1996a). Shutdown/startup would cause wear on the equipment (page 4-14, NRC 1996). Also, the treatment technology is designed, and operates best, by continuous operation. If the process has to be shut down, a long cooldown period and a long startup time would be needed (page 4-14, NRC 1996).

All of these factors could lead to greater downtime for inspection and repair, maintenance, or equipment change out. Given the very complex operating system, and the fact that commercial scale units of this type have never been used for this application, there will likely be downtime needed for troubleshooting and system modifications. Greater downtime, especially with the long startup needed, could result in a significantly longer time to treat the stockpile, compared to the baseline or other technologies with less complex, or better demonstrated processes.

7.5 Impacts of the molten metal technology on consumption of natural resources

This technology uses relatively inefficient electric induction heating. The operating temperature must be high at all times, even if agent isn't being treated, to avoid long re-start times (NRC pg 4-14). The maximum load required for startup would be about 7,500 kW, with the net operating load in the range of about 1500 kW (page 4-36, NRC 1996). Total electricity requirements are estimated to be 1.8×10^7 kW-hr. Water usage would be relatively low at about 10 gal/min (page 4-37, NRC 1996). Total water usage was estimated to be 7.2×10^6 gallons. This technology depends on a constant feed of iron. If ton containers are not treated along with agent, iron would have to be added (page 4-8, NRC 1996). The technology would require a total of 1.1×10^7 gallons of water and 2.7×10^7 kW-hr to process the entire Umatilla stockpile.

7.6 Period of time to test out the molten metal technology and have it fully operational and how that impacts the overall risk of the stockpile

The vendor ~~has the expertise~~ to scale up and still get six nines DRE (page 4-37, NRC 1996). However, extensive research and development would be needed to bring this technology to commercial scale, especially in the following areas: piping, offgas, cooling system, integrity of refractory lining, and combustible gases (page 4-42, NRC 1996). The process is similar to induction furnaces used to melt metal, which have operated at commercial scale and have a proven record. However, there is no industry experience for an application similar to agent destruction. The operational experience for contaminant destruction is limited to pilot scale. The experience with chemical agents is limited to laboratory scale only. Performance has not been proven at full-scale. While there is experience with iron baths containing carbon, sulfur, and chlorine, there is no operational experience with phosphorus (page 4-58, NRC 1996).

Additional testing is needed for air monitoring, which would take at least 24 months to complete page 4-89, Army 1996a). The time to develop, permit, construct, test, and demonstrate the technology at Aberdeen/Newport has been estimated to be over 4 years (page 4-54, NRC 1996). It would likely take at least as long, or longer, at Umatilla. This technology could not meet the PL 102-484 deadline of December 2004 for treatment of HD, VX, or GB (page 4-97, Army 1996a).

7.7 Cost

This technology has the lowest estimated life cycle cost for treatment of HD/VX among any of the five alternatives (page 4-99, Army 1996a). Treatment cost for GB is unknown. Costs would be offset in that salable metal ingots and elemental sulfur would be produced. Salable hydrochloric acid could also be recovered from the liquid waste stream for resale (page 4-18, NRC 1996). The offgas, containing methane and carbon monoxide, would be used to generate power for in plant uses in a turbine generator, which could offset the power demand.

8. Electrochemical Oxidation (Silver II)

8.1 Types/quantities/toxicity of discharges to the environment by operation of electrochemical oxidation

Treatment Efficiency. *In principle* electrochemical oxidation should meet six nines DRE, but this has not been demonstrated. Laboratory tests showed no residual but because of the detection limits and the small amounts tested, the computed DRE was only four nines (page 5-13, NRC 1996). Therefore, additional development and testing is needed to demonstrate the required six nines DRE (page 6-2, Mitretek 1996). Once the agent is destroyed it would not reform (page 5-13, NRC 1996). The technology could only achieve 3X decontamination of ton containers (page 4-19, Army 1996a).

Air Emissions. The offgas treatment (hydrogen peroxide and activated carbon) should remove any residual agent and volatiles; the gas would not be held prior to release (page 5-14, NRC 1996). The air emission levels would be moderate (page 4-4, Army 1996a). Discharges would include carbon dioxide, nitrogen, oxygen, with minor amounts of carbon monoxide, nitrogen dioxide, and NO_X; no major toxic discharges are expected (page 6-11, Mitretek 1996). However, silver or nitrates may be released (Table 10-6, Mitretek 1996). Electrochemical oxidation would generate less gaseous waste than an incinerator (page 6-2, Mitretek 1996).

Wastewater Discharges. The liquid residuals would be relatively non-toxic and are not expected to be hazardous to human health or the environment (page 5-13, NRC 1996). The waste streams generated include dilute nitric acid, neutral mixed salt solutions (mostly sodium salts), and a strong alkaline liquid. Assuming the wastewater discharge rates provided by the NRC (page 5-14, NRC 1996) and assuming the same rate for GB as for VX, then the total wastewater discharges associated with processing of all agents are expected to be 7.5×10^6 gallons.

Solid Wastes. Based on Oregon regulations, all solid wastes (except for metals) generated from demilitarization, treatment, and testing of blister (F998) or nerve agents (F999) are considered listed hazardous wastes. Very little solid waste likely would be generated, although little information is available. Salt solutions could be treated by evaporation/solidification and landfilled, instead of being discharged as a liquid.

8.2 Risks of discharge from a catastrophic event or breakdown in operation of the electrochemical oxidation technology

Leaks of hydrogen peroxide, in the presence of organic material, such as oil or grease, could produce enough heat to cause combustion and contribute to propagation of a fire (page 6-17, Mitretek 1996). Catastrophic failure from uncontrolled reactions is unlikely because of the slow feed rate of agent, constant low concentrations, and low amount of agent accumulation in any one location (pages 5-16 and 5-23, NRC 1996). Because it is a low temperature process, there is little or no threat from a catastrophic agent release (page 4-51, Army 1996a).

Nitric acid is stored and used throughout the process. Because it is a very strong oxidizing agent, if combined with organic material, such as oil or grease, a runaway oxidation reaction could occur, with pressure buildup and possible explosion. However, for a runaway condition to occur, three independent systems must fail simultaneously, which is unlikely. Therefore, a runaway reaction is not considered very likely (page 5-16, NRC 1996).

8.3 Safety of the operation of an electrochemical oxidation facility

The technology operates at low temperature (80-90 degrees C) and low pressure (1 atmosphere). The proposed design, along with trained personnel and proper protection gear and in-place procedures (such as plant shut downs) to deal with potential agent spills/leaks, could provide a safe operation and reduce the risk of worker injury (page 6-17, Mitretek 1996).

Nitric acid, used throughout the process, is a very strong oxidizing agent with risk to workers of serious skin burns and toxic vapors during maintenance (pages 6-18 and 6-25, Mitretek 1996). Failure of the oxides of nitrogen (NO_X) reformer/condenser, or the NO_X boiler could result in release of hot nitric acid fumes. Nitric acid is corrosive to metals and generates ignitable hydrogen; it reacts violently with sodium hydroxide and could develop sufficient pressure to rupture containers (page 6-25, Mitretek 1996).

Sodium hydroxide can react with water and generate pressure, or react with nitrogen compounds to form explosive mixtures (page 6-25, Mitretek 1996). Activated carbon waste could generate risk during change out but it would not be greater than baseline incineration (page 6-18, Mitretek 1996). The process uses very strong currents (2,000 amperes). A short circuit could cause fire or explosion. Strong electromagnetic forces could interfere with instrumentation (page 6-26, Mitretek 1996).

8.4 The rapidity with which electrochemical oxidation can destroy the stockpile

At full scale (24 hr/day) operation the technology would destroy about 140 metric ton HD or 75 metric ton VX in 245 days (i.e., 1,260 pounds/day HD and 675 pounds/day VX) per module (page 5-1, NRC 1996). For the Umatilla stockpile, it would require several modules. For example, with three modules, it would take over 3 years for HD, one year for VX, and 3 years for GB to destroy the entire stockpile.

The process would be difficult to monitor and control because it contains a large number of parallel modules that must be monitored and controlled simultaneously (page 4-19, Army 1996a).

8.5 Impacts of electrochemical oxidation technology on consumption of natural resources

This is an energy intensive process. It uses 72,000 kW/hr per metric ton HD destroyed and 134,000 kW/hr per metric ton VX destroyed (page 5-5, NRC 1996). Assuming the same rate of electricity use for GB as VX, the total electricity requirement for agent destruction based on stockpile quantities was estimated to be 3.2×10^8 kW-hr. Total water use was estimated to be 3.8×10^7 gallons based on rates provided by the NRC (page 5-26, NRC 1996).

8.6 Period of time to test out electrochemical oxidation and have it fully operational and how that impacts the overall risk of the stockpile

Laboratory tests have been successful but only one pilot test, at a small scale, has been completed; the technology has yet to be operated at a commercial scale (page 5-6, NRC 1996). Because the process generates large heat loads, temperature control in each of the modules, and in the system as a whole, must be tested and validated (page 5-6, NRC 1996). The process instrumentation and control system needs to be developed. No fully operational system or full-scale design exists (page 5-15, NRC 1996). There is a concern that the technology hasn't been demonstrated to operate long-term with phosphates and sulfates without developing corrosion in key areas (page 4-36, Army 1996a).

A test program is needed to verify that the planned control systems are adequate to ensure stable operation over the full range of compositions expected (page 5-16, NRC 1996). It is uncertain whether the spent decontamination and other floor drain wastes can be successfully treated and additional research is needed. No information has yet been developed for mitigation of a potential accident regarding release of agent through the vessel jacket cooling system if there is a leak in the vessel (page 6-13, Mitretek 1996). Additional research is needed to evaluate key safety issues, including: stress cracking due to nitric acid; effects of phosphorus and variations in electrolyte composition; and construction materials' compatibility and durability (page 5-19, NRC 1996). Temperature control in each unit, and in the system as a whole, needs to be evaluated (page 10-10, NRC 1996). The effects of silver chloride loading, especially for HD processing, still has to be pilot tested at the conditions and loadings expected at full scale; the HD treatment process under this technology is the least developed of any of the technologies (page 10-12, NRC 1996).

The technology would likely be viewed by regulators as novel; the lack of familiarity and operating experience with the technology for the treatment of agent might delay the regulatory permitting process significantly (page 10-13, NRC 1996).

Based on the estimates prepared for the Aberdeen/Newport project, it would take on the order of 4-5 years to design the system; permit, construct, and install it; and perform the testing needed to assure its safety and operability (page 5-23, NRC 1996). This technology could not meet the PL 102-484 deadline of December 2004 for treatment of HD or VX (page 4-97, Army 1996a), or for GB.

8.7 Cost

This technology was ranked second most expensive among all five technologies for treatment of HD and the most expensive for VX (page 4-99, Army 1996a).

9. GAS-PHASE CHEMICAL REDUCTION

The data presented for this technology in the NRC report (1996) were primarily based on experience with non-agent organic compounds (e.g., PCBs, DDT) and also HD. Data for VX were limited and no data for GB were presented. Assumptions used in this section for purposes of estimating quantities will be clearly identified.

9.1 Types/quantities/toxicity of discharges to the environment by operation of gas-phase chemical reduction

Predicting residuals from treatment of organosulfur compounds (i.e., HD) is more straightforward than for organophosphate compounds (i.e., VX). Only treatment of HD and VX were considered in the alternative evaluation. Therefore, no assumptions were made about treatment of GB.

Methane and hydrogen are burned in the steam boiler. Residuals from combustion exit as CO_2 and steam (page 6-9, NRC 1996). Only mass rates of individual chemical compounds were provided in the reports reviewed. Total waste stream masses/volumes were provided, including any associated water (for aqueous discharges) or nitrogen/oxygen (for air emissions).

9.1.1 HD

Air Emissions. Carbon dioxide is given off from the monoethanolamine scrubber at a rate of 51.2 g-moles/min (page F-9, NRC 1996). Carbon dioxide also is released through the burner at a rate of 22.0 g-moles/min (page F-9, NRC 1996). These rates, derived for the Aberdeen stockpile of HD, combine to represent a total carbon dioxide release of 73.2 g-moles/min, or 426 pounds/hr. For a total mass of 4.7×10^6 lbs of HD to be treated at UMCD, a total of 4.6×10^6 pounds of carbon dioxide would be released. No data was provided for VX; consequently, emission rates for VX and GB were not estimated.

Solid Wastes. Carbon is present as soot in the water scrubber at a rate of 8.7 g-moles/min. (page 6-9, NRC 1996). This corresponds to 146,000 pounds of soot over the duration of the treatment of HD. Elemental sulfur is produced by the SulFerox process at a rate of 21.84 g-moles/min. This corresponds to 960,000 pounds sulfur over the duration of the treatment of HD. Based on Oregon regulations, all solid wastes (except for metals) generated from demilitarization, treatment, and testing of blister (F998) or nerve agents (F999) are considered listed hazardous wastes.

Liquid Wastes. Hydrochloric acid is produced in the water scrubber at the rate of 43.68 g-moles/min (page 6-9, NRC 1996). This corresponds to 2.2×10^6 lbs hydrochloric acid over the duration of the treatment. Sodium salt solution is generated by the caustic scrubber (page 6-9, NRC 1996). Masses were not provided.

9.1.2 VX

For phosphorus containing materials, such as VX, products exiting the reactor are not well understood. Experimental work is needed to identify potential discharges to the environment (page 6-5, NRC 1996). If phosphine is produced, a proprietary technology developed by the vendor is proposed to scrub the phosphine (page 6-6, NRC 1996). The reaction chemistry for treatment of VX is still uncertain. Possible residuals include nitrogen, ammonia, nitrogen oxides, elemental phosphorus, hydrogen sulfide and possibly minor amounts of hydrogen cyanide (page 6-10, NRC 1996).

9.2 Risks of discharge from a catastrophic event or breakdown in operation of gas-phase chemical reduction

The NRC found no failure scenario involving loss of electrical power, loss of cooling, failure of pipes and valves, inadvertent over pressurization, or inadvertent temperature transients that would lead to off-site release of agent or toxic process products. (page 6-22, NRC 1996). The full operational manual, hazard and operability studies, and process and instrumentation diagrams have been developed for processing DDT-toluene mixtures and PCBs at commercial facilities located outdoors (page 6-7, NRC 1996).

The secondary containment system required for agent destruction facilities will need to be designed so that hydrogen will not stratify or build up locally to a combustible concentration (page 6-23, NRC 1996). A large detonation or burn of combustible gas near containers that store agent could damage containment structures and cause a release of agent. This risk must be considered when designing component locations and shielding (page 6-23, NRC 1996). The current systems design has features and controls in place to address the potential for combustible mixtures of air and hydrogen inside the circulating gas system as a result of air in-leakage (page 6-23, NRC 1996). The sequencing batch vaporizer (SBV) door seals must be designed to reliably seal against leakage of agent (page 6-23, NRC 1996). The design of the reactor vessel must consider thermal stresses, welding problems, crevices, and local design problems (page 6-23, NRC 1996).

9.3 Safety of the operation of gas-phase chemical reduction

The system operates at low pressure and it appears to be ~~extremely difficult~~ to over pressurize the system inadvertently (page 6-24, NRC 1996). The SBV chambers and reactor have pressure relief to the caustic scrubber (page 6-24, NRC 1996). Loss of electrical power, failure of cooling water to the heat exchanger, or failure of cooling water to the pumps will cause "graceful" shutdown of the system (page 6-24, NRC 1996). The integrity of the system does not appear to be threatened in any realistic failure scenarios (page 6-24, NRC 1996).

Worker safety issues are associated with high temperature hydrogen, high temperature steam, hot water, and corrosives in scrubbers (page 6-24, NRC 1996). The vendor has assessed several failure modes and has developed control strategies for them. Process parameters have been identified that are critical for process control and safety (page 6-14, NRC 1996).

Mitretek has identified other safety concerns. The gas flow from the SBV to the reactor cannot be stopped quickly without adverse impact to the SBV. The gas flow could be contaminated with agent volatilized from heels remaining in ton containers after drainage. The design should address this (page 7-10, Mitretek 1996). Gas flow from the catalytic steam reformer (CSR) to the reactor cannot be stopped quickly without adverse impact to the CSR. The design should address this (page 7-10, Mitretek 1996). The primary mover for the process gas is a single positive displacement blower. Failure of the blower is not catastrophic to the process, but the possibility of unsafe conditions resulting from failure can be mitigated through the process design (page 7-10, Mitretek 1996). The nitrogen purge vent in the SBV and several purge vents located throughout the process discharge to the atmosphere through activated carbon beds. These vents provide a direct path for process gas to escape, particularly if the carbon is saturated (page 7-10, Mitretek 1996).

9.4 The rapidity with which gas-phase chemical reduction can destroy the stockpile

The vendor's proposed destruction rate is 5 metric tons per day (5.5 English tons per day) for each agent and is assumed to operate on a continuous basis (pages F-5 and 6-19, NRC 1996). The vendor states that the time for facility construction is 6 months, assuming that the Army provides the secondary containment building and ancillary nonprocess facilities. Systemization requires 3 months (page 6-24, NRC 1996).

Using the UMCD stockpile quantities and assuming 20% downtime (page 6-19, NRC 1996), the estimated time to treat the agents is:

- GB 1,015 tons/(5.5 tons/day) × 1.2 = 221 days
- VX 365 tons/(5.5 tons/day) × 1.2 = 80 days
- HD 2,340 tons/(5.5 tons/day) × 1.2 = 510 days

These estimates total 811 days (27 months) including downtime or 676 days (about 22 months) excluding downtime for treatment of all three agents. These durations were used to estimate resource utilization and waste production. Information was not provided to indicate if additional downtime is required to modify the treatment system to allow switching from one type of agent to another type.

Other than increases in monitoring requirements, the design of the secondary containment, and the engineering necessary for managing the sulfur and phosphorus wastes, this technology is at a point where a unit like the existing commercial systems could serve as the pilot operation for agent destruction (page 6-24, NRC 1996). Schedule impacts for design of secondary containment and re-engineering to handle the various agents is unknown. The schedule for VX and GB is likely to be more greatly impacted than for HD (page 6-24, NRC 1996).

9.5 Impacts of gas-phase chemical reduction on the consumption of natural resources

The vendor did not provide a complete energy balance (page 6-8, NRC 1996). The reactor is expected to require 5,019 kW-h/day for processing agent (based on values provided for HD). Electrical power supply needed for pumps, heaters, and other equipment is 20,000 kW-h/day. The total average electrical power is 25,019 kW-h/day (pages 6-8 and 6-20, NRC 1996). Based on the operational durations in Section 9.4 (excluding downtime), and assuming the agents are treated sequentially, a total of 1.69×10^7 kW-hr of electricity would be consumed.

The water requirement is 100 gallons per minute for steam feed and scrubbing, although the panel believes this may be on the high side for treating HD (page 6-20, NRC 1996). The total water requirement over the duration of treatment (based on the operational durations in Section 9.4 above [excluding downtime], and assuming the agents are treated sequentially) would be 9.7×10^7 gallons of water. This does not include cooling water.

Propane use, assuming 5 metric ton/day processing rate, is 1,954 MJ/hr which converts to 1.85×10^6 Btu/hr. This requires approximately 86 pounds of propane each hour, assuming 21,500 Btu/lb of propane (pages 6-20 and 6-26, NRC 1996). Based on the operational durations provided in Section 9.4 above (excluding downtime), and assuming the agents are treated sequentially, a total of 1.4×10^6 lbs of propane would be required.

9.6 Period of time to test out gas-phase chemical reduction and have it fully operational, and how that impacts the overall risk of the stockpile program

The 1996 Army report estimated a treatment duration schedule of 132 months for HD and 134 months for VX for the base case. Risk-adjusted schedules of 150 and 154 months, respectively were also presented. These durations were for treatment of the Aberdeen and Newport stockpiles, respectively, and do not apply to Umatilla (page 4-85, Army 1996). The Army predicts that gas-phase electrochemical reduction would take the longest time among the candidate technologies to complete at both Aberdeen and Newport. Longer durations generally correlate to greater risks due to longer storage prior to treatment (page 4-85, Army 1996).

The 1996 AMSAA report, like the 1996 Army report, also provided "base" and "risk-adjusted" schedules for treatment of HD and VX at Aberdeen and Newport, respectively. Their (base/adjusted) estimates were 95/145 months for HD at Aberdeen and 91/128 months for VX at Newport (page 31, AMSAA 1996). AMSAA predicts that gas-phase chemical reduction could be completed at Aberdeen and Newport more quickly than all the technologies except molten metal for VX at Newport, but would be the second longest duration for treatment of HD at Aberdeen.

Due to the uncertainties presented below, no schedule was presented in the 1996 NRC report. The reactions of the heteroatoms, sulfur, nitrogen, and phosphorus, have not been investigated extensively, and the interplay of kinetics and thermodynamics is difficult to predict. Predictions are necessary both for developing appropriate scrubber systems, and for identifying and managing toxic residuals (page 6-4, NRC 1996).

The vendor has presented proprietary chemistry for scrubbing phosphine, but the technique may not be required if phosphine is in fact, not produced (page 6-6, NRC 1996). Experimental work is needed to define the phosphorus end products in the reactor. These speciation issues are serious and will require substantial laboratory testing to resolve them prior to pilot scale work (page 6-5, NRC 1996). The vendor has developed a plan to determine speciation of phosphorus and design of a method of scrubbing the phosphorus containing residuals from the reactor effluent (page 6-5, NRC 1996). Although the panel received detailed modeling data from the vendor, it did not receive detailed laboratory data from the agent destruction tests. No bench scale tests have been reported to the panel (page 6-7, NRC 1996). The vendor has little experience with phosphorus containing materials, even at bench scale.

Although the vendor has developed a plan for addressing these issues, the time line for doing so is unclear (page 6-7, NRC 1996). The vendor has stated, "the schedules for design, construction, testing and evaluation of a pilot scale system have been requested by the Army and will be provided according to their requirements" (page 6-24, NRC 1996). Still to be assessed are the effects on the schedule of designing the secondary containment and any associated re-engineering. The effect on schedule is likely to be more severe for VX and GB than for HD because the need for identifying and managing phosphorus containing reaction products applies only to these agents (page 6-24, NRC 1996).

9.7 Cost

Development of gas-phase chemical reduction for treatment of HD was estimated to be the most expensive of the alternative technologies. Development of this technology for treatment of VX was considered to be the second most expensive alternative (page 4-99, Army 1996a).

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ATTACHMENT A

TABLES FOR COMPARISON OF ALTERNATIVES TO THE BASELINE INCINERATION SYSTEM

FROM THE MITRETEK REPORT

Table 10-6. Potential Health and Environmental Risks Due to Chemicals

Potential Risks from Exposure to Chemicals	U.S. Army Neutralization Followed By Off-Site Post-Treatment	U.S. Army Neutralization Followed By Biodegradation	AEA Silver II Electrochemical Oxidation	Eco Logic Gas-Phase Chemical Reduction	M4 Molten Metal Catalytic Extraction
Cancer Risk	HD hydrolysates	HD hydrolysates	None	None	Nickel
Chronic Noncancer Health Hazard	None	None	• Silver nitrate • Nitrite compounds	• Hydrochloric acid	None
Acute Health Effects*	• *Sodium hydroxide* • *Sulfuric acid* (VX only) • *Sodium hypochlorite*	• *Sodium hydroxide* • *Sulfuric acid* • *Phosphoric acid* • *Ammonium hydroxide* • *Hydrogen peroxide*	• *Nitric acid* • *Sodium hydroxide* • *Hydrogen peroxide* • *Silver nitrate*	• Hydrogen sulfide • Carbon monoxide • Phosphine • *Hydrochloric acid*	• Methanol • Carbon monoxide • Hydrogen sulfide • Hydrogen cyanide (for VX only) • *Sodium hydroxide* • *Hydrochloric acid* • *Sodium hypochlorite*
Ecological Hazards	• HD or VX hydrolysates • Sodium hydroxide • Sulfuric acid	• HD hydrolysates † • Sodium hydroxide • Sulfuric acid	• Silver nitrate • Nitric acid • Sodium hydroxide	• Hydrochloric acid	• Methanol • Hydrogen cyanide • Hydrocarbon solvent • Nickel compound

* Acute effects from chemicals (listed in italicized font) would result primarily from potential accidents during transport to the facility of bulk quantities of chemicals used in the process.

† Toxicity of HD hydrolysates towards some aquatic organisms (e.g., brine shrimp) is reduced by biodegradation.

Table 10-7. Highlights of Alternative Technologies by Major Risk Evaluation Parameter Categories

Evaluation Parameter Subcategories	Alternative Technologies				
	U.S. Army Neutralization Followed By Off-Site Post-Treatment	U.S. Army Neutralization Followed by Biodegradation	AEA Silver II Electrochemical Oxidation	Eco Logic Gas-Phase Chemical Reduction	M4 Molten Metal Catalytic Extraction
Inherent Risks (For details, see Tables 10-1, 2, and 3 for process hazards, & the tables in Appendix H for chemical hazards. "Toxic chemical" used in this row is defined to be a chemical having an IDLH limit.	• Low operating temperature & pressure. • One toxic chemical in medium quantities used for VX only (sulfuric acid). • Negligible quantity of flammable gases generated.	• Low operating temperature & pressure. • Three toxic chemicals in large quantities used (ammonium hydroxide, H_2O_2, & phosphoric acid). • Negligible quantity of flammable gases generated.	• Low operating temperature & pressure. • Three toxic chemicals in medium quantities (H_2O_2, Nitric Acid, & NOx). • No flammable gases generated.	• High operating temperature, low pressure. • Three toxic chemicals in large quantities generated/used (CO, HCl, & H_2S). • Large quantities of several flammable gases generated.	• Very high operating temperature, low pressure. • Four toxic chemicals in large quantities (CO, HCl, H_2S, & solvent). • Large quantities of several flammable gases generated.
Major Failure Modes and Effects (For details, see Section 10.1.2 & FEMA tables in Appendices C through G).	• Potential release of partially neutralized agent outside controlled areas.	• Potential release of partially neutralized agent outside controlled areas.	• Potential release of agent outside controlled areas. • Potential contamination of personnel because of improperly defined ventilation zones.	• Potential release of agent during purging & venting of the system. • Potential for fire & explosion if hot process gases are released in CDB.	• Potential for fire & explosion if hot process gases are released in CDB.
External Events (For details, see Tables 10-4 & 5)	• Worst/most likely off-site fatalities: 48/1 for NECA & 0/0 for APG).	• Worst/most likely off-site fatalities: 48/1 for NECA & 0/0 for APG).	• Worst/most likely off-site fatalities: 48/1 for NECA & 0/0 for APG).	• Worst/most likely off-site fatalities: 48/1 for NECA & 0/0 for APG).	• Worst/most likely off-site fatalities: 48/1 for NECA & 0/0 for APG).

Table 10-7. (Continued)

Evaluation Parameter Subcategories	Alternative Technologies				
	U.S. Army Neutralization Followed By Off-Site Post-Treatment	U.S. Army Neutralization Followed by Biodegradation	AEA Silver II Electrochemical Oxidation	Eco Logic Gas-Phase Chemical Reduction	M4 Molten Metal Catalytic Extraction
Health and Environment (See Table 10-6 for details).	• Potential cancer risk from some HD or VX hydrolysates.	• Potential cancer risk from some HD hydrolysates.	• Chronic health effects of silver & nitrate compounds.	• Acute effects of generated process gases; no chronic effects.	• Acute effects of generated process gases; cancer risk for nickel fumes.
Process and Essential Facility Systems Uncertainties. (For details, see Table 10-8).	• Design package at preliminary design phase; includes: - P&IDs & logic diagrams for processing & several major support systems, detailed layout drawings, & design & construction to be used in certain areas. - Undefined seismic design requirements for CDB, TOX, & agent transfer system. • Accounts for agent impurities.	• Design package at preliminary design phase; includes: - P&IDs & logic diagrams for processing & several major support systems, detailed layout drawings, & design & construction to be used in certain areas. - Undefined seismic design requirements for CDB, TOX, & agent transfer system. • Accounts for agent impurities.	• Design package at conceptual design phase; includes: - Flow diagrams for the processing systems (none for support systems), & general layout drawings. - Undefined seismic design requirements for CDB, TOX, & agent • Does not account for agent impurities; however, can destroy organic, (but may not remove inorganic) materials.	• Design package at conceptual design phase; includes: - Flow diagrams for processing systems (none for support systems), & general layout drawings. - Undefined seismic design requirements for CDB, TOX, agent transfer system, & certain process equipment. • Does not account for agent impurities in its waste stream; but is capable of destroying any organics & removing inorganics.	• Design package at advanced stage of conceptual design phase; includes: - Flow diagrams for processing and support systems, & general layout drawings. - Undefined seismic design requirements for CDB, TOX, agent transfer system, & certain process equipment. • Does not account for agent impurities in its waste stream; but is capable of destroying any organics & removing inorganics.

Table 10-7. (Concluded)

Evaluation Parameter Subcategories	Alternative Technologies				
	U.S. Army Neutralization Followed By Off-Site Post-Treatment	U.S. Army Neutralization Followed by Biodegradation	AEA Silver II Electrochemical Oxidation	Eco Logic Gas-Phase Chemical Reduction	M4 Molten Metal Catalytic Extraction
Scheduling and Continued Storage Uncertainties	• Provides 50% excess capacity & redundancy in design of process & support systems.	• Provides 50% excess capacity & redundancy in design of process & support systems.	• Modular design provides redundancy for processing agent; however, unknown redundancy in support systems.	• Concern with possible processing at one site first, then the other site. • No redundancies in design of processing or support systems. • No schedule provided.	• Concern with possible processing at one site first, then the other site. • No redundancies in design of processing or support systems.
Environmental Permitting Uncertainties	• Concern with suspended & dissolved solids. • No information on off-site treatment/ disposal of HD/VX hydrolysate.	• No information on management of solid waste if the recycle waste water system is removed.	• No detailed information on permitting strategy. • Concern about management of liquid waste from process.	• Concern with management of liquid waste. • Concern with acceptance of recycling of product gas.	• No information on handling of waste water. • Concern with acceptance of recycling philosophy (e.g., use of synthesis gas, as fuel recycling of hydrochloric acid & sulfur). • Concern with generation of hydrochloric acid & sulfur.

Table 10-8. Qualitative Conclusions of Alternative Technology Characteristics

	Value Subjectively Concluded on a Relative Basis				
Characteristic	U.S. Army Neutralization Followed By Off-Site Post-Treatment	U.S. Army Neutralization Followed by Biodegradation	AEA Silver II Electrochemical Oxidation	Eco Logic Gas-Phase Chemical Reduction	M4 Molten Metal Catalytic Extraction
Level of Detail Provided					
Overall Design Information	High	High	Low	Low	Medium
Hazards analyses, HAZOP, or FMEA	Medium	Medium	Low+	Low	High
Ton Container Processing					
Operational Details	High	High	Low	Low	Medium
Drawings	Medium	Medium	Low	Low	Medium
Redundancy/Availability	Low	Low	Low	Medium	Low
Material Balance	Medium	Medium	Low	Low	Medium
Mass Balance	Medium	Medium	Low	Low	Medium
Treatment					
Operational Details	High	High	Medium	High	High
Drawings	High	High	Medium	Low	Medium

Table 10–8. (Continued)

Characteristic	Value Subjectively Concluded on a Relative Basis				
	U.S. Army Neutralization Followed By Off-Site Post-Treatment	U.S. Army Neutralization Followed by Biodegradation	AEA Silver II Electrochemical Oxidation	Eco Logic Gas-Phase Chemical Reduction	M4 Molten Metal Catalytic Extraction
Treatment (Continued)					
Reaction Chemistry	High	High	Medium-	Medium	High
Material Balance	High	High	Medium	Medium	High
Mass Balance	Medium	Medium	Low	Medium	High
Post-Treatment					
Operational Details	None	High	Medium	High	High
Drawings	None	High	Medium	Low	High
Reaction Chemistry	Unknown	High	Low	Medium	High
Material Balance	Unknown	High	Medium	Medium	High
Mass Balance	Unknown	Medium	Low	Medium	High
Waste Steam Disposal	Low	Medium	Low	Low	Medium
Support Systems	High	High	Low	Low	High
Emergency Response Strategy	Low	Low	Medium	Medium	Medium

Table 10–8. (Continued)

Characteristic	Value Subjectively Concluded on a Relative Basis				
	U.S. Army Neutralization Followed By Off-Site Post-Treatment	U.S. Army Neutralization Followed by Biodegradation	AEA Silver II Electrochemical Oxidation	Eco Logic Gas-Phase Chemical Reduction	M4 Molten Metal Catalytic Extraction
Level of Automation/Remoteness of Operators for Process					
Ton Container Processing	Low	Low	Low	High	Medium
Treatment	High	High	High	High	High
Post-Treatment	Unknown	Low	High	High	Medium
System Redundancy/Excess Capacity	Medium	Medium	High	Low	Low
Confidence in Design					
Ton Container Processing	Medium	Medium	Medium	Low	Medium
Treatment Process	High	High	High	High	High
Post-Treatment	Low	High	Medium	Medium	Medium
Waste Stream Disposal	Medium	High	Low	Low	Low

Table 10–8. (Concluded)

Characteristic	Value Subjectively Concluded on a Relative Basis				
	U.S. Army Neutralization Followed By Off-Site Post-Treatment	U.S. Army Neutralization Followed by Biodegradation	AEA Silver II Electrochemical Oxidation	Eco Logic Gas-Phase Chemical Reduction	M4 Molten Metal Catalytic Extraction
Apparent understanding of the Army's CSDP Safety Design Requirements	High	High	Medium	Low	High
Level of agent processing experience with AT	Medium	Medium	Low	Low	Low
Level of commercial experience with AT	None	None	Medium	Low	Medium
Degree of Recycling	None	Low	High	Medium	Medium
Commercial viability of waste streams (resale instead of waste)	None	None	None	Medium	High

Neutralization process

<u>"PLUSES"</u>

- Successful demonstration of agent destruction removal efficiency.
- Farthest along in terms of development of all the alternative technologies.
- Low temperature process, with limited air emisisons.
- Design of system allows for capacity increase.
- No dioxin formation.

<u>"MINUSES"</u>

- Design level for chemical demilitarization is 60% for neutralization with on-site bio-degradation, and 20% for neutralization followed by off-site shipment of hydrolysate. **An additional 4-5 years will be required for development.**
- Some related commercial experience.
- **Suitable for liquid agent only, and some metal parts** (to a "3x" level).
- **Requires high amounts of water for processing** (10 times that of incineration), and **will have significant amounts of wastewater** discharge (although it is expected to be of low toxicity).
- Will generate solid waste in the form of biomass filter cakes (if on-site biodegration is used). Amounts estimated to be 4.7 million pounds

Molten Metals (Catalytic Extraction Processing)

"PLUSES"

- Successful demonstration of agent destruction removal efficiency.
- System design allows for capacity increases.
- No dioxin formation.
- Gaseous discharges could be stored and tested prior to release to atmosphere.
- Limited water usage, no wastewater discharges.

"MINUSES"

- Design level for chemical demilitarization is only at 35%, **estimated time for development an additional 6-7 years.**
- Limited commercial experience.
- **Suitable for liquid agent, and possibly metal parts** (without energetics).
- High temperature process.
- Nature of the process could pose serious risk to worker safety.

Electrochemical oxidation (Silver II)

"PLUSES"

- Successful demonstration (at very small scale) of agent destruction removal efficiency.
- Modular system design allows for capacity increases.
- Operates at low temperature and low pressure.
- Catastrophic failure from uncontrolled reactions is highly unlikely.
- No dioxin formation.
- Could be designed so that gaseous discharges could be stored and tested prior to release to atmosphere.

"MINUSES"

- Design level for chemical demilitarization is only at 20%, **additional time to develop estimated at 6-7 years.**
- No commercial experience.
- **Suitable for liquid agent only**, and drained ton containers would only be at a "3x" decontamination level, requiring further treatment off-site.
- **High wastewater generation, wastewater characterization is not available (although likely to be low toxicity)**.
- A very energy-intensive process.
- No regulatory experience with this technology, which will probably slow down permitting process.
- Complete material balances not available, residuals not yet tested for toxicity.

Gas Phase Chemical Reduction

"PLUSES"

- Successful demonstration of agent destruction removal efficiency.
- Modular system design allows for capacity increases.
- Low pressure system.
- No dioxin formation.
- Gaseous discharges can be stored and tested before release to the atmosphere.

"MINUSES"

- Design level for chemical demilitarization is only at 20%, estimated **development time an additional 7-8 years.**
- **Suitable for liquid agent only**, and drained ton containers would only be at a "3x" decontamination level, requiring further treatment off-site.
- Limited commercial experience.
- High temperature process.
- Use of Hydrogen presents safety hazard.

MEMORANDUM

To: Brett McKnight, DEQ

From: Julie Wroble, E & E

Date: November 20, 1996

Subj: Additional Information on PreRA Issues

DEQ requested that E & E address the two issues below that relate to the risk assessment.

- Explain how duration of exposure was factored into calculation of fish tissue concentrations; and
- Describe how dioxin concentrations change with increasing distance from the proposed UMCDF.

The approach used to calculate fish tissue concentrations was based on the Implementation Guidance (EPA 1994). The concentrations modeled in fish tissue and used in the pre-trial burn risk assessment (PreRA, E & E 1996) likely overestimate actual fish tissue concentrations for the reasons described below. Fish tissue concentrations were based on concentrations in other environmental media (e.g., surface water, sediment, soil) and were assumed to remain constant after UMCDF operations cease. In other words, even though the UMCDF is expected to operate for only 3.2 years, the concentrations in fish tissue were assumed to remain constant for 30 years (i.e., the exposure duration of the subsistence fisher). Furthermore, even though some fish may exist in the Umatilla River for a relatively short period of time (e.g., a salmon swimming upstream to spawn), the tissue concentrations in these fish were assumed to be the same as tissue concentrations in resident species.

Figures 3-11, 3-12, and 3-13 from the PreRA show how vapor concentrations, particulate concentrations, and deposition rates, respectively, change with increasing distance from the UMCDF stack. In general, these concentrations decrease with increasing distance from the stack. Local topography and annual average wind direction influence the shape of the isopleths. These figures indicate that concentrations at the facility boundary are between one to two orders of magnitude (10 to 100 times) lower than at the stack. Additionally, concentrations at the edge of the 50-km boundary are expected to be between three and four orders of magnitude (1,000 to 10,000 times) lower than at the stack.

These decreases in concentration with increasing distance from the stack have significant implications for risk. In the PreRA, risk estimates for human health were generated for three locations, 100 meters northeast of the stack, on the facility fenceline northeast of the stack, and on the Umatilla River northeast of the stack. The risks to human health were below regulatory benchmarks at the fenceline and Umatilla River locations. These locations represent plausible future receptor locations. Receptors that are located further from the facility would have correspondingly lower risks. For example, if a receptor lived in downtown Hermiston, their risks would be about 10 times lower than the fenceline receptor. If a receptor lived in Stanfield, their risks would be between 100 and 1,000 times lower than the fenceline receptor. Figure 1 illustrates how concentrations decrease with increasing distance from the stack. Three of the locations presented on this figure correspond to receptor locations evaluated in the PreRA. Three additional locations were added to show the magnitude of decrease in concentrations, and thereby risks, with increasing distance from the stack.

References:

Ecology and Environment, Inc. (E & E), April 1996, Draft Pre-Trial Burn Risk Assessment, Proposed Umatilla Chemical Demilitarization Facility, Hermiston, Oregon, prepared for Oregon Department of Environmental Quality, Contract No. 64-93, Task No. 64-93-10, Seattle, Washington.

United States Environmental Protection Agency (EPA), April 22, 1994, *Implementation Guidance for Conducting Indirect Exposure Analysis at RCRA Combustion Units*, Draft, Waste Management Branch, Office of Solid Waste and Emergency Response, Washington, D.C.

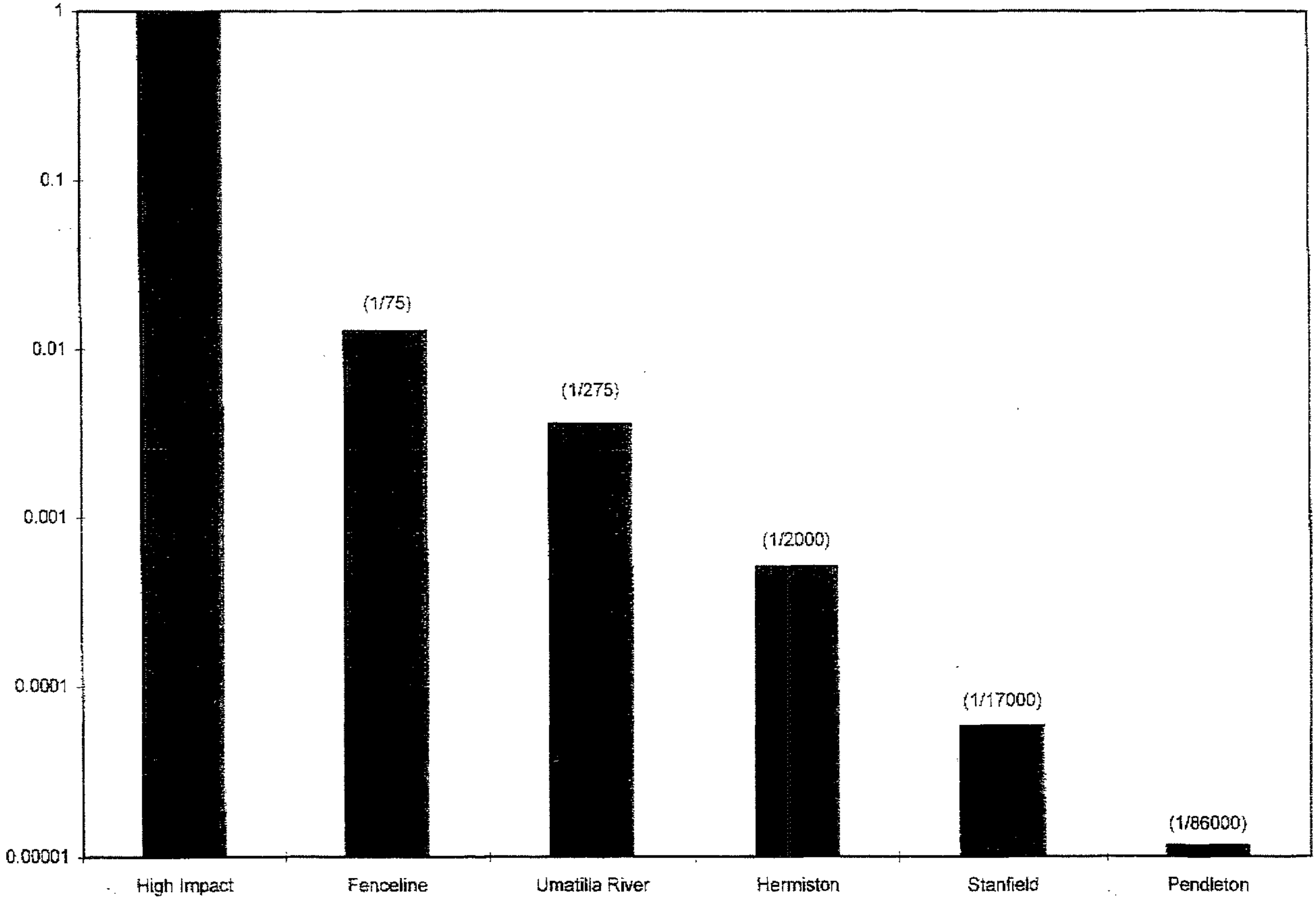

Figure 1
RELATIVE CONCENTRATIONS BASED ON UNITIZED DEPOSITION RATES FROM THE COMMON STACK

Potential emissions of dioxins and furans were among the primary contributors to risks in the risk assessments performed for proposed and operating chemical demilitarization incinerators. However, the risks calculated for these incinerators can be attributed in large part to a series of conservative assumptions used in the calculation of emission rates and media concentrations.

The draft pre-trial burn risk assessment for the proposed Umatilla Chemical Demilitarization Facility (UMCDF) in Hermiston, Oregon demonstrates some of the ways exposure to dioxin is overestimated. Because the incinerator has not yet been built, the risk assessment was performed using surrogate data from trial burns at the Johnston Atoll Chemical Agent Disposal System (JACADS). Emissions from JACADS were scaled based on expected UMCDF operating conditions and number of munitions to be processed. Dispersion modeling was then performed, and concentrations of emitted constituents were calculated in soil, water, and food, according to USEPA's *Guidance for Performing Risk Analyses at Combustion Facilities Burning Hazardous Wastes.*

Following is a brief discussion of some of the sources of overestimation of dioxin emissions or media concentrations and the effects on the overall risks:

1. **JACADS trial burns were performed at suboptimal operating conditions.** Temperatures in the incinerators were lower than standard, which tends to increase production of dioxins and other products of incomplete combustion. Also, the munitions destroyed in the trial burns were those which were expected to be the "most challenging" for the incinerators, such as M55 rockets. Therefore, it is likely that emissions for the stockpile as a whole were overestimated during the JACADS trial burns.

2. **Maximum concentrations of constituents detected in any trial burn were used to represent the entire operation of the facility.** Each of the furnaces at JACADS was tested repeatedly during the trial burns. The liquid incinerators were tested a total of eleven times, four times each with the chemical agents HD and VX and three times with the agent GB. The maximum concentration detected in any of these tests was assumed to be emitted continuously from the facility, regardless of the type of agent being destroyed. A recalculation of emission rates using average dioxin concentrations from all trial burns indicates that dioxin emissions from the liquid incinerators are overestimated by about a factor of 2.1. (Other furnaces have varying results.)

3. **Use of detection limits to represent nondetected dioxin and furan congeners.** The majority of dioxins and furans were not detected in most trial burns at JACADS. In some tests, no dioxins or furans were detected whatsoever. In cases where a congener was not detected, the congener was assumed to be present in the emissions at the detection limit. Use of detection limits overestimated dioxin emissions from the liquid incinerators by about a factor of 3.6. (Other furnaces have varying results.)

4. **Upset conditions were exaggerated.** Because emissions of dioxins and other products of incomplete combustion are generally higher when incinerators are in "upset", a scaling factor was included which assumed that dioxin emissions were ten times normal for 20% of the time of facility operations. However, data from JACADS operations in 1995 indicate that upset

conditions at that facility occurred less than 2% of the time. Assuming similar operations at UMCDF, the use of the higher factor for upset conditions would overestimate emissions by a factor of about 2.4.

5. **All incinerators were assumed to operate constantly for the entire lifetime of the facility.** The incinerators at the UMCDF would actually be operating infrequently during the facility's lifespan of slightly over three years; if the munitions were actually being processed round-the-clock the stockpile would be destroyed in about ten months. Furthermore, most munitions do not require use of all furnaces at the facility. For example, processing ton containers of HD (mustard) requires the liquid incinerators and the metal parts furnace, but the deactivation furnace and the dunnage incinerator are not used. Historically, the furnaces at JACADS have all operated at under 15% of their capacity. By assuming constant operations of all furnaces at UMCDF, emissions are overestimated by at least a factor of three, and are likely overestimated by as much as a factor of eight.

6. **Dioxins (and other constituents) were assumed to remain in soil without any loss.** Typically, dioxin concentrations in the environment will decrease over time, through degradation, volatilization, runoff, or other sources. If dioxins are on the soil surface, as would be expected with deposited emissions, photodegradataion may be significant. By assuming that soil concentrations remain constant for the length of time that receptors are exposed (as high as 40 years for subsistence farmers), exposure to dioxins may be significantly overestimated. The magnitude of the overestimation is difficult to quantify.

7. **Overestimation of the dry deposition velocity of vapor phase of dioxin.** Transfer of vapors to soil was modeled for dioxin and other constituents present as in vapor phase. One term used in this equation is the dry deposition velocity of vapor phase. No chemical-specific values could be found for this term, so a default value of 3 cm/sec was assumed. More recent data indicates that a value of 0.2 cm/sec is appropriate for dioxins. Use of the default value overestimates concentrations; the magnitude of this overestimation varies at different locations as air concentrations and deposition rates vary, but at the fenceline of the Umatilla Chemical Depot (the closest location at which residents could be expected to live) dioxin concentrations are overestimated by about a factor of 3.

8. **Deposition and vapor transfer into plants was assumed to continue well beyond the operating duration of the facility.** Because the equations presented in the USEPA guidance do not consider facility operating time when calculating above-ground plant concentrations, transfer of constituents from air to plants was assumed to continue for the duration of residence for receptors. For the subsistence farmer receptor (the receptor with the highest calculated cancer risks), dioxin transfer into beef and milk through plants was the most significant route of exposure. By making the more reasonable assumption that deposition to plants and vapor transfer to plants would end shortly after the facility ceases operations, risks to the subsistence farmer associated with consumption of beef, milk, and vegetables would be lowered by a factor of about 12. (Deposition to waterbodies, and therefore transfer to fish for the subsistence fisher receptor, also was overestimated in a similar manner.)

9. **The addition of activated carbon filters was not considered when modeling emissions.** The proposed facility plans for Umatilla to include activated carbon filters to reduce potential emissions from the stacks. These filters are not present at JACADS, and no data is currently available to directly estimate the effectiveness of these filters. However, the Army has estimated that dioxin emissions would be reduced by about a factor of seven; this estimate may significantly underestimate the effectiveness of the filters. Filters used at other incinerators have been shown to reduce dioxin emissions by over a factor of 1,000.

Overall effects: Each of the above issues contributes to the overestimation of dioxin risks for the proposed UMCDF. Most effects mentioned above are multiplicative, and lead to a total overestimation of risks by at least a factor of 1,000. This factor may be even higher for the subsistence farmer receptor or if the activated carbon filters remove more emissions than the Army has estimated.

Summary of effects of conservative assumptions in emission modeling on risk calculations

Cause	Effect on dioxin emission rates or risk calculations
Trial burns at suboptimal conditions	Likely to overestimate (by unknown amount)
Use of maximum concentrations for all operations	Overestimates by factor of about 2.1
Use of detection limits	Overestimates by factor of about 3.6
Upset condition modifiers	Overestimates by factor of about 2.4
Assumed full-time operations of all incinerators	Overestimates by at least a factor of 3; possibly as much as a factor of 8
Assumed no loss from soil	Overestimates by unknown amount
Dry deposition velocity	Overestimates soil concentrations by factor of about 3
Plant deposition/vapor transfer	Overestimates above-ground plant, beef, and milk concentrations by factor of about 12
Carbon filters	Overestimates; probably by factor of at least 7, possibly as much as factor of 1,000
Overall effects:	**Most media concentrations probably overestimated by factor of over 1,000; plant, beef, and milk concentrations probably overestimated by factor of over 10,000**

509 520 1386

E on Dorian - ~~sign to~~ left off Walla Walla - M-F
past Chevy dealership too far (on right)
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4TH DISTRICT, OREGON
RESOURCES COMMITTEE
SUBCOMMITTEE:
WATER AND POWER RESOURCES
TRANSPORTATION AND
INFRASTRUCTURE
SUBCOMMITTEES:
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Congress of the United States
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November 20, 1996

Chairman Henry Lorenzen
Environmental Quality Commission
811 SW 6th Ave.
Portland, Oregon 97204

Dear Chariman Lorenzen:

The Oregon Environmental Quality Commission will soon consider the U.S. Army's permit to begin construction of a chemical weapons demilitarization facility at the Umatilla Depot. As you know, during the past year I have urged the Army, Governor Kitzhaber and your Commission to delay the permitting process in order to thoroughly examine all of our options. Recently, I had the opportunity to visit the Umatilla facility in order to examine several safety concerns and believe that some of what I learned is relevant to your permitting decision. I am now even more convinced that Oregon needs to insist that the Army provide alternatives to its current incineration plans for demilitarizing the Umatilla stockpile before issuing a permit. The Commission should also insist on much more stringent safety and emergency response requirements.

Although everyone wants to rid Oregon -- and the rest of nation -- of the lethal legacy of chemical weapons stored since World War II, this does not mean that Oregon must expose its citizens to the risks inherent in the Army's current plans. Oregon must ensure that the solution is not worse than the problem. With recent major developments in viable alternative disposal technologies, we now have a host of options that could prove safer, cheaper and more environmentally benign.

As the Commission knows, the National Academy of Sciences recently released a study that found no technical impediments to a slate of alternative technologies for chemical weapons demilitarization. At least two Army studies also found these technologies viable and recommended moving ahead with them at the Maryland and Indiana storage sites.

Some Army sources have stated that continued storage of the chemical munitions poses an unacceptable risk. Understandably, storage risk is central to Oregon's decision. However, I am curious as to how the Army can claim increasing risk. During my visit, I was surprised to learn that the Pentagon's information on storage risk has shown *decreasing* numbers of "leaker" incidents. Although "common sense" may indicate that all devices degrade over time, the latest Army status report on stockpile stability shows no increased incidents of "leakers" over time since 1984.

The Army seems to feel that any delay in the demilitarization schedule would pose a dramatic threat to the public (despite the fact that even its baseline schedule will require continued storage for more than a decade). However, the Army's concern would stand in

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sharp contrast to their currently inadequate policy of addressing basic safety needs. The Hermiston area still does not have a working emergency response system. If the Army truly wants to place the lives of Oregonians first, why doesn't it fund Umatilla's emergency operation center on a 24 hour basis or provide a positive pressure room for the response team? Also, if safety is the first priority, why does the Pentagon allow continued aerial bombing at the Navy's Boardman bombing range located only a few minutes away from the Depot? It is also perplexing why the Army continues to ignore the idea of temporarily "reconfiguring" the M-55 rockets in order to greatly decrease the risk posed by these munitions.

The Army's plan to destroy chemical weapons is an issue of great importance to the nation, as well as our state, with many critical safety and environmental questions still unanswered. The health and safety of Oregonians -- not political and economic expediency -- should be the driving factor for any decision. It is my hope that the Oregon Environmental Quality Commission will take a serious look at alternative chemical weapons destruction technologies beyond the current incineration plans of the Army, and insist that the Army do the same. I also urge the Commission to require much more stringent safety and emergency response measures.

Thank you for your consideration. Please feel free to contact me or my staff if you wish to discuss this critical issue.

Sincerely,

PETER DeFAZIO
Member of Congress

CC: Commission Members

FAX COVER SHEET

Office of
Rep. Peter DeFazio

2134 Rayburn H.O.B.
Washington, DC 20515
Phone: 202-225-6416
Fax: 202-225-0373

DATE:

TO: **Environmental Quality Commission**

FROM: **Peter Tyler (for Congressman DeFazio)**

3 Pages (including cover)

COMMENTS: Here is the letter that I mentioned. Thanks for sending it to the Commission members.

I can act as point of contact if you or any of the Commission members have comments or questions.

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Corvallis, October 29, 1996

Enclosed is a report containing my answers to the questions on dioxin formation in the proposed Umatilla Chemical Demilitarization Facility. The questions were presented to me in letters from the Department of Environmental Quality dated August 8, 1996 and September 6, 1996. My findings can be summarized as:

1) Sulfur inhibits dioxin formation.
2) Other factors are more important in setting dioxin emissions than the chlorine content in the feed.
3) The dioxin emissions from the proposed facility will be less than 1 ng/m^3 during normal operation and not significantly different than emissions from similar plants burning natural gas only.
4) The design of the incinerator is not important as long as proper combustion conditions are maintained.
5) The most important features of a pollution abatement system for minimization of dioxin emissions are rapid cooling of the flue gases and removal of dioxin by e.g. carbon filters. Both of the methods are employed in the proposed facility.
6) No other method offers better dioxin removal than activated carbon filters.

If you have any questions regarding the report or wish further clarification of information, please, feel free to contact me. I apologize for being so slow in writing the report and wish that it can be of assistance to you.

Sincerely

Kristiina Iisa

Kristiina Iisa
Assistant professor

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY
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BEND

Answers to the four questions presented by the Department of Environmental Quality in their request dated August 8, 1996 and additionally to the fifth question presented in a separate letter dated September 6, 1996.

1. Sulfur and Dioxin Formation

a. The DEQ has received technical information indicating that sulfur is an inhibitor to the formation of dioxins. Does sulfur act as an inhibitor to the formation of dioxins and will the sulfur present in mustard (HD) act as an inhibitor for dioxin formation in the proposed incineration process for the UAD incinerators?

Yes, the presence of sulfur in sufficient quantities in a fuel inhibits dioxin formation, and yes, sulfur in mustard is likely to act as an inhibitor for dioxin formation during its incineration in the proposed plant.

The inhibiting effect of sulfur on the formation of dioxins has been confirmed by several studies. /1-6/ Both laboratory and full scale plants experiments have shown that the addition of sulfur decreases the formation of dioxins. The presence of sulfur in coal is believed to be the reason for negligible dioxin emissions in coal combustion.

The form in which the sulfur has been added in the experiments has been sulfur dioxide or sulfur in coal that has been added to municipal solid waste incinerators. During combustion all sulfur regardless of source is oxidized to sulfur dioxide. Thus the sulfur in the mustard gas will behave in exactly the same manner as sulfur dioxide added to the incinerators in the tests or sulfur in coal and the results are applicable to combustion of mustard in the incinerators.

Reductions in the formation of dioxin by factors of up to thousand have been measured. With the addition of coal there seems to be a critical sulfur to chlorine molar ratio above which the reduction is considerable but below which there is little reduction. With the addition of sulfur dioxide, there seems to be reduction regardless of the sulfur to chlorine ratio though the extent varies with the amount of sulfur added. In the tests with natural gas combustion that seem most applicable to the incinerator proposed here, two levels of sulfur to chlorine ratios were used: 0.64 and 1.34. At these levels the dioxin emissions were less than one tenth of those that were obtained without any sulfur in the gases./4/ In coal combustion tests the addition of sulfur dioxide to increase the sulfur to chlorine ratio from 0.36 to 0.78 decreased the dioxin and furan yields by a factor of ten. In another study sulfur to chlorine ratios as low as 0.1 were sufficient to reduce dioxin concentrations by a factor of one hundred./5/

The molar ratio of sulfur to chlorine in mustard agent HD is 0.69. It seems safe to assume that the sulfur in mustard inhibits dioxin formation. Reductions in the amount of dioxins by at least a factor of ten could be expected.

2. Chlorine and Dioxin Formation

a. Can dioxins be formed in a combustion process when chlorine is not an ingredient in the waste feed (i.e. chlorine in trace amounts as combustion air)?

Yes, any chlorine in the incinerator regardless of the source of the chlorine can contribute to dioxin formation. Even trace amounts of chlorine can lead to dioxin formation.

Laboratory and pilot scale studies done in well controlled conditions usually indicate that increasing the amount of chlorine by e.g. addition of hydrogen chloride increases the yield of dioxins/4,7-8/. Full scale studies on the other hand have failed to show any trends with the chlorine concentration./8-10/

The discrepancy between the two findings can be explained by the extreme complexity of the processes leading to dioxin formation. There are several routes for dioxin formation: *de novo* synthesis in which carbon in ash or soot reacts with chlorine to dioxin and formation via precursor mechanism in which chlorinated products of incomplete combustion are transformed to dioxins. Both may occur at short time scales in flight or over extended periods on deposits and other surfaces. Both are affected by the presence of several impurities.

Overall, factors other than the chlorine content are more important in setting the level of dioxin emissions during gas combustion in an incinerator./11-12/ The form at which chlorine is present in the flue gases is believed to influence dioxin formation more than the total amount of chlorine in the gas phase: elemental chlorine is more reactive than hydrogen chloride for dioxin formation./13/ During gas combustion factors such as sooting (formation of small particles consisting mainly of carbon) may have a greater impact on dioxin formation than the chlorine content./7,14/ Metals such as copper and iron catalyze dioxin formation, and the presence of them in the flue gases greatly increases dioxin formation. /15-17/

In general the existing data on the effect of chlorine concentration can be concluded to imply that at relatively high concentrations of chlorine in the feed, of the order of percents, the dioxin emissions are independent of the chlorine content of the feed. At low chlorine concentrations at otherwise identical conditions an increase in the chlorine content may increase dioxin emissions. Factors other than the chlorine content have a greater impact on the formation of dioxins and it is impossible to predict dioxin concentrations solely based on the chlorine content of the feed.

It is important to bear in mind that the dioxin concentrations are so low that even minute amounts of chlorine may lead to substantial dioxin formation if the conditions are right. With a chlorine content of 1 ppb (0.0000001 volume %) in the flue gases and a conversion of one percent of the chlorine to dioxins we could produce more than 5 ng/m^3 of dioxin.

b. Because the UAD incinerators are natural gas fired, would one expect other natural gas fired combustion facilities such as the Co-Gen facilities in the area, to form dioxin if chlorine was not a key component? If so at what mass emission rate would dioxin be produced?

Yes, there may be formation of dioxins from the Co-Gen facilities due to trace impurities of chlorine in the combustion air or the natural gas. However, without measurements it is impossible to quantify the dioxin emissions. Generally, natural gas fired combustion facilities are deemed not to produce significant amounts of dioxins. Significant dioxin emissions could be defined for example as emissions above 1 ng/m^3. Measurements in the literature have indicated, however, dioxin concentration well above 30 ng/m^3 during gas combustion without other chlorine sources except impurities in the fuel and combustion air. These measurements come from small scale experimental facilities and they are probably not applicable to large scale applications such as the Co-Gen facility.

c. How would the dioxin mass emission rate for the UAD incinerators while operating on natural gas compare to when mustard (HD) is introduced into the incinerators versus not introduced into the incinerators? What is the dioxin reduction for the UAD incinerators if HD is not burned? In calculating the dioxin emissions, the calculations should include: start up, shut down, normal operations, and upset conditions.

Some increase in the dioxin emissions may occur when mustard is introduced in the incinerator compared to the incineration of the nerve agent VX. However, the emissions from the proposed system both with and without mustard addition are expected to be below 1 ng/m^3 and thus it is impossible to give an estimate for the increase. The emissions during start up or shut down or upset conditions are not either expected to exceed 30 ng/m^3.

Mustard contains 41 % chlorine by weight which makes it seem like a strong candidate for dioxin formation. However, as stated in the answer for the first question it contains sulfur at a sulfur to chlorine molar ratio of 0.46, and sulfur inhibits dioxin formation. Based on studies in full scale plants there is no direct proportionality of dioxin formation with the input chlorine concentration, at least at high concentrations. Further, dioxin formation is normally greatly increased by the presence of certain metals, notably copper and iron. The concentrations of these metals are relatively low in mustard. This would make the dioxin emissions low when compared to e.g. incineration of municipal solid waste at similar chlorine concentrations. Overall the expectation is that despite the high chlorine content of mustard the dioxin emissions will be low.

The nerve agent GB contains 0.1 weight % hydrogen chloride as impurity. This makes the amount of chlorine in GB about one four hundredth of that in mustard. However, GB does not contain any significant amounts of sulfur. One way of comparing the emissions during combustion of mustard or GB is to assume that the dioxin emissions are directly proportional to the chlorine concentration until up to 1 weight % and that above this concentration the dioxin emissions are independent of the input concentration. This seems a reasonable assumption based on the data available. Further, based on the data presented in the answer to the first question it is safe to assume that the sulfur in mustard decreases the dioxin emissions by at least a factor of ten. This would make the dioxin emissions during combustion of mustard the same as during destruction of GB.

The nerve agent VX does not contain any significant chlorine impurities. The chlorine source during VX incineration is then any trace impurity in the agent, natural gas or combustion air. In addition VX contains sulfur, at about half the concentration of that in mustard. These two factors make it likely that the dioxin emissions during destruction of VX in the incinerator are lower than during destruction of mustard.

The dioxin emissions from the proposed plant could be best estimated based on the trial burns at Johnston Atoll. Table 1 shows the reported dioxin and furan emissions during different sets of trial burns. Included in the table are only values that were actually detected. The results of the five sets with three to four experiments in each are shown. The values for each run in the sets as well as the average for each set is given.

Table 1. Sum of the detected concentrations of dioxins (PCDD) and furans (PCDF) in ng/m^3 during the experiments at Johnston Atoll. LIC refers to liquid incinerator, DFS to deactivation furnace system, MPF to metal parts furnace, and DUN to dunnage furnace. Source: Appendix G (JADACS Emission Test Summaries and ANCDF Emission Estimates) of the Final SRA, RCRA Part B, RA No. 39-26-1399-95, Revision No. 1, 14 July 1995.

agent	run 1	run 2	run 3	run 4	average
HD, LIC	0.1	0.04	0.09	0.33	0.14
VX, LIC	0.06	0	0	0	0.01
GB, LIC	0.13	.02	0.18	-	0.13
VX, DFS	0.64	0.31	0.1	0	0.26
HD, MPF	0.18	0.04	1.21	0.21	0.41
GB, DUN	7.25	6.97	4.02	7.66	6.47

The average emissions vary from 0.01 ng/m^3 for the liquid incinerator tests with VX to 6.5 ng/m^3 for the dunnage furnace tests with GB. The liquid incinerator test runs show the expected trends: higher and approximately equal emissions for mustard and GB and lower emissions for VX. The comparatively high emissions from the deactivation furnace with VX and the dunnage furnace with GB may seem surprising at first.

The source of chlorine in the VX experiments could be trace impurities in the combustion air or natural gas or the feed (energetics and small metals parts). Johnston Atoll is situated in the Pacific Ocean at a relatively warm climate. This makes the air contain considerable quantities of chlorine. This could raise the chlorine concentration to a level high enough to explain the dioxin formation. The feed to the deactivation furnace contains metals, and the flue gases contained higher concentrations of metals than those from the liquid furnace. The presence of metals in the flue gases enhances dioxin formation. This may easily explain the relatively high emissions from the deactivation furnace.

Another interesting feature in the data for VX destruction in the deactivation furnace is the decrease in dioxin concentration from experiment to experiment. It has been demonstrated that contamination of incinerators by soot or metals affects dioxin emissions and that the dioxin emissions may be slow to respond to changes in the feed conditions, e.g. changes in sulfur concentration./7,18/ Response times of several days have been reported. It is possible that there may have been some incident that had rendered the furnace highly active for dioxin formation and that the activity was slowly decreasing.

The GB that was added in the dunnage incineration test contains some chlorine. Thus the chlorine sources are GB and impurities in air and natural gases plus possibly in the waste. One difference between the dunnage furnace and the other incinerators is that the pollution abatement system contains no quench tower for quickly cooling the flue gases. Dioxin formation occurs at high rates only at temperatures in a relatively narrow range of 250-400°C. The longer residence times at these critical temperatures increases the formation of dioxin. The flue gases contained higher concentrations of metals than those in the liquid incinerator tests. In particular copper concentrations seem to have been high. As stated for the emissions from VX destruction in the metals parts furnace, metals , in particular copper, enhance the formation of dioxins. A further factor may be that the material burned in the dunnage incinerator includes wooden pallets and packing materials. They form ash, and ash also promotes the formation of dioxins. The concentrations of volatile products of incomplete combustion were also somewhat higher than those in the tests in the liquid incinerator. The combustion may not have been as complete as in the liquid incinerator. GB does not contain sulfur that would have inhibited dioxin formation. All of these factors contributed to the higher dioxin emissions even though the chlorine content of GB is low compared to mustard and the amount of the agent is smaller in the incinerator is smaller than in the liquid incinerator.

The data from the deactivation and dunnage furnaces clearly demonstrate that other factors are more important for dioxin formation than the concentration of chlorine in the feed.

The dioxin and furan emissions taking into account the detected amounts and undetected ones at the detection limit were all below 7 ng/m^3, and with the exception of the dunnage furnace below 1.5 ng/m^3. With the addition of carbon filters the emissions from the proposed Umatilla incinerator will be considerably lower than this. With the carbon filters it is possible to decrease the dioxin emissions by several orders of magnitude. Thus an estimate of actual emissions below 0.1 ng/m^3 is reasonable and below 1 ng/m^3 conservative.

The above applies to operation at normal considerations. The emissions during start-up, shut-down or upset conditions could be higher. However, with the safety procedures proposed for the plant I do not expect them to be exceed 30 ng/m^3.

Some conditions that would increase the dioxin emissions include:

- Improper combustion conditions in the incinerator. This would result in increased formation of products of incomplete combustion. In extreme cases dioxins could be formed in the incinerator. However, a more likely and greater effect of improper combustion is increased soot formation and the formation of precursors for dioxin formation. The presence of excess amounts of soot greatly increases the formation of dioxin. The proposed plant contains primary and secondary chambers or primary burners and afterburners for all incinerators to ensure proper combustion.

  A good indicator for improper combustion conditions is the carbon monoxide level in the incinerator. If the carbon monoxide concentration exceeds 100 ppm in the incinerators the agent feeds to the furnaces will be cut off. The agent feed will also be cut off if the oxygen concentration becomes lower than 3 %, or if the temperature becomes lower than set values. Also if the combustion air pressure decreases below a set limit, the incinerators will be shut down. All of these precautions should ensure that proper combustion conditions are maintained and that there will not be increased dioxin emissions. Even if there were improper combustion conditions, the carbon filters still provide a buffer against increased concentrations of dioxin, and the dioxin emissions are not expected to exceed 30 ng/m^3.

- Lack of cooling in the quench tower. If the cooling liquid flow to the quench towers decreases or ceases, the temperature of the flue gases may remain high. This would lead to increased exposure of the gases to temperatures in the window 250-400°C (480-750°F) that is critical for dioxin formation and thus increase dioxin emissions. All feed will stopped if the temperature of the gases leaving the quench tower exceed 250°F. This seems adequate for ensuring that no sustained temperatures above 480°F will be encountered. The carbon filters still provide extra security, and the emissions are not expected to exceed 30 ng/m^3.

- Unavailability of a carbon filter. If the carbon filters were not operational the dioxin emissions would increase. In this case, the dioxin emissions are expected to be comparable to those measured at Johnston Atoll and they would still be below the limit 30 ng/m^3. There are two spare carbon filters that are common to all of the incineration units. This should be adequate for ensuring that the gases can be switched over to one of them in case of an unavailability of a filter.
- Formation of hot spots in the filter. The formation of hot spots may cause fires and release of adsorbed dioxins from the filter. The carbon monoxide concentrations before and after the carbon filters are measured and used as an indication of possible hot spots in the filters. The carbon filters are also taken off line if the temperature of the inlet gas exceeds 130°F.

All of the precautions seem adequate to ensure that the dioxin emissions during upset conditions do not exceed 30 ng/m^3.

3. Combustion technology and dioxin.

a. What is considered state of the art design technology for preventing dioxin formation in a combustion process?

Most of the dioxin formation occurs at the low temperatures downstream of the combustion chambers at temperatures 250-400°C. Hence the incineration technology is not nearly as crucial as the design of the pollution abatement system for formation of dioxin. As long as conditions are maintained for destruction of the agents at the desired level the design of the incinerator in not crucial.

For proper combustion a sufficient residence time at high temperatures with good mixing is required. Non-proper conditions increase the formation of products of incomplete combustion. This includes formation of precursors for dioxin formation or dioxin itself though the latter is usually not of great importance. Further, improper combustion produces soot. The formation of dioxins increases considerably when the combustion produces higher amounts of soot.

4. Pollution Control Technology and Dioxin

a. What are the essential design elements of a pollution abatement system for controlling dioxin emissions from a combustion process?

The essential elements of a pollution abatement system for controlling dioxin emissions from combustion processes are: a) rapid cooling of the gases in a quench system to prevent dioxin formation and b) adsorption of dioxin once it has been formed. Both of these processes are employed here, the former as quench towers for the liquid incinerators, deactivations furnaces and metal parts furnaces and the latter as the carbon filters for all of the systems. Due to the low concentration of the agents in the dunnage furnace the dioxin emissions are expected to be lower than from the other furnaces, and no quench cooling is provided for this stream.

In principle there are two different ways of addressing the minimization of dioxin emissions. The first is to prevent the formation of dioxin and the second is destruction or removal of dioxin once it has been formed.

The formation of dioxin occurs in a relatively narrow temperature window of 250-400°C. Above 400°C and below 250°C the net rates of dioxin formation are negligible. The minimization of the exposure to these temperatures is one of the most efficient methods of preventing dioxin formation. By this method the formation of dioxins is easily decreased by factors of ten to hundred./19/ Other suggested methods for the prevention of dioxin formation include the removal of precursors of dioxin formation. An example is the removal of hydrogen chloride by use of limestone./20/

The addition of compounds containing sulfur to inhibit dioxin formation has been suggested and demonstrated as well. Good results have been obtained with the addition of high sulfur coal or lignite to municipal solid waste incinerators./3/ Mustard and the agent VX have high sulfur contents and sulfur is naturally present in the incinerators in these cases.

Several methods have been developed for removal of dioxin. Activated carbon is the most common candidate for adsorption of dioxin. The injection of activated carbon as a final step to remove dioxin emissions after scrubbers is used extensively in Europe. In this method activated carbon or a mixture of carbon with limestone is injected into flue gases after scrubbers or other flue gas cleaning equipment. The carbon is then captured in fabric filters. Some of the removal of the dioxin occurs in flight on the activated carbon particles, the rest on the activated carbon collected on the filters. Removal efficiencies of more than 95 % and emissions below 5 ng/m^3 are easily achieved.

Another way of using activated carbon for the capture of dioxin are static or dynamic carbon filter beds. The flue gases are led through beds of activated carbon and dioxin and other impurities are adsorbed onto the carbon granules. This is the method chosen for the Umatilla facility. The efficiency of the carbon filters depends on the quality of the activated carbon. With a proper selection of this very high reduction efficiencies can be obtained. The efficiency of activated carbon filters is unsurpassed by other methods. An activated carbon filter used in the incineration of solid radioactive waste in Germany was reported to decrease the dioxin emissions by factors ranging from 250 to 5700 with an average reduction by a factor of 1700 in nine tests/23/. These correspond to reduction efficiencies of 99.6 to 99.98 %.

The activated carbon filters have two distinct advantages. The use of activated carbon in method gives the ability to simultaneously reduce the concentrations of other pollutants as well. Thus they offer added security against accidental releases of the agents or other products of incomplete combustion. Another benefit of using carbon filters is that they contain large quantities of the filter bed material. This offers buffering capacity in cases of accidental high concentrations of pollutants, whether they are dioxins or agents. This feature is unique to the carbon beds.

The use of activated carbon together with limestone in the equipment for sulfur dioxide removal has been proposed. The ability of dry, semi-dry and wet processes to reduce the toxic equivalent to values of less than 0.1 ng/m^3 has been demonstrated in Europe./21/ A disadvantage of these methods is that the wastes are mixtures of the carbon that has been contaminated by dioxins and other pollutants together with the limestone and possibly ash from the combustion process. The disposal of the waste mixture creates a problem.

Mixtures of sodiumbicarbonate and carbon have been used as well in the dry method with good success./22/

Several other methods for the reduction of dioxin emissions are being developed./24/An example is the application of selective catalytic reduction for oxidation of dioxin. The selective catalytic reduction is used for nitrogen oxides removal. High destruction efficiencies can be obtained if the temperature in the catalyst is high enough. /21,25/ Other catalysts for dioxin oxidation are being developed as well.

In many cases the methods of reducing the amount of dioxin formation may be sufficient for achieving low dioxin concentrations. With high dioxin emissions, removal or destruction of dioxin is needed as well.

5. **Design of the carbon filters and best available control technology. My opinion on the pollution abatement system (PAS) carbon filter design and comment as to the carbon filter system applicability as being the best available technology for incineration design was asked.**

As expressed in the answer to the fourth question, activated carbon filters together with rapid quenching of the flue gases is the most efficient methods of reducing dioxin emissions. No other method seems to be able to offer higher reduction efficiencies. The carbon filters have the advantage of being able to reduce concentrations of other pollutants as well and of offering added security against accidental high releases during upset conditions.

The use of carbon filters contains some risks. There is a possibility for the formation of local hot spots that could lead to fires and release of the adsorbed compounds from the carbon. Also, condensation of water in the filters might render the filters unusable. The preventive actions proposed for the carbon filters at the Umatilla facility seem adequate for reducing the risks associated with the use of the carbon filters.

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ENVIRONMENTAL QUALITY COMMISSION

MEETING

NOVEMBER 22, 1996

PENDLETON, OREGON

Persons Present:
Henry Lorenzen, Chair
Carol Whipple, Vice Chair
Melinda Eden, Member
Linda McMahan, Member
Tony Van Vliet, Member
Langdon Marsh, DEQ Director
Larry Edelman, Assistant Attorney General
Stephanie Hallock, DEQ Regional Administrator
Gil Decker, Assistant Secretary of the Army for RDA
Colonel Landry, Alternative Technologies
Maj. General Orton, Program Manager for Chemical Demilitarization
Gary Boyd, Science Applications International Corp.
Brett McKnight, Manager, Eastern Region Hazardous Materials Program

TAPE 1, SIDE 1

HALLOCK: . . . operations, proposed permit for the chemical demilitarization facility at the Umatilla Army Depot, and this is a, the purpose of this meeting is for Commission deliberation and not for public comment. We have had several opportunities for that, and today is not a public comment day, I want to clarify that for everyone who is here today. We want to begin with some folks who will follow up on some questions that were raised by the Commission at our November 15 work session in Portland. I call this tying up some loose ends before you begin your deliberations. We have Mr. Decker, who is here from the Army. We have some of the consultants here who worked on the quantitative risk assessment. They will all introduce themselves as they speak. We've asked specifically that they follow up on three issues that you had raised. The first one that I believe Mr. Decker is going to address is, there's been a lot of interest expressed by the Commission in the possibility of not processing the HD, the mustard, with the other munitions and agents in the incineration technology, but somehow either deferring that decision or setting it aside and somehow considering that separately, because the Army is considering that also at the Aberdeen facility, perhaps waiting until they have the ability to pilot and find out if that's appropriate in Umatilla. And I think Mr. Decker's going to talk with you today about potential ramifications of that decision. Secondly, there are a number of questions about water quality impact, both water coming in and water going out, or hydraulically going out, with the neutralization technology, and I think Colonel Landry is here from the Army Alt Tech Program, really he was in charge of the Alt Tech Program, and he will talk a little bit about that. Commissioner Eden asked if we had had an opportunity to talk to Water Resources Department about potential water rights issues in terms of withdrawing water from the Columbia

River, if that were to be considered an option. Unfortunately, we have not had a chance to do that, but I would just mention to you that that would be an issue that would need to be addressed as well as in terms of discharge. The depot itself, my understanding is, their property is not adjacent to any body of water, so there would be issues of how you discharge, how you go through people's property and that sort of thing. But we have not done any work on that. The Army has, they can address that. And thirdly, an issue that was raised, in particular by the Confederated Tribes, but others as well, is the issue of taking some kind of action to -- there's actually two different (inaudible). One is reconfigure the stockpile, and the other is reverse assembly, and those are actually two very different things. Reconfiguration of the stockpile is generally meant in the context of taking what's in the igloos now, M55 (?) and whatever else, and redistributing those munitions in more igloos, and stacking them differently or whatever. Reverse assembly is the term that has been used when we're actually talking about beginning to process the munitions, no matter what technology that you use, where you have to go through a process of (inaudible). So those are two very different things, and A, I wanted to clarify that, and B, Gary Boyd from SAIC, who did the quantitative risk assessment, is going to talk with you about the practical impact of, on risk, of each of those processes. So we're going to start with that, and then when we've gotten to that discussion, then we'll go to the next (inaudible). So I would invite Mr. Decker and Colonel Landry and Gary Boyd to (inaudible).

LORENZEN: Secretary Decker, welcome to Eastern Oregon.

DECKER: What I would like to do is just give an overview and tie together some of these issues that Ms. Hallock described. They are somewhat interrelated, then we'll have Colonel Landry and Gary Boyd talk about some of the specifics. In terms of the agenda, I'll take the question as is. The issue, it says, what's the impact of the overall project if mustard HD agent, which, as you know, is contained in one-ton containers here, has no explosive, is removed from the proposed permit. There's two dimensions to that question and part of it needs interpretation. If we interpret that as a, that the plant and the application that we've submitted would be permitted as is, with the proviso that one cannot burn mustard until further assessment, then we would probably proceed, but I think that creates some significant potential negative impact. That says we would build the plant, and as we had planned in our schedule always, the first thing that we do, once the plant's completed, has its shakedown crews and is approved by the Environmental Commission for operation, we would begin with the nerve agent and the weapons first. They are far and away the most dangerous by any measure, and clearly contribute the greatest risk of storage, and so it's sensible, because of our own risk analyses, to proceed with the baseline technology and get rid of the weapons first. And in our scheduling for our campaign for each of the individual weapons burned, the thing that would be scheduled last in there would be the mustard. Now, that schedule says, if we go according to schedule, and I think our experience is backing up our schedules reasonably well now, including, if we were to receive ultimate approval to go ahead and use baseline for the mustard in the one-ton containers, then we would be completed with everything by the end of 2003, including the demilitarization of the facility itself. And that's where we'd be. If we reach the point of having completed the weaponry destruction successfully, and the mustard containers are still waiting to be accomplished, our schedule estimate, we provided these data to the Environmental Commission, is that it would be, the use of baseline to complete the mustard one-ton containers is only a little over six months, period. So we then are done at the end of 2003. If, however, we were to be required to go to an alternative technology, and I'm going to touch on the ramifications of that unto itself in a moment, we really wouldn't be able to get the construction and systemization and the project started until we'd completed the baseline, for a whole host of reasons. One, it would clearly require, if we tried to do it before, we'd have to redo health risk assessments. We would have construction workers somewhere on the site building a second facility, and so it changes the risk profile to employees and everything. So it's our perception that we would have to complete the baseline process for the weaponry. We could begin our permitting parallel with that. But we really could not begin the construction and systemization, this is under a success scenario of the alternative technology, we could not begin the construction and systemization of the alternative for the mustard until we had completed the destruction of the weapons, and so our estimate of the time to get that systematized, constructed, tested and get into the process probably adds around seven years to the total schedule. So that's one impact of delaying, and probably the very, very significant, serious impact, and the longer the mustard is here, even though it's a less hazard in a palliative sense than nerve agent and weaponry, the longer it ties up the land, the longer it's an intrusion on the community. We don't believe that's a very good trade-off, to be honest. Now, let me turn my attention for a moment to the potential alternative technology itself. As you're undoubtedly aware, we were recommended to, by the National Research Council, in their '92-'93 study, to continue the baseline, but for bulk sites, which we only have two, one being Aberdeen, we were recommended by the National Research Council to continue our research for an alternative technology for the bulk agent only. We took that advice to heart and did that, and recently, as you well know, completed the assessment by the National Research Council of five different potential alternative technologies. They were not addressed to the weaponry and to the complexity of the explosives and things like that. It looks like we may have, we've done some testing, not done a pilot plant, and it looks like neutralization -- we don't have a hard decision on this. Timing is everything, and our official meeting with everyone to reach ratification on our next step happens next Tuesday. But I project that the recommendation that will be made is that we should go ahead at Aberdeen and pilot the alternative technology. So I'm hazarding a guess that'll be the final decision this coming Tuesday. For purposes of this discussion, we may as well go ahead and assume that. Neutralization, followed by biodegradation, is probably going to be the recommended process. That process is essentially, as you know, a hot water sparging of the mustard itself, which would be disassembled from the one-ton containers, and a flushing out of the one-ton containers. And the sparging creates a contaminated water solution with substantial amounts of biodiglycols and salts and probably trace elements of the agent itself. That is then followed by a biodegradation process in a holding tank, where biological organisms eat at the impurities and bring the water down then to a much lower percentage of biodiglycol and a much lower percentage of the impurity salt. At that point, our assessments are that the water is safe enough to discharge where you have a place to discharge it that has the mass to accommodate it. So the plans there, if we're successful, would be that we would discharge that final processed water through biodegradation into a fast-flowing portion of the Chesapeake Bay, that's a large water body, it's turbulent and a very small percentages of salt and biodiglycol. Here, we are concerned, there's a much more fragile water system here by far, and we're not sure there's a mass large enough to handle the water discharge. Even if the calculations show that it ought to be safe, you still have to have a mass to stir it up and move it on. So we're very concerned about that. There are some numbers, here there are about, I'm rounding off, almost twenty-four hundred tons of mustard agent inside the containers. And in Maryland there are around sixteen hundred. So they have a lesser quantity. The process of sparging followed by biodegradation and the way the water is used creates about a ninety to one ratio of water to mustard tonnage. So you're discharging, even after the biodegradation, about ninety gallons of water, and it's got to go someplace. If you truck it off, it's got to go someplace. For every -- ninety gallons for every gallon of agent. And that gives us some great concern here. It is a concern in Maryland too, but they've got the mass places to discharge it. So you've got, if you round all that off in the process of what we think the conversion efficiency is, we end up with something like twenty-six or twenty-seven million gallons of processed water we've got to put someplace. Whereas in Maryland, it's about sixty percent of that, with the ability of a mass that we can discharge it in. So there are unique differences in the two locations, and that water issue is one that would need further work, but our first cursory assessment of that is as I've described. The last point I might make on that issue is, I think the basis for the National Academy recommending we continue to pursue an alternative technology, even though all of our evidence from actual burning of mustard at Johnston Island, we've not burned any mustard yet at Tooele, we're on the nerve agents and rockets as we speak, but all our evidence of burning mustard at Johnston Island, plus our constituency analyses and whatever, indicate that the baseline process handles mustard very well, and falls well below the required, or in terms of performance, well above the required standards of conversion efficiency. And so we just think it would not be good with this water problem to mix and match the two processes. If Maryland had a mix of weapons, as opposed to a smaller quantity of pure agent but no weapons, we would be in the same fix there and would not be recommending alternative technology. So that's a quick summary of kind of an overview, summarize potential impact if mustard is removed from the proposed permit, and what that means is to go ahead and built a plant as is, but that sooner or later we're going to have to bite the bullet, either take another six months and finish the mustard with baseline or see a seven or eight year delay with an alternative process, and how to face this water problem. And the second question about water, I gave you an overview, and I've got Colonel Landry here if you want to get into more detail on that. And I will leave it, if it's okay with you, up to Gary Boyd, he's the risk analysis expert, to address your issues about reconfiguration of the (inaudible).

LORENZEN: Any questions from the commission?

VAN VLIET: Was the seven-year figure for the building of another plant to handle the mustard, seems exceedingly long compared to the building of a plant to do incineration. Why does that seem to be such a long period of time for building?

DECKER: It's a seven-year period to complete the operation, and it's inclusive of the plant building.

VAN VLIET: Well, you have six months to, under normal, under an incineration process, you said six months to get rid of the mustard.

DECKER: Right.

VAN VLIET: I would assume that it's not going to take too much longer than that for the water process, is it, or is that seven years really because you're working at an alternative of the water process, the building of the plant and the water treatment or whatever does take that additional amount of time.

DECKER: Basically, that is the answer. The conversion rate of the sparging and biodegradation, in terms of throughput, is slower than incineration. I'll give you a little breakdown on that. As I said, if you go baseline incineration to the end, assuming permit reasonably soon, we're finished toward the end of 2003 with everything. If we were to say we will use neutralization someday, but use incineration of the weaponry, that's early in 2003 when we finish the weaponry. We would have known by then if our piloting of the alternative technologies for mustard worked. If it doesn't, we're back to square zero at Aberdeen. If it does, that's not going to be known until about 2001 or 2002, but we'll know enough to begin permitting for that plant in about 2001 here. But we can't start construction of it until we've completed the incineration. We can't put construction sites, crews on site, we have to find another site. And so you really have to wait until the burning is over, the incineration's over of the weaponry, and then you're (inaudible) go, you award the contract. Our estimate is that the construction and systemization, including trial burns of surrogate agent -- I mean trial processing of small amounts of agent to shake down the plant and everything, would probably take four to five years. Just with the way it goes. And then another two to two and a half years to finish up. And that's how you get seven year (inaudible). I hope that wasn't (inaudible).

(INAUDIBLE COMMENT)

DECKER: Once the plant is systematized, that's the definition for approved for operation, once you say go (inaudible).

(INAUDIBLE COMMENT)

LORENZEN: Secretary Decker, I have a couple questions I'd like to have you address, and you touched on one probably sufficiently, but if there's anything more you could add I'd appreciate it. The first question is, what additional costs do you estimate would be imposed upon the government if the facility were constructed as a hybrid facility, that is, incineration on everything but HD and neutralization of HD. And the second thing, the second question, is, and you touched on this already probably in sufficient detail, but if there's anything more that can be added I would appreciate it. From our position, we are dealing in a great deal of uncertainty, we never have the benefit or the luxury of perfect information, unfortunately, but what are the trade-offs and what are the benefits that are achieved if we don't incinerate mustard but do neutralize mustard? You've touched on the problems associated with the neutralization, namely the quantity of water needed and also the quantity of water that has to be discharged, and then the potential harm to the environment through water that is not distilled water quality. On the incineration side, there are certain shortcomings as well. As I mentioned, I wish we could be genies and could make this stuff simply disappear, but unfortunately we have to worry about mass balances. And on the, but on the incineration side, what do you see that we would gain environmentally if we did not incinerate and compare that to what we'd lose by having to neutralize and dispose of the products of neutralization, from the neutralization process.

DECKER: That's a fair question. I may refer to a couple of our experts, but I'll try and handle it. We probably gain some degree of public comfort, back to the mass balance issue. There's really great concern about incineration in general of anything in this country. A number of people feel that we shouldn't incinerate anything, and I understand that. And there's certainly some fear that something could happen and we would release toxic waste into the air. Something could happen in the neutralization process, spring a leak or stuff could pour out. And I don't think you'd want a quantitative trade-off of those risks. I think -- part of this gets into the risk. I think, personally, this is my qualitative opinion, that from what I understand, the water system in this area is treasured, as it should be, not just the Columbia River but the water tables and things. As you're quite aware, we are -- at the base, where we have the chemical weapons stored, in the previous operation it was a, it handled conventional weapon, and some contamination of PNT and one other constituency got into the ground, and we're remediating that now, with a dig-up and biodegradation process. And I don't believe any of that has moved into the water table yet, but it has a potential of doing that. So that's just evidence to me that, rightly so, there is great concern about the water in general here, and I would feel, qualitatively, that you're really better off, since we've proven the incineration handles things, and more than meets the standards that have been established, we would, we might be better off to complete early and get it done, and we might lose rather than gain with the water issue. That's a qualitative answer. If you want to get into specifics of discharge and everything I'll get the experts up here.

LORENZEN: And then the issue of cost, what would you anticipate the additional cost would be if we --

DECKER: It's about three hundred forty, three hundred fifty million net delta to the second facility.

LORENZEN: And that's in comparison to what the total project costs without the neutralization?

DECKER: Yeah, of the one point two billion, about six hundred million is the baseline facility, and the rest is operation maintenance till we're done, and disposal operations. But one point one, one point two billion, goes to about one point three, one point four billion.

LORENZEN: Thank you.

DECKER: We have, we have tried to look at this trade-off and answer your questions, just putting the cost issue aside. I mean it has to loom someday, but it contaminates the true technical answers (inaudible).

LORENZEN: Thank you. Lang?

(INAUDIBLE PORTION)

LANDRY: I'll answer your second question first.

LORENZEN: Welcome, Colonel.

LANDRY: To address your second question first (inaudible). The essential difference between the Columbia River and the Chesapeake Bay is the Chesapeake Bay is (inaudible) somewhat salty water. The discharge that is coming from the Aberdeen proving ground plant, after it comes out of the biodegradation facility, it would then be fed into the basin sewage treatment facility (inaudible) several times before it was actually discharged into the Chesapeake Bay. The salinity of the material at that time is approximately equal to the seasonal peak in the Chesapeake Bay, so in terms of discharge to the Bay (inaudible) that's not a problem. Whether or not it would be a problem in the Columbia River as a (inaudible), I don't know (inaudible). In terms of quantity, we're looking somewhere around, total salt content, about one pound, about a pound and a half of salt for every pound of (the rest of this speaker's answer was inaudible).

(INAUDIBLE QUESTION AND ANSWER)

HALLOCK: I need to ask everyone to speak close, very close to these mikes. Yeah, they're not particularly -- that's better, thank you. And the Commissioners too, please.

LORENZEN: Lang, do you have any further questions?

(INAUDIBLE QUESTION)

LANDRY: The neutralization/biodegradation process for the mustard -- I need to specify that we're dealing with HD. There are several other forms of mustard which we haven't done any research on yet, haven't completed. But that process has demonstrated up through what we define (inaudible), up through a forty-gallon capacity repeatedly (inaudible portion).

DECKER: Could I make an extension of your (inaudible) and he's a well-qualified (inaudible) engineer, so I'm not (inaudible). One other aspect (inaudible) not scientific proof (inaudible) at some pilot level, in this case with the forty-gallon (inaudible), maturity in one sense is the totality of the engineering process, that's what we're going to have to find out with the pilot, which we'll probably agree that we'll move out on when we have our meeting this next Tuesday. We're having the Maryland supervisory commission chairman in, he's got some technical advisers, he's going to brief their views of this to our review board, and we're going to recommend a decision to Dr. (inaudible) Secretary of Defense office where we want to go. Having said that process, you won't know the engineering production totality of maturity until we complete a full pilot scale plan, which is like a small production plant. So we have not any of these potential alternatives that we analyzed and tested at bench scale, that they've been proven in any sense of production. And it's going to be three or four years of piloting to have that level of maturity at Aberdeen, and they know that.

LANDRY: If I could just use one of my favorite analogies to try to capture that. If you watch Julia Childs make a souffle on television (inaudible). However, what we need to do now is to take that souffle over to the Sara Lee plant and we need to start producing ten thousand each day. That's the kind of transition we're talking about making. All this research that we've done (inaudible portion) taking that process now and moving it over to the production process is very analogous (inaudible).

LORENZEN: Any further questions? Melinda?

EDEN: Just to follow-up, Colonel, on what I thought I heard you say about the distilled mustard. All of your alternative technology studies with respect to mustard involve the distilled mustard, is that correct, and there are other types that you did not -- am I --

LANDRY: There are essentially three kinds of mustard (inaudible), what's called H, otherwise known as (inaudible) mustard, did not go through the second (inaudible) step. The HD or distilled mustard, and there's a third type called HT. HD is mustard mixed with another compound called C, it looks a lot like mustard (inaudible). We have done (rest of answer is inaudible).

LORENZEN: Further questions? Thank you very much, appreciate, very much appreciate you coming out. Thank you. Mr. Boyd?

BOYD: My name is Gary Boyd from SAIC. I want to address --

LORENZEN: What is SAIC? You'll have to excuse us, we're --

BOYD: Science Applications International Corporation.

(INAUDIBLE SPEAKER)

BOYD: I want to address a topic that Stephanie introduced this morning about the potential for various means of -- but I think I want to step back from that and address it kind of holistically about all possible (inaudible) risk reduction in the stockpile so we don't get hung up on one particular concept of what that might be. First of all, as I mentioned in the last meeting, risk reduction is something that we are pursuing, both for the facility and for the storage at the stockpile. We had to get the baseline risk assessment done and under review before we investigated in great detail (inaudible) the ability to reduce the risk of the existing stockpile. And those studies are now being completed, we wanted them completed on all sites since there's a potential for some synergism here for potential risk reduction. That is a principal activity planned for early 1997, is to find ways to address a potential for risk reduction. Many ideas have been forwarded as to ways to reduce the risk, but it really does take study, because there are many trade-offs involved, and you don't want to embark on a certain issue before you really understand all the implications thereof. And so the risk reduction has been, is being evaluated. As a matter of fact, we have done some specific studies of means to reduce risk, for example, to give you an example, at the Tooele facility, there has been a suggestion to, for a number of operational and risk reasons, to change the order of certain campaigns, order of initiating the process, and we have looked at, for example, doing things to reduce the seismic risk of VX rockets, delayed further in the production process. And we have to produce models in order to do that. And that's a thing I expect to do on other sites also. In terms of risk reduction measures, the reason I said I wanted to talk about it holistically is that, you can go at it a number of different ways. You can, first of all, you can mitigate the risk (inaudible), you can identify what's important at a site and just go after those. Another is that you can identify things that can go wrong at a site, and try to limit the consequences of an accident, have better response to a potential item, that still reduces the risk, reduces the consequences that could occur. Another potential is to somehow reconfigure the munitions and store them differently, address the principal risk, and there is varying levels of reconfiguration that can take place, all the way out to, I think it was mentioned as reverse assembly, which would be separating the agent from any explosives, and having essentially those stored separately from then on. I want to talk through all those just briefly in terms of risk effect. With regard to risk reduction, we have been focusing on the sites that -- at the Tooele study, we've been looking at, very thoroughly, public risk and work risk. At the sites where we do not yet have a plant, we have been focusing on public risk. But in order to look at any sort of change in risk associated with trying to reduce the overall risk, we do need to look at work risk, because it could be very important for some of these activities where you actually have to bodily handle munitions. And there are some trade-offs there in that you may be able to gain a reduction in public risk, but at the expense to work risk, that is usually the case, and those aren't always necessarily in the same order of magnitude. Cutting in half the public risk and doubling the work risk, that may be a very difficult trade-off decision. And the other thing that becomes important, and I'll bring it up a few times, because of the importance of the storage, the changes in storage time are critical to the risk (inaudible), so that any concept that comes up, an important aspect of that is how quickly you can accomplish that, overall (inaudible) getting rid of weapons and other agents. I want to talk through, I guess, the most drastic risk reduction measures first, which would be some reverse assembly, cutting of (inaudible), some complete separation of agent from energetics, explosives or propellants. For some of the munitions, that process is somewhat straightforward. Some of the projectiles, there are certain (inaudible) projectiles where there is a problem, but some of the projectiles, reverse assembly can be shown and can be (inaudible) the risk. But I think we have to keep coming back to the rockets, the M55 rockets, which fairly clearly dominate the risk. Reverse assembly on rockets has been looked at and is a very difficult process if you intend to completely eliminate the energetics from the agent. The removal of the propellant from the rockets is something that can be done and has been done, but it still involves a number of steps where you have to actually remove the rocket from its tipping and firing tube, you have to have an explosive containment in order to do that. It is not a risk-free process, but there are means available and shown, that could develop separation of the propellant from the rocket warhead. Now, the warhead at that point would still have the fuse and (inaudible), so it would not completely accomplish the overall mission that I talked about first. If you were going to try and completely separate for the rockets, it looks like you would have to get into some method of draining rather than reverse assembly. The reason reverse assembly is not a particularly likely option is that the rocket warhead is a fairly, relatively soft aluminum, so if you put force on it attempting to take pieces apart, you could twist it and result in spilling of the agent that's therein. So there are means proposed, but not tested or shown for any large-scale draining of rockets. So that if we did proceed down that path, it would be development time and also a considerable look at risk, as to what the risk of that overall process would be. If we, if you head down a path of attempting to separate the energetics from the agent completely, you're also involving a great deal more handling risk. We know from the risk studies that as you, that what dominates the processing risk itself is the handling activity, the removal of munitions, and moving them around. That's particularly true with regards to the workers. If you were trying to accomplish a complete separation of energetics from agent, you would essentially need the front end of the existing facility, the proposed baseline facility. You would need the --

END OF TAPE 1, SIDE 1

TAPE 2, SIDE 2 (PORTION OF SIDE 2 WAS TAPED OVER BY SIDE 6; SOME OF THE INITIAL PORTIONS OF SIDE 2 WERE TAKEN FROM THE KUMA RADIO TAPE)

BOYD: -- comes to me and says I can take that out of your house, and I have overwhelming technical evidence that suggests that I can dispose of it without harming your family, the environment, or other families, then I'm left with this option of fairly unlikely that something will go wrong in my own household, or eliminating that potential risk. And I think that analogy's fairly good in this case. Mr. (Inaudible) has asked several times, why, why does this storage risk keep coming up higher than processing, is because you have it stored there, and you can put in the (inaudible) and things to protect it, but you still remain with some residual risk that doesn't go away until you eliminate the chemical. And you can eliminate, you can come up with all sorts of other options as to eliminating ninety percent of it and waiting a few years to eliminate the rest, but ultimately it comes down to, if you were a parent making a decision, is do I need this stuff anymore, and is there a way to get rid of it now. And I know we've had a few discussions about how to view this risk, and I think that analogy's fairly good, because for the people in this area, they know the cupboard's full, it's full of things that we no longer need, and at issue is, do we have, we have the technical evidence available to say we can empty that cupboard now. If there are any additional questions --

(Unrecorded portion)

BOYD: -- it also can get further complex when you add in the workers, obviously, but to answer your specific question, with regard to the emissions, they have been studied in a risk framework by your own state. The answers from the quantitative risk assessment and the health risk assessment aren't, can't be compared on a one-to-one basis because the health risk assessment was done with a method, methodology to identify whether or not the public is fully protected against any harmful effects of these emissions. And that has been done using a method that doesn't attempt to arrive at a best estimate of risk. It attempts to estimate conservatively, with regard to risk, as to how bad the risk could be, and then compare it to a standard. And I guess I would have to come back on that to, if you do that assessment, and you compare it to your standard, and your standard says that, below that standard, I'm seeing no practical consequences, then that's about the only way I can compare these two risks. Now, one could go off and do a health risk assessment using best estimates on all aspects and come up with something that perhaps might be more comparable, but in the decision framework we're in now, they can't be compared one-to-one, other than to state the health risk assessment standards and methods are set up to say that if you are below that standard, you are not having an impact on the environment or the health of people.

(Unrecorded portion)

UNIDENTIFIED SPEAKER - MALE: I would say emergency response was one of the key things that came out that there was a real feeling that more needed to be done there, and that that was, you know, from the local standpoint, that was a definite concern.

LORENZEN: Okay, questions?

(Unrecorded portion)

MARSH: -- at this point, but in discussing our recommendation on this finding, we will not be talking about the CSEPP program. There is an opportunity, however, because that was such a strong element of your concerns and also the public concerns, to discuss that in the next phase after we're done with the discussion of the findings. I think that you recognize the key issue. It's a very important decision, it's an unavoidable one to make, and it is a very difficult one. The challenges, I think, both you, Mr. Chair, and others have recognized is to weigh the risks of continued storage of munitions and agent against the risks of emissions and residues from the destruction of the agent, (inaudible) technology is chosen. We are dealing in fairly arcane probabilities here. It's really a fairly low risk of consequences, which, if they occur, would be extremely catastrophic. That makes your job, I think, a lot more difficult and challenging. The context here, therefore, I think is very important. And the context is that this is not an application for a commercial facility to take in at a profit or for profit materials from various places and destroy them as part of a commercial hazardous waste disposal operation. If there were no stockpile here, we would be faced with a very, very different decision, and it would be, I think, a lot, I don't know if it would be an easier decision, but certainly the option of taking as much time as necessary, both to look at, finding the lowest possible risk methodology for dealing with the material, we could take as long as you wanted or as anyone wanted, because we would in effect be saying nothing is going to come here to be handled or destroyed until everything is ready and we're satisfied that the risks are as low as possible. We don't have that luxury. Best available technology, therefore, in my view, has to be defined in terms of risks which currently exist, which face this community and this part of the country right now. And in looking at that, of course, time is a critical factor. Whatever criticisms or feelings about the quantitative risk assessment there might be, it is pretty clear from that document that the storage risk does far outweigh the risk of disposal processing, and within the disposal processing risk, the non-treatment risks seem to dominate, those risks that occur because of outside events or because of handling of materials dominate the risks during those years of processing. So even if we assume that the quantitative risk assessment is off, even off by quite a bit, the relationship is still there of those risks of storage outweighing the risks of processing and processing risks being dominated by non-treatment considerations. And therefore, any delay in the processing of the material and in its destruction must be justified on the basis of weighing the risks of delay against the risks that would be reduced by choosing some alternative course of action. And what I think we have done, and I have done personally on this issue, over and over, is to try to weigh these various considerations, and our conclusion, from what we know today, is that neither an alternative to incineration nor any reconfiguration nor reverse assembly scenario provides sufficient assurance that overall risks would be reduced enough to justify the delay in waiting for some alternative technology to be developed. Now, this is not an intuitive conclusion, at least on my part. I think until fairly recently, I was of the belief that some combination of incineration and processing through an alternative technology, at least of the HD, was the most likely preferred alternative. But having looked at the situation carefully in the light of all the public comments and all the materials that have been presented, I have reached that conclusion. Let me go through some of the reasons for that. None of the technologies that we've looked at seem to, on their face, provide the promise of a very substantial reduction in overall risk. All of them, including incineration, reach a substantial degree of destruction removal efficiencies, six-nines or better, and yet none of them, not all of them are ready to be deployed at this point. Also, another consideration which weighed strongly with me is that the dioxin emissions from this facility are projected to be lower than other allowable dioxin emissions that we have asked you to approve for other facilities, such as municipal incinerators. Lower, for example, than the new source performance standards for municipal garbage incinerators. The reverse assembly and reconfiguration options, it appears to me, only make sense if you conclude that a delay to await a new technology is justified. And in that respect, I think you have to weigh what it is, what the benefits are of a new technology. It seems to me that with respect to that, the alternative technologies, the main benefit that is associated with them, is that some, if not all of them, promise to reduce or eliminate any dioxin formation or potentially some other chemicals as well, and so if you go back to the analogy of the drain cleaner under the cupboard, one might say, well, it's better to take the dioxin out altogether rather than put on a lot of bells and whistles, you know, and keep the child from getting under the cupboard at all. Dioxin is a bad actor. And I think that the general proposition, wherever possible, dioxin strands and other chemicals like that should be eliminated rather than simply reduced or controlled, is a good principle, and I think a lot of the public comment instinctively takes that point of view. And again, if we were dealing with a commercial facility, I think that that kind of thinking might dominate. However, we're looking at weighing those risks of dioxin emissions that might be reduced or eliminated altogether against the risks of delay. We're also, to some extent, benefited by, or comforted, if you will, by putting the dioxin emissions in some kind of overall context, and that in doing that, I think that they are pretty small in relation to other sources, either on a worldwide or regional basis, or even on a local basis, where there are dioxin emissions on a more or less continuous basis from sources such as motor vehicles, wood and other fuel burning, pesticide application and so on. That's not to say dioxin emissions are unimportant or shouldn't be controlled if possible, but I think in the context that we're in, especially where the dioxin emissions here would be temporary, three-plus years, they do, I think, fall into a category of a risk, a long-term risk, as the Chair indicated, that is controlled and the effects of which would be somewhat limited. I think the risk assessment that was done on the health risk and environmental risk from the emissions from the proposed incinerator do indicate that the risks are within acceptable levels using standard methodologies, with very conservative assumptions. So that whether you look at long-term health risks or bio-accumulation of material, I think that that health risk assessment does indicate that they are within an acceptable range. Now, that health risk assessment, as was pointed out earlier, is not perfect, it doesn't calculate all risks or provide comparability with all other possible risks. But again, it's difficult for us in a situation where we have established standards and established methodology for the assessment of these risks, to say that that's inadequate. And then of course, further, we'll get to this in the permit conditions which we'll discuss later, but I believe you will insist on carbon filters as part of this overall technology. That will reduce emissions further. And of course, the one material, HD mustard, that has probably the best chance of being dealt with in an alternative technology, also is the one that has within it the sulphuric content that tends to reduce dioxin formation further. So in looking at the other technologies, which would arguably reduce or eliminate dioxin emissions, I think that the, in looking at the E & E document and information that's been presented, it does appear that, with respect to the destruction of these kinds of materials, all of those technologies are some years away from development, must less permitting and construction. And they all have significant technical uncertainties, with the possible exception of neutralization. Either they have safety worker concerns associated with them, or they are not clear that many of them would be able to destroy other than agent itself. And of course, we have to deal with the full range of munitions, energetics and so on. The matrix in the E & E report does, I think, demonstrate these problems. We can go through those, or Brett would certainly be prepared to go through each of them as you wish in making your finding, but that's my conclusion from reading that report and discussing it with the staff. So with all of that, it's hard to conclude that the risks, the controlled risks of dioxin and other chemicals being emitted into the atmosphere and settled on the landscape outweighs what has been calculated on this record to be the very much larger risk of doing nothing. I think the case of neutralization of HD does require a kind of separate discussion, because I believe that is the closest that we have to being readily deployable. I think the testimony, though, indicates that it would result in more delay, whether it's seven years or four years or something like that is not entirely important, the fact is that it's not going to be ready to be workable on the same time scale as incineration. In addition, that technology does involve some potential risk to the Columbia ecosystem from wastewater discharges. I was somewhat, some of my concerns were somewhat answered this morning about that, and it may well be that there are ways to handle that discharge so it is acceptable in the Columbia system. However, there are a lot of unknowns about exactly how that would be done, the capacity of local wastewater plant to deal with it, access to the Columbia River, all of the calculations and risk assessments that would need to be made to make sure that fish and wildlife resources were protected. There are some uncertainties there. They may be able to be overcome. So I guess those delays, however, plus the uncertainties, make it unclear what the overall comparative impacts on health and ecosystem of the Columbia Basin would be if we were to wait for neutralization. Now, if we had assessed those risks and faced no significant delays, I think it might well be that that technology is something that could be implemented in at least as risk free and possibly more risk free manner, if it were available today. So with all of that, our recommendation would be, number one, that best available technology be defined in terms of today's available technology, because of the time factor, that the risk of waiting in this situation makes it different from any other kind of facility where you could weigh the risks without looking at time; that other technologies are not available today, or at least not on the same time schedule that incineration would be; and that because of the assessed risks from dioxin (inaudible) and other chemicals being within acceptable ranges, the benefits of waiting for an alternative technology are not compelling enough to accept any additional risk of that catastrophic event from happening, however remote that risk of event might be. So our conclusion is that incineration is best available technology for all agent and munitions, including HD. I'd just add one further comment before listening to your discussion, and that is that, you know, public opinion I think is a very relevant factor in all of this. And because of the flexibility or wide range of decision making that you have, the interpretation of what BAT is and how to apply that, I think it is a factor that you can take into account. As you've heard this morning, it is somewhat split, as to whether the public accepts the risks that we're talking about. So while I think it gives you some guidance, I think we had very excellent testimony and comment throughout the process, and I believe it has helped us enormously to shape the questions and the concerns that we all have, I do think you can take it into account, I do not think that we have heard anything that makes the case sufficiently for delay or for other, any other alternative does seem to involve some significant waiting period, whether it's reconfiguration or reverse assembly or just waiting for a new technology, and that given the quantitative risk assessment, unless you completely reject that kind of analysis, it seems to us that with delay, and time is a key factor here, and that any technology that was available today that had roughly the same risk factors associated and which were all acceptable, would be a good technology to use, and incineration is one.

LORENZEN: Thank you. At this point, I would like to discuss the Commission's procedure that we'll use in going forward. We're obviously coming up close to the time of decision making, and it's always, it's one of the things that we've led up to for the last several months, and also is the most difficult and stressful time, I suppose, for the Commission, because it's very easy, in comparative terms, to take in information, it's always very difficult in analyzing and coming to the conclusions with regard to decisions as momentous as this one. But I would suggest that at this point the Commission have the opportunity to ask questions of anyone, including Director Marsh regarding his recommendation. At the conclusion of that, I think it's pretty obvious that we need to have a general consensus of where we stand, and I think the up or down question is whether or not, generally, and conceptually, we as a Commission believe that the appropriate technology to apply for the destruction of nerve agent, either in full or part, is the technology proposed by the Army, and that is the baseline incineration process. If we conclude, and with just a general consensus, not with a formal motion, that this is not the appropriate technology, then at that point the appropriate action would be a motion to deny the application for the permit. If it turns that the Commission as a whole, the majority of the Commission believes that it is the appropriate technology, then we will begin the laborious process of going through findings, not only in working the details of best available technology findings, but other findings that are required by the Oregon statutes as well as suggestions on permit conditions that we may wish to impose or insert within the permit to assure further compliance and protection of the environment. At the point, what I propose, and I guess maybe my preferred procedure is molded somewhat by the way I've seen the Ninth Circuit Court of

Appeals work, where the most junior judge goes first. And I think, unless there's a, unless there is any objection to that, and being the more senior person as well as the chair, I can, I'll see which way the wind is going to be blowing here in deciding what to do. However, I think that will be our procedure in going about this discussion.

(INAUDIBLE STATEMENT)

LORENZEN: Okay, Commission members, do you have questions of anyone, including Lang, regarding his discussion and his recommendations to us? Do you want to think about this a little bit? You know, it's interesting, because people have asked me whether or not I've taken a head count, and I have assured the press that I have not, so I'm a great believer in our process of public debate among commissions, I'm a great believer in Oregon's open meeting law and the spirit of the open meeting law, and for that reason I have not done that. And I don't know where people are going to be coming out on this issue, and so I propose what would be appropriate at this time would be to have some indication from Commission members where they stand on this issue. Linda, you're the newest member, so I'll let you have the mike first.

EDEN: At this moment, I'm simply overjoyed by my appointment to this Commission and the fact that I get to go first in speaking into the void here. First I want to say that up until ten-twenty, I did not know what the Department recommendation would be. And I do want to say, before I pass my general consensus vote, that I very much appreciate all of the work that everybody, all of the parties, and the people who have participated before this Commission, have put forth here. It's been extremely helpful to us, at least to me, and I know that people have put years into this process, both within the agency and outside of the agency. And this is not an easy decision, of course, as all of you know. My position arrived at about thinking about this every single day since I was appointed here, exactly mirrors the DEQ recommendation. I did not come into this process with any idea that I would approve of incineration. I looked very carefully at the alternative technologies, and listened to everybody involved, and I have come to this conclusion somewhat reluctantly, but I'm at it. I think that incineration is the best technology that's available right now.

LORENZEN: All right. Tony?

VAN VLIET: Well, first of all, I would want to say that I hope that because we didn't have any questions doesn't mean that there hasn't been a very exhaustive amount of hearings that have been conducted, and I wanted to also compliment on the great amount of excellent material. I don't know if I would have subjected any of my graduate students to six feet of material reading over the last several months, but it has been a real task and I do appreciate that. It is a tough decision, and I do concur with the Department's estimate that the best available technology here in this particular case is incineration. I went down through very many of the same kind of analyses that apparently the Department has done in their presentation this morning, but I looked at the risk involved in moving the munitions from bunkers and I looked at that as being equal with all the technology, if you have to move it from one place to another, and so the risk factor is essentially the same. I looked at dismantling into components that all the technologies probably were equal there, that the risk factors were very similar. I looked at the neutralizing of the agents part, the munitions and the casements, and there's where the technology started to separate a little bit. And I looked at the waste streams, and I think it was the waste streams that bothered me the most, because of the fact that there are waste streams in all of these to a certain extent and certain levels of risk involved in even the explosion factor in some of them with the high temperatures. You come around to looking then at the danger of the processes in general and also the incineration time line, and you have to really consider that when you're dealing with something that's probably been talked about since 1969, you have to think that by delaying the situation, are we just simply creating another Hanford where we keep piling this stuff deeper and deeper in holes and hoping the problem will go away, or do we deal with it forthrightly and go after it. I looked at the possibility of also the delay aspect, but it really didn't make sense from both the cost factor and of course the dioxin issue has always been one of importance, and as being somebody who has been associated with that from the forest products industry and pulp and paper plants, I can tell you it's probably one of the most complicated compounds around or series of compounds, which are very, very hard to assess. But also, at the same time, we live in a place where there's a lot of interaction of chemicals. And when you start talking about statistics of interaction, there's very little that has been worked on what the real interaction going on in our society of the numerous amount of things that we take into our system. And we are just beginning to get a handle on that at the Academy of Sciences and even on the university campuses. But we don't really have a good handle on what the interactions will be in these particular cases. And it looked to me as if the safety factor that was built in on this with the carbon filters and everything, that the amount that we were talking about was so small in comparison with probably what is in existence in our normal everyday live, that that part was, helped me make my decision. So I think we do need to go forward, and it is a tough one, no matter how you look at it, but I do think that there was a lot of class testimony put forward and very thoughtful testimony by a lot of the organizations that had real sincere concerns. And it was well-written. I didn't find myself correcting very many papers. So I thank you, and that's where I'm at.

LORENZEN: Thank you, Tony. Linda, I believe you're up.

McMAHAN: I thank you, Lang, for having your Department come forward with a recommendation. I asked for that specifically, it's one of the way that I weigh my own process. And I have to say, like others, that the process that I went through in reaching my decision, which is the same as the other two commissioners that have spoken so far, that is, in favor of the permit, I follow very much the same process as you do, and I think I'm beginning to satisfy myself that I haven't left anything out. I came to this process ready to be convinced that there were good alternatives and that we would indeed adopt one of those. And having looked at it very carefully and with a very caring attitude toward our environment, which is perhaps more important to me than anything else in my life, I've come to the conclusion that this, in this particular case, is the best alternative. And some things that were important in that to me is the time scale, the fairly short time scale which you had mentioned in your analysis, is actually a very important consideration in mine, it is the short time scale, that there will ultimately be incineration. I am not an advocate of incineration. In this particular case, partly because of that short time scale, I think it is acceptable. I was --

END OF TAPE 2, SIDE 2

TAPE 3, SIDE 3

McMAHAN: -- acceptable or not. The people that are in the area have to live with it, and their opinions on both sides I took very, very highly into consideration. I understand there are risks. I think we are having to talk about acceptable risks, I believe that we are talking, because of the time scale and the high, the low probability, the high consequence, of particular events, that time is a factor, and I believe we do need to do something very quickly. I am uneasy with relying on technology, but I think I'm satisfied that the risk assessments have taken that into account. It's not a perfect world. I also believe that intelligent and caring people can differ on this decision. It's only history that's going to prove us right or wrong, but I'm ready to make my decision based on those factors today.

LORENZEN: And which way are you leaning?

FEMALE: I thought I'd indicated. I'm leaning in favor of awarding the permit.

LORENZEN: Carol?

WHIPPLE: I don't know whether it's fortuitously or not, but I think I have the luxury of being a little bit of the fly in the ointment here this morning. I certainly would echo everything my fellow Commissioners have said in terms of availability of information, the quality of information. And once again, I would commend our staff for providing, I think, excellent material. I'll probably, when I leave here today, I think that I get to travel the farthest away from the site, though I will still be in Oregon, so you might want to keep that in mind as you listen to my stumbling through what I think about this. I have some concerns about the project, and like Linda and her comment that she came to the table feeling a certain way but ready to learn something, I think I sort of came to the table ready to be convinced that incineration was the best thing. And unlike finding that the alternatives were not the best, I don't know that I necessarily found that alternatives were the best, but I have some deep concerns about incineration, though maybe it even goes back farther than that. I can support the technology of incineration, and I certainly think I understand it better than when we started this discussion. I think I understand dioxin better, I've learned, I think, quite a bit about dioxin. The place where I'm stuck, I guess, and I have to be candid, is I understand that storage risks outweigh disposal processing risk, I think I believe that, I think I've been convinced of that. I guess my sticking point is, is in fact what is the immediate risk? I think I have some pretty good reasons for feeling that way. I think there are some historical reasons and some precedent for wondering about that. What I don't doubt is that this is bad stuff. And I think that how the people who live here feel about it may be more of a weighing factor for me than the technology. I think I believe, sort of as a matter of philosophy, that decisions are best made the closest to where the greatest impact is felt. So I'm sort of in a bit of a conflict, because I think the testimony of both citizens and local government officials, the preponderance of the testimony is that they would like to see us move ahead. I think about what the NRC said in their report, actually as they were developing their evaluation of alternative technology, and I think it says in there on several occasions, I outlined it several times, is it says that incineration, the baseline incineration technology is adequate. Now, I'm not sure what adequate means to the NRC. I know what it means to me. It's that, it's not great, it's adequate. I think we can do this, but I think how we do it, the conditions imposed on this facility, are really crucial. I think many of them are almost sociological, as opposed to being technical. Again, I didn't know I was going to have the luxury of being the fourth person to speak, or knowing what my fellow Commissioners were going to say. I think that the finding for me that incineration is the best available technology available today, I think I can, I think I can agree with that. To say that, to represent to the citizens of this community that after several months of study I have been overwhelmingly convinced that the risk is immediate, and when I say immediate, a month, I'm not even talking about years. In all candor, I am not convinced of that. I believe we have to get rid of it, and I will support -- but I've worked darn hard on moving this discussion to what conditions may be, and those conditions are going to matter a lot to me. Again, I'm influenced by those of you who most closely live with this, but in fairness both to you and to the rest of the Commission, I think you are entitled to know that I was not overwhelmingly convinced that this is an immediate problem.

LORENZEN: Thank you, Carol. I have a perspective that's very personal with regard to this particular issue. My grandparents came to the Pendleton area, all my grandparents came to the Pendleton area over a hundred years ago. On my father's side, they were farmers, and they farmed in west Pendleton, and I now live on a farm that was farmed by my father, and is also ten miles west of Pendleton. I'm raising my children here. This is an extremely important issue to me. And when asked by the Governor, at the time he was considering asking me to chair this Commission, his first question was whether I'd be comfortable dealing with this particular issue, given the fact that I lived here and it so immediately impacts me and my family. And so I can tell you that I've brought to this a commitment to review and to analyze that is probably even greater than the commitment I brought to a number of the tough decisions this board has had to make, the Commission has had to make. The bottom line, I also agree with the conclusion of the Director. And the one area, the particular area that concerned me the most, and it was evidenced by my questioning at our last meeting, was the issue of how to handle the destruction of the mustard agent. And the thing that seemed obvious to me at the time was that we'd just simply hold the decision regarding the destruction of mustard agent out of the permit until all the other weapons were destroyed. I have now, I wouldn't say changed my mind, but I've concluded that that is no longer the wise course of action, or appropriate course of action, and that it is more appropriate to destroy all the agent with the process that has been proposed by the Army. And my conclusion in this regard is directed substantially by the results of the two professors from Oregon State University and the testimony provided at the last commission meeting by Professor Iisa. The counter-intuitive conclusion that the destruction of mustard agent that contains large amounts of chlorine did not significantly contribute any additional dioxin emissions compared to destruction of agents that do not have chlorine, caused me to reach this ultimate result. In my mind, the environmental benefits, as indicated by Professor Iisa, from destroying mustard agent through a process that is not yet proven, simply don't exist. And secondly, while we are guardians of the environment, we must also be mindful of our resources and in particular the cost to the nation that would accrue from building essentially two plants to destroy this particular product. I have always eschewed cost considerations in dealing with environmental concerns, but when factors weigh so equally, cost must and should enter into the calculations. The other thing that has moved me toward concluding that this is the best available technology is the imposition of the activated carbon filters on the output of the incinerators. In essence, the incinerators will be fitted with a gas mask. If there are fugitive emissions, the carbon filters will assist in trapping any sort of emissions, either maybe agent that might accidentally be released, but more importantly, or I should say equally important, is the fact that the carbon filters provide a much greater reduction in emissions of dioxins as well as potential heavy metals such as mercury. Last week, I particularly, I asked Dr. Iisa whether or not the activated carbon filters would also assist in the reduction of mercury emissions, and she indicated that it definitely would. The combination of incinerators as designed with the carbon filters, in my opinion, clearly point to best available technology that can destroy these weapons in a timely manner and do it in a safe manner that will not harm the residents in this area, both me, my children and my children's children that hopefully will live on our family farm in generations to come. For that reason, I will also support the permit application by the Army. But also, as Commissioner Whipple has indicated, I have in mind conditions as well that will be stringent, that will assure that the operation of this facility is carried out in a manner that is safe and that is reliable, with a great deal of oversight, and will also assure that other concerns that I have expressed in the past to the Army and to members of the public will be met. So with that lengthy discussion, I think we have, we have now a general consensus of where we're going to be coming out, and now we're going to have to start the difficult work, both of reviewing findings that are appropriate, and then I also consider the incredibly important task of developing permit conditions that will meet the particular concerns of the commission.

(INAUDIBLE)

MARSH: Excuse me. I think the question of how you want to proceed in actually recording your (inaudible) decisions and findings, we could continue discussing each of the other findings and then together, individually or in groups, or make a motion on this particular finding now and then (inaudible) each other's findings, I think that would be my recommendation.

LORENZEN: Well, Lang, this is a difficult one, because normally, I just explained to the members of the audience, in the vast majority, and I say vast majority, virtually all permits issued by this Department, or this agency, are issued by the Department itself. And permits are very technical, they contain a tremendous number of terms. In this particular case, by statute, the obligation, the authority to issue the permit rests solely with the Commission. And as a result, we're dealing with something here that is highly technical, with numbers and with a great number of particular items that must be addressed. And it is something this Commission has not done before, at least in my seven years of serving on it, and for that reason we're going to be struggling here a little bit to figure out just the mechanics of how we're going to accomplish this. And my belief, Lang, and we certainly can defer to you to help us look smart in this procedure, but we could either go through it finding by finding, or we could simply discuss the entire package. I think generally you have a sense of where the Commission is. We could go through the entire group of findings, the staff could then ultimately draft those and put them in final form for voting by the Commission as a whole on the entire package of findings. Now, my own personal preference, and it's not a strong one, but my personal preference is to do the latter, and to have discussion with regard to each of the findings, but to not have a vote on a finding by finding basis, but to have that in an overall package that ultimately could be circulated before a vote and any final wordsmithing which any individual commissioner would want to do could be done at that time. What, what, do we need some direction from Larry to keep us out of trouble?

(INAUDIBLE COMMENT)

LORENZEN: Yes, precisely. And then included within that order would be the adoption of those findings which have been generated as a result of our discussions here, but not as a result of a formal vote on a finding-by-finding basis.

MARSH: Then I guess I would recommend that we have an opportunity to discuss (remainder of statement inaudible).

LORENZEN: Yes, that's my recommendation. Do the Commission members have feelings one way or the other? Okay. Shall we proceed, then?

MARSH: Do you have any further discussion then on finding (inaudible).

LORENZEN: Now, if you can help me with the particular findings. I do not have in front of me -- okay. And this was the material that was handed out last time. And finding four is the best available technology. Well, I'll start, Lang, and I'll tell you the one thing I want to make certain is included in here in language as explicit as possible, that at least from my perspective, and I hope from the remainder of the Commission's perspective with regard to the discussion, but from my perspective, the conclusion that this is best available technology is absolutely hinged upon the inclusion of activated carbon filters on the output of the incinerators, and that if that, if for any reason in the future it appears that that is not feasible and practical, that then we need to, the Commission needs to start this process all over again, and to take a very hard look at the prospect of alternate technology. And included in that would not only be technology for destruction of the weapons systems itself, but also for the destruction of mustard agent. That I would like to make certain that that foundation is very explicitly built within the finding on best available technology.

(INAUDIBLE COMMENT)

LORENZEN: No, I will not get down to that, on what color the housing should be, but that's a -- I know. Any comments?

(INAUDIBLE COMMENT)

LORENZEN: Yes, I want to make certain that it is clear in our findings that if eventually, and the reason for it is if there is an eventual application to modify the permit to reduce the carbon filters or eliminate the carbon filters, that then that opens up this entire (inaudible).

HALLOCK: I don't know if this will help clarify, because none of us have ever done this before, so we were trying to figure out ahead of time how the discussion might flow, but we do have, we had thought after we went through this deliberation on the findings, where we were going to be figuring out if there was even going to be a permit to discuss, then Brett and the staff are prepared to walk through with you various and sundry permit conditions that have been discussed a bit before, plus housekeeping kinds of -- that kind of thing. So we can do that today anytime, we're kind of, we're waiting to see how the discussion flows.

LORENZEN: I think it's appropriate to go through these findings now, and then we can move on to the -- there may be some interrelationship between permit conditions and findings. We may have to worry about those iterations, but maybe we can keep moving on track here and see how (inaudible).

EDEN: My understanding of what you want to do here is emphasize that the technology that we consider to be best available now includes the carbon filters. And that it will be a permit condition, but also that it has to be part of the findings.

LORENZEN: Yes, that is correct. Raising it to the level of a constitutional amendment. Okay, anything else on our findings regarding best available technology? Now, you have, what I have before me is Attachment A, Department Conclusions (inaudible). I have here a general outline of considerations, but I do not have the findings.

MARSH: Conclusions on each one of the findings other than four, is contained at the end of each of the findings documents, so that you'll see something called

Department Conclusions, at the end of finding one, for example, on page A6. So I guess what we would suggest is that you have any discussion you want or directions you want to give us on each of those findings. I don't think you need to go through the (inaudible) process of (inaudible).

LORENZEN: Right, yeah, that's fine. Okay, anything additional? I think, Lang, you have the, you had an extensive discussion on best available technology, not only from your recommendation, which to a great extent has been adopted by this Commission informally, as well as the further direction regarding the explicit language relating to carbon filters, and I think that with that, there's probably sufficient direction on developing findings at least for our review in a document that would be close to final format.

EDEN: We're getting into legal technicalities here, but I think it would be appropriate for the draft order to include the concerns and the reasoning expressed by each commissioner to the extent that it's not already included in the fact that (inaudible) supported the finding.

(INAUDIBLE COMMENT)

WHIPPLE: I guess my question would be with staff. I guess in terms of the findings that we do write and where we do write it, I don't mean to belabor, belabor a point, but I would like to, I'd like to know how, I mean, how we're going to address the notion of the timing and the risk. I know I heard the other Commissioners feel that we had been provided sufficient evidence to move quickly, relatively quickly. Is there going to be a spot to register some questions or -- I don't know, having never seen this written either, I'm just kind of wondering.

MARSH: Yeah, I think it would be very appropriate to particularly note your concerns as part of the findings and indicate that the conclusions drawn by the majority of the Commissioners on that finding was (inaudible).

LORENZEN: All right, let's -- we have, we have some help here, we'll move on to number one.

(INAUDIBLE COMMENT)

MARSH: The finding should incorporate or include or append a list of all of the documents, public comments and so forth, just a reference, not a compendium.

LORENZEN: And going along and building upon what Tony has just said, not only do we have a conclusion that's statutory and regulatory, not the conclusion, the intent of the statute or the regulatory edicts have been fulfilled, I think it's important to place in there the basis for that conclusion, which is the listing of the public involvement.

McMAHAN: On this particular question, there were a lot of comments and the public had a broader, a broader public contact, it's my feeling that, you know, this long list is appropriate, but I'd like to see included that we, that I feel we have met our statutory obligations, and additional plus, in other words, statutory plus, if not necessarily what everyone would like. We did exceed our expected (inaudible).

MARSH: We'll do it.

LORENZEN: Anything further on finding number one? Moving on, finding two. And that particular finding, the Commission finds the proposed facility location is suitable for the type and amount of hazardous waste intended for treatment at the facility, provides the maximum protection possible to public health and safety and to the environment, and is situated sufficient distance from urban growth boundaries, parks, wilderness and recreational areas. Any comment on the staff's analysis of those findings in support of that particular conclusion?

(INAUDIBLE COMMENT)

LORENZEN: And this, you know, again, these are technical that lawyers can help us substantially in developing and wordsmithing in these particular findings. The one that I believe that some attention should be given to is the distance from urban growth boundaries, and I think if this were a facility that were to be located without consideration of the origin of the product which it is destroying, we probably would not like this particular location, and I think that in order to be true to our requirement of this finding, directed by this finding, it's also necessary to stress the fact that the material to be destroyed is now located in its present location, that there are risks attendant with moving the materials to other locations. And I think that that should be inherent as part of the findings with regard to location and proximity to urban growth boundaries.

MARSH: We'll do that.

LORENZEN: I thought I'd --

(INAUDIBLE COMMENT)

LORENZEN: Okay. Okay. And I think in our prior analysis of these findings, as an overall comment, mention that the Commission has adopted rules relating to some of these statutory findings, the rules mainly were in the context of off-site waste proposal facilities, and that to some extent they don't apply, it's a round peg in the square hole or a square peg in a round hole or whatever it may be. But I think that we need to struggle to make certain that we not only try to fulfill the obligations imposed by our own rules, but also as best that we can ferret from the statutory intent at the time that these statutes were adopted. So in drafting the findings, I hope that you'd take an inclusive approach to doing that. I'm sure you will. Larry looks away from me. Larry, you're going to have a good involvement in this, I hope. Yes, okay.

VAN VLIET: In finding number three, I don't think the intent of the statute was for us to play architect, is that right?

MARSH: No.

LORENZEN: Well, even though it does not apply, Larry, one thing we could do that comes to mind on that is that what we are requiring at this time is that the agent, even though we're not making a requirement, the Army has come to us with a proposal to destroy the agent there. It is the desire of the Commission that all agent be destroyed and that this facility does, in fact, is the type of facility that is capable of destroying the entire stockpile. It may not fit exactly as the intent of the legislature at the time they adopted the statute, but with a tortuous reading of the language, you may be able to come to that application of it in any event. I don't know, it's just something to think about in looking at it.

(INAUDIBLE COMMENT)

LORENZEN: Absolutely, absolutely, that was one of the things in the (inaudible) conditions, but I think we can also then boost this -- that's a good point. I think that within our findings we can also strengthen our position that no materials from outside the boundaries of the reservation or the depot should be brought in for destruction at this facility. And I think that we can strengthen the permit and limitations on the permit through the finding process as well.

(INAUDIBLE COMMENT)

LORENZEN: I assume that's what the Commissioners desire.

EDEN: That sounds reasonable to me. One scenario that occurs to me is, in the event there were a leak that the community had to respond to and that there ended up being materials that were contaminated then, wouldn't the best way to destroy those materials be by taking them back to the incinerator? I hope that, of course, never happens. And I anticipate that it will not, but we wouldn't want to be unduly restricted, so I just -- Larry can be careful in that regard.

LORENZEN: Benefit of having another, a lawyer on the Commission who's an environmental law specialist. And for further discussion, for purposes of the record, if someone ever reviews this in the future, there has been discussion, has been concern by the Commission that federal legislation could change that would allow transportation from existing storage facilities, waste disposal facilities, concern that maybe Oregon and Utah may be dupes because we're the first ones to build these facilities and that others would be then wanting to transport to us. I know people have been making, even local people have made inquiry to folks in Utah whether or not they wouldn't like to take our munitions and destroy them down there and save all that money, but we don't want to be in a position of being number two, of having people making the same inquiry to us. And so the reason for wanting to boost these findings, I agree completely, is to make certain that -- we can't under Oregon law impose those restrictions that are not ultimately preempted by federal law, but to the extent we can go on record, and I hope not only on the record in an informational way, but also on the record in a legally binding sense through our findings, that the facility is to be restricted to destroying agents that are located onsite or happen to migrate off and come back. It is a permit condition. But -- yes.

(INAUDIBLE COMMENT)

MARSH: (inaudible) tie that down, and as well as here. I think it's also important that we note that even without a permit condition, no off-site materials be taken to this facility without a complete new siting process such as we've just gone through here. You couldn't do it by an amendment to the permit, so there is a further guarantee that that won't happen without a lot of additional (inaudible). And one of the conditions we'll get to later is the destruction of the facility once it has been completed, and however that condition turns out, I think will help bolster or we'll incorporate whatever it is into the finding as well.

(INAUDIBLE COMMENT - FEMALE)

(INAUDIBLE COMMENT - MALE)

McKNIGHT: And Carol, the question was?

WHIPPLE: What is the, what is, in this case, actually I suppose it's (inaudible) yet, but I've sort of lost track of what the time lines are, when does something have to happen for, or not happen before a permit is no longer valid?

McKNIGHT: Once the Commission makes a permit decision to issue the permit, the Department will have to prepare the final documents. The permittee would not be able to take any action as far as construction activity on-site until such time that a final permit decision is rendered, in other words, (inaudible) the permit by the Commission. Once that occurs, then the applicant can proceed forward. When you start looking at some of the schedules that would occur, there's first the bringing a contractor onboard, the Army has not started that yet, as far as advertising and selecting an operator for the facility. You have that process that they would have to go through, and then once the operator is selected, you can go into the construction phase, which is approximately a year and a half, two year construction schedule, and then you go into the shakedown where you (inaudible) things out, verifying that things are working the way they were designed on paper, and once you're systemized, then you go into the surrogate trial burn where you test (inaudible) and then the agent trial burn (inaudible).

WHIPPLE: Well, I think I don't even need to go that far out. I mean, what is, maybe in this case, what is the shortest time line available to the applicant, by which time something has to be done in terms of moving along?

McKNIGHT: I believe the applicant is, when we have the final documents prepared for you which, again, we will try to have that as soon as possible, possibly probably have a final permit ready to sign in January. Once that's, and assuming we can incorporate all of your requirements in on that time, but that is I think doable.

WHIPPLE: But is there a window of time at which point the applicant has to show some sort of material in moving, and how long is the permit good for, I guess?

McKNIGHT: The permit's issued for ten years.

LORENZEN: I think, Carol, it might be helpful if the, the Army may be able to help us, that if you, once a permit is issued and you have it in hand, when do you actually begin work?

DECKER: I'd like to make a slight correction to what Brett said. We have been proceeding with our competitive process in parallel with permitting, realizing that we can do nothing to implement until the permit's received. So we have indeed prepared requests for proposals from qualified contractors, and we have received bids, based upon the permit as it was received by you. Should there be any major changes required in those requested proposals as a result of the permit, we'll send those changes to the bidding contractors, and they'll submit the final bid. But we, if there are no changes of substance, and so far, to be honest, I haven't heard anything at this level of discussion that totally departs from (inaudible) on the findings so far. At the level we're talking about we're in agreement, and we're not (inaudible) -- that's a gratis comment. It would be about two months from the time the permit was issued, assuming no gargantuan changes, that we would finish our competitive selection process and award the contract. And then the spin-up time for the contractor to do his final planning and actually begin work to construct the facility is probably another thirty to sixty days beyond that. So we're in a two to four month window of actually breaking ground, probably closer to three month window of actual process once the permit is issued. I don't know if that's your question.

WHIPPLE: Well, I guess I'm, what I'm wondering in terms of, from the Department's perspective, or maybe we've not yet really arrived at what, or at least I don't have a good understanding of what really the oversight is going to be, whether it will be strictly within the Department, whether we might look to some other additional method of oversight, but I guess one of the things I'm wondering is making sure that it does happen. I'm just wondering what the Department's position is on that.

MARSH: So your question is related in part to whether the Army could accept this permit and then sit on it and not do anything for an extended period of time?

WHIPPLE: I think that's it.

MARSH: Brett, does the permit condition, do the permit conditions as presently drafted address that in any way?

McKNIGHT: No. Once the permit's issued, then the applicant can move forward, there isn't, we as a Department don't see a reason that we would -- we wouldn't have proposed the permit on a public notice if we (inaudible).

MARSH: I guess the question would be whether you wish to get from the Army the commitment that we could write into the findings, possibly into the permit, that if the permit is issued, they will proceed expeditiously on the schedule that they've outlined to us to complete the construction and operate the facility and meet the time schedule that they have outlined to us.

WHIPPLE: Well, I think there's a bit of a paradox, all right, here. I mean here I'm the one that's wondering -- I mean, I guess I have a lot of questions about time, because I am frankly curious about what is the --

END OF TAPE 3, SIDE 3

TAPE 1, SIDE 4

WHIPPLE: -- whether it is we need to do it because it needs to be done now, then I think we ought to follow that up some way.

HALLOCK: I think I finally understand your question. I've been quiet trying to see if I could get there. We don't have any statutory or regulatory condition on when we must act. We have always, when we deal with permit applications, we try to be responsive to the permit applicant as best we can, but there is no time by which we must act. It think Brett's answer is that we will take everything you give us today, and as quickly as we can with counsel's help, turn that into the final document that you will need to review -- I didn't get it? Okay.

LORENZEN: No, I think Carol's question is how quickly will the Army react.

VAN VLIET: Carol wants the shovel to start in right away. I'd like to say something as an old budgeteer, and whether you're in Congress or the Legislature, it's always funds available. And I think that will be the fact. If Congress was to come along and cut the budget on this, no matter how far the Army wanted to move and how quickly, they would be, they would have a delay in it. So it's funds available. Assuming that funds are available, then that's the question Carol's asking, when does the first shovel of dirt get turned over and they get going.

UNIDENTIFIED SPEAKER - FEMALE: In plus 2004, if that's still, if you're still working with that.

LORENZEN: Secretary Decker?

DECKER: I would just like to state, we'll sign a memorandum of agreement or if we need something (inaudible). We haven't been struggling with this for the last three years with the intent (inaudible), we need to move. Now, a couple of good points have been brought up. Mr. Van Vliet clearly point out one. I do not anticipate this is going to become a major issue of the budget, but Congress is sometimes a random process. They budget annually. Our current -- I don't want to give you a description of the federal budget process in detail, because you'd never believe it. But we in the Defense Department submit a six-year program every other year, called our program objective memorandum. That anticipates our budgeting needs for six years. If things change, that gets amended each year as it slides forward. As it stands now, our, we call it the POM, our six year submitted budget that went in for fiscal year '97 we're currently in, and the one that will be submitted to the president for 1998, probably in

February when the budget usually goes in for the subsequent fiscal year, is on a schedule funding profile commensurate with the schedule I gave you this morning. Given Congress maintains that budget each year, then we will complete this thing in 2003 as I indicated. We need to start construction not later than February to March time frame of '97 to make that schedule effective. I left that out of my earlier comments. So we plan to move as rapidly as we can as soon as we have the permit to go ahead. That's why I said it'll be probably two to three months from that time. There's a little bit of slop in there in the front end, but not too much. So we clearly have no budgetary or any other rationale for wanting to go back to a leisurely pace. So we're really consistent on things beyond our control not happening. The budget is there. There may be litigation (inaudible). Barring those external events, we're ready to move (inaudible).

MARSH: Mr. Chair, I think that the points that have been made here are very significant, and I think what we ought to do is, in the findings and permit conditions that we put back to you, I believe we ought to address the circumstance in which, for example, Congress defunds the baseline incineration process across the board, but continues to fund the alternative technology process, which could happen, and I think we need something, some reopener in the permit, because your findings are, as I understand it, would be premised on timely completion. If that is taken away, then at least one other technology becomes more equivalent, if you will, in terms of timeliness of accomplishment. And it may be that some reopener needs to be put in to make sure that those findings get revisited by the Commission if there is a delay beyond, well, whether it's within their control or beyond their control. I had also asked whether you would like us to pursue Secretary Decker's offer of some kind of memorandum of agreement which we could incorporate into the findings and possibly the permit to complete the facility and operation on a timely basis.

WHIPPLE: Well, I -- yes, I think the answer to that is yes.

LORENZEN: The thing that comes to my mind, it's always, these sorts of things are always very difficult to define ahead of time, because you attempt to anticipate events that are difficult to predict. And lawyers always put language in such as reasonable efforts will be directed toward completing the facility in an expeditious manner given regulatory constraints and financial constraints, budgeting constraints, that sort of thing. And I think that would, that's probably the best we can do, given the fact that we deal in an uncertain world, but at least that commitment is one that I think would address Carol's concern, and secondly, if it, as you say, if it goes on long enough, it may be that additional information comes in out there. If we, if our predictions are inaccurate, that there, that, and our prediction is that the neatest, new model of technology is not just right around the corner, I don't see anything that probably would change that, but if two or three years out, something happens and Congress puts the brakes on building these things, saying we need to be looking at alternate technology, and all of a sudden one magically falls out of the air, we would not want to be in this position where we have a permit that would allow the old model to be used. Realistically, I don't see that happening, but it would be of some comfort, I think, to all of us if such type of language in some manner could be included within the permit. We're getting away from findings now, but I think we need to deal with this particular issue. And I think it can be done in a way that does not cause the Army any great uncertainty, because the uncertainty is going to be directed principally by what Congress does with regard to this particular issue. Am I making sense? Okay. Carol?

WHIPPLE: Well, I guess the reason I'm struggling is, and I think we want to move ahead and I appreciate that. But if we're finding that we're doing something because this is what we need to do and we need to do it now, it just seems to me there needs to be something that follows up.

MARSH: Agreed.

LORENZEN: Okay, where are we?

HALLOCK: Five.

LORENZEN: Coming up on five. Has the need for the facility been demonstrated. That seems like it's a no-brainer, but -- and so I'm sure you can come up with appropriate language to support the inevitable conclusion. Anything further? On to number six? Post facility have an adverse effect on either public health and safety or to the environment of adjacent lands. And these findings in isolation sometimes are difficult to address. Any activity we engage in could arguably be said to have some adverse impact. But I think that it's important here to be, as you have done, to weigh and to develop this finding in a context of the alternatives of doing nothing, and in the context of other alternatives that could be available. Now, Larry, is this one of those -- can you tell me, can you, and again, I have not had a chance to quickly read through this and my memory's a little fuzzy from last Friday. Is this one of these, is this an alternative for which -- or not alternative, is this a finding for which there exists an administrative rule?

EDELMAN: No, there is not (inaudible).

(INAUDIBLE COMMENT)

LORENZEN: And does the statute have the, does it include the language "have an adverse effect" or is it absolute or is it, I assume that within that is going to be a standard of reason or substantial or not insignificant --

(INAUDIBLE COMMENT)

LORENZEN: Okay, that's -- no major, yeah, that makes it much different than adverse effect as indicated in the staff report, so, okay, that makes it easier. And I think, in my recollection of reviewing these particular findings last week, I did not have, nothing jumped out at me as being inappropriate. Let's see. Comments on findings six? I think I'll, it's very close. In findings seven and eight --

HALLOCK: Larry needs to give you some information on operator.

LORENZEN: Right, and that's, I was going to go on to that step. One of the things that gave us pause, gave me pause last time in looking at the report, findings seven and eight, is that there is the requirement that we must address this finding to both the owner and the operator of the facility, and at the present time the operator has not been selected. And so it would be difficult if not impossible to make the determination with regard to the operator. I understand, Larry, you have done some analysis with regard to this particular issue. I'd ask that you share that with the Commission at this time.

(INAUDIBLE COMMENT)

VAN VLIET: Can we raise the liability level?

(INAUDIBLE COMMENT)

LORENZEN: This is a troubling area. So many different considerations go into this. On the one hand, there's a reality of the insurance market that those kinds of risks, where the likelihood of an event occurring is incredibly remote, but if that event does occur, the consequences are incredibly catastrophic. And that's the sort of risk that's difficult to insure against, if not impossible. And contractors and subcontractors can always set up joint venture -- not joint ventures, but specific subsidiaries that can shield risk. This is something that we're just, we're simply going to have to look at as time goes on, but I think that we are hung by our own petard in this particular situation, where we've adopted certain rules, certain rules may apply to this endeavor. The Army, and as a complex analysis, I actually called my friends in the U.S. Attorney's office yesterday and we discussed some of the intricacies of the tort claims act and the potential liability of the Army in this circumstance. And again, there is never, and like always, and like everything that lawyers touch, there's never an easy clear analysis, and it's one that is some difficulty, but I think it's something that we're just, we have to live with the rules as they exist.

EDEN: I should know the answer to this, but I can't remember. Under RCRA, is it not possible for the states to adopt regulations that are stricter than those adopted by the EPA?

(INAUDIBLE COMMENT)

EDEN: Is it specifically impossible to do that with respect to the insurance requirement, do we know? I don't know the answer.

(INAUDIBLE COMMENT)

LORENZEN: Well, this is something -- yes, Brett?

McKNIGHT: One further follow up to what Larry said. Adding the operators to the permit would be a modification of the permit, that's a class two modification which requires a full public notice, public comment period. Because the Commission must make a finding on the operator, that is a permit modification that would have to come back to the

Commission.

HALLOCK: Is the significance of that comment that we could research the rule issue that Melinda's talking about, and that might be incorporated in a permit modification if the rule was changed? Or am I getting brain dead?

(INAUDIBLE COMMENT)

LORENZEN: How is this handled in Utah? What are the, what liability is the contractor in that facility subjected to, what type of liability?

(INAUDIBLE COMMENT)

LORENZEN: And the other thing, simply because insurance is set at a million dollars doesn't necessarily mean that the operator's liability is capped at a million dollars. And that's, there's a difference there. And we face this issue with heap leach mining operations here in Oregon, where typically, and I don't know whether something like this would work in this area or not, but typically subsidiary corporations are set up for each individual mine, and we adopted rules in Oregon that require that a parent corporation sign on the liability as a condition of the subsidiary getting a permit. And that, that has -- no mine has opened up yet, but we don't know whether these rules were particularly good or bad, but -- okay, all right, that's something for another day, I don't think we have to face that directly here at the present time. Yes? Sure, you bet.

(INAUDIBLE COMMENT)

LORENZEN: I would hope that we could make that as quickly as possible, but I don't know what the --

MARSH: Let me ask Brett to lay out the process that you would have to go through under the (inaudible).

McKNIGHT: For adding an operator to the permit?

MARSH: Yes.

McKNIGHT: We would go through a permit modification where the operator would submit the documentation to satisfy the findings, and we would, in review, make sure that they comply with that. Once that's been done, it goes out on public notice, for public comment, and we would conduct a Commission, as we've done in this, with make a report and recommendation on the findings (inaudible) making a finding, a decision as far as permit modification and also a public notice is forty-five days, and a public hearing (inaudible).

LORENZEN: Let me ask a question. First of all, I'd like to know what we're really talking about in terms of time. And secondly, the thing that jumps to mind, is the operator the contractor that constructs? Is there, is the operator, as contemplated by this particular finding, the operator who actually operates the facility when it's destroying agent, or is the operator the person that builds the facility, the person that --

(INAUDIBLE COMMENT)

LORENZEN: But my point is that there may be no time delay required for the construction phase, but the time delay may be applicable only to the operation of the facility, if that's what this particular statute goes toward. And if that's the case, then we don't have a concern about time. But the risk is, is that your contractor may ultimately not be found to meet the standards of this finding, and --

(INAUDIBLE COMMENT)

LORENZEN: Yeah, but that, I'm just saying, yeah --

(INAUDIBLE COMMENT)

LORENZEN: The theoretical risk is that the contractor, if he can go forward and is not covered by the operator, is not included within the definition of operator, goes ahead and builds and then ultimately you go through the process of determining that the operator doesn't meet the requirements of these particular findings, and if the conclusion is that it does not, then you're probably stuck in the contracting process, and having to back out of that contract.

(INAUDIBLE COMMENT)

LORENZEN: Okay, and that's, and for that reason, this may not be, may not be an issue of timing, that's the only reason why I mentioned it. All right. And the findings that we've discussed, and the first one is, has the owner and operator demonstrated adequate financial and technical capability to properly construct and operate the facility. Now we're right back again to the owner -- does the owner construct or does the operator construct, or does the operator just operate, according to that. Something we'll have to think about.

(INAUDIBLE COMMENT)

LORENZEN: Right. And you (inaudible) wonderful ambiguity in language. Have the owner and operator of the facility demonstrated ability and willingness to operate the post facility in compliance with statutory and regulatory provisions? We're going to need, Larry, particularly, this is where your assistance is going to be required in working our way through the intricacies of this language. It may very well be that the findings here as specified also don't parallel and don't track the language of the statute explicitly.

VAN VLIET: Mr. Chair?

LORENZEN: Yes.

VAN VLIET: Just a question. Was that Department of Defense, Army, or can we have the Navy be responsible?

(INAUDIBLE COMMENT)

LORENZEN: Yeah. Sure, Carol?

(INAUDIBLE COMMENT)

LORENZEN: Okay. The point, as I understand it, is that we would not be making findings with regard to the operator. When the operator comes on board, that's going to require permit modification. That's going to have to come back before the Commission again, and the Commission then will have to decide. And the open question in my mind is whether or not these findings even apply to the contractor for the facility, whether that is subsumed within the definition of owner, and that the owner, or the contractor is acting as the owner's agent in the construction, or that the owner is doing the construction.

EDEN: So we will be revisiting this once --

LORENZEN: Yes. Yes. Okay, we've gone through the findings. I think we've given sufficient direction, or at least we've got Larry particularly interested in a particular point. But we have gone through the findings. I don't think, I think we've given sufficient direction now to the staff to do their normal good wordsmithing and to be able to come back to us with proposed language with regard to these findings.

HALLOCK: Lunch will be here at twelve-thirty.

LORENZEN: I am tired. And I think what we ought to do, even though we're going to be, recognize people have a little longer drive tonight than I have in getting back home, but the, I don't know, I'm just mentally not ready to go on and do this right now, I just am, just have a break right now and reconvene at basically one o'clock, and we'll continue on with what I consider probably the most important aspect of this, and that would be the permit conditions that we wish to have incorporated, in addition to those that are laid out in the permit as it has now been developed.

(END OF SESSION)

(SESSION RECONVENES)

LORENZEN: Environmental Quality Commission is now back in session. What we'll be taking up this afternoon would be our analysis of permit modifications and recommendations regarding such modifications. How to you want to proceed, Stephanie, how do you suggest that we go forward on this? I notice that --

HALLOCK: Well, Mr. Chairman, I guess I'd like you to state for the record with regard to the housekeeping kind of corrections that need to be made to the permit, typos corrected and things that are not significant policy, that we would just be directed to do that in preparing the final document for you.

LORENZEN: I notice that the comments submitted by the Army included a number of technical corrections, and I would request that the staff review those and incorporate them as appropriate and provide us with a completed document, but incorporate those corrections as the staff believes are appropriate. Is that okay with the Commission?

HALLOCK: All right, we will do that, and then, Mr. Chairman, I would call your attention to the handout that we provided to you, Department Recommended Permit Conditions in Response to Public Comments and to Issues Raised at Commission Meetings. I think these are some of the key conditions we would like to walk through today with you, and then if there are that you see that are missing in light of the discussions this morning, we might talk further about those. And Brett's really going to kind of lead this discussion.

McKNIGHT: The first condition has to do with emergency response. We're looking at proposing to modify the contingency plan in a couple of ways. In talking to Larry Edelman, I notice that the first condition which he talks about, before the permittee may begin any construction activities, is that it needs to be certified to the Department that the essential elements of emergency preparedness and response are in place or acceptable schedules for securing the essential elements have been accepted by Oregon Emergency Management Division. We have been in contact with Oregon Emergency Management Division on the essential elements. We do not have them yet at this time. They have looked at this language, permit language, and they agree with the language. However, before we could actually incorporate the conditions into the permit, we would need to have those essential elements defined as part of the conditions. During the public comment period, we did receive essential elements from Oregon Health and from Morrow County, but as far as OEM, Oregon Emergency Management, and Umatilla County, we do not have those yet, and we would (inaudible).

LORENZEN: Okay, I'm -- one of the things I -- this impacts upon when construction can begin. In some ways I'm concerned about this, just reflecting upon Carol's concern as well, is that if the permit is issued, we have timely and expeditious action moving forward to actually build the plant, and I worry whether this will be something that could hold up construction, and the construction activities are not those which increase the risk to the community, in my mind, but delay of construction could do that. And I wonder if this kind of condition that ties to construction could be counter-productive.

McKNIGHT: Our rationale for tying it to construction was to hold the permittee, kind of hold their feet to the fire, in that there are a number of local emergency response issues that those agencies were having trouble moving forward on. And this was an idea where, in some cases, the Oregon Emergency Management, Morrow County have identified elements that they feel are required for emergency response, and the federal CSEPP program is not willing to fund those. So it's really trying to get those parties to move forward on what we think would be some pretty critical issues, if the agency responsible for emergency planning has identified what they feel to be essential elements, and they're not able to receive federal funding, the permittee (inaudible) step up and assist in that, and that was the intent of tying the construction --

HALLOCK: If I can add something, in terms of the contract. This permit, we developed this document some time ago in September, and at that time, I think we actually had a discussion with you where it was requested, because there are two conditions here, one is tied to construction and one is to operation. And that was because during those discussions things were really proceeding very poorly in the emergency response arena, and with the attention I think that you all brought to the matter, and the Governor's involvement, things started to proceed a little more rapidly. So you may want to discuss a little bit whether or not you still feel that tying it to construction is as critical as it was a couple of months ago.

LORENZEN: Yes, Tony?

VAN VLIET: If I read number four, you really have got it pretty well tied down, that is, that you can't commence any kind of a shakedown without that preparedness program being in place, which, if you've gone through building the plant, you're certainly not going to renege at that stage of the game and not have a good contingency plan in place. So I think you could wipe out that other one, but with a statement saying that during the construction period, emergency planning will progress rapidly, and then go directly to number four as the fire to the feet approach.

LORENZEN: My personal feeling, I'm comfortable with that as well. There's enough of a construction manager in me that I worry about what impacts on a construction schedule could be attendant with emergency preparedness, but I also, I want to emphasize that the overwhelming concerns within the community, expressed especially in the Hermiston area, were with the level of preparedness on emergency response. And this is something which a great deal of attention needs to be, it needs to be the subject of a great deal of attention and effort. And, but I also, I have to tell you, I personally spoke with the Governor on this issue to determine the condition and make sure we were on the same page in establishing a condition that causes the decision to be elevated to the level of the Governor's office or his designated agency, and the Governor understood the obligation that was imposed on him by this kind of a condition, but he also saw it as such an overriding concern that he was willing to take this on and recognized that the ultimate responsibility resided with his office. And I want to emphasize that if we do -- I agree with Tony, that we can take out the reference to construction, but I also want to emphasize how critically important this critical response program is, and I would hope that future commissions would understand how important this is and the Department understands how important it is, and that no, no testing of any agent, even the begin testing of small amounts, would ever start unless the emergency response program in place is certified by the Governor or his agency as being suitable to the task. Folks, Secretary Decker, any other, do you have any comments to this, or is this an approach that's satisfactory to the Army?

(INAUDIBLE COMMENT)

EDEN: I appreciate the concerns expressed by Commissioner Whipple and other people about getting construction going as soon a possible. I am of the belief and understanding that the CSEPP program and emergency preparedness is supposedly independent of construction and operation of the incinerator, and that we're way behind on getting those things in place anyway. So I guess what I would be happy with would be some kind of real deadline. If we're going to remove construction from here as the deadline, beginning construction as the deadline for getting these things ironed out and in place, then I guess I need another deadline that is before shakedown, since these two events were supposed to be independent.

LORENZEN: Boy, one of the things -- the difficulty is trying to figure out how that fits into a permit. Also, just the reality is that, I think that, figure out a tactful way to say this, there may be, there are tensions, and understandable tensions that go with elements of an emergency response program. What is perceived by certain communities as being exceedingly important may be exceedingly important for reasons other than simply emergency response. And that we don't want to have folks in a position where, you know, the wrong sorts of pressures for the wrong reasons are brought to bear on this. And I don't know how we balance it, how we balance it out correctly, but I'd tell you from my own experience, is that the emergency preparedness has been moving forward rapidly and is developing much better. I've had contact with folks here who are staffing now in Pendleton, and things are improving. I think that our

Commission has had a great impact on that, Melinda, in the last six months, and the Governor's involvement in this has not unsurprisingly had some impact on it as well. So I'm -- if you can help us here, please do, if there are any suggestions on how we can assure that we move along on the emergency response.

HALLOCK: Well, what I was asking Secretary Decker is if there was a date when this integrated team approach to solving problems was scheduled to be done, and his response was that they hope to be done with that part of it in six to eight months, but it is somewhat of an iterative process, because I was trying to think in response to Commissioner Eden if there could be a date of the end of next year or '97 rather, or something like that, to give you a finite date. But I think they probably need to respond a little bit more.

LORENZEN: And the practical part, too, and I don't mean to belabor this, I'm sorry for interrupting you, it would be important to hear from the Army as well. The practical aspect is that they cannot begin testing unless there's a program that is in place and is suitable.

EDEN: But there's supposed to be a program in place because the stockpile is there, not because incineration is to begin. But I appreciate that we need it for the incineration process as well.

LORENZEN: I don't -- well, I don't think it's, I think it's important for both, but the time motivation is going to be there because they're going to want to operate the incinerator, and it's going to take time to put a good program in place, and they'll know that if they don't get that program in place, which is going to take some time, there'll be a six hundred million dollar investment sitting out there gathering dust. That does help create some of the tension of moving forward. But it would be nice if we could have -- what can we do, what can we, what mechanism do we have to promote timely implementation of emergency response programs short of saying you can't turn a spadeful of dirt until you have certain things in place?

McKNIGHT: As we were trying to point out on this condition, they may not physically be able to get everything in place, but if there was at least an agreed-upon schedule for securing those things, that would have been acceptable with us and with the permit committee. Again, what we were trying to address here is the immediate concerns that the storage poses out there right now today.

LORENZEN: What hook do we have other than tying it to construction?

MARSH: Let me ask, while you're thinking about that, let me ask if there aren't points of time in the review process for plans and other operational activities short of the completion of construction and the test burns on non-agents and that kind of thing. For example, when the plans of the facility are finalized, do we have another point of review, are there other intermediate points of review, and could we mechanically -- the Chair raises the question legally whether it's appropriate, but mechanically could we attach something at that point?

McKNIGHT: Maybe Larry might be able to think about this and help respond on this, but one thing the Commission could do is require that the Department come back in say six months or whatever and report on the status of emergency response, even request that OEM come in and brief the Commission. If in that briefing they felt that progress was not being made to their satisfaction, I think in some of the new permit conditions that we added under section, shutdown of facility in case something goes wrong section, that if the Department made a finding that there was a reasonable cause to believe that a clear and imminent danger existed, that we could in fact cause some sort of shutdown. That could send a strong message that we need to get things in place, and that's an area that --

LORENZEN: How about this? That doesn't quite fit, because the danger is there, and we're not actually shutting down the dangerous storage by telling them to cease activities. Maybe what would work and meet Melinda's objective would be to have a report back or a reporting back to this Commission regarding the emergency preparedness, and that if there is a lack of sufficient progress, that then the Commission could halt construction activities under the permit. Now, I know that that's almost maybe cutting off our nose to spite our face, but at the same time it could very well create the pressure point to assure that these things do go forward. And I think something like that, whether it may be strong enough to satisfy Melinda, I'm not sure, but at least at that point I think if there's a threat that the construction could be shut down, it would certainly tend to enlist the assistance of the Army to make certain that this program would be in place.

EDEN: Mr. Chair, that leaves us with the problem of slowing down construction and tying the program to operation of the facility. Let me ask this. Do you Army folks have any idea when you might be able to come up with an agreed-upon schedule for implementing -- you know, the language here says "or an acceptable schedule for securing the essential elements".

(INAUDIBLE COMMENT)

EDEN: I understand what you're saying. Does anybody have any idea when these three or four contentious items, what progress is being made toward resolving them? This is an issue that was raised time and time and time again by the people who are going to live closest and who live closest to the facility now. And so that's why I'm belaboring it.

(INAUDIBLE COMMENT)

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TAPE 2, SIDE 5

MARSH: Mr. Chair Commissioner, I have a suggestion. Since the Commission's involvement, and I'll mention Chair Lorenzen has assisted greatly in moving this process along, along with the Governor's involvement, perhaps one alternative might be to require a report back sometime after the period that Secretary Decker mentioned, six to eight months from now, and if there's not demonstrated satisfactory progress in the Commission's view, exercising its general responsibility to advise on policies, it could report to the Governor and to the other appropriate agencies about the sufficiency of these recommendations for doing things, because I think that that has, that action by itself has proven to be one of the most effective things the Commission has done on this issue over the last year.

HALLOCK: May I add something to that, if you like that approach? I think what might be helpful is, and I'm not sure if it would be in the permit condition or findings or what, but we would identify now with specificity the issues that Secretary Decker is talking about that are not resolved, so that when the report comes back, it would be specifically on those issues, so that we would get, you know, a substantive response on the very specific things that are hanging up that process.

LORENZEN: That might be better -- doesn't seem like that's the sort of thing we put in a permit, but have it specifically in a letter --

(INAUDIBLE COMMENT)

LORENZEN: Yeah. Melinda, what do you think? This is a --

EDEN: I think those are good suggestions. My concern is twofold. Do we have to call the Governor up every time we don't like the progress that's being made on something, and I guess concurrent with that is what enforcement possibilities do we have, not part of the permit or other, or what leverage do we have at that point, if everybody says, well, we haven't been able to reach agreement on these few things, well, then, when are they going to be resolved.

LORENZEN: And part of the problem, I'll tell you the other thing, what we're dealing with is the fact that, like in Fishville (?) issues, where this is an area that's probably the responsibility of agencies other than ours, and our frustration is that we believe it's an important and integral part of what we're doing here, but we see that the jurisdictional boundaries sort of blur and go over to another agency of the state.

MARSH: Could I ask Larry to address what he thinks the jurisdictional boundaries might be?

(INAUDIBLE COMMENT)

EDEN: The only question remaining is that I can't remember what's been designated waste and what hasn't.

EDELMAN: The rockets.

UNIDENTIFIED SPEAKER - FEMALE: But nothing else has?

McKNIGHT: That's correct.

LORENZEN: And also I think the fact that there is, that the rockets do exist that are waste, our jurisdictional hook will essentially in reality go to the entire process, because the responsive (inaudible) for responding to a rocket catastrophic event would probably be satisfactory for responding to any other event.

MARSH: Let me then amend my recommendation that you ask for a report as part of the permit condition by a time certain, you know, within six to eight months and we'll try to work that out before we give you the permit back, and that at that time you leave yourselves room to determine to take whatever action may be appropriate, which could include reporting to other agencies or the Governor or using whatever authority might be available under this section that Larry mentioned.

EDEN: I don't mean to -- I don't mean to belabor this, but I do appreciate your institutional restrictions, and I understand that there are a lot of other agencies involved and other budgets involved and it's a very difficult process. I'm just trying to be somewhat responsive to the people who live nearby and who have expressed these very concerns. And we're, in essence, we're their voice in this.

WHIPPLE: Well, have to add, I guess, my two cents' worth, too, in that we have in fact, this very day, as a Commission, as part of our findings, we are saying that storage risks outweigh by disposal processing risks, and to tie emergency response to the facility, this does not make sense to me.

LORENZEN: Carol, I think the only reason why, and as a comment to that, is that the permit itself deals with the operation of the facility. So within the permit, tying emergency response to them being able to operate, that's one small aspect of emergency response, and that is that portion that ties the operation of the facility, that doesn't mean that we're precluded from independently of the permit also examining emergency response. I think if we look at it as not just a single focus but as a multifaceted focus, that that way we can, it doesn't make the permit and our focus on it within the permit seem too myopic.

WHIPPLE: No, I understand that, but I'm also saying, I guess I am taking that beyond just the notion of the permit, that we're back to some of the underlying philosophy that got us here.

LORENZEN: Yeah. Okay. Yes?

(INAUDIBLE COMMENT)

LORENZEN: And the ultimate hammer is going to be a plant that cannot operate if it's not in place. And that's -- okay.

HALLOCK: I think I would just ask you if the condition that is in there on having it in place before operation is as (inaudible).

LORENZEN: It seems just right on the money as far as I'm concerned.

UNIDENTIFIED SPEAKER - FEMALE: I don't want to move off of this condition until you're ready to move off, because I know it's an important one.

UNIDENTIFIED SPEAKER - FEMALE: So we're eliminating the one about construction and leaving the one about shakedown crew.

HALLOCK: Right, and we're going to put a, we're going to change the one about construction to require this reporting back and that specific problems get resolved, etcetera. And then the next one Brett's going to do has to do with the structure at closure.

McKNIGHT: The only thing here, Commission, that I'd like to point out is that in the comments, we did receive a comment where we referenced the Umatilla Depot Base Realignment Closure Plan, there is an agency responsible for that and we would be checking with them, if there were uses for the facility that were being submitted, that it would be (inaudible).

LORENZEN: I might mention, I've had conversations with Secretary Decker regarding this issue and he pointed out to me that there are certain buildings here that could, with a high degree of probability, have beneficial re-use, buildings such as laboratories and other structures. My focus -- I'm not so worried about those. Those ultimately can be, with the resources available locally, demolished upon their abandonment and non-use, or when their useful life has terminated. The building, however, and I don't know how you'd describe it, but it would be a structure which houses the weapons and agent handling and processing equipment, you might call it the munitions disassembly equipment or incineration equipment, essentially that big, massive structure with lots of small rooms and very thick concrete walls, and I don't know how you -- and pipes and you know, all sorts of things that are in there that -- it's not going to be an easy process taking the thing down. And you know the old expression, if you take it in you pack it out, I don't know anyone else around that would have the financial incentive to pack it out once the thing is no longer used. I would hope that within this, I would like to see a little stronger wording related specifically to that particular structure that houses the main equipment, the main massive concrete edifice -- is that -- okay. MDB, that's it, great. Okay. And that, with that one, that I hope that there would be even more restrictive language relating to re-use, and if it is subject to re-use, that the Army maintain ultimate responsibility that that building be taken down and the site restored. That even in the event of re-use, that -- and the Army, in their condition they would place upon any re-use to any possible entity, could impose that obligation, but the Army would ultimately retain the obligation for its removal and restoration. That's the building I'm focusing on. The others, as far as I'm concerned, you know, ultimately over time they'll be taken down if they're not useful. Secretary Decker, by the way, I very much appreciate this position. I know, I can appreciate from the Army's point of view that in a fine economic analysis, this doesn't make any sense, but I've been -- because you can look at the value of land here in Eastern Oregon, especially desert land, and you do your computations on a spreadsheet, and the net present value analysis, and it doesn't compute, it just comes out tilt, that it doesn't make sense to take it down. But there's some obligations that we face as a society that don't fit neatly on a spreadsheet. And having been raised in this area, I see the value of the desert and its beauty, and I don't want to see something like this hung on here for centuries. Enough said, but it's a -- sorry for the -- opportunity for the soapbox, I'm not going to pass it up. Okay. All right. But that to me is very critical and I very much appreciate your willingness to go along with that. Further comments?

McMAHAN: One comment. I view this particular restriction or condition as a very important one, because commissions change, politics change, we can't assure what's going to happen in the future, and I think having this as a strong, the closure part as a strong statement along with whatever, you know, whatever we can do to strengthen that, will better carry forward our intent that this is just a temporary facility, this is not meant in any way as a long-term facility. And I think even if we could strengthen it in subtle ways to put that intent in, it would please me a great deal.

LORENZEN: I don't think this would make a very good municipal waste incinerating facility. Just the layout of the thing wouldn't work very well. But there is always a possibility of somebody saying it'd be a great PCB disposal facility, that sort of thing, and it's clearly not our intent that we open up a disposal site here in Eastern Oregon for incinerating

PCBs or other hazardous materials..

McKNIGHT: Moving on to the next one. The pollution abatement systems, carbon filter systems, we had added this question in the previous sessions to make sure that it was in fact tied to the findings so that if there was a modification of this, it would be clear that it was a class three modification and would have to go back to the Commission. I believe in the findings that you've made, you've clarified that so that it is on the record, and this condition may actually be a duplication --

LORENZEN: That's okay.

McKNIGHT: The other thing I'd like to point out is that in response to other technical comments received on the carbon filter unit, that is one area where we did receive quite a few detailed comments, technical comments. What we intend to do there, just so the Commission will know, is that we are incorporating the operating element and maintenance element of the carbon filter units to be a part of the tables for each of the incinerators, that there will be actual things or items on those tables that go with each incinerator that the facility will have to monitor and maintain with regard to these units. And a couple of examples would be when the dunnage, or not the dunnage, excuse me, when the liquid incinerator is operating, the inlet temperature of the carbon would have to be monitored and that the moisture content going into the carbon filters would be monitored. Those are items, elements that are added to the operating parameter tables done in module six to the permit. So this carbon filter unit will have those sort of equivalent requirements in the permit. I believe that's all I have to say at this point.

LORENZEN: Well, I think that's good. And you've, our same comments that we made with regard to the findings would also apply to the permit conditions, and the fact that there's duplication doesn't offend me a bit. I always gain some comfort in repetition. Next item is the --

McKNIGHT: Emergency Operation Center Positive Pressure. We've also added to this condition, one of the concerns that came out and that was that the existing EOC is not manned on a 24-hour a day, 7-day a week time frame. That's been incorporated into this in addition to positive pressure. Recognizing that there may be some staffing up problems or bringing on additional staff to meet that requirement, we've specified that they have a hundred a eighty days to deal with the staffing aspect, and three hundred and sixty days to deal with the positive pressure.

EDEN: I want to pretend I'm not trying to tell the Army how to do its job, but it seems to me that those, that those deadlines are too far out. Maybe just rescheduling could take care of the staffing at this point, but again, my understanding is that that emergency operation center is sort of the lifeblood of the information that goes to the local folks, and I had a concern when I visited there that there might be time delays, and apparently Congressman DeFazio shares my concern. And so I'm wondering if it can't be implemented sooner.

LORENZEN: (Inaudible) can put in a little overtime.

(INAUDIBLE COMMENT)

EDEN: So it's three hundred and sixty, but honestly I don't know how long it takes to institute positive pressure in one particular place. I honestly don't, so I'm asking for your input, yeah.

(INAUDIBLE COMMENT)

MARSH: Perhaps taking that, if that's the direction of the Commission, we will take it up with the Army and negotiate the shortest possible time that we can.

EDEN: That's fine with me. I just want to be on the record as wanting it sooner rather than later.

(INAUDIBLE COMMENT)

LORENZEN: And by the way, I want to thank the Army in this area. One of the dangers of public involvement and communication with the public regarding these things is we actually may have some ideas and they may not be very good, we may be relying upon intuition more than the training and the skill that you folks have. But yet, there's some things that as a citizen commission we find so intuitive, maybe incorrectly, and maybe the conclusion is incorrect, but the intuition is so strong that we find them important to ask for. And in these areas, I think it goes a great, it assists us in our relationship a great deal to develop these sort of working compromises on these areas that don't jeopardize your system and your procedures and your plans, and at the same time do not pose an inordinate drain upon our country's money supply to finance these sorts of operations. And to that extent, I want to thank you for your willingness to consider these things that have been suggested by citizens and by the citizens' committee. And I just wanted that message to ring out loud and clear.

McKNIGHT: Moving on to independent oversight?

LORENZEN: Right

McKNIGHT: Again, in this condition what we tried to do is, the Department does have a cooperative agreement with the Army, and what we've identified here is that the permittee shall propose and the Department shall approve a plan for independently inspecting the facility. The idea here is that we could address that then through the cooperative agreement. We have left it somewhat open because of our authority problem in requiring (inaudible).

LORENZEN: What about the funding for the Department's activities where you clearly have authority, will that funding be available from the permittee?

(INAUDIBLE COMMENT)

LORENZEN: Okay, and so this is not creating a financial drain on the Department to do the environmental oversight. Let me tell you my -- I'm sorry, go ahead.

McKNIGHT: If I could go ahead and respond to that. We do have a cooperative agreement that we submit to the Army each year, and we identify the resources, both Departmental personnel resources and professional services, contract services that we need to proceed with the permitting of this project and also the compliance oversight. So far, the Army has looked at that and approved or accepted our proposals to date, so we have not, this has not been an added drain on the Department, because the Army has (inaudible).

LORENZEN: Let me tell you my own philosophy on the third-party oversight, and I've mentioned this before. On the one hand, you don't want to have overseers tripping over overseers, or overseeing overseers. You can at some point have so many people walking around you actually increase the risk of something going wrong, because you have too many people doing the checking and the oversight. And yet, there are lessons learned from the nuclear power industry, is that there is some benefit of having review and inspection by people who are so totally removed from those responsible for the operation that there is not a conceivable chance that there is any motivation, whether it be conscious or unconscious, to overlook problems. And from the very beginning, this has been one of my major concerns, is to make certain that in place there is the opportunity for real, meaningful, and underline and put bold letters, independent oversight of the operation. Now, I know the Army has similar motivation to do this sort of thing, and it would give some comfort as a fact that there is an independent contractor who is responsible for the operation, so there is some physical separation there and organizational -- not physical but organizational separation with the independent contractor actually performing the operations. I would feel more comfortable, however, if there's some way we could build into the permit the opportunity for DEQ to in some way establish or require or play a very strong role in developing a third-party oversight plan, if you determine that the oversight in place by the Army is not sufficient. Now, I don't know how we do that. I recognize I'm getting into areas of organizational structure and responsibility and authority that may be such a morass it's very difficult to sort it out. But maybe folks from the Army or Secretary Decker can help out in this area. And I tell you, the depth of my concern in this area is very real. And it probably is for you as well, because this is the type of facility where a small mishap can result in a catastrophic result, even more so than a nuclear power plant, probably. What can we do here to make sure as a state agency that the independent oversight that will be put in place is truly independent and truly with teeth and of substance.

McKNIGHT: Again, in the cooperative agreement, we do have the ability to (inaudible) professional services, where we can hire contractors and do whatever task that we have to do. So if there was (inaudible) sampling requirements that we wanted done, or if we decided that we wanted to perform a source test (inaudible). Is that getting at --

LORENZEN: No, no, I'm not -- I recognize that, I'm comfortable that those oversight provisions are in place that relate to environmental releases from the operation, from the incineration process. What I'm concerned about also is whether or not, and this is basic as can be, is there appropriate screen of the forklift driver to make sure that he doesn't have a bad hair day or something, you know, out there, and would trip the wrong lever because he happens to be tired or under emotional stress or whatever it may be. That sort of thing. Because that's where the real risk is going to be, in my opinion. Yes, General?

(INAUDIBLE COMMENT)

LORENZEN: You know, what comes to my mind in listening to this, is that what would satisfy me is if we could build within the permit, not, and this again, we may not even have the authority to do it, Larry, so you've got to help me -- but build into the permit not the requirement of setting up another level of independent oversight, but some provision that would allow us to have an opportunity to periodically review the oversight that's in place by the Army, and to in some way have some checks to make sure that that remains in place. What you've described is very comforting to me, and I guess the ultimate question here is what is our role? Are we overstepping our bounds here? And I guess we take this decision so seriously and understand sort of the weight of this thing that we want to make sure all aspects of it are done in the appropriate manner, and maybe we're the greater fools here, because you folks have the experience, the expertise and the knowledge to do this sort of thing, and we by training do not. But yet, I just have this gnawing sense that it's important to be able to maintain some review and to maintain some level of assurance that the oversight that's in place by the Army is there, is effective and continues to be effective. It's not the full-blown, develop our own independent oversight ability, but it is a modified develop our ability to assure ourselves that the oversight that's in place is appropriate.

HALLOCK: Mr. Chairman, maybe, and Larry really will have to help us, perhaps one way to articulate that is if the, if and when the various bodies that General Orton has described, the health people and the inspector general and everybody, do their reviews, A, that somehow we are able to have access to the results of those reviews, and more importantly, if there are problems identified in those reviews, whether or not there can be any connection to operation, any restrictions that we might be able to put in our permit with regard to operation of the facility, depending on the nature of those problems. Now again, I have no idea if we have the authority to do that, but that might be a meaningful connection.

LORENZEN: That's all I'm trying for, it'd be not only the results but also just the procedures involved in those reviews. If we could have some opportunity to review that. Now, maybe this is so far outside the environmental area that we have no business or legal basis for being in this area. However, I have a feeling that since at least we have the rockets that are hazardous waste, we probably have some jurisdictional hook into this since it's the management of hazardous waste material.

HALLOCK: Unless Larry has an answer right this very minute, can we look into this for you and --

LORENZEN: Yes. You know the direction, and I want to assure the Army, I do not want to set up a total new QAQC system here that's going to duplicate all your efforts, that's --

(INAUDIBLE RESPONSE)

LORENZEN: We have the general parameters of what we're shooting for. Linda, you --

McMAHAN: Mr. Chair, I'd like to ask a question, if I could, and maybe it's something for the Department to look into as well. Oversight I don't think is just us and the Department, but I believe the public, with access to information, can sometimes find things that we don't, and so as part of this process, I would like to see an opportunity for the public to view whatever documents there are. That may be in place already, it may be an implicit part of the process, but I would like to make sure of that.

LORENZEN: And you know, I think as part of the continuing Commission involvement in this over the life of the project can be a period public review. If there is interest in the area for that sort of thing, it may be that interest will wane, but if there is sufficient interest, we could have formal public review of what was happening and information sessions. It always is very helpful for the public to understand what is going on. It takes away and does allay numerous fears when you do have information available.

VAN VLIET: Mr. Chair, the Governor may like to have single rep, with the agreement of the Army, to have a single rep sit on those reviews. It could be a citizen chosen by the Governor to do so, cleared by you folks.

McKNIGHT: We are proposing the permit have a computer link monitor certain key elements so that we'll have real-time compliance data. And we'd propose to have that in a location where the public could in fact view that information.

McMAHAN: My comment was specifically toward the oversight documents and process, that there be some openness in that as well.

LORENZEN: Okay, great. I think, number one, that -- I'm sorry, I'm jumping ahead of you. Go ahead.

McKNIGHT: Number six is the Shutdown Procedures. Again, these are taken out of the statutes. They probably didn't need to be in the permit, because they're actually statutory authority, but we thought we'd go ahead and put them in the permit so that it's very clear what authorities you do have.

EDEN: I notice that this says that the permit could be revoked after public hearing. Are there any, they can't anticipate a situation where this might occur, but are there any emergency provisions that would allow something before, I presume, (inaudible) thirty days notice for a hearing?

(INAUDIBLE COMMENT)

McKNIGHT: Commissioner Eden, the second item, I.C.3, talks about if the Department finds that there's reasonable, there's clear and imminent danger to public health, welfare or safety (inaudible).

LORENZEN: Okay, that's a sticky issue, and we've probably discussed it to the extent we can.

(INAUDIBLE COMMENT)

LORENZEN: Bad hair days, yeah. That's also, you know, in reading through it, recognizing how difficult it is to determine what is a bad weather condition, but it certainly would be useful to have some discussion.

McKNIGHT: If I can explain to the Commission on number eight, Bad Weather Conditions, in talking with the Army, we have been made aware that they do have certain standard operating procedures which they do follow during certain weather conditions and what have you. What we've done here in the permit is ask that the permittee submit as a class two permit modification, identify those standard operating procedures so that we can in fact incorporate them into the permit, and that will give us an opportunity to review what they're defining as inclement weather and their operating procedures (inaudible).

VAN VLIET: Does that include air inversion day?

McKNIGHT: It may, when they do their, when they submit to us, in discussing this issue with the Army, in their modeling, if there are weather conditions such that they may have a release that goes offsite, they curtail certain activities. If those are submitted to the Department as part of this, then they would be included in the permit modification. So really what we're doing is we're leaving it up to the permittee to identify what standard operating procedures they use and dialogue with the agency (inaudible).

LORENZEN: Probably the most critical thing on the bad weather day would be those situations in which if there were a release, probably considered a substantial release, the air direction and the speed and the rate of attenuation were such that it would put nearby populations in significant jeopardy, those would be the times you would be worrying about in your operations and what restrictions should be placed upon operations.

HALLOCK: An example, I think I've maybe given this to you before, that I think Colonel Ontiveros used, was for the Johnston (inaudible) facility, that they have in the operating plan that they do not operate on the days that the trade winds are not blowing, if I got that right, correct me if I'm wrong --

(INAUDIBLE COMMENT)

HALLOCK: -- don't move munitions, that's right, that's right, because, so they have been conscious of that, and it would be that kind of thing.

LORENZEN: Yeah. Because the real risk, what I see the tremendous risk here is getting it from the igloo into the transport vehicle. You know, once that step is completed, then you're not so worried about the weather, you might be worried about the truck sliding off the road getting to the plant if it's severely icy, but still, the transport mechanism is such a massive thing that it would probably contain any problems that occur there. But that is what I see the issue. One other thing that I notice that we didn't --

END OF TAPE 2, SIDE 5

TAPE 2, SIDE 6

LORENZEN: -- are agents and materials from off-site, other than the exception Melinda may have mentioned. But boy, put that in there in belt and suspenders and underline it and highlight it and put self-detonation on it and everything else, because that is, that's critical.

McKNIGHT: It is in the permit, Mr. Chairman, in that they're not allowed to take off-site stockpile material and process it. One clarification I would like to make, and that is when they go into their surrogate trial burn, they will have to bring material on-site to process it.

LORENZEN: Okay. Now, there's one further thing, and it's something that Melinda mentioned to me earlier as well. What about baseline studies, both before and during and after, or upon completion of operations? Have there been sufficient baseline data gathered to determine what the conditions are before the operation of this facility, and are there provisions included within the permit that assure that data is constantly gathered so that we can assure ourselves and the public that emissions are not occurring that are in fact going to be cumulative and harmful to the environment?

McKNIGHT: There are no permit conditions that deal with baseline monitoring. We do not have in the Department a standardized program that would be in place that we could rely on.

LORENZEN: Can you -- I thought this was sort of a standard procedure for a new industrial source, that one of the requirements is to develop baseline data, pre-operation data. Am I using the wrong terminology here, is that what's fouling it up? In other words, what monitors are out there now to determine what conditions exist before you start operating the thing, to determine as a second, as a backup to prove your conclusions, or your calculations that no significant amount of materials are going to be released into the environment? One way, obviously, is to make certain that that is, that those calculations are correct, is to measure what's there now, and compare it to what's going to be there, you know, and to compare it with what will be there a year after operations begin. Seems like that would be a prudent thing to do in this circumstance.

EDEN: Basically that's what I had in mind, and I confess that the idea comes from practicing environmental law and having clients required to do this sort of thing, but also in some of the materials that I, I cannot remember where it was, and I'm sure it was one of the opposition groups, it was suggested that the citizens' committee be funded to do monitoring. I'm not necessarily willing to go that far, but I think it would be extremely helpful, both on a real knowledge basis and a public perception basis, to get some baseline soil samples -- I'm not talking about an extensive system, but some baseline data collection that we could then compare, you know, a year after we begin, a few years after we begin, and when we're finished, something like that, some kind of basic monitoring system off-site.

HALLOCK: Okay, I want to clarify, so, because you did say soil, and that's helpful, I was going, and then the next question was going to be what are we talking about checking, air, soil, water --

EDEN: All of the above.

HALLOCK: All of the above, okay. I think --

EDEN: But not on a daily basis, you know, just some kind of measure.

MARSH: I think it's a very good idea, and I think that we can look at some protocols that have been used with other, not like facilities, but facilities with potential impact. I know that in the case of some of the municipal incinerators approved around the country, some of that has been done, and we'll look for something as comparable as possible to --

LORENZEN: There are two aspects of this, Lang, I'm sorry. One is the technical aspect to make sure that what is being done, what actually occurs is what we predict is going to happen. The second, which is an equally important aspect, is it provides some assurance to the public that this is a second check, a safety review, to make certain that we are not fouling things up. And in the grand scheme of costs, it is not going to be a huge number compared to six hundred million dollars. Or one point two billion, whichever way you look at it.

(INAUDIBLE COMMENT)

LORENZEN: It certainly goes a good portion of the way. But I think that what we're looking at is, that is something that's looking specifically at what's coming out of the stack, to overly simply, it's measure -- you're looking specifically at what's coming out of the stack, and I think, and I understand from a scientist's point of view, that probably is the best possible information. From the lay person's point of view, I think what people say, you know, all this may be well and good, but one thing I'd really like to know is if this spot that's two miles from the facility, that over time nothing's gone wrong here. And I recognize it's difficult to sample soil, because all sorts of events can occur right at the point where you pick up your soil sample or you grab your air sample or whatever it may be. But it's almost, it's -- you know, maybe a poor analogy would be one of trying to measure gas mileage with a car, you can do all the testing in the world on the odometer and that sort of thing, but ultimately at the end of the year, you look at how many miles you drove and what your credit card bill was, and it gives you a check that what you saw on your very precise measurements actually proved out. Now, I think this is not unusual methodology in the municipal waste incinerator business. And am I correct in that, Lang?

MARSH: Yes, I think both here in the United States and Europe, there's been a number of protocols at work, baseline and operational and post-operational sampling of hot spots detected in the air quality analysis, for example, areas of (inaudible) concentration, as well as sampling the biota and the (inaudible) quality in the soil in the various locations, just to check on whether (inaudible). That's something we can work into a condition.

LORENZEN: I think that's, yes, I see lots of nervousness here --

McKNIGHT: Now that I understand, well, that's what I understand, the baseline sampling that you're looking at, let me just tell you what we did have in the permit, and I think we can expand it to address the concerns that have been expressed here. In the risk assessment, we do identify what we figured, or what the permittee assessed where the highest concentrations are to occur. At closure of the facility, they must go back and evaluate those areas, and if there are levels of contaminants that would pose a threat to the environment, they would be required to remediate those areas. I think what we need to do from this discussion is go out and try to develop some sort of baseline, what we're starting at those locations, and then some sort of periodic monitoring throughout the operation. so that when closure comes, we'll have a good track record to try to --

LORENZEN: Exactly. And I don't see this as a real-time monitoring operation, where you have monitors going all 24 hours a day, all year round, but it'd be sample monitoring to show, as a double-check, that what you're predicting to occur in certain areas is in fact not being exceeded. Now, that's simple to state. I know from an environmental standpoint, these may be very difficult things to measure, but I would appreciate some work in this area to see if we can develop it.

HALLOCK: Do you, at this point, have any, I would assume, dioxin is a constituent concern, are there any other that come to mind?

LORENZEN: No, that's, whatever you -- there was some, mercury was identified as one of the potential, the metals, coming off of the dunnage -- not dunnage, but the metal parts, incinerators.

EDEN: Like the way carbon monoxide is a measure of how complete the combustion is inside the incinerator, is there some other indicator outside the incinerator that would be easy to pick up, if it were there (inaudible).

LORENZEN: My hunch is that the dioxin level emissions are going to be so incredibly small that you're not going to find any kind of measuring instruments that are going to be sufficiently sensitive enough, and if they are, if they do detect anything, we've got a big problem, because that means that the levels emitted are going to be so far greater than what had been predicted, but there may be other indicators, as mentioned, such as the heavy metals, where the tests can in fact be more, less costly and more sensitive.

McKNIGHT: The facility will be required during the trial burn to sample and test for those parameters --

LORENZEN: I understand. But this is a further test. I recognize that you may feel that this is not necessary, but this may be something that provides greater assurance to the public that this facility is operating and is causing the ultimate result out on the ground that has been predicted. And I think that assurance and that data is also a very important thing, an important function we can provide to the public.

HALLOCK: Mr. Chairman, that's all that we had, but are there other, in addition to those two that you had brought up (inaudible) are there any other things that you can think of to add to this morning's discussion or the list in terms of permit conditions? Do you think we've pretty much --

WHIPPLE: I have one more question, and I don't think it really has anything to do with permit conditions. It may go back a little bit to the two-step process, but I kind of lost track. What role or where is the role, if there's there any role for local government, the cities or the counties that are directly involved?

HALLOCK: It is CSEPP, they're intimately involved in CSEPP.

WHIPPLE: Right, right, but I mean beyond that or the avenue for which they may have specific questions, it's just, it's sort of a standard relationship with the Department?

HALLOCK: It's the standard relationship, obviously, if they come to us with complaints in terms of whatever, we will have a compliance presence in the Hermiston-Pendleton area all the time, and every complaint, concern, anything that anyone raises about that facility in the local communities will be investigated by us.

(INAUDIBLE COMMENT)

LORENZEN: Well, I want to thank everyone. In particular I want to thank and compliment the staff for the wonderful work that you folks have done over the last six months to a year. It has been, the workload has been enormous and the quality of the product has been exceptional. You folks have done a tremendous job in assisting us in this very, very tough issue. And I want to compliment the Army as well, I want to thank you for the professional presentations that you've made, and in particular today, I want to thank you for your willingness to give and to compromise on issues that are important to this commission, and recognize in quite frankness that you don't agree with us completely on these things. But it's the nature of give and take, and I want to express my deep appreciation for your willingness to come to the table and to make those concessions. It gets us a long ways toward a good working relationship and one that I think provides assurance to the community that we're all working at our very humanly best and to the best of our capabilities to make sure that these incredibly dangerous weapons are destroyed and destroyed safely, and done in a way that provides assurances to the community that they will be done in that manner. And with that, I also want to thank the Commission itself for its hard work. This is one of those tasks I think that's been the most daunting that we have faced in at least the seven years I've served on this Commission. So with that, and we just pray that we have made the right decision. We certainly have worked and agonized to arrive at this point, and we've given it our very best analysis, and hopefully our best reasoning, and with that, unless there's any further business --

VAN VLIET: Well, your junior members want to thank you, Mr. Chair, for running a very good gavel.

LORENZEN: Thank you very much. With that, we're adjourned.

(END OF TAPE 2, SIDE 6)

<u>CERTIFICATE</u>

STATE OF OREGON)

COUNTY OF DESCHUTES)

I, KAREN NUTTING, do hereby certify that:

I transcribed the foregoing matter from tape-recordings provided to me by the Department of Environmental Quality;

The foregoing transcript, pages 1 through 88, is, to the best of my knowledge and belief, a correct transcript of the Environmental Quality Commission meeting held November 22, 1996, with the exception of those portions of the audiotapes which were inaudible.

I have hereunto set my hand this 22nd day of January, 1997, in the City of Bend, County of Deschutes, State of Oregon.

Karen J Nutting

Karen Nutting, Transcriptionist