OMB# 2050-0024; Expires 12/31/2014

SEND COMPLETED FORM TO: The Appropriate State or Regional Office.	United States Environmental Protection Agency **RCRA SUBTITLE C SITE IDENTIFICATION FORM**	

1. Reason for Submittal MARK ALL BOX(ES) THAT APPLY	**Reason for Submittal:** ☐ To provide an Initial Notification (first time submitting site identification information / to obtain an EPA ID number for this location) ☒ To provide a Subsequent Notification (to update site identification information for this location) ☐ As a component of a First RCRA Hazardous Waste Part A Permit Application ☒ As a component of a Revised RCRA Hazardous Waste Part A Permit Application (Amendment # 21) ☐ As a component of the Hazardous Waste Report (If marked, see sub-bullet below) ☐ Site was a TSD facility and/or generator of ≥1,000 kg of hazardous waste, >1 kg of acute hazardous waste, or >100 kg of acute hazardous waste spill cleanup in one or more months of the report year (or State equivalent LQG regulations)
2. Site EPA ID Number	**EPA ID Number** O R Q 0 0 0 0 0 9 4 3 1
3. Site Name	**Name:** Umatilla Chemical Agent Disposal Facility
4. Site Location Information	**Street Address:** On the Umatilla Chemical Depot (off of Interstate Highway-84 at Exit 177 at latitude 45°50'30" and longitude 119°26'00"), north of Badger Road between Rim Road and K-Block **City, Town, or Village:** Hermiston — **County:** Umatilla/Morrow **State:** OR — **Country:** U.S.A. — **Zip Code:** 97838
5. Site Land Type	☐ Private ☐ County ☐ District ☑ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other
6. NAICS Code(s) for the Site (at least 5-digit codes)	**A.** 5 6 2 2 1 1 — **C.** **B.** — **D.**
7. Site Mailing Address	**Street or P.O. Box:** 1. U.S. Army Umatilla Chemical Depot UMCDF Site Project Manager 78072 Ordnance Road 2. Washington Demilitarization Company, LLC 78068 Ordnance Road **City, Town, or Village:** Hermiston **State:** OR — **Country:** U.S.A. — **Zip Code:** 97838
8. Site Contact Person	**First Name:** Gary — **MI:** M — **Last:** Anderson **Title:** Chemical Materials Activity Site Project Manager **Street or P.O. Box:** 78072 Ordnance Road **City, Town or Village:** Hermiston **State:** OR — **Country:** U.S.A. — **Zip Code:** 97838 **Email:** gary.m.anderson22.civ@mail.mil **Phone:** 541-564-7097 — **Ext.:** N/A — **Fax:** 541-564-7057
9. Legal Owner and Operator of the Site	**A. Name of Site's Legal Owner:** U.S. Army Chemical Materials Activity — **Date Became Owner:** 10/8/2012 **Owner Type:** ☐ Private ☐ County ☐ District ☑ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other **Street or P.O. Box:** 78072 Ordnance Road **City, Town, or Village:** Hermiston — **Phone:** 541-564-7057 **State:** OR — **Country:** U.S.A. — **Zip Code:** 97838 **B. Name of Site's Operator:** Washington Demilitarization Company, LLC — **Date Became Operator:** 01/09/1998 **Operator Type:** ☑ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other

10. Type of Regulated Waste Activity (at your site)
Mark "Yes" or "No" for all current activities (as of the date submitting the form); complete any additional boxes as instructed.

A. Hazardous Waste Activities; Complete all parts 1-10.

Y [✔] N [ ] **1. Generator of Hazardous Waste**
If "Yes", mark only one of the following – a, b, or c.

[✔] a. LQG: Generates, in any calendar month, 1,000 kg/mo (2,200 lbs./mo.) or more of hazardous waste; **or** Generates, in any calendar month, or accumulates at any time, more than 1 kg/mo (2.2 lbs./mo) of acute hazardous waste; **or** Generates, in any calendar month, **or** accumulates at any time, more than 100 kg/mo (220 lbs./mo) of acute hazardous spill cleanup material.

[ ] b. SQG: 100 to 1,000 kg/mo (220 – 2,200 lbs./mo) of non-acute hazardous waste.

[ ] c. CESQG: Less than 100 kg/mo (220 lbs./mo) of non-acute hazardous waste.

If "Yes" above, indicate other generator activities in 2-4.

Y [ ] N [✔] **2. Short-Term Generator** (generate from a short-term or one-time event and not from on-going processes). If "Yes", provide an explanation in the Comments section.

Y [ ] N [✔] **3. United States Importer of Hazardous Waste**

Y [ ] N [✔] **4. Mixed Waste (hazardous and radioactive) Generator**

Y [ ] N [✔] **5. Transporter of Hazardous Waste**
If "Yes", mark all that apply.

[ ] a. Transporter
[ ] b. Transfer Facility (at your site)

Y [✔] N [ ] **6. Treater, Storer, or Disposer of Hazardous Waste** Note: A hazardous waste Part B permit is required for these activities.

Y [ ] N [✔] **7. Recycler of Hazardous Waste**

Y [ ] N [✔] **8. Exempt Boiler and/or Industrial Furnace**
If "Yes", mark all that apply.

[ ] a. Small Quantity On-site Burner Exemption
[ ] b. Smelting, Melting, and Refining Furnace Exemption

Y [ ] N [✔] **9. Underground Injection Control**

Y [ ] N [✔] **10. Receives Hazardous Waste from Off-site**

B. Universal Waste Activities; Complete all parts 1-2.

Y [✔] N [ ] **1. Large Quantity Handler of Universal Waste (you accumulate 5,000 kg or more) [refer to your State regulations to determine what is regulated]. Indicate types of universal waste managed at your site. If "Yes", mark all that apply.**

a. Batteries [✔]
b. Pesticides [ ]
c. Mercury containing equipment [ ]
d. Lamps [✔]
e. Other (specify) ______________ [ ]
f. Other (specify) ______________ [ ]
g. Other (specify) ______________ [ ]

Y [✔] N [ ] **2. Destination Facility for Universal Waste**
Note: A hazardous waste permit may be required for this activity.

C. Used Oil Activities; Complete all parts 1-4.

Y [ ] N [✔] **1. Used Oil Transporter**
If "Yes", mark all that apply.

[ ] a. Transporter
[ ] b. Transfer Facility (at your site)

Y [ ] N [✔] **2. Used Oil Processor and/or Re-refiner**
If "Yes", mark all that apply.

[ ] a. Processor
[ ] b. Re-refiner

Y [ ] N [✔] **3. Off-Specification Used Oil Burner**

Y [ ] N [✔] **4. Used Oil Fuel Marketer**
If "Yes", mark all that apply.

[ ] a. Marketer Who Directs Shipment of Off-Specification Used Oil to Off-Specification Used Oil Burner
[ ] b. Marketer Who First Claims the Used Oil Meets the Specifications

D. Eligible Academic Entities with Laboratories—Notification for opting into or withdrawing from managing laboratory hazardous wastes pursuant to 40 CFR Part 262 Subpart K

❖ You can **ONLY** Opt into Subpart K if:

- you are at least one of the following: a college or university; a teaching hospital that is owned by or has a formal affiliation agreement with a college or university; or a non-profit research institute that is owned by or has a formal affiliation agreement with a college or university; AND
- you have checked with your State to determine if 40 CFR Part 262 Subpart K is effective in your state

Y ☐ N ☑ 1. Opting into or currently operating under 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories **See the item-by-item instructions for definitions of types of eligible academic entities. Mark all that apply:**

☐ a. College or University

☐ b. Teaching Hospital that is owned by or has a formal written affiliation agreement with a college or university

☐ c. Non-profit Institute that is owned by or has a formal written affiliation agreement with a college or university

Y ☐ N ☑ 2. Withdrawing from 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories

11. Description of Hazardous Waste

A. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g., D001, D003, F007, U112). Use an additional page if more spaces are needed.

D001	D010	D022	D035	F003		
D002	D011	D027	D036	F005		
D003	D012	D028	D037	U037		
D004	D014	D029	D039	U131		
D005	D015	D030	D040	U210		
D006	D018	D031	D041			
D007	D019	D032	D042			
D008	D020	D033	D043			
D009	D021	D034	F002			

B. Waste Codes for State-Regulated (i.e., non-Federal) Hazardous Wastes. Please list the waste codes of the State-Regulated hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed.

F998						
F999						
P998						
P999						

12. Notification of Hazardous Secondary Material (HSM) Activity

Y ☐ N ☑ Are you notifying under 40 CFR 260.42 that you will begin managing, are managing, or will stop managing hazardous secondary material under 40 CFR 261.2(a)(2)(ii), 40 CFR 261.4(a)(23), (24), or (25)?

If "Yes", you must fill out the Addendum to the Site Identification Form: Notification for Managing Hazardous Secondary Material.

13. Comments

14. Certification. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. For the RCRA Hazardous Waste Part A Permit Application, all owner(s) and operator(s) must sign (see 40 CFR 270.10(b) and 270.11).

Signature of legal owner, operator, or an authorized representative	Name and Official Title (type or print)	Date Signed (mm/dd/yyyy)
[signature] For	Gary Anderson, CMA Site Project Manager	10-8-12
[signature]	Steven D. Warren, Project General Manager	10/8/12

UMATILLA CHEMICAL AGENT DISPOSAL FACILITY WASTE ANALYSIS PLAN

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UMCDF
Waste Analysis Plan

[40 CFR 264.13, 268.1-268.9, 268.34, 270.31;
OAR 340-100-0002, 340-101-0030, 340-101-0033, 340-102-0011, 340-104-0001(2)]

1. Introduction

Detailed information regarding wastes which will be treated or stored at the Umatilla Chemical Agent Disposal Facility (UMCDF) must be obtained in order to ensure proper hazardous waste management practices. This plan details how this information will be obtained.

This Waste Analysis Plan (WAP) describes/includes:

- the physical and chemical analyses the UMCDF will perform before hazardous wastes are stored, treated, or transported off facility for further treatment and disposal;
- the rationale for the selection of analyses;
- analysis required for hazardous waste treated at the UMCDF;
- the chemical analysis the UMCDF will perform to meet the Permit Condition II.B.2 agent-free hazardous waste off-site shipment requirement before potentially agent contaminated items are transported off facility for recycling or disposal;
- the sample collection methods;
- the frequency of sampling and analyses;
- the analytical methods;
- quality assurance;
- the basis for generator knowledge;
- analyses for the determination of the applicability of Subpart CC exemptions; and
- analysis for the determination of the applicability of Subpart BB.

Information on the chemical agent characteristics is provided in the RCRA Tank Assessment (Permit Attachment 12). All historical and UMCDF-generated waste characterization information shall be maintained in the UMCDF operating record.

Information regarding sampling and analyses and UMCDF laboratory quality control requirements are included in Appendix C and Appendix D to this plan.

Terms as Defined Within the WAP	
Agent Free	A waste is “agent free” if 1) it can be verified, as specified in this WAP, that it has never been exposed to chemical agent, 2) agent free can be demonstrated through the use of process knowledge as allowed by this WAP, or 3) the analytical results of the samples required by this WAP are below the permit compliance concentrations (PCCs) identified in Section 8 of this WAP.
Explosives Analysis	Includes TNT, RDX, tetryl, and nitroglycerine.
Off Facility	Outside of the UMCD boundaries

Terms as Defined Within the WAP	
On Facility	Includes the UMCDF and the Umatilla Chemical Depot (UMCD)
TCLP Metals	Includes sample preparation using the toxicity characteristic leaching procedure (TCLP) followed by analysis for arsenic (D004), barium (D005), cadmium (D006), chromium (D007), lead (D008), mercury (D009), selenium (D010), and silver (D011).
TCLP Organics	Includes sample preparation using the TCLP followed by analysis for the organic analytes shown in Table 4.
Total BB/CC Organics	Analysis is used to verify exemption from Subpart BB/CC requirements. Total organic carbon (TOC) analysis will be conducted for an initial screen of the waste. If the results are equal to or greater than 0.05% for organics, then additional analysis will be necessary in order to identify the organics present in the waste stream.
Total Metals	Includes sample preparation via SW-846 Methods 3015, 3005, 3050, or 3052 followed by analysis for antimony, arsenic (D004), barium (D005), beryllium, boron, cadmium (D006), chromium (D007), cobalt, copper, lead (D008), manganese, mercury (D009), nickel, phosphorus, selenium (D010), silver (D011), thallium, tin, vanadium, and zinc.
Total Organic Carbon	Analysis used to determine TOCs in the waste stream. Does not identify which organics are present.
Total Organics	Includes sample preparation via SW-846 Methods 5030, 5035, 3510, 3520, or 3540 followed by analysis for the organic analytes shown in Table 4.
Totals	Used to differentiate analysis conducted on the entire matrix versus the leachable or "TCLP" fraction, and is not intended to represent that entire quantity of specified analyte in the waste.

2. Analyses and Rationale for Selection

The DEQ may require sampling or monitoring at reasonable times any substances or parameters at any location for the purpose of confirming a waste determination or other permit compliance.

2.1 Analyses for Process Wastes Requiring Treatment at the UMCDF

Wastes requiring treatment at the UMCDF will be treated in one or more of the four incinerators or the Brine Reduction Area (BRA). Table 1 presents a summary of the selected analyses, analytical methods, sampling frequencies, and sample collection methods for all of the UMCDF waste streams that will be treated at the UMCDF. Representative samples will be collected using the sampling methods specified in Table 1. Various agent-contaminated secondary wastes that may be generated from Umatilla Chemical Depot (UMCD) munition storage activities are included in Table 1. The table also includes a reference to the unit that will treat each waste stream. Analyses were selected for each waste stream based on analytical results obtained for similar waste streams, the homogeneity of the waste, process knowledge of the waste, and the ability to obtain a representative sample, and/or government manufacturing specifications (for munition energetic components.)

For a number of waste streams, it is neither feasible nor practical to collect a representative sample due to the physical nature of the waste. In the specific waste stream descriptions that follow, "prevents" is used to identify that the physical state of the waste hinders collection of a representative sample. Instead of sampling and analyzing these waste streams, process knowledge will be used to ensure the waste does not substantially change over time and waste feed limits are met. Analytes for these waste streams were determined by the need to meet waste feed limits and to verify that the waste has not changed. Analytes for waste feed limits include metals and chlorine (chlorine only for the HD campaign). Analytes to ensure that the waste has not changed include agent purity, corrosivity, and ignitability. Some waste streams have been determined to be exempt from Subpart BB and/or Subpart CC requirements. Organic analysis to document these exemptions is also required (reference Section 11 for further details).

For wastes to be treated at the UMCDF that are not included in Table 1, the Oregon Department of Environmental Quality (DEQ) will be notified to determine the most appropriate treatment method and appropriate analyses. This written notification will occur within thirty (30) days of the time when the UMCDF determines a waste requiring treatment at UMCDF, yet not listed in Table 1, has been generated.

Secondary wastes will be evaluated for RCRA nonembedded metals content in accordance with the approach identified in Section 9 of this plan prior to incineration.

2.1.1 Chemical Agents

Chemical agents treated at the UMCDF are limited to the nerve agents GB and VX and mustard agent HD. Production data, previous analyses of chemical agents, and UMCDF waste characterization sampling and analyses, have identified agent breakdown products, organic stabilizers, and metal constituents expected in chemical agents. Samples will be taken from the Agent Collection System (ACS) and analyzed for agent purity and metals to ensure that the chemical agents treated at the UMCDF conform to the constituents previously identified and to ensure that feed rate limits are met.

For the HD campaign, two types of samples will be collected: initial characterization samples and confirmation samples. The frequency of HD agent confirmation sampling was determined to be sufficient and did not change upon review of the HD agent trial burn metals characterization results.

Initial Characterization Samples for the HD Campaign

Initial characterization samples will be collected from the first ten ACS tanks for the HD campaign. For the purposes of agent characterization, a “tank” will consist of at least 500 gallons of agent. Initial characterization samples will be collected from the first ten Rinsate Collection System (RCS) tanks for the HD campaign. For the purposes of HD rinsate characterization, a “tank” will consist of at least 300 gallons of HD rinsate. The sample results from the first ten tanks and follow-on confirmation sampling will be utilized to calculate upper confidence levels (UCLs) for metals concentrations, utilizing the most current version of U.S. Environmental Protection Agency software ProUCL (available at www.epa.gov).

Agent Feed During Characterization Sampling and Analyses

The UMCDF will limit agent feed during the characterization period as follows:

- **Tanks #1-5** - Do not feed until characterization data is available; upon availability of characterization results feed at up to 100% of permitted agent feed rate unless metals content results in limited feed. Using the analytical results for Tanks 1 through 5, enter all characterization data into the EPA statistical program ProUCL, to calculate the UCL and the UCL metal feed rate for each metal.

- **Tanks #6-10** - When characterization data is obtained for Tanks 1 through 5 and the UCL calculations are complete, Tank 6 may be fed at risk based on the calculated UCL and the UCL metal feed rate for each metal based on the available results. For each successive tank, through Tank 10, each tank may be fed at risk only if the results of the prior tank’s sampling have been incorporated into the UCL calculations and the feed rate is based upon the updated UCLs and UCL metal feed rates. For example, Tank #7 may be fed utilizing the calculated UCL from

Tanks 1 through 6. Tank #9 may be fed utilizing the calculated UCL from Tanks 1 through 8, and so on.

HD Rinsate Feed Characterization

Tanks #1-10 – Do not feed until characterization data is available; upon availability of characterization results feed at up to 100% of permitted feed rate unless metals content results in limited feed. Using the analytical results, enter all characterization data into the EPA statistical program ProUCL to calculate the UCL and the UCL metal feed rate for each metal.

Confirmation Samples for the HD Campaign

For confirmation sampling, the UMCDF will sample at least every 7,000 gallons of agent processed. The ACS tank must contain a minimum of 500 gallons of agent during collection of confirmation samples. Once the confirmation sample is collected, the agent remaining in the ACS tank may be fed at a rate not to exceed the permitted metal feed rate limits based on the prior characterization results. For confirmation sampling, the UMCDF will sample at least every 7,000 gallons of RCS rinsate processed. The RSC tank must contain a minimum of 300 gallons of rinsate during collection of confirmation samples. Once the confirmation sample is collected, the HD rinsate remaining in the RCS tank may be fed at a rate not to exceed the permitted metal feed rate limits. The compliance determination for a particular tank is based on the sample from that tank. If the results indicate that metal feed rate limits have been exceeded, the UMCDF will notify the DEQ to discuss and evaluate the adequacy of the confirmation sampling frequency.

Confirmation sample results will be included in the UCL, metal feed rate, and restricted agent feed rate (if applicable) calculations.

In the event the UMCDF determines that a result is not representative, exceptions to the sampling scheme will be addressed with the DEQ on a case-by-case basis.

Description of Calculations

The UCL for data will be calculated using U.S. Environmental Protection Agency software ProUCL. For the UCL calculations the following parameters will be selected in order to address both normal and nonnormal data:

- Confidence Coefficient – 0.95 (the default value)
- Number of Bootstrap Runs – 2,000 (the default value)
- Select UCL Type – All

Following the calculation of all UCLs, the UCL(s) recommended by the software will be used in further calculations as follows: If more than one UCL is identified by the software, the highest UCL will be used to allow for conservatism in the calculation.

The feed rate for each metal will be calculated based on the UCL as follows:

$$\text{Metal feed rate} = \frac{\text{UCL result (mg/L)} \times \text{max. permitted agent feed rate (lb/hr)}}{1.2685\ \text{g/mL} \times 1\text{E}+03\ \frac{\text{mg}}{\text{g}} \times 1\text{E}+03\ \frac{\text{mL}}{\text{L}}}$$

If the calculated UCL metal feed rates do not exceed the applicable metal feed rate limits in Table 6-1 of Module VI and the table in Module VII, Permit Condition VII.B.3.i, agent may be fed at or below the permitted agent feed rate limit. If any metal feed rate limit is exceeded by the calculated metal feed rate, agent will be fed at a reduced feed rate in order to comply with the permitted metal feed rates. The reduced agent feed rate is calculated as follows:

$$\text{Reduced agent feed rate} = \frac{\text{permitted metal feed rate (lb/hr)} \times \text{maximum permitted agent feed rate (lb/hr)}}{\text{metal feed rate (lb/hr)}}$$

2.1.2 Spent Decontamination Solution (SDS)

A grab sample will be collected. SDS will be analyzed for chemical agent, total metals, total BB/CC organics, and chlorine (chlorine only for the HD campaign) on a statistical basis in accordance with EPA guidance in “Waste Analysis Guidance for Facilities that Burn Hazardous Waste,” EPA 530-R-94-019, October 1994. Analysis for these constituents address information needs to ensure that waste feed limits are not exceeded. Analysis for total organics is also used to substantiate that SDS meets the exemption criteria for 40 CFR 264 Subparts BB and CC. Whenever there is an abnormal event that would warrant sampling, analysis will be for the constituents of concern. The statistical basis for sampling SDS is detailed in Appendix A of this attachment. If chemical agent is detected above 20 parts per billion (ppb) for GB, 20 ppb for VX, or 200 ppb for HD, additional decontamination solution will be added to the tank, the contents of the tank will be mixed, and another sample will be analyzed for chemical agent. For constituents other than chemical agent, the LIC-11 AWFCO (Tables 6-3 and 7-2) setpoint will be set to assure all permit waste feed limits are not exceeded.

2.1.3 Laboratory Liquid Waste

UMCDF laboratory liquid wastes, which have potentially been exposed to agent, may be collected in LAB-TANK-101 prior to transfer to the SDS tanks for eventual treatment in the Liquid Incinerators (LIC). If necessary, laboratory liquid wastes may be containerized and transferred to permitted storage. Laboratory liquid wastes transferred to permitted storage will be returned to the UMCDF for treatment as appropriate. Laboratory liquid wastes may include water from safety shower and eyewash testing, spent decontamination solution, glassware soap, isopropyl alcohol, metals sample analysis solutions, solvents from analysis of agent and agent residues, and equipment rinsate. These wastes may contain metals and organics that are associated with the chemical agents or related to analyses for chemical agent and other analytes. (This waste stream does not include spent solvents which were never exposed to chemical agent and that will be treated and disposed off facility). These liquid wastes will be analyzed for chemical agent and total BB/CC organics. Analyses for total organics will be conducted on an annual basis. Analysis for total BB/CC organics will be used to verify that the composition of the waste is exempt from CC requirements.

Analyses for chemical agent will be conducted for each tank prior to transfer to the SDS tanks. Analysis for chemical agent will be used to substantiate that the waste has no detectable agent other than the campaign agent prior to transfer to the SDS tank. Each tank of laboratory liquid waste will be evaluated individually based on the associated analytical results. For the purpose of Spent Decontamination Solution feed to the LIC, nondetect analytical results for noncampaign agents indicate that the laboratory liquid waste is not multiagent contaminated.

A noncampaign agent detection indicates that the tank of laboratory liquid waste is multiagent contaminated and cannot be transferred to the SDS tanks during a single-agent campaign.

2.1.4 Miscellaneous Agent-Contaminated Liquid Wastes

Spent hydraulic fluid and lubricating oil generated in the Munitions Demilitarization Building (MDB), characterized as agent contaminated by analysis or process knowledge, will be treated in the LIC. See sampling and analysis requirements located in Section 2.2.17 for those fluids not characterized as agent contaminated. The waste may contain up to 80% water content. The waste will be sampled and analyzed for total organic carbon to ensure at least 20% of the material is organic. The material will be sampled and analyzed for total metals to ensure that metal feed rate limitations for the selected treatment are not exceeded. The total organic analysis is used to determine if the waste is suitable for treatment in the LIC primary chamber.

2.1.5 Container Handling Building (CHB) Sump Liquids of Unknown Origin

CHB sump liquids of unknown origin will be containerized and sampled and analyzed for the presence of chemical agent, total metals, total organics, corrosivity, and ignitability. These analyses will be used to verify that composition of the waste and that it is within applicable limits. Following characterization, the unknown sump liquids will be transferred to the SDS tanks for incineration in the LIC.

2.1.6 Liquids from Enhanced On-Site Containers (EONCs)

Liquids discovered in EONCs during the unpacking process will be treated as hazardous waste. Decontaminated liquids will be transferred to the SDS tanks for treatment in the LIC secondary chamber; the applicable SDS tank will be sampled for chemical agent prior to treatment. Liquids that are known to be precipitation, through a combination of ACAMS monitoring and records review, will not be sampled. No further analysis is required for precipitation alone; i.e., no mixing with any other liquid takes place. Precipitation will be removed from the EONC and managed as nonhazardous waste. Any mixing of precipitation with any other liquid or waste will be treated as hazardous waste.

2.1.7 Personnel Maintenance Building (PMB) Waste Tank Liquids

PMB waste tank liquids are liquids collected in PMB-TANK-101. PMB-TANK-101 is used on an emergency basis when patients in the medical facility of the PMB must be decontaminated. The contents of the tank are considered to be SDS. PMB waste tank liquids will be sampled on an as-generated basis and analyzed for chemical agent, total organic carbon, and corrosivity prior to transfer to the SDS tanks. These analyses will be used to verify that the composition of the waste is as expected and within applicable limits. These analyses will also ensure that information is obtained to document compliance with feed rate limits and to verify that there is nothing unusual in the waste.

2.1.8 **RESERVED**

2.1.9 Explosive Containment Room (ECR) Maintenance Residue

Maintenance performed on the demilitarization machines (i.e., rocket shear machines and projectile/mortar demilitarization machines), agent quantification system (AQS) components, and ACS components that are located in the ECRs generates waste residues. These residues may include the following items contaminated with chemical agent: sludges and solids from AQS/ACS filters, filter elements and bags, rags with chemical and explosive residues, munition fragments (fiberglass, metal, and explosive), and explosive and reactive dust and dirt. During the projectile campaign, ECR maintenance residues were also comprised of reactive (D003) dust generated from the shearing of the bursters. The ECR residues generated during the projectile campaigns were not expected to be contaminated with chemical agent because projectiles are not drained of chemical agent in the ECRs. Maintenance and housekeeping of the ECRs occurs on a routine basis. Dry residues are placed into polypropylene or burlap bags while sludges are placed into fiberboard combustible containers. ECR maintenance residue will be weighed prior to treatment. The weight of the waste will be used in conjunction with an evaluation to ensure that feed limits are not exceeded when the waste is treated in the DFS.

2.1.10 Partially Treated DFS Ash

Ash will be removed from the DFS during maintenance activities. The ash may not have met the appropriate residence time in the DFS, and consequently this ash will be re-treated in the DFS. This waste stream includes waste material removed from the DFS kicker chute (note that waste removed from the DFS kicker chute that has met the appropriate residence time requirements is included under the "DFS Ash" waste stream in Section 2.2.3). This waste will have minimal agent contamination because the waste will have been previously fed to the DFS and partially treated. These wastes will be weighed before treatment and the weight, in conjunction with an evaluation, will be used to comply with feed rate limits.

2.1.11 Drained HD Ton Containers with Agent Residue

Drained HD ton containers to be treated in the Metal Parts Furnace (MPF) contain undrainable amounts of chemical agent and may contain solids. The undrainable chemical agent and solids may contain concentrations of metals. In addition, metals may be found in the paints used on the ton containers. These nonembedded metals may volatilize during the incineration process, while the metal components of the ton containers are not volatile.

The solids in ton containers may be treated by a bulk drain station (BDS) heel transfer system (HTS). The ton containers with undrainable agent, solids, and HTS rinsate will be treated in the MPF. Samples were taken from 60 ton containers to be treated in the MPF after the commencement of the HD agent campaign and analyzed for metals. The analysis data was evaluated to demonstrate compliance with MPF feed rate limits.

The metals and other waste constituents associated with HD ton containers to be treated at the UMCDF are identified in Table 6-4 and the table in Permit Condition VII.C.3.i. Data obtained during the HD shakedown and agent trial burn has been used to determine the quantity and associated feed rate of metals fed to the incinerator.

2.1.12 **[RESERVED]**

2.1.13 ACS, RCS, AQS, RCS, and SDS Residues

Sludges from the ACS, RCS, AQS, and SDS as well as chemical agent contaminated debris such as filter elements and rags generated from the maintenance of these systems in the MDB, but outside the ECRs, may be containerized and placed in permitted storage prior to treatment at the UMCDF. In addition to this debris, this waste stream may consist of agent-contaminated dirt as well as UMCD secondary waste of similar type. This waste stream may also include strainer sludge from the depressurization glove box, HD rinsate feed collection system, and/or sludge from UMCD liquid waste containers. For strainer sludges from the RCS, three confirmation samples will be taken to confirm feed rate calculations; the sampling methodology will be developed in consultation with the Department. This waste stream will be treated in the MPF. The waste weight, in conjunction with an evaluation, will be used to comply with feed rate limits.

2.1.14 Noncombustible Waste

Noncombustible waste is composed of noncombustible waste generated from MDB maintenance activities as well as other locations on the facility. Waste from the ECR is not included unless surface explosives residues have been decontaminated. This waste stream includes, but is not limited to, the following items: ton container plugs, motors, valves, nuts, bolts, washers, wire, conduit, switches, junction boxes, breaker boxes, extension cords, gears, rollers, conveyors, punches, pressure regulators, meters, gauges, CCTV cameras, sample probes, escape air tanks, noncombustible painting debris, fittings, aerosol cans, pans, chains, bushings, bearings, idlers, gearboxes, crimp jaws and pins, drain probes, projectile pickup heads, shear blades, pusher assemblies, bore station bits, wheels, collets, jaw gripper assemblies, metal grating, metal brackets, metal stands, metal fixtures, banding material, pneumatic actuators, empty carbon absorber trays, nozzles, thermocouples, pressure regulators, chemical seals, hand tools, glass, hydraulic cylinders, piping, flanges, batteries, empty overpacks, metal drums, ventilation prefilters, light bulbs, and harness regulators. This waste stream may contain up to five percent (5%) combustible materials. The waste stream will be limited to less than 12.5 pounds of aluminum per batch feed to the incinerator. These items may be containerized and placed in permitted storage prior to treatment at the UMCDF. This waste stream may also include UMCD secondary waste of similar type. This waste stream will be treated in the MPF. For those items containing nonembedded metals such as CCTV cameras and circuit boards, compliance with metal feed rate limits will be determined by calculation based upon material characterization data. The waste weight, in conjunction with an evaluation, will be used to comply with feed rate limits.

2.1.15 High-Heat Plastic

High-heat plastic waste is composed of waste that may be generated from various activities, such as demilitarization operations and MDB maintenance activities, throughout the facility. This stream consists of high-heat-releasing plastics such as polystyrene and polyethylene material with a heat release during combustion of over 15,000 Btu/lb. Waste from the ECR is not included unless surface explosives residues have been decontaminated. This waste stream includes, but is not limited to, the following items: tubing, plastic, polystyrene/polyethylene bags, brushes, rollers, other painting items, seals, gaskets, synthetic fibers, Styrofoam, and Tyvek suits. This waste stream may contain up to five percent (5%) noncombustible materials. This waste stream may also consist of other types of combustible wastes, such as low-heat plastics, cellulose, felt, rubber, and leather components, not to exceed five percent (5%) total weight. This waste stream may be containerized and placed in permitted storage prior to treatment at the UMCDF. This waste stream may also include UMCD secondary waste of similar type. This waste stream will be treated in the MPF. Compliance with metal feed rate limits will be determined by calculation based upon material characterization data. The waste weight, in conjunction with an evaluation, will be used to comply with feed rate limits.

2.1.16 Ventilation System Filters

The spent high-efficiency particulate air filters and prefilters will contain low levels of chemical agent. The physical state of these wastes prevents the collection of a representative sample. These items may be containerized and placed in permitted storage prior to treatment. This waste stream may also include UMCD secondary waste of similar type. The treatment method for ventilation filters has been determined to be the MPF. Compliance with metal feed rate limits will be determined by calculation based upon material characterization data. The waste weight, in conjunction with an evaluation, will be used to comply with feed rate limits.

2.1.17 Spent Carbon

Activated carbon is used as a filter medium to prevent the release of agent vapors from the MDB, ACS tanks, Automatic Continuous Air Monitoring System (ACAMS) units, depressurization glove box, heating, ventilation, and air conditioning (HVAC) filters; and UMCDF laboratory. It is also used to filter the air in the Control Room and the UMCDF Medical Clinic. Activated carbon and sulfur-impregnated carbon are also used as a filter media for the Pollution Abatement System (PAS) Filter System (PFS). The waste stream may also include UMCD secondary waste of similar type. The treatment method for agent-contaminated spent carbon is yet to be determined. Agent-contaminated spent carbon will be stored in a permitted storage unit at the UMCDF until a treatment method has been determined. Once a treatment method has been determined, this Attachment will be revised in accordance with 40 CFR §270.42 to include the treatment method.

2.1.18 Personal Protective Equipment (PPE) Respirator Carbon Filter Canisters

PPE respirators used exclusively to prevent the inhalation of chemical agent include carbon filter canisters composed of activated carbon. PPE respirator carbon filter canisters are generated by personnel working in areas with possible chemical agent vapors. Because the carbon canisters are generated as waste before the carbon inside them has become saturated with chemical agent, the quantity of agent adsorbed on the carbon is minimal. The treatment for spent activated carbon is under development. PPE carbon canisters contaminated with chemical agent or potentially contaminated with chemical agent may be containerized and placed into permitted storage until treated. This waste stream may also include UMCD secondary waste of similar type. Once a treatment method has been determined, this attachment will be revised in accordance with 40 CFR 270.42 to include the treatment method.

2.1.19 Laboratory Solid Waste

UMCDF laboratory solid wastes which have potentially been exposed to agent will be containerized and transferred to the MDB for treatment or to permitted storage prior to treatment. This waste stream will be treated in the MPF. Laboratory solid wastes include, but are not limited to, discarded glassware, gloves, tubing, vials, sharps, silver fluoride (AgF) pads, Mustard (HD) prefilters, Teflon tubing, Tygon tubing, capillary columns, butyl rubber gloves, nitrile gloves, surgical gloves, DAAMS tubes, spent ACAMS preconcentrator tubes, pipette tips, Pasteur pipettes, polypropylene transfer pipettes, adjustable pipettor, polypropylene specimen cups, paper towels, Kimwipes, gauze pads, cotton swabs, beakers, flasks, plastic bags, duct tape, glass vials, silicone septa with PTFE face, polypropylene vial caps, aluminum vial caps, urea vial cap, polypropylene sample bottles, glass sample bottle, glass syringe, Vacutainer w/rubber stopper (centrifuge tube), spill pillows, vermiculite, molecular sieve, stir bars, parafilm, silicone O-rings, Teflon ferrules, vial and flask labels, charcoal filters, charcoal traps, and paper filters which have contacted liquid or vapor chemical agent. This waste stream may also include UMCD secondary waste of similar type. These wastes will be weighed prior to treatment; and the weight, in conjunction with an evaluation, will be used to comply with feed rate limits.

2.1.20 Cellulose Waste

Cellulose waste includes the following items: paper, wood, cotton, high-efficiency particulate air (HEPA) filters, rags, brushes, rollers, fiberboard containers, scrub brushes, and other similar wastes. This waste stream may contain up to five percent (5%) noncombustible materials. This waste stream may also consist of other types of combustible wastes, such as high- and low-heat plastics, felt, rubber, and leather components, not to exceed five percent (5%) total weight. Waste from the ECR is not included unless surface explosives residues have been decontaminated. These items may be containerized and placed in permitted storage prior to treatment. This waste stream may also include UMCD secondary waste of similar type. This waste stream will be treated in the MPF. These wastes will be weighed prior to treatment; and the weight, in conjunction with an evaluation, will be used to comply with feed rate limits.

2.1.21 Level A (DPE) Suits (includes other types of low-heat plastics)

Level A (DPE) suits are encapsulating, supplied-air PPE worn by personnel required to enter areas in the MDB where agent liquid or vapors are known to exist. Level A (DPE) suits are made of polyvinyl chloride, as opposed to other levels of Army protective clothing, which are made of butyl rubber. Other waste low-heat plastics include fiberglass, halogenated plastics, latex, nitrile, insulation, and Teflon with a heat release during combustion of less than 15,000 Btus/lb. This waste stream may contain up to five percent (5%) noncombustible materials. This waste stream may also consist of other types of combustible wastes, such as high-heat plastics, cellulose, felt, rubber, and leather components, not to exceed five percent (5%) total weight. Discarded Level A (DPE) suits and low-heat plastics that have potentially contacted liquid or vapor chemical agent during their use will be managed as hazardous wastes. Discarded Level A (DPE) suits and low-heat plastics may be containerized and placed into a permitted storage area until treated at the UMCDF. This waste stream may also include UMCD secondary waste of similar type. This waste stream will be treated in the MPF. These wastes will be weighed prior to treatment; and the weight, in conjunction with an evaluation, will be used to comply with feed rate limits.

2.1.22 Toxicological Agent Protective (TAP) Gear/Rubber

TAP gear is typically worn by personnel working in environments with possible chemical agent vapor. TAP gear is made of butyl rubber. This waste stream may also consist of other types of rubber items including, but not limited to, hoses, gaskets, gloves, and seals. This waste stream may contain up to five percent (5%) noncombustible materials. This waste stream may also consist of other types of combustible wastes, such as high- and low-heat plastics, felt, cellulose, and leather components, not to exceed five percent (5%) total weight. This waste stream may be containerized and placed into permitted storage prior to treatment in the MPF. This waste stream may also include UMCD secondary waste of similar type. These wastes will be weighed prior to treatment; and the weight, in conjunction with an evaluation of the composition of the TAP gear/rubber, will be used to determine feed rates to the MPF.

2.1.23 Brines

The brines generated from the two LICs, MPF, and DFS PASs will be collected in the brine surge tanks. Water softener regeneration wastewater may also be included with this waste stream. Brines collected in the brine surge tanks will be treated in batches at the UMCDF in the BRA evaporators and drum dryers. A brine batch may consist of up to two brine surge tanks. Each brine batch will be tested for chemical agent(s), specific gravity, and pH. A sample will be analyzed for total metals monthly. Total organics carbon analysis will be performed for the first three months of a campaign change and for the first three months of operation after the completion of the HD ton container campaign. If these analysis results are less than 0.05% organics, then the frequency of this analysis will be changed to an annual basis. In the event TOC is $\geq$0.05%, then total organic analysis will be performed to determine which organics are present. Analysis for chemical agent will be used to verify the brine meets the agent-free criteria. Analysis for total organic carbon is used to substantiate the brine is exempt from Subpart BB and CC requirements. Analysis for total metals, pH, and specific gravity ensures BRA feed limitations are met.

Only agent-free spent scrubber brines will be treated in the BRA. The brines will be analyzed for the campaign agent; and when prior noncampaign agent secondary waste is treated, the related brine must also have an agent-free determination for the prior noncampaign agent. If the brines in the brine surge tanks are not agent free, decontamination solution will be added to the affected brine surge tank(s), the tank contents mixed, and the agent-free determination will be repeated.

2.1.24 Explosive-Contaminated Spill Pillows

The 3-M maintenance-type sorbents, including pillows and pads, will be used at the UMCDF. This secondary waste may also include other types of sorbents that have similar characteristics. This type of waste is expected to be generated infrequently as a result of cleanup activities from agent spills. The sorbent waste will be placed into either polypropylene bags or fiberboard containers and then weighed prior to treatment. An evaluation, in conjunction with the waste weight, will be used to ensure feed rates are not exceeded. This waste will be treated in the DFS.

2.1.25 3-M Maintenance Sorbents

This waste stream consists of high-Btu spill pillows and pads, similar to 3-M maintenance sorbents. The sorbents may be constructed from a variety of materials, some of which are listed as proprietary components by the manufacturer. This waste may be generated from various locations at the facility. If the sorbent waste originates from the ECR, explosive contaminants will be removed prior to storage or treatment of the waste. The waste may be containerized and placed in permitted storage. This waste stream may also include UMCD secondary waste of similar type. This waste stream will be treated in the MPF. These wastes will be weighed prior to treatment; and the weight, in conjunction with an evaluation, will be used to comply with feed rate limits.

2.1.26 Noncombustible Sorbents

There may also be agent-contaminated spill pillow and pad waste generated that are not readily combustible. These sorbents are expanded, amorphous, silicate-based type spill pillows and pads that may be generated from various locations at the facility. If the sorbent waste originates from the ECR, explosive contaminants will be removed prior to storage or treatment of the waste. This waste stream may also include UMCD secondary waste of similar type. Noncombustible sorbents will be treated in the MPF. These sorbents may be containerized and placed in permitted storage. These wastes will be weighed before treatment; and the weight, in conjunction with an evaluation, will be used to comply with feed rate limits.

2.1.27 Bulk Aluminum

Bulk aluminum may be generated from maintenance activities at the facility. This waste stream may contain up to five percent (5%) combustible waste components. This waste may be containerized and placed in permitted storage prior to treatment at the UMCDF. This waste stream may also include UMCD secondary waste of similar type. Bulk aluminum will be treated in the MPF. Bulk, unpainted aluminum does not contain nonembedded metals. The waste will be weighed prior to treatment; and the weight, in conjunction with an evaluation, will be used to comply with feed rate limits.

2.1.28 Foam Core Panels

Agent-contaminated foam core panel waste may be generated from within the MDB. The panels are comprised of an exterior steel skin and a urethane-modified isocyanurate foam core. This waste may be containerized and placed in permitted storage prior to treatment at the UMCDF. This waste stream may also include UMCD secondary waste of similar type. This waste stream will be treated in the MPF. The waste will be weighed prior to treatment; and the weight, in conjunction with an evaluation, will be used to comply with feed rate limits.

2.1.29 Concrete

Agent-contaminated concrete may be generated as a result of maintenance activities at the facility. This waste stream consists of three categories of concrete waste. These categories are:

(1) Concrete Rubble-a mixture of concrete pieces less than two inches in diameter to large blocks with a maximum thickness of seven inches. The concrete may contain pieces of metal-reinforcing bar;
(2) Scabbled Concrete-a fine concrete powder resulting from the surface removal of concrete from walls and floors; and
(3) Concrete Sludge-a water-saturated fine concrete powder resulting from the cutting or drilling of concrete.

This waste stream may also include UMCD secondary waste of similar type. The concrete waste will be treated in the MPF. These wastes may be containerized and placed in permitted storage. These wastes will be weighed before treatment; and the weight, in conjunction with an evaluation, will be used to comply with feed rate limits.

2.1.30 Agent-Contaminated Wood Pallets

Agent-contaminated wood pallet waste may be generated from UMCD and UMCDF chemical agent munitions and bulk containers storage and transportation activities. This wood pallet waste stream includes associated banding, nails, etc. used to secure the munitions and bulk containers during the storage and transport activities. This waste will be treated in the MPF as a cellulose waste stream in accordance with the operating limits allowed by the Permit. The wood pallet waste may be placed into permitted storage prior to treatment in the MPF. This waste stream may also include UMCD secondary waste of similar type. The pallet waste will be sampled in accordance with the requirements of this plan (see Section 2.2.7). Agent-contaminated wood pallet waste will be weighed prior to treatment; and the weight, in conjunction with an evaluation, will be used to comply with MPF feed rate limits.

2.1.31 Silica Gel/Vermiculite

This waste stream consists of silica gel, vermiculite, or any combination thereof. This waste may originate at the UMCDF or UMCD. These materials may be generated from various sources, including UMCD stockpile activities, laboratory activities, and as adsorbents and absorbents from maintenance and spill response activities. This waste stream will be treated in the MPF. Portions of this waste stream generated at the UMCDF may be containerized and placed in permitted storage prior to treatment at the UMCDF. Silica gel/vermiculite will be weighed prior to treatment; and the weight, in conjunction with an evaluation, will be used to comply with feed rate limits.

2.1.32 UMCD Liquid Waste

This waste stream consists of liquid waste generated during UMCD stockpile maintenance and laboratory activities. This waste stream will be treated in the LIC. Individual drums of UMCD liquid waste will be sampled for pH. Those containers with pH less than 5 will be treated with calcium carbonate to bind any fluoride present, and then adjusted to pH 5 or greater with sodium hydroxide, as needed. Following compositing in an SDS tank (which may include addition of UMCDF SDS, decontamination solution, or process water), a grab sample will be collected. Analysis for total organic carbon will be conducted to establish the applicability of Subparts BB and CC. UMCD liquid waste will be analyzed for chemical agent and all metals that have designated feed rates and/or emission limitations. The feed rate based on metals content will be calculated using the formula for SDS in Appendix A. The feed rate based on organics will be calculated as follows:

$$F = \frac{[E][\mathrm{d}](3{,}600\ \mathrm{s/hr})(1\ \mathrm{lb}/453.6\ \mathrm{g})(1{,}000{,}000\ \mathrm{ug/g})(1{,}000\ \mathrm{mL/L})}{[C]}$$

Where,
F is the maximum allowable hourly feed rate of the UMCD liquid waste (lb/hr)
[E] is the organic emission limit (g/sec) identified in Modules VI and VII of the permit
d is the nominal density of UMCD liquid waste, 0.998 g/mL
[C] is the reported organic analyte concentration (ug/L)

The most limiting feed rate (based on metals or organics) will be used.

If chemical agent is detected above 20 parts per billion (ppb) for GB, 20 ppb for VX, or 200 ppb for HD, additional decontamination solution will be added to the tank, the contents of the tank will be mixed, and another sample will be analyzed for chemical agent.

2.2 Analyses for Process Wastes Requiring Off-Facility Treatment and/or Disposal

The waste streams included in this section will be transported off facility for further treatment and/or ultimate disposal. These do not include waste streams that will be temporarily placed in permitted storage prior to treatment at the UMCDF. Table 2 presents a summary of the selected analyses, analytical methods, sampling frequencies, and sample collection methods for all of the UMCDF waste streams that will be treated and/or disposed of offsite. Representative sampling will be conducted using the sampling methods specified in Table 2. The analytical parameters were selected based on process knowledge and UMCDF waste characterization data. TCLP organics and TCLP metals analysis results support waste characterization determination, off-site facility waste acceptance criteria, and land disposal restriction (LDR) notification requirements. Chemical agent analyses are used for verification of agent-free criteria requirements for waste shipped off site for treatment and disposal. Those waste streams generated through the BRA and BRA PAS have already been determined agent free based on the sampling results of the brine before processing and, therefore, do not require additional chemical agent analysis. Further waste characterization analyses includes dioxin/furan analysis for waste streams generated by the DFS or MPF processes, nitrocellulose and explosive analysis for wastes generated by the DFS process, free liquids for solid waste streams with the potential to have free liquids, and corrosivity on liquid waste streams with a potential of being characteristic for corrosivity.

2.2.1 Refractory Brick

Incinerator refractory brick will be periodically removed and replaced. The brick will be removed from the incinerator primary and secondary chambers. A batch will consist of all the brick removed during one periodic change out. Also included in this waste stream will be refractory from the crossover ducts and refractory in the exhaust ducts leading to the PASs. Upon change out each batch of discarded refractory brick will be analyzed for TCLP metals. Before change out, the primary and secondary chambers of the LIC will be maintained at a temperature of at least 1,000°F for a minimum of 15 minutes after the last waste feed to either chamber. Thus, chemical agent analysis is not required.

2.2.2 LIC Slag

The incineration of chemical agent and the spent decontamination solutions in the Liquid Incinerators generates a glasslike slag waste stream. Slag (in a molten state) accumulates in the secondary chambers of LIC1 and LIC2. Each batch of slag will be removed by tapping the slag extension of the secondary chamber and draining the molten slag into refractory-lined drums or by manually chipping the solidified slag and placing the slag into containers. Each LIC secondary chamber is equipped with a view port that allows the operator to visually determine the slag level within the secondary chamber.

Each LIC slag batch generated will be analyzed for chemical agent and TCLP metals. A LIC slag batch is defined as the group of drums produced each time the slag removal system is used or each time the slag is manually removed.

2.2.3 DFS Ash

DFS ash is ash discharged from the DFS heated discharge conveyer (HDC) output and debris from within the HDC and its enclosure, as well as kicker chute waste that has met residence time requirements and is agent-free. DFS ash will be sampled with each annually. Grab samples will be taken from the first three off-facility containers, for a total of three samples. The samples will be analyzed for chemical agent, TCLP organics, TCLP metals, nitrocellulose, and explosives. DFS ash will also be analyzed for dioxins and furans. If a DFS ash sample cannot be collected due to a lack of available ash material, an agent-free determination for bursters or other metal waste will be made using the associated DFS cyclone residue sample. In addition, every container of DFS ash from the kicker chute will be sampled for chemical agent

2.2.4 DFS Cyclone Residues

Every container of DFS cyclone residues will be analyzed for chemical agent. On an annual basis, one DFS cyclone residue sample will be analyzed for explosives, nitrocellulose, TCLP organics, and TCLP metals. DFS cyclone residues will also be analyzed for dioxins and furans annually.

2.2.5 MPF Ash

MPF ash includes any material vacuumed from the inside of munitions, ton containers, and cradles after treatment in the MPF, or any thermally treated waste residue removed from the MPF. MPF ash will be sampled and individually analyzed for TCLP organics, TCLP metals, and dioxins and furans annually. Grab samples will be taken from the first three off-facility containers, for a total of three samples.

<u>Normally Processed TC HD Agent Sampling</u>

One grab sample shall be collected from one, representative donor ton container out of every six donor ton containers treated in the MPF. Each sample will be individually analyzed for HD chemical agent. Ton containers that experience a boilover and/or ton containers that are returned to Zone 3 for additional treatment are not qualifying ton containers and shall not count toward the normally processed ton container sampling requirements.

<u>Upset Condition TC HD Agent Sampling</u>

A grab sample of MPF ash will be collected from each individual ton container that experiences a “boilover” in the MPF. Each sample will be analyzed for chemical agent, TCLP metals, TCLP organics, and total organic carbon and the results reported to the Department within three working days of receipt of the results (Permit Conditions VI.C.3.xxiii and VII.C.4.xiv).

A grab sample of MPF ash will be collected from each individual ton container that registers an ACAMS alarm greater than or equal to 0.20 VSL during MPF discharge airlock (DAL) monitoring. Each sample will be analyzed for chemical agent and the results reported to the Department within three working days of analysis (Permit Conditions VI.C.3.xii and VII.C.4.ix).

If any MPF ash sample result exceeds the PCC, then the ash from every remaining individual donor ton container will be sampled and each grab sample will be analyzed for chemical agent.

2.2.6 Non-RCRA-Empty Ton Containers

This waste stream consists of ton containers that have been treated in the MPF, but which are not considered empty containers in accordance with 40 CFR 261.7(b)(3)(ii) because they do not meet the criteria of HW Permit Condition II.C.4 requiring standard thermal treatment. In accordance with Permit Condition II.C.4, this waste stream will be managed as listed hazardous waste and sent to either a RCRA Subtitle C permitted smelting facility for treatment/destruction, or to a RCRA Subtitle C permitted hazardous waste disposal facility. Non RCRA-empty ton containers will be sampled annually. Grab samples of the ton container residues will be taken from the first three off-facility containers, for a total of three samples. The samples will be analyzed for chemical agent to verify the waste stream is agent free.

2.2.7 Wood Pallets

This waste stream consists of wood pallet waste generated from UMCD and UMCDF chemical agent munitions and bulk containers storage and transportation activities. This wood pallet waste stream includes associated banding, nails, etc. used to secure the munitions and bulk containers during the storage and transport activities.

Wood Pallets From Igloos Without a Record of Leakers

For wood pallets from igloos without a record of leakers, the EONC interior will be monitored using DAAMS or ACAMS for the agent associated with the munition/bulk container. If no agent is detected at or above 1.0 WPL, the pallet material is agent free and may be shipped off-site for reuse for their intended purpose or disposal as a hazardous waste at a permitted facility. If agent is detected in the EONC at or above 1.0 WPL and cannot be refuted using DAAMS, the pallets will either be 1) treated in accordance with Section 2.1.30 of this plan without further sampling being required or 2) sampled and analyzed in order to make an agent-free determination. A composite sample will be collected in accordance with Appendix B of this plan and analyzed for chemical agent. If the sample is agent free, the pallets are considered agent free and may be shipped off-site for reuse for their intended purpose or disposal as a hazardous waste at a permitted facility. If the sample is not agent-free or an agent-free determination cannot be made, the pallets must be treated in accordance with Section 2.1.30 of this plan. This process is depicted in Figure 2-1 of this plan

Wood Pallets From Igloos With a Record of Leakers

Chemical releases have occurred in the course of UMCD storage operations. Munitions found leaking are overpacked to prevent further chemical release. Any igloo reported to have a chemical release is categorized as a “leaker.” Subsequently , any remaining wood pallet within a “leaker” igloo is suspected to be potentially contaminated and must be further assessed to determine its handling and disposition. Two phases of sampling will be conducted for wood pallets from igloos with a record of leakers – initial sampling and confirmation sampling.

Initial Sampling:

The initial sampling and analysis of three leaker igloos will be used to show no statistical difference between pallets regardless of which leaking igloo they come from. Three leaker igloos containing a minimum of 100 pallets each will be selected for the initial sampling effort. All wooden pallets from the three leaker igloos will be sampled and analyzed in pallet groups. The wood pallets will be monitored in EONCs using ACAMS or DAAMS. Pallets from EONCs less than 1.0 WPL will be included in pallet groups of 10 pallets. If an EONC is greater than or equal to 1.0 WPL and the presence of agent cannot be refuted using DAAMS, the pallets from that EONC will comprise a separate pallet group. A composite sample from each pallet group will be collected in accordance with Appendix B of this plan and analyzed for chemical agent. If the sample is agent free, the pallets from that pallet group are considered agent free and may be shipped off-site for disposal as a hazardous waste at a permitted facility. If the sample is not agent free or an agent-free determination cannot be made, the pallets from that pallet group must be treated in accordance with Section 2.1.30 of this plan. This process is depicted in Figure 2-2 of this plan.

Confirmation Sampling:

Confirmation sampling will be conducted on a quarterly basis.

The wood pallets will be monitored in EONCs. Pallets from EONCs less than 1.0 WPL will be included in pallet groups of 10 pallets and a pallet group composite sample will be collected in accordance with Appendix B of this plan and analyzed for chemical agent on a quarterly basis. Those pallet groups that are not sampled are agent free and may be shipped off site for reuse for their intended purpose or disposal as hazardous waste at a permitted facility. For those pallet groups that are sampled, if the sample is agent free, the pallets from that pallet group are considered agent free and may be shipped off-site for reuse for their intended purpose or disposal as a hazardous waste at a permitted facility. If the sample is not agent free or an agent-free determination cannot be made, the pallets from that pallet group must be treated in accordance with Section 2.1.30 of this plan. In addition, all future pallet groups from that igloo must be sampled and analyzed in order to make an agent-free determination. This process is depicted in Figure 2-3 of this plan.

If an EONC is greater than or equal to 1.0 WPL and the presence of agent cannot be refuted using DAAMS, the pallets from that EONC will comprise a separate pallet group, and a composite sample from that pallet group will be collected in accordance with Appendix B of this plan and analyzed for chemical agent. If the sample is agent free, the pallets from that pallet group are considered agent free and may be shipped off-site for reuse for their intended purpose or disposal as a hazardous waste at a permitted facility. If the sample is not agent free or an agent-free determination cannot be made, the pallets from that pallet group must be treated in accordance with Section 2.1.30 of this plan. In addition, all future pallet groups from that igloo must be sampled and analyzed in order to make an agent-free determination. This process is depicted in Figure 2-3 of this plan.

Refutation of ACAMS or DAAMS Results

Appendix D to this WAP describes how the presence of chemical agent is confirmed. DAAMS tubes used for confirmation/refutation purposes will aspirate an adequate sample volume to confirm at the WPL, typically using an aspiration time of ten minutes or greater.

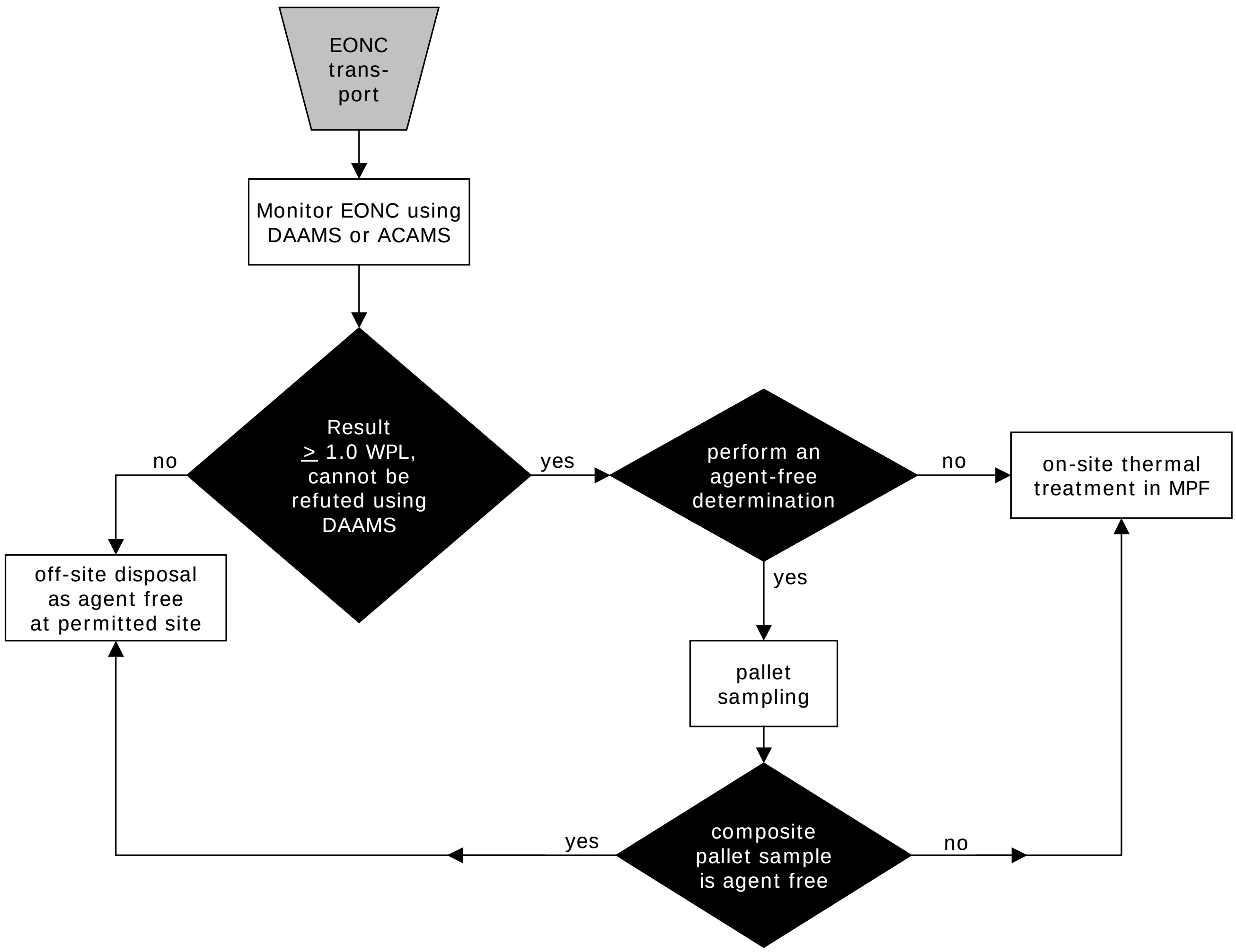

Figure 2-1 UMCDF Nonleaker Igloo Wood Pallet Characterization Process

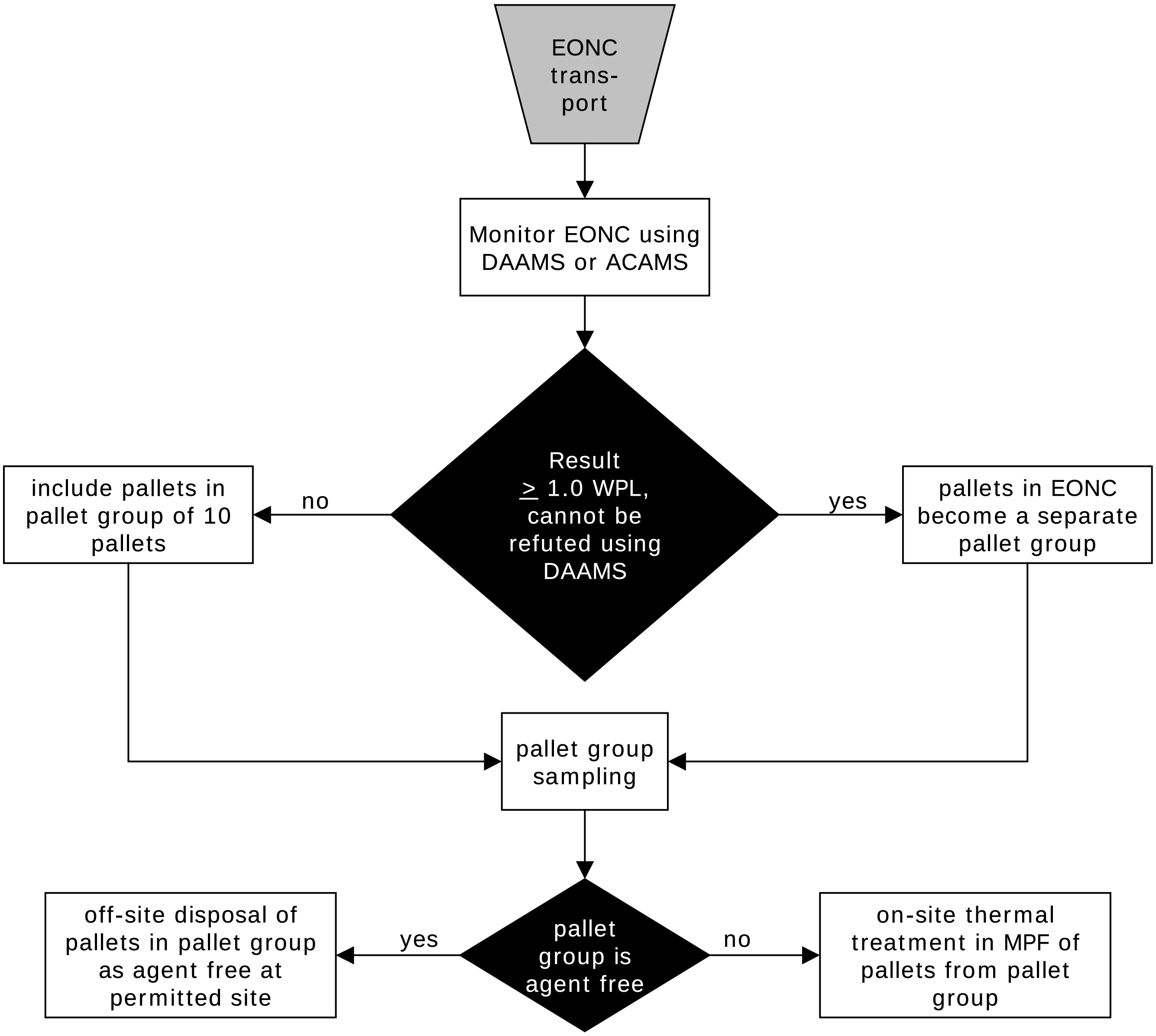

Figure 2-2. UMCDF Leaker Igloo Wood Pallet Initial Characterization

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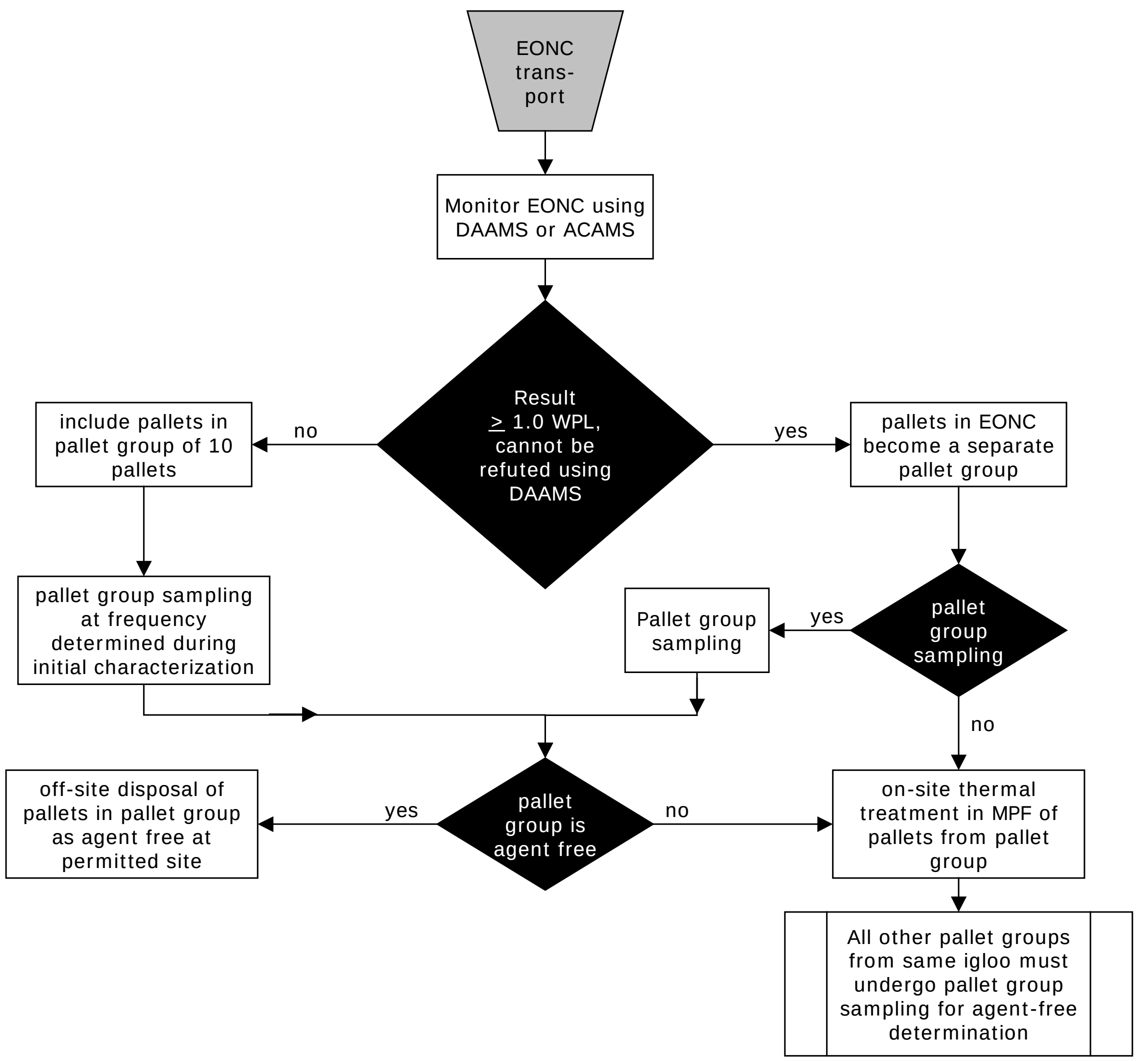

Figure 2-3. UMCDF Leaker Igloo Wood Pallet Confirmation Sampling

2.2.8 PAS Brines Destined for Off-Site Treatment

The LIC, MPF, and DFS PAS brines generated from the treatment of agent or agent-contaminated materials may be shipped off-site for treatment in accordance with the conditions provided in Module II (II.B.4 and II.B.5). A brine sample will be analyzed for TCLP metals and TCLP organics monthly to characterize the brine for shipment. Alternatively, total metals can be performed in lieu of TCLP metals analysis, if desired.

Agent-derived brines will be sampled per batch for chemical agent to ensure the brine is agent free prior to shipment. A brine batch may consist of up to two brine surge tanks, or one tanker truck if the brine is sent for off-site shipment directly from the PAS.

2.2.9 PAS Residues

PAS residues include strainer solids, PAS sump sludge, and PAS vessel solids (scrubber brine precipitate). The precipitate is collected in the bottom of the PAS process tanks (i.e., the quench towers, packed-bed scrubbers, and mist eliminator vessels), and the PAS brine filters. Each container of PAS residues will be analyzed for chemical agent. On an annual basis, one PAS residue sample will be analyzed for free liquids, TCLP organics, and TCLP metals.

2.2.10 PAS Mist Eliminator Candles

PAS mist eliminator candles will be analyzed at each change out. One grab sample will be collected from each of the first three off-facility containers generated during the change out. (If fewer than three off-facility containers of waste are generated, multiple grab samples may be collected from the same container.) The three grab samples will be combined to form one composite sample, which will be analyzed for chemical agent, TCLP metals, and TCLP organics.

2.2.11 PAS Parts and Maintenance Debris

PAS parts and maintenance debris includes, but is not limited to, PFS prefilters, strainers, filter elements, gaskets, piping, hoses, valves, flanges, pumps, thermocouples, and pH probes generated as a result of PAS operations and maintenance activities. These items will be characterized based on process knowledge. This waste stream will be considered agent-free if the most recent PAS residues sample was agent-free.

2.2.12 Brine Salts

This waste stream consists of brine salts generated from dewatering (by evaporation) of the concentrated brine in the drum dryers, residues collected in the BRA PAS knockout box, and the BRA PAS baghouse residues. The BRA PAS baghouse residue waste includes other salt wastes collected downstream of the BRA heater. Brine salts will be sampled annually. Grab samples will be taken from the first three off-facility containers, for a total of three samples. The samples will be analyzed for free liquids, TCLP metals, and TCLP organics. An agent-free determination of the brines will be made in accordance with Section 2.1.23. All downstream waste is, consequently, determined to be agent free.

2.2.13 Brine Tank Sludges/Solids

Brine tank sludges/solids are removed from the BRA tanks between agent campaigns and on an as-needed basis. This waste stream is expected to have the same characteristics as the brine salts. A composite sample of the BRA tank sludges/solids will be taken upon removal. The composite sample will consist of one grab from each BRA tank from which sludges/solids are removed. The sample will be analyzed for chemical agent, corrosivity, TCLP metals, and TCLP organics.

2.2.14 Spent Carbon

Spent carbon is generated in filter systems throughout the UMCDF. Prior to offsite disposal, carbon must be characterized for standard hazardous waste constituents (metals and organics) and for agent-free determinations. Section 2.2.14 of Table 2 summarizes the waste characterization requirements for spent carbon. This section addresses sampling strategies for agent analysis of spent carbon.

Sampling strategies for agent-free analyses of spent carbon are based on system design and process knowledge for each system. A sample population is defined by the process and operating history of the system (e.g., MDB HVAC filters) from which it is generated, the agent type(s) to which it may have been exposed, and the characteristics of the carbon (e.g., PPE carbon is impregnated with metals). Assigned confidence intervals are based on the likelihood of agent contamination in the specific waste stream. For each population of spent carbon, the number of samples required for agent analysis shall be calculated using the most current version of the Visual Sample Plan (VSP) software (http://vsp.pnl.gov/).

When no agent contamination is expected, three confirmation samples from each population are collected for waste characterization purposes; analysis for agent will be performed as part of the waste characterization. This category of sampling applies, for example, to filters of supply-air (ambient air drawn from outside the building) to the PMB and the control room (CON). All filters included in this category are presented below:

No Agent Contamination Expected Confirmation Sampling Only (Three Grab Samples)			
Filter System	**Population**	**Basis for Confirmatory Sampling Only**	**Assumptions Related to Population**
PMB Supply Filters (2 banks, 12 trays/bank)	All filters = one population	Air supply from outside; no contact with agent	No environmental release; no need for filter changeout over life of project
PMB Exhaust Filters (2 banks, 6 trays/bank)	All filters = one population	Only one decon event; SDS was agent-free; gross decon performed in MDB prior to PMB decon	No need for filter changeout over life of project; no additional decon activities in PMB
CON Filters (2 banks, 48 trays/bank)	All filters = one population	Air supply from outside; no contact with agent	No environmental release; no need for filter changeout over life of project
Supelcarb Filters (35 filters to date)	All filters = one population	Introduce clean air into ACAMS for instrument integrity; no contact with agent	No agent detections in room where air intake occurs

When there is slight potential for agent contamination, e.g., from low-level loading (long-term use of a filter in a very low-level agent environment) or from anomalies in system function, the sampling strategy is based upon a 90% confidence that 90% of the population (90/90 sampling) meet the acceptance criteria (agent-free). All filters associated with the on-site laboratory are included in this category and are presented below:

Minimal Potential for or Low-Levels of Agent Contamination Exists 90/90 Sampling			
Filter System	**Population**	**Basis for 90/90 Sampling**	**Assumptions Related to Population**
Lab HVAC Vestibule Filters (HEGA) (1 vestibule, 2 HEGAs)	All filters = one population	Only very low levels of agent expected in the filter system due to the use of primarily RDT&E samples. Long-term use, potential for low-level loading.	No need for filter changeout over life of project
Laboratory HVAC Filters (2 banks, 48 trays/bank)	All filters = one population	Only very low levels of agent expected in the filter system due to the use of primarily RDT&E samples. Long-term use, some potential for low-level loading.	No need for filter changeout over life of project

When agent contamination of carbon is possible, the sampling strategy is based upon a 95% confidence that 95% of the population (95/95 sampling) meet the acceptance criteria (agent free). An example of the carbon subject to this sampling strategy is the Depressurization Glove Box (DGB) filter system carbon, which captures HD vapors as the ton containers are depressurized. Filters in this category are presented below:

Possibilty of Agent Contamination Exists 95/95 Sampling			
Filter System	**Population**	**Basis for 95/95 Sampling**	**Assumptions Related to Population**
PFS Activated Carbon (6 filter systems, 4 banks/system, 2 beds/bank)	Carbon associated with each agent type (or combination) = one population	Some potential for agent contamination based on pre-PFS DAAMS monitoring and below-PCC analytical results for brine and mist eliminator candles	Furnace efficiency coupled with PAS performance reduces pre-PFS agent levels to extremely low levels, even under upset conditions
PFS Sulfur-Impregnated Carbon (6 filter systems, 4 banks/system, 2 beds/bank)	Carbon associated with each agent type (or combination) = one population	Some potential for agent contamination based on pre-PFS DAAMS monitoring and below-PCC analytical results for brine and mist eliminator candles	Furnace efficiency coupled with PAS performance reduces pre-PFS agent levels to extremely low levels, even under upset conditions
DFS Cyclone Enclosure (2 banks, 12 trays/bank)	All filters = one population	Some potential for agent contamination based on below-PCC agent levels in ash and residues	N/A

Possibilty of Agent Contamination Exists 95/95 Sampling			
Filter System	**Population**	**Basis for 95/95 Sampling**	**Assumptions Related to Population**
M-40 Masks (canisters)	Four populations: Masks associated with GB, GB/VX, VX, HD campaigns	Some potential for agent contamination, exposure times/levels limited by worker safety restrictions	N/A
MPF Cool-Down Area Exhaust Filters (2 banks, 6 trays/bank)	First bank = one population	Some potential for agent contamination, due to low-level loading	No need for filter changeout over life of project
DGB Filters (2 banks, 6 trays/bank)	First bank = one population	Some potential for agent contamination, due to low-level loading	No need for filter changeout over life of project
MDB HVAC Exhaust Filters (9 units, 6 banks/unit, 48 trays/bank)	Selected bank of each filter unit = one population	First bank expected to be contaminated; 2nd bank has some potential for agent contamination	No need for filter changeout over life of project
MDB HVAC Vestibule Filters (HEGA) (9 units, 1 vestibule/unit, 2 HEGAs/vestibule) 6 spent HEGAs in storage	All filters = one population	Some potential for agent contamination, due to low-level loading	No need for filter changeout for remainder of project
MDB HVAC Vestibule IONEX Charcoal Canisters	All filters = one population	Some potential for agent contamination, due to low-level loading	No need for filter changeout for remainder of project
ACAMS C2A1 Canister Filters	Three populations: Canister filters associated with GB, VX, HD campaigns	Used to filter ACAMS exhaust into corridors; some potential for agent contamination	No need for filter changeout for remainder of project

The sampling strategies for some of the filter systems are based on the assumptions as identified above. In the event an assumption is invalidated (e.g. a filter system requires an unanticipated changeout), the permittee must revise the sampling strategy to address the new circumstances. In that event, changes to the sampling strategy will be proposed through a permit modification request.

For filter systems, such as the DGB or MDB HVAC, with multiple banks of filters, one bank will be selected for sampling. If the results indicate that the acceptance criteria (agent-free) has been met for that bank, all subsequent (downstream) banks for that unit will also be considered agent-free. All carbon banks for that unit prior to the bank selected for sampling will be considered agent contaminated unless subsequent agent-free sampling demonstrates each bank meets the agent-free criteria.

If sampling results indicate agent concentrations above the PCC in any sample, that population will be considered agent contaminated and will require treatment. No composite samples will be used to determine agent concentrations. For each population of spent carbon, three samples will be analyzed for TCLP metals and organics.

2.2.15 [RESERVED]

2.2.16 BRA Parts and Maintenance Waste

BRA parts and maintenance waste includes valves, pumps, gearboxes, conveyors, belts, piping, hoses, flanges, thermocouples, pH probes, nuts, bolts, gaskets, and other waste removed during operations and maintenance activities. These items will be characterized based on process knowledge. An agent-free determination of the brines will be made in accordance with Section 2.1.23. All downstream equipment is consequently determined to be agent-free.

2.2.17 Spent Hydraulic Fluid and Spent Lubricating Oil

Spent hydraulic fluid and spent lubricating oil generated outside the MDB have not been exposed to chemical agent liquid or vapor and are agent free. Spent hydraulic fluid and spent lubricating oil generated inside the MDB will be analyzed for chemical agent to verify they are agent free. Spent hydraulic fluid and spent lubricating oil that are agent free may be shipped off facility for treatment and disposal. In addition to applicable agent-free analyses, these wastes will be analyzed for TCLP metals and TCLP organics for initial characterization and, thereafter, in accordance with applicable regulations.

2.2.18 CHB Sump Liquids of Known Origin

CHB sump liquids of known origin will include washdown water and precipitation remaining on the exterior of containers as they are brought into the building. On an annual basis, a grab sample of these wastes will be analyzed for chemical agent, TCLP metals, TCLP organics, and corrosivity. The wastes must be agent free for shipment off facility.

2.3 Analyses for Nonprocess Waste

Nonprocess waste is waste generated as a result of maintenance and other activities. Nonprocess waste was not exposed to chemical agent, and is not covered by a process waste stream. These waste streams will be characterized based on generator knowledge. The waste streams are provided for information in the following table.

Waste Stream	Includes	Generated From
Hydrochloric Acid	Hydrochloric Acid	Cleaning in the BRA and PAS
Painting Debris	Rags, brushes, rollers, cans, solvents, other painting items	Painting
Expired Shelf Life Materials	Laboratory chemicals, paints, fuels, sealant, lubricants, cleaning supplies	Miscellaneous activities
Batteries	Lead Acid, Ni-Cad, Lithium	Items requiring battery power
Sodium Hydroxide	Sodium hydroxide	Cleaning activities in PUB
Absorbed Sodium Hydroxide	Sodium hydroxide	Clean up of sodium hydroxide spills
High-Pressure Sodium Lamps	High-pressure sodium lamps	Lighting
Laboratory Solvents	Non-agent-contaminated spent solvents	Laboratory activities
Refractory Saw Water	Water	Cooling water for saw used to cut refractory brick for rebricking activities.

Waste Stream	Includes	Generated From
Absorbed Battery Acid	Sulfuric acid	Sulfuric acid spills from recharging forklift batteries

2.4 Analyses for Items Destined for Recycling

Table 3 presents a summary of the selected analyses, analytical methods, sampling frequencies, and sample collection methods for all of the UMCDF waste streams that may be sent offsite for recycling. Representative samples must be collected using the sampling methods specified in Table 3.

2.4.1 RCRA-Empty Ton Containers

This waste stream consists of ton containers that have been treated in the MPF and are considered empty containers in accordance with 40 CFR 261.7(b)(3)(ii) and have met the criteria of Permit Condition II.C.4 requiring standard thermal treatment. RCRA-empty ton containers may be managed in accordance with the scrap metal requirements of 40 CFR 261.6(a)(3)(ii), and recycled to a smelting facility; otherwise they will be managed in accordance with Section 2.2.6. Residues that may be generated as a result of this activity will be managed as MPF ash (see Section 2.2.5 of this plan). RCRA-empty ton container residues will be sampled annually. Grab samples of the ton container residues will be taken from the first three off-facility containers, for a total of three samples. The samples will be analyzed for chemical agent to verify the waste stream is agent free.

2.4.2 Recyclable Spent Hydraulic Fluid and Spent Lubricating Oil

Spent hydraulic fluid and spent lubricating oil generated outside the MDB have not been exposed to chemical agent liquid or vapor and are agent free. Spent hydraulic fluid and spent lubricating oil generated inside the MDB will be analyzed for chemical agent to verify they are agent free. Spent hydraulic fluid and spent lubricating oil that are agent free may be shipped off facility for recycling. In addition to applicable agent-free analysis, these wastes will be analyzed for TCLP metals and TCLP organics annually.

2.5 Analyses for Agent Monitoring and Sampling

Agent monitoring, sampling, and analyses required by this permit must be conducted in accordance with the appropriate methods specified in this permit; Table 1, Table 2, or Table 3 of this WAP; and in accordance with Appendix B and Appendix C of this WAP.

Appendix D to this WAP describes how the presence of chemical agent is confirmed or refuted when using ACAMS and/or DAAMS to monitor for the presence of agent. DAAMS tubes used for confirmation/refutation purposes will aspirate an adequate sample volume to confirm at the vapor screening level (VSL), worker population limit (WPL), etc. typically using an aspiration time of ten minutes or greater.

3. Sampling Methods

The sampling method used for each waste stream is indicated in Table 1, Table 2, and Table 3 and Appendix C.

4. Frequency of Analyses

The frequency of analysis must be in accordance with Table 1, Table 2, Table 3, and Appendix C of this WAP, and as otherwise specified in this permit.

5. Additional Requirements for non-UMCD and non-UMCDF Wastes

The UMCDF is prohibited from storing or treating waste that is not generated at the UMCDF or UMCD.

6. Additional Requirements for Ignitable, Reactive, or Incompatible Wastes

Federal regulations require that container storage hazardous waste management units managing ignitable and reactive hazardous waste must be located at least 50 feet away from the UMCD facility property line. The UMCDF meets this requirement.

7. Recordkeeping Requirements

Analytical results generated in compliance with the UMCDF Waste Analysis Plan are maintained on file at the UMCDF as part of the operating record.

8. Agent-Free Criteria

The criteria in this section apply to waste streams in Section 2.2 where agent-free criteria have not been specifically addressed elsewhere.

In accordance with Permit Condition II.B.2, waste must be agent-free prior to shipment off-facility. Samples will be considered agent free if they are below the permit compliance concentrations (PCC) identified in this section. Analytical results will be recorded as concentration in units of parts per billion (ppb). Analytical results greater than 0.5 x PCC shall be reported to the Department within seven calendar days from the date of analysis. Analytical results below the PCC, but greater than 0.5 PCC, will be flagged as estimates. All analytical results will be recorded with decimal places truncated; rounding will not occur.

The sample matrix determination will be made in accordance with UMCDF standing operating procedure (SOP) UM-0000-M-559, “Agent Extraction & Analyses.” If the process stream is not listed, the matrix that the sample most resembles will be used (e.g., soils fall under the water-insoluble solid matrix).

<table>
<tr><th>Matrix Type</th><th>WAP Section Number</th><th>Waste Streams</th><th>GB PCC (ppb)</th><th>VX PCC (ppb)</th><th>HD PCC (ppb)</th></tr>
<tr><td rowspan="3">WML/WSS</td><td>2.1.23</td><td>Brines</td><td rowspan="3">13</td><td rowspan="3">8</td><td rowspan="3">127</td></tr>
<tr><td>2.2.17</td><td>Spent Hydraulic Fluid</td></tr>
<tr><td>2.2.18</td><td>CHB Sump Liquids Known Origin</td></tr>
<tr><td>WIL</td><td>2.2.17</td><td>Lubricating Oil</td><td>16</td><td>15</td><td>177</td></tr>
<tr><td rowspan="11">WIS</td><td>2.2.2</td><td>LIC Slag</td><td rowspan="11">16</td><td rowspan="11">13</td><td rowspan="11">152</td></tr>
<tr><td>2.2.3</td><td>DFS Ash</td></tr>
<tr><td>2.2.4</td><td>DFS Cyclone Residues</td></tr>
<tr><td>2.2.5</td><td>MPF Ash</td></tr>
<tr><td>2.2.6</td><td>Non-RCRA-Empty Ton Containers</td></tr>
<tr><td>2.2.7</td><td>Wood Pallet Material</td></tr>
<tr><td>2.2.9</td><td>PAS Residue</td></tr>
<tr><td>2.2.10</td><td>PAS Mist Eliminator Candles</td></tr>
<tr><td>2.2.13</td><td>Brine Tank Sludge/Solids</td></tr>
<tr><td>2.2.14</td><td>Spent Carbon</td></tr>
<tr><td>2.4.1</td><td>RCRA-Empty Ton Containers</td></tr>
</table>

WIL - Water-Immiscible Liquid
WIS Water-Insoluble Solid
WML Water-Miscible Liquid
WSS Water-Soluble Solid

9. Nonembedded Metal Secondary Waste Analysis/Feed Controls

As described in Section 2.1, some secondary wastes contain nonembedded metals that are susceptible to volatilization into the incinerator exhaust during treatment. To comply with permitted metal feed rates as well as metal emission rates, secondary wastes that contain nonembedded metals will be controlled/analyzed according to the methodology presented in this section.

Nonembedded metals may be present in various types of secondary wastes. Wastes with protective coatings, batteries, light bulbs, CCTVs, circuit boards, and other electronic equipment may contain nonembedded metals. The total quantity of nonembedded metals in the waste will be characterized to determine the maximum allowable feed rate. The characterization results will be documented in the operating record and may be based on a combination of analytical data generated from the UMCDF or other demilitarization sites, information from calculations generated from other demilitarization sites, manufacturer data, and other published information

The maximum allowable feed rate for a nonembedded metal secondary waste will be calculated based on the metal feed rate limits for the DFS or MPF, as applicable. The maximum feed rate of the waste will be no greater than the feed rate of the most restrictive nonembedded metal contained in the waste.

The maximum allowable feed rate of a nonembedded metal secondary waste will be calculated using the following equation:

$$F = \frac{\text{Permitted feed rate(lb/hr)} \times 1{,}000{,}000\ \text{mg/kg}}{\text{concentration of metal in waste matrix (mg/kg)}}$$

Nonembedded metal wastes may be combined with other bulk solid waste streams provided the permitted metal feed rates and emission limitations are met.

10. Quality Assurance/Quality Control

The data quality objectives (DQOs) for waste sampling include the following:

- Determine if waste to be treated is within the Permit limitations;
- Sufficiently characterize wastes that will be sent off facility to a hazardous waste treatment, storage, or disposal facility.
- Sufficiently sample and monitor wastes within the treatment areas to ensure the analyte(s) being monitored are being accurately detected.
- Sufficiently characterize wastes that will be sent off facility for recycling.

Other UMCDF quality assurance/quality control requirements are located in the respective laboratory documents found in Appendix C this WAP. Ongoing method performance verification checks will be performed and evaluated in accordance with the laboratory documents found in Appendix C of this WAP.

11. Sampling and Analysis for 40 CFR 264 Subpart BB and Subpart CC Exemptions

Subpart BB, Air Emission Standards for Equipment Leaks (40 CFR 264.1050), establishes monitoring and repair requirements for equipment such as pumps, valves, and flanges that contact waste with an organic content of ten percent or greater. Equipment exempt from the requirements of Subpart BB, namely the brine, spill tanks, and SDS storage systems, must have documented process knowledge or analyses to support the exemption determination in accordance with 40 CFR 264.1063(d). The sampling and analysis that will be performed to satisfy these determinations are specified in Table 1 of this section. The samples will be collected at the storage tanks and handled in a manner to minimize escape of volatile organics. A minimum of four samples must be collected within a one-hour time frame.

Subpart CC, Air Emission Standards for Tanks, Surface Impoundments, and Containers (40 CFR 264.1080), establishes the requirements for emission controls on applicable equipment that contains hazardous waste with a volatile organic content of 500 ppm or greater. Applicable waste streams that have been determined to be exempt from these requirements are required to have documentation supporting the exemption determination. The UMCDF shall use sampling and analysis to make these determinations, and a screening method that detects total organic carbons (SW-846 Method 9060 or equivalent) will be used as specified for applicable waste streams in Sections 2.1 and 2.2. If the total organic carbon measurement using the screening method is 500 ppm or greater, analytical results from Methods 8260 and 8270 (instead of Method 25D) will be obtained to determine the volatile organic compounds (VOCs) present in the waste. The samples will be collected and handled in a manner to minimize escape of volatile organics. A minimum of four samples must be collected within a one-hour time frame.

For nonagent-contaminated hazardous waste containers, this determination may be made using process knowledge in accordance with 40 CFR 264.1083.

Table 1. Process Wastes and UMCD Wastes Requiring Treatment at the UMCDF

WAP Section Number	Waste Stream	Treatment Unit(s)	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
2.1.1	Chemical Agent	LIC1 LIC2 MPF DFS	Agent Percent Purity	UM-0000-M-554	**HD:** • Initial Characterization Samples: First 10 ACS tanks. • Confirmation Samples: Every 7,000 gallons	Grab
			Total Metals	Preparation: 3015 or 3005 or 3010 or 3052 Analysis: 6010 or 6020 Preparation and Analysis: 7470		
	HD Rinsate	LIC1 LIC2	Total Metals	Preparation: 3015 or 3005 or 3010 or 3052 Analysis: 6010 or 6020 Preparation and Analysis: 7470	• Initial Characterization Samples: First 10 RCS tanks. • Confirmation Samples: Every 7,000 gallons	Grab
2.1.2	Spent Decontamination Solution	LIC1 LIC2	Chemical Agent	UM-0000-M-559	In accordance with Appendix A and whenever there is an abnormal event warranting sampling	Grab
			Chlorine (HD campaign only)	USEPA Method 330.5 or Standard Method 4500-C1 G		
			Total Metals	Preparation: 3015 or 3005 or 3010 or 3052 Analysis: 6010 or 6020 and 7470 Preparation and Analysis: 7470		
			Total Organics	Preparation: 5030 and 3510 or 3520 Analysis: 8260 and 8270	If TOC $\geq$ 0.05%	
			Total Organic Carbon	Preparation and Analysis: 9060	Annually	
2.1.3	Laboratory Liquid Waste	LIC1 LIC2	Chemical Agent	UM-0000-M-559	Prior to each tank transfer	Grab
			Total Organics	Preparation: 5030 and 3510 or 3520 Analysis: 8260 and 8270	If TOC $\geq$ 0.05%	
			Total Organic Carbon	Preparation and Analysis: 9060	Annually	

Table 1. Process Wastes and UMCD Wastes Requiring Treatment at the UMCDF

WAP Section Number	Waste Stream	Treatment Unit(s)	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
2.1.4	Miscellaneous Agent-Contaminated Liquid Wastes	LIC1 LIC2	Chemical Agent	UM-0000-M-559 or process knowledge	As generated	Grab
			Total Metals	Preparation: 3015 or 3005 or 3010 Analysis: 6010 or 6020 and 7470		
			Total Organic Carbon	Preparation and Analysis: 9060		
2.1.5	CHB Sump Liquids of Unknown Origin	LIC1 LIC2	Chemical Agent	UM-0000-M-559	As generated	Grab
			Total Metals	Preparation: 3015 or 3005 or 3010 Analysis: 6010 and 7470		
			Total Organics	Preparation: 5030 and 3510 or 3520 Analysis: 8260 and 8270		
			Total Organic Carbon	Preparation and Analysis: 9060		
			Corrosivity	9040		
			Ignitability	1010		
2.1.6	Unknown Liquids from Enhanced On-Site Containers or Spray Tank Overpacks	LIC1 LIC2	See chemical agent and spent decontamination solution waste streams	N/A	N/A	N/A
2.1.7	Personnel Maintenance Building Waste Tank Liquids	LIC1 LIC2	Chemical Agent	UM-0000-M-559	As generated prior to transfer to the SDS tanks	Grab
			Corrosivity	9040		
			Total Organic Carbon	Preparation and Analysis: 9060		
2.1.8	**[RESERVED]**					
2.1.9	Explosive Containment Room Maintenance Residue	DFS	None; weight will be determined prior to feed to treatment unit	N/A	N/A	N/A

All federal Title 40 CFR citations are citations to the Title 40 CFR adopted as Oregon rule by OAR 340-100-0002 and as altered by OAR Chapter 340, Divisions 100-106, 109, 111, 113, 120, 124, and 142. See the preface introduction for further explanation.

Table 1. Process Wastes and UMCD Wastes Requiring Treatment at the UMCDF

WAP Section Number	Waste Stream	Treatment Unit(s)	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
2.1.10	Partially Treated DFS Ash	DFS	None; weight will be determined prior to feed to treatment unit	N/A	N/A	N/A
2.1.11						
	HD TC with Agent Residue, Solids, or Rinsate	MPF	Total Metals	Preparation: 3015 or 3005 or 3010 or 3052 Analysis: 6010 or 6020 Preparation and Analysis: 7470	60 randomly selected HD ton containers	Composite sample collected at BDS after use of HTS
2.1.12	**[RESERVED]**					
2.1.13	ACS, RCS, AQS, RCS, and SDS Residues	MPF	None; weigh prior to feed to treatment unit	N/A	N/A	N/A
2.1.14	Noncombustible Waste	MPF	None; weigh prior to treatment	N/A	N/A	N/A
2.1.15	High-Heat Plastic	MPF	None; weigh prior to treatment	N/A	N/A	N/A
2.1.16	Ventilation System Filters	MPF	None; weigh prior to treatment	N/A	N/A	N/A
2.1.17	Spent Carbon	TBD	None; weigh prior to treatment	N/A	N/A	N/A
2.1.18	PPE Respirator Carbon Filter Canisters	TBD	None	N/A	N/A	N/A
2.1.19	Laboratory Solid Waste	MPF	None; weigh prior to treatment	N/A	N/A	N/A
2.1.20	Cellulose Waste	MPF	None; weigh prior to treatment	N/A	N/A	N/A

Table 1. Process Wastes and UMCD Wastes Requiring Treatment at the UMCDF

WAP Section Number	Waste Stream	Treatment Unit(s)	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
2.1.21	Level A (DPE) Suits (including other types of low-heat plastics)	MPF	None; weigh prior to treatment	N/A	N/A	N/A
2.1.22	TAP Gear/Rubber	MPF	None; weigh prior to treatment	N/A	N/A	N/A
2.1.23	Brines	BRA	Chemical agent • Campaign agent • Prior noncampaign agent (while prior noncampaign agent secondary waste is treated)	UM-0000-M-559	Each batch	• **Composite** if batch consists of 2 tanks • **Grab** if batch consists of 1 tank
			Specific gravity	ASTM D1429-03 or Mettler-Toledo DE40 density meter		
			Corrosivity	9040		
			Total Metals	Preparation: 3015 or 3005 or 3010 or 3052 Analysis: 6010 or 6020 and 7470	On a monthly basis	
			Total Organics	Preparation: 5030 and 3510 or 3520 Analysis: 8260 and 8270	If TOC $\geq$ 0.05%	
			Total Organic Carbon	Preparation and Analysis: 9060	Monthly for the first three months of an agent campaign, then annually	
2.1.24	Explosive-Contaminated Spill Pillows	DFS	None; weigh prior to feed to treatment unit	N/A	N/A	N/A

Table 1. Process Wastes and UMCD Wastes Requiring Treatment at the UMCDF

WAP Section Number	Waste Stream	Treatment Unit(s)	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
2.1.25	3-M Maintenance Sorbents	MPF	None; weigh prior to treatment	N/A	N/A	N/A
2.1.26	Noncombustible Sorbents	MPF	None; weigh prior to treatment	N/A	N/A	N/A
2.1.27	Bulk Aluminum	MPF	None; weigh prior to treatment	N/A	N/A	N/A
2.1.28	Foam Core Panels	MPF	None; weigh prior to treatment	N/A	N/A	N/A
2.1.29	Concrete	MPF	None; weigh prior to treatment	N/A	N/A	N/A
2.1.30	Agent-Contaminated Wood Pallets	MPF	None; weigh prior to treatment	N/A	N/A	N/A
2.1.31	Silica Gel/Vermiculite	MPF	None; weigh prior to treatment	N/A	N/A	N/A
2.1.32	UMCD Liquid Waste	LIC 1 LIC 2	Corrosivity	9040	Each waste container	Grab
			Chemical Agent	UM-000-M-559	Each composited SDS tank	Grab
			Total Metals (all metals with designated feed rates and/or emission limitations in Modules VI and VII of the Permit)	Preparation: 3015 or 3005 or 3010 Analysis: 6010 or 6020 and 7470		
			Total Organics (all organics with designated feed rates and/or emission limitations in Modules VI and VII of the Permit)	Preparation: 5030 and 3510 Analysis: 8260 and 8270		
			Total Organic Carbon	Preparation and Analysis: 9060	Annually	

Table 2. Process Wastes Requiring Off-Facility Treatment and/or Disposal

WAP Section Number	Waste Stream	Generation Source	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
2.2.1	Refractory Brick	LIC, crossover ducts	TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471	Each batch	Composite
2.2.2	LIC Slag	LIC	Chemical Agent	UM-0000-M-559	Each batch	Composite
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		
2.2.3	DFS Ash	DFS Heated Discharge Conveyer Output	TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081	Annually	Grab samples taken from first three off-facility containers
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		
			Dioxins/Furans	Preparation and Analysis: 8280		
			Nitrocellulose	Modification of Method 353.2 of EPA 600 series methods for water and wastewater		
			Explosives	8330		
			Chemical Agent • non-kicker chute waste	UM-0000-M-559		
			• kicker chute waste		Each container	Grab

Table 2. Process Wastes Requiring Off-Facility Treatment and/or Disposal

WAP Section Number	Waste Stream	Generation Source	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
2.2.4	DFS Cyclone Residues	DFS Cyclone	Chemical Agent	UM-0000-M-559	Each container	Grab
			Nitrocellulose	Modification of Method 353.2 of EPA 600 series methods for water and wastewater	Annually	Grab
			Explosives	8330		
			Dioxins/Furans	Preparation and Analysis: 8280		
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		

Table 2. Process Wastes Requiring Off-Facility Treatment and/or Disposal

WAP Section Number	Waste Stream	Generation Source	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
2.2.5	MPF Ash	MPF	TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081	Annually	Grab samples taken from first three off-facility containers
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		
			Dioxins/Furans	Preparation and Analysis: 8280		
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081	Each boilover ton container	Grab samples from each individual ton container
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		
			Total Organic Carbon	Preparation and Analysis: 9060		
			Chemical Agent	UM-0000-M-559 (Department-approved MPF ash method)	• Each boilover ton container[a] • Each ton container registering an ACAMS alarm equal to or greater than 0.20 VSL during DAL monitoring[a] • 1 out of every 6 donor TCs[a.] [a] If one sample result is above the PCC, each remaining TC treated in the MPF shall be sampled	Grab sample taken from each individual ton container
2.2.6	Non RCRA-Empty Ton Containers	MPF	Chemical Agent	UM-0000-M-559	Annually	Grab samples taken from first three off-facility containers

Table 2. Process Wastes Requiring Off-Facility Treatment and/or Disposal

WAP Section Number	Waste Stream	Generation Source	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
2.2.7	Wood Pallets	Igloos/EONCs	Chemical Agent	Monitor EONC using DAAMS or ACAMS	Each EONC	Air sample
			Chemical Agent (for pallets from igloos reported as leakers)	UM-0000-M-559	See Section 2.2.7	Grab samples taken from up to ten pallets to form one composite sample per Section 2.2.7
2.2.8	PAS Brines Destined for Off-Site Treatment	PAS	Chemical Agent	UM-0000-M-559	Each Batch	• **Composite** if batch consists of 2 tanks • **Grab** if batch consists of 1 tank
			TCLP or Total Metals	Preparation: 1311 or 3052 Analysis: 6010 or 6020 and 7470	Monthly to characterize brines for shipment	
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
2.2.9	PAS Residues	PAS	Chemical Agent	UM-0000-M-559	Each container	Grab
			Free Liquids	9095	Annually	Grab
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
			TCLP Metals	Preparation: 1311 Analysis: 6010 and 7471		
2.2.10	PAS Mist Eliminator Candles	PAS	Chemical Agent	UM-0000-M-559	Each change out	Grab samples taken from each of the first three off-facility containers and combined to form one composite sample
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
2.2.11	PAS Parts and Maintenance Debris	PAS	None	N/A	N/A	N/A

Table 2. Process Wastes Requiring Off-Facility Treatment and/or Disposal

WAP Section Number	Waste Stream	Generation Source	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
2.2.12	Brine Salts	BRA	Free Liquids	9095	Annually	Grab samples taken from each of the first three off-facility containers
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
2.2.13	Brine Tank Sludges/Solids	BRA	Chemical Agent	UM-0000-M-559	Upon removal	Composite consisting of one grab from each BRA tank from which sludges/solids are removed
			Corrosivity	9045		
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
2.2.14	Spent Carbon	PMB supply filters	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples taken from each of the first three off-facility containers
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
		PMB exhaust filters	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples taken from each of the first three off-facility containers
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
		Supelcarb	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples taken from each of the first three off-facility containers
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		

Table 2. Process Wastes Requiring Off-Facility Treatment and/or Disposal

WAP Section Number	Waste Stream	Generation Source	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
		CON Filters	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples taken from each of the first three off-facility containers
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
		Laboratory HVAC vestibule filters (HEGA)	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14.
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
		Laboratory HVAC filters	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples taken from the selected filter bank. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14.
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		

Table 2. Process Wastes Requiring Off-Facility Treatment and/or Disposal

WAP Section Number	Waste Stream	Generation Source	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
		PFS activated carbon (GB)	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14; a minimum of 3 samples per changeout.
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
		PFS activated carbon (GB/VX)	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14; a minimum of 3 samples per changeout
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		

Table 2. Process Wastes Requiring Off-Facility Treatment and/or Disposal

WAP Section Number	Waste Stream	Generation Source	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
		PFS activated carbon (HD)	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14; a minimum of 3 samples per changeout
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
		PFS SIC carbon (VX/HD)	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14; a minimum of 3 samples per changeout
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		

Table 2. Process Wastes Requiring Off-Facility Treatment and/or Disposal

WAP Section Number	Waste Stream	Generation Source	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
		PFS SIC carbon (HD)	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14; a minimum of 3 samples per changeout
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
		DFS cyclone enclosure filters	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples from the selected filter bank. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14.
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		

Table 2. Process Wastes Requiring Off-Facility Treatment and/or Disposal

WAP Section Number	Waste Stream	Generation Source	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
		M-40 mask canisters/PPE carbon (GB)	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14.
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
		M-40 mask canisters/PPE carbon (GB/VX)	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14.
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		

Table 2. Process Wastes Requiring Off-Facility Treatment and/or Disposal

WAP Section Number	Waste Stream	Generation Source	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
		M-40 mask canisters/PPE carbon (VX)	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14.
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
		M-40 mask canisters/PPE carbon (HD)	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14.
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471	Before off-site shipment	Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		

All federal Title 40 CFR citations are citations to the Title 40 CFR adopted as Oregon rule by OAR 340-100-0002 and as altered by OAR Chapter 340, Divisions 100-106, 109, 111, 113, 120, 124, and 142. See the preface introduction for further explanation.

Table 2. Process Wastes Requiring Off-Facility Treatment and/or Disposal

WAP Section Number	Waste Stream	Generation Source	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
		MPF CDA Exhaust filters	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples taken from the selected filter bank. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14.
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471	Before off-site shipment	Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
		DGB filters	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples taken from the selected filter bank. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14.
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		

Table 2. Process Wastes Requiring Off-Facility Treatment and/or Disposal

WAP Section Number	Waste Stream	Generation Source	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
		MDB HVAC exhaust filters	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples taken from the selected filter bank. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14.
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
		MDB HVAC vestibule filters (HEGA)	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14.
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		

Table 2. Process Wastes Requiring Off-Facility Treatment and/or Disposal

WAP Section Number	Waste Stream	Generation Source	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
		MDB HVAC vestibule IONEX charcoal canisters	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14.
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
		ACAMS C2A1 canister filters	Chemical Agent	UM-0000-M-559	Before off-site shipment	Grab samples. Calculate required number of samples using VSP in accordance with the sampling direction provided in WAP Section 2.2.14.
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		Grab samples taken from each of the first three off-facility containers
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
2.2.15	**[RESERVED]**					
2.2.16	BRA Parts and Maintenance Waste	BRA	None	N/A	N/A	N/A

Table 2. Process Wastes Requiring Off-Facility Treatment and/or Disposal

WAP Section Number	Waste Stream	Generation Source	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
2.2.17	Spent Hydraulic Fluid and Spent Lubricating Oil	Not exposed to chemical agent liquid or vapor; miscellaneous sources	Chemical Agent	UM-0000-M-559	As generated for waste from inside the MDB	Grab
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7470		
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
2.2.18	CHB Sump Liquids of Known Origin	CHB Sump	Chemical Agent	UM-0000-M-559	Annually	Grab
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7470		
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		
			Corrosivity	9040		

Table 3. Items Destined for Recycling

WAP Section Number	Waste Stream	Generation Source	Analytical Parameters	Analytical Methods (The latest approved method per SW-846 will be used unless otherwise listed)	Frequency of Analysis	Sampling Method
2.4.1	RCRA-Empty Ton Containers	MPF	Chemical Agent	UM-0000-M-559	Annually	Grab samples taken from first three off facility containers
2.4.2	Spent Hydraulic Fluid and Lubricating Oil	UMCDF	Chemical Agent	UM-0000-M-559	As generated for waste from inside the MDB	Grab
			TCLP Metals	Preparation: 1311 Analysis: 6010 or 6020 and 7471		
			TCLP Organics	Preparation: 1311 Analysis: 8260 and 8270 and 8081		

Table 4. Organic Analytes

Analyte	EPA Hazardous Waste Number
Benzene	D018
Carbon tetrachloride	D019
Chlordane	D020
Chlorobenzene	D021
Chloroform	D022
1,4-Dichlorobenzene	D027
1,2-Dichloroethane	D028
1,1-Dichloroethylene	D029
2,4-Dinitrotoluene	D030
Endrin	D012
Heptachlor and Heptachlor epoxide	D031
Hexachlorobenzene	D032
Hexachlorobutadiene	D033
Hexachloroethane	D034
Methoxychlor	D014
Methyl ethyl ketone	D035
Nitrobenzene	D036
Pentachlorophenol	D037
Tetrachloroethylene	D039
Toxaphene	D015
Trichloroethylene	D040
2,4,5-Trichlorophenol	D041
2,4,6-Trichlorophenol	D042
Vinyl chloride	D043

Appendix A. Spent Decontamination Solution Sampling, Analysis, and Control Requirements to Ensure Compliance with Waste Feed Limits

The UMCDF will periodically sample spent decontamination solution (SDS) to monitor the compliance of waste feed to the Liquid Incinerators (LIC1 and 2) feed limits. The UMCDF will establish empirically that liquids collected in the SDS tanks can be fed to the LICs in compliance with feed limit requirements.

Initial Sampling Calculations

The UMCDF will sample the first ten tanks of SDS waste generated for each munition and agent campaign and calculate the upper confidence limit (UCL) for chlorine (HD campaign only) and each metal for which a permitted feed limit is established. The UCL will be calculated using U.S. Environmental Protection Agency software ProUCL (available on the EPA website www.epa.gov). For the UCL calculations, the following parameters will be selected in order to address both normal and nonnormal data:

- Confidence Coefficient – 0.95 (the default value)
- Number of Bootstrap Runs – 2,000 (the default value)
- Select UCL Type – All

Following the calculation of "All" UCLs, the UCL(s) recommended by the software will be evaluated for use in further calculations as follows:

- If the recommended UCL(s) are less than the maximum sample result obtained, then the highest recommended UCL will be used in further calculations.
- If the recommended UCL(s) are greater than the maximum sample result obtained, the maximum sample result will be used in further calculations.
- If there is more than one recommended UCL and at least one is greater than and one is less than the maximum sample result, the maximum sample result will be used in further calculations.

The UMCDF may feed SDS at risk during the characterization period as follows:

- **Tank #1** – Do not feed until characterization data is available. Upon availability of characterization results, feed at up to 100% of permitted agent feed rate unless metals content results in limited feed.

- **Tank #2** – Feed at up to 75% of the feed rate limit of Tank #1; or, if the analytical data for Tank #2 are available, feed rate limit will be based on the results of the analysis. For Tank #2, compliance with permitted metal feed rates will be evaluated on the metals data associated with Tank #2.

- **Tank #3** – Feed at up to 75% of the feed rate limit for the most limiting constituent for which analytical results are available thus far; or, if the analytical data for Tank #3 are available, feed rate limit will be based on the results of the analysis. Prior to feeding to Tank #3, the analytical results for both Tank #1 and Tank #2 must be available. For Tank #3, compliance with permitted metal feed rates will be evaluated based on the metals data associated with Tank #3.

- **Tank #4** – Feed at up to 75% of the feed rate limit for the most limiting constituent for which analytical results are available thus far; or, if the analytical data for Tank #4 are available, feed rate limit will be based on the results of the analysis. Prior to feeding Tank #4, the analytical results for Tank #1 through Tank #3 must be available. For Tank #4, compliance with permitted metal feed rates will be evaluated based on the metals data associated with Tank #4.

- **Tanks #5 through #10** – Prior to feeding Tank #5 through Tank #10, the analytical results for all tanks previously fed must be available, or if the analytical data for the tank to be fed are available, feed rate limit will be based on the results of the analysis. After the preceding tank results are available, calculate the UCL and the UCL-metal feed rate for each metal based on the results available thus far. Feed at up to 100% of the permitted SDS feed rate limit or the calculated reduced SDS feed rate, whichever is more restrictive. For Tank #5 through Tank #10, compliance with permitted metal feed rates will be evaluated on a per-tank basis for the metals data associated with that particular tank.

The feed rate for each analyte based on the UCL (or maximum sample result, as applicable) will be calculated as follows:

$$\text{UCL analyte feed rate} = \frac{\text{UCL}\{\text{or maximum sample result}\}\ (\text{mg/L}) \times \text{maximum permitted SDS feed rate (lb/hr)}}{0.998\ \text{g/mL} \times 1\text{E}+03\ \frac{\text{mg}}{\text{g}} \times 1\text{E}+03\ \frac{\text{mL}}{\text{L}}}$$

If the calculated UCL analyte feed rates do not exceed the applicable metal and chlorine feed rate limits in Table 6-1 of Module VI and the table in Module VII, Permit Condition VII.B.3.i, SDS may be fed at or below the permitted SDS feed rate limit. If any metal or chlorine feed rate limit is exceeded by the calculated UCL analyte feed rate, SDS will be fed at a reduced feed rate in order to comply with the permitted metal and chlorine feed rates. The reduced SDS feed rate is calculated as follows:

$$\text{Reduced SDS feed rate} = \frac{\text{permitted metal or chlorine feed rate (lb/hr)} \times \text{maximum permitted SDS feed rate (lb/hr)}}{\text{UCL analyte feed rate (lb/hr)}}$$

Response to Initial Sampling Elevated Results

All sample results will be compared to the feed rate limits in the Permit. Anytime the results are above the limits, the UMCDF will proceed as follows:

1) That tank will not be fed to the incinerator at a rate that would exceed metal or chlorine feed rate limits,
2) Investigation will be initiated to determine the cause of the high concentration,
3) Corrections will be made to terminate the cause of the high concentration (if known), and
4) The SDS will be fed to the LIC at the calculated reduced SDS feed rate.

Confirmatory Sample Frequency

The UMCDF will take one (1) confirmatory sample for every 32,000 gallons of SDS generated. Confirmation sampling will be conducted without regard to a particular munition type and may include SDS from coprocessing activities. In the event of a major spillage of hydraulic fluid or some other atypical liquid spill, including abnormal agent spills in areas draining into the SDS system, the UMCDF will sample the SDS.

Response to Confirmatory Sampling Elevated Readings[1]

The results of the confirmation samples will be used to calculate chlorine (HD campaign only) and metal feed rates (based on the maximum SDS feed rate applicable at that time, which may be limited based on the UCL calculations), which will be compared to the applicable permitted chlorine and metal feed rate limits in Table 6-1 of Module VI and the corresponding table in Module VII, Permit Condition VII.B.3.i. If the chlorine and metal feed rate limits are not exceeded, the sample results confirm that the SDS feed is in compliance with the chlorine and metal feed rate limits. If the results indicate that chlorine or metal feed rate limits have been exceeded, the UMCDF will proceed as follows:

1) Investigation will be initiated to determine the cause of the high concentration,
2) Corrections will be made to terminate the cause of the high concentration, and
3) If the SDS has not yet been treated in the LIC prior to the results being received, the SDS will be fed to the LIC at the calculated reduced SDS feed rate.

Confirmation sample results will be included in the UCL, analyte feed rate, and restricted SDS feed rate (if applicable) calculations for the applicable munition (or multiple munitions in the case of coprocessing).

In the event the UMCDF determines that a result for initial characterization or confirmation samples is not representative, exceptions to the sampling scheme will be addressed with DEQ on a case-by-case basis.

[1] The SDS may be fed to the LIC for treatment prior to the results of the confirmatory samples are known, since it is sampled frequently enough to meet a 95% confidence level. If this option is used and results are received indicating a feed limit has been exceeded either:
(a) If the cause has been specifically identified and fixed, subsequent SDS tanks will return to the sample regime of once every 32,000 gallons or
(b) If the cause is not specifically identified, the initial sampling regime (sampling 10 tanks) will be repeated before returning to the sample regime of once every 32,000 gallons.

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Appendix B. Sampling and Analytical Requirements for Wood Pallets

The wooden pallets have metal fasteners, nails, and strapping. Chemical agent contamination is more likely to contact and, furthermore, to occur in the wooden media than the nonporous media consisting of steel fasteners, nails, and strapping. Therefore, confirmation testing will be limited to the wooden porous surfaces. Hence, the testing results for the wooden pallets or porous media will be used to determine the disposition for the entire pallet. The specific sampling spots shall be picked with bias at the location of any staining indicating the wood or porous material has previously been in contact with liquids as opposed to vapors.

Samples (i.e., wood shavings) will be obtained from two of the pallet corners using a wood plane or other tool capable of taking flat surface samples of generally consistent thickness. Wood shavings at an average thickness of two millimeters in depth or less will be collected from the surface of two pallet corners and composited with the shavings from the other pallets in the pallet group. If a sample is comprised of multiple pallets, approximately equal contributions from each pallet will be used for the composite sample. Stained areas, if evident, will be given priority for sampling over unstained areas. A minimum of six total grams of composited sample must be collected for homogenization and analysis for chemical agents by UMCDF analytical procedure UM-0000-M-559.

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Appendix C. Laboratory Plans and Procedures
[40 CFR 270.31]

The following laboratory documents are provided electronically on the compact disc (CD) attached to and made a part of this appendix.

Document #	Title
UM-0000-M-553	RDTE Dilute Agent Standards
UM-0000-M-556	DAAMS GC/FPD Analysis
UM-0000-M-557	DAAMS GC-MSD/FPD Analysis
UM-0000-M-559	Agent Extraction & Analyses
UM-0000-M-570	Total Metals Analysis by Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES)
UM-0000-M-571	Mercury Analysis by Cold Vapor Atomic Absorption Spectrometry (CVAAS)
UM-0000-M-572	Total Metals Analysis by Inductively Coupled Plasma/Mass Spectrometry (ICP/MS)
UM-0000-M-600	ACAMS Operations
UM-0000-M-601	DAAMS Monitoring
UM-PL-016	Laboratory Analysis and Monitoring Plan (LAMP)
UM-PL-017	Laboratory Quality Control Plan (LQCP)

DAAMS = Depot Area Air Monitoring System
FPD = Flame Photometric Detector
GC = Gas Chromatography
MSD = Mass Selective Detector

Additional Information Regarding UM-PL-016, Laboratory Analysis and Monitoring Plan (LAMP)

The LAMP specifies locations and monitoring levels throughout the UMCDF. Inclusion of Continuous Emission Monitors (CEMS), Automatic Continuous Air Monitoring System (ACAMS) stations, or Depot Area Air Monitoring System (DAAMS) stations in the LAMP does not mean that these monitors operation 100 percent of the time.

Permitted Monitors:

Monitors required by the Permit, including, but not limited to the agent monitors listed in Appendix B to UM-PL-016 (LAMP), are operated in accordance with the applicable permit requirements.

Non-RCRA Monitors:

In addition to permit-required monitors, non-RCRA monitors are in place to provide information regarding worker protection or system performance. If a system is not operational or monitoring is not required for worker protection, non-RCRA monitors may not be operational at all times.–.

ELECTRONIC VERSIONS OF APPENDIX C LABORATORY DOCUMENTS

(CD)

Appendix D. Chemical Agent Monitoring
[40 CFR 270.31]

Chemical Agent Monitoring

Chemical agents and agent-contaminated wastes are routinely managed at the UMCDF. Careful design of ventilation systems and proper operating procedures limit chemical agent exposure to negligible levels, but cannot rule them out completely. Thus, monitoring of the storage and treatment areas, treatment exhaust gas, workplace, and surrounding environment for chemical agents is appropriate to provide warning of potential releases and document potential exposures so that a chronic health hazard does not go undetected.

The UMCDF primarily uses two separate chemical agent monitoring, sampling, and analysis systems to monitor for the presence of chemical agent at the facility during chemical agent operations:

- Automatic Continuous Air Monitoring System
- Depot Area Air Monitoring System.

These chemical agent monitoring systems are located in the following areas:

- Inside the Munitions Demilitarization Building operating areas where the chemical agent, munitions, and bulk items are processed
- The incinerator common stack, the depressurization glove box exhaust stack.
- The filtered exhaust air from the Munitions Demilitarization Building ventilation system
- The ambient air outside of the Munitions Demilitarization Building
- Inside the Container Handling Building
- The incinerator pollution abatement systems (PAS) and PAS carbon filter systems. (ACAMS continuously monitor upstream and downstream of each carbon filter system.)
- The exhaust stack for the evaporator packages and drum dryers located in the Brine Reduction Area
- The exhaust air from the Deactivation Furnace System (DFS) cyclone enclosure, except when the cyclone waste collection container is being head-space monitored.
- The DFS heated discharge conveyor (HDC) bin enclosure is monitored before bin change out.

These chemical agent monitors continuously sample air and exhaust gases to detect any system upset and to initiate remedial action and any required containment control action. A more-detailed description of the chemical agent monitoring systems is provided in the following section entitled, “Chemical Agent Monitoring Devices.”

The common stack is equipped with a “staggered” ACAMS configuration to allow for continuous sampling of the exhaust gas. The configuration requires three ACAMS monitoring the common stack. During hazardous waste treatment operations, two of the three ACAMS must be monitoring the exhaust gas in a “staggered” sampling configuration. Automatic waste feed cut-off interlocks are programmed on the LIC, DFS, and the MPF:

- When there are less than two ACAMS on line monitoring the common stack
- When the two ACAMS on line are not in the “staggered” sampling configuration
- When either of the two on-line ACAMS activate a malfunction alarm and the standby ACAMS cannot be brought on line to provide for continuous sampling of the exhaust gas

CHEMICAL AGENT MONITORING DEVICES

The UMCDF’s site-specific chemical agent and air pollution monitoring plans include chemical agent monitoring and detection systems and is located in Appendix C to this WAP. These plans identify specific locations and sampling frequencies for each monitoring station and also include the specific types of instrumentation with which each station is configured.

The precision and accuracy of each monitoring system used has been determined through actual on-site testing after the equipment has been installed on location. From the data generated, quality control bounds, calibration, and challenge frequencies and procedures have been determined and delineated for each system in the quality control plan in Appendix C to this WAP.

The airborne exposure limits (AELs) to which the chemical agent monitoring devices monitor were established by the Centers for Disease Control (CDC). In the October 9, 2003, Federal Register (FR Volume 68 No. 196), the CDC promulgated final recommendations for new monitoring levels for GB and VX. In the May 3, 2004, Federal Register (FR Volume 69 No. 85), the CDC promulgated interim recommendations for new monitoring levels for HD. These monitoring levels, referred to as the AELs, are identified in Table 1-1 of the Permit.

The following descriptions cover the various chemical agent monitoring devices and address monitoring of chemical agents GB, VX, and mustard (HD). For near-real-time monitors, “cycle time” is the time from the beginning of the sampling period until the result is available.

AUTOMATIC CONTINUOUS AIR MONITORING SYSTEM

General

The Automatic Continuous Air Monitoring System (ACAMS) detector is capable of detecting nerve agents GB and VX and mustard agent HD at the Immediately Dangerous to Life and Health, Allowable Stack Concentration (ASC)**,** Vapor Screening Level (VSL), and Short-Term Exposure Limit (STEL) set by the U.S. Army Surgeon General for unmasked workers. The STEL is a reference to the 15-minute time-weighted average limit established for agent workers. The VSL is an instantaneous (one ACAMS cycle) AEL equivalent in concentration to the STEL. At the UMCDF, the ACAMS readout is programmed to display instantaneous (single-cycle ACAMS) VSL concentrations. ACAMS monitoring levels and cycle times are outlined below.

ACAMS MONITORING

		STEL[a] (VSL)[b]	ASC[c]	IDLH[d]
Monitoring Level:	GB	0.0001 mg/m^3	0.0003 mg/m^3	0.1 mg/m^3
	VX	0.00001 mg/m^3	0.0003 mg/m^3	0.003 mg/m^3
	HD	0.003 mg/m^3	0.03 mg/m^3	0.7 mg/m^3
Cycle Time:	GB	3-5 minutes	5-7 minutes	2-3 minutes
	VX	5-10 minutes	7-10 minutes	2-3 minutes
	HD	3-5 minutes	5-7 minutes	2-3 minutes

[a]STEL = Short-Term Exposure Limit
[b]VSL = Vapor Screening Limit (single-cycle ACAMS reading)
[c]ASC =Allowable Stack Concentration
[d]IDLH = Immediately Dangerous to Life and Health

A silver fluoride impregnated filter is needed for VX detection. With the addition of a stack sampling apparatus, it is also possible to sample these chemical agents in stack gases. The ACAMS consists of the monitor, sampling pump, strip chart recorder, and gas cylinders.

The ACAMS was chosen as one of the primary stack monitors because it represents proven technology instrumentation for the detection and quantification of chemical agents in both work place and stack environments. These two environments are substantially different in their composition and potential interferents. The ACAMS cannot be interfaced to the stack directly because of the water loading in the effluent. This necessitates the use of a special stack sampling apparatus to condition the stack gas before it contacts the solid sorbent in the ACAMS. The sole purpose for using the stack sampling apparatus is to lower the dew point of the stack gas to a point where condensation does not occur within the ACAMS. This is accomplished by diluting a known volumetric flow of stack sample with a measured volumetric flow of dry air or N_2, thereby lowering the dew point. The entire flow is sampled through the ACAMS where it is preconcentrated and subsequently thermally desorbed for analysis. Separation of the chemical agent from other potential interferents is optimized through the selection of analytical columns and operating parameters.

The evaluation and testing program for these units in the field is rigorous, and the precision and accuracy data are generated while sampling actual stack influents during nonchemical agent operations. The recovery of the overall system, not just the ACAMS, is evaluated by spiking the actual stack sample as it enters the stack sampling apparatus. This essentially tests the entire sample collection train.

The ACAMS uses column separation plus the selectivity of the flame photometric detector to gain specificity of the response to chemical agents. The ACAMS provides a quantitative output of chemical agent concentration.

ACAMS have been used extensively during nerve and blister agent operations. Information about the system follows:

	ACAMS*
• Amenable to Stack Sampling:	Yes
• Detect:	
▪ GB	Yes
▪ HD	Yes
▪ VX	Yes
• Cycle Time:	
▪ GB	3-5 minutes
▪ HD	3-5 minutes
▪ VX	5-10 minutes
• Quantitative Output:	Yes
• Remote Alarm:	Yes
• Remote Concentration Readout:	Yes
• Ability to Detect Allowable Stack Concentration Levels:	Yes

*ACAMS = Automatic Continuous Air Monitoring System

Testing and evaluation in all chemical agent modes has been completed. All monitors meet the 95-percent confidence level for ±25 percent accuracy as required by the Department of Health and Human Services.

Theory of Operation

The ACAMS unit uses gas chromatography to separate the chemical agents from interferents and detects the chemical agent by use of a flame photometric detector. The ACAMS unit operates in two cycle modes: sample and purge. In the SAMPLE mode, air is drawn into the instrument through a preconcentrator tube, which contains a solid sorbent material. The sorbent (40-70°C) scrubs the chemical agents from the air stream. When monitoring nerve agent VX, the sample first passes through a silver fluoride impregnated pad mounted on the inlet of the ACAMS, which converts any nerve agent VX present to the ethyl analog of nerve agent GB. Upon completion of the SAMPLE period (110-230 seconds for nerve agent GB and mustard agent HD, 240-540 seconds for nerve agent VX), the detector sample transfer line automatically switches to the PURGE mode. A heater surrounding the preconcentrator turns on and thermally desorbs (180-260°C) compounds that have been collected. These compounds are transported to the analytical column by nitrogen carrier. The stationary phase in the analytical column separates the various compounds chromatographically, because compounds of different polarity and vapor pressure travel at different rates. The compounds are then detected by a flame photometric detector. The detector flame is supported by hydrogen and air. As the various compounds enter the detector flame, the light emitted is detected by a photomultiplier tube, whose signal is transmitted to a recorder and alarm circuit. The photomultiplier signal is directly proportional to the level of nerve agents GB and VX that are detected. A linearizer circuit is activated when monitoring mustard agent HD.

ACAMS Alarm Response

Response to ACAMS agent alarm is addressed in Appendix C to this WAP.

DEPOT AREA AIR MONITORING SYSTEM

General

The DAAMS is a sampling and analysis technique capable of detecting chemical agents GB, HD, and VX in ambient air at the STEL, and Worker Population Limit (WPL) levels for unmasked workers and the General

Population Limit (GPL) for the general public. The technique can also be used to monitor stack gases with a stack sampling apparatus to lower the stack gas dew point to below 50°C. Analysis must be performed in a laboratory.

Theory of Operation

The DAAMS technique is based on solid sorbent preconcentration of air sampled, followed by thermal desorption, and analysis by gas chromatography using a flame photometric or mass spectral detector**.** With the exception of mass spectral detection, this is also the principle upon which the ACAMS is based. The solid sorbent tube is connected to a vacuum pump through a flow-control device. When monitoring nerve agent GB, the sample vapors may be passed directly into the sorbent tube, or may be passed through a V-to-G conversion pad unaffected then collected on a sorbent tube. When monitoring for HD, the sample vapors are passed through an HD prefilter then collected on a sorbent tube. The HD prefilter is a packed bed scrubber tube containing Chromasorb-P® impregnated with triethanolamine that scrubs oxides of nitrogen and moisture from the sample gas. This aids in HD retention on the sorbent tube. When monitoring for nerve agent VX, the sample vapor must first be passed through a V-to-G conversion pad. The conversion pad is a nonwoven polyester felt, impregnated with silver nitrate and potassium fluoride, that reacts with nerve agent VX to form the G-analog, ethylmethylphosphonofluoridate. The G-analog is then adsorbed onto the sampling tube. Nerve agents VX and GB are sampled using Chromosorb 106 or HayeSep-D®as the sorbent, and mustard agent HD is collected using Tenax TA®. The preconcentrator tubes are then manually or automatically inserted into a heated inlet where the contents are desorbed into a gas chromatograph. A flame photometric detector equipped with a 525nm bandpass filter is used to detect phosphorous emissions for nerve agent GB and the G-analog of nerve agent VX and may be used to detect sulfur emissions from HD. A 393nm bandpass filter may also be used to detect HD. Knowing the amount of chemical agent on the sorbent tube and the total volume of air sampled, the average chemical agent concentration in the air can be calculated. By increasing the sample time or flow rate, the average concentration sensitivity can be increased.

DAAMS MONITORING

	Short-Term Exposure Limit (STEL)	**Worker Population Limit (WPL)** (8-hour)	**Worker Population Limit (WPL)** (12-Hour)[1]	**General Population Limit (GPL)**
Monitoring Level:				
GB	0.0001 mg/m^3	3E-05 mg/m^3	2E-05 mg/m^3	1E-06 mg/m^3
VX	0.00001 mg/m^3	1E-06 mg/m^3	6.7E-07 mg/m^3	6E-07 mg/m^3
Mustard (HD)	0.003 mg/m^3	4E-04 mg/m^3	2.7E-04 mg/m^3	2E-05 mg/m^3
Averaging Time:				
GB, VX	15 minutes	8 hours	12 hours	24 hours
HD	15 minutes	8 hours	12 hours	12 hours
Sample Time:	1-12 hours	1-12 hours	1-12 hours	12 hours
Hold Time:	72 hours	72 hours	72 hours	72 hours
Analysis Time:	0.2-1 hour	0.2-1 hour	0.2-1 hour	0.2-1 hour

[1] Derived using Haber's Law (N=1) for the time-weighted exposure formula $C^N t=K$,
Where: C = concentration
t = exposure time
K = constant

DAAMS Detection and Confirmation

For historical monitoring, the DAAMS initial analysis consists of gas chromatographic (GC) separation followed by detection with a flame photometric detector (FPD). Upon detection of chemical agent during initial analysis, one or more additional DAAMS tubes will be analyzed using dissimilar columns and/or different detectors to confirm or refute the presence of chemical agent. The presence of chemical agent will be confirmed or refuted by use of dissimilar column GC-FPD or GC-mass spectrometry (MS) in either chemical ionization or electron impact mode. These methods are summarized in the following table:

Historical Monitoring - Initial Detection	Confirmation or Refutation
GC-FPD	GC-MS (Chemical Ionization Mode), GC-MS (Electron Impact Mode), GC-FPD (Dissimilar Column)

The DAAMS chemical agent detection and confirmation process is addressed in Appendix C to this WAP.

REAL-TIME ANALYTICAL PLATFORM

General

The Real-Time Analytical Platform (RTAP) is a self-contained mobile platform that can be moved from site to site for sampling and analysis of potentially agent-contaminated air. The RTAP low-level monitor is designed to respond in less than 15 minutes with alarm capability. The RTAP is especially useful in on-site clearance of igloos and other suspect agent-contamination sites.

Theory of Operation

The RTAP combines a vehicle with a mounted HP 5890 Dynatherm gas chromatograph with an automatic continuous environmental monitoring system that collects compounds on a solid sorbent trap, thermally desorbs them into a capillary gas chromatography column, and detects the compounds with a simultaneous phosphorous/sulfur, dual-headed flame photometric detector.

Each RTAP contains an automated continuous sample collection device called a Dynatherm ACEM 900 that collects agents in air samples on a solid sorbent trap. The Dynatherm uses the following six-step cycle to collect and transfer a sample to the gas chromatograph (GC):

1. Sample collection on a DAAMS or other sorbent tube packed with Tenax (for HD, Hay-Sep (for GB or VX), or other similarly absorbent material;
2. The sorbent tube is dried to remove moisture;
3. To remove agent the sorbent tube is heated at 275^{o}C for two minutes;
4. After removal of the agent, the sorbent tube is cooled;
5. To move it to the GC, the focusing tube in which the sample is trapped is heated; and
6. The apparatus is returned to initial conditions in preparation for the next sample.

The Dynatherm uses three sorbent tubes in series. The first tube collects the air sample and releases the compounds during the third step of the cycle. This tube, the sorbent tube, is packed with Tenax (for HD) and Hay-Sep (for GB or VX) material. The sorbent tube is dried and heated to desorb and volatilize the agent. The collected material is then transferred to a focusing tube in a nitrogen carrier gas. The second tube may be used as a sample saver if operators need to save a portion of the sample for later analysis. The third tube, also called a preconcentrator tube or focusing trap, concentrates the sample before injecting it onto the GC. The focusing tube is also heated to transfer the collected sample to the GC. The collected agent transferred from the focusing tube is passed through an adapted HP 5890 GC fitted with a capillary column and phosphorous/sulfur dual-headed FPD.

Other analytical equipment may also be added to RTAPs, such as miniature continuous air monitors (MINICAM). The MINICAM is very similar to, but smaller than, the ACAMS. Both were developed by the same people. The MINICAM is an automatic air monitoring system that collects compounds on a solid sorbent trap, thermally desorbs them into a capillary gas-chromatography column for separation, and detects the compounds with a flame-photometric detector. It is a lightweight, portable, real-time, low-level monitor with alarm capability. A description of its operation may be found in the preceding ACAMS section.

Samples may be collected through one of three heated vapor sample transfer lines (HVSTL), each 80 feet long. Only one line may be used at a time. The line connects the igloo sampling line to the sample inlet of the Dynatherm or MINICAMs inside the RTAP. Vacuum is furnished by a vacuum pump in the RTAP to draw air from the sampling point to the collection system, but heat is also necessary to move the low-volatility agent. HVSTLs are constructed of Teflon, which minimizes sorption of organic substances to the walls of the line, and are hermetically sealed for outdoor use. The outer jacket of each HVSTL may reach temperatures of up to 110^{o}F. Sample line flow rates must be monitored with a calibrated flow meter because amounts detected are directly related to the flow rate. Only a total mass of agent is detected; the volume of air sampled is back calculated from the sampling flow rate and duration of sampling, so that the airborne concentration is estimated as a detected mass/volume of air collected. Each RTAP is equipped with an audible alarm that can sound within 15 minutes of sampling.

Sampling exhaust gases will be filtered at the exit port of the vacuum pump to prevent possible agent release.

RTAP Monitoring	
Monitoring Level	**Unmasked Workers**
GB	0.0001 mg/m^3
VX	0.00001 mg/m^3
Mustard (HD)	0.003 mg/m^3
Sample Time:	4-5 minutes
Analysis Time:	6-7 minutes

<u>RTAP Detection and Confirmation</u>

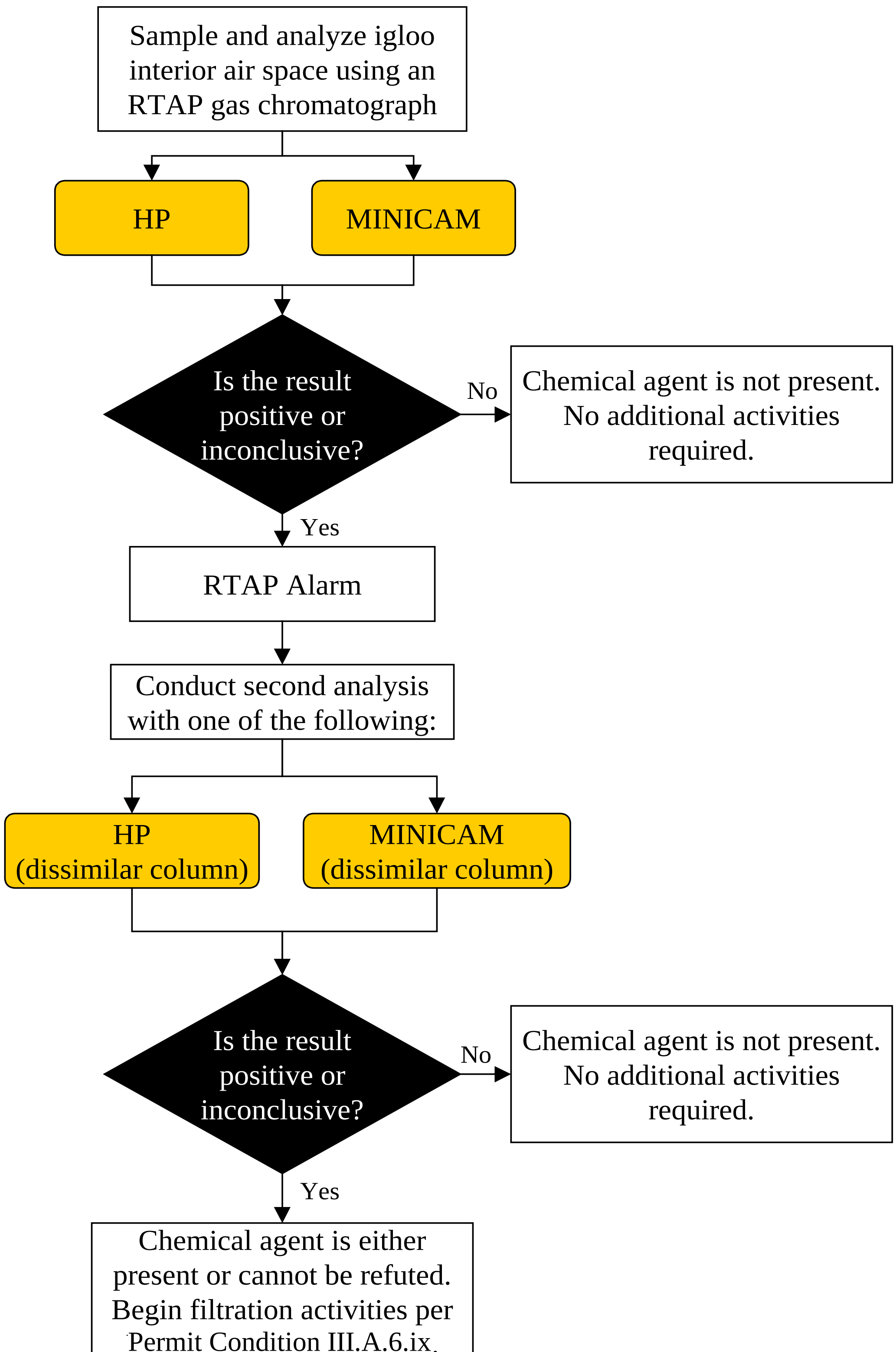
The RTAPs are equipped with two gas chromatographs: the Hewlett Packard (HP) 5890/6890 and the MINICAM. If agent is detected with one GC, then another GC (with a dissimilar column) is run to confirm or refute. If agent is detected by both, agent detection is confirmed.

Typically, a MINICAM, which has a dissimilar column from the HPs, is used to confirm or refute HP GC results. However, an HP GC may be used to confirm or refute a MINICAM or another HP GC provided they have dissimilar columns (see table below).

Equipment	Column		
	DB5	SP1701	DB1
HP 5890	3	3	
HP 6890		3	
MINICAM			3

Figure D-1 summarizes the RTAP chemical agent detection and confirmation process.

Figure D-1. RTAPs Chemical Agent Detection and Confirmation Process



Umatilla Chemical Agent Disposal Facility

ATTACHMENT 3

INSPECTION SCHEDULE

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INSPECTION TABLES:

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UMCDF INSPECTION SCHEDULE

1. GENERAL INSPECTION REQUIREMENTS [40 CFR 264.15, OAR 340-105-0140]

The Umatilla Chemical Agent Disposal Facility (UMCDF) will be inspected according to a prescribed inspection schedule designed to detect equipment deterioration and prevent possible equipment malfunctions that will cause a release of hazardous wastes to the environment or pose a threat to human health. Inspection logs and documents will be available as part of the UMCDF operating record, which is located in the UMCDF Document Control Center (DCC).

Inspection frequencies have been developed from operational knowledge gained at the UMCDF. Manufacturers' recommendations, Army standing operating procedures (SOP), Occupational Safety and Health Administration (OSHA) regulations, and specific regulated unit requirements must be adhered to by the UMCDF.

The UMCDF will have no landfill units, land treatment units, surface impoundments, or waste pile units. The UMCDF will not operate any distillation/fractionation, thin-film evaporation, or solvent extract units, and will not conduct air or steam stripping operations. The requirements for inspections of these units and activities are not applicable to the UMCDF and are not included in this inspection schedule.

1.1. INSPECTION FREQUENCIES AND METHODS [40 CFR §264.15(A), (B)]

The inspections for various systems/areas are provided in Tables 1 through 12 of this inspection schedule. The frequency of inspection is based on the rate of possible deterioration of equipment and the probability of an environmental or human health incident if the deterioration, malfunction, or operator error goes undetected between inspections. When applicable, alarms and/or waste feed cut-offs occurring during normal operations will count toward the inspection frequency of the applicable inspection item (i.e., sump level indicators and automatic waste feed cut-offs [AWFCO]). Except for those inspections that require a system to not be operating (i.e., some furnace inspections), all inspections will take place while the system is operating or in use. Also, prior to a system being brought back on-line, applicable inspections will be conducted (i.e., daily inspection of furnaces).

1.1.1. Inspection Frequencies

The frequency of inspection is how often (at a minimum) an inspection must be performed. For the purposes of this inspection schedule, the various inspection frequencies have been established with sufficient conservatism to be protective of human health and the environment. The inspection frequencies most frequently used in this plan are outlined below.

Inspection Frequencies	
Frequency	**Definition**
Daily	Once per calendar day
Weekly	Once per calendar week
Monthly	Once per calendar month
Bimonthly	Once every other calendar month
Quarterly	Once per calendar quarter
Semiannually	Once per 6-month calendar period
Annually	At least once during a 12-month period +/- 30 days

1.1.2. Inspection Methods

The method of inspection is how an inspection is to be performed. The three primary methods of inspection identified and required by this inspection schedule are described below.

Methods of Inspections	
Physical	An inspection conducted physically in person (e.g., maintenance). A physical inspection requires the physical presence of the inspector at the item of inspection and is not to be confused with a remote inspection. Due to accessibility limitation, physical inspections may be conducted with the aid of instruments (e.g., boroscope, mirrors).
Remote	An inspection conducted by any one or all of the following methods: closed-circuit television, process data acquisition and recording (PDAR) system, programmable logic controller (PLC), control panel, level probes, interstitial probes, advisor screen, or any other inspection that is not conducted physically in person. Although stated inspection frequencies may be "daily," "weekly," etc., many of the pieces of equipment that provide the information for these inspections feeds the information continuously to the PDAR, which creates an electronic record.
Functional	An inspection to determine if equipment/instrument is capable of performing or is operational.

1.1.3. Suspended Inspections

For situations when an entire system is inactive and there is no useful purpose in performing the inspection, the inspection will be suspended until the system is placed back into operation. The inspections identified in Tables 2.1, 3.1, 3.2, 3.3, 3.4 (except the stack and carbon filter system inspections), 4.1, 4.2, 4.3, 4.4, and 4.8 may be suspended if the system is not in operation. All suspended inspections will be documented on the log sheets described in Section 2. In addition, an initial inspection will be conducted when the system is brought back on-line and regularly scheduled inspections are resumed.

- In the case of suspended daily inspections, the initial (restart) inspection will satisfy the daily inspection requirement for that day.

- In the case of inspections that have been suspended prior to expiration of the next scheduled inspection, the inspection requirement will be satisfied by the conduct of the initial inspection performed when the system is brought back on-line.

When a hazardous waste management unit is no longer receiving and managing or treating wastes, the unit-specific inspections may be suspended. However, inspections necessary to maintain the integrity of and/or operate the building, secondary containment, and any other systems necessary to prevent a release to the environment must be continued.

1.2. CHANGES TO THE INSPECTION SCHEDULE

1.2.1. Temporary Inspection Modifications

The inspections listed in Table 1 through Table 12 will be adhered to. However, under extreme conditions, Table 1 through Table 11-inspection(s) may be temporarily reduced, condensed, or eliminated to prevent unnecessary risks to the inspector and/or facility workers, provided that the reduced inspection does not endanger facility safety and is protective of human health and the environment. In no case, will an inspection be changed to accommodate daily operation of the facility.

The Environmental Manager or delegate will decide changes in the inspection method and/or frequency on a case-by-case basis. If an inspection is reduced or eliminated, the inspection will be considered a priority on the Inspection Schedule and will be conducted as soon as the inspector can safely do so. The decision to temporarily reduce, condense, or eliminate an inspection will be documented and maintained in the operating record in accordance with Section 2.

The change in the Inspection Schedule will also be included in the quarterly noncompliance report.

1.2.2. Allowed Inspection Schedule Changes (Permit Modification not Required)

The following changes may be made to the Inspection Schedule without first obtaining a Permit modification:

- Upon DEQ receipt of the UMCDF's notice to start closure of an individual waste management unit, any portion of the Inspection Schedule specific to the operation of that unit may be deleted except for any inspections necessary to maintain the integrity of and/or operate the building, secondary containment, and any other systems necessary to prevent a release to the environment.
- Inspection parameters may be added to an existing inspection form, table, or figure in cases where such an addition will result in a more comprehensive inspection schedule.
- Additional inspection forms, tables, or figures may be created to address inspection parameters for equivalent or superior replacement equipment, which must be routinely inspected.

2. INSPECTION RECORDS [40 CFR §264.15(d)]

Inspection log sheets, including calibration logs, will be kept at the UMCDF. These will be the records of the items contained in the Inspection Schedule and will be kept as a hardcopy or an electronic copy. The inspection records will record at a minimum, the date and time of inspection, inspector's name, a notation of the observation made, date and nature of any repairs or other remedial actions, and, if appropriate, the reason for reduction/suspension of a regularly scheduled inspection. The records will be kept for a minimum of three years from the date of inspection.

3. REMEDIAL ACTION [40 CFR §264.15(c)]

If inspections show that nonemergency maintenance is needed, it will be completed as soon as possible to prevent further damage and to reduce the need for subsequent emergency response. If it is found during an inspection, including, but not limited to, unsatisfactory tank nondestructive test results, or between inspections that a hazardous situation is imminent or has already occurred, remedial action measures will be undertaken immediately.

A detailed description of remedial action measures and notification procedures for incidents resulting from an explosion, fire, or hazardous waste release is provided in the UMCDF Contingency Plan (Permit Attachment 9). Section 3 provides initial response actions, including notification; Section 5 provides emergency response procedures; and Section 6 provides postincident activities after implementation of the Contingency Plan.

4. TON CONTAINER PERMITTED STORAGE AREA INSPECTIONS

The Container Handling Building (CHB) and the Munitions Demilitarization Building (MDB) both include areas that are permitted for storage of ton containers and enhanced on-site containers (EONC), referred to in the Inspection Schedule as “containers.”

The containers in the permitted storage areas will be counted per the Inspection Schedule. The number of EONCs that may be stored in the CHB permitted storage areas is given in Permit Condition III.B.3. The number of ton containers that may be stored in the permitted storage areas is given in Permit Condition III.B.4.

Table 1 provides the inspection frequencies and methods that will be conducted in the permitted storage areas. Some physical inspections, as applicable, will be conducted during scheduled entries.

4.1. CHB PERMITTED EONC AND TON CONTAINER STORAGE AREAS

This section includes the EONCs, CHB lower level, and CHB Unpack Area.

The CHB permitted storage areas include the following:

- CHB Lower Level (CHB)
- CHB Upper Level (CHB UPA)

NOTE:	Ton containers will be stored in the permitted storage areas of the CHB only when contained within an EONC.

4.1.1. EONCs

Inspection of the EONCs includes leak testing and observing the condition and number of containers stored in the area. The inspections are as follows:

- A seal leak test will be performed on EONCs upon receipt from the Umatilla Chemical Depot (UMCD).
- The EONCs stored in the CHB will be monitored for chemical agent. If any of the EONCs are found to contain leaking munitions or bulk items, they will be processed on a priority basis and chemical agent monitoring of the area will be performed continuously while the suspect EONC is present.
- The EONCs will be inspected for leaks, secured closures, and deterioration.
- A count of EONCs stored in the area will be performed. The EONCs will be coded for tracking purposes.
- A nondestructive examination (NDE) including visual testing will be conducted on EONCs. The NDE will be used to determine the structural integrity and ability of the EONC to contain vapors.

4.1.2. CHB General Area and Load/Unload Areas

The inspections in the CHB include both the general area and the load/unload areas as follows:

- The floors in the CHB will be inspected. The inspection will be to determine structural integrity and for areas exhibiting excessive wear. The inspection will also be to determine if there are drips, spills, or leaks in the area.
- When the load/unload areas are in use, they will be inspected for leaks, spills, and fugitive emissions.

4.1.3. CHB UPA

The secondary containment system, containers, and the general areas of the CHB UPA will be inspected as follows:

- The secondary containment system, which consists of the sump, trenches, and flooring, will be inspected.
- All containers stored in the CHB UPA will be inspected for deterioration.
- The number of containers stored in the area will be counted to ensure maximum inventory is not exceeded.
- The general area of the CHB UPA will be inspected for structural integrity.
- The load/unload areas will be inspected for leaks, spills, and fugitive emissions.

4.2. MDB PERMITTED EONC AND TON CONTAINER STORAGE AREAS

Permitted ton container storage in the MDB will be in the following areas:

- Unpack Area (MDB UPA)
- Explosive Containment Vestibule (ECV)
- Upper Munitions Corridor (UMC)
- Munitions Processing Bay (MPB)
- Lower Buffer Storage Area (LBSA)
- Lower Munitions Corridor (LMC)
- Toxic Maintenance Area (TMA) “C” Airlock (TMA “C” Airlock)
- TMA “A/B” Decontamination Area (TMA Decon Area)

4.2.1. MDB UPA

The secondary containment system, containers, and the general areas of the MDB UPA will be inspected as follows:

- The secondary containment system, which consists of the sump system, will be inspected.
- All containers stored in the MDB UPA will be inspected for deterioration.
- The containers stored in the area will be counted.
- The general area of the MDB UPA will be inspected for structural integrity.
- When the load/unload area is in use, it will be inspected for leaks, spills, and fugitive emissions.

4.2.2. TMA “C” Airlock

The secondary containment system, containers, and the general areas of the TMA “C” Airlock will be inspected as follows:

- The secondary containment system, which consists of the sump system, will be inspected.
- All containers stored in the TMA “C” Airlock will be inspected for deterioration.
- The number of containers stored in the area will be counted.
- The general area of the TMA “C” Airlock will be inspected for structural integrity.
- The load/unload area will be inspected for leaks, spills, and fugitive emissions.

4.2.3. ECV, ECR, UMC, MPB, LBSA, LMC, and TMA Decon Area

Inspections in these areas will include primary containment, secondary containment, containers, and the general area. Except for the inspections that can be performed remotely from the Control Room—level switches and transmitters, interstitial probe, material in sump—weekly visual (physical) inspection of the sump components identified in Table1.6 will be performed.

The inspections are as follows:

- All containers stored in the above-listed areas will be inspected for deterioration.
- The containers stored in the area will be counted.
- The general area will be inspected. The inspection will cover the floors, walls, and ceilings.
- The designated primary containment within the permitted portions of the MDB will be inspected. Cameras and/or level indicator information can be utilized to fulfill this requirement to ensure the integrity of the primary containment is not compromised. Physical inspection of the sump systems will be performed during scheduled entries, until the initial decontamination for that area has been completed in accordance with the Closure Plan (Permit Attachment 8) .
- The interstitial probe for the secondary containment areas will be inspected. Before the start of closure activities, the interstitial probes will be checked for functionality. The metal sump liner will be inspected for signs of deterioration. If deterioration of the primary metal sump liner is identified, the UMCDF will conduct a functional check of the interstitial probe within five days of documentation of the deficiency. The probe will continue to be functionally inspected monthly until the liner is repaired (the remote inspections will also be continued).

5. DEMILITARIZATION (DEMIL) MACHINES

The only remaining demilitarization machines are the ton container processing equipment.

The inspection frequencies are based on manufacturers' recommendations, operational experience, and lessons learned from the UMCDF, JACADS, and TOCDF.

Maintenance and physical inspection activities will be conducted during scheduled Level A (DPE) entries. Inspections for correct operations will be done via the control room panel and remote closed-circuit television cameras. When possible, inspections will occur during processing (i.e., functional inspection).

For specific demil machine items to be inspected and inspection frequencies, refer to Table 2.

6. INCINERATOR INSPECTIONS

The incinerators permitted at the UMCDF include the Deactivation Furnace System (DFS)/DFS pollution abatement system (PAS), Liquid Incinerators (LIC1 & LIC2)/LIC PASs, and the Metal Parts Furnace (MPF)/MPF PAS.

For a detailed list of inspection items and frequencies refer to Table 3.

The incinerators, PASs, and associated equipment will be inspected for leaks, spills, fugitive emissions, and signs of tampering. Some of the incinerator inspections require DPE entries and/or shutdown of the furnace in order to be conducted physically. The UMCDF will conduct daily remote inspections of the incinerator hardware within the furnace rooms visible by CCTV, followed by weekly physical inspections. Thus, in addition to the physical inspections, which will be conducted at the stipulated frequencies during normal operations and maintenance entries, more-frequent remote inspections of the incinerators and associated equipment are conducted to prevent unnecessary entries.

Calibration and maintenance of incinerator process monitoring and recording equipment are addressed in Module VII of the *UMCDF Hazardous Waste Permit* as follows:

- LICs see Table 7-1a and 7-1b
- MPF see Table 7-3
- DFS see Table 7-5

The AWFCO system and associated alarms for each incinerator will be tested to verify operability. The AWFCO for the furnaces are designated in Modules VI and VII. The tables for the AWFCO are as follows:

- LICs see Tables 6-3 and 7-2
- MPF see Tables 6-7 and 7-4
- DFS see Tables 6-11 and 7-6

Positive verification that the AWFCO system and associated alarms are operable will be conducted using the PLC software.

The incinerators will be taken off-line in order to perform a detailed inspection/maintenance operation.

The mercury monitoring system is used to verify sulfur-impregnated carbon (SIC) bed life during HD operations. Table 3 lists the inspection items and frequencies. Calibration and maintenance of the mercury monitoring system is performed in accordance with the requirements of Permit Attachment 7 and Permit Attachment 11.

7. MISCELLANEOUS TREATMENT UNITS

7.1. BRINE REDUCTION AREA (BRA)

This section includes the brine feed pumps, BRA evaporator packages, BRA drum dryers, BRA PAS, BRA transfer line, and the associated secondary containment systems. For additional inspection items and frequencies, refer to Table 4. BRA surge tank inspection requirements are discussed in Section 8, Permitted Hazardous Waste Tank Systems, and in Table 4 of this attachment.

The frequency of inspections for the BRA and all associated equipment is based on operational knowledge and lessons learned from the UMCDF, JACADS, and TOCDF and on manufacturers' recommendations. Inspections will include:

- All the overfill/spill control equipment will be checked for evidence of corrosion, erosion, and leaking seams or fixtures. The tanks level switches and transmitters will also be inspected for proper operation.
- The secondary-containment system, general area, and sump system of the BRA drum dryers and evaporator packages will be inspected.
- The brine salt loading area will be inspected for leaks, spills, and fugitive emissions.

The AWFCO system and associated alarms for the appropriate components of the BRA will be tested to verify operability. The AWFCOs for the BRA are designated in Table 5-5 of Module V.

Positive verification that the AWFCO system and associated alarms are operable will be conducted using the PLC software.

7.2. DEPRESSURIZATION GLOVE BOX

This section includes the depressurization glove box, associated secondary containment system, and associated exhaust filter system. The glove box and its associated systems will be inspected in accordance with the inspections and frequencies listed in Table 4. The inspection frequencies for the glove box and secondary containment are based on operational experience from the UMCDF and Deseret Chemical Depot (DCD). For the exhaust filters, the inspection frequency and type of inspection is based on the manufacturer's recommendations and UMCDF operational experience with similar units (i.e., the MDB HVAC units). Inspections will be conducted for integrity; evidence of drips, spills, or leaks; proper operation; and equipment malfunctions or plugging. The filter units will be inspected for proper operation and integrity.

Maintenance and physical inspection activities do not require Level A (DPE) entries. Daily physical inspections are performed when the unit is in use.

8. PERMITTED HAZARDOUS WASTE TANK SYSTEMS

The permitted hazardous waste tank systems include the agent collection system (ACS) tanks, spent decontamination system (SDS) tanks (including the spill tanks), the HD rinsate feed collection system (RCS), and BRA surge tanks. For ACS, RCS, and SDS tank system inspection activities and frequencies refer to Table 5. Inspection requirements for the BRA surge tanks are described in Table 4.

Each tank system will be thoroughly inspected. The inspection will address the tanks overfill and spill-control equipment, data gathered from monitoring and leak-detection equipment, construction materials, the area immediately surrounding the externally accessible portion of the tank, as well as the secondary containment system.

Since none of the tanks to be permitted will be underground tanks or underground portions of the aboveground tanks, the regulatory requirements for inspection of the cathodic protection system are not applicable**.**

Due to safety concerns and the unnecessary risks that may be encountered during vessel entry for internal inspection, a variance from any requirements [40 CFR §264.193(i)(2)] to empty the agent holding tank, agent surge tank, and spent decontamination holding tanks to allow entry and inspection of the interior to detect corrosion or erosion of the tank sides and bottom has been granted to the permittees. The DEQ-approved nondestructive test (NDT) method for the structural integrity inspection of the permitted hazardous waste tanks is ultrasonic wall thickness testing. Personnel performing the inspection will be knowledgeable and experienced in relevant inspection methodologies and will be qualified and certified in accordance with project requirements and to applicable industry standards. The results of the NDT inspections will be documented in a report, maintained in the UMCDF operating record, and submitted to the Department within 60 calendar days of the performance of the assessment.

8.1. BRA SURGE TANKS

The BRA surge tank inspections will be performed in accordance with Table 4.5. The annual tank condition inspections require vessel entry for internal inspection. Inspectors visually inspect the walls and floor of the tanks for damage (signs of erosion, corrosion, holes, cracks, and leaks). If the coating is determined to be intact by visual examination and dry film thickness measurements, no additional NDT is performed. If the coating has failed, ultrasonic wall thickness testing will be performed utilizing NDT methods on the exposed tank surfaces.

8.2. ACS TANKS, SPILL TANKS, SDS, AND RCS TANKS

The ACS holding tank, spill tank, SDS, and RCS holding tank inspections will be performed in accordance with Tables 5.1, 5.2,and 5.3 respectively. Visual and NDT inspections for signs of erosion, corrosion, cracks, leaks, and wall thinning to less-than-sufficient shell strength of the ACS, spill, SDS, and RCS tanks will be performed from the exterior of the tanks.

The ACS holding tanks, spill tanks, SDS, and RCS holding tanks and associated sump systems are in toxic (chemical agent-contaminated) areas of the MDB. Therefore, except for the inspections that can be performed remotely—level switches and transmitters and the portions of the tank area visible via closed-circuit television—weekly visual (physical) inspections of the tank and secondary containment components to identify corrosion, erosion, and leaks will be performed.

9. 90-DAY HAZARDOUS WASTE STORAGE

For specific inspection items and frequencies for the 90-day hazardous waste storage tanks and areas, refer to Table 6.

9.1. 90-DAY STORAGE TANKS

The inspection will include the tanks overfill/spill-control equipment, corrosion of tank, releases of waste, data gathered from monitoring equipment, the construction materials, and the area immediately surrounding the externally accessible portion of the tank system including secondary containment.

9.2. 90-DAY CONTAINER STORAGE AREAS

Inspections of these areas will include the hazardous waste containers, secondary containment, and emergency-response spill kits.

10. PERMITTED SECONDARY WASTE STORAGE UNITS

10.1. J-BLOCK

J-Block igloos will be used to store secondary waste. The visible portion of the neoprene seals used to seal the igloo openings and the containers and spill pallets within the J-Block igloos being used for secondary-waste storage will be inspected. For specific inspections and frequencies, refer to Table 7.

10.2. TMA “A/B” DECON AREA, TMA “A” AREA, TMA “C” AREA

Inspections in these areas will include the following:

- Inspect container and its cover and closure devices to check for visible cracks, holes, gaps, or other container defects. Visually inspect permitted secondary waste storage area for leaking containers and container corrosion or deterioration.
- Ensure that secondary containment for liquid waste containers (consisting of the coated concrete floor) is not cracked or otherwise deteriorated.

11. MDB AND LABORATORY VENTILATION

The accessible, external components of the MDB and laboratory general ventilation systems will be inspected for physical integrity. The MDB carbon filter system will be continuously monitored for chemical agent breakthrough in accordance with Table 2-2 and Permit Attachment 2 (Waste Analysis Plan), and the carbon will be replaced in accordance with criteria presented in Condition II.O of the Permit (Module II). The laboratory carbon filter system will also be continuously monitored for chemical agent breakthrough in accordance with Table 2-3 and Permit Attachment 2 (Waste Analysis Plan) and the carbon will be replaced in accordance with criteria presented in Condition II.O of the Permit (Module II).

Pressure gauges and airflow will be checked to ensure proper operating range.

The MDB and laboratory HVAC secondary containment vestibules will be monitored for chemical agent breakthrough in accordance with Tables 2-2 and 2-3 and Permit Attachment 2 (Waste Analysis Plan) and inspected for physical integrity. The high-efficiency gas absorber (HEGA) filters will be replaced per Table 8.

For specific inspections and frequencies for the ventilation systems, refer to Table 8.

12. CHEMICAL AGENT MONITORS

Chemical agent monitors include the Automatic Continuous Air Monitoring System (ACAMS), the Depot Area Air Monitoring System (DAAMS), and Real-Time Analytical Platforms (RTAPs). The ACAMS, DAAMS, and RTAPs will be checked for proper operation.

For detailed inspections and frequency of inspections for the chemical agent monitors, refer to Table 9.

13. SUPPORT SYSTEMS

The support systems at the UMCDF include the uninterruptible power supply (UPS), emergency generators, communication system, security, fire protection system, and transportation vehicles. For specific inspections and frequencies refer to Table 10.

13.1. UPS

The UPS will be checked for proper voltage, current, and frequency.

13.2. EMERGENCY GENERATOR

The emergency generator and the standby emergency generator specific to the MDB HVAC filter units will be inspected for mechanical integrity and operability.

A loss of off-site power will be simulated to verify the functional ability of the emergency generator.

13.3. COMMUNICATION

The control room alarm panels will be checked for the integrity of the audible/visual alarms.

The emergency radios, Control Room emergency telephone, and the public-address system will be checked for proper operation of audibility.

13.4. PERIMETER SECURITY

The perimeter fences and warning signs will be inspected for appearance and signs of tampering.

13.5. FIRE PROTECTION SYSTEM

The fire protection system will be checked for signs of deterioration, proper operation, and/or leaks.

13.6. TRANSPORTATION VEHICLES

The hazardous waste transportation vehicle(s) and emergency vehicle will be inspected for proper operability. The hazardous waste transportation vehicle(s) will be inspected when in use.

14. SAFETY AND EMERGENCY EQUIPMENT

This section includes inspections of protective clothing, the butyl rubber storage area, emergency decontamination stations (EDS), HAZMAT truck, and decontamination trailer. The inspections of safety and emergency equipment will detect items with excessive wear and depleted stock. For specific inspection items refer to Table 11.

14.1. PROTECTIVE CLOTHING

Protective clothing includes Level A (Demilitarization Protective Ensembles [DPE]), butyl gear, outergarments, life support system (LSS) air, and self-contained breathing apparatus (SCBA). Inspections include the following:

- The Level A (DPE) and outer garments will be checked for sufficient inventory.
- The LSS air system will be checked to ensure operability.
- A user function test on SCBAs will be performed prior to donning. Per manufacturer's recommendation, a monthly inspection will also be performed.

14.2. BUTYL RUBBER GEAR STORAGE AREA

The butyl rubber gear storage areas will be checked to ensure sufficient inventory is maintained, and the expiration dates on butyl rubber gear will be checked.

14.3. EMERGENCY DECONTAMINATION STATION (EDS)

The EDSs will be located throughout the MDB. Locations will vary depending on chemical activity. At a minimum an EDS will be located in the following areas:

- TMA "C" Area
- Lower Observation Corridor
- Upper Observation Corridor

When the EDS is opened to verify the inventory, a new seal will be placed on the container.

14.4. HAZMAT TRUCK AND DECONTAMINATION TRAILER

The HAZMAT truck and decontamination trailer will be inspected to ensure sufficient inventory of emergency response equipment.

14.5. ADDITIONAL EMERGENCY EQUIPMENT

Chemical antidote kits and stretchers will be inspected to ensure they are in the proper locations and in good condition. The chemical antidote kits inspected are those that are stationed throughout the UMCDF. Personally issued chemical antidote kits are not covered by this Inspection Schedule.

15. ORGANIC AIR EMISSION STANDARDS INSPECTION REQUIREMENTS

Organic air emission standards for tank and container hazardous waste storage are found in 40 CFR 264 Subpart CC; process equipment leaks are governed by 40 CFR 264 Subpart BB. UMCDF activities to maintain compliance with 40 CFR 264 Subparts BB and CC are described in Permit Modules II and IX. Refer to Tables 1, 5, 6, and 7 of this attachment for applicable tank system and container inspection details. Refer to Table 12 for inspection details on equipment subject to 40 CFR 264 Subpart BB.

TABLE 1. MUNITIONS/BULK CONTAINERS PERMITTED STORAGE AREA INSPECTIONS

ITEM 40 CFR 264.15(b)(1)	TYPES OF PROBLEMS/INSPECTIONS 40 CFR 264.15(b)(3)	FREQUENCY[1] 40 CFR 264.15(b)(4)	METHOD[2]
1.1. MDB OUTSIDE BUILDING			
Outside Perimeter	Inspect the outside of containment building and check that there are no signs of leakage.	Weekly	Physical
1.2. CHB			
Load/Unload Areas	Inspect for leaks, spills, and fugitive emissions.	Daily	Physical
EONCs/Overpacks	Leaks, closures are secured, deterioration, rust, corrosion		
	Number of containers in storage and duration		
	Monitor for chemical agent.	Within 24 hours of receipt	ACAMS
		Every 7 days while in storage	
	Seal leak test	Upon receipt	Functional
	Container labels	Weekly	Physical
EONCs	Structural Integrity	Annually	Nondestructive Examination
General Area in CHB	Examine floors for drips, spills, or leaks.	Weekly	Physical
Bridge Crane System	Deterioration of hoist, excessive wear. Inspect lift area for leaks from EONCs/overpacks.		
Monorail Hoist System			
Lift System (Elevators)	Deterioration or excessive wear. Inspect for drips, spills, and leaks.		
Pneumatic Roller Track Conveyor			
1.3. CHB UPA			
Secondary Containment	Inspect flooring for cracks, flaking, chips, or areas with excessive wear. Check the sump system for corrosion, erosion, leaking seams or fixtures, and deterioration of coating.	Daily	Physical
	Check the sump pump glands and connections for evidence of leakage.		
	Inspect level switches for proper operability. To meet the inspection requirements for the functional test, liquid may be added to the sump.	Upon installation, and annually	Functional
	Inspect coated metal sump for signs of deterioration.	Annually whichever is more frequent	Physical
Load/Unload Areas	Inspect for leaks, spills, and fugitive emissions.	Daily	
Containers[3]	Count number of containers stored.		
	Inspect for deterioration and check labels.	Weekly	
General Area	Inspect roof and walls with regard to structural integrity. Examine floors for drips, spills, or leaks.		
Bridge Crane System	Deterioration of hoist, excessive wear. Inspect lift area for leaks from EONCs/overpacks.		
Lift System (Elevator, scissor lift)	Deterioration or excessive wear. Inspect for drips, spills, and leaks.		
Pneumatic Roller Track Conveyor			
1.4. MDB UPA			
Secondary Containment	Check the sump system for corrosion, erosion, leaking seams or fixtures, and deterioration of coating.	Daily	Physical
	Check the sump pump glands and connections for evidence of leakage.		
	Inspect level switches for proper operability. To meet the inspection requirements for the functional test, liquid may be added to the sump.	Upon installation and annually	Functional
	Inspect coated metal sump for signs of deterioration.	Annually	Physical
Load/Unload Area	Inspect for leaks, spills, and fugitive emissions.	Daily	
Containers[3]	Count number of containers stored in area.		
	Inspect for deterioration	Weekly	
General Area	Inspect roof and walls with regard to structural integrity. Examine floors for drips, spills, or leaks.		
Conveyor Systems	Clean and inspect chain guard, fittings, bearing houses, seals, and check for proper alignment.	Monthly	
Airlock Gates	Clean and inspect chain guard, chain sprockets, sprocket teeth and chain, and for alignment between sprockets.	Quarterly	

TABLE 1. MUNITIONS/BULK CONTAINERS PERMITTED STORAGE AREA INSPECTIONS			
ITEM 40 CFR 264.15(b)(1)	**TYPES OF PROBLEMS/INSPECTIONS 40 CFR 264.15(b)(3)**	**FREQUENCY[1] 40 CFR 264.15(b)(4)**	**METHOD[2]**
1.5. TMA "C" AIRLOCK			
Load/Unload Area	Inspect for leaks, spills, and fugitive emissions.	Daily	Physical
Secondary Containment	Check the sump system for corrosion, erosion, leaking seams or fixtures, and deterioration of coating.	Daily	Physical
	Check the sump pump glands and connections for evidence of leakage.	Daily	Physical
	Inspect level switches for proper operability. To meet the inspection requirements for the functional test, liquid may be added to the sump.	Annually	Functional
	Inspect coated metal sump for signs of deterioration.	Annually	Physical
General Area	Inspect floor and curbing for cracks, flaking, chips, gouges, and areas with excessive wear. Inspect roof and walls with regard to structural integrity. Examine floors for drips, spills, or leaks.	Weekly	Physical
1.6. ECV, ECR, UMC, MPB, LBSA, LMC, and TMA Decon Area			
Sump System			
• Sump Structure • Trench Structure • Piping and Valves	Corrosion, erosion, leaking seams or fixtures, and deterioration of coating.	Weekly[4]	Physical
• Level Switches and Transmitters	Inspect level switches for proper operability. To meet the inspection requirements for the functional test, liquid may be added to the sump.	Annually	Functional
	Check for proper operation.	Daily	Remote
• Interstitial Probes	Check to see if interstitial probe is in alarm.	Daily	Remote
	Check for proper operation.	Before the start of closure activities	Functional
	Check for proper operations if deterioration of the primary metal sump liner is identified.	Within 5 days of documentation of metal sump liner deficiency and monthly thereafter until the liner is repaired	Functional
• Sump Conditions	Inspect metal sump liner for signs of deterioration.	Annually	Physical
• Material in Sump	Review that no sump accumulated liquid for longer than 24 hours.	Daily	Remote
Containers[3]	Count number of containers stored in area.	Weekly	Physical
	Deterioration of containers.	Weekly	Physical
General Area[4]	Inspect floor and curbing for cracks, flaking, chips, gouges, and areas with excessive wear. Inspect roof and walls with regard to structural integrity. Examine floors for drips, spills, or leaks.	Weekly	Physical

Notes:

[1] **Inspection Frequencies**

Daily	Once per calendar day
Weekly	Once per calendar week
Monthly	Once per calendar month
Bimonthly	Once every other calendar month
Quarterly	Once per calendar quarter
Semiannually	Once per 6-month calendar period
Annually	At least once during a 12-month period +/- 30 days

[2] **Inspection Methods**

Functional	An inspection to determine if equipment/instrument is capable of performing or is operational.
Remote	An inspection conducted by any one or all of the following methods: closed-circuit television, process data acquisition and recording (PDAR) system, programmable logic controller (PLC), control panel, level probes, interstitial probes, advisor screen, or any other inspection that is not conducted physically in person. Although stated inspection frequencies may be "daily," "weekly," etc., many of the pieces of equipment that provide the information for these inspections feeds the information continuously to the PDAR, which creates an electronic record.
Physical	An inspection conducted physically in person (e.g., maintenance). A physical inspection requires the physical presence of the inspector at the item of inspection and is not to be confused with a remote inspection.

[3] **Containers**: Includes chemical munitions, EONCs/overpacks, and bulk containers only. Hazardous waste container inspections are addressed in Table 6.2.

[4] Physical inspections of these items in the ECR, MPB, and LBSA will be conducted if scheduled entries are made. Level A (DPE) entries may not be scheduled for the sole purpose of conducting an inspection. The inspections will be conducted at the specified frequency, at a minimum; but if conditions warrant that they be performed remotely, the temporary inspection modification (Section 1.2.1) will be documented in accordance with Section 2.

TABLE 2. DEMIL MACHINES INSPECTIONS[3]

ITEM 40 CFR 264.15(b)(1)	TYPES OF PROBLEMS/INSPECTIONS 40 CFR 264.15(b)(3)	FREQUENCY[1] 40 CFR 264.15(b)(4)	METHOD[2]
2.1. TON CONTAINER PROCESSING SYSTEM			
Computerized Automatic Control System Interlocks	Access diagnostic screens and verify system integrity.	Daily	Remote
Monorail w/Lifting Device	Inspect bearings and electrical connections.	Monthly	Physical
	Perform functional test for correct operations.	Daily	Functional
Bulk Drain Stations	Test for correct operation of agent drain tube system (including spring tips, encoders, and sensors).		
Conveyor Systems	Test lift cylinders and load cell/weighing system for correct operation. Test lift cylinders for drift and hydraulic pressure leaks.		
Lift Station	Test for correct operations.		
	Inspect for deterioration or excessive wear, drips, spills, and leaks.	Weekly	Physical
Conveyor Systems	Inspect lift cylinders for damage, excessive wear, hydraulic leaks		
Bulk Drain Stations	Inspect punch for chipping or damage, replace if necessary; inspect agent drain tube for bending or damage or plugging, replace if necessary; inspect bolts, clamps, nuts, and screws for looseness, tighten as necessary; inspect all sensor mountings to assure mounting brackets are secure, adjust and tighten as necessary. Check for hydraulic leaks.		
	Inspect load cells, summing board, and weight-indicator box for excessive wear, and correct operation.	Quarterly	
	Check gear reducer unit for leaks and oil condition, replace or refill as necessary; check for excessive vibration or unusual noises during operation, repair as necessary.	Semiannually	
Conveyor Systems	Remove and clean chain guard; clean around grease fittings and vent fittings as necessary; inspect chain for adequate lubrication; clean bearing housings; inspect seals for integrity and excessive lubricant leakage. Reinstall chain guard and inspect for proper alignment. Inspect lift cylinders and other equipment associated with the weighing system for cleanliness, adequate lubrication, and excessive leakage.		
Heel Transfer System	Inspect high-pressure spray wand and rinsate drain tube for bending, damage, or plugging and correct operation. Inspect rinsate pumps and associated equipment for evidence of excessive wear, corrosion, or leakage; check for excessive noise or vibration; inspect for adequate lubrication; inspect seals, and test for proper operation. Inspect expansion joint for damage, excessive wear, corrosion, or leakage.	Weekly	Physical
High-Pressure Hot Water System	Inspect high pressure hot water spray skid, heaters, purge valve, and pump for evidence of excessive wear, corrosion, or leakage, check for excessive noise and vibration, and check for proper operation.	Daily	

Notes:

[1] **Inspection Frequencies**

Daily	Once per calendar day
Weekly	Once per calendar week
Monthly	Once per calendar month
Bimonthly	Once every other calendar month
Quarterly	Once per calendar quarter
Semiannually	Once per 6-month calendar period
Annually	At least once during a 12-month period +/- 30 days

[2] **Inspection Methods**

Functional	An inspection to determine if equipment/instrument is capable of performing or is operational.
Remote	An inspection conducted by any one or all of the following methods: closed-circuit television, process data acquisition and recording (PDAR) system, programmable logic controller (PLC), control panel, level probes, interstitial probes, advisor screen, or any other inspection that is not conducted physically in person. Although stated inspection frequencies may be “daily,” “weekly,” etc., many of the pieces of equipment that provide the information for these inspections feeds the information continuously to the PDAR, which creates an electronic record.
Physical	An inspection conducted physically in person (e.g., maintenance). A physical inspection requires the physical presence of the inspector at the item of inspection and is not to be confused with a remote inspection.

[3] Inspections will take place during the respective munition campaign. Inspections will occur during processing, when possible.

TABLE 3. INCINERATOR INSPECTIONS[3]

ITEM 40 CFR 264.15(b)(1)	TYPES OF PROBLEMS/INSPECTIONS 40 CFR 264.15(b)(3)	FREQUENCY[1] 40 CFR 264.15(b)(4)	METHOD[2]
3.1. DEACTIVATION FURNACE SYSTEM			
Combustion System (Exterior)	Inspect for leaks, spills, fugitive emissions, and signs of tampering.	Daily	Physical
Flame Safeguard Ultraviolet Sensors	Check for proper output at local control panel	Daily	Remote
High-Temperature Safety Shutdown and Temperature Controls	Observe temperature readouts while in operation.	Daily	Remote
Heated Discharge Conveyor	Inspect general area for leaks, structural damage, and signs of wear.	Daily	Remote
		Weekly[4]	Physical
	Inspect accessible areas for loss of lubrication, check for vibration, inspect bearings for overheating, inspect conveyor belt for physical integrity and alignment, and inspect shafts and gears for signs of binding.	Quarterly	Physical
Incinerator Hardware within Furnace Rooms	Inspect for leaks, spills, fugitive emissions, and signs of tampering.	Daily	Remote
		Weekly	Physical
Ash Collection Containers (HDC bin, cyclone drum)	Inspect for leaks, spills, fugitive emissions, and containers out of place	Daily when storing hazardous waste	Physical
Load/Unload Area	Inspect for leaks, spills, and fugitive emissions.	Daily when storing hazardous waste	Physical
Combustion Air Blowers[4]	Inspect for lubrication, overheating, and vibration	Weekly	Physical
Rotary Retort Drive[4]	Inspect for lubrication, overheating, vibration, and bindings.	Weekly	Physical
Automatic Waste Feed Cut-Off Mechanism (AWFCO)	Test control circuits and document waste feed cut-off.	Weekly	Remote
Blast Gates[4]	Inspect gate gasket and closure surfaces; inspect gate latch assembly for proper operation; inspect gate opening and closing mechanism for proper operation; clean closure surfaces, as necessary, to hold a tight seal; and repair and replace components showing signs of corrosion and wear.	Weekly	Physical
Isolation Dampers	Check for operability via the PLC.	Weekly	Remote
Overall Incinerator	Detailed inspection/maintenance.	Annually	Physical
3.2. LIQUID INCINERATOR 1 & 2			
Combustion System (Exterior)	Inspect for leaks, spills, fugitive emissions, and signs of tampering.	Daily	Physical
Flame Safeguard Ultraviolet Sensors	Check for proper output at local control panel	Daily	Remote
High Temperature Safety Shutdown and Temperature Controls	Observe temperature readouts while in operation.	Daily	Remote
Secondary Chamber SDS Atomizing Nozzle	Observe pressure of atomizing air and pressure of SDS. Check that low-pressure switches show closed contacts.	Daily	Remote
Primary Chamber Burner Block Atomizing Nozzle	Observe pressure of atomizing air and pressure of liquid chemical agent. Check that low-pressure switches show closed contacts.	Daily	Remote
Incinerator Hardware within Furnace Rooms	Inspect for leaks, spills, fugitive emissions, and signs of tampering.	Daily	Remote
		Weekly	Physical
AWFCO Mechanism	Test control circuits and document waste feed cut-off.	Weekly	Remote
			Physical
Combustion Air Blowers[4]	Lubrication, overheating, and vibration	Weekly	Remote
			Physical
Overall Incinerator	Detailed inspection/maintenance.	Annually	Physical

TABLE 3. INCINERATOR INSPECTIONS[3]

ITEM 40 CFR 264.15(b)(1)	TYPES OF PROBLEMS/INSPECTIONS 40 CFR 264.15(b)(3)		FREQUENCY[1] 40 CFR 264.15(b)(4)	METHOD[2]
3.3. METAL PARTS FURNACE				
Combustion System (Exterior)	Inspect for leaks, spills, fugitive emissions, and signs of tampering.		Daily	Physical
Burnout Chamber	Inspect for leaks, spills, fugitive emissions, and signs of tampering.		Daily	Remote
Flame Safeguard Ultraviolet Sensors	Check for proper output at local control panel		Daily	Remote
High Temperature Safety Shutdown and Temperature Controls	Observe temperature readouts while in operation.		Daily	Remote
Incinerator Hardware within Furnace Rooms	Inspect for leaks, spills, fugitive emissions, and signs of tampering.		Daily	Remote
			Weekly	Physical
AWFCO Mechanism	Test control circuits and document waste feed cut-off.		Weekly	Remote
				Physical
Combustion Air Blowers[4]	Lubrication, overheating, and vibration		Weekly	Remote
				Physical
Overall Incinerator	Detailed inspection/maintenance.		Annually	Physical
3.4. PASs FOR LIC #1&2, MPF, and DFS				
Exhaust Blowers	Lubrication, overheating, and vibration		Daily	Physical
Venturi Plug Valve	Check to assure that valve operates freely			Remote
Stack[5]	Observe opacity			Physical
Thermocouple on Gas Stream Entering Venturi Scrubber	Check for proper operation			
Pressure Drop Across Venturi Scrubber	Check for calibration of differential pressure devices			
Scrubber Tower	Inspect shell for corrosion.		Weekly	
Quench Tower				
Mist Eliminator Vessel				
Carbon Filter System[5]:				
• Pressure Gauges	Check for pressure drop.		Daily	Physical
• Air Flow	Check that monitor is reading in appropriate range.			
• Instrumentation	Check for calibration of pressure and airflow instrumentation.		Weekly	
• General System	Inspect for evidence of corrosion, malfunctions, leaks, or excessive wear.			
• Damper	Check elastomeric seals and bearings for excessive wear.		Annually	
• Carbon Filters	Perform leak testing.		Upon change out of carbon	
• Mercury Monitoring System (VEN-MERC-001)	Calibration	VEN-MERC-001A/B	Daily	
		VEN-MERC-001C	Daily and/or before each use	
	System Leak/Flow Check	VEN-MERC-001C	Daily and/or before and after each sorbent trap sampling interval	
		VEN-MERC-001D		
	Performance Audit	VEN-MERC-001A/B/C/D	Quarterly	
Overall PAS	Inspect for leaks, spills, fugitive emissions, and signs of tampering		Daily	
	Detailed inspection/maintenance		Annually	

Notes:

[1] **Inspection Frequencies**

Daily	Once per calendar day
Weekly	Once per calendar week
Monthly	Once per calendar month
Bimonthly	Once every other calendar month
Quarterly	Once per calendar quarter
Semiannually	Once per 6-month calendar period
Annually	At least once during a 12-month period +/- 30 days

[2] **Inspection Methods**

Functional	An inspection to determine if equipment/instrument is capable of performing or is operational.
Remote	An inspection conducted by any one or all of the following methods: closed-circuit television, process data acquisition and recording (PDAR) system, programmable logic controller (PLC), control panel, level probes, interstitial probes, advisor screen, or any other inspection that is not conducted physically in person. Although stated inspection frequencies may be "daily," "weekly," etc., many of the pieces of equipment that provide the information for these inspections feeds the information continuously to the PDAR, which creates an electronic record.
Physical	An inspection conducted physically in person (e.g., maintenance). A physical inspection requires the physical presence of the inspector at the item of inspection and is not to be confused with a remote inspection.

[3] Some of the incinerator inspections require DPE entries and/or shutdown of the furnace in order to be conducted physically. Thus, in addition to the physical inspections, which will be conducted at the stipulated frequencies during normal operations and maintenance entries, more-frequent remote inspections of the incinerators and associated equipment are conducted to prevent unnecessary DPE entries.

[4] Physical inspections of these items will be conducted if scheduled entries are made. Level A (DPE) entries may not be scheduled for the sole purpose of conducting an inspection. The inspections will be conducted at the specified frequency, at a minimum; but if conditions warrant that they be performed remotely, the temporary inspection modification (Section 1.2.1) will be documented in accordance with Section 2.

[5] These inspections may not be suspended in accordance with Section 1.1.3.

TABLE 4. MISCELLANEOUS TREATMENT UNIT INSPECTIONS

ITEM 40 CFR 264.15(b)(1)	TYPES OF PROBLEMS/INSPECTIONS 40 CFR 264.15(b)(3)	FREQUENCY[1] 40 CFR 264.15(b)(4)	METHOD[2]
4.1. BRINE FEED PUMPS			
Brine Feed Pumps	Inspect glands and connections for evidence of leakage. If on-line pump is operating, check for excessive noise and vibration. Check oil level.	Daily	Physical
BRA Strainers	Inspect differential pressure gauge to see if differential pressure is greater than manufacturer's recommended value.		
4.2. BRA EVAPORATOR PACKAGES			
Overfill/Spill Control Equipment	Inspect for evidence of corrosion, leakage, or other physical damage.	Daily	Physical
Level Switches and Transmitters	Check for proper operation.		Remote
Evaporator/Heat Exchanger Structure	Inspect for corrosion, erosion, and leaking of seams or fixtures.		Physical
Evaporator/Heat Exchanger	Inspect for corrosion, erosion, and leaking of seams or fixtures.		
Piping and Valves	Inspect for evidence of corrosion and leakage.		
Circulation Pumps and Desuperheater Pumps	Inspect glands and connections for evidence of leakage; if pump is operating, check for excessive noise and vibration.		
Skid Supports	Inspect for visible signs of deterioration.		
AWFCO Mechanism	Test control circuits and document waste feed cut-off.	Weekly	Remote
Evaporator/Exchanger Condition	Structural integrity.	Annually	Nondestructive testing
4.3. BRA DRUM DRYERS			
Overfill/Spill Control Equipment	Inspect for evidence of corrosion, leakage, or other physical damage.	Daily	Physical
Level Switches and Transmitters	Check for proper operation.		Remote
Drum Dryer Housing	Inspect for evidence of corrosion, leakage, or other physical damage.		Physical
Drum Dryer Area	Inspect for evidence of corrosion and leakage on floor.		
Piping and Valves	Inspect for evidence of corrosion and leakage.		
Drum Dryer Conditions	Inspect for corrosion, cracks, wear, or other damage.		
Drum Dryer Drip Oil Feeders	Check operation, oil level, drip rate, and cleanliness; check that all lines are receiving oil.		
Drum Dryer Knife Blades	Inspect for appearance of a heel and any other abnormalities.	Daily prior to start up	
Endscrapers	Check that endscrapers are keeping drum ends clean.	Daily	
Endboards	Check condition, damage.		
Augers	Check auger sleeve and blades for signs of wear and brine salt buildup.		
Drum Dryer Catch Pans	Inspect for accumulated liquids and condition of pans.	Daily and always as part of shutdown	
AWFCO Mechanism	Test control circuits and document waste feed cut-off.	Weekly	Remote

TABLE 4. MISCELLANEOUS TREATMENT UNIT INSPECTIONS

ITEM 40 CFR 264.15(b)(1)	TYPES OF PROBLEMS/INSPECTIONS 40 CFR 264.15(b)(3)	FREQUENCY[1] 40 CFR 264.15(b)(4)	METHOD[2]
4.4. BRA PAS			
Exhaust Blower	Inspect lubrication, vibration, and for overheating.	Daily	Physical
Stack	Observe opacity	Daily	Physical
Stack	Test ACAM and document waste feed cut-off	Weekly	Remote
Dryer Knockout Box	Inspect manway cover, knife gate, and flashing for salt residue buildup. Inspect discharge container for proper labeling. Inspect transfer hose for cracks or tears. Inspect outside of container and area around container for salt residue.	Daily	Physical
Ductwork that Connects Evaporators and Drum Dryers to the Baghouses[3]	Inspect for presence of liquid or salt buildup. Inspect for obstructions or dust buildup per pounds of salt processed for GB: 150,000 lbs., HD: 300,000 lbs., and VX: 250,000 lbs.	Per pounds of salt processed or semiannually, whichever is more frequent	Physical
Ductwork[3]			
Baghouses:			
• Baghouse Bags	Check the Delta P across bags for indications of system deterioration	Weekly	Remote
• AWFCO Mechanism	Test control circuits and document waste feed cut-off.	Weekly	Remote
• Thermocouple on Gas Stream to Baghouse	Check for proper operation.	Weekly	Physical
• Pressure Drop Across Baghouse	Verify pressure reading and check calibration of differential pressure devices.	Daily during operation	Physical
• Pulse Timer	Proper operation	Daily	Physical
• Cleaning Air Pressure	Check that pressure is 80-85 pounds per square inch for Ryton bags.	Daily	Physical
• Rotary Valve	Inspect for dust discharge in normal fashion	Daily	Physical
• Rotary Valve Motor	Check for visible signs of wear, broken parts, and leakage.	Daily	Physical
• Clean Air Plenum (top of baghouse)	Inspect for signs of dust or moisture.	Daily	Physical
• Baghouse Pad Sump (BRA-SUMP-105)	Presence of liquid.	Daily	Physical
• Ductwork[3]	Inspect for obstructions or dust buildup per pounds of salt processed for GB: 150,000 lbs., HD: 300,000 lbs., and VX: 250,000 lbs.	Per pounds of salt processed or semiannually, whichever is more frequent	Physical
• Baghouse Flange Joints	Inspect for leaks.	Annually	Physical
• Structural Steel Connections	Inspect for tightness of bolts.	Annually	Physical
• Mechanical Equipment	Inspect for rust or corrosion.	Annually	Physical
• Support Steel			
• Baghouse			
4.5. BRA SURGE TANKS			
Overfill/Spill Control Equipment	Inspect for evidence of corrosion, erosion, or leaking seams or fixtures.	Daily	Physical
Tank Structure	Inspect for evidence of corrosion, erosion, or leaking seams or fixtures.	Daily	Physical
Tank Area	Inspect for evidence of leakage on floor of diked area.	Daily	Physical
Piping and Valves	Inspect for corrosion and leakage.	Daily	Physical
Tanker Unload Transfer Pump	Inspect glands and connections for evidence of leakage; if pump is operating check for excessive noise and vibration.	Daily	Physical
Tank Supports	Inspect for corrosion.	Daily	Physical
Level Switches and Transmitters	Check for proper operation.	Daily	Remote
Tank Conditions	Structural integrity.	Annually	Nondestructive Testing

TABLE 4. MISCELLANEOUS TREATMENT UNIT INSPECTIONS

ITEM 40 CFR 264.15(b)(1)	TYPES OF PROBLEMS/INSPECTIONS 40 CFR 264.15(b)(3)	FREQUENCY[1] 40 CFR 264.15(b)(4)	METHOD[2]
4.6. BRINE TRANSFER LINE			
Piping and Associated Equipment Pipe Supports Pipe Area	Inspect for evidence of corrosion, leakage, or other physical damage.	Daily	Physical
4.7. BRA SURGE TANKS, DRUM DRYERS, AND EVAPORATOR PACKAGES SECONDARY CONTAINMENT SYSTEM			
General Area	Inspect floor and curbing for structural integrity (cracks, flaking, chips, gouges) and areas with excessive wear. Examine floors for drips, spills, or leaks.	Daily	Physical
Sump System:			
• Sump Structure • Piping and Valves	Corrosion, erosion, leaking seams or fixtures, and deterioration of coating.	Daily	Physical
• Sump Pump	Inspect glands and connections for evidence of leakage; if pump is operating, check for excessive noise and vibration.	Daily	Physical
• Level Switches and Transmitters	Check for proper operation.	Daily	Remote
	Inspect level switches for proper operability. To meet the inspection requirements for the functional test, liquid may be added to the sump.	Annually	Functional
• Sump Conditions	Inspect coated metal sump for signs of deterioration.	Annually	Physical
4.8. BRA SALT LOADING AREA			
Load/Unload Area	Inspect for leaks, spills, and fugitive emissions.	Daily	Physical
4.9. PROCESS AND UTILITY BUILDING (PUB)			
Fans	Check for salt buildup.	Weekly	Physical
PUB Roof	Check for salt residue or buildup	Weekly	Physical
4.10. DEPRESSURIZATION GLOVE BOX			
Decontamination Strainer (on bottom of glove box)	Inspect decontamination strainer for evidence of plugging.	Daily (when in use)	Physical
Rubber Gloves	Inspect gloves for integrity.	Daily (when in use)	Physical
General Area	Inspect glove box exterior and equipment for integrity and evidence of corrosion. Inspect exterior floor for drips, spills, and leaks to detect any releases of waste. Inspect work platform and glove area for integrity. Inspect airlock for condition and proper operation. Inspect inlet filter unit for filter housing integrity and proper operation.	Daily (when in use)	Physical
SDS Return Pump	Inspect connections for evidence of leakage. If pump is operating, check for excessive noise and vibration.	Daily (when in use)	Physical
Drain Pan	Inspect for presence of standing liquid and evidence of corrosion.	Daily (when in use)	Physical
Airlock	Inspect for presence of standing liquid.	Daily (when in use)	Physical
Roof Panel	Inspect integrity of roof panel gasket (joint between the roof panel and glove box) and roof panel clamps for evidence of deterioration.	Weekly	Physical
Glove Ports and Windows	Inspect gasket integrity.	Weekly	Physical
Pressure Relief Device	Inspect for physical integrity.	Weekly	Physical
Service Connections	Inspect connections for plant air, decontamination solution, process water, and nitrogen gas for physical integrity and leaks.	Weekly	Physical
Overall Glove Box System (glove box, roof panel, and roof panel clamps)	Inspect the glove box, roof panel, and roof panel clamps to check for visible cracks, holes, gaps, or other open spaces into the interior of the container when the roof panel (cover) and roof panel clamps (closure devices) are secured in the closed position for evidence of deterioration.	Annually	Physical

TABLE 4. MISCELLANEOUS TREATMENT UNIT INSPECTIONS

ITEM 40 CFR 264.15(b)(1)	TYPES OF PROBLEMS/INSPECTIONS 40 CFR 264.15(b)(3)	FREQUENCY[1] 40 CFR 264.15(b)(4)	METHOD[2]
4.11. DEPRESSURIZATION GLOVE BOX EXHAUST FILTER UNITS			
Filter system	Monitor filter system continuously for breakthrough.	Daily	Remote
Exhaust filter units	Check for physical integrity and leaks. Inspect blower for vibration and for overheating. Inspect curbed area for standing liquid.	Daily	Physical
Stack	Check for visible emissions.	Daily	Physical
Pressure Gauges	Check for pressure drop.	Daily	Physical
Air Flow	Check that monitor is reading within appropriate range.	Daily	Physical
General System	Inspect for evidence of corrosion, malfunctions, leaks, spills, or excessive wear and signs of tampering.	Weekly	Physical
Carbon filters	Perform leak testing.	After carbon changeout	Physical
Exterior Ductwork	Check for physical integrity.	Monthly	Physical
Overall System	Perform detailed inspection/maintenance. Inspect internal components for evidence of corrosion, and excessive wear. Inspect blowers for loss of lubrication and bearing overheating. Inspect curbed area for integrity.	Annually	Physical

Notes:

[1] **Inspection Frequencies**

Daily	Once per calendar day
Weekly	Once per calendar week
Monthly	Once per calendar month
Bimonthly	Once every other calendar month
Quarterly	Once per calendar quarter
Semiannually	Once per 6-month calendar period
Annually	At least once during a 12-month period +/- 30 days

[2] **Inspection Methods**

Functional	An inspection to determine if equipment/instrument is capable of performing or is operational.
Remote	An inspection conducted by any one or all of the following methods: closed-circuit television, process data acquisition and recording (PDAR) system, programmable logic controller (PLC), control panel, level probes, interstitial probes, advisor screen, or any other inspection that is not conducted physically in person. Although stated inspection frequencies may be "daily," "weekly," etc., many of the pieces of equipment that provide the information for these inspections feeds the information continuously to the PDAR, which creates an electronic record.
Physical	An inspection conducted physically in person (e.g., maintenance). A physical inspection requires the physical presence of the inspector at the item of inspection and is not to be confused with a remote inspection.

[3] Due to accessibility limitations, physical inspections may be conducted with the aid of instruments (e.g., boroscope, mirrors).

TABLE 5. PERMITTED HAZARDOUS WASTE TANK SYSTEMS INSPECTIONS

ITEM 40 CFR 264.15(b)(1)	TYPES OF PROBLEMS/INSPECTIONS 40 CFR 264.15(b)(3)	FREQUENCY[1] 40 CFR 264.15(b)(4)	METHOD[2]
5.1. AGENT HOLDING TANKS AND THE SECONDARY CONTAINMENT SYSTEMS			
General Area	Inspect floor and curbing for cracks, flaking, chips, gouges, and areas with excessive wear. Inspect roof and walls with regard to structural integrity. Examine floors for drips, spills, or leaks.	Weekly[3]	Physical
Tank Overfill/Spill Control Equipment	Inspect for evidence of corrosion, erosion, or leaking seams or fixtures.		
Tank Level Switches and Transmitters	Check for proper operation.	Daily	Remote
Tank Area	Inspect for evidence of leakage on floor of diked area.		
Tank Structure	Inspect for evidence of corrosion, erosion, or leaking seams or fixtures.	Weekly[3]	Physical
Piping and Valves	Inspect for corrosion and leakage.		
Pump	Inspect seals and connections for evidence of leakage.		
	If pump is operating, check for excessive noise and vibration.		
Tank Supports	Inspect for corrosion.		
Tank Conditions	Structural integrity.	Annually	Nondestructive testing
Sump System:			
• Sump Structure	Inspect for evidence of corrosion, erosion, leaking seams or fixtures, or deterioration of coating.	Weekly[3]	Physical
• Piping and Valves			
• Level Switches and Transmitters	Check for proper operation at control panel	Daily	Remote
	Inspect level switches for proper operability. To meet the inspection requirements for the functional test, liquid may be added to the sump.	Annually	Functional
• Sump Conditions	Inspect metal liner for signs of deterioration.	Annually	Physical
• Sump Pump	Visually inspect glands and connections for evidence of leakage. With pump operating, check for excessive noise and vibration.	Weekly[3]	
5.2. SPENT DECONTAMINATION SYSTEM, SPILL TANK SYSTEM, AND SECONDARY CONTAINMENT SYSTEM			
General Area	Inspect floor and curbing for cracks, flaking, chips, gouges, or areas that indicate excessive wear or deterioration of protective coating. Also, examine floor and sump area for drips, spills, or leaks.	Weekly	Physical
Tank Overfill/Spill Control Equipment	Inspect for evidence of corrosion, erosion, or leaking seams or fixtures.		
Tank Level Switches and Transmitters	Check for proper operation.	Daily	Remote
Tank Area	Inspect for evidence of leakage on floor of diked area.		
Tank Structure	Inspect for evidence of corrosion, erosion, or leaking seams or fixtures.	Weekly	Physical
Piping and Valves	Inspect for corrosion and leakage.		
Pump	Inspect seals and connections for evidence of leakage.		
	If pump is operating check for excessive noise and vibration.		
Tank Supports	Inspect for corrosion.		
Tank Conditions	Structural integrity.	Annually	Nondestructive Testing
Sump System:			
• Sump Structure	Inspect for evidence of corrosion, erosion, leaking seams or fixtures, or deterioration of coating.	Weekly	Physical
• Piping and Valves			
• Level Switches and Transmitters	Check for proper operation at control panel	Daily	Remote
	Inspect level switches for proper operability. To meet the inspection requirements for the functional test, liquid may be added to the sump.	Annually	Functional
• Sump Conditions	Inspect metal liner for signs of deterioration.	Annually	Physical
• Sump Pump	Visually inspect glands and connections for evidence of leakage. With pump operating, check for excessive noise and vibration.	Weekly	
5.3. HD RINSATE FEED COLLECTION SYSTEM			
General Area	Inspect floor and curbing for cracks, flaking, chips, gouges, or areas that indicate excessive wear or deterioration of protective coating. Also, examine floor and sump area for drips, spills, or leaks.	Weekly	Physical
Tank Overfill/Spill Control Equipment	Inspect for evidence of corrosion, erosion, or leaking seams or fixtures.		

TABLE 5. PERMITTED HAZARDOUS WASTE TANK SYSTEMS INSPECTIONS

<table>
<tr><th>ITEM
40 CFR 264.15(b)(1)</th><th>TYPES OF PROBLEMS/INSPECTIONS
40 CFR 264.15(b)(3)</th><th>FREQUENCY[1]
40 CFR 264.15(b)(4)</th><th>METHOD[2]</th></tr>
<tr><td>Tank Level Switches and Transmitters</td><td>Check for proper operation.</td><td rowspan="2">Daily</td><td rowspan="2">Remote</td></tr>
<tr><td>Tank Area</td><td>Inspect for evidence of leakage on floor of diked area.</td></tr>
<tr><td>Tank Structure</td><td>Inspect for evidence of corrosion, erosion, or leaking seams or fixtures.</td><td rowspan="5">Weekly</td><td rowspan="5">Physical</td></tr>
<tr><td>Piping and Valves</td><td>Inspect for corrosion and leakage.</td></tr>
<tr><td rowspan="2">Pump</td><td>Inspect seals and connections for evidence of leakage.</td></tr>
<tr><td>If pump is operating check for excessive noise and vibration.</td></tr>
<tr><td>Tank Supports</td><td>Inspect for corrosion</td></tr>
<tr><td>Tank Conditions</td><td>Structural integrity.</td><td>Annually</td><td>Nondestructive Testing</td></tr>
<tr><td colspan="4">Sump System:</td></tr>
<tr><td>• Sump Structure</td><td rowspan="2">Inspect for evidence of corrosion, erosion, leaking seams or fixtures, or deterioration of coating.</td><td rowspan="2">Weekly</td><td rowspan="2">Physical</td></tr>
<tr><td>• Piping and Valves</td></tr>
<tr><td rowspan="2">• Level Switches and Transmitters</td><td>Check for proper operation at control panel</td><td>Daily</td><td>Remote</td></tr>
<tr><td>Inspect level switches for proper operability. To meet the inspection requirements for the functional test, liquid may be added to the sump.</td><td>Annually</td><td>Functional</td></tr>
<tr><td>• Sump Conditions</td><td>Inspect metal liner for signs of deterioration.</td><td>Annually</td><td rowspan="2">Physical</td></tr>
<tr><td>• Sump Pump</td><td>Visually inspect glands and connections for evidence of leakage. With pump operating, check for excessive noise and vibration.</td><td>Weekly</td></tr>
</table>

Notes:

[1] **Inspection Frequencies**

Daily	Once per calendar day
Weekly	Once per calendar week
Monthly	Once per calendar month
Bimonthly	Once every other calendar month
Quarterly	Once per calendar quarter
Semiannually	Once per 6-month calendar period
Annually	At least once during a 12-month period +/- 30 days

[2] **Inspection Methods**

Functional	An inspection to determine if equipment/instrument is capable of performing or is operational.
Remote	An inspection conducted by any one or all of the following methods: closed-circuit television, process data acquisition and recording (PDAR) system, programmable logic controller (PLC), control panel, level probes, interstitial probes, advisor screen, or any other inspection that is not conducted physically in person. Although stated inspection frequencies may be "daily," "weekly," etc., many of the pieces of equipment that provide the information for these inspections feeds the information continuously to the PDAR, which creates an electronic record.
Physical	An inspection conducted physically in person (e.g., maintenance). A physical inspection requires the physical presence of the inspector at the item of inspection and is not to be confused with a remote inspection.

[3] Physical inspections of these items will be conducted if scheduled entries are made. Level A (DPE) entries may not be scheduled for the sole purpose of conducting an inspection. The inspections will be conducted at the specified frequency, at a minimum; but if conditions warrant that they be performed remotely, the temporary inspection modification (Section 1.2.1) will be documented in accordance with Section 2.

TABLE 6. 90-DAY HAZARDOUS WASTE STORAGE INSPECTIONS

ITEM 40 CFR 264.15(b)(1)	TYPES OF PROBLEMS/INSPECTIONS 40 CFR 264.15(b)(3)	FREQUENCY[1] 40 CFR 264.15(b)(4)	METHOD[2]
6.1. 90-DAY STORAGE TANKS			
Level Switches and Transmitters	Check for proper operation.	Daily	Remote
Overfill/Spill Control Equipment	Inspect for evidence of corrosion, erosion, or leaking seams or fixtures.	Daily	Visual from open hatch
Tank Structure	Inspect for evidence of corrosion, erosion, or leaking seams or fixtures.	Daily	Visual from open hatch
Tank Area	Inspect for evidence of leakage on floor of diked area.	Daily	Visual from open hatch
Piping and Valves	Inspect for corrosion and leakage.	Daily	Visual from open hatch
Pump	Inspect glands and connections for evidence of leakage; with pump operating check for excessive noise and vibration.	Daily	Visual from open hatch
Tank Supports	Inspect for corrosion.	Daily	Visual from open hatch
Overfill/Spill Control Equipment	Inspect for evidence of corrosion, erosion, or leaking seams or fixtures.	Monthly	Physical
Tank Structure	Inspect for evidence of corrosion, erosion, or leaking seams or fixtures.	Monthly	Physical
Tank Area	Inspect for evidence of leakage on floor of diked area.	Monthly	Physical
Piping and Valves	Inspect for corrosion and leakage.	Monthly	Physical
Pump	Inspect glands and connections for evidence of leakage; if pump is operating check for excessive noise and vibration.	Monthly	Physical
Tank Supports	Inspect for corrosion.	Monthly	Physical
Tank Conditions	Structural integrity.	Annually	Nondestructive testing
6.2. 90-DAY CONTAINER STORAGE AREAS			
Hazardous Waste Containers	Inspect for leaks, corrosion, and deterioration. Count the number of containers and check the inventory list for accuracy and ensure it is up to date. Check for proper labeling and duration containers have been in storage for 90-day areas.	Weekly	Physical
General Area	Inspect floors for drips, spills, and leaks. Inspect roof and walls for integrity.	Weekly	Physical
Spill Pallets	If present, inspect pallets for deterioration.	Weekly	Physical
Emergency Response	Check for spill kit, fire extinguisher (except in the A, A/B, B areas of the MDB), Point of Contact identification, appropriate signs.	Weekly	Physical

Notes:

[1] **Inspection Frequencies**

Daily	Once per calendar day
Weekly	Once per calendar week
Monthly	Once per calendar month
Bimonthly	Once every other calendar month
Quarterly	Once per calendar quarter
Semiannually	Once per 6-month calendar period
Annually	At least once during a 12-month period +/- 30 days

[2] **Inspection Methods**

Functional	An inspection to determine if equipment/instrument is capable of performing or is operational.
Remote	An inspection conducted by any one or all of the following methods: closed-circuit television, process data acquisition and recording (PDAR) system, programmable logic controller (PLC), control panel, level probes, interstitial probes, advisor screen, or any other inspection that is not conducted physically in person. Although stated inspection frequencies may be “daily,” “weekly,” etc., many of the pieces of equipment that provide the information for these inspections feeds the information continuously to the PDAR, which creates an electronic record.
Physical	An inspection conducted physically in person (e.g., maintenance). A physical inspection requires the physical presence of the inspector at the item of inspection and is not to be confused with a remote inspection.

TABLE 7. PERMITTED SECONDARY WASTE STORAGE UNITS

ITEM 40 CFR 264.15(b)(1)	TYPES OF PROBLEMS/INSPECTIONS 40 CFR 264.15(b)(3)	FREQUENCY[1] 40 CFR 264.15(b)(4)	METHOD[2]
7.1. SECONDARY WASTE J-BLOCK STORAGE IGLOOS			
Igloos Containing Secondary Hazardous Waste	Inspect container and its cover and closure devices to check for visible cracks, holes, gaps, or other open spaces into the interior of the container. Inspect igloos for leaking containers and container corrosion or deterioration.	Weekly	Physical
Spill Pallets	Inspect spill pallets to ensure they are not cracked or otherwise deteriorated.		
Neoprene Gasket Seals	Inspect visible portions of gaskets for obvious signs of deterioration such as tears, punctures, blisters, cracks, etc.	Quarterly	
7.2. TMA "A/B" Decon Area, TMA "A" Area, TMA "C" Area			
Permitted Secondary Waste Storage Areas	Inspect container and its cover and closure devices to check for visible cracks, holes, gaps, or other open spaces into the interior of the container. Visually inspect permitted secondary waste storage areas for leaking containers and container corrosion or deterioration. Inspect coated concrete floor for cracks or other deterioration.	Weekly	Physical

Notes:

[1] **Inspection Frequencies**

Daily	Once per calendar day
Weekly	Once per calendar week
Monthly	Once per calendar month
Bimonthly	Once every other calendar month
Quarterly	Once per calendar quarter
Semiannually	Once per 6-month calendar period
Annually	At least once during a 12-month period +/- 30 days

[2] **Inspection Methods**

Functional	An inspection to determine if equipment/instrument is capable of performing or is operational.
Remote	An inspection conducted by any one or all of the following methods: closed-circuit television, process data acquisition and recording (PDAR) system, programmable logic controller (PLC), control panel, level probes, interstitial probes, advisor screen, or any other inspection that is not conducted physically in person. Although stated inspection frequencies may be "daily," "weekly," etc., many of the pieces of equipment that provide the information for these inspections feeds the information continuously to the PDAR, which creates an electronic record.
Physical	An inspection conducted physically in person (e.g., maintenance). A physical inspection requires the physical presence of the inspector at the item of inspection and is not to be confused with a remote inspection.

TABLE 8. MDB AND LABORATORY VENTILATION INSPECTIONS

ITEM 40 CFR 264.15(b)(1)	TYPES OF PROBLEMS/INSPECTIONS 40 CFR 264.15(b)(3)	FREQUENCY[1] 40 CFR 264.15(b)(4)	METHOD[2]
Exhaust Filter Units (Exterior)	Check for physical integrity and leaks around filter unit doors	Weekly	Physical
Ductwork (Exterior)	Check for physical integrity	Monthly	
Pressure Gauges	Check for pressure drop.	Daily	Remote
Air Flow	Check that monitor is reading appropriate range.		
Filter Vestibules	Inspect for physical integrity.	Weekly	Physical
	Inspect for separation of liner panel joints, flashing joints, sealant bead from the substrate, and verify door seal and door sweep integrity.	Quarterly	
	Replace HEGA filters	After confirmation of agent ≥ 0.2 VSL in the vestibules and prior to being returned to service	
Internal Mechanical	Inspect for evidence of corrosion, excessive wear, loss of lubrication, and bearing overheating.	Annually	

TABLE 9. CHEMICAL AGENT MONITORS INSPECTIONS

ITEM 40 CFR 264.15(b)(1)	TYPES OF PROBLEMS/INSPECTIONS 40 CFR 264.15(b)(3)	FREQUENCY[1] 40 CFR 264.15(b)(4)	METHOD[2]
9.1. ACAMS			
Chemical Agent Monitor	Agent challenge. Check diagnostic indicators on front panel and ancillary ACAMS equipment (sample line and chart recorder).	Daily	Physical
9.2. DAAMS			
Chemical Agent Monitor	Check DAAMS tubes and inspect ancillary DAAMS equipment (sample line and sequencer) for proper operability.	Daily	Physical
9.3. RTAPs			
UMCDF Chemical Agent Monitor	Agent challenge. Check diagnostic indicators on front panel and ancillary ACAMS/MINICAMS equipment (sample line and chart recorder).	Prior to use	Physical

Notes:

[1] **Inspection Frequencies**

Daily	Once per calendar day
Weekly	Once per calendar week
Monthly	Once per calendar month
Bimonthly	Once every other calendar month
Quarterly	Once per calendar quarter
Semiannually	Once per 6-month calendar period
Annually	At least once during a 12-month period +/- 30 days

[2] **Inspection Methods**

Functional	An inspection to determine if equipment/instrument is capable of performing or is operational.
Remote	An inspection conducted by any one or all of the following methods: closed-circuit television, process data acquisition and recording (PDAR) system, programmable logic controller (PLC), control panel, level probes, interstitial probes, advisor screen, or any other inspection that is not conducted physically in person. Although stated inspection frequencies may be “daily,” “weekly,” etc., many of the pieces of equipment that provide the information for these inspections feeds the information continuously to the PDAR, which creates an electronic record.
Physical	An inspection conducted physically in person (e.g., maintenance). A physical inspection requires the physical presence of the inspector at the item of inspection and is not to be confused with a remote inspection.

TABLE 10. SUPPORT SYSTEMS INSPECTIONS

ITEM 40 CFR 264.15(b)(1)	TYPES OF PROBLEMS/INSPECTIONS 40 CFR 264.15(b)(3)	FREQUENCY[1] 40 CFR 264.15(b)(4)	METHOD[2]
10.1. UPS			
Input Voltage Input Current Battery Voltage Output Voltage Output Frequency	Check meter for proper voltage, current, and frequency.	Weekly	Physical
10.2. EMERGENCY GENERATOR			
Emergency Generator	Inspect for loose drive belts, oil leaks, coolant leaks, lube oil level, mechanical integrity, and crankcase containment.	Monthly	Physical
Emergency Generator	Start up using remote control from the Control Room. Verify voltage, frequency output, engine lube oil pressure, engine coolant level, fuel level, and air filter differential pressure. Shut down using remote control from the Control Room.	Bimonthly	Functional
Emergency Generator	Simulation of loss of off-site power	Annually	Functional
MDB HVAC Filters Standby Emergency Generator	Inspect for loose drive belts, oil leaks, coolant leaks, lube oil level, mechanical integrity, and crankcase containment.	Monthly	Physical
MDB HVAC Filters Standby Emergency Generator	Start up and shut down. Verify voltage, frequency output, engine lube oil pressure, engine coolant level, fuel level, and air filter differential pressure.	Bimonthly	Functional
10.3. COMMUNICATION			
Control Room Alarm Panels	Check integrity of audible/visual alarm.	Daily	Functional
Radio (Security) Control Room Emergency Telephone Public-Address System	Check proper operation of audibility.	Weekly	Functional
Closed-Circuit Television Cameras	Check for proper operation, i.e., visual clarity, and tilt/pan/zoom function.	Weekly	Functional
10.4. PERIMETER SECURITY			
Fences Warning Signs	Check for appearance and signs of tampering.	Daily	Physical
10.5. FIRE PROTECTION SYSTEM			
Alarms Fire Detectors	Check for signs of deterioration, proper operability and/or leaks.	Daily	Remote
Extinguishers Dry Chemical Fire Protection System in Toxic Cubicle	Check for signs of deterioration, proper operability and/or leaks.	Monthly	Physical
Fire Extinguishing Medium for Control Room	Check for signs of deterioration, proper operability and/or leaks.	Semiannually	Physical
UMCDF Site Fire Pump	Check for signs of deterioration, proper operability and/or leaks.	Weekly	Physical
UMCDF Site Fire Pump	Check for signs of deterioration, proper operability and/or leaks.	3 times/year	Functional
UMCDF Site Fire Pump/system	Check for signs of deterioration, proper operability and/or leaks.	Annually	Functional
Sprinkler System	Check for signs of deterioration, proper operability and/or leaks.	Annually	Physical
10.6. TRANSPORTATION VEHICLES			
Hazardous Waste Transport Vehicles	Check fluid levels, operability, and signs of needed maintenance.	Weekly	Physical
Emergency Vehicle	Parked at proper location, operability, and gas tank more than one-half full.	Weekly	Physical

Notes:

[1] **Inspection Frequencies**

Daily	Once per calendar day
Weekly	Once per calendar week
Monthly	Once per calendar month
Bimonthly	Once every other calendar month
Quarterly	Once per calendar quarter
Semiannually	Once per 6-month calendar period
Annually	At least once during a 12-month period +/- 30 days

[2] **Inspection Methods**

Functional	An inspection to determine if equipment/instrument is capable of performing or is operational.
Remote	An inspection conducted by any one or all of the following methods: closed-circuit television, process data acquisition and recording (PDAR) system, programmable logic controller (PLC), control panel, level probes, interstitial probes, advisor screen, or any other inspection that is not conducted physically in person. Although stated inspection frequencies may be "daily," "weekly," etc., many of the pieces of equipment that provide the information for these inspections feeds the information continuously to the PDAR, which creates an electronic record.
Physical	An inspection conducted physically in person (e.g., maintenance). A physical inspection requires the physical presence of the inspector at the item of inspection and is not to be confused with a remote inspection.

TABLE 11. SAFETY AND EMERGENCY EQUIPMENT INSPECTIONS

ITEM 40 CFR 264.15(b)(1)	TYPES OF PROBLEMS/INSPECTIONS 40 CFR 264.15(b)(3)	FREQUENCY[1] 40 CFR 264.15(b)(4)	METHOD[2]
Level A (DPE) Suits	Check for sufficient quantity for entries, and ensure emergency air bottles stored in the DSA are filled.	Daily	Physical
LSS Air	Ensure the LSS air system is operational.	Prior to use	Remote
SCBA	Perform user function test		Functional
	Perform inspection per manufacturer recommendation.	Monthly	Physical
Butyl Rubber Gear Storage Area	Check for sufficient inventory, expiration date, and excessive wear.	After use or annually, whichever is more frequent	Physical
Emergency Decontamination Stations	Check storage container for sufficient content inventory, check expiration and condition of chemical antidote kits, and place a new seal on the container.		Physical
HAZMAT Truck	Check that the truck is parked at proper location, operability, and its gas tank more than one-half full.	Weekly	Physical
	Check for sufficient content inventory.	After use or annually, whichever is more frequent	
Decontamination Trailer	Check for sufficient content inventory.		Physical

Notes:

[1] **Inspection Frequencies**

Daily	Once per calendar day
Weekly	Once per calendar week
Monthly	Once per calendar month
Bimonthly	Once every other calendar month
Quarterly	Once per calendar quarter
Semiannually	Once per 6-month calendar period
Annually	At least once during a 12-month period +/- 30 days

[2] **Inspection Methods**

Functional	An inspection to determine if equipment/instrument is capable of performing or is operational.
Remote	An inspection conducted by any one or all of the following methods: closed-circuit television, process data acquisition and recording (PDAR) system, programmable logic controller (PLC), control panel, level probes, interstitial probes, advisor screen, or any other inspection that is not conducted physically in person. Although stated inspection frequencies may be "daily," "weekly," etc., many of the pieces of equipment that provide the information for these inspections feeds the information continuously to the PDAR, which creates an electronic record.
Physical	An inspection conducted physically in person (e.g., maintenance). A physical inspection requires the physical presence of the inspector at the item of inspection and is not to be confused with a remote inspection.

TABLE 12. EQUIPMENT REGULATED UNDER 40 CFR PART 264 SUBPART BB

Hazardous Waste Management Unit (P&ID Number)	Location at the UMCDF	Type of Equipment	Equipment Identification Number[b]	Method of Compliance[a]
Originally transferred liquid chemical agent from ACS-TANK-103 to agent holding tanks. Line now isolated and does not contain or contact agent. (UM-01-D-503)	Explosive Containment Room A (03-211) in the MDB	Ball valve	V-8	ACAMS
		Closed spec blind	SP-256	
	Munitions Corridor in the MDB	Control valve	XV-43	
Originally transferred liquid chemical agent from ACS-TANK-104 to agent holding tanks. Line now isolated and does not contain or contact agent. (UM-01-D-502)	Explosive Containment Room B (03-0212)	Ball valve	V-18	ACAMS
		Closed spec blind	SP-256	
	Munitions Corridor	Control valve	XV-46	
Transfers liquid chemical agent from the Bulk Drain Station 101 to the agent holding tank (UM-01-D-514)	Munitions Processing Bay	Check valve	V-24	ACAMS
		Ball valves (7)	V-21, V-22, V-23, V-73, PDIT-67-941, PDIT-67-942, PIT-39-911	
		Control valves (4)	FV-20, XV-496, XV-401, XV-402	
		Hose connection assembly (2)	SP-130(2)	
		Flexible hose assembly (4)	SP-159(2), SP-238, SP-159A, SP-159B	
		Pump	ACS-PUMP-115	
		Open spec blind	SP-256	
Transfers liquid chemical agent from the Bulk Drain Station 102 to the agent holding tank (UM-01-D-515)	Munitions Processing Bay	Check valves	V-44	ACAMS
		Control valves (4)	FV-120, XV-396, XV-301, XV-302	
		Hose connection assembly (2)	SP-130(2)	
		Flexible hose assembly (5)	SP-159(2), SP-159A, SP-159B, SP-238	
		Ball valves (7)	V-41, V-42, V-43, V-115, PIT-58-911, PIT-66-941, PIT-66-942	
		Open spec blind	SP-256	
		Pump	ACS-PUMP-114	
Agent Collection System from multipurpose demilitarization machines. Lines now isolated and equipment removed. (UM-01-D-521)	Munitions Processing Bay	Blind flanges (2)	No equipment number	ACAMS
Agent Collection System spill tanks (UM-01-D-522)	Munitions Processing Bay	Ball valves (10)	V-54, V-55, V-56, V-57, V-9800, V-9801, V-9802, V-9803, V-9804, V-9805	ACAMS with supplemental visual inspection by closed-circuit television as needed
		Check valve	V-59	
		Control valves (2)	LV-9848, HV-9835	
		Pressure safety valves (2)	PSE-9849, PSV-9849	
		Hose connections (2)	SP-130(2)	
		Flexible hose assemblies (2)	SP-159(2)	
		Pump	ACS-PUMP-105	
		Open spec blind	SP-256	
		Tank	ACS-TANK-401A/B	

TABLE 12. EQUIPMENT REGULATED UNDER 40 CFR PART 264 SUBPART BB				
Hazardous Waste Management Unit (P&ID Number)	**Location at the UMCDF**	**Type of Equipment**	**Equipment Identification Number[b]**	**Method of Compliance[a]**
Agent Holding Tank (UM-01-D-536)	Toxic Cubicle	Ball valves (74)	V-78, V-79, V-80, V-81, V-82, V-83, V-84, V-85, V-86, V-87, V-88, V-89, V-91, V-94, V-95, V-98, V-99, V-100, V-101, V-102, V-103, V-104, V-105, V-106, V-107, V-108, V-109, V-113, V-114, V-116, V-117, V-9003, V-9004, V-9005, V-9006, V-9007, V-9008, PDIT-099-561, PDIT-099-562, PDIT-104-561, PDIT-104-562, PI-43-1421, PI-101-1421, PI-118-1421, PI-739-1421, PI-742-1421, V-9800, V-9801, V-9803, V-9804, V-9805, V-9806, V-9807, V-9808, V-9809, V-9810, V-9811, V-9812, V-9813, V-9814, V-9815, V-9816, V-9817, V-9818, V-9819, V-9820, V-9821, V-9822, V-9823, V-9824, V-9825, V-9826, V-9827, V-9828	ACAMS
		Check valves (12)	V-76, V-77, V-90, V-92, V-93, V-96, V-97, V-110, V-112, V-115, V-9849, V-9853	
		Control valves (13)	LV-84, LV-86, LV-97, LV-105, LV-244, XV-736, XV-737, HV-775, LV-9811, LV-9812, LV-9821, LV-9822, HV-9850	
		Pressure Safety Valves (10)	PCV-43, PSV-102, PSV-103, PSV-738, PSV-161, PSV-160, PSV-026, PSE-162, PSE-159, PCV-735	
		Hose Connections (2)	SP-130 (2)	
		Pumps (3)	ACS-PUMP-101, ACS-PUMP-102, ACS-PUMP-201	
		Tanks (2)	ACS-TANK-101, ACS-TANK-102	
		Filters (7)	ACS-FILT-108A&B ACS-FILT-109A&B, ACS-FILT-9001, SP-304 (2)	
Transfers agent spill (UM-01-D-010)	Toxic Cubicle	Control valves (2)	LV-249 and HV-9851	ACAMS
		Blind flange	(1)	
Transfers liquid chemical agent to LIC1 furnace (UM-01-D-546)	Toxic Cubicle	Ball valves (3)	V-70, PIT-732-911,PSLLL-733-1321	ACAMS
		Control valve	FV-731	
	Munitions Corridor	Blind flange	No equipment number	
	Liquid Incinerator Room	Ball valves (7)	V-71, V-73, V-74, V-72, PI-760-1421, PIT-761-911, PSLL-760-1321	
		Control valves (4)	XV-761A, XV-761B, XV-204, XV-9816	
		Flexible hose	No equipment number	
Transfers liquid chemical agent to LIC2 furnace (UM-01-D-526)	Toxic Cubicle	Ball valves (3)	V-20, PIT-119-911,PSLLL-115-1321	ACAMS
		Control valve	FV-127	
	Munitions Corridor	Blind flange	No equipment number	
	Liquid Incinerator Room	Ball valves (7)	V-21, V-22, V-23, V-24, PI-112-1421, PIT-113-911, PSLL-112-1321	
		Control valves (4)	XV-104, XV-134A, XV-134B, XV-9813	
		Flexible hose	No equipment number	

TABLE 12. EQUIPMENT REGULATED UNDER 40 CFR PART 264 SUBPART BB

Hazardous Waste Management Unit (P&ID Number)	Location at the UMCDF	Type of Equipment	Equipment Identification Number[b]	Method of Compliance[a]
Agent Holding Tank (UM-01-D-535)	SDS Room	Ball or plug valves (34)	V-51, V-138, V-9645, V-9829, V-9830, V-9831, V-9838, V-9839, V-9840, V-9841, V-9842, V-9843, V-9844, V-9846, V-9848, V-9850, V-9852, V-9854, V-9855, V-9856, V-9857, V-9858, V-9859, V-9867, V-9868, V-9869, V-9871, V-9872, V-9873, V-9874, V-9875, V-9876, LIT-64-1971, LIT-64-1972	ACAMS
		Check valves (5)	V-56, V-9847, V-9851, V-9866, V-9870	
		Control valves (5)	LV-9839, LV-9845, LV-9846, HV-9847, LV-9852	
		Pressure safety valves (5)	PSV-025, PSV-9841, PSV-9842, PCV-9843, PCV-9844	
		Hose connection	SP-130	
		Pumps (2)	ACS-PUMP-401, ACS-PUMP-402	
		Tank	ACS-TANK-108	
		Filter	ACS-FILT-9002A	
Heel Transfer System (UM-01-D-593)	Munitions Processing Bay of the MDB	Check valves (2)	V-9113, V-9213	ACAMS
		Plug valves (8)	V-9101, V-9104, V-9105, V-9106, V-9201, V-9204, V-9205, V-9206	
		Pumps (2)	HTS-PUMP-9101, HTS-PUMP-9201	
		Control valves (2)	XV-9107, XV-9207	
		Flex hose assemblies (3)	SP-368 (2), SP-369 (1)	
		Expansion joints (4)	SP-370 (4)	
Rinsate Tank (UM-01-D-597)	Explosive Containment Vestibule	Ball valves (7)	V-9866, V-9867, V-9868, V-9854, V-9853, V-9859, V-9858,	ACAMS
		Plug valves (27)	V-9843, V-9845, V-9857, V-9839, V-9839, V-9831, V-9837, V-9829, V-9833, V-9834, V-9851, V-9830, V-9838, V-9832, V-9841, V-9842, V-9862., V-9848, V-9846, V-9852, V-9836, V-9835, V-9826, V-9828, V-9826, V-9828, V-9827	
		Gate valves (5)	V-9865, V-9849, PI-9873-, PI-9874-, V-9850,	
		Check valves (6)	V-9844, V-9855, V-9856, V-9847, V-9860, V-9861	
		Control valves (16)	XV-9816, XV-9848, XV-9818, XV-9845, XV-9904, XV-9849, XV-9851, XV-9866, XV-9846, XV-9905, XV-9850, XV-9852, XV-9867, XV-9843	
		Pressure Safety Valves (5)	PSE-9860, PSV-9863,PCV-9868, PCV-9869, PCV-9870	
		Flexible hose assemblies (6)	SP-369 (4) SP-111 (2)	
		Hose Connections (2)	SP-109 (2)	
		Pumps (2)	RCS-PUMP-101, RCS-PUMP-102	
		Tanks (2)	RCS-TANK-101A, RCS-TANK-101B	
		Agitator (2)	RCS-AGIT-101A, RCS-AGIT-101B	
		Heater (2)	RCS-HTR-101A, RCS-HTR-101B	
Transfers rinsate to LIC1/LIC2 furnace (UM-01-D-598)	Explosive Containment Vestibule (ECV)	Plug valves (5)	V-9887, V-9892, V-9888, V-9895, V-9889	ACAMS
		Ball valves (13)	V-9878, V-9879, V-9882, V-9883, V-9880, V-9881, V-9884, V-9885, PI-9884- , V-9897, PI-9886, V-9886, V-9919, V-9877	
		Gate Valve (2)	V-9896, V-9920	
		Check valves (2)	V-9891, V-9894,	
		Control valves (4)	LV-9878, LV-9877, XV-9888, XV-9889	
		Pressure Safety Valves (2)	PSV-9885, PSV-9887,	
		Pumps (2)	RCS-PUMP-101, RCS-PUMP-102	
		Filter (2)	RCS-FILT-102A, RCS-FILT-102B	

TABLE 12. EQUIPMENT REGULATED UNDER 40 CFR PART 264 SUBPART BB

Hazardous Waste Management Unit (P&ID Number)	Location at the UMCDF	Type of Equipment	Equipment Identification Number[b]	Method of Compliance[a]
Transfers rinsate to LIC2 furnace (UM-01-D-546, UM-01-D-598)	Lower Munitions Corridor (LMC) /Liquid Incinerator Room	Plug valves (2)	V-9899, V-9911	ACAMS
		Gate valves (1)	XY-9900-181	
		Ball valves (11)	V-9926, V-9927, V-9930, V-9929, V-9828, V-9902, V-9903, PIT-9893, PSLLL-9893, PI-9907, PIT-9905	
		Check valves (2)	V-9900, V-9901	
		Control valves (5)	XV-9900, XV-9897, FV-9895, XV-9891, XV-9902,	
Transfers rinsate to LIC1 furnace (UM-01-D-526, UM-01-D-598)	Lower Munitions Corridor (LMC) /Liquid Incinerator Room	Plug valves (2)	V-9916, V-9904	ACAMS
		Gate valves (1)	XY-9899-181	
		Ball valves (11)	V-9922, V-9921, V-9925, V-9923, V-9924, PIT-9914, PSLLL-9915, PI-9906, PIT-9904, V-9907, V-9908	
		Check valves (2)	V-9905, V-9906	
		Control valves (5)	XV-9899, XV-9897, FV-9894, XV-9890, XV-9901	
Heel Transfer System to filters (UM-01-D-593)	Munitions Processing Bay (MPB)	Plug valves (1)	V-9931	ACAMS
		Control valves (1)	XV-9898	
		Flex hose assemblies (2)	SP-369 (2)	
Rinsate Tank Filters (UM-01-D-596)	Munitions Processing Bay (MPB)	Ball Valves (11)	V-9898, V-9872,, V-9875, V-9876, V-9871, V-9825, V-9869, V-9874, V-9870, V-9873, V-9869	ACAMS
		Plug Valves (6)	V-9823, V-9820, V-9821, V-9819, V-9822, V-9818	
		Gate Valves (1)	V-9824	
		RCS Filters (4)	RCS-FILT-101A, RCS-FILT-101B, RCS-FILT-101C, RCS-FILT-101D	
		Hose Connections (6)	SP-109	
		Control Valves (24)	XV-9830, VX-9829, XV-9828, XV-9827, XV-9817, XV-9815, XV-9831, XV-9836, XV-9832, XV-9837, XV-9833, XV-9838, XV-9834, XV-9826, XV-9822, XV-9825, XV-9821, XV-9824, XV-9820, XV-9823, XV-9819, XV-9813, XV-9814, XV-9835	
Rinsate Collection BDS Interface (UM-01-D-595)	Discharge from Filters	Ball Valves (3)	V-9933, V-9932, V-9817	ACAMS
		Plug Valves (10)	V-9800, V-9801, V-9802, V-9804, V-9807, V-9808, V-9809, V-9811, V-9814, V-9815	
		Gate Valves (4)	V-9805, V-9806, V-9812, V-9813,	
		Check Valves (2)	V-9803, V-9810	
		Hose Assembly (8)	SP-111 (2), SP-368 (2), SP-369 (4)	
		Air Motors (2)	RCS-AMTR-9102, RCS-AMTR 9204	
		Control Valves (8)	XV-9810, XV-9807, XV-9808, -9811, XV-9812, XV-9800, XV-9801, XV-9802	

Notes:
[a] Automatic Continuous Air Monitoring System will provide continuous monitoring.
[b] Flexible hose assemblies and slip-on flange connections for pipe spool fit-up do not have equipment identification numbers
ACAMS = Automatic Continuous Air Monitoring System
MDB = Munitions Demilitarization Building
P&ID = Piping & Instrumentation Diagram

Umatilla Chemical Agent Disposal Facility

ATTACHMENT 4

REQUIREMENTS FOR RECOVERY FROM A BOILOVER IN THE METAL PARTS FURNACE

All federal Title 40 CFR citations are citations to the Title 40 CFR adopted as Oregon rule by OAR 340-100-0002 and as altered by OAR Chapter 340, Divisions 100-106, 109, 111, 113, 120, 124, and 142. See the preface introduction for further explanation.

ATTACHMENT 4

Requirements for Recovery From a Boilover in the Metal Parts Furnace

During processing of HD (mustard) ton containers (TCs) in the Metal Parts Furnace (MPF), boilover events, as defined in Permit Condition I.B and as identified in Table 1 of this attachment, may occur. When a boilover occurs, the Permittees must classify and recover from the boilover by completing and documenting, at a minimum, the following.

A. Recovery Plan for Ton Container Boilover

The following steps will be taken to return to operational status and resume TC processing activities. The steps following the immediate activities required by the Startup, Shutdown, and Malfunction Plan (SSMP) may be performed out of order based on the direction from the recovery manager (RM).

A.1 Classification of TC Boilover Event

A boilover is defined in Permit Condition I.B and exhibits material physically coming out of a TC while being treated in the MPF. Activations of any of the following MACT or RCRA AWFCOs accompanied by visual observation of material physically coming out of a TC are classified as follows:

- **Class 1**: A boilover that is accompanied or followed by any one or more of the following MACT or RCRA AWFCOs:
  - PFS exhaust O_2 alarm low-low (24-AALL-670C)
  - PFS exhaust O_2 alarm high-high (24-AAHH-670A/B)
  - Furnace pressure switch high-high (14-PSHH-034)
  - Afterburner (14-TAHH-065) or primary chamber (14-TAH-010) Exhaust temperature high-high
- **Class 2**: A boilover that is accompanied or followed by any one or more of the following MACT and RCRA AWFCOs:
  - CO ROHA activation (24-AAHH-669C)
  - Afterburner flue gas flow high-high (14-PDAHH-786)

A.2 Class 1 Boilover Event Action Requirements - If it is determined a Class 1 boilover has occurred, all of the following actions need to take place.

- Review PDAR data with engineering and environmental to identify initiating AWFCO and cascading alarms
- Verify no operator error
  - If operator error has occurred, report what the operator error was

  - Steps taken and controls put in place to mitigate future occurrence of this particular operator error
- Notify the DEQ
- Conduct an after-action review (AAR) per UM-CONOPS-03
  - Verify immediate corrective actions from AAR have been completed
- Release the MPF to process recipient TCs only
  - Obtain PGM and Chemical Materials Agency Field Office site project manager (SPM) approval to resume MPF processing for recipient TCs only
  - Provide notification to the DEQ of intent to resume MPF processing with recipient TCs only
- Engineering and environmental will review trends (e.g., PDAR, alarms, etc.) for donor TCs processed through the MPF, and engineering <u>may</u> recommend a reduced total heel or solid heel limit for donor TCs
  - Document recommended reduced solid heel size
  - Document recommended reduced total heel size
- Complete the "Recovery Plan for Ton Container Boilover' paperwork
- Release the MPF to process donor TCs
  - Obtain PGM and Chemical Materials Agency Field Office SPM approval to resume processing of donor TCs
  - Provide notification to the DEQ of intent to resume MPF processing of donor TCs, and submit written documentation of completed actions resulting from the boilover.

A.3 Class 2 Boilover Event Action Requirements - If it is determined a Class 2 boilover has occurred, all of the following actions need to take place.

- Review PDAR data with engineering and environmental to identify initiating AWFCO and cascading alarms
- Verify no operator error
  - If operator error has occurred, report what the operator error was
  - Steps taken and controls put in place to mitigate future occurrence of this particular operator error
- Notify the DEQ
- Conduct an after-action review (AAR) per UM-CONOPS-03
  - Verify immediate corrective actions from AAR have been completed
- Release the MPF to process recipient TCs only
  - Obtain PGM and Chemical Materials Agency Field Office SPM approval to resume MPF processing for recipient TCs only
  - Provide notification to the DEQ of intent to resume MPF processing with recipient TCs only
- Engineering and environmental will review trends (e.g., PDAR, alarms, etc.) for donor TCs processed through the MPF, and engineering <u>will</u> recommend a reduced total heel or solid heel limit for donor TCs
  - Document recommended reduced solid heel size
  - Document recommended reduced total heel size
- Verify immediate corrective actions from AAR have been completed
- Complete the "Recovery Plan for Ton Container Boilover" paperwork
- Release the MPF to process donor TCs

- Obtain PGM and Chemical Materials Agency Field Office SPM approval to resume processing of donor TCs, and submit written documentation of completed actions resulting from the boilover.
- Provide notification to the DEQ of intent to resume MPF processing of donor TCs, and submit written documentation of completed actions resulting from the boilover.

A.4 Recovery Plan Closeout Action Requirements

- Ensure that recovery plan steps have been completed and substantiating evidence is available as necessary. As a minimum, this will include:
  - Video recording of boilover event
  - Control room operator log book
  - PDAR report(s)
  - TC lot identification
  - Immediate corrective action closure information
  - Ash sampling results from the boiled over ton container

- If the heel limit is changed, engineering and environmental will review trend for the next 100 donor TCs processed, and engineering may recommend increasing the total heel or solid heel limit for donor TCs. Any recommendation to increase the total heel or solid heel limit will require DEQ concurrence prior to implementation.

- Review Recovery Plan closeout

TABLE 1 MPF UPSET CONDITIONS CONSTITUTING A BOILOVER REQUIRING AN AUTOMATIC STOP FEED

Item	Instrument Tag Number [a]	Table 7-4 Item #	Upset Limits	Parameter Description
1	14-TAHH-065	MPF-05	>2,113 ^{o}F (instantaneous)	MPF afterburner temperature high-high
2	24-AAHH-669C	MPF-13	>100 ppm (corrected to 7% O_2, dry basis) based on hourly rolling average	CO concentration in PFS exhaust gas high-high
3	24-AALL-670C	MPF-26	<4.8% (2-minute rolling average)	PFS exhaust O_2 low-low
4	24-AAHH-670A/B	MPF-25	15% corrected to a dry basis (instantaneous)	Oxygen concentration in PFS exhaust gas high-high
5	14-PDAHH-786	MPF-12	0.38 in WC (instantaneous)	Afterburner flue gas flowrate high-high
6	14-TAH-010	MPF-43	>2,385^{o}F (instantaneous)	Primary chamber exhaust temperature high
7	14-PSHH-034	MPF-19	>-0.15 in WC (instantaneous)	Furnace pressure high-high

[a] The instruments have associated automatic waste feed cut-off listed in Module VII, Table 7-4.

Comprehensive Monitoring Program
Sampling and Analysis Plan

for the

UMATILLA CHEMICAL AGENT DISPOSAL FACILITY
AND UMATILLA CHEMICAL DEPOT
HERMISTON, OREGON

REVISION 17

Revised By:
Washington Demilitarization Company, LLC
Hermiston, Oregon

Originally Prepared By:

Battelle's Pacific Northwest Division
Richland, Washington
Contract No. 98200006

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1. Introduction

The Umatilla Chemical Depot (UMCD) is located in Northeastern Oregon in Umatilla and Morrow Counties, and is approximately six miles southwest of the City of Umatilla, Oregon. The UMCD stored chemical agents in projectiles, ton containers, rockets, bombs, spray tanks, and land mines. Only one campaign remains, the HD ton containers. There is also GB-, VX-, and HD-contaminated secondary wastes stored in J-Block. The Umatilla Chemical Agent Disposal Facility (UMCDF) was constructed within the UMCD boundaries. The purpose of the UMCDF is to destroy the UMCD stockpile of chemical weapons.

The U.S. Army Program Manager for Chemical Demilitarization (PMCD) applied for a hazardous waste permit in March 1995. Prior to issuance of the Permit, the Oregon Department of Environmental Quality (DEQ) conducted a pre-trial burn risk assessment (pre-RA) to provide preliminary estimates of potential human health and ecological risks associated with operation of the UMCDF. The pre-RA indicated that the UMCDF would not have an adverse effect on human health or the environment (Ecology and Environment, 1997).

Following an extensive public comment period, the Environmental Quality Commission and the DEQ issued the Permit (I.D. No. OR6 213 820 917) for the Storage and Treatment of Hazardous Waste ("Hazardous Waste Permit") to the UMCD and the UMCDF on February 12, 1997 (DEQ, 1997). The Hazardous Waste Permit was reissued with a new identification number (ORQ 000 009 431) in January, 1999. As a result of public comment, the Environmental Quality Commission required that the UMCD and UMCDF establish a Comprehensive Monitoring Program (CMP). A work group of interested parties convened to define locations and media for collection, analyses to be performed, and frequency of sampling. The CMP Workplan (U.S. Army, 1999) defined monitoring requirements and led to the development of this Sampling and Analysis Plan (SAP).

The CMP monitors for chemical warfare agents and other analytes to document that concentrations in soil and biota during and after UMCDF operations remain at or below the concentrations predicted in the pre-RA. Air is monitored to document any confirmed detections of chemical agent. The CMP is divided into three phases: baseline, operational, and postoperational monitoring. The baseline phase began in April 1999 and consisted of 22 quarters of monitoring. Fourteen quarters occurred prior to the start of surrogate treatment operations and eight quarters were during surrogate testing. Operational monitoring began in September 2004 with agent treatment. Postoperational monitoring will begin following the conclusion of hazardous waste treatment operations at UMCDF.

This document discusses all the requirements for performing the CMP and to meet the conditions of the Hazardous Waste Permit for the UMCDF. Organization of the document is based on the U.S. Environmental Protection Agency's requirements for quality assurance project plans for environmental data operations (USEPA, 1997). Appendices include information pertaining to sampling methods for air monitoring; collection of soil and biota; and site descriptions.

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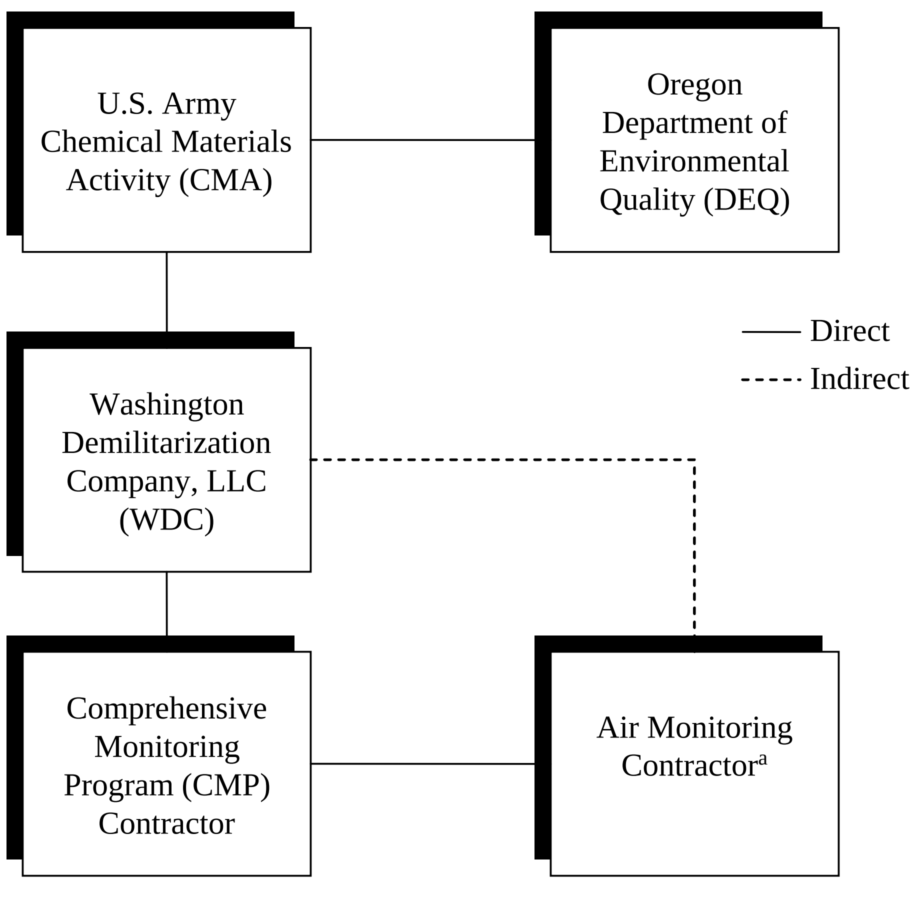
2. Project/Task Organization

The purpose of this SAP is to provide requirements needed to conduct sampling and analysis for the CMP for the UMCD and UMCDF. Figure 2-1 shows the organization for the CMP. A major portion of the CMP is conducted for Washington Demilitarization Company, LLC (WDC) by the CMP contractor. The CMP contractor is responsible for field sampling, laboratory analyses and, data validation (Figure 2-2). WDC implements the CMP contract under the direction of the U.S. Army Chemical Materials Activity (CMA) and as specified in the Hazardous Waste Permit for the UMCDF issued by the Environmental Quality Commission and DEQ.

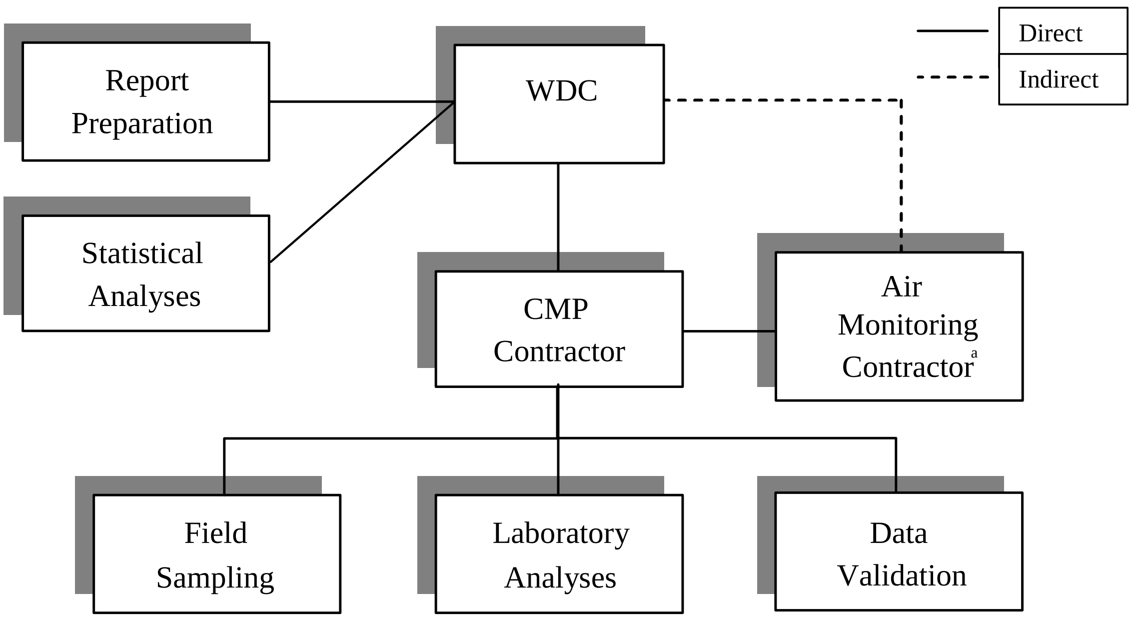
The CMP contractor identified organizations participating in the project and discussion of their specific roles and responsibilities is provided in Table 2-1. The CMP contractor ensures the project quality assurance manager is independent of the unit generating data. The CMP contractor organizational relationships and levels of communication among all project participants are shown in Figure 2-2.

Figure 2-1. Comprehensive Monitoring Program Organization Chart



[a] The air monitoring contractor is the onsite chemical demilitarization laboratory contractor.

Figure 2-2. Comprehensive Monitoring Program Contractor Organization Chart



[a] The air monitoring contractor is the onsite chemical demilitarization laboratory contractor.

Table 2-1. Roles and Responsibilities for Leads in Figure 2-2

Role	Responsibilities
WDC Technical Manager	Receives direction from CMA. Responsible for implementing the CMP, including maintenance of programmatic documents, oversight of CMP contractor and activities conducted in execution of the CMP. Oversight includes performance of and adherence to the SAP, contract, environmental compliance, and assurance of technical adequacy and quality of data generated through CMP activities.
Air Monitoring Contractor Project Manager	Receives direction from WDC. Provides onsite chemical demilitarization laboratory services. Operates all air monitoring systems (DAAMS) and analyzes all air monitoring samples. Provides laboratory results to CMP contractor for data validation of results. Provides laboratory results to WDC for inclusion in quarterly and annual reports.
CMP Contractor Program Manager	Receives direction from WDC. Provides oversight for field sampling, laboratory analyses, and data validation tasks. Field oversight includes sample collection and tracking from the field through the laboratory to final data output. Responsible for overall health and safety program, preparation of health and safety plan, and conducting appropriate training. Has responsibility and authority to effect corrective actions on a day-to-day basis. Notifies the WDC technical manager of any nonconformances with field or laboratory procedures, or with health and safety procedures/practices.
Field Sampling Task Manager*	Receives direction from CMP contractor program manager. Leads all field sampling activities and is responsible for field records. Responsible for implementing field procedures and the health and safety plan in the field. Notifies CMP contractor program manager of any unusual or noteworthy conditions at sites or any nonconformances with field sampling activities. Provides input to the quarterly and annual reports.
Laboratory Analyses Task Manager*	Receives direction from CMP contractor program manager. Oversees all laboratory activities. Notifies CMP contractor program manager in case of nonconformances with laboratory activities.
Data Validation Task Manager*	Receives direction from CMP contractor program manager. Oversees all data validation activities. Notifies CMP contractor program manager in case of nonconformances with data validation. Provides input to the quarterly and annual reports.
Statistical Analyses Task Manager	Receives direction from WDC. Oversees all statistical analyses. Notifies WDC in case of nonconformances with the data. Provides input to the quarterly and annual reports.
Report Preparation Task Manager	Receives direction from CMA and WDC technical manager. Assembles material from various task managers and prepares quarterly and annual reports. Notifies WDC technical manager of any unusual or noteworthy items.

*CMP contractor may choose to combine these tasks.

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3. Problem Definition

The CMP is designed to meet conditions of the Hazardous Waste Permit for the UMCDF. The CMP monitors for the presence of numerous analytes to document that concentrations in soil and biota during UMCDF operations remain at or below the concentrations predicted in the pre-RA. Air is monitored to document any confirmed detections of chemical agent.

The CMP does not provide monitoring for public or worker safety, or provide real-time data for use in any type of emergency response scenario. This type of monitoring is covered by the U.S. Army’s Chemical Stockpile Emergency Preparedness Program. The CMP also does not include the agent monitoring which occurs within the UMCDF and the UMCD storage area.

The CMP monitors air deposition of chemical agents (Table 3-1) and risk-driving analytes (RDAs) (Table 3-2) in air, soil, and biota media. Not all media are sampled for all analytes. Results of monitoring of these analytes prior to agent operations at the UMCDF were used to calculate a baseline threshold value for each analyte. Results of operational monitoring after agent operations are compared to baseline values to determine if statistically significant increases are occurring during agent operations at the UMCDF. Section 18.3 describes how baseline threshold values were calculated and how operational and postoperational monitoring results are compared to baseline values. Data collected during the CMP will be available for use in future risk assessments.

Table 3-1. Chemical Agents to be Monitored

Abbreviated Name	Chemical Name
GB	O-isopropyl methylphosphonofluoridate
VX	O-ethyl-S-(2-diisopropylaminoethyl)methylphosphonothiolate
HD	bis(2-chloroethyl)sulfide

Table 3-2. Risk-Driving Analytes to be Monitored[a]

Metals
antimony
arsenic
beryllium
cadmium
chromium
manganese
mercury
thallium

Semivolatile Organics
bis(2-ethylhexyl)phthalate
4-methylphenol

Furans (Polychlorinated Dibenzofurans)[b]
2,3,7,8-tetrachlorodibenzofuran
1,2,3,7,8-pentachlorodibenzofuran
2,3,4,7,8-pentachlorodibenzofuran
1,2,3,4,7,8-hexachlorodibenzofuran
1,2,3,6,7,8-hexachlorodibenzofuran
1,2,3,7,8,9-hexachlorodibenzofuran
2,3,4,6,7,8-hexachlorodibenzofuran
1,2,3,4,6,7,8-heptachlorodibenzofuran
1,2,3,4,7,8,9-heptachlorodibenzofuran
1,2,3,4,6,7,8,9-octachlorodibenzofuran

PCBs (Polychlorinated Biphenyls)[c]
3,3',4,4'-tetrachlorobiphenyl (PCB 77)
2,3,3',4,4'-pentachlorobiphenyl (PCB 105)
2,3,4,4',5-pentachlorobiphenyl (PCB 114)
2,3',4,4',5-pentachlorobiphenyl (PCB 118)
2',3,4,4',5-pentachlorobiphenyl (PCB 123)
3,3',4,4',5-pentachlorobiphenyl (PCB 126)
2,3,3',4,4',5'-hexachlorobiphenyl (PCB 156)
2,3,3',4,4',5'-hexachlorobiphenyl (PCB 157)
2,3',4,4',5,5'-hexachlorobiphenyl (PCB 167)
3,3',4,4',5,5'-hexachlorobiphenyl (PCB 169)
2,2',3,3',4,4',5-heptachlorobiphenyl (PCB 170)
2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB 180)
2,3,3',4,4',5,5'-heptachlorobiphenyl (PCB 189)

Dioxins (Polychlorinated Dibenzodioxins)[b]
2,3,7,8-tetrachlorodibenzo-p-dioxin
1,2,3,7,8-pentachlorodibenzo-p-dioxin
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin
1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin

[a] Hydrogen chloride was identified in the pre-RA but is not included in this able due to the fact that hydrogen chloride is an unstable compound that will decompose upon contact with alkaline soils and water. Periodic sampling minimizes the likelihood of detecting this compound.

[b] Dioxins and furans can be formed from the operation of boilers, automobile exhaust, and brush fires. The dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin was evaluated for the pre-RA. All of the polychlorinated dibenzodioxins and polychlorinated dibenzofurans required for a Toxic Equivalency calculation are monitored for the CMP.

[c] All PCB congeners required for a Toxic Equivalency calculation will be monitored for the CMP.

4. Project/Task Description

The purpose of this SAP is to establish processes and criteria for monitoring of the UMCD (Zone 1) and identified areas outside the UMCDF (Zones 2 and 3). Sample site locations are described in Appendix D. These areas are monitored for the presence of chemical agents and other analytes to document concentrations in soil, air, and biota during UMCDF operations (Table 4-1).

Table 4-1. Sites, Media, and Analytes for CMP

Zone	Total Sites	Chemical Agent Sampling		Risk-Driving Analyte Sampling	
		Air	Soil	Soil	Biota
1	19	12	3	10	9
2	8	-	-	8	8
3	7	-	-	7	2

There are five major tasks to be performed for the CMP: 1) field sampling; 2) laboratory analyses; 3) data validation; 4) statistical analyses; and 5) report preparation (see Figure 2-2). This SAP contains requirements for these tasks.

4.1 Field Sampling

Ambient air sampling is performed only in Zone 1 for chemical agents (Table 3-1) and is known as the perimeter monitoring network (PMN). The air samples are collected by a system of negative-pressure tubes, called the Depot Area Air Monitoring System (DAAMS). DAAMS tubes are filled with an adsorbent material and a vacuum pump continuously draws air through each tube. Any chemical agents, GB (commonly called “sarin”), VX, and/or HD (commonly called “mustard”) in the air will be trapped on the adsorbent material. The tubes are sampled for 12 hours and sent to the UMCDF laboratory for analysis. Baseline air sampling was initiated in May 2000 to document if chemical agent or interferents were present at each location. Data were used to identify and address interferents before the UMCDF started thermal operations. Further discussion on ambient air sampling can be found in Appendix B.

Collection of baseline soil, surface water, and biota samples was initiated in April 1999 and continued until the beginning of agent operations. In Zones 1 and 2, collections are performed on a quarterly basis during winter, spring, summer, and fall. In Zone 3, three sites are sampled on a quarterly basis and four sites are sampled on a semiannual basis. The established collection periods allow sufficient time to collect biota and for appropriate weather considerations. Each collection period will not exceed three (3) calendar weeks. The winter quarter sampling event should be scheduled for a time period when temperature inversion conditions are likely to be experienced in the CMP sampling zones. The results of each quarterly collection period are summarized in quarterly reports.

Soil samples are being collected to determine if statistically significant increases in RDAs are occurring due to air deposition when comparing baseline levels to UMCDF agent operation levels. There are 25 sites sampled and analyzed for risk-driving analytes. In addition, 3 of the 25 sites are sampled for chemical agents. All of the sites are covered in vegetation, which will interfere with the analysis of the soil and increase the variability of the periodic monitoring. In order to minimize the variability within a site and between sites, soil sampling stations were constructed at each site.

The soil sampling stations consist of an excavated area (50 cm by 50 cm, and 20 cm deep), lined with Tyvec®, and filled with soil representative of the soil in the surrounding area. Prior to installation of the soil sampling stations, a geologist visually inspected the soils in the vicinity of each sample site to determine the appropriate soil type. This evaluation was documented in the first quarterly report. Approximately one-fourth of the top one (1) cm surface of the stations is sampled.

To monitor long-term deposition, three additional soil sampling stations were constructed at three sites in Zone 1 (Sites 1-3, 1-4, and 1-7) for biannual monitoring. The biannual monitoring soil sampling stations will have a larger excavated area (approximately 50 cm by 130 cm, and 10 cm deep) yet were constructed in the same manner as the quarterly monitoring soil sampling stations. The area of the station is divided into 10 areas, each 25 cm by 25 cm. Biannually, a new area of the station will be sampled to a depth of one (1) cm. These sites were monitored on an annual basis through October 2007.

In case of heavy snow covering the ground, which cannot be easily removed, no soil samples will be taken until the snow has melted since the snow will interfere with monitoring from air deposition. If environmental factors inhibit sample collection during the scheduled event, efforts will be made to collect a sample in accordance with field procedures when conditions improve. If conditions do not improve within a three-week period, then a sample will not be collected for that event. Further discussion on soil sampling can be found in Appendix C.

Biota samples are being collected to determine if statistically significant increases in RDAs are occurring due to air deposition when comparing baseline levels to UMCDF agent operation levels. Vegetation and small mammals are collected at 18 quarterly sites (Zones 1 and 2) and 1 additional site in April and October (Zone 3). The most predominant forms of vegetation at most sites are grasses. The surface of the grasses will accumulate contaminants from air deposition and soil uptake throughout the year even though the grass species will be dormant for a period of time. Sampling involves cutting the shoots at a height approximately four (4) cm above the soil surface to avoid surface deposition. Roots are not sampled. Further discussion on vegetation sampling can be found in Appendix C.

Small mammals are an important part of the food chain in the shrub-steppe habitat. Mice are the most abundant small mammals at the sampling sites. Since mice generally live more than one year, they will likely assimilate more air-deposited contaminants than grasses and terrestrial invertebrates. Organic contaminants concentrate in fatty tissues of the body, while heavy metals concentrate in muscle. Therefore, separate individuals will be analyzed for the risk-driving analytes. A combination of snap traps and Sherman live traps are used. Snap traps are used exclusively in Zone 1. Sherman live traps are used in Zones 2 and 3, but may also be used in Zone 1. Metal analyses are done on specimens without skin, stomach, and intestines. Organic analyses are done on whole bodies. Further discussion on small mammal sampling can be found in Appendix C.

Surface water and terrestrial invertebrates were included for the first eight years of CMP sampling.

4.2 Laboratory Analyses

Laboratory analyses are done on all media for the specified analytes. Appropriate quality assurance/ quality control protocols are followed as discussed in later sections of the SAP. Laboratories deliver analytical data packages for air, soil, and biota samples to data validators in an electronic or hard-copy format. Information from the laboratory is entered into the CMP database.

4.3 Data Validation

Data validation is done by a third party, independent from the CMP contractor and the laboratories. The data validation packages are delivered to the CMP contractor. Data validation results (flags on data that do not meet all the quality objectives) are included in the CMP database.

4.4 Statistical Analyses

Statistical analyses are critical to achieve the purpose of the CMP. Baseline threshold values were from the data collected during 22 quarterly sampling events that occurred prior to the start of agent treatment operations at the UMCDF. Monitoring results from the agent operational phase are statistically compared to baseline threshold values to determine if there are significant increases in analyte concentrations. Air monitoring data are excluded from the statistical analysis for reasons explained in Section 18.3.

4.5 Report Preparation

The monitoring results are reported quarterly. Statistical analyses and recommendations for future monitoring will be reported in annual reports. See Reporting (Section 20) for more information.

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5. Quality Objectives for Measurement Data

Data quality objectives are quantitative and qualitative descriptions of the quality of data required to support project decision-making processes and ensure data are of known and appropriate quality. Data quality objectives provide the mechanism for ongoing control and evaluation of measurement data quality throughout the course of the project. The quality assurance/quality control effort will focus on controlling measurement error within the established limits, and will ultimately provide a database for estimating the field and analytical uncertainty in measurement data.

This SAP was developed to provide specific quality assurance/quality control guidelines for the implementation of sampling and analytical programs to meet the project data quality objectives and to ensure quality of all analytical data. All CMP contractors and subcontractors will follow the requirements specified in this SAP.

To support data quality objectives for projects involving environmental measurements, the Environmental Protection Agency (EPA) established the following data quality indicators: precision, accuracy, representativeness, completeness, and comparability (PARCC Parameters). The PARCC parameters are evaluated using the UMCDF Data Validation Methodology(reference Permit Condition II.A.4). PARCC parameters are discussed further below.

For this project, goals were defined (as described further below) for each data quality indicator to assess performance of the measurement system. Data are analyzed from field and laboratory quality assurance/quality control samples to provide an estimate of how well the goals were achieved.

5.1 Field Quality Assurance Objectives

The following section applies to field quality assurance of soil and biota samples. For further information on the field quality assurance for air monitoring at the DAAMS stations, see WDC, 2006a.

5.1.1 Precision

Precision is expressed in terms of the relative percent difference (RPD) for those samples where both the sample and the duplicate are greater than five times (5X) the Practical Quantitation Limit (PQL). An RPD less than 35 percent for soil and biota samples indicates variability is small and samples come from the same population.

For those samples where either the sample value or duplicate/split value is less than five times the PQL, precision is evaluated in terms of the range between the sample and the duplicate/split. A range of <2X PQL for soil and biota samples indicates variability is small and samples come from the same population.

It should be noted that greater variability between samples increases the uncertainty in the results. If samples are found to be outside these criteria, then field-sampling procedures will be evaluated to identify corrective actions, if necessary.

5.1.2 Accuracy

Field instruments and equipment are calibrated, as needed, to ensure accuracy of the measurement of field parameters. Field blanks are used to verify that the sample collection and handling process has not affected the quality of samples. Field blanks are used to measure the cleanliness of sampling equipment for each media. Field blanks are prepared in the field by simulating collection of a sample through a piece of equipment. Organic-free reagent water is used. Field blanks are analyzed for chemical agents and RDAs. Blanks that exhibit contamination in excess of reporting limits result in corrective action. The nature of the corrective action is assessed on an individual basis.

5.1.3 Representativeness

The sampling procedures presented in Appendix C were designed to ensure a representative sample for each matrix in the field. Precision of field duplicates evaluates representativeness, the degree to which data accurately and precisely represent the characteristic of the population, natural variation at the sampling point, or the environmental condition.

5.1.4 Completeness

To meet the completeness goal, a limit was established for human error, i.e., failed holding times, sample container breakage, or chain-of-custody errors. Data are tracked from the field to ensure 95-percent completeness. If this level is not obtained, then sampling procedures will be reviewed by the CMP contractor program manager and corrective actions will be initiated. Corrective actions could be changes in procedures to be implemented the next quarter, or they could include a resampling effort to be completed before the next sampling period begins. Collection of quality control samples (e.g., field blanks) is discussed in Section 12 and Appendix B and Appendix C. The CMP contractor ensures all quality control samples are included with each sample set.

5.1.5 Comparability

The sampling method shall remain constant for each media and site in order to ensure comparability of data over time.

5.2 Laboratory Quality Assurance Objectives

The following section applies to laboratory quality assurance objectives of soil and biota samples. For further information on the laboratory quality assurance objectives for air monitoring at the DAAMS stations, see WDC, 2006a.

Analytical laboratory quality assurance/quality control samples are used to check the precision and accuracy of the measurement system in the laboratory. Analytical laboratory quality assurance/quality control samples include calibration blanks, matrix blanks, method (or reagent) blanks, laboratory duplicates, quality control check samples, matrix spikes/matrix spike duplicates, and surrogates. Analytical laboratory quality control samples are described further in Section 12.

5.2.1 Precision

Precision measures reproducibility of measurements of the same physical and chemical property under a given set of conditions. It is a quantitative measure of the variability of a group of measurements compared to their average value. The measure used to estimate the precision of a method is the standard error of the estimates for the least square regression line of "measured" versus “target" concentrations. Analytical precision for a single analyte is expressed as a percentage, with the difference between results of matrix spike samples and matrix spike duplicates for a given analyte divided by the average result.

Precision is determined through the use of matrix spikes and matrix spike duplicates for the analytical work performed. Project personnel select 1 sample in 20 (or 1 per batch if a batch is less than 20 samples) and split the sample into 3 aliquots. The first aliquot is analyzed routinely for the parameters of interest, while the other two aliquots are spiked with known quantities of the parameters of interest prior to analysis. Precision is evaluated in accordance with the UMCDF Data Validation Methodology (reference Permit Condition II.A.4).

5.2.2 Accuracy

Accuracy is a measure of bias in the measurement system. It is the degree of agreement of a measurement or average of measurements with an accepted reference or true expected value. The closer the numerical value of the measurement comes to the true value or actual concentration, the more accurate the measurement. Possible sources of error are the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analysis techniques. The objective is to minimize determinate errors so each analytical method performs within its specified quality control limits.

Accuracy can be determined from the results of matrix spike analyses performed at the rate of 1 set every 20 samples or 1 per batch. Laboratory surrogate compounds are also commonly used as a measure of the accuracy of analysis. Laboratory surrogates are compounds structurally and chemically similar to the analytes of interest and are usually specified in the analytical methods used, e.g., with semivolatile organic compounds. Analytical accuracy may be expressed as the percent recovery of an analyte that has been added to an environmental sample at a known concentration before analysis. Recovery of surrogate is calculated and compared to the known quantity added to the samples to assess the accuracy of the analysis. Surrogate compounds are added to all standards, quality control samples, and unknown samples.

5.2.3 Representativeness

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, natural variation at a sampling point, or an environmental condition. If the same results are reproducible, data obtained can be said to represent the environmental condition. Representativeness is achieved through sampling program design. Criteria for representativeness are met by ensuring sampling locations are selected properly and standard protocols are used so resulting data represent chemical conditions at the site at the time of collection. For samples where both results are greater than five times (5X) the PQL, representativeness is evaluated by calculating the RPD between analytical results for field duplicate/split samples. For the samples where either the sample value or the duplicate/split value are less than five times (5X) the PQL, representativeness is evaluated in terms of the range between the sample and the duplicate/split.

5.2.4 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system per analyte compared with the amount that was expected to be obtained under optimum conditions. Completeness of the data is calculated by dividing the number of valid measurements obtained by the number of measurements planned. To be considered valid, data must meet all acceptance criteria stated in the UMCDF Data Validation Methodology(reference Permit Condition II.A.4). The objective for completeness is 95 percent to allow for errors throughout data collection, transport, and analysis. If this level is not obtained, then sampling and laboratory procedures will be reviewed by the CMP contractor program manager and corrective actions will be initiated.

5.2.5 Comparability

Comparability is a qualitative characteristic expressing the confidence with which one data set can be compared with another. The comparability goal is achieved using standard techniques to collect and analyze representative samples, and reporting analytical results in appropriate units. Duplicate samples collected and analyzed using the exact same methods and key quality control elements provide a means to evaluate comparability.

6. Training Requirements/Certifications

6.1 General Training Requirements

The CMP contractor maintains a training program that details the processes for identifying statutory, regulatory, or professional certifications that may be required to perform specific operations. Additionally, the training program describes the processes for identifying, designing, performing, and documenting technical, quality, and management training, as applicable.

This training program includes initial and continuing training and qualifications. Objective evidence of personnel training/qualifications is documented and maintained as a record. Training records are securely stored for the established retention period.

6.2 Specific Training

Monitoring at the UMCD requires site-specific training per the policies of WDC. This includes training on issues of security and evacuation routes. Given the varying conditions of the sampling region (extreme heat to snow/ice) a health and safety plan is maintained to ensure worker safety.

Field sampling personnel performing biota identification are able to classify in the field each plant and mammal collected to the lowest taxon possible. A bachelor’s degree in the physical or life sciences, or equivalent combination of experience, education, and training, is required. Nondegreed personnel may assist in sample collection under the direction of degreed field personnel. Each field sampling team has a minimum of one person certified in first aid and CPR, with retraining at a frequency recommended by the certifying agency or as required by WDC policy. Field sampling personnel handling small mammals must receive training on respirator use due to the presence of the Hantavirus in the deer mice population in the region.

Data validators are responsible for data validation and reporting activities. Data validators must have a minimum of a bachelor’s degree in chemistry or any physical or life science with a minimum of 40 hours of training in data validation under the supervision of a senior validator. Senior validators provide oversight and sign-off on all work performed by data validators. Senior validators must have a bachelor’s degree in chemistry or any physical or life science, plus one year experience performing data review and validation. All data validators and senior validators are trained to the UMCDF Data Validation Methodology (reference Permit Condition II.A.4).

Statistical analysts are responsible for calculating baseline threshold values and for any statistical comparisons of data. Statistical analysts must have a minimum of a bachelor’s degree in mathematics or statistics with a minimum of 40 hours of training in statistics under the supervision of a senior statistician. Senior statisticians provide oversight and sign-off on all work performed by statistical analysts. Senior statisticians must have a bachelor’s degree in mathematics or statistics, plus one year of experience performing statistical analyses.

Report writers must have a minimum of a bachelor’s degree in any physical or life science or an equivalent combination of education, training, and experience.

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7. Documentation and Records

A system is maintained for timely preparation, review, approval, issuance, use, control, revision, and maintenance of documents that prescribe work activities and specify requirements. A system is also maintained for identifying, preparing, approving, transmitting, correcting, distributing, retaining, retrieving, and disposing of records.

7.1 Document Control

Document control includes measures by which documentation is controlled, tracked, and updated in a timely manner to ensure applicability and correctness. Control measures are in place to ensure that documents are reviewed for adequacy, approved for release by authorized personnel, and distributed.

Revised documents are reviewed and approved by the appropriate organizations that participated in the original review and approval, unless designated otherwise. The nature of the change(s) shall be identified within the document or in appropriate attachments.

Obsolete or superseded documents are identified, and measures taken to promptly remove or otherwise control these documents to prevent their inadvertent use.

7.2 Instructions, Procedures, and Drawings

Activities are described by documented instructions, procedures, or drawings that include quantitative or qualitative acceptance criteria used to determine whether activities are satisfactorily accomplished as appropriate.

Instructions, procedures, and drawings are reviewed and approved by appropriately qualified individuals. Revisions to instructions, procedures, and drawings that affect the process or are technical receive the same level of review and approval as the original document. Editorial changes may be made to these documents without review and approval.

Procedures include, but are not limited to, the following:

- Environmental, health, and safety activities
- Sampling activities
- Assessment activities
- Sample shipping and receipt
- Sample chain-of-custody
- Sample storage
- Sample preparation
- Sample analysis
- Standard preparation and handling
- Post-analysis sample handling
- Data security and confidentiality
- Control of reagents and water quality
- Cleaning laboratory glassware

- Waste disposition
- Decontamination of field sampling equipment
- Control and transfer of electronic data
- Records management.

7.3 Records

Documents designated to become records shall be legible, accurate, complete, and appropriate to the work performed. Corrections to these documents are made by drawing one line through an error, initialing and dating the correction, and justifying the correction (if not self-explanatory). Changes to computerized data records shall be identified so that the original and corrected entries are retrievable, and the individual initiating the changes can be identified.

A documented records control system is maintained. The system includes the following:

- Specifications of items, data, and processes of the records controlled
- Requirements for the preparation, review, approval, and maintenance of records to accurately reflect completed work and to fulfill statutory requirements
- Requirements and responsibilities for records transmittal, distribution, change, retention, protection, preservation, traceability, archival, retrieval, and disposal
- Verification that records received are legible and are in agreement with the transmittal document
- Requirements for access to and control of the files
- Procedures for control and accountability of records removed from storage locations
- Procedures for filing of supplemental information and disposing of superseded records
- Storage of records in a manner approved by the organizations responsible for the records
- Replacement, restoration, or substitution of lost or damaged records
- Procedures for data correction that include how corrections are to be made and establish who is authorized to change or correct data.

Sufficient records are maintained in order to readily reconstruct technical- and quality-affecting activities.

8. Sampling Process Design (Experimental Design)

The experimental design for this SAP addresses the purpose of the CMP:

> Concentrations of chemical agents and risk-driving analytes in soil, air, and biota will be monitored to calculate baseline threshold values upon completion of surrogate testing. Monitoring will determine if statistically significant increases are occurring during agent operations at the UMCDF and data will be available for use in future risk assessments.

This section includes a schedule, rationale for the experimental design, sampling design assumptions, procedures for locating and selecting environmental samples, and classification of measurements as critical or noncritical.

8.1 Schedule

Quarterly field sampling began in April 1999, and will continue for one year after hazardous waste treatment operations conclude at the UMCDF. Table 8-1 suggests the schedule per quarter of the CMP. The schedule is based on experience with field sampling, holding times, and Hazardous Waste Permit requirements. Quarterly reports must be submitted to DEQ in accordance with Permit Condition II.A.4. The winter quarter sampling event should be scheduled for a time period when temperature inversion conditions are likely to be experienced in the CMP sampling zones.

Table 8-1. Schedule for CMP Quarterly Activities

Activity	Time to Completion*
Field Sampling (soil and biota)	Approximately 10 days, not to exceed three calendar weeks
Laboratory Analytical Data Reports	30 calendar days from the end of field sampling event
Data Validation Reports	15 calendar days from the receipt of Laboratory Analytical Data Reports

*Note: these times are approximate and may be adjusted by the WDC technical manager.

Air samples are taken continuously (in triplicate). DAAMS tubes are replaced every 12 hours. The quarterly period will end for DAAMS sampling on the date coinciding with the end of field sampling. Results of the air samples will be submitted to the CMP contractor within 30 calendar days of the sampling period. The air sample data and validation results will be included with the soil and biota portions in the quarterly report.

8.2 Rationale for Experimental Design

Quarterly sampling is important to the purpose of the CMP – calculate baseline threshold values and determine if statistically significant increases are occurring during agent operation of the UMCDF. Geographical spread and variety of habitat found across the CMP sample sites add to the heterogeneity of the monitoring effort. Repeated sampling is important to decrease variability of monitoring results and increase the possibility to detect significant impacts during operation of the UMCDF.

Collection of small mammals at 18 sites (19 sites semiannually) requires careful planning. Small mammal trapping is repeated over multiple days in order to obtain enough sample.

If thick ice or heavy snow, which cannot be easily removed, is found at sample sites, then the site will be monitored during the remainder of the sampling period to determine if a sample can be taken at the site. If environmental factors inhibit sample collection during the scheduled event, efforts will be made to collect a sample in accordance with field procedures when conditions improve. If conditions do not improve within a three-week period, then a sample will not be collected for that event.

Field sampling in the winter quarter should be scheduled for a time period when temperature inversion conditions are likely to be experienced in the CMP sampling zones. See Section C.2 for additional information on temperature inversions.

Air-deposited contaminants will collect on vegetation and soils. It is important to analyze both media to understand if significant increases in deposition are occurring over time. Soil and vegetation samples can be variable based on weather conditions, e.g., wind and rain. Such variables will increase variance in analyte monitoring during all phases.

8.3 Design Assumptions

Based on the results of the pre-RA, the list of risk-driving analytes was chosen (see Table 3-2). The listed metals and organic compounds disperse in air and collect in the environment. The media sampled are used to determine if concentrations remain at or below concentrations in the pre-RA. The experimental design was optimized to monitor for any significant increases of these analytes during UMCDF operations.

8.4 Procedures for Locating and Selecting Environmental Samples

The frequency of sampling and the sample site locations were chosen during the development of the CMP. The selection of the CMP sample sites in each zone was based on a variety of factors, including prevailing wind direction, location of population centers, accessibility, review of the pre-RA, and discussions with the DEQ and the Interested Parties Workgroup. Soil sampling stations were constructed at each site. Upon completion of the soil sampling station, a global position system (GPS) measurement was taken. Approximate site dimensions for biota collection are also shown in Appendix D.

The Perimeter Monitoring Network was constructed based on the review of the available meteorological, air-dispersion modeling, and population data (U.S. Army, 1998c). This network is composed of twelve sampling stations surrounding the UMCDF, close to the UMCD fence line. All sites have easy access and utilities.

9. Sampling Methods Requirements

Sampling method requirements include instructions on the sampling methods, equipment, sample containers, sample preservation, and holding times. The sampling methods requirements for air monitoring can be found in Appendix A. The sampling methods requirements for soil and biota can be found in Appendix C.

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10. Sample Handling and Custody

Health and safety procedures guide decisions of the field samplers such that their health and safety are protected during collection and handling of the samples. These procedures include guidelines on sample site obstructions (e.g., crossing barbed-wire fences), collection and handling of small mammals, and chemicals used for preservation and cleaning.

Procedures describe methods to ensure samples are identified and controlled in a consistent manner. Identification systems ensure traceability of samples from the time and place of collection through shipment to authorized persons or organizations and/or disposition. Quality control (QC) samples are identified within project documentation to enable tracing the relationship of QC data to specific samples. Each sample has a unique identification number and is recorded in appropriate field and project documentation (i.e., field data sheets) with information describing the sample. Labels are applied to sample containers and include sample identification number, date and time of collection, media, preservative used, analysis required, and the collector's initials or signature.

Whenever possible, sample preservatives are added to the sample container before sample collection or immediately upon sample collection. The analytical procedure specifies the acceptable preservation technique (acidification, chemical addition, or refrigeration/freezing).

Samples are placed in coolers containing ice immediately after sampling. QC samples are also placed in the cooler, along with a temperature sample that is used during shipping. Temperature samples are read upon receipt at the laboratory and shall be <6°C. If this temperature measurement exceeds the required range, an evaluation shall be made as to the appropriateness of sample analysis (see Section 16, Corrective Actions and Assessment).

The CMP contractor established procedures to control samples during handling and transfer to preclude loss of identity, damage, deterioration, and loss of sample. Chain-of-custody documents accompany samples at all times. The field custodian completes, dates, and signs the appropriate sections of the chain-of-custody. Verification of sample identification and integrity is performed before acceptance of the sample from another staff member or organization for introduction to storage or delivery to the laboratory. When transferring samples, the person who accepts the samples legibly prints and signs their name and records the date and time of the transfer on the chain-of-custody record. If the transfer of custody is between companies, the company affiliation is noted along with the signatures.

Only the necessary information is transmitted to the laboratory, not including the source of the sample or observations. The unique sampling number is not too descriptive as to allow bias on the part of the laboratory technicians.

Table 10-1. lists the minimum information required in field records and on the completed chain-of-custody form.

Table 10-1. Information Required in Field Records and Chain-of-Custody Forms

Required Information	Field Records	Chain-of-Custody Form*
Project name	X	X
Unique sampling number	X	X
Date and time sample collected	X	X
Analysis required	X	X
Name of sampler	X	
Signature of field custodian		X
Source of sample (name, location, etc.)	X	
Matrix		X
Preservatives		X
Observations, including weather or disturbances	X	
Serial number of certified bottles	X	
Transportation containers		X
Signatures of individuals involved in sample transfer		X
Date and time of transfers		X

*Note that the shipper is not required to sign off on the chain-of-custody form, but that the shipping papers will serve as part of the chain-of-custody records.

11. Analytical Methods Requirements

In conducting the CMP, laboratories analyze the projected number of samples within required holding times and comply with analytical and quality assurance/quality control criteria specified in this SAP. Each laboratory provides analytical services that subscribe to appropriate procedures and protocols described herein.

11.1 Air Analytical Requirements

Air is monitored with DAAMS tubes, which are analyzed according to methods detailed in Table 11-1. Method testing was performed for each method described in the table. The Reportable Limit is used by the UMCDF air monitoring laboratory to describe the limit at which notifications are made and corrective actions are taken (see footnote to Table 11-1). Further information on analysis of DAAMS samples is provided in Appendix B.

11.2 Soil and Biota Analytical Requirements

Soil and biota samples are analyzed according to the methods detailed in Table 11-2 and Table 11-4. Method testing was performed for each method described in these tables. The Reporting Limit is the level that the nonair laboratory is required to meet or be below when determining the following:

- Method Detection Limit (MDL) is a measure of the minimum concentration of a substance that can be measured and reported with 99-percent confidence that the analyte concentration is greater than zero, and is determined from the analysis of a sample in a given matrix containing the analyte (40 CFR Part 136 Appendix B). Analytical MDLs are determined by procedures described in 40 CFR Part 136 Appendix B. MDLs will be determined for chemical agent analyses in soil.

- Practical Quantitation Limit (PQL) is the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operations. Analytical PQLs are determined after using the procedures described in SW-846 (USEPA, 1996). PQLs will be determined for organic analyses.

- Instrument Detection Limit (IDL) is a measure of the minimum concentration of a substance that can be measured and reported with 99-percent confidence that the analyte concentration is greater than zero. Analytical IDLs are determined by procedures described in *U.S. Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) for Inorganic Analyses* (ILM02.0). IDLs will be determined for metals analyses.

Concentrations of polychlorinated biphenyl (PCB) coplanar congeners are determined using a modification of SW-846 Method 8082. For individual congeners which coelute, the peak is assigned to the congener required for the Toxic Equivalency (TEQ) calculation. These congeners are listed in Table 11-2 and Table 11-3. PCB 118 and PCB 123 coelute; and, consequently, will be reported as a sum. PCB 156 and PCB 157 also coelute; and, consequently, are reported as a sum. In addition to the listed congeners, total PCBs are reported by integrating the entire chromatogram. Further information about TEQ calculations can be found in Section 18.4

SW-846 Method 7062 was modified to improve performance. The method utilizes manual addition of the prereductant, addition of ascorbic acid as well as potassium iodide to the prereductant, and use of flow injection determination rather than continuous injection. In addition, acid strengths, gas flow rates, and reagent strengths are optimized for the particular instrumentation.

Table 11-4 requires use of a National Oceanic and Atmospheric Administration (NOAA) procedure (NOAA, 1993) for the preparation of biota samples for PCB analysis. The method allows use of Soxhlet extraction instead of a micronizer. Soxhlet extraction efficiency must meet SAP analytical performance specifications prior to use on actual samples.

Table 11-1. Analytical Methods, Preparation Methods, Reportable Limit, and Holding Times for Air Media

Air Media	Analytical and Preparation Method	Reportable Limit*	Holding Time
GB, VX, and HD	UM-0000-M-556 UM-0000-M-557	GB: 5E-07 mg/m^3 VX: 3E-07 mg/m^3 HD: 1E-05 mg/m^3	72 hours

*The Reportable Limit is 0.5 GPL. The GPLs are: GB=1x10^{-6} mg/m^3; VX=6x10^{-7} mg/m^3; HD=2X10^{-5} mg/m^3. The GPL is a 24-hour time-weighted average for GB and VX and a 12-hour time-weighted average for HD.

Table 11-2. Analytical Methods, Preparation Methods, Reporting Limits, and Holding Times for Soil Media

Type		Soil Media	Preparation Method	Analytical Method	Reporting Limits[6]	Holding Times
Metals		Arsenic, Beryllium, Chromium, Manganese	SW-846 Method 3051 or SW-846 Method 3050B	[1] SW-846 Method 6010B	1.0 mg/kg 0.5 mg/kg 1.5 mg/kg	180 days from collection
Metals		Antimony, Thallium Cadmium	SW-846 Method 3051 or SW-846 Method 3050B	[1] SW-846 Method 6020	1.0 mg/kg 0.033 mg/kg	180 days from collection
Metals		Mercury	SW-846 Method 7471A	[1] SW-846 Method 7471A	1.0 mg/kg	28 days from collection
Organic	Semivolatile	4-Methylphenol	SW-846 Method 3540C (Soxhlet Extraction)	[1] SW-846 Method 8270C	333 µg/kg	14 days from collection to extraction, 40 days from extraction to analysis
Organic	Semivolatile	bis(2-Ethylhexyl) phthalate				
Organic	PCB	PCB 77, PCB 105, PCB 114, PCB 118, PCB 123, PCB 126, PCB 156, PCB 157, PCB 167, PCB 169, PCB 170, PCB 180, PCB 189	SW-846 Method 3540 or equivalent	[1,4] SW-846 Method 8082	33 µg/kg	14 days from collection to extraction, 40 days from extraction to analysis
Organic	Dioxins/Furans	TCDD, TCDF PeCDD, HxCDD, HpCDD, PeCDF, HxCDF, HpCDF OCDD, OCDF[5]	SW-846 Method 8290	[1] SW-846 Method 8290	1.0 pg/g 2.5 pg/g 2.5 pg/g 5.0 pg/g	30 days from collection to extraction, 45 days from extraction to analysis
Chemical Agent	GB/VX	O-isopropyl methyl-phosphonofluoridate and O-ethyl-S-(2-diisopropyl-aminoethyl)methyl-phosphonothiolate	[2] Laboratory Specific Method	Laboratory Specific Method	Established by Laboratory [3,7]	7 days from collection to extraction, 7 days from extraction to analysis
Chemical Agent	HD	bis(2-chloroethyl)sulfide				

[1]Method Blank (MB), Matrix Spike (MS), Matrix Spike Duplicate (MSD), Laboratory Control Sample (LCS).
[2]MS/MSD, MB, Spiked MB (SpkMBlk)
[3]The method detection limits for chemical agents in soil are laboratory-specific, but are determined in accordance with SW-846 and 40 CFR Part 136 Appendix B, with the following exceptions:

- The MDL study is repeated if the calculated detection limit is not within 10 times the spike level; seven replicates will be used
- The spike level is within 10 times 20 ppb for GB and VX, and 200 ppb for HD.

[4]This method has been modified as mentioned in the text.
[5]For a complete listing of dioxins and furans, refer to Table 18.1.
[6]Reporting limits in this table are based on MDLs for agent analyses, IDLs for metals analyses, and PQLs for organic analyses.
[7]Reporting limits are the lower limit of the 95% confidence intervals for the practical quantitation limits (PQLs). PQLs are calculatedin accordance with Permit Attachment 2 (Waste Analysis Plan), Appendix C. Primary and confirmatory analysis will be performed in accordance with Permit Attachment 2 (Waste Analysis Plan).

Table 11-3. Analytical Methods, Preparation Methods, Reporting Limits, and Holding Times for Field Blanks[1]

Type		Surface Water Media	Preparation Method[2]	Analytical Method	Reporting Limits[5]	Holding Times
Metals		Arsenic Beryllium, Chromium Manganese	SW-846 Method 3005A	SW-846 Method 6010B	10 µg/L 5 µg/L 15 µg/L	180 days from collection
Metals		Antimony, Thallium Cadmium	SW-846 Method 3005A	SW-846 Method 6020	10 µg/L 0.02µg/L	180 days from collection
Metals		Mercury	SW-846 Method 7470A	SW-846 Method 7470A	10 µg/L	28 days from collection
Organic	Semivolatile	4-Methylphenol	SW-846 Method 3510C (Sep-funnel Liquid/Liquid Extraction)	SW-846 Method 8270C	1 µg/L	7 days from collection to extraction, 40 days from extraction to analysis
Organic	Semivolatile	bis(2-Ethylhexyl) phthalate			10 µg/L	
Organic	PCB	PCB 77, PCB 105, PCB 114, PCB 118, PCB 123, PCB 126, PCB 156, PCB 157, PCB 167, PCB 169, PCB 170, PCB 180, PCB 189	SW-846 Method 3510C or 3520C	[3]SW-846 Method 8082	1 µg/L	7 days from collection to extraction, 40 days from extraction to analysis
Organic	Dioxin/Furans	TCDD, TCDF PeCDD, HxCDD, HpCDD, PeCDF, HxCDF, HpCDF OCDD, OCDF[4]	SW-846 Method 8290	SW-846 Method 8290	10 pg/L 25 pg/L 25 pg/L 50 pg/L	30 days from collection to extraction, 45 days from extraction to analysis

[1]Field blanks are also analyzed for chemical agents using the parameters for chemical agents listed in Table 11-2.
[2]Method Blank (MB), Laboratory Control Sample (LCS).
[3]This method has been modified as mentioned in the text.
[4]For a complete listing of dioxins and furans, refer to Table 18.1.
[5]Reporting limits in this table are based upon IDLs for metals analyses, and PQLs for organic analyses.

Table 11-4. Analytical Methods, Preparation Methods, Reporting Limits, and Holding Times for Biota Media (Vegetation and Small Mammals)

Type		Biota Media	Preparation Method	Analytical Method[1]	Reporting Limits[4]	Holding Times
Metals		Antimony, Thallium Cadmium	NOAA (1993) Or equivalent total digestion	EPA Method 200.8	0.1 mg/kg 0.02 mg/kg	180 days from collection
		Arsenic	NOAA (1993) Or equivalent total digestion	SW-846 Method 7062 (modified) [2]	0.1 mg/kg	180 days from collection
		Beryllium, Chromium Manganese	NOAA (1993) Or equivalent total digestion	SW-846 Method 6010B	0.2 mg/kg 0.2 mg/kg	180 days from collection
		Mercury	NOAA (1993) Or equivalent total digestion	EPA Method 245.6	0.01 mg/kg	28 days from collection
Organic	PCB	PCB 77, PCB 105, PCB 114, PCB 118, PCB 123, PCB 126, PCB 156, PCB 157, PCB 167, PCB 169, PCB 170, PCB 180, PCB 189	[2]NOAA (1993)	[2]SW-846 Method 8082; Krahn et al. (1988)	1 µg/kg	14 days from collection to extraction, 40 days from extraction to analysis
	Dioxins/Furans	TCDD, TCDF PeCDD, HxCDD, HpCDD, PeCDF, HxCDF, HpCDF OCDD, OCDF[3]	SW-846 Method 8290	SW-846 Method 8290	1.0 pg/g 2.5 pg/g 2.5 pg/g 5.0 pg/g	30 days from collection to extraction, 45 days from extraction to analysis

[1]Method Blank (MB), Matrix Spike (MS), Matrix Spike Duplicate (MSD), Laboratory Control Sample (LCS).
[2]This method has been modified as mentioned in the text.
[3]For a complete listing of dioxins and furans, refer to Table 18.1.
[4]Reporting limits in this table are based upon IDLs for metals analyses, and PQLs for organic analyses.

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12. Quality Control Requirements

Quality control requirements are discussed for field sampling and laboratory analyses.

12.1 Field Quality Control

To assess the quality of field sampling techniques, field quality control samples are collected. Procedures for collection of field samples are described in Appendix B and Appendix C and are designed to ensure the collection of a representative sample while minimizing potential for contamination from external sources.

Two types of field quality control samples are required:

- Duplicate samples for soil and biota: Field duplicates are used to assess the reproducibility of sample collection techniques.

  A single sample is collected and placed in a sample container. Another sample is taken and placed in another sample container. Soil and vegetation duplicates are collected at the same time as the original sample. Small mammal duplicate samples may be collected at the same time, or during a subsequent visit. Care is taken to make field duplicates indistinguishable so personnel performing analyses cannot determine which samples are duplicates.

  At a minimum, ten percent of each media sampled is prepared and analyzed as a duplicate for the parameters of interest. For example, there are 25 sites where soil samples are collected for risk-driving analytes in April and October (21 in July and January), so a total of 3 samples are collected in duplicate.

- Field Blanks: Field blanks are used to verify sample collection and handling process has not affected the quality of the samples. Field blanks are used to measure the cleanliness of sampling equipment for each media. Each quarter, one field blank is prepared in the field by simulating the collection from decontaminated sampling equipment. Organic-free reagent water is used. The field blank is analyzed for chemical agents and RDAs.

All field quality control samples are recorded as such in the field records.

Field blanks are prepared in the field prior to or during sampling for a specific media. Sample duplicates are prepared in the field and are handled exactly the same as other field samples throughout the analytical procedure. Splits are prepared in the laboratory and are subsequently handled the same as other samples. These quality control samples are analyzed by the laboratory to assess the quality of the sampling methodology. Field QC samples remain blind to the laboratory.

12.2 Laboratory Quality Control

Internal quality control is an important part of the measurement system to ensure analytical results are reliable and data integrity is maintained. Laboratory performance is evaluated through analysis of laboratory quality control samples (in conjunction with field quality control samples, as appropriate).

CMP data validators evaluate analytical performance of the laboratory by reviewing results from analysis of the blank, matrix spike, surrogates, duplicate, and quality control check samples. Evaluation is also based upon instrumental calibration, instrument performance, percent recovery of internal standards, adequacy of detection limits, obtained precision of replicate analyses, and comparison of the percentage of missing or undetected substances among replicate samples. A list of sources of standards will be provided upon request from the analytical laboratory.

The following describes the batch preparative quality control samples that may be required by the analytical method and as indicated in Table 11-2 and Table 11-4.

- Method Blank (MB): A Method Blank consists of Type II ASTM water that is subjected to the sample preparation or extraction procedures and analyzed as a sample. It serves to measure contamination associated with laboratory storage, preparation, or instrumentation. One MB is required for every 20 samples analyzed.

  If the analyte of interest is above the Reporting Limit, corrective action will be taken except for common solvents, such as methylene chloride, acetone, toluene, and 2-butanone.

- Spiked Method Blank (SpkMBlk): A Spiked Method Blank consists of Type II ASTM water to which known amounts of analyte have been added and is subjected to the sample preparation or extraction procedures and analyzed as a sample. One SpkMBlk is required for every 20 samples analyzed.

- Surrogates: Surrogates are measured amounts of certain compounds added before preparation or extraction of a sample. These compounds are similar to the chemical of interest, but differ by molecular weight or chemical configuration (e.g., ortho vs. meta). Recovery of a surrogate is measured to determine systematic extraction losses of analytes. Surrogate standards are added prior to extraction of the sample to monitor the extraction efficiency of the method.

- Matrix Spike (MS): A Matrix Spike is an aliquot of sample to which known amounts of analyte have been added. It is subjected to the sample preparation or extraction procedures and analyzed as a sample. Stock solutions used for spiking are purchased or prepared independently of calibration standards. One MS is required per 20 samples analyzed.

  The spike recovery measures the effects of interferences in the sample matrix and reflects the accuracy of the determination.

- Matrix Spike Duplicate (MSD): A Matrix Spike Duplicate is an additional aliquot of sample to which known amounts of analyte have been added and subjected to the same preparation and analytical scheme as the original sample. The Relative Percent Difference (RPD) between MS and MSD measures the precision of a given analysis. One MSD is required per 20 samples analyzed.

- <u>Laboratory Control Sample (LCS):</u> Laboratory Control Sample is created from a standard reference material which is a material similar in nature to the sample being processed [traceable to the National Institute of Standards and Technology (NIST) or other agencies, to the extent possible]. A known amount of analyte is added to an aliquot of Type II ASTM water. The LCS is subjected to the sample preparation or extraction procedure and analyzed as a sample. The stock solutions used for LCS recovery tests the function of analytical methods and instrumentation. One LCS is required per 20 samples analyzed.

Laboratory splits are used to assess the homogenization techniques. Samples are homogenized, then divided into two equal parts for analysis. Care is taken to make both samples representative of materials present, including heterogeneities. If applicable, ten percent of the media sampled may be prepared and analyzed as splits for parameters of interest.

Laboratory quality control requirements are specified for analysis of DAAMS tubes (WDC, 2006a, 2005b, 2006b).

The laboratory qualifies data in accordance with the UMCDF Data Validation Methodology (reference Permit Condition II.A.4).

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13. Instrument Calibration and Frequency

Chemical measurements are made using a system that includes sample preparation and measurement processes. All aspects of the measurement process are calibrated. Temperature, pressure, humidity, particle size, volumetric capacity, mass, and flow rate data may be needed as well, using accurately calibrated instrumentation for their measurement. Accordingly, any of the instruments, standards, and methods used for these purposes will be calibrated to assure that their accuracy is within acceptable limits.

13.1 Calibration Records

The laboratory keeps a record of raw calibration data for all methods. Calibration records (initial calibration, initial calibration verification, and continuing calibration verification) include raw calibration data, associated reports, date of analysis, and analyst's name or initials, at a minimum. Calibration data are traceable to standards used. All samples analyzed are traceable to the calibration under which results were produced. Sample analysis only proceeds when measurement systems are accurately calibrated. Records are maintained according to Section 7, Documentation and Records.

13.2 Balances, Thermometers, and Pipettes

Calibration records of measurement devices such as balances and thermometers for critical mass and temperature measurement are maintained. All analytical balances are calibrated annually, at a minimum, by an approved metrology organization. An approved metrology organization is one that has been evaluated and selected on the basis of specified criteria consistent with industry standards for the calibration of balances (see Section 14, Procurement of Items and Services). Calibration records contain the date of calibration, initials of the person performing the calibration, the identity of the device or serial number, and the date calibration expires. This information is affixed on or near the balance. Acceptable balance calibration is verified and documented daily when in use. The accuracy of thermometers and thermocouples used for critical temperature measurements (e.g., refrigerator temperature for sample storage) is verified annually by comparing readings of such devices with readings of a NIST-traceable, factory-certified thermometer.

It is considered good laboratory practice that mechanical pipettes used for critical measurements be verified to ensure acceptable performance. Daily, before use, single-delivery volume checks are performed and documented, as necessary.

13.3 General Requirement for Standards

Standards used for calibration of measurement systems are traceable to a nationally or internationally recognized standard agency source or measurement system, if available. A program is in place to verify and document the accuracy and traceability of all working standards against appropriate primary grade standards or the highest quality standards available.

Standards used for calibration are accompanied by a certificate of analyses or record that includes the vendor, lot number, purity, date of preparation and/or expiration, and concentration of the standard material. At a minimum, the following information is maintained on standard preparations and, if possible, placed on the label.

- Name of preparer
- Date prepared
- Standard identification
- Dilution performed
- Final concentration
- Expiration date or shelf life

When recognized standard material is not available or purchase is impractical, the laboratory will attempt to purchase alternate standard material from a reliable source. The laboratory has procedures in place to determine acceptability of such materials.

13.4 Calibration of Laboratory Measurement Systems

The calibration process correlates instrument response to an established concentration. Calibration procedures established by the laboratory consider the manufacturer's recommendations and the requirements of the methods stated in Table 11-1 through Table 11-4.

Initial calibration verification checks the accuracy of calibration and standards used. A level of independence exists between materials used for calibration and for initial calibration verification when such materials are available. When an independent source is not available, the laboratory will attempt to purchase an alternate lot of the same material.

Continuing calibration verification checks the stability of the original calibration over time. This standard is from the same source as that used for either calibration or initial calibration verification.

Minimum requirements of calibration, frequency, and acceptance criteria for laboratory measurement systems are found in the methods stated in through Table 11-4.

The laboratory takes corrective action when measurement systems fail calibration QC criteria. Sample analysis does not proceed until the calibration QC criteria have been met.

13.5 Instrument/Equipment Maintenance

A periodic preventative and corrective maintenance program for instrumentation and equipment is maintained. This assures availability and satisfactory performance of the instrumentation and equipment. Equipment and/or instrumentation requiring periodic maintenance are identified. All instrumentation/equipment subject to maintenance or repair are recalibrated, as necessary, before use.

The following items were considered for inclusion in the program:

- Routine inspections (e.g., daily, weekly, or as needed) are based on the manufacturer's recommendations, performed by the responsible staff, and followed by corrective actions, if necessary. Where appropriate, anomalies are noted in a logbook, record sheet, or electronic record system, which is kept close to the instrument/equipment.

- Significant corrective action(s) for the instrument/equipment are documented in a logbook, record sheet, or electronic record system**,** if necessary. The notation may include a description of the corrective action, the date performed, and the initials of the person who performed the corrective action.
- Instrument/equipment maintenance is performed by appropriate personnel. This includes services provided through an external maintenance contract.
- Instrument/equipment maintenance and repairs are documented, when appropriate, including the date and signatures of personnel who performed the maintenance. This documentation, whether in a logbook, record sheet, or electronic records system, is reviewed annually.
- Critical spare parts list and an inventory are maintained, if needed. A written contingency plan specifying backup equipment is maintained.

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14. Procurement of Items and Services

A process is maintained to control purchased items and services (e.g., metrology services, analytical services, certified sample bottles, standards, and reagents). Procured items and services meet established requirements and perform as specified. Prospective suppliers are evaluated and selected on the basis of specified criteria. Processes to ensure that approved suppliers continue to provide acceptable items and services are maintained.

The procurement process provides for the following:

- Defining applicable technical and administrative requirements for subcontracted services and items including acceptance criteria
- Selecting qualified subcontractors
- Verifying that qualified subcontractors can continue to provide acceptable products and/or services
- Accepting purchased items and/or services
- Receiving and maintaining procurement records including evidence of conformance
- Documenting nonconforming items and services

Qualified suppliers and, as necessary, subtier suppliers are monitored periodically to ensure acceptable items and services continue to be supplied.

Procurement documents contain information clearly describing the item or service needed and associated technical and quality requirements. Procurement documents specify the quality system requirements within this plan for which the supplier is responsible. Procurement documents are reviewed for accuracy and completeness by qualified personnel before release. Changes to procurement documents receive the same level of review and approval as the original documents.

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15. Data Management

Data management consists of five areas where data are collected, analyzed, and reported: field sampling data, laboratory analyses, data validation, statistical analyses reports, and quarterly/annual reports. A database is maintained, which contains fields to store all areas identified above. As much as possible, data are transferred electronically through data management areas to avoid transcription errors. The WDC technical manager is responsible for checking all data entered into the database or transferred into the database are consistent and correct, including field, laboratory, validation, and statistical information. This includes meeting all records management criteria in Section 7.3. In addition, the WDC technical manager is responsible for checking the consistency of units and terminology in data fields.

15.1 Database for Data Management

The notes from field sampling events are recorded and entered into the database. A system is in place to assign sample identification numbers. Field notes will include the following for each site:

- Date and time
- Weather conditions (site-specific)
- Chain-of-custody information
- Any nonconformance with the SAP

The laboratories develop contract laboratory program (CLP)-equivalent analytical data packages. These packages are delivered to the CMP contractor data validators. Data validators send a report of the validated data packages to the CMP contractor. Validation flags are entered into the database by the WDC technical manager.

The results of the certified statistical analyses are included in the database. Quarterly and annual reports contain information from the databases. Section 20, Reporting, contains more information about the reports.

15.2 Data Management Requirements

All raw data and data packages associated with analysis of CMP project samples will be archived for a minimum of five years after closure of the UMCDF. This includes field notebooks, data notebooks, hardcopies of data packages from laboratories and CMP contractor data validators, certified statistical analysis reports, and any associated workbooks and calculations. The analytical laboratory will provide notification to the CMP contractor prior to the disposal of any archived materials.

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16. Corrective Actions and Assessment

16.1 Corrective Action

A system is maintained to identify, correct, and prevent quality problems. Items, services, and processes that do not meet established requirements are identified, controlled, and corrected according to the importance of the problem and the work affected. For significant problems, correction includes identifying the causes of problems and working to prevent their recurrence. Item characteristics, process implementation, and other quality-related information are reviewed, and data are analyzed to identify items, services, and processes needing improvement. Examples of conditions where corrective action is required are as follows:

- Documentation errors
- Diverse trends in the analysis of standards
- Failure to comply with approved technical and administrative procedures
- Failure to follow the preventative maintenance program
- Failures in instrument systems that would impact data quality or delivery
- Failures in performance evaluation sample analysis audits, surveillances, and assessments
- Validation and/or verification issues negatively impacting reported results
- Recurring adverse problems
- Misidentification or mishandling of samples
- Nonconforming materials, parts, or components

These types of issues are also considered deviations and must be included in the applicable CMP quarterly report.

The corrective action process describes the provisions for determining the cause of nonconforming items and processes. The extent of analysis is commensurate with the significance of the problem (i.e., graded approach).

The corrective action process includes the following requirements: 1) determining the significance of the problem, 2) taking effective corrective action based on the potential impact on the data quality, 3) eliminating or minimizing the recurrence of the problem, and 4) verifying implementation of corrective action.

Provisions for making corrective actions include, but are not be limited to, the following:

- Determining the cause of the adverse condition
- Determining the technical and work activities associated with the quality problem
- Ascertaining the quality problem's generic implications
- Determining the extent to which similar quality problems have been recognized
- Determining the effectiveness of corrective actions that were taken
- Determining the impacts on the completed work
- Recommending actions that can be taken by the responsible organization to prevent recurrence

- Determining whether stopping the work associated with the activity is necessary
- Determining measures to prevent the use of nonconforming materials, parts, or components including identification, documentation, evaluation, disposition, and segregation (where practical)

Significant problems discovered by project personnel are immediately reported to the CMP contractor program manager and WDC technical manager for resolution. Significant problems involving data quality or sample integrity are thoroughly documented.

The WDC technical manager is included on the distribution of all audit reports. Significant problems encountered in day-to-day operations are reported to line management immediately by the CMP contractor program manager.

16.2 Assessments

Assessments are evaluations intended to provide an increased understanding of the program or system being evaluated and to provide a basis for improving such programs or systems. An assessment program is maintained to determine the effectiveness of systems and verify that activities comply with the stated requirements.

The program includes:

a) Documented schedule
   - Topic area
   - Organization being assessed
   - Approximate date the assessment is performed

b) Assessor qualifications, responsibilities, authorities, and accountabilities

c) Assessment plans prepared, reviewed, and approved prior to initiation, including:
   - The organization and work that is being assessed
   - The location, time, and duration
   - The documents that specify the criteria against which the work is being measured
   - The identification of assessment personnel
   - Signatures and dates of approval

d) Checklists used during the assessment process

e) Reporting of assessment results which include:
   - A specified format
   - Reference to the assessment plan
   - A summary of the results of the assessment
   - A discussion of the deficiencies, observations, and concerns that were identified as a result of the assessment
   - Action owner(s)

- Associated dates for follow-up actions
- Required distribution for all related documentation

At a minimum, the laboratory and/or field assessment program addresses the following types of assessments:

a) Management Assessments – Assessments directed by those immediately responsible for overseeing and/or performing the work. The following is evaluated:
   - Effectiveness of management control systems
   - Adequacy of resources and personnel
   - Effectiveness of training and assessment
   - Applicability of data quality requirements

b) Technical System Assessments – Assessments directed by the laboratory or the field and/or program quality assurance function. Technical system assessments consist of a review of laboratory or field operations, specific procedures, and related documentation. Areas of interest may include:
   - Measuring and testing equipment calibration or control procedures
   - Document control procedures
   - Technical procedure compliance
   - Adherence to data quality requirements
   - Identification, control, storage, and preservation of samples or standards

c) Performance Evaluation Assessments – Assessments coordinated by the quality assurance function, whenever practicable, that are generally blind or double-blind tests introduced into the field or lab to provide information regarding the effectiveness of these processes. Performance evaluation programs are either external to the organization, internal, or both.

d) Data Quality Assessments – Assessments used to evaluate the degree of conformance to data quality requirements. They are performed by the quality assurance representative, whenever practicable.

e) External Assessments – Assessments performed by agencies or groups not under the control of management. External assessments may consist of inspections, interviews, and/or evaluations that focus on the ability to meet program requirements. Management is responsible for initiating, tracking, following up on, and documenting all corrective actions that are required as a result of external assessments.

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17. Reports to Management

A formal mechanism for reporting the status of the program to the CMP contractor management is maintained. At a minimum, reports are issued annually. The reporting system identifies the following:

- Frequency schedule for quality assurance, tasks, and subcontractor reports
- Report recipient(s)
- Report preparer(s)
- Quality assurance reports may include a summary of the results on the following:
    - Performance evaluation assessments
    - Technical system assessments
    - Management system assessments
    - External audits and surveillance activities
    - Data quality and validation assessments
    - Regulatory compliance issues
    - Corrective actions and status
    - Supplier/subcontractor performance

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18. Data Verification, Validation, and Statistical Analyses

18.1 Data Review and Verification

The CMP contractor program manager ensures that soil and biota field data are reviewed. Data concerning the DAAMS tubes are reviewed before the information is submitted to the CMP contractor. Prior to reporting, laboratory personnel (other than the person performing the work) review analytical data for technical adequacy.

Data review consists of:

- Evaluation of method and quality control performance
- Accurate transcriptions
- Correct calculations
- Overall consistency and reasonableness of the data
- Appropriate corrective action, if necessary

The CMP contractor prepares and implements procedures for the verification of supplied data and resolution of anomalies. Verification activities include, but are not limited to, the following:

- Verification that the amount of data requested matches the amount of data received (number of samples for requested methods and analytes)
- Verification of procedures/methods used
- Verification that documentation/deliverables are complete
- Verification that hardcopy and electronic versions of the data are identical
- Verification that data seem reasonable based on analytical methodologies.

18.2 Data Validation

Data validation is performed by a third party (not by the laboratory or the CMP contractor). The laboratory supplies CLP-equivalent analytical data packages intended to support data validation by the third party. The laboratory submits data packages that are supported by quality control test results and raw data.

Controls are in place to preserve the data sent to the validators and allow only additions to be made, not changes to the raw data.

There are three validation levels:

Level A. This level of data validation includes:

- verification of required deliverables,
- requested versus reported analyses,

- evaluation and qualification of results based on holding times, and
- qualification of results based on method blank results.

Level B. This level of data validation includes all items identified in Level A plus evaluation and qualification of results based on the following:

- matrix spike/matrix spike duplicate (MS/MSD) analysis,
- surrogate recoveries, and
- internal standards performance.

Level C. This level of data validation includes all items identified in Levels A and B plus evaluation and qualification of results based on the following:

- initial and continuing instrument calibrations (standards and blanks)
- laboratory control samples,
- instrument tuning,
- analytical sequence, and
- internal standards performance.

At least one laboratory analysis package per quarter is validated by the third-party data validators to Level C. The number of samples in the packages selected for Level C will be maximized, if possible. Half the remaining soil, field blank or biota packages are validated by third party data validators to Level B, with the other half validated to Level A. Through the course of a year, data packages containing soil, field blanks and biota are validated at Level C for each analyte. Following receipt of all the samples at the laboratory, but prior to receipt of the laboratory data, the contractor selects packages for varying levels of validation in accordance with the SAP. Three of the air laboratory analysis packages per quarter are validated to Level C; three packages per quarter are validated to Level B; and three packages per quarter are validated to Level A. The UMCDF Data Validation Methodology is used (reference Permit Condition II.A.4).

18.3 Statistical Analyses

Soil and biota data collected during baseline, before UMCDF agent operations, were used to calculate baseline threshold values for RDAs at each sampling site. Data rejected during data validation were not included in statistical analyses. Methods discussed below determined the levels of RDAs in the environment before the start of UMCDF agent operations. Because chemical agent concentrations are more restricted than RDAs, threshold values were not calculated. Operational data are compared to reporting limits listed in Table 11-1. Threshold values determined statistically above these levels would not be acceptable. Results below these levels would not be reliable given limitations of instrument detection limits.

Air sample data collected during the baseline period was not required to have statistical analyses performed. The purpose of generating a baseline threshold value was to use this value as a comparison during operational and postoperational monitoring to determine if action is necessary. Existing laboratory procedures established action levels as shown in Table 11-1. Response actions are implemented at these levels. Figure 18-1 presents the methodology for determining the baseline threshold values. As seen in this figure, the maximum concentrations in baseline were used in some instances for comparison to operational sampling. The maximum value was determined after the removal of outliers, where appropriate, using the same methods as implemented for outlier removal for calculation of upper tolerance limits (UTLs) in Section 18.3.1. In addition to the procedures described in the figure, distributional comparisons between baseline data and operational data also may be performed to further evaluate differences between phases.

18.3.1 Sample Size, Distributional Form, Nondetect, and Outlier Removal Criteria

The DEQ requires that five samples be collected to evaluate baseline threshold concentrations. As noted in Figure 18-2, if fewer than five samples are ever collected, the distributional form of the data would not be evaluated but the maximum value from the data becomes the baseline threshold value. For all baseline data, five or greater samples were available. The distributional form of the data was evaluated using a Shapiro-Wilk, Anderson-Darling, or other appropriate test. These tests were used to determine whether data were normally distributed. If data were not normal, then baseline threshold values were calculated using a nonparametric 95/95 upper tolerance limit as described in Section 18.3.2 below. If data were determined to be normal, a parametric 95/95 upper tolerance limit (USEPA, 2006a) was calculated (Section 18.3.2).

In general, nondetect values were replaced with one-half of the PQL. However, if all samples were nondetectable values, then the baseline threshold was set to the reporting limit for the purposes of statistical comparisons.

Method B (DEQ, 1994) describes an outlier as a value exceeding the median plus three times the interquartile range. Data determined to be outliers were removed before a baseline threshold value was determined.

18.3.2 Baseline Threshold Evaluation for Nonnormal Data

If data were determined to be nonnormal, then a nonparametric 95/95 UTL of the mean was used to calculate the baseline threshold value. The 95/95 UTL of the mean is defined as the 95 percent upper confidence limit (UCL) on the 95th percentile of the distribution. When sample size was small ($n \leq 20$) a procedure described by Conover (1980, p 112) was used to calculate the 95/95 UTL. When the sample size was large ($n > 20$) a procedure described by Gilbert (1987, p 141) was used to calculate the 95/95 UTL.

18.3.3 Baseline Threshold Evaluation for Normal Data

When data were determined to be normally distributed, baseline threshold values were calculated using a parametric 95/95 UTL (USEPA, 2006a). This agrees with EPA guidance, in which the baseline threshold value is equal to the 95/95 upper tolerance limit of the data (USEPA, 1989 and 1992). The confidence limit constructed around the 95th percentile was based on the mean of the baseline sample data and was equal to the sample mean plus a complicated term of normal quantiles times the sample standard deviation. The 95/95 UTL calculations are provide in EPA guidance on statistical tools (USEPA, 2006b).

Figure 18-1 presents the methodology for determining the baseline threshold values. As seen in this figure, the maximum concentrations in baseline were used in some instances for comparison to operational sampling.

18.3.4 Assessment of Operational and Postoperational Data

For each sampling site, media, and analyte combination, the operational sampling data set will be compared to the baseline threshold determined for that sampling site and analyte (Figure 18-2). According to the DEQ Soil Clean-up Manual (DEQ, 1994), there are two steps in the procedure for comparing operational sampling data to baseline sampling data. First, each operational sample value is compared to the baseline threshold value (BTV). If all operational sample values are less than the BTV, then there is no action taken and the results are documented in a quarterly data report. The second step is taken if any operational sample value exceeds the BTV. The operational sample value is compared to the baseline maximum value (BMV) calculated previously. If the BMV is greater than the operational sample value, then there is no action taken and the results are documented in a quarterly data report**.** Due to very low detection levels for some CMP analytes, an additional step was added to the operational and postoperational data comparison that is not specified in the DEQ Soil Cleanup Manual. This additional step evaluates whether operational results are above reporting limits listed in Table 11-2 and Table 11-3. If the reporting limit is greater than the operational sample value, then there is no action taken and the results are documented in a quarterly data report.

If evaluations indicate increases of chemical concentrations, additional data analysis may include the following:

- Evaluation of the magnitude of results relative to BTV and BMV;
- Evaluation of the historical frequency of results that exceed the BTV and BMV for that site and medium;
- Determination of the spatial and temporal distribution of results that exceed the BTV and BMV;
- Evaluation of the analytical uncertainty;
- Evaluation of the toxicity of the particular analyte exceeding the BTV and BMV;
- More rigorous data validation for the applicable data set.

The results of any applicable data analysis activities will be presented in the quarterly report.

Based on the results of data analysis, the following actions will be considered for results that exceed BTVs and BMVs:

- Identification of any UMCDF and/or UMCD chemical release events during the previous quarter;
- Review of agricultural activities (such as spraying of pesticides) that have occurred in the vicinity of the sample site during the previous quarter;
- Review of operation upsets of other nearby potential sources of the analyte (especially combustion sources);
- Collection of additional samples from the same medium during the subsequent sampling event;
- Use of analytical methods that may indicate the source of the increase (such as pesticide analyses that may indicate agricultural spraying) or that may add information regarding the toxicological significance of the increase (such as metals speciation).

Selection of appropriate action will be made in consultation with the DEQ.

18.3.5 Additional Analyses

Additional analysis will be dependent on the number of operational sampling periods and the number of samples within a zone determined to be greater than both the BMV and BTV. Characteristics of the sampling zone may be used to determine the range of variability in contaminant concentrations that could be expected across the site. This range provides an indication of how much greater an operational sample concentration might be before reaching a level of concern.

Descriptive statistics used to characterize each zone include sample size, mean, standard deviation, the 25th, 50th, and 75th percentiles, and minimum and maximum BTVs and BMV for each analyte. A contour plot of the larger value of either the BTV or BMV may be used to provide a visual characterization of the spatial distribution of selected contaminants. Sites within a zone are considered to be of the same population if they are contained in the same cluster using a multivariate cluster analysis for all detected analytes. Sites within a zone designated as separate clusters are identified and characterized with descriptive statistics. Physical characteristics of these sites will be noted to determine a potential reason for the existing differences.

In the early stages of operational sampling, there may be few to no operational samples determined to be larger than both the BTV and BMV. In this case, operational observations will be determined to be statistically significantly greater than baseline if they can be considered an outlier from the baseline site data using the method described in ASTM E 178-94. The magnitude of the operational sample concentration will be compared to the mean baseline concentration for the cluster for which that site belongs. If the operational sample concentrations fall within a 95-percent confidence interval of the mean for this baseline cluster, then there is no further action taken and the results are documented in a quarterly data report. If the operational sample is greater than the upper confidence limit of the mean, then other evaluations in Figure 18-2 will be considered.

The location of all contaminants determined to be greater than both the BTV and BMV will be examined. If particular sites are continually showing elevated levels of contaminants with a potential adverse impact, then this information will be documented. Activities that may affect the concentration of contaminants at these sites will be identified, and additional sampling or analytical techniques may be requested (Figure 18-2).

If there are at least three operational sampling values for a given site (i.e., at least three sampling periods) or at least three sampling values within the same cluster from at least three sampling periods with elevated concentrations of contaminants, then a Mann-Whitney test will be conducted to determine if the operational samples are statistically greater than the baseline. The Mann-Whitney tests the null hypothesis H_0 (the populations of baseline and operational concentrations have identical distributions) against the alternative H_1 (the populations differ with respect to location). If greater than five operational sampling values at a given site (or within a cluster over more than five sampling periods) have elevated contaminant concentrations, then a regression analysis will also be conducted to determine if the concentrations are increasing significantly with time either at the site or within the cluster. A contour map of elevated contaminant concentrations will be used to document potential spatial trends in the data.

18.4 Toxic Equivalency Calculations

Seven dioxin congeners, 10 furan congeners, and 13 PCB coplanar congeners are monitored for the CMP (Table 3-2). These compounds are used to calculate a Toxic Equivalency (TEQ) for the mixture using

Toxicity Equivalency Factors (TEFs) in accordance with USEPA methodology (USEPA, 1998). The TEFs for each compound are shown in Table 18-1. The TEQ for each compound is calculated by multiplying the concentration of individual congeners by their respective TEF. The sum of the TEQ concentrations for the individual congeners is the TEQ concentration for the mixture. Both the TEQ concentration for the mixture and the concentrations of individual compounds will be evaluated in statistical analyses.

Figure 18-1. Determination of Baseline Threshold Values

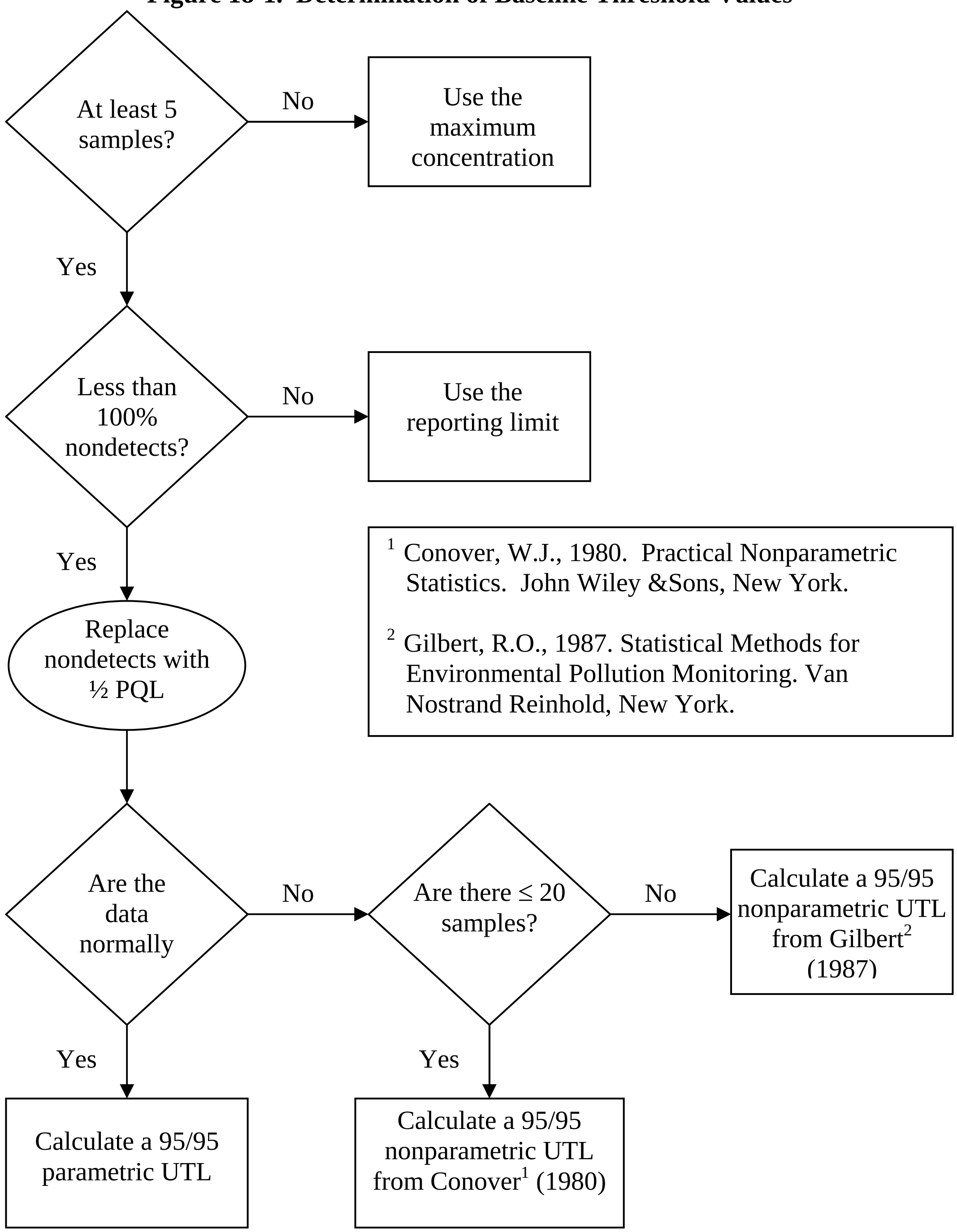
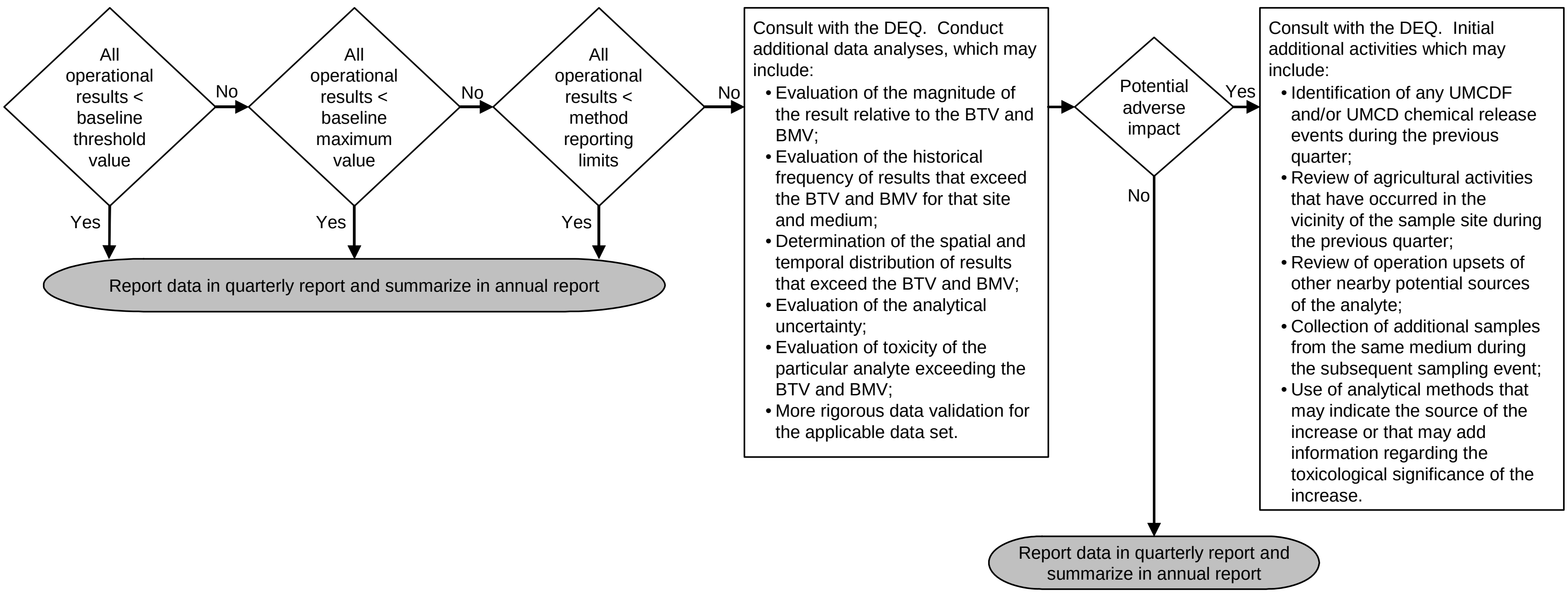


Figure 18-2. Comparison of Operational and Postoperational Data to Baseline Data[a]



[a] Based on Oregon DEQ Soil Cleanup Manual, Oregon Department of Environmental Quality, Waste Management and Cleanup Division; OAR 340-122-045 and 046, April 1994.

Table 18-1. Toxic Equivalency Factors for Dioxins, Furans, and PCBs

Analyte	TEF
Dioxins	
2,3,7,8-tetrachlorodibenzo-p-dioxin	1.0
1,2,3,7,8-pentachlorodibenzo-p-dioxin	0.5
1,2,3,4,7,8- hexachlorodibenzo-p-dioxin	0.1
1,2,3,6,7,8- hexachlorodibenzo-p-dioxin	0.1
1,2,3,7,8,9- hexachlorodibenzo-p-dioxin	0.1
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	0.01
1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin	0.001
Furans	
2,3,7,8-tetrachlorodibenzofuran	0.1
1,2,3,7,8-pentachlorodibenzofuran	0.05
2,3,4,7,8- pentachlorodibenzofuran	0.5
1,2,3,4,7,8-hexachlorodibenzofuran	0.1
1,2,3,6,7,8- hexachlorodibenzofuran	0.1
1,2,3,7,8,9- hexachlorodibenzofuran	0.1
2,3,4,6,7,8- hexachlorodibenzofuran	0.1
1,2,3,4,6,7,8-heptachlorodibenzofuran	0.01
1,2,3,4,7,8,9-heptachlorodibenzofuran	0.01
1,2,3,4,6,7,8,9-octachlorodibenzofuran	0.001
PCBs	
3,3’,4,4’-tetrachlorobiphenyl (PCB 77)	0.0005
2,3,3’,4,4’-pentachlorobiphenyl (PCB 105)	0.0001
2,3,4,4’,5-pentachlorobiphenyl (PCB 114)	0.0005
2,3’,4,4’,5-pentachlorobiphenyl (PCB 118)	0.0001
2’,3,4,4’,5- pentachlorobiphenyl (PCB 123)	0.0001
3,3’,4,4’,5- pentachlorobiphenyl (PCB 126)	0.1
2,3,3’,4,4’,5’-hexachlorobiphenyl (PCB 156)	0.0005
2,3,3’,4,4’,5’- hexachlorobiphenyl (PCB 157)	0.0005
2,3’,4,4’,5,5’- hexachlorobiphenyl (PCB 167)	0.00001
3,3’,4,4’,5,5’- hexachlorobiphenyl (PCB 169)	0.01
2,2’,3,3’,4,4’,5-heptachlorobiphenyl (PCB 170)	0.0001
2,2’,3,4,4’,5,5’- heptachlorobiphenyl (PCB 180)	0.00001
2,3,3’,4,4’,5,5’-heptachlorobiphenyl (PCB 189)	0.0001

19. Software and Database Control

Software systems are separated by application into two categories: administrative and technical. Administrative software systems are used to manage the workflow or to monitor performance against administrative requirements. Examples of administrative software systems are those that control sample tracking, procedural control, training, and reporting. Technical software systems are used to control laboratory systems and to accumulate and reduce data. Examples of technical software systems are those that provide instrument interface, calculations, calibration control, and control charts. Databases are included in administrative or technical software.

Software control requirements applicable to commercial and laboratory-developed software are maintained.

For commercial software, acceptance testing is performed when installed, after changes, and periodically during use, as appropriate.

For laboratory-developed software, a copy of the original program code is maintained, acceptance tested, and all changes include a description of the change, authorization for the change, and test data that validates the change.

Requirements are maintained for the backing up software and electronic data at regular intervals. The frequency of the backups is based on quantity of data and impact of data or software loss.

Software user manuals are available to personnel using the software.

Software error detection and reporting systems are maintained.

The senior statistician will verify software calculation of statistical analysis. The senior statistician will confirm that the data were correctly entered into the software and verify that decisions made by the statistician followed the statistical approach in Section 18.3. The statistician and senior statistician will sign a certification statement and sign each page of applicable spreadsheet printouts.

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20. Reporting

There are three types of reports generated as part of the CMP: 1) quarterly reports; 2) annual reports; and 3) information distributed on an Internet server. These reports will function to keep WDC, the CMA, the DEQ, and the public informed of the results of the CMP.

20.1 Quarterly Reports

Quarterly reports are prepared and distributed to the CMA and the DEQ. The reports contain all information collected over the previous quarter, including a summary of field observations, all laboratory and data validation results, and a summary of any reports of deficiencies or nonconformances. During operational monitoring the quarterly reports include comparisons to baseline values.

20.2 Annual Reports

Annual reports summarize the previous four quarters of monitoring and include trending analyses. The annual report summarizes field activities, laboratory results, and any changes to the SAP. Annual reports are distributed to the CMA and the DEQ.

Baseline threshold values for all sample sites, based on media and analyte, were reported in the Baseline Report (WDC, 2003) or the latest revision submitted to the DEQ. Comparison of operational monitoring results to the baseline values is included in all subsequent quarterly reports and summarized in annual reports. Annual reports are due on 31 December of each year.

20.3 Information Distributed on an Internet Server

Following submittal of quarterly reports to the DEQ, a summary of the data will be available on the CMP web site (www.umatilla-cmp.org). Annual reports will be made available in the same fashion.

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21. References

American Society for Testing and Materials (ASTM), 1994, American Society for Testing and Materials Standard Practice for Dealing with Outlying Observations, Designation: E 178-94.

Conover, W.J., 1980. Practical Nonparametric Statistics. John Wiley & Sons, New York.

Center for Disease Control and Prevention, 1993, *Hantavirus Infection – Southwestern United States: Interim Recommendations for Risk Reduction,* "Morbidity and Mortality Weekly Report", July 30, 1993, 42(RR-11): 1-13. Available URL: http://www.cdc.gov/epo/mmwr/preview/index93.html

Ecology and Environment, Inc., 1997, *Pre-Trial Burn Risk Assessment, Proposed Umatilla Chemical Demilitarization Facility, Hermiston, Oregon*, prepared for Oregon Department of Environmental Quality, February 1997.

Gilbert, R.O., 1987. Statistical Methods for Environmental Pollution Monitoring. Van Nostrand, Reinhold, New York.

Krahn, M.M, CA Wigren, R.W. Pearce, S.K. Moore, R.G. Bogar, W. D. McLeod, Jr., S.L. Chan, and D.W. Brown, 1988, *New HPLC Cleanup and Revised Extraction Procedures for Organic Contaminants,* NOAA Technical Memorandum MNFS F/NWC-153, Standard Analytical Procedures of the NOAA National Facility, 1988, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Seattle, WA.

Mills, J.N., et al., 1995a, *Guidelines for Working with Rodents Potentially Infected with Hantavirus*, Journal of Mammology, 76(3):716-722.

Mills, J.N., et al., 1995b, *Methods for Trapping and Sampling Small Mammals for Virologic Testing*, U.S. Department of Health and Human Services, September, 1995.

National Oceanographic and Atmospheric Administration (NOAA), 1993, *Sampling and Analytical Methods of the National Status and Trends Program National Benthic Surveillance and Mussel Watch Projects 1984-1992*, NOAA Tech. Mem. NOS ORCA 71, NOAA Silver Spring, Maryland. Available URL: ftp://seaserver.nos.noaa.gov/publications/cmbad/1_CMBAD_93-20/93-20.pdf

Oregon Department of Environmental Quality (DEQ), 1997, *Permit for the Storage and Treatment of Hazardous Waste, issued by the State of Oregon Department of Environmental Quality to the U.S. Army Umatilla Chemical Depot*, effective 12 February 1997 through 12 February 2007, Identification No. OR6 213 820 917 (re-issued January 1999 with new Identification No. ORQ 000 009 431).

Oregon Department of Environmental Quality (DEQ), 1994, *Waste Management and Cleanup Division, Soil Cleanup Manual*, OAR-340-122-045 and -046, April 1994.

U.S. Army, 1996, *U.S. Army Program Manager for Chemical Demilitarization, Sampling Analysis Report, Umatilla Depot Activity*, January 1996.

U.S. Army, 1998c, *U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), Ambient Air Quality Consultation No. 43-EN-8044-98, Criteria for Deployment of a Perimeter Monitoring Network for the Umatilla Chemical Agent Disposal Facility, Umatilla Chemical Depot, Umatilla, Oregon*, July 1998.

U.S. Army, 1999, *U.S. Army Program Manager for Chemical Demilitarization, Comprehensive Monitoring Program Workplan for the Umatilla Chemical Agent Disposal Facility and the Umatilla Chemical Depot*, March 24, 1999.

U.S. Army, 2004, U.S. Army Chemical Materials Agency, Programmatic Monitoring Concept Plan, Final, June 2004.

U.S. Environmental Protection Agency (USEPA), 1986 (Revised 1996), *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846,* 3rd ed. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C. Available URL: http://www.epa.gov/epaoswer/hazwaste/test/main.htm

U.S. Environmental Protection Agency (USEPA), 1989, *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities,* Interim Final Guidance, Office of Solid Waste, Waste Management Division, EPA/530-SW-89-026, February 1989.

U.S. Environmental Protection Agency (USEPA), 1992, *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities*, Addendum to Interim Final Guidance, Office of Solid Waste, Waste Management Division, EPA/530-R-93-003, July 1992.

U.S. Environmental Protection Agency (USEPA), 1997, *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations*, Draft Final-Electronic Version, Quality Assurance Division, EPA QA/R-5, October 1997. Available URL: http://es.epa.gov/ncerqa/qa/qa_docs.html

U.S. Environmental Protection Agency (USEPA), 1998, *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities*, Peer Review Draft, Office of Solid Waste and Emergency Response, EPA/530-D-98-001A.

U.S. Environmental Protection Agency, 2006a, *Guidance on Systematic Planning Using the Data Quality Objective Process* (EPA QA/G-4). EPA/240/B-06/007.

U.S. Environmental Protection Agency, 2006b, *Data Quality Assessment: Statistical Tools for Practitioners* (QA/G-9S). EPA/240/B-06/003.

Washington Demilitarization Company, 2003, Umatilla Chemical Agent Disposal Facility Comprehensive Monitoring Program Baseline Report, Revision 0. Unpublished report by WDC, Hermiston, OR. February 2003.

Washington Demilitarization Company, 2005a, Umatilla Chemical Agent Disposal Facility Data Validation Methodology, Revision 3, September 2005.

Washington Demilitarization Company, 2005b, Umatilla Chemical Agent Disposal Facility Standing Operating Procedure for Depot Area Air Monitoring System (DAAMS) Gas Chromatograph-Mass Selective Detector/Flame Photometric Detector (GC-MSD/FPD) Analysis, UM-0000-M-557, Rev. 5, Chg.0, Hermiston, Oregon, November, 2005.

Washington Demilitarization Company, 2006a, Umatilla Chemical Agent Disposal Facility Laboratory Quality Control Plan, UM-PL-017, CDRL A038, Rev. 7, Chg. 1, Hermiston, Oregon, March, 2006.

Washington Demilitarization Company, 2006b, Umatilla Chemical Agent Disposal Facility Standing Operating Procedure for Depot Area Air Monitoring System (DAAMS) Gas Chromatograph/Flame Photometric Detector (GC/FPD) Analysis, UM-0000-M-556, Rev. 7, Chg.1, Hermiston, Oregon, February, 2006.

Washington Demilitarization Company, 2006c, *Laboratory Analysis and Monitoring Plan, UM-PL-016, Rev. 7, Chg.3*, Hermiston, Oregon, September, 2006.

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Appendix A. Acronym List

ALD	Analytical Laboratory Department
ASTM	American Society for Testing and Materials
BMV	Baseline Maximum Value
BTV	Baseline Threshold Value
CLP	Contract Laboratory Program
CMA	U.S. Army Chemical Materials Activity
CMP	Comprehensive Monitoring Program
DAAMS	Depot Area Air Monitoring System
FPD	Flame Photometric Detection
DEQ	Oregon Department of Environmental Quality
EPA	Environmental Protection Agency
GB	O-isopropyl methylphosphonofluoridate, common name “sarin”
GC	Gas Chromatography
GPL	General Population Limit
GPS	Global Positioning System
HD	bis(2-chloroethyl)sulfide, common name “mustard”
IDL	Instrument Detection Limit
LCS	Laboratory Control Sample
MB	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NIST	National Institute of Standards and Technology
NOAA	National Oceanic and Atmospheric Administration
PARCC	Precision, accuracy, representativeness, completeness, and comparability
PCB	Polychlorinated biphenyl
PMCD	U.S. Army Program Manager for Chemical Demilitarization
PMN	Perimeter Monitoring Network for air sampling on UMCD perimeter
ppb	Parts per billion
PQL	Practical Quantitation Limit

Pre-RA	Pre-Trial Burn Risk Assessment
RCRA	Resource Conservation and Recovery Act
RDA	Risk-Driving Analyte
RPD	Relative Percent Difference
SAP	Sampling and Analysis Plan
SpkMBlk	Spiked Method Blank
SW-846	EPA publication entitled, "Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods"
TEF	Toxicity Equivalency Factors
TEQ	Toxic Equivalency
UCL	Upper Confidence Limit
UMCD	Umatilla Chemical Depot
UMCDF	Umatilla Chemical Agent Disposal Facility
USEPA	U.S. Environmental Protection Agency
VX	O-ethyl-S-(2-diisopropylaminoethyl)methylphosphonothiolate
WDC	Washington Demilitarization Company, LLC

Appendix B. Sampling Methods for DAAMS Only

B.1 Background

This appendix covers monitoring required to provide a historical record of agent concentrations at the Umatilla Chemical Depot (UMCD). Air sampling on the perimeter of the UMCD is termed the "perimeter monitoring network" (PMN) and is accounted for by Zone 1 (See Table B-1 and

Figure B-1). Each PMN station operates independently using Depot Area Air Monitoring System (DAAMS) tubes, and the tubes are collected for laboratory analysis.

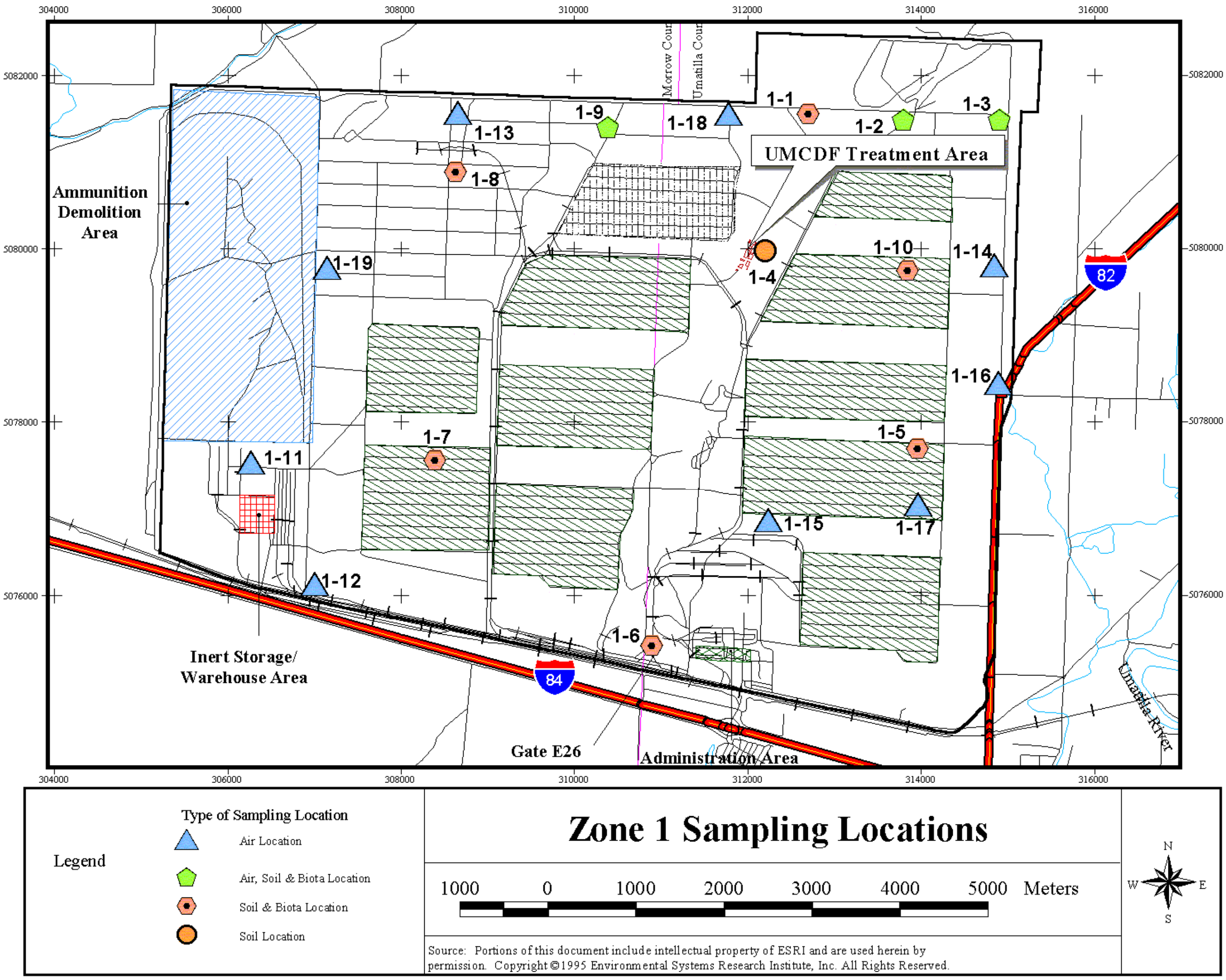
This sampling plan does not cover monitoring for public or worker safety because the PMN cannot provide real-time data to any central emergency response location (U.S. Army, 1998c). The monitoring for public or worker safety is covered by the U.S. Army's Chemical Stockpile Emergency Preparedness Program.

Table B-1. Zone 1 Sample Numbers and Locations

Site	Location Description
1-2	Inside the southwest corner of the intersection of Rim Rd and North Patrol Rd
1-3 *	Southwest of the intersection of North Rd and East Patrol Rd
1-9	Adjacent to Ironwood Rd, ½ mile south of North Patrol Rd; in the vicinity of the gate to Area IV
1-11	Near the southeast corner of Building 202
1-12	Northeast corner of the intersection of South Rd and West Patrol Rd
1-13	Intersection of Maple Rd and North Patrol Rd
1-14	0.25 miles North of E Street on East Patrol Rd
1-15	0.25 miles east of Rim Rd on Birch Rd (near Less Than Truckload Building)
1-16	½ mile south of E Street on East Patrol Road
1-17	Adjacent to igloo B-1032
1-18	North of K-Block on North Patrol Rd
1-19	100 feet east of intersection of West Patrol Rd and unmarked road (unmarked road is 0.3 miles south of intersection of Badger Road and West Patrol Rd)

*This is the subsistence farmer position from the pre-RA.

Figure B-1. Map of Zone 1 Sampling Locations



The CMP baseline air sampling data identified interference (for example, aerial spraying of pesticides near a PMN monitoring station) that elicited false positive and/or false negative analytical responses within the instrumental system. PMN baseline monitoring revealed interferents and established protocols that improved reliability of the agent PMN system. An interference study was conducted on air samples collected at the UMCD from 10 April 1995 through 14 April 1995 and 19 June 1995 through 23 June 1995 (U.S. Army, 1996). Methylisothiocyanate was found to be an interferent for VX and GB analyses. Benzothiozole and EPTC (trade name, Eptam) were found to be interferents for HD analyses. Reliability of the agent PMN system may be improved by the use of different analytical columns, additional filters before the air enters the DAAMS tubes, or changes in the chromatographic method such as altered temperature ramp or carrier gas flow rate. These options will be evaluated on a case-by-case basis in the event that future interferents are encountered.

The most likely points of early detection, should there be a release, are at the UMCDF stack, the UMCDF building filters, and the UMCD storage structures. Air monitoring is not conducted in Zones 2 and 3 due to the dilution factors involved in sampling at locations beyond the UMCD boundary. The need to sample a large volume of air would introduce interference from industrial and agriculture sources or automobile exhaust.

B.2 Sampling Frequency

Air sampling at the PMN locations is continuous. DAAMS air samples are collected in Zone 1 every 12 hours. The CMP air monitoring consists of three periods: baseline, operational, and postoperational monitoring.

Baseline monitoring was conducted prior to the start of UMCDF agent operations. Baseline DAAMS air sampling commenced on 09 May 2000. Confirmed agent detections are reported at or above the levels shown in Table 11-1. Statistical calculations of baseline threshold values were not required for the air monitoring data because action levels will not be assigned to any level lower than the 0.5 GPL.

Operational monitoring began at the start of surrogate treatment. Postoperational monitoring will be conducted for one year after completion of all hazardous waste treatment operations at the UMCDF.

B.3 DAAMS Sampling

Each DAAMS station consists of tubes filled with an adsorbent material and a vacuum pump to continuously draw air through each tube. The adsorbent material traps chemical agent. The tubes are changed every 12 hours and sent to the laboratory for analysis.

The chemical demilitarization laboratory maintains standard operating procedures to accurately record the possession and handling procedures for each sample from the moment of collection through the moment of disposal. Individuals collecting samples follow published EPA-approved procedures and site-specific requirements, as approved by the site-specific, state, or local agencies (WDC, 2006a, 2006c).

B.3.1 Unique Identification of Sample Lines

The Systems Contractor laboratory provides unique identification (e.g., color coding) for the terminating end of all DAAMS sample transfer lines. Identification includes the station number and the location (name) of the sample point (See Table B-1). This unique identification minimizes errors and assists the operator for sample transfer line connection and sample line challenging (WDC, 2006a, 2006c).

B.3.2 Quality Control Sample Preparation

A quality plant sample is a quality control sample which has been spiked with a solution of analyzed dilute chemical agent and aspirated in the field. Quality plant samples within ten percent of the hazard level and ten percent of the reporting limit are routinely employed to assess the performance of DAAMS methods. DAAMS quality plant samples are sampled in the same manner as other samples, including the use of VX conversion pads (as required), the sample line, instrument, laboratory analysis (as required), and data processing.

Quality laboratory samples are quality control samples that have been spiked with a solution of analyzed dilute chemical agent in the laboratory and have not been aspirated in the field. The Quality laboratory samples are used to check in-/out-of-control status of the gas chromatographs.

B.3.3 DAAMS Samples

DAAMS samples, as used at the PMN, are designed to provide a historical record of the chemical agent measurements at the general population limit level and will be employed for the CMP. Air monitoring department personnel (primarily monitoring technicians) initiate chain-of-custody documents, place the DAAMS tubes in the field to sample, record sample information, retrieve the DAAMS samples, deliver the DAAMS samples to the analytical laboratory department, and transfer custody of the DAAMS samples to the analytical laboratory department sample custodian. The analytical laboratory department sample custodian coordinates DAAMS sample analysis. All broken DAAMS tubes are returned to the laboratory. The analytical branch documents broken tubes. DAAMS tubes broken after aspiration are separated from the other DAAMS tubes to ensure there is no possible cross contamination.

For VX DAAMS samples, a V-to-G conversion pad is installed at the distal end of each sample line. V-to-G conversion pads are changed routinely as specified in the Systems Contractor laboratory standard operating procedure.

For HD DAAMS samples, an NO_x prefilter is used. The NO_x prefilter is changed at least every two weeks. The DAAMS sequencer timer is set to within 3.0 minutes of the control room time.

DAAMS initial analysis consists of gas chromatograph separation followed by flame photometric detection (FPD). Upon detection of chemical agent during initial analysis, one or more additional DAAMS tubes will be analyzed using dissimilar columns and/or different detectors to confirm or refute the presence of chemical agent. The presence of chemical agent is confirmed or refuted by the GC-mass spectrometry and either chemical ionization or electron impact mode. The GC-FPD will refute the presence of chemical agent. These methods are detailed in onsite procedures.

If the presence of chemical agent cannot be refuted within four hours, the Oregon Department of Environmental Quality will be notified in accordance with Permit Condition I.U.1.iii. Figure 2 of Attachment F-1 of the UMCDF Permit Application summarizes the chemical agent detection and confirmation process.

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Appendix C. Sampling Procedure for Soil, and Biota

C.1 Introduction

The Comprehensive Monitoring Program (CMP) was designed to monitor for the presence of chemical agents and other risk-driving analytes in soil, air, and biota at the Umatilla Chemical Depot (UMCD). Baseline monitoring was used to determine baseline threshold values for chemical agents and/or risk-driving analytes (RDAs) at respective sites. UMCDF agent operations began in September 2004. Operational monitoring is used to determine whether concentrations of chemical agents or RDAs from air deposition during agent operations have significantly increased compared to baseline threshold values.

This appendix covers collection methods for soil and biota to provide a historical record of chemicals of interest at the UMCD. The area surrounding the Umatilla Chemical Agent Disposal Facility (UMCDF) is divided into three zones:

- Zone 1 includes the UMCDF and extends to the UMCD fence line (perimeter). Zone 1 is the site most likely to have elevated concentrations of agent and RDAs (see Figure C-1).
- Zone 2 extends from the UMCD fence line out to a 50-kilometer (31-mile) radius from the UMCDF common stack (see Figure C-2).
- Zone 3 extends from Zone 2 to approximately 100 kilometers (see and Figure C-4).

Figure C-1. Map of Zone 1 Sampling Locations

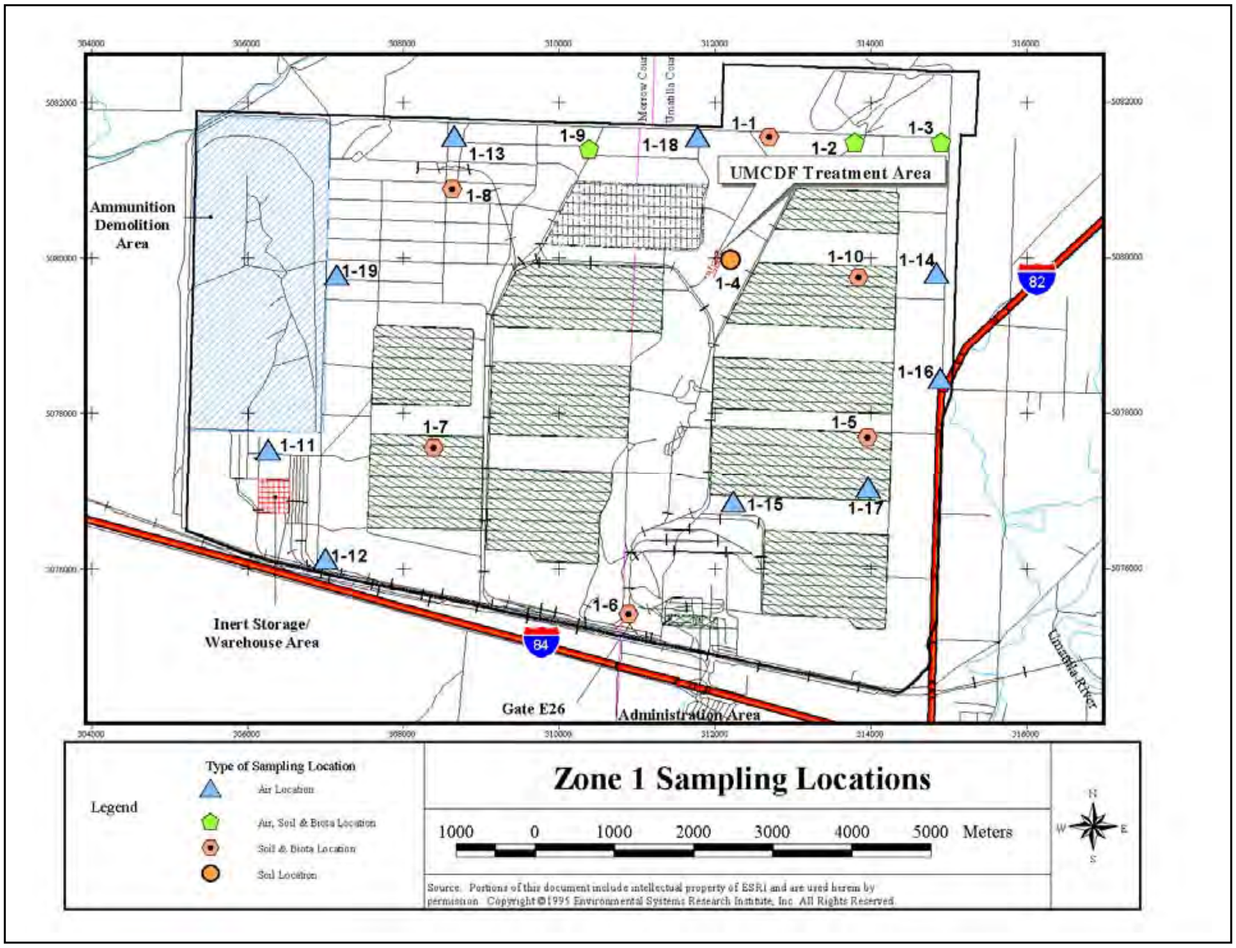


Figure C-2. Map of Zone 2 Sample Locations

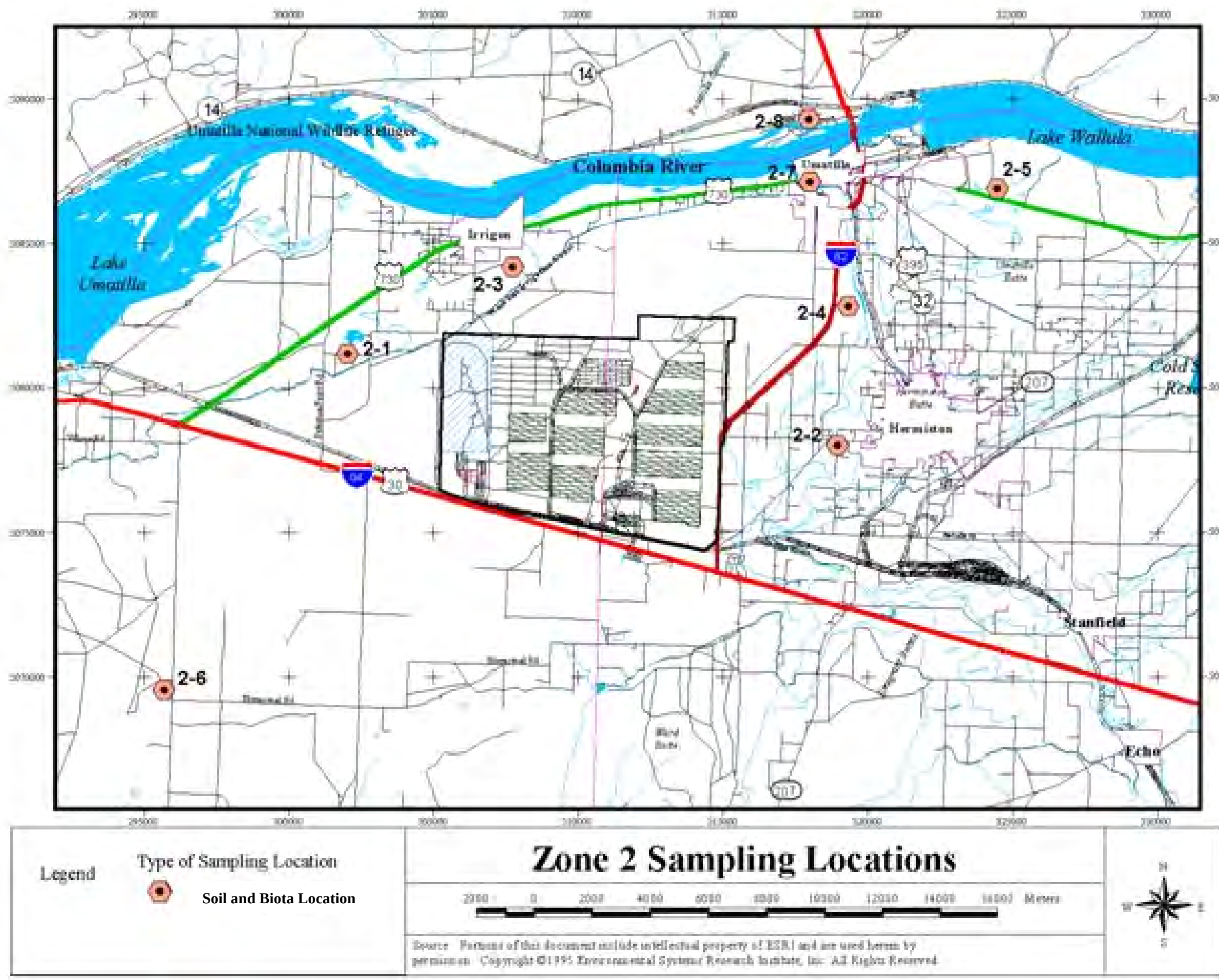
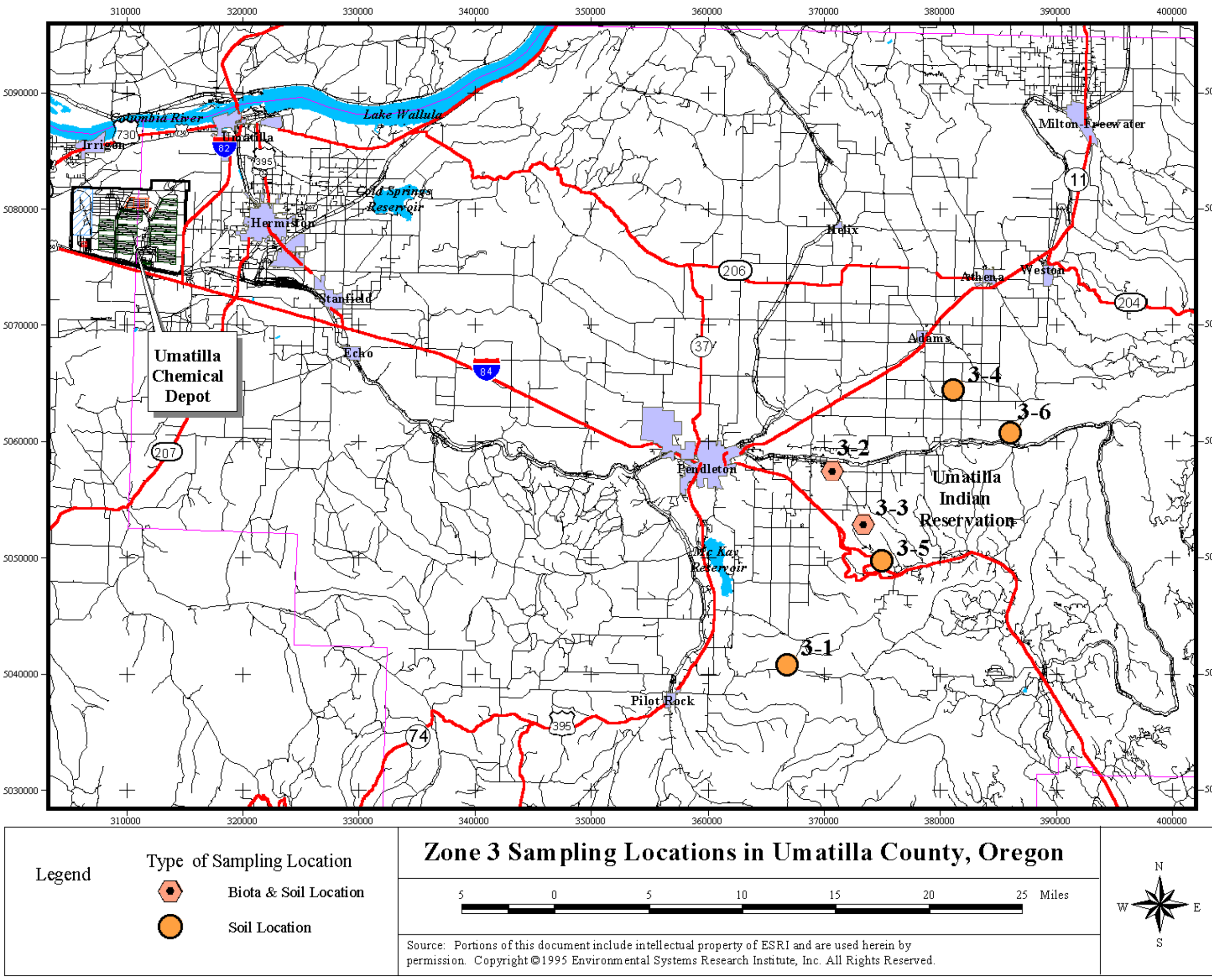
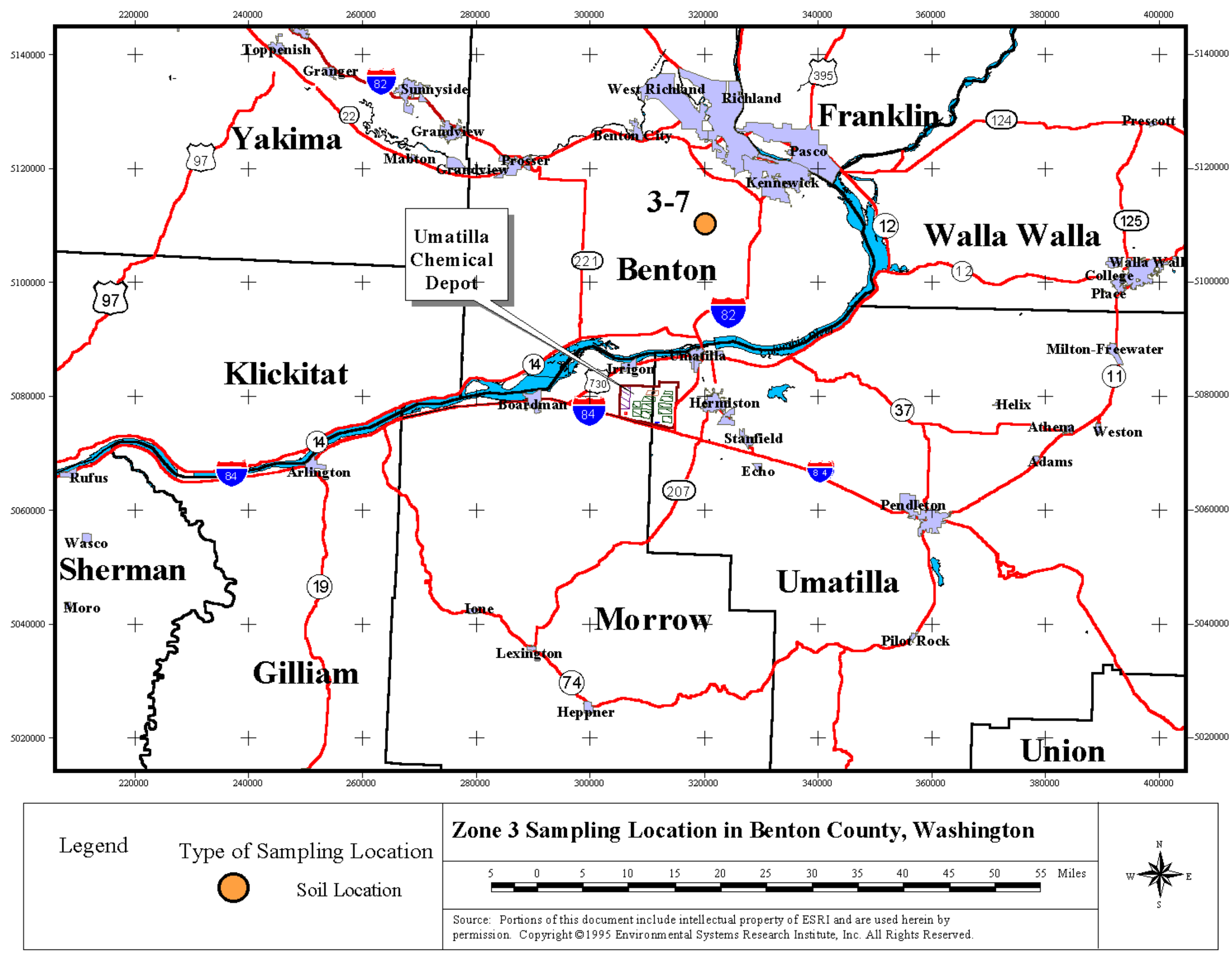


Figure C-3. Map of Zone 3 Sample Locations in Umatilla County, Oregon



NOTE: Sites 3-1, 3-3, 3-4 and 3-6 in Zone 3 are sampled on a semiannual basis each April and October.

Figure C-4. Map of Zone 3 Sample Location in Benton County, Washington



C.2 Soil and Biota Sampling Frequency

The sampling frequency is quarterly for Zones 1, and 2, and 3, except for Sites 3-1, 3-3, 3-4 and 3-6 which are sampled semiannually. Sites 3-1, 3-3, 3-4 and 3-6 were sampled quarterly through January 2008. Monitoring phases include: Baseline monitoring (prior to thermal operations and including surrogate testing), operational monitoring (after UMCDF agent operations began), and postoperational monitoring (one year after completion of all operations at UMCDF).

The operational monitoring began at the start of agent operations and continues through completion of all hazardous waste treatment operations at the UMCDF. Operational soil samples are collected on a quarterly basis (except for Sites 3-1, 3-3, 3-4, and 3-6 which are sampled semiannually). At three sites (Sites 1-3, 1-4, and 1-7), additional soil samples are taken biannually to monitor long-term deposition (note annual collection occurred between 2002 and 2007, biannual collection started in 2009).

The postoperational monitoring will be conducted for at least one year after completion of all hazardous waste treatment operations at the UMCDF. Postoperational soil samples will be collected on a quarterly basis (semiannually at Sites 3-1, 3-3, 3-4, and 3-6) and annually at long-term soil sampling stations.

To ensure comparability, the same sample locations are expected to be monitored throughout the lifetime of the CMP. If a station becomes unavailable due to a change in land use or for other reasons, it will be relocated as near as is reasonable to the original location. In addition, consistent sampling methods are used at each site from one sampling period to the next. Maintaining this type of consistency is important to reducing the variability of the monitoring results.

A winter sampling event should be scheduled for a period when temperature inversion conditions are likely to be experienced in the CMP sampling zones and a time in which the UMCDF is conducting thermal operations. Scheduling winter sampling to coincide with thermal operations is not applicable during the baseline and postoperational phases of the CMP. A temperature inversion describes the stable atmospheric condition when a gradation of temperatures is formed where the ground is colder than the layers above. Meteorologists at the National Weather Service in Pendleton, Oregon, and Spokane, Washington, suggest that inversions are most likely to occur in the months of December and January. Favorable weather conditions for an inversion include snow cover and a very light breeze. Temperature inversions can last up to a week and may be accompanied by heavy fog. Cloudy weather may retain heat and is not a favorable inversion condition. Brief overnight inversions may frequently occur during favorable inversion conditions (95% probability). The nightly inversions normally break up mid-morning as the sun warms the earth.

Other factors influence the frequency of sampling. For example, due to weather conditions or other environmental factors, biota may not always be available at the identified locations. Also, soil sample sites may be obstructed by standing water, ice, or heavy snow, and sampling may not be possible during a scheduled event.

If thick ice or heavy snow, which cannot be easily removed, are present during a sampling event, soil samples should not be taken. Samplers should return during the sampling period to determine if a sample can be taken. If environmental factors inhibit sample collection during the scheduled event, efforts will be made to collect a sample in accordance with field procedures when conditions improve. If conditions do not improve within a three-week period, then a sample will not be collected for that event.

C.3 Cleaning Procedures for Sampling Equipment

This section describes the general procedures for cleaning field sampling equipment before and after use. Care is taken to minimize contamination of the sampled media and to prevent cross-contamination among sites. Dedicated sampling equipment is placed at each site to minimize the number of quality control samples and decrease the amount of time spent in the field cleaning equipment. All equipment that comes in direct contact with the samples is made of an inert material (e.g., Teflon or stainless steel). Cleaning of equipment takes place in a controlled environment with proper ventilation and with proper waste-disposal protocol. Equipment is cleaned at least 48 hours before use, and will not be stored for more than 14 days.

Sample bottles are not required to be cleaned using these procedures, as they will be precleaned using EPA-certified methods.

Equipment

The following equipment may be needed to clean the field sampling equipment:

- Laboratory-grade detergent (e.g., Alconox)
- Reagent-grade hexane
- Pesticide-grade isopropanol
- Deionized water
- 50% Hydrochloric acid solution (made from reagent-grade hydrochloric acid)
- Acid-resistant bins
- Safety goggles
- Acid-resistant, solvent-resistant gloves
- Acid-resistant, solvent-resistant aprons
- Aluminum foil
- Equipment storage containers

Cleaning Procedures for Teflon Equipment, Before Field Sampling Event

1. Put on safety goggles, acid-resistant gloves, and acid-resistant apron for every step of this activity.

2. Wash all Teflon equipment with laboratory-grade detergent. Rinse with deionized water.

3. In a monitored, well ventilated area, prepare a 50-percent (50%) hydrochloric acid solution from reagent-grade hydrochloric acid. Place Teflon equipment in an acid-resistant bin. Soak equipment in 50-percent (50%) hydrochloric acid solution for 24 hours. After 24 hours, remove Teflon equipment and rinse equipment five times in deionized water. Rinsing equipment with deionized water can be done outside of the ventilated area.

4. Let equipment dry in the air.

5. Wrap equipment in aluminum foil and label foil. Place in equipment storage container for transport to field.

Cleaning Procedures for Stainless Steel or Aluminum Equipment, Before Field Sampling Event

1. Put on safety goggles, solvent-resistant gloves, and solvent-resistant apron for every step of this activity.

2. Wash all stainless steel equipment with laboratory-grade detergent. (Note: All equipment for use with small mammals will be cleaned with Alconox disinfecting detergent.) Rinse with deionized water.

3. In a monitored, well ventilated area, place all stainless steel equipment in bin. Rinse equipment with reagent-grade hexane. Then rinse equipment with pesticide-grade isopropanol. Then rinse equipment three times with deionized water. Rinsing equipment with deionized water can be done outside of the ventilated area.

4. Let equipment dry in the air.

5. Wrap equipment in aluminum foil. Place in equipment storage container for transport to field. Snap traps and Sherman live traps may be wrapped in aluminum foil in groups or placed in a sealed container, rather than individually wrapped in aluminum foil.

6. Steps 3 to 5 may be repeated to decontaminate stored equipment.

Cleaning Procedures for Equipment After Field Sampling Event

1. After shovels or scissors are used in the field, they should be placed back in aluminum foil to prevent cross-contamination. Sherman live traps and snap traps may be bagged or placed in a sealed container instead of foil.

2. All equipment used in the field should be thoroughly cleaned in laboratory-grade detergent and rinsed with deionized water.

3. Let equipment dry in the air.

4. Store in dry location until next quarter's field sampling.

C.4 Soil Sampling

Soil samples are collected at 25 sites in all Zones. See Table C-1 for site numbers and descriptions of soil sampling in Zones 1, 2, and 3. In order to reduce interferences from vegetation and decrease variability within a site, soil sampling stations were constructed at each site and the soil at the station is sampled on a quarterly basis (semiannually at Sites 3-1, 3-3, 3-4, and 3-6). At sites 1-3, 1-4, and 1-7, additional soil sampling stations were constructed and will be sampled on a biannual basis (note annual collection occurred between 2002 and 2007, biannual collection started in 2009). This section discusses the procedures for constructing the soil sampling stations and sampling the soil.

Table C-1. Site Number and Description for Surface Soil Analysis of RDAs and Agent

Site	Location Description	Agent	RDA
1-1	South of road cut, 0.2 mile east of Haul Rd on North Patrol Rd		X
1-2	Inside the southwest corner of the intersection of Rim Rd and North Patrol Rd		X
1-3[1,4]	Southwest of intersection of North and East Patrol Rds	X	X
1-4[4]	130 meters northeast of common stack (maximum deposition site)	X	X
1-5	Halfway between Avenue E and igloo B1097		X
1-6	20 meters north of gate E26 and 10 meters east of fence		X
1-7[4]	Halfway between igloos H1630 and H1640		X
1-8	Along ridge top 100 meters south of the center of Building 608		X
1-9	Ironwood Rd, ½ mile south of North Patrol Rd; near gate to Area IV		X
1-10	Adjacent to igloo D1257	X	X
2-1[3]	Lower Sand Spring; soil collection 0.25 miles south of Depot Ln. and 0.3 miles east of Paterson Ferry Rd. in unused corner of a field.		X
2-2[3]	0.25 miles south of Highland Rd on Quick Rd		X
2-3[3]	Main canal of the West Extension Irrigation District and southwest of the Gate 68 lateral (~1.1 miles east of Division Street at Hoop-N-Holler Ln)		X
2-4[2]	Three Mile Dam on west side of Umatilla River; upstream from irrigation dam		X
2-5	Conforth Ranch, north of the intersection of Beach Access Rd and Highway 730 (4.5 miles west of Diagonal Rd)		X
2-6	East side of the Boardman Bombing Range, ~ 200 feet inside gate on south side of main road, located 5.0 miles south of I-84 on Bombing Range Rd		X
2-7	Park at Tucker Rd and Stephens Ave (0.5 miles south of Highway 730 on Powerline Rd)		X
2-8	Plymouth Park at Lake Umatilla east of Plymouth off Christy Rd; in undeveloped field campsite 17		X
3-1[5]	North of McKay Creek Road, 0.6 miles west of the intersection of McKay Creek Road and Somac Road.		X
3-2	Mission area adjacent to ceremonial grounds		X
3-3[3, 5]	Old Emigrant Rd and Old Jeep Rd intersection; southeast of the hairpin turn ~3.5 miles south of Mission Rd		X
3-4[3, 5]	1/8 mile north of Tubbs Ranch Rd, 1/4 mile east of the USDA office building		X
3-5[3]	Cabbage Hill site; on Old Emigrant Road between the hairpin curve and Boiling Point; southeast of the cattle guard on the south side of the road		X
3-6[5]	CTUIR fish hatchery at Umatilla River on Thorn Hollow Road		X
3-7[3]	Southeast corner of intersection at Clodfelter Rd. and Bently Rd.		X

Notes: [1]This is the subsistence farmer position from the pre-RA.
[2]This is the subsistence fisherman location evaluated in the pre-RA.
[3]Sample location is on private property. Site will be relocated nearby if permission is revoked.
[4]Long-term soil site.
[5]Sites 3-1, 3-3, 3-4, and 3-6 are sampled on a semiannual basis.

C.4.1 Soil Sampling Station Construction

This section describes how quarterly monitoring soil sampling stations were constructed at sites listed in Table C-1, and the biannual monitoring soil sampling stations (Sites 1-3, 1-4, and 1-7). The size of the station was designed to provide stability to the station and provide enough soil such that more than 1 kg of soil volume can be collected every monitoring event throughout the baseline, operational, and post-operation phases of the CMP. Stations were installed at all 25 sites during April 1999, and may need to be constructed if a site is relocated.

Equipment

The following equipment may be needed to construct the soil sampling stations:

- Soil (sieved, site-appropriate) (80 kg per quarterly monitoring site, 104 kg per biannual monitoring site)
- Spade-shaped shovels (2)
- Flat-edged shovel
- Leather gloves
- Measuring tape
- Bags or drums for excavated soil
- Tyvec® sheets
- Stainless steel knife with 1 cm wide blade
- Shearing scissors
- Camera and film (or digital camera)
- Bound field notebook
- GPS equipment

1. Locate a secluded, level area at the site for the soil sampling station (see Table C-1 and Appendix D).

2. Photograph the sampling location within its contextual setting prior to construction of station (wide-angle lenses are preferred). Take GPS measurement of the station.

3. Wearing leather gloves, use shovel to excavate an area for soil sampling station. The area for the quarterly monitoring station is 50 cm by 50 cm and a depth of 20 cm. The area for the biannual monitoring station is 50 cm by 130 cm and a depth of 10 cm. Put excavated soil into bag such that the soil may be removed from the site.

4. Place Tyvec®over excavated area. If more than one sheet of Tyvec® is needed, then the seams should overlap by 5 cm.

5. Using a stainless steel knife with a 1-cm wide blade, pierce the Tyvec® every 5 cm in a grid fashion. The width of the slit made by the knife should be no wider than the width of the knife's blade.

6. Using second shovel, place sieved, site-appropriate soil on Tyvec® and fill excavated area. Level soil. Trim excess Tyvec® to ground level.

7. Photograph completed station.

C.4.2 Soil Sampling

Soil samples are collected from the soil sampling stations and are analyzed for concentrations of chemical agents and RDAs (see Table C-1 for frequency and analytes).

Equipment

The following equipment may be needed to collect soil samples:

- Camera and film (or digital camera)
- Measuring tape
- Certified-clean glass jars
- Trowel
- Sample labels
- Chain-of-Custody form
- Permanent marking pen (black ink)
- Appropriate work procedures and permits from the UMCDF
- Portable spring scale or balance and appropriate accessories (calibration weights)
- Cooler and ice
- Bound field notebook
- Latex gloves

Soil Sample Collection Procedure

1. Proceed to the soil sampling station at a site (see Table C-1 and Appendix D). Take care not to walk on or disturb the sampling area until after all of the monitoring samples are collected.

2. If the sample location has not already been photographed during the sampling event, photograph the sampling location within its contextual setting prior to collecting samples (wide-angle lenses with digital camera are preferred).

3. In the field notebook, record conditions at the site (e.g., weather, fire, etc.). If the sample site has been disturbed, notify the CMP contractor program manager and/or supervisor so that corrective measures can be taken.

4. For the quarterly monitoring soil sampling stations: Using an additional certified-clean glass jar, randomly select an edge of the station while avoiding areas of vegetation growth, where possible. Place the jar upside down on the soil. Press the jar into the soil 1 cm. Slide a trowel under the jar to cut the soil even with the bottom lip of the jar. Lift the jar and trowel, turn them over, and let the soil fall back into the jar.

5. For the biannual monitoring soil sampling stations: Measure off the next available 25-cm area using a measuring tape from the sides of the soil sampling station (Figure C-5). The soil sample should be collected as listed above for the quarterly monitoring soil sampling stations. The first sample to be collected from the biannual monitoring soil sampling station should be located at one end of the station. The second sample to be collected from the biannual monitoring station should be located

next to the first designated collection area. The third sample to be collected from the biannual monitoring station should be located above the first collection area. By proceeding in this manner, a new and undisturbed designated collection area will be sampled every other year. In the field notebook, record the exact area of the biannual monitoring soil sampling station where the soil sample was collected, and describe any changes to the station from the previous sampling event (e.g., evidence of disturbance). Also, photograph the station showing where the soil sample was collected.

Shading in Figure C-5 indicates areas that were collected annually from October 2002 until October 2007. Unshaded areas were collected biannually beginning in October 2009.

1	3	5	7	9
2	4	6	8	10

Figure C-5. Order of Sample Collection Areas in Biannual Monitoring Soil Sampling Stations

6. Transfer the soil sample into a certified-clean sample jar.

7. Repeat until enough soil is collected from approximately one-fourth of the station's surface area. Avoid sampling the surface in areas of station that have been disturbed by the trowel or contain debris that might have accumulated since the last quarterly sampling event (e.g., vegetation).

8. Seal the certified-clean glass jar with the appropriate lid.

9. Weigh the sample and record the weight in the field notebook.

10. Record the sample time on the chain-of-custody form. The sample date may be preprinted on the chain-of-custody form. If so, verify that the date is correct. Enter the sample date if it is not preprinted on the sheet.

11. Verify that all samples have been collected from the site. Quality control samples (duplicates) require filling additional sample jars.

12. Place the samples in a cooler on ice for transport back to CMP contractor facilities.

13. Before submitting the samples to the analytical laboratory, the chain-of-custody forms and sample labels must be checked for accuracy. The reviewer should sign and date the chain-of-custody form in the appropriate locations.

14. For delivery to the laboratory, the sample custodian should sign and date the chain-of-custody form in the "Relinquished By" space. The shipping papers will serve as the chain-of-custody for delivery to the laboratory. A list of packaged samples will be faxed to the laboratory prior to shipping coolers. The chain-of-custody forms enclosed in the coolers will become part of the permanent records.

15. The soil in the quarterly and semiannual monitoring soil sampling stations should be leveled with a trowel before leaving the site. Remove any foreign objects from the soil, e.g., any plant material. For the biannual monitoring soil sampling stations, the soil should not be leveled after sampling. However, every quarter, any plants growing in the biannual monitoring soil sampling station should be removed with the least amount of disturbance to the soil's surface.

16. Notify the CMP contractor field sampling task manager of any deviations from this procedure or if any unusual or noteworthy conditions exist.

C.5 Reserved

C.6 Biota Sampling

See Table C-2 for site numbers and descriptions of biota sampling sites. Approximate site dimensions are provided in Appendix D.

Plants collected are typically abundant and fast-growing types that are common to most sites, e.g., grasses. Plant species vary from site to site, but are consistently collected at that site each sampling event. For example, bunch grasses are abundant at Site 1-8 and are the only species collected there each time there is a sampling event. Catastrophic events such as fire, or some other environmental perturbation that depletes the selected species, may require selection of a new plant species. Plants collected are identified to family, genus, or species when possible. This is recorded in the field notebook.

Table C-2. Site Number and Location Description for RDAs in Biota

Site	Location Description
1-1	South of road cut, 0.2 mile east of Haul Rd on North Patrol Rd
1-2	Inside the southwest corner of the intersection of Rim Rd and North Patrol Rd
1-3[1]	Southwest of intersection of North Rd and East Patrol Rd
1-5	Halfway between Avenue E and igloo B1097
1-6	20 meters north of gate E26 and 10 meters east of fence
1-7	Halfway between igloos H1630 and H1640
1-8	Along ridge top 100 meters south of the center of Building 608
1-9	Ironwood Rd, ½ mile south of North Patrol Rd; near gate to Area IV
1-10	Adjacent to igloo D1257
2-1[3]	Lower Sand Spring; biota collection 0.25 miles south of Depot Ln and 0.3 miles east of Paterson Ferry Rd in unused corner of a field.
2-2[3]	Sample 0.25 miles south of Highland Rd on Quick Rd
2-3[3]	Main canal of the West Extension Irrigation District and southwest of the Gate 68 lateral (~1.1 miles east of Division St at Hoop-N-Holler Ln)
2-4[2]	Three Mile Dam on west side of Umatilla River; upstream from irrigation dam
2-5	Conforth Ranch, north of Beach Access Rd & Hwy 730 intersection (4.5 miles west of Diagonal Rd)
2-6	At the east side of the Boardman Bombing Range, approximately 200 feet inside of a gate on the south side of the main road, located 5.0 miles south of I-84 on Bombing Range Rd
2-7	Park at intersection of Tucker Rd & Stephens Ave (0.5 miles south of Hwy 730 on Powerline Rd)
2-8	Plymouth Park at Lake Umatilla east of Plymouth off Christy Rd; in undeveloped field near campsite 17
3-2	Mission area adjacent to ceremonial grounds

3-3[3, 4]	Old Emigrant Rd & Old Jeep Rd intersection; SE of hairpin turn ~3.5 miles so. of Mission Rd

Notes: [1] This is the subsistence farmer position from the pre-RA
[2] This is the subsistence fisherman location evaluated in the pre-RA.
[3] Sample location is on private property. Site will be relocated nearby if permission is revoked.
[4] Site 3-3 is sampled semiannually in April and October.

Small mammals are less numerous than vegetation, and collection of one individual will have a relatively larger impact upon the community. The sampling is designed to catch the minimum number of individuals that are needed for analysis. Another consideration when collecting animals is the niche that different species occupy. For example, the pocket mouse is mostly vegetarian, while the deer mouse is vegetarian as well as carnivorous. The differences in diet will add variability to the monitoring program. Thus, identification of the species captured for analysis is important, and, if possible, only one species per site should be analyzed.

Terrestrial invertebrates were included in biota sampling for the first eight years of CMP sampling. Collection was discontinued in 2007 due to low detection rates and the resulting limitations on statistical evaluations. Information on the removal of terrestrial invertebrates from the CMP is provided in PMR UMCDF-06-010-CMP(3).

C.6.1 Vegetation Sampling Procedures

Vegetation samples are collected at all the sites described in Table C-2. The predominant vegetation species at each site is collected in a manner to avoid surface deposition. Collection at Site 3-3 will occur semiannually in April and October.

Equipment

The following equipment may be needed to collect vegetation samples:

- Camera and film (or digital camera)
- Pruning shears or scissors
- Certified-clean glass jars
- Sample labels
- Chain-of-custody form
- Permanent marking pen (black ink)
- Appropriate work procedures and permits from the UMCDF
- Portable spring scale or balance and appropriate accessories (calibration check weights)
- Cooler and ice
- Bound field notebook
- Latex gloves

Vegetation Sample Collection Procedure

1. Proceed to the soil sampling station at each sampling location (see Table C-2 and Appendix D). Select predominant vegetation species within the designated area for sampling.

2. Collect vegetation sample as appropriate.

3. Collect samples away from the surface to avoid surface deposition. If collecting grass species, using shears or scissors, cut the shoot of the grass at a height approximately 4 cm above the soil surface.

4. Collect vegetation (weight should be based on the needs of the laboratory for all analytical procedures).

5. Put the samples in a certified-clean glass jar, and put lid on jar. Label jar and ensure information on the label is correct.

6. Weigh the sample and record the weight in the field notebook.

7. Record the sample time on the chain-of-custody form. The sample date may be preprinted on the chain-of-custody form. If so, verify that the date is correct. Enter the sample date if it is not preprinted on the sheet.

8. Place the samples in a cooler on ice for transport back to CMP contractor facilities. Freeze sample prior to shipment to the analytical laboratory.

9. Before submitting the samples to the analytical laboratory, the chain-of-custody forms and sample labels must be checked for accuracy. The reviewer should sign and date the chain-of-custody form in the appropriate locations.

10. For delivery to the laboratory, the sample custodian should sign and date the chain-of-custody form in the “Relinquished By” space. The shipping papers will serve as the chain-of-custody for delivery to the laboratory. A list of packaged samples will be faxed to the laboratory prior to shipping coolers. The chain-of-custody forms enclosed in the coolers will become part of the permanent records.

11. Notify the CMP contractor field sampling task manager of any deviations from this procedure or if any unusual or noteworthy conditions exist.

C.6.2 Reserved

C.6.3 Small Mammal Sampling Procedures

Small mammals are collected at all the sites described in Table C-2. Snap traps are used exclusively in Zone 1 to collect small mammals. Sherman live traps are used in Zones 2 and 3, and may also be used in Zone 1. Collection at Site 3-3 will occur semiannually in April and October.

Equipment

The following equipment may be needed to collect small mammal samples:

- Camera and film (or digital camera)
- Leather and Latex gloves
- Certified-clean glass jars
- Snap traps
- Sherman live traps

- Bait – i.e., peanut butter, cheese, and/or oats
- Dissecting tools (stainless steel)
- Alconox (disinfecting solution)
- Deionized water
- Aluminum foil
- Sample labels
- Chain-of-custody form
- Permanent marking pen (black ink)
- Biological hazards bag
- Appropriate work procedures and permits from the UMCDF
- Portable spring scale or balance and appropriate accessories (calibration check weights)
- Cooler and ice – blue, wet or dry (one cooler for each laboratory)
- Bound field notebook
- Respirator

Small Mammal Sample Collection Procedure

1. Proceed to the soil sampling station at each sampling site (see Table C-2 and Appendix D).

2. Snap traps are used in exclusively Zone 1. Sherman live traps will be used in Zones 2 and 3, but may also be used in Zone 1. Sampling location placements are based on the available habitat in order to maximize success in collecting samples.

3. Traps are baited with appropriate bait and checked the next day.

4. Gloves should be worn while checking the trap line. Animals trapped in Sherman live traps are to be euthanized using cervical dislocation. Determine and document species, and sex as well as time of day, date, and weather condition. It may be necessary to determine the sex of the specimen at the laboratory. Each quarter, all specimens for analyses should be the same species, if possible.

5. Specimens for organic analyses are not dissected. Put on clean pair of surgical gloves and respirator, remove specimen from trap, double-bag specimen and place in a certified-clean glass jar.

NOTE: Steps 6 and 7 may be performed at the laboratory rather than in the field.

6. Specimens for metal analyses should be skinned. Put on a clean pair of surgical gloves prior to handling specimen. Place the small mammal on aluminum foil. The specimen should be in a “belly-up, spread-eagle” position. Using blunt-ended, sharp dissecting scissors, make a cut just below the animal’s jaw making sure only to penetrate the skin. Slip the sharp end of the scissors under the skin and cut along the long axis of the animal.

7. Using a pair of tweezers, lift a cut end of the skin and with the blunt end of the scissors and begin “peeling” the hide away from the carcass. Continue until entire hide is removed. With the entire hide removed, rinse carcass with deionized water making sure to wash away any hair clinging to it. Dissect and remove the stomach and intestines.

8. Weigh the sample and record the weight in the field notebook. Label jar and ensure information on the label is correct.

9. Record the sample time on the chain-of-custody form. The sample date may be preprinted on the form. If so, verify that the date is correct. If not, enter the sample date on the form.

10. Place the samples in a cooler on ice for transport back to CMP contractor facilities. Freeze sample prior to shipment to the analytical laboratory.

11. Repeat trapping process until enough small mammals have been obtained for a sample. The minimum collection weights should be established by the laboratory, and defined in collection procedures.

12. Dispose of the aluminum foil and used surgical gloves in biological hazards bag, to avoid any cross contamination.

13. Before submitting the samples to the analytical laboratory, the chain-of-custody forms and sample labels must be checked for accuracy. The reviewer should sign and date the chain-of-custody form in the appropriate locations.

14. For delivery to the laboratory, the sample custodian should sign and date the chain-of-custody form in the “Relinquished By” space. The shipping papers will serve as the chain-of-custody for delivery to the laboratory. A list of packaged samples will be faxed to the laboratory prior to shipping coolers. The chain-of-custody forms enclosed in the coolers will become part of the permanent records.

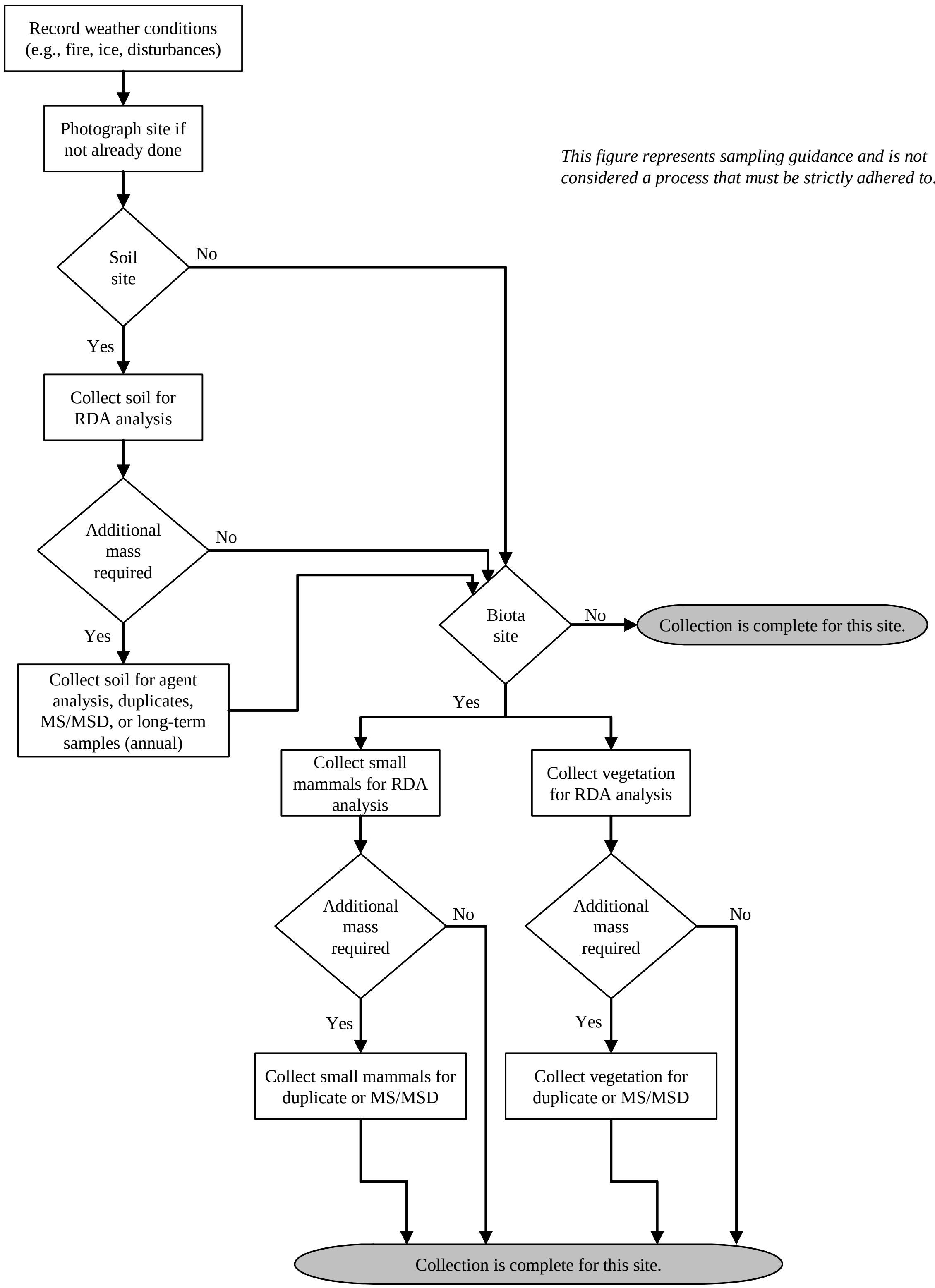
15. Notify the CMP contractor field sampling task manager of any deviations from this procedure or if any unusual or noteworthy conditions exist.

C.7 Order of Field Sampling Activities

The preceding methods for field sampling shall take place in an order such that the sampling activities will not damage or contaminate the samples to be collected. The field sampling task manager is responsible for ensuring that all the required samples are collected (i.e., rinsates, agent samples, duplicate samples, and MS/MSD samples) at all required sampling locations.

Figure C-6. Illustrative Representation of Field Sampling

This figure represents sampling guidance and is not considered a process that must be strictly adhered to.



Appendix D. Site Descriptions and Approximate Site Dimensions for the Comprehensive Monitoring Program (CMP)

This appendix provides additional information about each site. At the end of the appendix is a figure showing the GPS locations of each site. For security reasons, the coordinates for the sites will be maintained by WDC and the CMP contractor.

Site Descriptions

Zone 1

Site 1-1

Location: South of the road cut, 0.2 miles east of Haul Road on North Patrol Rd.
Sampling: RDAs in soil and biota
Orientation: North northeast of incinerator

Sandy soil, cryptogamic (CRG) layer. Mostly bunch grasses, yellow daisy-like flowers. No sage, rabbit or bitter brush.

Site 1-2

Location: Inside the southwest corner of the intersection of Rim and North Patrol Roads
Sampling: Agent in air; RDAs in soil and biota
Orientation: Northeast of incinerator

Sandy soils, CRG layer. Low shrubs, grasses (cheat grass), rabbit and bitter brush.

Site 1-3

Location: Southwest of the intersection of North and East Patrol Rds
Sampling: Agent in air and soil; RDAs in soil and biota
Orientation: East northeast of incinerator.

Sandy soils, CRG layer. Grasses predominate (cheat grass, some bunch grass). Rabbit brush (green and gray sub species).

Site 1-4

Location: 130 meters northeast of the common stack (area of maximum deposition).
Sampling: Agent and RDAs in soil
Orientation: Northeast of incinerator

Sandy and rocky soil. Very disturbed site, no CRG layer. Site was fenced during construction to avoid disturbance.

Site 1-5

Location: Halfway between Avenue E and igloo B1097
Sampling: RDAs in soil and biota
Orientation: Southeast of incinerator

Sandy soils, CRG layer and dry lichens. Some sage brush. Location good for small-mammal traps.

Site 1-6

Location: 20 m north of gate E26 and 10 m east of the fence
Sampling: RDAs in soil and biota
Orientation: South of incinerator

Gravel surface, larger grain size. Not much CRG layer. Very disturbed site. Sparse biota, a few opportunistic weeds growing up.

Site 1-7

Location: Halfway between Igloos H1630 and H1640
Sampling: RDAs in soil and biota
Orientation: Southwest of incinerator

Sandy soil, CRG layer. Low green perennials and grasses (cheat grass and bunch grass with flat blade). Good for small-mammal traps. Scarcity of burrowing holes, no brushes.

Site 1-8

Location: Along the ridge top 100 meters south of Building 608
Sampling: RDAs in soil and biota
Orientation: West northwest of incinerator

Sandy soil with thin CRG layer. Grasses dominate, mostly bunch grass with some low growing rabbit brush. No tall bushes.

Site 1-9

Location: Adjacent to Ironwood Rd., ½ mile south of North Patrol Rd; in the vicinity of the gate to Area IV
Sampling: Agent in air; RDAs in soil and biota
Orientation: Northwest of incinerator

Next to gate into restricted area. Sandy soil, CRG layer. Grasses dominate (cheat grass), other low ground cover. Not much in the way of sage or rabbit brush.

Site 1-10
Location: Adjacent to Igloo D1257
Sampling: Agent in soil; RDAs in soil and biota
Orientation: East southeast of incinerator

Sandy soils, CRG layer. Low shrubs (rabbit brush and bitter brush). Holes of small borrowing animal.

Site 1-11
Location: Near the southeast corner of Building 202
Sampling: Agent in air
Orientation: Southwest of incinerator

Site 1-12
Location: Northeast corner of the intersection of South and West Patrol Rds.
Sampling: Agent in air
Orientation: Southwest of incinerator

Site 1-13
Location: Intersection of Maple and North Patrol Rd
Sampling: Agent in air
Orientation: Northwest of incinerator

Site 1-14
Location: 0.25 mile north of E St. on East Patrol Rd.
Sampling: Agent in air
Orientation: East of incinerator

Site 1-15
Location: 0.25 miles east of Rim Rd. on Birch Rd. (near Less Than Truckload Bldg.).
Sampling: Agent in air
Orientation: South southeast of incinerator

Site 1-16
Location: ½ mile south of E street on East Patrol Rd.
Sampling: Agent in air
Orientation: Southeast of incinerator

Site 1-17
Location: Adjacent to Igloo B1032
Sampling: Agent in Air
Orientation: Southeast of incinerator

Site 1-18
Location: North of K-Block on North Patrol Road
Sampling: Agent in air
Orientation: North of incinerator

Site 1-19

Location:	100 feet east of intersection of West Patrol Road and unmarked road. (Unmarked road is 0.3 miles south of Badger Rd.)
Sampling:	Agent in air
Orientation:	West of incinerator

Zone 2

Site 2-1

Location:	Lower Sand Spring; water samples collected 0.3 miles west and south on Depot Ln. from intersection of Depot Ln. and West 8th Rd. Soil and biota collection 0.25 miles south of Depot Ln. and 0.3 miles east of Paterson Ferry Rd. in unused corner of a field.
Sampling:	RDAs in soil and biota
Orientation:	West northwest of incinerator

Large pond with pasture and agriculture surrounding. Soil is sandy with organics. Line of trees by fence. Grasses abundant in unused portion of field. Small mammals should abound due to seeping water and dense vegetation.

Site 2-2

Location:	0.25 miles south of Highland Rd. on Quick Rd.
Sampling:	RDAs in soil and biota.
Orientation:	East southeast of incinerator

Sandy loam soil supports sage brush, rabbit brush, grasses, and some Russian Olive trees. Good for small-mammal traps.

Site 2-3

Location:	Main canal of the West Extension Irrigation District and southwest of the Gate 68 lateral (approximately 1.1 miles east of Division Street at Hoop-N-Holler Lane)
Sampling:	RDAs in soil and biota
Orientation:	Northwest of incinerator

Area located among agricultural fields. Sandy soil supports sagebrush, rabbit brush, and grasses. Canal runs south and east of the location.

Site 2-4

Location:	At Three Mile Dam on the west side of the Umatilla River (upstream from the dam).
Sampling:	RDAs in soil and biota
Orientation:	Northeast of incinerator

Wetland site for sampling biota. Both vascular and woody vegetation (salix, elodea). Good environment for mouse traps. On bluff above wetland is shrub-steppe environment for soil sampling (sandy substrate, low grasses and weeds).

Site 2-5

Location: Conforth Ranch, north of the intersection of Beach Access Rd. and Highway 730 (4.5 miles west of Diagonal Rd.)
Sampling: RDAs in soil and biota.
Orientation: Northeast of incinerator

Rocky outcrop in surrounding wetland. Cattails and other aquatic plants dominate. Soil is sandy, appears dry at edge of wetland. Lots of woody plants (Russian Olive), some cheat grass. Good for small-mammal traps.

Site 2-6

Location: At the east side of the Boardman Bombing Range, approximately 200 feet inside of a gate on the south side of the main road, located 5.0 miles south of I-84 on Bombing Range Road
Sampling: RDAs in soil and biota
Orientation: Southwest of incinerator

Sandy soil supports sagebrush, green and gray rabbit brush, tumbleweeds, and grasses. Boardman coal-fired power plant is in a general upwind direction. Evidence of small mammals.

Site 2-7

Location: Park near intersection of Stephens Avenue and Tucker Road. Stephens Avenue is 0.5 miles south of Highway 730 on Powerline Rd.
Sampling: RDAs in soil and biota
Orientation: North northeast of incinerator

Down the hill (20m) from park's parking lot, river is another 50m north. Wheat-type weeds are prolific, small foot path through weeds. Sagebrush is primary woody plant, lichens on north-facing slope, tumbleweeds.

Site 2-8

Location: Plymouth Park at Lake Umatilla east of Plymouth of Christy Rd. Located in the undeveloped field near Campsite 17.
Sampling: RDAs in soil and biota
Orientation: North northeast of incinerator

Substrate is sandy loam. The undeveloped field contains mostly grasses and some small bushes. Good for small-mammal traps.

Zone 3

Site 3-1

Location: North of McKay Creek Road, 0.6 miles west of the intersection of McKay Creek Road and Somac Road.
Sampling: RDAs in soil
Orientation: Southeast of incinerator

Location in flood plain near McKay Creek. Sandy loam with heavy vegetation cover of weeds and grasses. Heating source for several residences alongside creek may be wood burning stoves. Pasture on other side of road may be subject to chemical applications.

Site 3-2

Location: Mission area adjacent to ceremonial grounds
Sampling: RDAs in soil and biota
Orientation: East southeast of incinerator

Weeds and grasses that are mowed on occasion, not apparently watered. Lots of woody trees surrounding, due to wet gulley south of sampling site. Wheat field on a hill further south. Tall shrubs and weeds (head high) among trees. Sandy loam under heavy organic layer. Excellent for small-mammal traps.

Site 3-3

Location: Intersection of Old Emigrant Rd. and Old Jeep Rd.; southeast of the hairpin turn approximately 3.5 miles south of Mission Road.
Sampling: RDAs in soil and biota
Orientation: East southeast of incinerator

Site is on the east side of a large hill, drainage basin is east of access road and downhill. Sandy sediments supporting prolific blackberry bushes, woody vegetation, and tall grasses. Excellent for small-mammal traps. No obvious agriculture or grazing in immediate area.

Special Note: Downhill and downwind is an excavation site (0.25 miles north/northeast).

Site 3-4

Location: One-eighth (1/8) mile north of Tubbs Ranch Road, 1/4 mile east of the USDA office building
Sampling: RDAs in soil
Orientation: East southeast of incinerator

Location surrounded by agricultural fields and gravel access road. Area is subject to chemical applications that are part of the research conducted at the Department of Agriculture Research Center.

Site 3-5

Location: Cabbage Hill site; on Old Emigrant Road between the hairpin curve and Boiling Point; southeast of the cattle guard on the south side of the road
Sampling: RDAs in soil
Orientation: East southeast of incinerator

Site is on the top of a hilly bluff, sandy sediments lie on top of rocky outcrop. CRG crust and burrowed holes. Bunch grasses and weeds. Good environment for small-mammal traps.

Site 3-6

Location: CTUIR fish hatchery at Umatilla River on Thorn Hollow Road
Sampling: RDAs in soil
Orientation: East southeast of incinerator

Site located south of Umatilla River and west of fish hatchery. Area heavily vegetated with tall weeds, grasses, and some small trees. Some small farms nearby.

Site 3-7

Location: Southeast corner of Clodfelter Rd. and Bently Rd., in undeveloped corner of intersection.
Sampling: RDAs in soil
Orientation: North of incinerator, half way between Umatilla and Tri-Cities

Located in the undeveloped corner of intersection. Active agricultural fields surrounding area. Vegetation cover is mostly grasses with small bushes. Sandy soils.

APPROXIMATE SITE DIMENSIONS

Development of Approximate Site Dimension:

In order to determine approximate site dimensions, WDC personnel visited each biota site during the October 1999 field sampling activity. Taking trap placement during previous sampling events into account, they developed approximate dimensions for the biota sampling activities at each site. The site maps and a summary table follow.

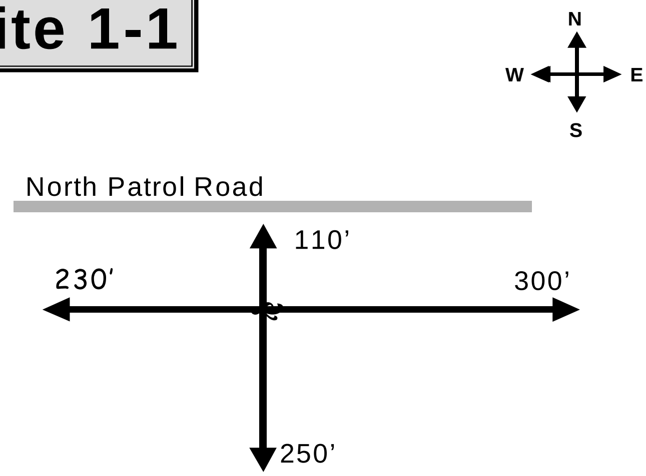
Explanation:

Collection of biota samples is a site-specific activity. Evaluation of the 19 CMP biota sample sites revealed that it is not appropriate to apply a universal standard regarding size limits to all sample sites due to varying conditions encountered. The approximate site dimensions and site maps will be used to ensure that unreasonable expansion of biota sample site areas does not occur during future sampling events.

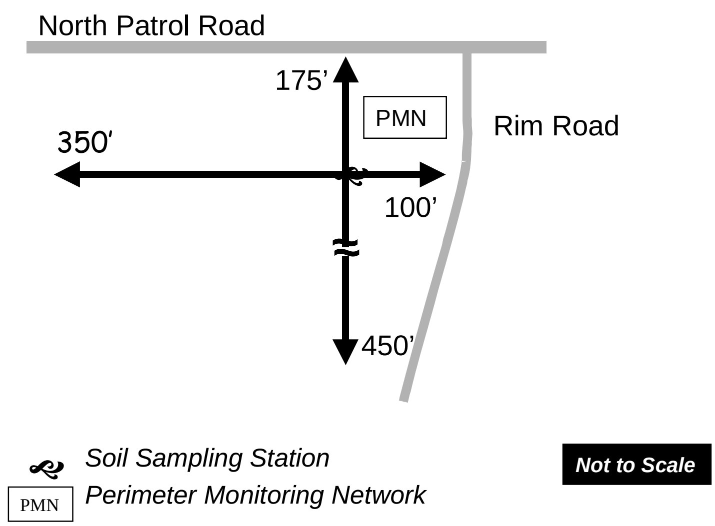
Table D-1. Approximate Site Dimension for Biota Locations

Site	North	South	West	East
1-1	110	250	230	300
1-2	175	450	350	100
1-3	90	350	600	140
1-5	230	150	350	130
1-6	600	110	30	160
1-7	220	190	350	330
1-8	200	90	200	390
1-9	60	250	500	130
1-10	190	195	260	140
2-1	90	0	265	65
2-2	70	140	95	80
2-3	30	60	200	90
2-4	100	250	350	350
2-5	150	125	60	240
2-6	60	70	90	110
2-7	250	500	45	45
2-8	40	45	160	280
3-2	50	40	200	350
3-3	0	300	175	50

Site 1-1



Site 1-2



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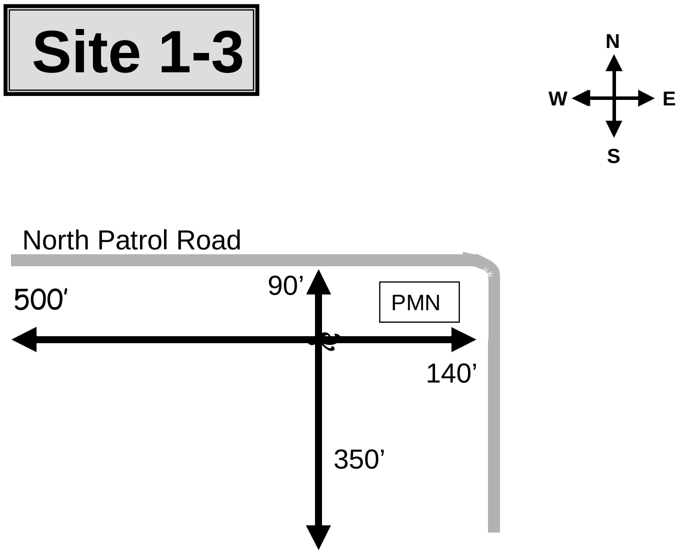

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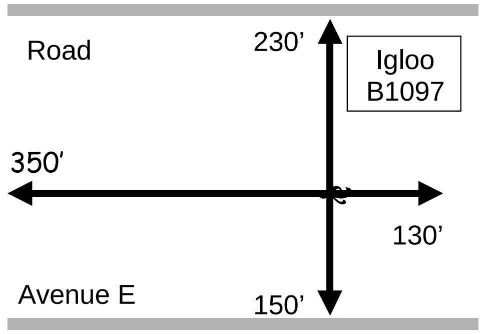
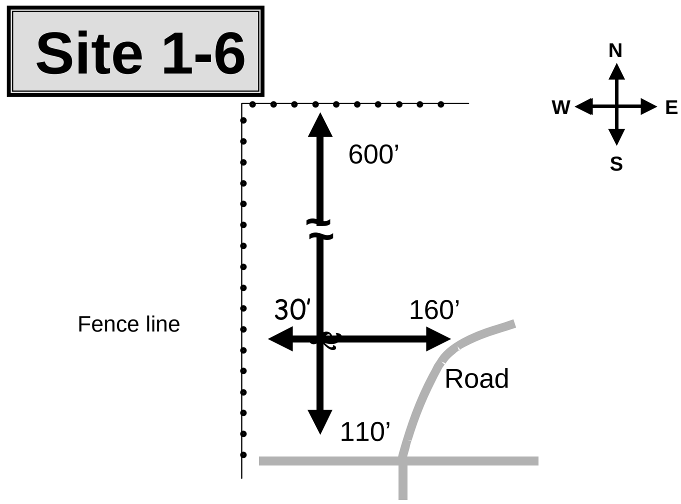
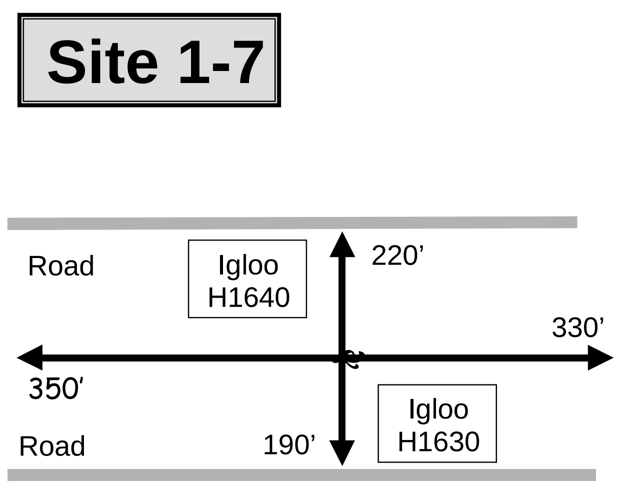


Soil Sampling Station

PMN *Perimeter Monitoring Network*

Not to Scale

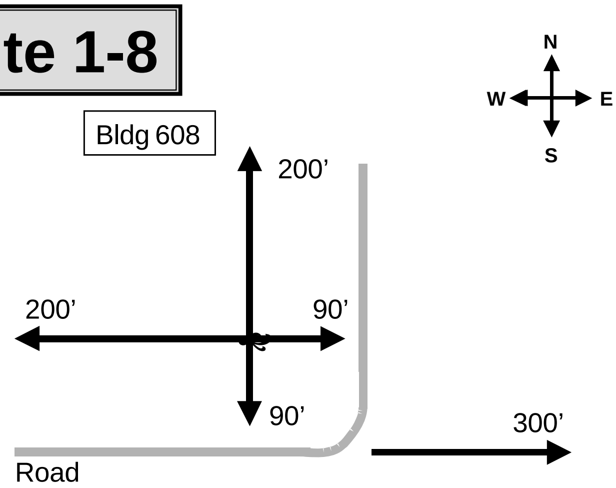




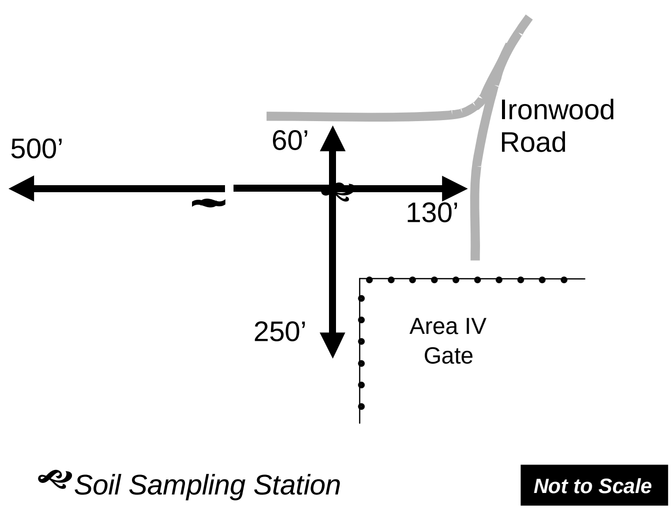
Soil Sampling Station

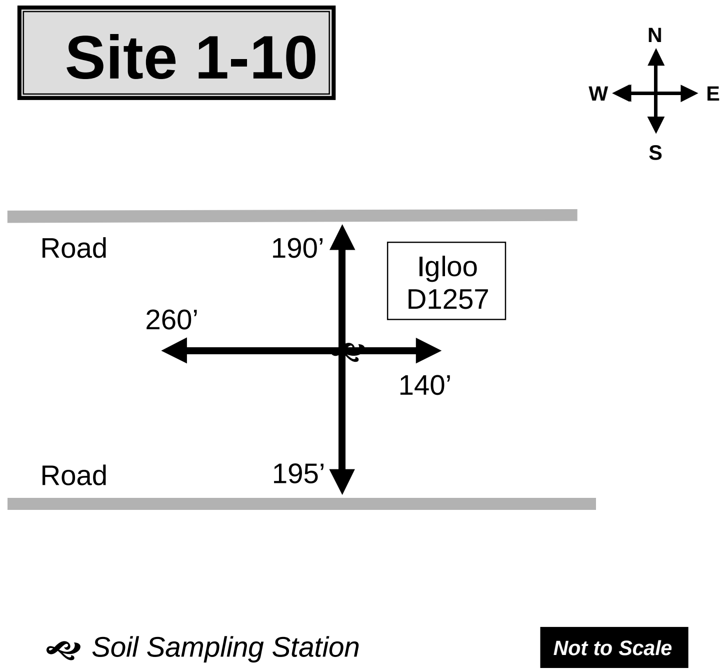
Not to Scale

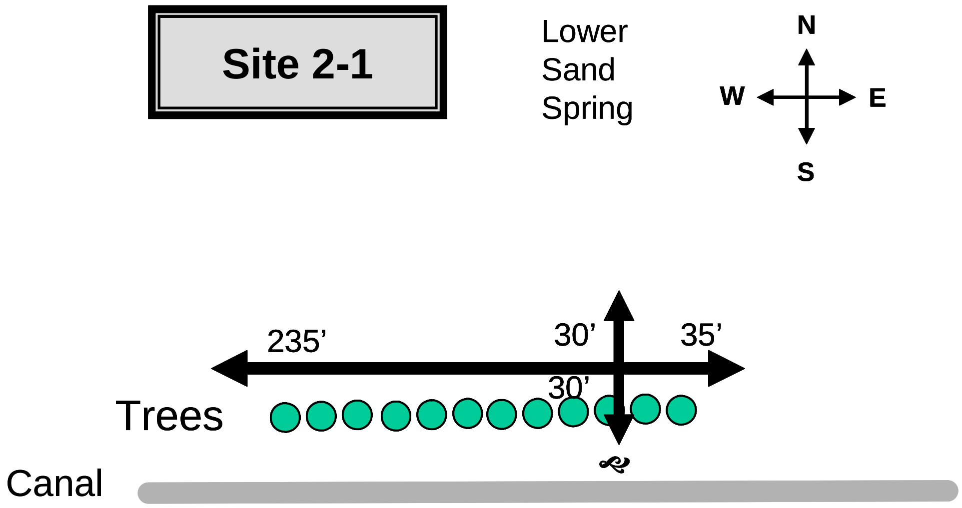
Site 1-8

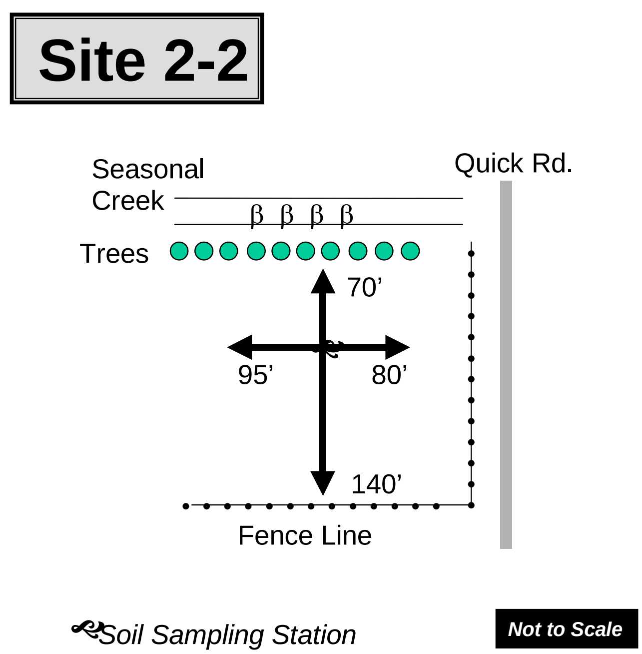


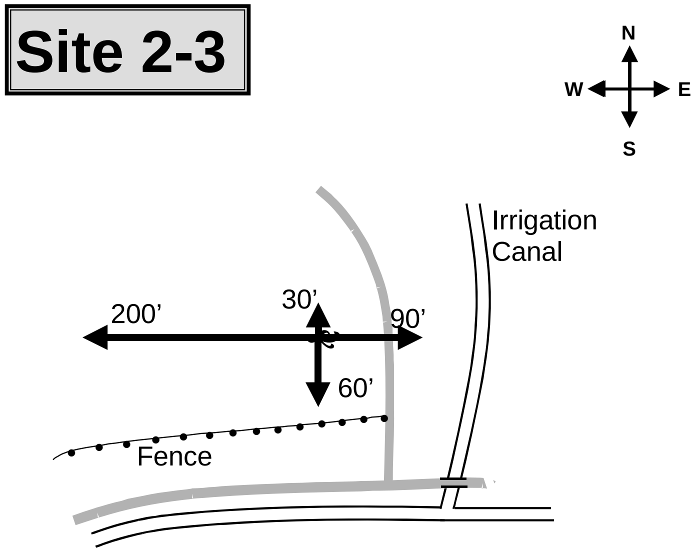
Site 1-9

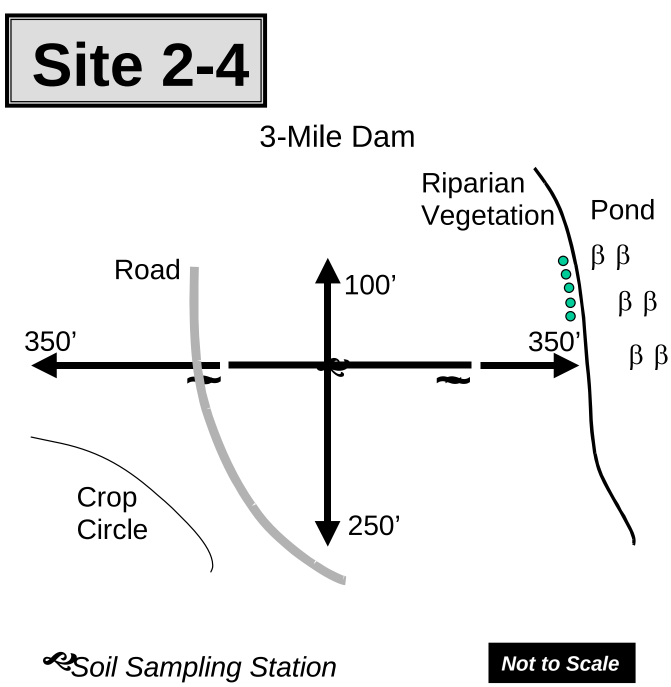



Site 1-10
N
W
E
S
Road
190’
Igloo D1257
260’
140’
Road
195’
Soil Sampling Station
Not to Scale

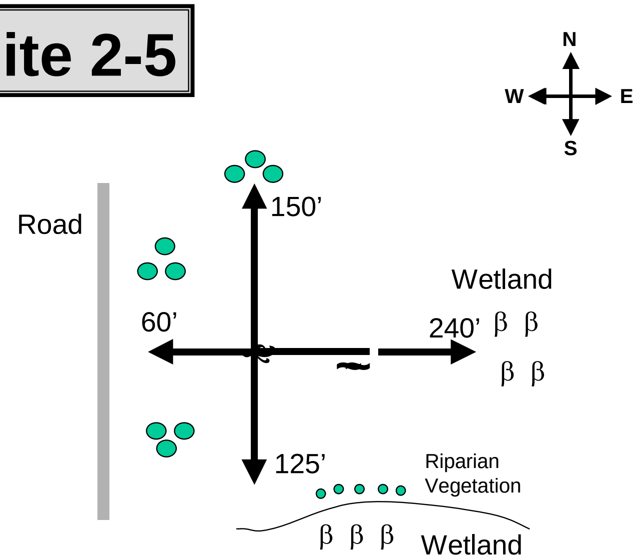

Site 2-1
Lower
Sand
Spring
N
W
E
S
235'
30'
35'
30'
Trees
Canal


Site 2-2
Seasonal
Creek
Quick Rd.
β β β β
Trees
70'
95'
80'
140'
Fence Line
Soil Sampling Station
Not to Scale

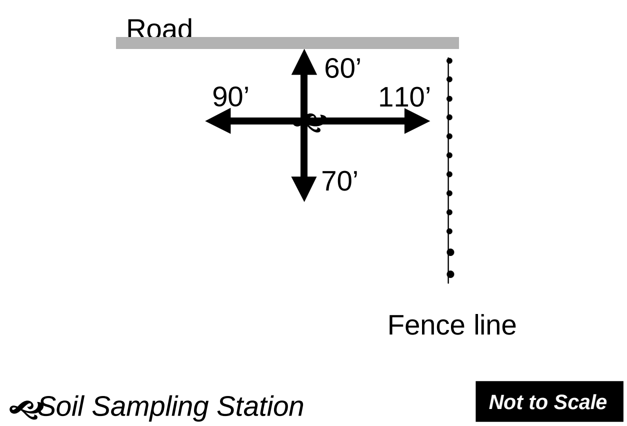

Site 2-3
N
W
E
S
Irrigation
Canal
200'
30'
90'
60'
Fence


Site 2-4
3-Mile Dam
Riparian
Vegetation
Pond
β β
β β
β β
Road
100'
350'
350'
Crop
Circle
250'
Soil Sampling Station
Not to Scale

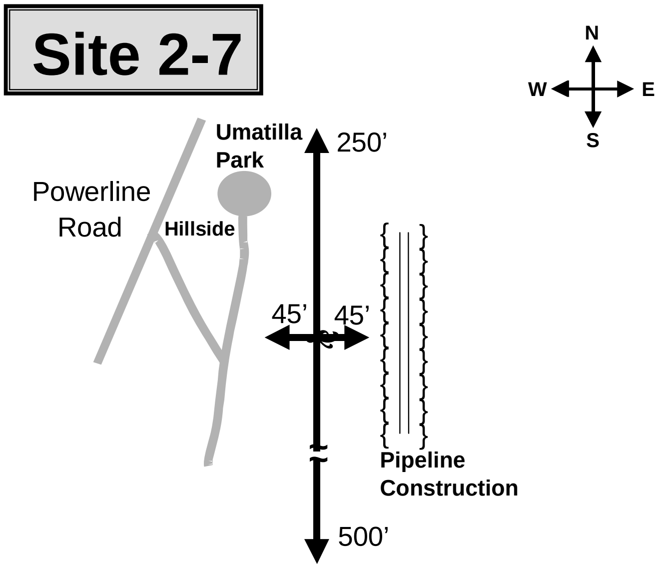
Site 2-5



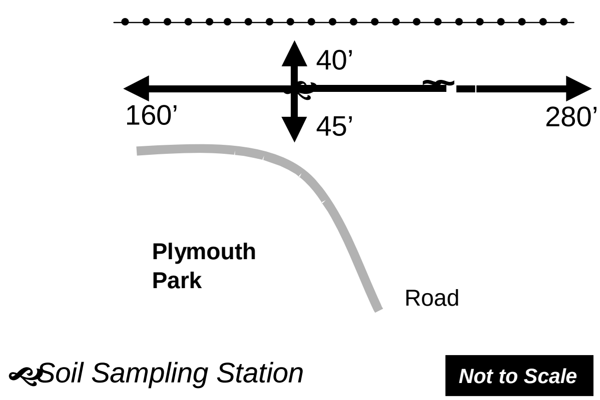
Site 2-6



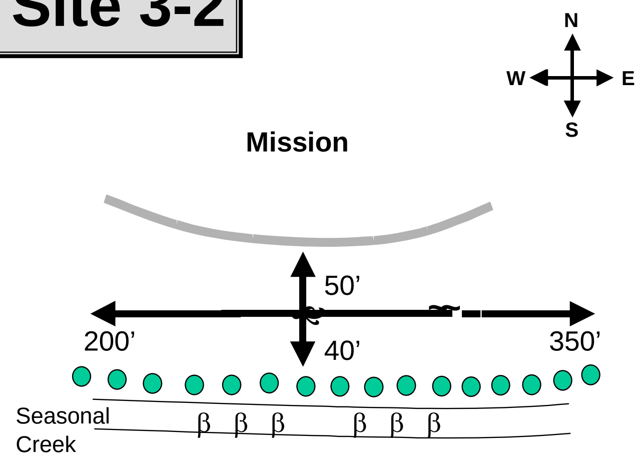
Site 2-7



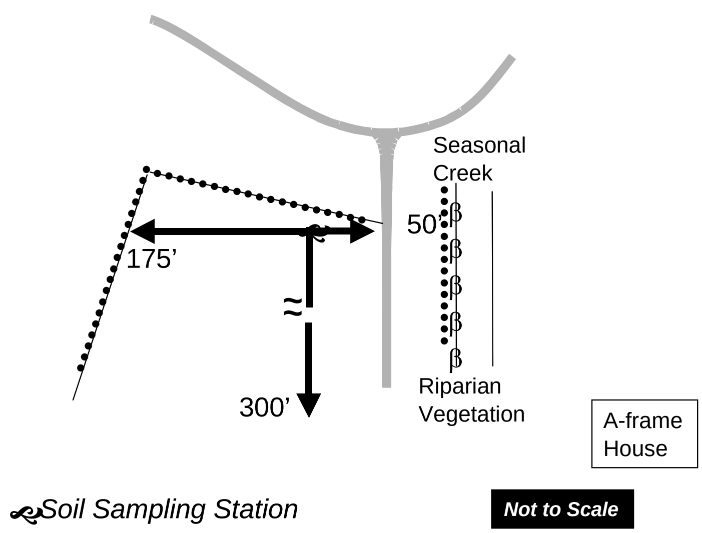
Site 2-8



Site 3-2



Site 3-3



Umatilla Chemical Agent Disposal Facility

ATTACHMENT 6

SECURITY, PREPAREDNESS, AND PREVENTION PROCEDURES, EQUIPMENT, AND REQUIREMENTS AND WASTE AND PRECIPITATION RELEASE RESPONSE PROCEDURES

TABLE OF CONTENTS

FIGURES AND TABLES

Security Procedures

1. SECURITY
[40 CFR 264.14, 270.32; OAR 340-104-0001]

The permittee shall comply with the security procedures set forth under 40 CFR §264.14(b) and (c) and as described in this attachment, except as allowed by 40 CFR §264.14(a) and the Closure Plan (Permit Attachment 8).

In addition to the security procedures in effect at the UMCDF, the UMCD provides overall security. The unclassified portions of the various security systems are discussed below; all systems are in full effect during chemical demilitarization operations. The location of fencing and gates for the treatment portion of the UMCDF is shown in Figure 1-1. These security systems prevent unknowing entry into the UMCDF and minimize the possibility for the unauthorized entry of persons or livestock onto the UMCDF by use of the following procedures and equipment: (1) fencing around the entire UMCD perimeter; (2) 24-hours-per-day, 7-days-per-week surveillance by roving armed patrols; (3) warning signs posted along perimeter fences to discourage unknowing or unauthorized entry; (4) entry to the UMCD is limited to gates, staffed by armed security personnel; (5) access limited to persons and vehicles displaying appropriate identification; (6) two-way radio or alternative means of communication between security personnel, selected UMCD personnel, and a central communications center; (7) telephone communications available at selected facilities; and (8) security lighting provided at key locations.

The UMCDF administration offices, J-Block permitted storage, and some other waste-management areas managed under the UMCDF's EPA ID number are located outside the treatment area.

1.1. SECURITY PROCEDURES AND EQUIPMENT
[40 CFR 264.14,; OAR 340-104-0001]

The general security provisions for the UMCDF shall include: (1) double fencing surrounding the UMCDF treatment area; (2) 24-hours-per-day, 7-days-per-week surveillance by additional stationary and roving UMCD armed patrols; (3) warning signs posted at the UMCDF perimeter; (4) entry to the UMCDF treatment area limited to gates staffed by UMCD armed security personnel; (5) access to the UMCDF treatment area limited to persons and vehicles displaying appropriate identification issued only by the UMCD; (6) two-way radio or alternative means of communication between security personnel, UMCDF personnel, and the central communications center; and (7) security lighting to illuminate the UMCDF treatment area. In addition, UMCD security personnel patrol the UMCDF constantly in a random manner.

During the remaining HD ton container storage and treatment operations, the permittee must comply with both Sections 1.1.1 and 1.1.2 of this attachment. After HD ton container storage and treatment operations have been completed and no more surety chemical agent remains on the UMCD or the UMCDF, the permittee shall only be required to comply with Section 1.1.2 except as allowed by 40 CFR §264.14(a) and the Closure Plan (Permit Attachment 8).

1.1.1. Twenty-Four-Hour Surveillance System
[40 CFR 264.14(b)(1); OAR 340-104-0001]

Continuous surveillance of the UMCDF and the UMCD Chemical Limited Area shall be accomplished by roving UMCD security patrols. Each roving patrol is motorized and radio-equipped and assigned to a specific patrol area during its watch.

1.1.2. Barrier and Means to Control Entry
[40 CFR 264.14(b)(2)(i); OAR 340-104-0001]

1.1.2.1. **Barrier**
[40 CFR 264.14(b)(2)(i); OAR 340-104-0001]

The UMCDF treatment area is surrounded by two approximately 7-foot-high chain-link security fences. These fences are separated by 30 feet. Each fence is topped with dual-strand barbed wire, for a total height of approximately 8 feet. This design forms a buffer zone surrounding the UMCDF. The perimeter is completely lighted. The bottom of the fence is close enough to firm ground to prevent an intruder from crawling under the fence.

The UMCD perimeter fence, consisting of a five-foot-tall chain link fence with barbed wire on top, serves as a barrier to unauthorized entry to the J-Block storage area.

The permittee shall maintain these fences in good repair.

1.1.2.2. **Means to Control Entry**
[40 CFR 264.14(b)(2)(ii); OAR 340-104-0001]

Access to the UMCDF treatment area within the double-fenced perimeter requires specially signed forms. Visitors are always accompanied during their visit within the UMCDF treatment area and are subject to security checks.

For those individuals who routinely work in the UMCDF treatment area special badges are issued and indicate that the individual is certified to work in this area. If the special badge has been revoked or restricted for any reason or the person's name is not on the UMCDF entry control roster, the worker will not be allowed past the guards. Entry badges are also coded to indicate limited versus full access once inside the UMCDF treatment area.

Access to the UMCDF treatment area is controlled by a remote-activated double-gate and turnstile system. All gate guards are armed and have authorization to use deadly force.

For vehicle entry to the UMCDF treatment area, all persons but the driver must enter through the double turnstiles. Only the driver is allowed to drive the vehicle to a zone between two gates, both of which are locked upon entry. The vehicle is thoroughly inspected, including under the hood and seats, in the trunk, etc. The second gate is then opened to permit the vehicle into the UMCDF treatment area. This procedure is reversed upon leaving the UMCDF treatment area. The only exceptions to this procedure occur during an emergency.

Some workers require temporary entry passes. Employees, such as electricians, grounds mowers, etc., fall in this "temporary entry" category. These personnel are accompanied by an escort during their time within the UMCDF treatment area.

Entry into the UMCDF is made at the main guard gate or auxiliary gate. The main gate is manned 24 hours a day by an armed guard. All auxiliary gates are manned during all periods of use. Anyone requesting entrance at one of the auxiliary gates must have an appropriate badge. All visitors to the UMCD storage areas must obtain their entrance badges.

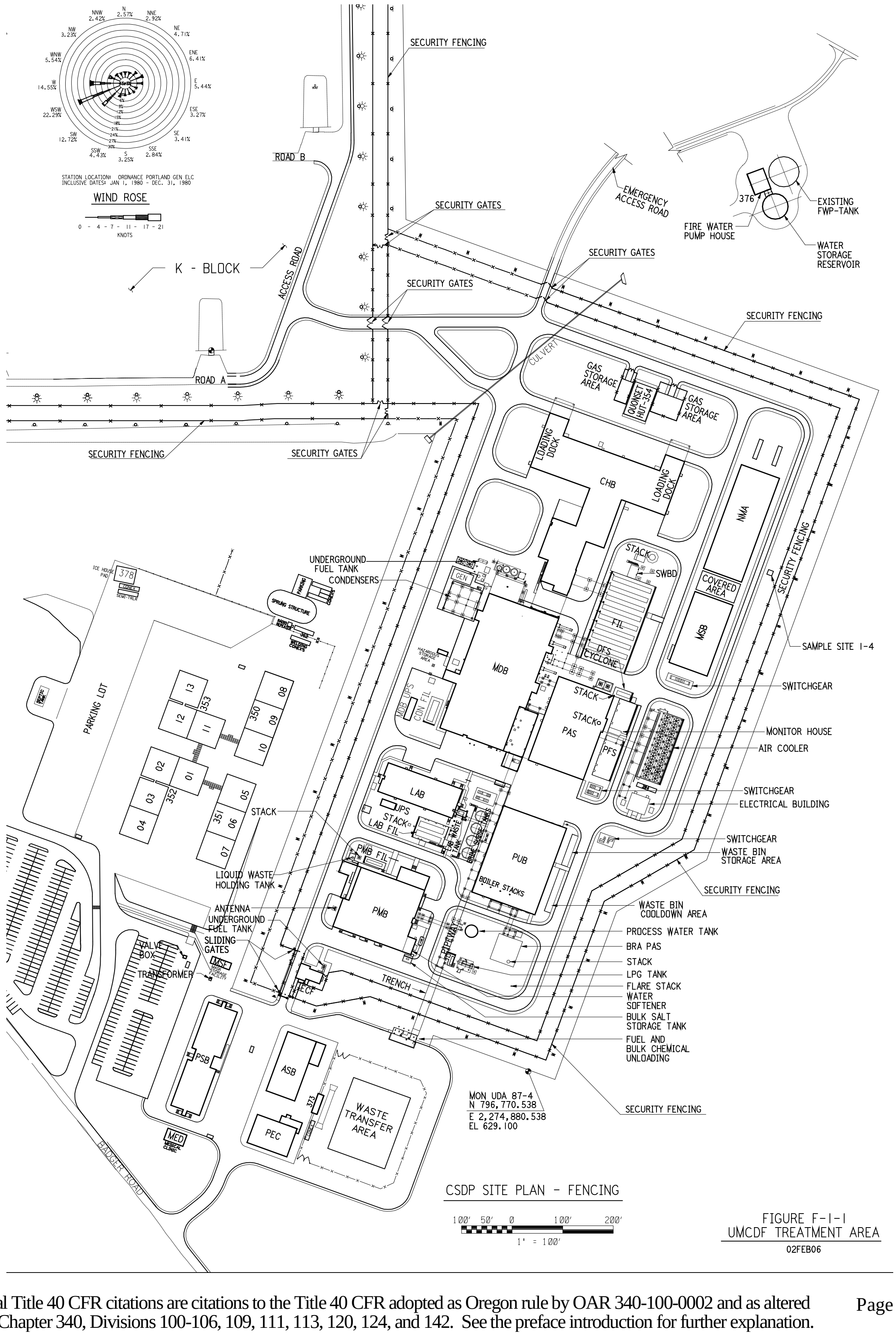
In order for a visitor to gain access to the J-Block storage area, he/she must have an established need to enter and must be properly badged.

1.1.2.3. **Warning Signs**
[40 CFR 264.14(c); OAR 340-104-0001]

Signs warning stating the area is restricted and dangerous, and that unauthorized entry is illegal are posted along the perimeter fence surrounding the UMCDF treatment area at intervals of 500 feet or less and near all access gates. These signs are approximately 18 inches by 24 inches and easily visible at a distance of 25 feet. Large signs describing the "Conditions of Entry" are posted at each UMCD gate. These signs warn of the possible consequences of unauthorized entry. The warning signs are in both English and Spanish.

J-Block storage igloo doors are marked, “Danger – Unauthorized Personnel Keep Out.” The markings are visible from a distance of at least 25 feet.

FIGURE 1-1. UMCDF TREATMENT AREA



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Preparedness and Prevention Requirements

2. PREPAREDNESS AND PREVENTION REQUIREMENTS
[40 CFR 264.32; 264.35, ; OAR 340-104-0001]

2.1. Equipment Requirements

2.1.1. Internal Communications
[40 CFR 264.32(a); OAR 340-104-0001]

Immediate emergency notification and instruction is provided to UMCDF personnel working outside by sirens and the accompanying public address system. Sirens are located in strategic locations throughout the UMCD. The public address speakers are located together with the sirens. The Operations Center has the capability of sounding the sirens individually, in any combination, or all at the same time. The public address system can broadcast recorded or live messages. Live messages are used in most instances. A second siren network is available for back up, and is controlled by the UMCD Fire Department. This network does not have the capability of broadcasting messages. The sirens may be sounded individually or all at once.

Personnel working in J-Block communicate via two-way radio or cellular phone.

During hazardous waste operations, all personnel involved in the operation have immediate access (either directly or indirectly through visual or voice contact with another employee) to an internal alarm or emergency communication device. Telephones and public-address loudspeakers are available throughout the UMCDF treatment area for use in case of emergencies. This telephone system is available for internal as well as external communications. The UMCDF's emergency communications systems are further described in Permit Attachment 9.

2.1.2. External Communications
[40 CFR 264.32(b); OAR 340-104-0001]

The UMCDF telephone system provides the means for external communications with the UMCD and the surrounding areas. Cellular phones are used for external communications to and from J-Block.

2.1.3. Emergency Equipment Requirements
[40 CFR 264.32(c); OAR 340-104-0001]

The UMCDF maintains an extensive inventory of emergency equipment.

Portable fire extinguishers, a sprinkler system, a fire extinguishing medium system, and a dry chemical system are built into the UMCDF treatment units to minimize the threat of fire. Portable fire extinguishers are available in J-Block. A detailed list of all emergency equipment , including spill control equipment and decontamination equipment, is located in Section 7 of Permit Attachment 9. The emergency storage stations shall include the equipment identified in Permit Attachment 3 and Permit Attachment 9. The UMCD is the first responder for fire-related emergencies, and shall maintain fire trucks and other emergency equipment necessary to adequately respond to a fire at the UMCDF.

2.1.4. Water for Fire Control
[40 CFR 264.32(d); OAR 340-104-0001]

A storage tank and pump system designed to provide water at adequate volume and pressure to supply the UMCDF fire water needs. The fire water reserve is 362,000 gallons. A primary and a backup fire pump are located at the water storage tank. Each pump is powered from an independent power source to ensure fire water flow on demand in the event of an interruption in one of the sources of power. All water storage tank system components are designed to National Fire Protection Association standards. The fire protection system is described in Section 7 of Permit Attachment 9 (the Contingency Plan). In addition, a 120,000-gallon water tower located on North Patrol Road may be used to fight fires in J-Block.

2.2. AISLE SPACE REQUIREMENTS
[40 CFR 264.35; OAR 340-104-0001]

The Container Handling Building, the Munitions Demilitarization Building, and J-Block igloos are used for container storage. The storage area arrangements provide efficiency in container storage, provide adequate access for fire fighting, meet minimum fire code requirements, and allow easy access for personnel and equipment needed for inspections and emergency operations.

The Container Handling Building stores the munitions and bulk items before demilitarization processing. There is a minimum of four feet of aisle space between containers in the Container Handling Building. Aisle space for permitted storage in the Munitions Demilitarization Building and J-Block is maintained in accordance with 40 CFR 264.35.

Drawings UM-07-G-501 through UM-07-G-506 (in Permit Attachment 12) show the container storage arrangements for the Container Handling Building.

Preventive Procedures, Structures, and Equipment

3. PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT
[40 CFR 264.30 - 34]

The UMCDF procedures, structures, and equipment utilized to prevent releases to the environment and to protect human health are described below.

3.1. Unloading Operations

The three categories of remaining waste managed at the UMCDF include, but is not limited to: (1) chemical agent in ton containers; (2) the brine salts; and (3) the incinerator ash, residues, slag, ventilation system filters, spent carbon, and other demilitarization waste. (See Attachment 2 of the UMCDF Permit for more detail.)

Brine and spent decontamination solution are not physically handled. The brines may be pumped from the incinerator pollution abatement system to the brine surge tanks before they are fed to the Brine Reduction Area. Brines may also be pumped to the brine load/unload station from either the PAS or the brine surge tanks for transfer to tankers for off-site disposal. Spent decontamination solution is collected in sumps, pumped to the spent decontamination holding tanks, and then pumped to the Liquid Incinerators' secondary chambers.

The HD ton containers are delivered to the Container Handling Building in enhanced on-site containers (EONCs) via transport truck. They are unloaded from the transport truck and placed in the Container Handling Building. From the Container Handling Building, the EONCs are transported by a pneumatic roller track conveyor system and lift system and then on a conveyor to the Munitions Demilitarization Building. There they are unloaded in the unpack area where processing begins.

When brines are processed at the Brine Reduction Area, the brine salts are discharged directly to collection containers. The filled containers are covered and labeled. The containers of brine salts are then moved via forklift to the Residue Handling Area, to await transportation to an approved off-site hazardous waste treatment, storage, or disposal facility.

Incinerator ash, slag, and residues are handled in the same manner as the brine salts. These wastes, like the brine salts, are placed into collection containers. The spent carbon from the ventilation systems and other carbon filter systems is removed and placed in containers.

Hazards in J-Block unloading operations (as well as handling and loading operations) are minimized through implementation of the appropriate provisions in project-approved, controlled procedures. Hazards during unloading and other waste handling operations at J-Block are also minimized through the use of training. All hazardous waste handlers are trained for their respective job duties; personnel who load and unload hazardous waste receive training on those activities before performing them.

3.2. Runoff

Runoff from all hazardous waste handling areas to other areas of the UMCDF or the environment is prevented by UMCDF design features. Waste handling in the Container Handling Building, Munitions

Demilitarization Building, Residue Handling Area, and Brine Reduction Area take place in enclosed buildings. The J-Block igloos are also enclosed structures. These measures minimize the potential for precipitation runoff to reach these areas. The waste handling areas of the Container Handling Building, Munitions Demilitarization Building, and the Brine Reduction Area have floor drains and/or sumps for collection of spilled hazardous waste. The floor sumps for all hazardous waste management areas of the Munitions Demilitarization Building have provisions for transferring sump contents to spent decontamination holding tanks. The other areas have passive sumps, which are pumped dry when liquids accumulate in them.

3.3. Water Supplies

The processing and storage of all hazardous waste (including brine drying and brine salt storage) at the UMCDF takes place in enclosed structures with concrete bases that prevent the downward percolation of wastes or liquids. In J-Block, secondary containment is provided for containers that hold liquid wastes.

3.4. EQUIPMENT AND POWER FAILURE

3.4.1. Equipment Failure Control

The automatic control system is designed and operated to perform shutdown of the entire UMCDF or a portion of the UMCDF should an equipment failure (or other emergency) occur. The Control Room has a positive-pressure, filtered-supply air system providing protection against toxic fumes that could be emitted during an emergency. A detailed description of the automatic control system is provided below.

The automatic control system in the Control room uses process controllers with functional keyboard(s) for operator interface and control of the system, as required, monitors for displays, and a printer to print out alarms and messages. The process controllers contain the programs for each type of waste to be treated at the UMCDF and process-supporting systems, such as utilities and heating, ventilation, and cooling systems. An operator is able to remove a unit or piece of equipment from automatic control and control it manually through the keyboard on the console. The automatic control system is designed as a fail-safe system. All local controllers communicate with the Control Room on a real-time basis. Should this communication link become inactive (presumably from a failure in the automatic control system), the local controls automatically fail to a safe mode. The communication system is a redundant system to reduce the likelihood of a failure in the communication link.

Initialization of the automatic control system is necessary before HD ton container processing can begin. The initialization procedure resides within the process controller; the actual initialization is a semiautomatic operation. When the initialization has been successfully completed, the operator is notified via a monitor, which indicates that all permissives have been received and the automatic control system is now ready to process the ton container. Any problems that may arise during the initialization is displayed on the monitor and an alarm is actuated.

Before processing HD ton containers, each system is prechecked by a test program from within the process controller. If the presence of a HD ton container is required to perform checks, that function is bypassed by the process controller during this check.

After initialization and performance verification, a second level of performance verification is conducted by the process controller that verifies the presence of any shutdowns and any permissive interlocks.

Having met all performance verification checks, a message appears on the monitor and printer that the UMCDF, as viewed by the process controller, is ready for operation.

After start of the automatic control system has been initiated, automatic operation follows as long as all individual steps occur within their predetermined parameters and no shutdown signals occur. If a step or function does not occur within its predetermined parameters, a message appears on the monitor and on the printer; the operator must take action. This requirement for operator intervention is not the same as that required by loss of permissive or shutdown action.

Shutdown requests and interlocks are monitored continuously. Where possible, applicable prealarms or indications that a shutdown condition is imminent are used. This gives the operator time to prevent a shutdown or to be prepared for it. Interlocks have been developed to respond to various conditions in a manner applicable to the condition and equipment. As an example, some shutdowns are immediate, while others are staged. The system logs all abnormal conditions, such as starting and stopping of equipment. These logs and records are analyzed for malfunction reports, maintenance, etc.

In addition to the automatic control system, equipment such as incinerators, boilers, and airlock doors in the unpack area and each load station have a local control panel that offers limited control. Local control panels offer the capability of operating in conjunction with the automatic control system or independently for maintenance purposes. Areas such as the unpack area or incinerators are operated in a semiautomatic mode, either during normal operation or startup. In the semiautomatic mode of operation, the automatic control system may start a unit and wait for the next step to be initiated and controlled by an operator before proceeding to the next logic control step.

J-Block igloos are not equipped with electrical power and, consequently, are not controlled by the automatic control system.

3.4.2. Incineration Upset Control

A control system provides continuous automatic control of the incineration process. System interaction by the operator is limited to initiation of process systems or reaction to abnormal conditions. In monitoring critical functions, the automatic control system gives advance warning of alarms where possible, indicating that a critical or hazardous condition is developing and warning operators in time to take action. Interlocks are provided to respond to various conditions. Shutdown could be immediate or staged. More detailed system shutdown procedure descriptions are provided in applicable standing operating procedures as required by Permit Condition I.L).

All incinerators have automatic waste feed cut-off systems. For example, with the Deactivation Furnace System, all feed stops (blast gates will close) under emergency shutdown conditions caused by loss of flame in the rotary retort pilot burner or afterburner, loss of flame in the two afterburner pilot burners or afterburners, low pressure from the rotary retort or afterburner combustion air blowers, low natural gas pressure from the gas supply line, high combustion velocity, or detection of chemical agent in the stack gas.

3.4.3. Emergency Power

The emergency power system consists of a diesel-driven electrical generation system adjacent to the Munitions Demilitarization Building. The system is capable of carrying the UMCDF's entire emergency load and provides backup power to all of the critical and essential loads in case of a power outage.

Critical functions such as computer memory, communication, selected instrumentation, emergency lighting, and other selected loads are connected to the uninterruptible power supply, which consists of a rectified charger, inverter, static switch, batteries, protective devices, instruments, and controls. The uninterruptible power supply provides power to critical loads without practical interruption and will be monitored from the Control Room. Because of the size of the uninterruptible power supply, the excess capacity is used for monitors, fire alarms, and other devices. If both primary feeders are lost, emergency shutdown occurs. Loss of one feeder does not start the emergency generator, but the generator will start and come online if both primary feeders from the utility are lost. During the switching and generator startup, the uninterruptible power supply ensures constant power to the critical items. If the emergency generator is lost, power for the critical items connected to uninterruptible power supply is available for 45 minutes.

A listing of the equipment that remains operational under emergency generator power and critical items connected to the uninterruptible power supply is provided in Table 3-1 and Table 3-2.

3.4.4. Spent Decontamination Collection System

In all Category A and B areas, as well as in most Category C areas, spent decontamination sumps and pump(s) are provided to collect any washdown from that area and pump it to one of the spent decontamination holding tanks e.

All primary sumps are constructed of steel and surrounded by an epoxy-coated external concrete liner. Secondary sumps are constructed of concrete with an epoxy-coated steel liner. The compatibility of materials was considered when designing these sumps. There are no incompatibility problems with the selected materials and anticipated decontamination solutions or other such wastes. All floors in Category A, A/B, and B areas are sloped at a rate of 1/4-inch per foot. In the Explosive Containment Room, the floor slopes to a trench, and the trench slopes at 1/16-inch per foot to the sump. In other Category A areas, the floor may slope to embedded trenches, which then slopes at 1/16-inch per foot to the sump. In Category C areas, the floor slopes at 1/16-inch per foot to the sumps.

3.4.5. Chemical Agent Monitoring Equipment

Various chemical agents are routinely handled at the UMCDF. The safe operation of the UMCDF requires not only that agent is not released to the environment during storage and operations, but also that personnel be protected from accidental or inadvertent exposure to these chemical agents. The ventilation system minimizes worker exposure to chemical agents. To supplement the ventilation system, a chemical agent monitoring system is provided to indicate the presence of chemical agents. The Automatic Continuous Air Monitoring System and the Depot Area Air Monitoring System are typically used at the UMCDF treatment area, and the RTAPs are used at the J-Block to monitor for the presence of agent. The capabilities, as well as the principles of operation and deployment areas, for these instruments are described in Permit Attachment 2 (Waste Analysis Plan), Appendices C and D, including a general description of the system, its theory of operation, and its required monitoring levels and response time.

It should be noted that because of the low volatility of mustard agent in ton containers, first-entry monitoring includes a thorough visual inspection of the ton containers in the area in addition to air sampling.

3.5. PERSONNEL PROTECTION EQUIPMENT

Various levels of protective clothing are required by UMCDF plans and standing operating procedures to protect workers from the effects of the chemical agent in the work environment. The type of protective clothing worn by the workers is based on the level of protection required by the location, the process, and the type of chemical agent.

TABLE 3-1. UMCDF EMERGENCY POWER LOAD SUMMARY

			Load (kVA)	Demand Factor	Demand (kVA)
	Exhaust Air Filter HVC-FILT-101 thru –109 – 7 out of 9 Running		700	0.8	560
	Process Area AHU HVC-AIRH-10 thru –103 – 2 out of 3 Running		150	0.8	120
*	Control RM AHU-HVC-AIRH-104 & -105		75	0.8	60
	UPS RM AHU HVC-AIRH-108 & -109		6	0.8	4.8
	Elect RM AHU HVC-AIRH-106 & -107		10	0.8	8.0
*	Mech Equip RM AHU HVC-AIRH-110A & B		20	0.8	16
	Cont & Mech RM AHU HVC-AIRH-111		2	0.8	1.6
	Chiller RM AHU HVC-AIRH-113		2	0.8	1.6
	Emergency General SWGR. RM AHU HVC-AIRH-114		2	0.8	1.6
*	Control RM Chilled Water Pump HVC-PUMP-140 & -150		15	0.8	12
*	Instrument Air Compressor IAS-COMP-101 & -102		150	0.8	120
*	LSS Air Comp LSS-COMP-101 & -102		50	0.8	40
*	Control Room Chiller HVC-CHIL-140 & -150		88.6	0.8	70.9
	Emergency Generator AUX		75	0.8	60
	Chiller RM Supply Fan HVC-FANX-103		20	0.8	16
*	Air Cooled Condenser HVC-COND-140 & -150		8	0.8	6.4
	DFS Retort DFS-FURN-101		5	0.8	4
	MPF Primary Combustion Air Blower MPF-BLOW-101	*Only one of the two will be running, thus only one is counted in the subtotal.*	100	0.8	80
	MPF Backup Combustion Air Blower MPF-BLOW-102				
	DFS Lube Oil Pump DFS-FUN-101B/C		4	0.66	2.7
	DFS Thrust Roller DFS-FURN-101D		1.5	0.8	1.2
	Secondary LIC Pit Area AHU HVC-AIRH-120		15	0.8	12
	Mechanical Equipment Room Air Handling Unit HVC-AIRH-123		1.5	0.8	1.2
	MPF Secondary Cooling Water Circ Pump SCW-PUMP-101		5	0.8	4
	Secondary LIC Pit Area Air Handling Unit HVC-AIRC-119		15	0.8	12
	HVC-FANX-108 – Emergency Exhaust		2	0.8	1.6
				Subtotal	1,217.6

TABLE 3-1. UMCDF EMERGENCY POWER LOAD SUMMARY

		Load (kVA)	Demand Factor	Demand (kVA)
	MPF Furn MPF-FURN-101A, B, & C	6	0.8	4.8
	MPF Conveyor MMS-CNVP-119 & MPF-CNVP-101	4	0.8	3.2
*	Decon Supply Pump CDS-PUMP-102 & -103	20	0.8	16
*	Decon Circulating Pump CDS-PUMP-105 & -106	1.5	0.8	1.2
*	Hot Water Boiler PUB-BOIL-201 & -202	55	0.8	44
*	Hot Water Boiler PUB-PUMP-201 & -202	125	0.8	100
	Process Water Supply Pump PRW-PUMP-101, -102, -103 (2 out of 3 Running)	80	0.8	64
*	Pri. Cooling Med. Circ. Pump PCS-PUMP-101 & -102	20	0.8	16
*	Pri. Cooling Med. Air Cooler PCS-COOL-101A & B	25	0.8	20
*	LIC #2 Quench Brine Pump PAS-PUMP-211 &-212	40	0.8	32
*	MPF Quench Brine Pump PAS-PUMP-102 & -103	40	0.8	32
*	DFS Quench Brine Pump PAS-PUMP-106 & -107	100	0.8	80
	UPS Power	225	0.7	157.5
	LAB Power	40	1.0	40
	Emergency Lighting & Miscellaneous Loads	300	0.8	240
	DFS Secondary Combustion Air Blower DFS-BLOW-102	100	0.8	80
	PMB Power	50	0.8	40
	DFS Cyclone Enclosure Filter	40	0.8	32
	LIC #1 Quench Brine Pump PAS-PUMP-111, -112	80	0.8	64
	LIC 1 PFS Gas Reheater Blower PFS-BLOW-101	1	0.8	0.8
	LIC 2 PFS Gas Reheater Blower PFS-BLOW-201	1	0.8	0.8
	MPF Secondary Cooling Water Circ Pump SCW-PUMP-102	5	0.8	4
	Filter Blower HVC-FILT-601	20	0.8	16
			Subtotal	1,088.3

TABLE 3-1. UMCDF EMERGENCY POWER LOAD SUMMARY

		Load (kVA)	Demand Factor	Demand (kVA)
	MPS PFS Gas Reheater Blower PFS-BLOW-102	1	0.8	0.80
	DFS PFS Gas Reheater Blower PFS-BLOW-103	2	0.8	1.60
$	LIC 1 Clean Liquor Air cooler PFS-COOL-113AA/AB/BA/BB	20	0.8	16.00
$	LIC 2 Clean Liquor Air cooler PFS-COOL-213AA/AB/BA/BB	20	0.8	16.00
$	MPF Clean Liquor Air Cooler PFS-COOL-114AA/AB/BA/BB	20	0.8	16.00
$	DFS Clean Liquor Air cooler PFS-COOL-115AA/AB/BA/BB/CA/CB/DA/DB	40	0.8	32.00
$	MPF Exhaust Blower PAS-BLOW-102A/B 1 out of 2 Running	25	0.8	20
$	DFS Exhaust Blower PAS-BLOW-103A/B 1 out of 2 Running	25	0.8	20
$	LIC 1 Exhaust Blower PAS-BLOW-104A/B 1 out of 2 Running	25	0.8	20
$	LIC 2 Exhaust Blower PAS-BLOW-204A/B 1 out of 2 Running	25	0.8	20
*	LIC 1 Clean Liquor Pump PFS Pump – 134/135	75	0.8	60
*	LIC 2 Clean Liquor Pump PFS Pump – 234/235	75	0.8	60
*	MPF Clean Liquor Pump PFS Pump – 136/137	75	0.8	60
*	DFS Clean Liquor Pump PFS Pump – 138/139	150	0.8	120
	PFS Misc. Loads (lighting, ventilator, etc.)	100	0.8	80
	LIC #1 Slag Removal Heaters	35	0.8	28
	LIC #1 Slag Removal Conveyors	20	0.1	2
	LIC #2 Slag Removal Heaters	35	0.8	28
	LIC #2 Slag Removal Conveyors	20	0.1	2
			Subtotal	602.4
*	1 out of 2 Running		Total Demand (page 1)	1,217.6
$	Adjustable-speed drive		Total Demand (page 2)	1,088.3
			Total Demand (pages 1, 2, 3)	2,908.3
			10% future spare =	290.8
			Total Demand including spare =	3,199.1
			Total Demand with diversity factor (assumed 1.2) =	2,665.9
			Use 2,250-kW generator @ 0.8 power factor =	2,812.5 kVA

TABLE 3-2. UMCDF UNINTERRUPTIBLE POWER SUPPLY (UPS)

Critical Systems Connected to the UPS*
Process Logic Controllers (PLCs), Status Boards, and Operator Consoles
Process Data Acquisition and Recording (PDAR)
Automatic Continuous Air Monitoring System (ACAMS) and Depot Area Air Monitoring System (DAAMS)
Continuous Emissions Monitors (CEMS)
Public Address System and Closed-Circuit Television
Control Room (CON) Lighting and Evacuation Lighting
Battery Room Ventilation Fans
Level A Personal Protective Equipment (Demilitarization Protective Ensemble [DPE]) Radio Receptacles and Amplifiers
Fire Shutters and Fire Isolation Dampers
MDB, Laboratory, and Control Room HVAC Systems

*This list reflects types of equipment connected to the UPS system; however, not all equipment of all listed types are connected to the UPS system (i.e., not all ACAMS are connected to the UPS system, only a select group of ACAMS considered critical are connected).

Prevention of Reaction of Ignitable, Reactive, or Incompatible Waste

4. PREVENTION OF REACTION OF IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTE [40 CFR §264.17, 264.176, 264.177, 264.198, 264.199; OAR 340-104-0001]

4.1. Precautions to Prevent Reaction of Ignitable or Reactive Wastes

The ignitable wastes permitted at the UMCDF include the HD mustard ton containers, which have become pressurized by the buildup of hydrogen during the years of storage in the igloos. The ignitability characteristic is required to be treated in accordance with Module V requirements (e.g., in the depressurization glove box) before any further demilitarization activities may take place.

Reactive wastes at the UMCDF include chemical agents by Environmental Protection Agency (EPA) characterization, explosives, propellants, and certain active ingredients in the fuzes. No precautions were taken by the UMCDF to protect reactive wastes from contact with the water from the automatic sprinkler systems. The munitions containing explosives, propellants, and fuze components have all been treated and are no longer present at the UMCDF. The chemical agents are slightly soluble in water. The chemical agents are all heavier than water (specific gravity greater than 1) and would be covered or blanketed by water, reducing the volatilization rate from any pool of chemical agent. Dissolution of a small amount of chemical agent in water also has the effect of reducing the partial pressure of the chemical agent above the solution. For these reasons, no special precautions are necessary to prevent contact with water from the automatic sprinkler systems. In fact, the reverse is true; flooding a small spill of chemical agent with a large amount of water is a possible emergency mitigation technique.

The demilitarization process and operations in the Munitions Demilitarization Building are designed to prevent accidental ignition or reaction of chemical agent. Cutting (other than as part of demilitarization machine operation) and welding will not be permitted within the process areas of the Munitions Demilitarization Building while depressurizing ton containers in those areas. The entire building is a designated nonsmoking area marked by conspicuously placed signs. During ton container and secondary waste processing, all equipment is grounded to prevent the transfer of electrostatic charges to the munitions.

Handling procedures have been incorporated into the transportation and UMCDF operation procedures to apprise personnel of the importance of handling the ton containers. Conveyors and charge cars are used to transport the ton containers and secondary waste within the Munitions Demilitarization Building. The conveyor will incorporate stops, interlocks, and guard rails that will prevent the ton containers and secondary waste from falling.

The UMCDF is protected from fires and explosions potentially caused by electrical shorts, fuel leaks, overheated equipment, or miscellaneous equipment and operator failures by fire protection systems designed to meet the special needs of the UMCDF areas. A description of the building fire protection system is provided in the Contingency Plan, in Section 7.

The probability of an explosion occurring in the Deactivation Furnace System is low. The system is designed, however, so that the effects of an explosion within the incinerator are minimized, and the system's barrier (room) is designed to contain the explosive effects of an explosion in the system (similar to the Explosive Containment Rooms). Materiel entrance to the rotary retort is accomplished through the blast gate, which isolates the rotary retort in case of an explosion. During Deactivation Furnace System operations, this was normally an unmanned area; however, the Deactivation Furnace System is not currently in use.

The chemical agent in the ton containers, the last remaining chemical agent campaign is remotely removed/drained by the Bulk Drain Station. This area requires protective clothing and will normally be unmanned during processing operations. The probability of reaction of the chemical agents is low because of the contained design of the Bulk Drain Stations and the compatibility of the materials in the UMCDF. If a reaction of chemical agents occurs, the system has been designed to contain all gases.

Waste stored in igloos is separated and protected from sources of ignition or reaction. Smoking is prohibited in the J-Block storage area, and "No Smoking" signs are posted on igloo exteriors. In addition, two igloo design features keep air in the igloos as cool as possible during the warm, summer months. Approximately two feet of fill covering each igloo insulates them from warm ambient temperatures; and for all igloos not containing higher-level waste, the different levels of the two ventilation stacks allows for air exchange.

4.2. General Precautions for Handling Ignitable or Reactive Wastes and Mixing of Incompatible Wastes

[40 CFR 264.17(b) and (c); OAR 340-104-0001]

General precautions for handling reactive waste are discussed above. Ignitable waste s are separated and protected from sources of ignition or reaction. When ignitable waste is being handled, smoking and open flames are prohibited from the vicinity of the ignitable waste. "No Smoking" signs are placed wherever there is a hazard from ignitable waste. Incompatible secondary wastes are stored in separate J-Block igloos.

4.3. Management of Ignitable or Reactive Wastes in Containers

[40 CFR 264.176; OAR 340-104-0001]

The brine salts, incinerator ash, Deactivation Furnace System cyclone residue, spent carbon, spent ventilation filters, Liquid Incinerator slag, and other demilitarization waste stored in containers are neither ignitable nor reactive. Therefore the requirements of 40 CFR 270.15(c) and 264.176 are not applicable to this waste. The containers of chemical agent are not ignitable regardless of whether a waste is ignitable or reactive.

4.4. Management of Incompatible Wastes in Containers

[40 CFR 264.177(a), (b), and (c); 340-104-0001]

No mutually incompatible hazardous wastes are stored in containers. Incompatible waste are stored in different J-Block igloos. Waste in J-Block igloos is segregated in accordance with Permit Condition III.B.9.

4.5. Management of Ignitable or Reactive Wastes in Tank Systems

[40 CFR 264.198(a)(2); OAR 340-104-0001]

Brine and spent decontamination solutions have flash points that classify them as Class IIIB liquids in accordance with the National Fire Protection Association. These are not unstable, ignitable, or reactive liquids, as defined by the National Fire Protection Association. The brine surge tanks and the spent decontamination holding tanks must be in full compliance with the National Fire Protection Association requirements. The agent holding tank, spill tanks, and spent decontamination holding tanks are located in the Toxic Cubicle and Spent Decontamination System Rooms. These areas are provided with trenches and sumps that provide containment in excess of the largest tank capacity. The spacing between tanks is in excess of 3 feet.

All tanks in the UMCDF are single purpose in design so, with the exception of the Spent Decontamination Holding Tank System, no mixing activities are possible. The wastes that enter the Spent Decontamination Holding Tank System include spent decontamination solution and dilute liquid laboratory wastes. Because the liquid laboratory wastes is primarily water, there should be no potential for adverse reactions. Small amounts of other waste streams such as Personnel Maintenance Building waste tank liquids and liquids from EONCs may also be sent to the spent decontamination system tanks. All these waste streams are expected to be primarily water, so no compatibility issues are anticipated. The storage of reactive waste is in accordance with National Fire Protection Association Code 30.

4.6. Management of Incompatible Wastes in Tank Systems
[40 CFR 264.199(b); OAR 340-104-0001]

The design of the UMCDF only allows for brines from the incinerator pollution abatement systems to go to the brine surge tanks in the Brine Reduction Area; spent decontamination solutions and liquid wastes from the laboratory and other sources to go to the spent decontamination holding tanks or containers; and drained chemical agent to go to the agent tanks. All pollution abatement system brines from all of the incinerators are compatible, whether processing chemical agents GB, VX, or mustard. Different chemical agents will not be processed together; and when changing from one chemical agent to another, the agent tanks were decontaminated.

Procedures for Waste Releases in Nontoxic Areas of the MDB and Waste Releases and Precipitation Outside the MDB

5. WASTE RELEASE AND PRECIPITATION MANAGEMENT PROCEDURES

5.1. Procedures for a liquid chemical agent spill or leaked waste in the nontoxic areas (Categories C, D, and E) of the Munitions Demilitarization Building

5.1.1. Stop all chemical agent processing, and shut down munitions feed, conveyors, and liquid incinerators, if affected.

5.1.2. Verify that UMCDF chemical agent monitors are operational and verify that spill vapor is contained.

5.1.3. Assess onsite spill and implement cleanup plan.

5.1.4. Isolate the chemical agent tank or piping that is leaking and transfer contents to appropriate storage tanks.

5.1.5. Flood area with Department of Army-approved decontamination solution for large spills (greater than 5 gallons), pump the contaminated decontamination solution to the spent decontamination holding tanks, and have emergency response team perform decontamination procedure.

5.1.6. Have maintenance staff repair leak in accordance with the requirements of the permit and site procedures.

5.1.7. Have the emergency response team perform decontamination procedures, and maintenance staff make repairs for small spills in accordance with the permit and site procedures.

5.1.8. Bag and incinerate any sorbent materials used in decontamination procedures in accordance with the Waste Analysis Plan (WAP) or place in permitted storage, as required.

5.2. Procedures for spills, leaked wastes, and precipitation outside of the Munitions Demilitarization Building

5.2.1. Spills, leaks, or precipitation in the pollution abatement systems areas must be collected in the pollution abatement system sumps and may be pumped to the brine surge tanks.

5.2.2. Spills, leaks, or precipitation at the brine surge tanks must be collected in the sump located within the diked area and may be containerized or pumped to the brine surge tanks.

5.2.3. Emergency Response Teams and maintenance personnel must don the appropriate level of protective clothing and conduct the applicable decontamination procedures and repair leaks.

5.2.4. Sorbent materials used in decontamination procedures must be bagged and incinerated in accordance with the WAP or placed in permitted storage, as appropriate.

Umatilla Chemical Agent Disposal Facility

ATTACHMENT 7

REQUIREMENTS FOR OPERATION OF THE MERCURY MONITORING SYSTEM

All federal Title 40 CFR citations are citations to the Title 40 CFR adopted as Oregon rule by OAR 340-100-0002 and as altered by OAR Chapter 340, Divisions 100-106, 109, 111, 113, 120, 124, and 142. See the preface introduction for further explanation.

ATTACHMENT 7

Requirements for Operation of the Mercury Monitoring System

A. General Description

During the HD campaign, the mercury monitoring system (VEN-MERC-001) shall continuously sample and monitor the total vapor phase mass concentration of mercury (Hg) (elemental and oxidized forms) in the MPF exhaust gas. It is located after the MPF PFS and before the common stack. It is comprised of the monitor units listed below and in Table 1.

A.1. The VEN-MERC-001A and VEN-MERC-001B CEMS provide the initial Hg detection and are the monitor of record during normal operations. They are redundant, and only one at a time must be online when being used to monitor for initial Hg detection. At least one must be online, operational, and monitoring except during the HD trial burn.

A.2. VEN-MERC-001C (Ohio Lumex monitor) is operated as a confirmational Hg monitor. It provides a means to confirm or refute the CEMS results.

A.3 VEN-MERC-001D is a historical Hg monitor, but may also be used to confirm or refute the CEMS or VEN-MERC-001C results and must be online during HD treatment operations. It may also be used to provide Hg detection when the VEN-MERC-001A, VEN-MERC-001B, and VEN-MERC-001C are not operational. VEN-MERC-001D must be online, functional, and sampling for Hg during the HD campaign.

B. Conversion of Mercury Concentrations

B.1. The measured mercury concentration at the stack shall be converted from grams per second to µg/dscm corrected to 7% oxygen using the following calculation.

$$\mathrm{Hg_c} = \mathrm{Hg_m} \times \frac{60\ \mathrm{sec/min}}{5{,}325\ \mathrm{dscf/min}} \times \frac{35.31\ \mathrm{dscf}}{\mathrm{dscm}} \times \frac{1{,}000{,}000\ \mu\mathrm{g}}{\mathrm{g}}\ \mathrm{x}\ \frac{14}{21 - 7.38}$$

Where: Hg_c = corrected concentration of mercury

Hg_m = measured concentration of mercury grams per second

5,325 = maximum measured flow rate during MPF surrogate trial burn (STB)

7.38 = average measured O_2 concentration in the stack gas during MPF STB

C. Operating Requirements

C.1. The mercury monitoring system shall be operated, maintained, and calibrated in accordance with Table 1 and Table 2 of this attachment.

C.2. The Permittees shall notify the Department no later than the next business day if VEN-MERC-001A and VEN-MERC-001B are inoperable, out-of-control (as defined in Table 2), or otherwise unable to accurately monitor for Hg. Notification is not required if either VEN-MERC-001A or VEN-MERC-001B is inoperable and the other CEMS is taken offline for routine calibration and maintenance.

a. If VEN-MERC-001C is being used as the monitor of record during the VEN-MERC-001A/B inoperability period, a VEN-MERC-001C tube shall be pulled and analyzed at least every four hours.

b. If VEN-MERC-001D is being used as the monitor of record during the VEN-MERC-001A/B inoperability period, a VEN-MERC-001D tube shall be pulled and sent offsite for analysis at least every four hours.

C.3. The Permittees shall notify the Department if VEN-MERC-001C becomes inoperable, out-of-control (as defined in Table 2), or otherwise unable to accurately monitor for Hg.

a. If VEN-MERC-001D is being used as the monitor of record during the VEN-MERC-001C inoperability period, the VEN-MERC-001D tubes shall be pulled and sent offsite for analysis at least every four hours.

C.4. At a minimum VEN-MERC-001D shall be operational and collecting samples for Hg monitoring purposes prior to feeding waste to the MPF. VEN-MERC-001A or VEN-MERC-001B must be monitoring during the HD campaign except during the HD trial burn .

C.5. If mercury (Hg) is detected at or above 15 micrograms per dry standard cubic meter ($\geq$15 µg/dscm) corrected to 7% oxygen, it shall be reported to the Department within 12 hours of detection.

C.6. When $\geq$15 µg/dscm corrected to 7% oxygen mercury is detected by the:

a. VEN-MERC-001A or -001B (CEMS), a VEN-MERC-001C tube shall be immediately pulled and analyzed.

b. VEN-MERC-001C (Ohio Lumex), a VEN-MERC-001D (historical) tube shall be immediately pulled and sent off-site for analysis.

C.7. Only one CEMS or the Ohio Lumex may be taken offline at a time for routine maintenance or calibration during HD campaign treatment operations.

D. Metal Parts Furnace Pollution Abatement System Carbon Filter System Carbon Change-Out Requirements

D.1. If the Hg CEMS results of ≥15 μg/dscm corrected to 7% oxygen are confirmed by VEN-MERC-001C or VEN-MERC-001D analysis or if the VEN-MERC-001C results of ≥15 μg/dscm corrected to 7% oxygen are confirmed by VEN-MERC-001D analysis, the affected PFS will be taken offline.

D.2. The affected PFS shall not be used in conjunction with any UMCDF treatment operations until the SIC is replaced in the affected PFS.

E. Metal Parts Furnace Waste Feed Limitations

At a minimum VEN-MERC-001D shall be operational and monitoring for Hg during the HD campaign and prior to feeding waste to the MPF. VEN-MERC-001A or VEN-MERC-001B must be monitoring during the HD campaign except during the HD trial burn .

F. Inspection Requirements

The mercury monitoring system shall be inspected in accordance with the requirements of the Inspection Schedule (Permit Attachment 3).

G. Recordkeeping Requirements

The following shall be documented in the daily operating record for the Hg monitoring system:

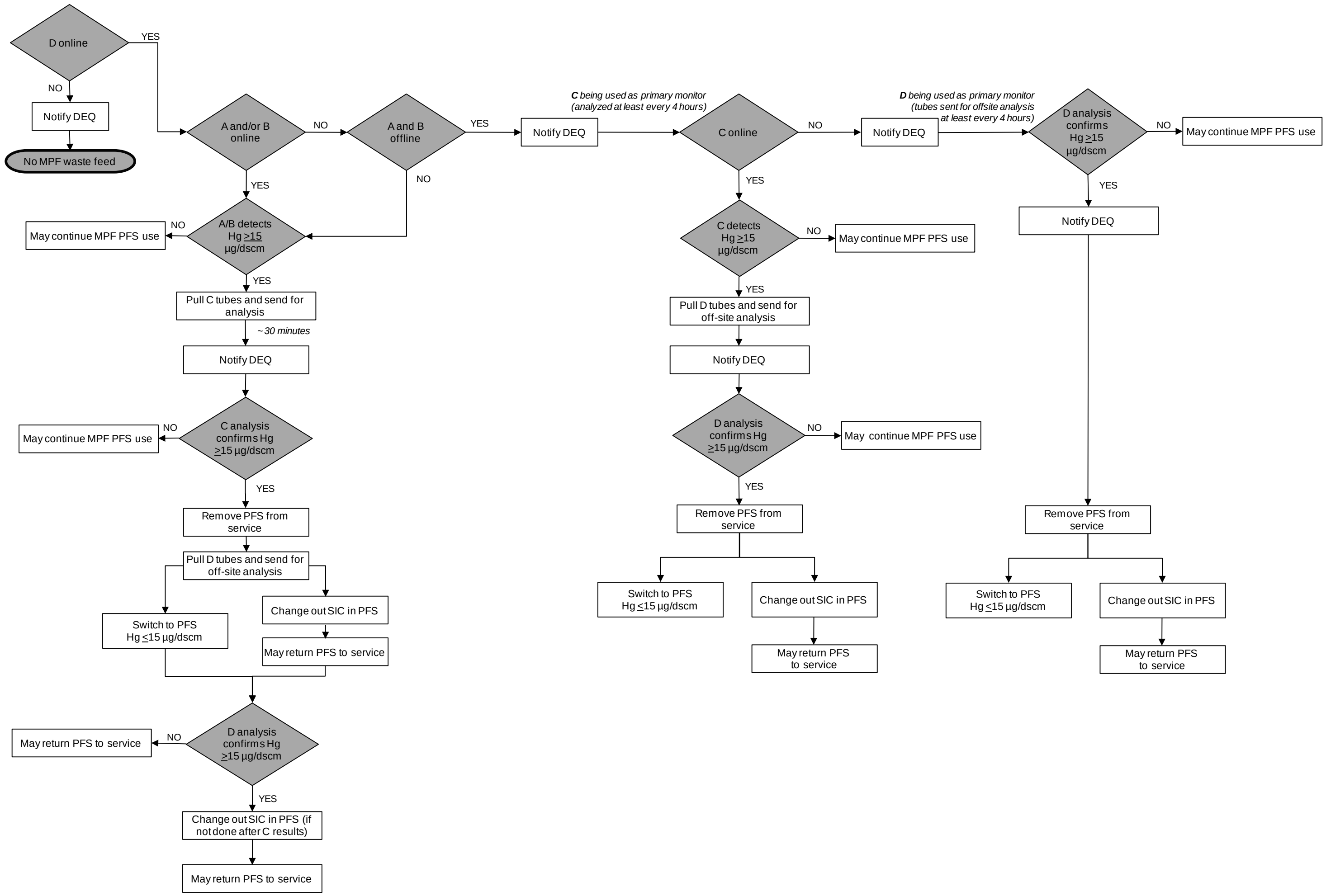
G.1. VEN-MERC-001A, VEN-MERC-001B, VEN-MERC-001C, and VEN-MERC-001D flow check and calibration results, quality assurance test results, operational status, and maintenance performed.

G.2. VEN-MERC-001A, VEN-MERC-001B, VEN-MERC-001C, and VEN-MERC-001D monitoring results.

H. Summary

Operation of the mercury monitoring system is depicted in Figure 1.

Figure 1. Mercury Monitoring System Decision Logic



A = VEN-MERC-001A (Hg CEMS – Primary, near-real-time monitoring)
B = VEN-MERC-001B (Hg CEMS – Primary, near-real-time monitoring)
C = VEN-MERC-001C (Hg sorbent bed (tube) monitor – secondary/confirmation monitoring, on-site analysis)
D = VEN-MERC-001D (Hg sorbent bed (tube) monitor – historical/confirmation monitoring, off-site analysis)

TABLE 1 MERCURY MONITORING SYSTEM INSTRUMENT AND PROCESS PARAMETERS

Tag Number	Type of Monitor	Normal Monitoring Function	Sampling and Analysis Frequency	Calibrated Instrument Range	RATA Method
VEN-MERC-001A	CEMS	Initial detection/ near-real-time analysis	90-second cycle, 5-minute averaging time	≤ 5% of the span value	EPA Method 29 or 30B
VEN-MERC-001B					
VEN-MERC-001C	Paired sorbent bed tubes with tube analyzer for on-site analysis	Confirmation	≤ 12-hours (confirmation operation) ≤ 4 hours (initial detection operation)		
VEN-MERC-001D	Paired sorbent bed tubes for off-site analysis	Historical	<u>Normal Function</u>: Sample: 24 hours Analysis: 1 tube every 10 days <u>Initial Detection Operation</u>: ≤ 4 hours	N/A (off-site analysis)	

CEMS = Continuous emission monitoring system
N/A = not applicable

TABLE 2 ONGOING QA TEST REQUIREMENTS FOR THE MERCURY MONITORING SYSTEMS

QA Test	Frequency	Procedure	Criteria[a]
Calibration Error Test	Daily	Challenge entire system with zero and mid- or high-level gas values of elemental or oxidized Hg	≤ 5% of the span value or ≤ 1.0 µg/scm absolute difference if span value is 10 µg/scm
Calibration Drift	Daily	Challenge entire system with zero and upscale elemental Hg gas once per day at two concentration values	≤ 5% of the span value
System Integrity	Weekly	Challenge entire measurement system with one oxidized Hg reference gas.	
System Integrity	Quarterly	Challenge entire measurement system with three reference gas values of elemental and oxidized Hg	
RATA and Bias	Annual	Compare mercury monitoring system results with results from an approved reference method for a minimum of nine (9) test runs.	≤ 20% of the mean RM value or ≤ 1.0 µg/scm absolute difference if the mean RM ≤ 5 µg/scm

[a] If criteria not met, identify and correct the problem before proceeding.

A. <u>Criteria for Excessive CD</u>. If either the zero (or low-level) or high-level CD result exceeds twice the applicable drift specification in the applicable PS in appendix B for five, consecutive, daily periods, the CEMS is out-of-control. If either the zero (or low-level) or high-level CD result exceeds four times the applicable drift specification in the PS in Appendix B during any CD check, the CEMS is out-of-control. If the CEMS is out-of-control, take necessary corrective action. Following corrective action, repeat the CD checks.
   1. <u>Out-Of-Control Period Definition</u>. The beginning of the out-of-control period is the time corresponding to the completion of the fifth, consecutive, daily CD check with a CD in excess of two times the allowable limit, or the time corresponding to the completion of the daily CD check preceding the daily CD check that results in a CD in excess of four times the allowable limit. The end of the out-of-control period is the time corresponding to the completion of the CD check following corrective action that results in the CDs at both the zero (or low-level) and high-level measurement points being within the corresponding allowable CD limit (i.e., either two times or four times the allowable limit in the applicable PS in Appendix B).

B. <u>Excessive Audit Inaccuracy</u>. If the RA, using the RATA, GA, or RAA exceeds the criteria in Section 5.2.3, the Hg monitor is out-of-control. If the Hg monitor is out-of-control, take necessary corrective action to eliminate the problem. Following corrective action, the source owner or operator must audit the monitor with a RATA, GA, or RAA to determine if the monitor is operating within the specifications. A RATA must always be used following an out-of-control period resulting from a RATA. The audit following corrective action does not require analysis of performance audit samples. If audit results show the monitor to be out-of-control, the monitor operator shall report both the audit showing the monitor to be out-of-control and the results of the audit following corrective action showing the monitor to be operating within specifications.
   1. <u>Out-Of-Control Period Definition</u>. The beginning of the out-of-control period is the time corresponding to the completion of the sampling for the RATA, RAA, or GA. The end of the out-of-control period is the time corresponding to the completion of the sampling of the subsequent successful audit.
   2. <u>Criteria for Excessive Audit Inaccuracy</u>. Unless specified otherwise in the applicable subpart, the criteria for excessive inaccuracy are:
      a. For the RATA, the allowable RA in the applicable PS in Appendix B.
      b. For the GA, ±15 percent of the average audit value or ±5 ppm, whichever is greater.
      c. For the RAA, ±15 percent of the three run average or ±7.5 percent of the applicable standard, whichever is greater.

C. <u>Criteria for Acceptable QC Procedure</u>. Repeated excessive inaccuracies (i.e., out-of-control conditions resulting from the quarterly audits) indicates the QC procedures are inadequate or that the Hg monitor is incapable of providing quality data. Therefore, whenever excessive inaccuracies occur for two consecutive quarters, the source owner or operator must revise the QC procedures or modify or replace the Hg monitor.

Umatilla Chemical Agent Disposal Facility

ATTACHMENT 8

CLOSURE PLAN FROM THE PART B APPLICATION

ATTACHMENT 8
UMCDF CLOSURE PLAN FROM THE PART B APPLICATION

This is the closure plan from the UMCDF's Part B permit application. Permit Condition II.J requires this plan to be updated before the start of closure to meet the 40 CFR §264.112(b) content requirements and to incorporate other closure requirements.

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SECTION I CLOSURE PLANS, POST-CLOSURE PLANS, AND FINANCIAL REQUIREMENTS

[40 CFR 270.14(1)(13), (15), (16), (17), (18), 264.110 through 264.151, 264.178, 264.197, 264.228, 264.258, 264.280, 264.310, 264.351, 264.601; OAR 340-105-014, 340-104-001]

This section describes the procedures and techniques that will be used to implement and complete closure of the Umatilla Chemical Agent Disposal Facility (UMCDF). Discussed in the Closure Plan (Section I-1) are anticipated closure procedures, decontamination techniques, and closure schedules for each of the hazardous waste management units located at the UMCDF. Also discussed are procedures for decontaminating other major structures or areas at the UMCDF, but which are not considered to be a hazardous waste management unit.

Post-closure care of the UMCDF (Sections I-2 and I-3) is not anticipated, since all hazardous waste and hazardous waste constituents will be removed or decontaminated to clean closure criteria during closure operations.

Since the UMCDF is a federal installation, the financial and liability insurance requirements of 40 CFR 264, Subpart H, do not apply to this Resource Conservation and Recovery (RCRA) Act permit application (Sections I-4 through I-9).

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I-1 CLOSURE PLAN

[40 CFR 270.14(b)(13), 264.112; OAR 340-105-0014, 340-104-0001]

I-1a Closure Performance Standard

[40 CFR 264.111; OAR 340-104-0001]

This closure plan is designed to provide for closure of the UMCDF in a manner that will:

- Minimize the need for further maintenance

- Control, minimize, or eliminate, to the extent necessary to protect human health and the environment, the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to surface water, groundwater, or the atmosphere.

Final closure of the UMCDF at the Umatilla Chemical Depot (UMCD) will accomplish the goals of the closure performance standards, noted above, by: (1) processing the entire chemical weapons inventory located on the UMCD at or before the commencement of closure activities for the UMCDF, and (2) removing and/or decontaminating all equipment, bases, structures, soils, or other materials containing or contaminated with hazardous waste or hazardous constituents associated with the hazardous waste management units located at the UMCDF that exceed clean-closure target levels. Clean-closure target levels will be based on Agency-approved health/risk information.

Post-closure maintenance or monitoring is not anticipated for the UMCDF since no hazardous wastes or hazardous constituents resulting from the UMCDF are expected to remain above clean-closure target levels at the facility following final closure.

Following UMCDF decontamination and removal of all process equipment, the stripped facilities will be monitored to assure removal or destruction of residual chemical agent prior to certification of final closure.

After final closure, certification, and acceptance of closure by the Oregon Department of Environmental Quality (ODEQ) has been completed, the UMCDF will no longer be classified as a hazardous waste, treatment, or storage facility.

I-1b Partial and Final Closure Activities

[40 CFR 264.112(a)(1); OAR 340-104-0001]

At this point, no specific date for implementation of UMCDF closure has been scheduled. Present estimates are that about 2.2 years will be required to demilitarize the inventory of chemical agent stored at the UMCD. Assuming UMCDF begins demilitarization operations in July 2000, closure activities are expected to begin in 2003, with final closure completed the same year. It should be noted that the duration of the demilitarization activity is dependent on the release of munitions and bulk items from the UMCD stockpile for processing at the UMCDF and the overall operational performance of the Chemical Stockpile Disposal Program.

Final closure of the UMCDF will be accomplished by an integrated sequence of partial closures (i.e., unit-by-unit closure operations). Closure of the UMCDF will be conducted as expeditiously as possible following completion of the chemical agent demilitarization operations. Furthermore, Public Law 99-145 requires that the UMCDF (except buildings) be dismantled at the conclusion of demilitarization activities and not be used for other purposes.

All aspects of UMCDF closure are briefly summarized in Table I-1-1[1] with detailed discussions of the closure procedures included in Section I-1e.

Certification of Closure
[40 CFR 264.115; OAR 340-104-0001]

Within 60 days of completion of the final UMCDF closure procedures described above, a representative of the UMCD Commander will submit a certification, signed by the Commander and an independent registered professional engineer, that the UMCDF has been closed in accordance with this closure plan and all applicable regulations. Since the UMCDF will not have any regulated disposal units, only certification of final closure of the UMCDF will be submitted. Documentation of closure activities for each regulated unit will be maintained by the certifying independent registered professional engineer.

Since overall UMCDF closure will be accomplished through a series of unit-by-unit closures, the independent registered professional engineer will make periodic inspections during the closure period. These inspections, relative to closure, are denoted in Figure I-1-1[1].

I-1c Maximum Waste Inventory
[40 CFR 264.112(b)(3); OAR 340-104-0001]

Table I-1-2 presents estimates of the maximum amount of hazardous waste on hand during the operational life of the UMCDF.

Wastes on hand at the UMCDF at the start of closure may include brine in the brine surge tanks; decontamination solution in the spent decontamination holding tanks; and waste brine salts, incinerator residues, and ash in the Residue Handling Area.

A small inventory of containerized hazardous wastes will typically be maintained in the brine salt packaging area of the Process and Utility Building awaiting transfer to the Residue Handling Area for

[1] All tables and figures are located at the end of this section.

consolidation and shipment to an approved offsite hazardous waste treatment, storage, or disposal facility. The onsite inventory of munitions and bulk items will be continuously processed, however, and will be eliminated prior to implementation of UMCDF closure activities.

I-1d Schedule for Closure
[40 CFR 264.112(b)(6); OAR 340-104-0001]

I-1d(1) Time Allowed for Closure
[40 CFR 264.113(a) and (b); OAR 340-104-0001]

Figure I-1-1 presents the proposed closure schedule for the UMCDF. The overall closure of the UMCDF will be completed by an integrated sequence of unit-by-unit closures (i.e., partial closures) until all hazardous waste management units have been closed. Each partial closure activity will be completed within 18 days of initiating each unit closure. It is anticipated that final closure of the entire UMCDF will take from 27 days to 1 year from the date of beginning the first unit closure. It is further anticipated that individual unit closures will occur concurrently with other unit closure activities (e.g., closure of the Container Handling Building will be concurrent with closure of the Agent Collection Tank System). The proposed closure sequence of the UMCDF, on a unit-by-unit closure basis, is summarized in Table I-1-3.

I-ld(1)(a) Extensions for Closure Time
[40 CFR 264.113(a) and (b); OAR 340-104-0001]

Closure of the UMCDF will be accomplished through a series of unit-by-unit closures of individual hazardous waste management units. It is not expected that any unit closure will exceed the 180 days allowed for each unit when partial closures are conducted. It is anticipated, owing to the complex nature of the UMCDF, the extensive decontamination procedures to be implemented during closure, and the extremely hazardous nature of the chemical agents treated at the UMCDF, that final UMCDF closure will be completed within 270 days to 1 year following commencement of the first hazardous waste management unit closure.

It is the intent of the Army to certify final closure of all regulated units (tank systems and incinerators) located within the Munitions Demilitarization Building upon completion of the postdecontamination chemical agent monitoring program within the building. This monitoring program will be conducted for a minimum of 3 months following completion of all decontamination activities within the building and is essential to completing the safe decommissioning of the UMCDF.

In some instances, such as closure of the Agent Collection Tank System (one of the first units to be closed), the overall time period (from start of tank closure to completion of chemical agent monitoring program in the building) may exceed 180 days, even though actual closure activities for the individual tank system will be completed in less than 180 days.

Since overall certification that the UMCDF has been properly closed and will not present any future threats to human health or the environment is the primary goal, the Army requests that all hazardous waste management units located within the Munitions Demilitarization Building be given a closure time period extension to a maximum of one calendar year following initiation of closure activities (i.e., commencement of closing the Agent Collection Tank System), with the elapsed closure time period not to exceed one year. This one-year time frame is for closure of the Munitions Demilitarization Building, including all units therein and including the minimum 3-month postdecontamination chemical agent monitoring program.

If closure of all units within the Munitions Demilitarization Building has not been initiated within 180 days of the initiation of the first unit closure (i.e., Agent Collection Tank System), the Army will prepare a revised schedule and extension request with supporting documentation on closure progress and reasons why additional time is needed to complete closure.

Similarly, if the final volume of hazardous waste in any other permitted unit cannot be completely removed within 90 days or the unit completely closed within the allowable 180 days, the Army will submit a closure extension request at least 30 days prior to expiration of the 90- or 180-day periods, respectively.

In all instances of closure extension, the Army will take all steps necessary to prevent threats to human health or the environment from unclosed but not operating hazardous waste management unit(s), including compliance with all applicable permit conditions pertaining to that unit(s).

I-1e Closure Procedures
[40 CFR 264.112(b)(4); OAR 340-104-0001]

This section is organized in a manner that describes the general activities associated with closure of the UMCDF, as well as specific RCRA-permitted unit closure activities. The following sections are included:

- I-1e(1) Inventory Removal, Disposal, or Decontamination of Equipment
  - General Decontamination Procedures and Techniques
  - Munitions Demilitarization Building Decontamination
  - Laboratory Building Decontamination
  - Facility Soils Investigation at Closure
- I-1e(2) Disposal or Decontamination of Equipment, Structures, and Soils
- I-1e(3) Closure of Disposal Units/Contingent Closures
- I-1e(4) Closure of Containers
  - Container Handling Building
  - Residue Handling Area
  - J-Block Storage Area
- I-1e(5) Closure of Tank Systems
  - Agent Collection Tank System
  - Spent Decontamination Holding Tank System

I-1e(1) Inventory Removal, Disposal, or Decontamination of Equipment [40 CFR 264.114; OAR 340-104-0001]

Prior to closure, the inventory of munitions and bulk items in the Container Handling Building, Agent Collection Tank System, and Munitions Demilitarization Building will be processed through the UMCDF. Prior to the commencement of closure operations, all hazardous waste residues originating from the final chemical agent demilitarization campaign will be removed from the UMCDF in accordance with normal operating procedures.

The closure of the hazardous waste management units and areas of the UMCDF will be completed according to the procedures discussed in this section. During closure operations, residues such as spent decontamination solutions, brine salts, ash, etc. will be generated. As described in greater detail in the following sections, some residues will be thermally treated in operable units active during the UMCDF closure sequence, or in mobile equipment brought onsite during closure. If a mobile incinerator is not permitted and available for use at the UMCDF closure, these wastes will be shipped offsite to an approved hazardous waste treatment, storage, or disposal facility. Other residues, such as brine salts (generated during closure) and cleaning residues, will be disposed of offsite in accordance with normal operating procedures.

General Decontamination Procedures and Techniques

Decontamination of the UMCDF will proceed after all demilitarization activities have been completed and all munitions, bulk items, chemical agents, and previously generated secondary waste have been incinerated. Closure will consist of decontamination of all buildings to the 3X level and all removable process equipment located in Category A and B areas to the 5X level (see Figures I-1-2 through I-1-5 and Attachment I-1).

These cleanup levels are defined by the Army as follows:

- 3X--Three Xs indicate that the item has been surface-decontaminated by specific procedures and that appropriate tests or monitoring has verified that vapor concentrations of 0.0001 milligram per cubic meter for nerve agent GB, 0.00001 milligram per cubic meter for nerve agent VX, and 0.003 milligram per cubic meter for mustard agent do not exist. Items are to be free of grease and oils that may absorb chemical agent. The 3X decontamination generally is accomplished by chemical neutralization. Items decontaminated to 3X cannot be subjected directly to open flame or heat such as drilling and machining unless it is done in an area having appropriate engineering controls such as ventilation systems. Equipment and facilities decontaminated to this level must be retained and controlled in government custody.

- 5X--Five Xs indicate that an item is clean (i.e., completely decontaminated), free of hazards, and may be released for general use or from government control without precaution or restriction.

> An Army-tested and approved method of achieving a 5X level is subjecting items to a sufficient temperature for a sufficient time to completely destroy agent. Such high-temperature thermal treatment is to result in no detectable residual chemical agent contamination of the item treated. For disassembled items, heating the items to 1,000^{o}F and holding them at that temperature for at least 15 minutes is considered sufficient. The 5X condition must be certified by the UMCD Commander's designated representative.

During closure activities, an independent registered professional engineer will review 5X decontamination records maintained by the UMCDF Commander's designated representative. This review will be included in the unit-by-unit partial closure operations as well as for final closure of the UMCDF. Reviews will be conducted during the periodic closure inspections shown in the closure schedule (see Figure I-1-1).

Chemical decontamination of structures and equipment will use water-based chemical solutions to neutralize (i.e., water react) chemical agent residue that may be present. Table I-1-4 presents the decontamination solutions used for each type of chemical agent and other non-chemical agent-related general purpose decontamination solutions that may be used during closure activities. The decontamination solutions will be sprayed on, poured on, pumped through equipment, and will be applied to areas where a potential for chemical agent contamination exists. Neutralization will be followed by a process or freshwater flush. All process-related areas in the Munitions Demilitarization Building will have sumps that will be used to collect decontamination and rinse waters for transfer to the spent decontamination holding tanks located in the Spent Decontamination System Room.

Personal protective clothing and equipment for chemical agent operations will be as detailed in the Department of the Army Draft Regulation AR 385-61, Army ToxicChemical Agent Safety Program**",** implemented in November 1992.

During decontamination, personnel working in a Category A area (see Attachment I-1) will be required to wear the Demilitarization Protective Ensemble until the area has been decontaminated. Other areas will require the level of protection required during operations until the area is certified decontaminated by the UMCD Commander's designated representative. The protective clothing requirements are listed in Attachment I-2.

All postdecontamination air monitoring will be accomplished using Depot Area Air Monitoring System tubes or an equivalent technique. Chemical agent-contaminated areas will be decontaminated until chemical agent is not detected, and as otherwise indicated below for specific areas or regulated waste management units. Work in suspected chemical agent-contaminated areas will cease until the chemical agent air monitoring results are reported.

During decontamination operations, the ventilation system will remain in operation to ensure that chemical agent vapors potentially present are not discharged to the atmosphere.

Chemical agent concentrations measured while the ventilation system is operating will use the current Automatic Continuous Air Monitoring System and Depot Area Air Monitoring System monitoring locations. When ventilation is shut off, Depot Area Air Monitoring System samples will be collected along the floors and sumps.

<u>Munitions Demilitarization Building Decontamination</u>

The Munitions Demilitarization Building area consists of the building, which houses the two Liquid Incinerators, the Deactivation Furnace System, the Metal Parts Furnace, and the associated tanks and pollution abatement systems for each of these incinerators (located outside the building and/or in adjacent buildings). General features of the overall decommissioning of the Munitions Demilitarization Building and the process-related equipment such as munitions handling equipment, conveyors, etc., are described in this section. Specific provisions pertaining to the closure of the permitted systems (e.g., bulk drain station miscellaneous treatment units, tank systems, and incineration equipment) are discussed separately.

Closure of the Munitions Demilitarization Building area will require decontamination of the associated buildings and structures to the 3X level and all incinerators and related equipment located in Category A and B areas to the 5X level. Equipment to be decontaminated to the 5X level will first be cleaned and certified to the 3X level using the appropriate decontamination solution as specified on Table I-1-4. A central Decontamination Solution Supply System located in the Munitions Demilitarization Building will be used to mix, store, and supply the solution(s) to be used. Final 3X decontamination of the building itself will be performed once all equipment has been removed and decontaminated to the 5X level and closure of the individual RCRA permitted units (Depressurization Glove Box miscellaneous treatment unit, tank systems and incinerators) has been completed. The Munitions Demilitarization Building area closure general decontamination procedure is shown in Table I-1-1.

The 3X decontamination is accomplished by washdown with decontamination solution followed by flushing with process or fresh water. This will be repeated as many times as necessary until chemical agent vapor concentration levels meet 3X criteria. All spent decontamination solution from washdown of the building UMCDF will be incinerated in the Liquid Incinerators, or in a mobile incinerator brought to the UMCDF during closure operations, at 2,000 F to destroy any organic chemical residues in the solution. (If a mobile incinerator is not permitted and available for use at UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.)

To facilitate decontamination, a number of engineered features have been incorporated into the Munitions Demilitarization Building design. These are:

(1) Surfaces of floors, walls, ceilings, and associated fixtures will be free of crevices, cracks, protrusions, and other irregularities that could entrap material. As necessary, foundation subsoils will be preconsolidated to reduce total and differential settlement, and to reduce structural cracking.

(2) Internal angles, corners, and recesses will be rounded with a radius larger than a minimum radius. For example, concrete corners will have a 1-inch minimum cant and fixtures will have a 1/4-inch radius.

(3) Surfaces that contact chemical agent or explosive will be selected and coated, polished, or machined to prevent or resist the adherence of liquids or solids.

(4) Structural integrity will be adequate to resist formation of leaks, cracks, and crevices as a result of stresses such as thermal and vibratory stresses. Concrete reinforcing steel allowable stress levels will be reduced to lessen the size of normal concrete tension cracks.

(5) Concrete surfaces in chemical agent areas will be treated with an epoxy coating. This sealant will span and seal normal fine concrete cracks without loss of integrity. To aid epoxy adherence, concrete framework will have a clean epoxy coating, and no wax paraffin or concrete curing agents will be used.

(6) Overlapping metal surfaces in fixtures will be avoided except where sealed by welding. Exceptions may be gasketed openings, such as inspection and access ports.

(7) Electrical fixtures will be capable of continuous service when subjected to vigorous washdown with decontamination solutions.

(8) Visual access will be provided to all surfaces or spaces where material is likely to accumulate. When necessary for access, floor grating will be removed by personnel in Demilitarization Protective Ensembles.

(9) Provisions have been made for flushing and draining and for removing and collecting rinsings in which chemical agent or explosive may be entrained or dissolved. Cast-in-place concrete-topped floors in Category A, A/B, B, and C areas will be sloped to sumps. In "A" and "B" areas the floor will be sloped at 1/4-inch per foot. In certain "A" areas the floor will be sloped to embedded trenches, which will then slope at 1/16-inch per foot to the sump. In the Explosive Containment Room, the floor will slope at 1/4-inch per foot to a trench and the trench will slope at 1/16-inch per foot to the sump. In the "C" areas, the floor is sloped at 1/16-inch per foot to sumps. The precast concrete slabs will act as forming for the cast-in-place topping and subsequently act integrally with it to resist live loads. Slab thickness will be controlled by shear considerations and, because the trenches will form "notches" in the slab, steel beams will be provided on each side of the trenches to provide slab support. The slabs will be cast with embedded plates for welding to steel beams and, as required, will be furnished with projecting reinforcing to ensure integral action with the cast-in-place topping.

(10) Openings in barriers between areas at different category levels will be limited in size to preclude loss of pressure differential.

(11) Wall penetrations for electrical and instrumentation access will be sealed to prevent vapor or liquid violation of area separations.

(12) The ventilation ductwork is designed to allow self-draining of spent decontamination solution to drain points. Ductwork has been designed to minimize dismantling of sections to accomplish decontamination. Washdown systems inside ventilation ductwork will not be required.

(13) The ventilation system is designed to preclude entrance of decontamination solution into the ductwork at air registers during routine decontamination activities. Either internal baffles or pitched airfoils will be incorporated in the supply and exhaust registers.

Following initial 3X decontamination, the Category A and B equipment in the Munitions Demilitarization Building will then be decontaminated to the 5X level. This will be accomplished in two steps, the first consisting of cleaning to 3X in a manner similar to that followed for the building, and the second consisting of disassembling the equipment to a size suitable for feeding to one of the remaining in-service incinerators for heating to 1,000 F for 15 minutes.

When an existing incinerator is not available for 5X decontamination or the treatment of wastes because (1) it has been decontaminated and taken out of service, or (2) the material is too large, a mobile incinerator, which will be brought to the site, will be used. (If a mobile incinerator is not permitted and available for use at UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.)

Process equipment only required to be decontaminated to a 3X condition (Category A and B) will be disconnected from the power source and disassembled to the extent necessary to ensure decontamination of all chemical agent accessible surfaces. Solids buildup will be removed from all surfaces. The equipment item will be washed with the appropriate decontamination solution for the suspect chemical agent type(s), thoroughly cleaned (if necessary) with a detergent solution (see Table I-1-4) to remove surface oil and grease, and subsequently rinsed with fresh water. Steam cleaning will also be used as appropriate.

Decontamination of equipment to achieve a 5X condition will require disassembly and high-temperature thermal treatment. Equipment is not expected to remain serviceable after this decontamination. Disassembly of 3X decontaminated equipment will be performed by specially trained Department of Army personnel wearing Demilitarization Protective Ensembles.

Excess air will be provided to all external surfaces of each item during thermal treatment. Prior to or during thermal treatment, potential chemical agent entrapments will be physically opened to ensure exposure of contaminant.

Laboratory Building Decontamination

The Laboratory is not considered to be a hazardous waste management unit at the UMCDF. However, since there is a potential for contamination of the structure and its ventilation system by chemical agents and other hazardous wastes during routine laboratory operations, decontamination procedures similar to those for the Munition Demilitarization Building will be employed during the Laboratory closure activities..

<u>Facility Soils Investigation at Closure</u>

The specialized munitions handling equipment and inspection/decontamination procedures, other engineered systems such as the Munitions Demilitarization Building and its associated munitions processing equipment, and the continuous UMCDF chemical agent monitoring system are intended to preclude (or detect) most anticipated nonrandom, systematic events (e.g., tank leaks) that could lead to a release of chemical agent or related hazardous waste to UMCDF soils. However, an unplanned release of chemical agent or other hazardous waste may occur during the operational life (including the closure period) of the UMCDF.

While the engineered safeguards of the UMCDF (such as the incineration systems and the secondary containment devices for munitions/bulk items storage areas and tank systems) are designed to prevent UMCDF operational failures, one of the most likely causes of an unplanned release of hazardous waste to UMCDF soils would be transportation-related (including loading and unloading operations); either occurring during transportation of munitions/bulk items from the stockpile storage area at the Chemical Limited Area to the UMCDF Container Handling Building, transportation of munitions/bulk items from the Container Handling Building to the Munitions Demilitarization Building Unpack Area, transportation of process-related hazardous waste (e.g., brine salts, incinerator ash, etc.) to an approved offsite hazardous waste treatment, storage, or disposal facility, or transportation of process-related hazardous waste to J-Block.

If such events occur during the life of the UMCDF, response and clean-up procedures are detailed in the UMCDF Contingency Plan (see Section G of this permit application).

To provide verification that UMCDF soils do not pose a threat of post-closure escape of chemical agent or related hazardous waste or hazardous constituents to the environment, UMCDF soils in the proximity of the regulated waste management units and all hazardous waste loading/unloading areas will be sampled. The samples will be analyzed for all chemical agents processed at the UMCDF, or nonchemical agent hazardous constituents, as applicable, for areas related to process wastes. Areas to be addressed include the following:

Transportation Routes (Chemical Agent-Related)

- All onsite roadways on which unprocessed chemical agents are transported, including the roadway from the Chemical Limited Area storage area to the Container Handling Building and from the Container Handling Building to the Munitions Demilitarization Building

- Munitions/bulk items receiving area outside the Container Handling Building

- Munitions/bulk items receiving area at the Munitions Demilitarization Building.

Transportation and Process Waste Discharge Areas (Nonchemical Agent-Related)

- All onsite roadways in which demilitarization process hazardous wastes are transported

- Deactivation Furnace System discharge and residue collection area

- Process and Utility Building loading/unloading area.

Other areas will be sampled, as appropriate. Prior to closure of the UMCDF, the independent registered professional engineer responsible for closure certification will review with the UMCD Commander's representative (or the Emergency Coordinator) all UMCDF operating records pertaining to spills, releases, or other unplanned events. If releases occurred during operations, the record of response will be examined. A determination will be made by the independent engineer as to whether the response action was appropriate. If documentation of the cleanup and followup verification sampling indicates that the release was removed to clean closure target levels, no closure verification sampling of that area will be conducted. (Note: Section G-4 of the Contingency Plan provides details on the planned response action(s) for chemical agent and nonchemical agent-related spills. The criteria for cleanup of all spills to UMCDF soils is complete removal.)

<u>Clean-Closure Target Levels</u>

Clean-closure target levels will be established for hazardous constituents related to the UMCDF in the following manner:

- For hazardous constituents, which are the active components of the chemical agents to be processed at the UMCDF, the detection limits for the analytical methods specified in Section C-2 ("Waste Analysis Plan") will be used.

- For organic hazardous constituents other than the active components of the chemical agents, health-risk based clean-closure target levels with background levels as appropriate will be used.

- For priority pollutant metals, which are measured above background levels, health-risk based clean-closure target levels will be used.

<u>Health-Risk-Based Clean-Closure Target Level Evaluation</u>

The Army will perform a clean closure health-risk assessment for the UMCDF nonchemical agent-related hazardous constituents shown to exceed background limits in soil samples (detection limit for organic constituents). In accordance with the Environmental Protection Agency (EPA) Office of Solid Waste and Emergency Response Directive 9476.00-12 (Closure Requirements), 02/02/88, target levels will be established based on Agency-approved health risk information. Attachment I-3 presents the procedures that will be used by the Army to determine clean-closure target levels for soils. The procedures include an assessment of UMCDF-related hazardous constituents for potential exposure routes including soil, surface water, groundwater, and air.

Background Soils Investigation

After initial earthwork (excavation and fill activities) and prior to construction activities in the immediate vicinity of sampling locations onsite soil sampling will be conducted to establish background levels of potential hazardous constituents. At least five background soil samples will be collected and analyzed from eight pre-selected locations representative of the UMCDF soils. At each location, individual samples will be collected at 1.5- to 2-foot intervals (depending on actual sampling equipment used), except for the 6-8 foot interval, to a total depth of 10 feet (or until groundwater is encountered, whichever occurs first). A surface soil sample will be taken in place of the 6-8 foot interval sample. Samples will be taken in pre-selected areas that have a high potential for possible contamination from various UMCDF activities and in areas determined by UMCD officials to be unaffected by previous waste management or munitions management activities. This will be verified by analysis of each sample for the presence of the chemical agents to be processed at the UMCDF. Samples will be taken from similar geologic strata and at similar depths for comparison during closure of the UMCDF. From the sampling, the background concentration for each constituent will be established at each depth interval.

Wide variations in the concentration of hazardous constituents in background samples will not be acceptable. The mean of each hazardous constituent concentration of the background samples (not including the background sample with the highest concentration of that constituent) must be compared to the background sample with the highest concentration of that constituent. If the difference is within four sample standard deviations of the mean (two sample standard deviations if log values are being used rather than actual values as with metals), then the background sample with the highest constituent concentration may be included in the background set. Otherwise, another background sample will be obtained that meets these criteria.

The Quality Assurance Project Plan for background soil sampling and analysis to be conducted as part of the closure requirements for the UMCDF is included in Attachment I-4.

Chemical Agent-Related Area Sampling

All UMCDF roadways and shoulder areas in which chemical agent has been transported on a regular basis during demilitarization operations will be sampled for the presence of chemical agent during closure activities. Sample results will be compared to the background levels established prior to UMCDF construction and clean-closure target levels for chemical agent and chemical agent-related organic hazardous constituents. Decontamination efforts will be carried out until these criteria are achieved.

Roadways. Road surface chip samples will be collected every 50 linear feet along the centerline crown and at both edges of the pavement. From each station, the three samples will be composited together and analyzed for each chemical agent processed at the UMCDF. If chemical agent or chemical agent-related organic hazardous constituents are detected above the clean closure target levels at any sample location, additional sampling on 10-foot centers in each direction will be conducted to determine the extent of contamination presence. Prior to final closure of the UMCDF, asphalt areas will be decontaminated. Those areas determined to have active chemical agent present, if any, will be removed to the base material and incinerated in the mobile incinerator. (If a mobile incinerator is not permitted and available for use at UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.) If the surface is Portland cement concrete, the concrete will either be removed, or grit blasted to remove the top 0.25 centimeter of concrete. Whenever surface removal activities such as grit blasting are performed during closure activities, a particulate collection device will be used to prevent the dispersion of particulate material. Residues, if any, will be incinerated in the mobile incinerator. (If a mobile incinerator is not permitted and available for use at UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.) For contamination other than active chemical agent, a decontamination program may be employed using a heavy duty cleaning solution or steam cleaning (see Table I-1-4). See Section I-1e(4) for a discussion of similar cleaning methods for the temporary container storage area in the Process and Utility Building, and Section I-1e(11) for a discussion of the decontamination techniques for the Brine Reduction Area.

Loading and Unloading Areas. Portland cement concrete aprons adjacent to loading and unloading areas of the Container Handling Building and the Munitions Demilitarization Building will be sampled for chemical agent and chemical agent-related organic hazardous constituents. Concrete chip samples will be collected at a frequency of one sample per 100 square feet. If active chemical agent is detected, the concrete will either be removed, or grit blasted (removal of top 0.25 centimeter of surface). Residues, if any, will be incinerated in the mobile incinerator. (If a mobile incinerator is not permitted and available for use at UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.) Contamination other than active chemical agent will be removed by cleaning.

Roadway Shoulders. Roadway shoulders will be sampled at the same frequency as the roadway surface, every 50 linear feet. On each side, one sample at the edge of the pavement surface and one sample 5 feet off the pavement will be collected. Each sample will be collected to a total depth of 1 foot. The two samples at each location (from the same side) will be composited and analyzed for each chemical agent processed at the UMCDF. If chemical agent or chemical agent-related organic hazardous constituents are detected above the established clean-closure target levels, additional sampling will be conducted on a 5-foot grid away from the sample location and at 1.5- to 2-foot intervals vertically to define the extent of contamination presence. Once defined, these areas, if any, will be excavated until clean-closure levels are achieved. Excavated soils and other residues will be incinerated in the mobile incinerator. (If a mobile incinerator is not permitted and available for use at UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.) All excavated areas will be replaced with clean fill material.

Soils Adjacent to Loading and Unloading Areas. Soils adjacent to the Container Handling Building and the Munitions Demilitarization Building munitions/bulk items loading and unloading areas will be sampled and analyzed for the presence of each chemical agent and chemical agent-related organic hazardous constituent processed at the UMCDF. Samples of soil at the edge of the apron and at a distance of 5 feet away will be collected every 10 linear feet around the perimeter of the building loading apron. The samples will be collected to a total depth of 1 foot. The two samples at each perimeter location will be composited and analyzed for each chemical agent processed at the UMCDF. If chemical agent is detected above the established clean-closure criteria, additional sampling will be conducted on a 5-foot grid away from the sample location and at 1.5- to 2-foot intervals vertically to define the extent of contamination presence. Once defined, these areas, if any, will be excavated until the clean-closure target levels are achieved. Excavated soils and other residues will be incinerated in the mobile incinerator. (If a mobile incinerator is not permitted and available for use at UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.) All excavated areas will be replaced with clean fill material.

Nonchemical Agent-Related Area Sampling

During UMCDF closure, a soil sample verification program will be conducted for roadway and loading/unloading areas of the UMCDF that are used to transport nonchemical agent-related hazardous wastes such as brine salts. The sampling strategy will be identical to that described above for chemical agent-related areas.

Soil samples will be analyzed for priority pollutant metals only (total metal analysis). Health-risk-based clean-closure target levels will be established for those metals shown to exceed background levels.

If the concentration of the analyzed hazardous constituents in the soil is within the established clean-closure target level concentration plus two standard deviations, then the clean-closure criteria for the constituent have been achieved. If levels in excess of the health-risk-based clean-closure target level are found, additional sampling as described for chemical agent-related areas will be conducted until the extent of contamination is determined.

If soil removal is necessary, excavation will be conducted until the soil clean-closure target level is achieved. All residue generated will be characterized in accordance with 40 CFR 261, Subpart C, "Characteristics of Hazardous Waste."

The independent registered professional engineer will review documentation of the UMCDF soils investigation, which will be included in the final UMCDF closure certification. Documentation of the soils investigation and all records of soil/pavement removal will be maintained in the engineer's logs.

I-1e(2) Disposal or Decontamination of Equipment, Structures, and Soils
[40 CFR 264.114; OAR 340-104-0001]

During closure of the UMCDF, wastes will be generated from closure activities. At or before final closure, all hazardous wastes to be thermally treated that are generated during closure will be processed through one of the UMCDF incinerators or the mobile incinerator. (If a mobile incinerator is not permitted and available for use at UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.) Hazardous wastes generated during closure that will not be thermally treated (e.g., brine salts) will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility. Waste management during closure will be in accordance with the RCRA permit (for wastes such as ash, brine salts, etc., that are routinely generated during the operating life of the UMCDF) and in accordance with the "Standards Applicable to Generators of Hazardous Waste" (40 CFR 262) for waste(s) that may be unique to closure activities.

All wastes from the final chemical agent demilitarization campaign will be removed from the UMCDF prior to commencement of closure.

It is not anticipated that soil removal will be necessary during closure because any incidents involving chemical agent release (or other hazardous waste) during the operational life will be addressed under the UMCDF Contingency Plan (Section G). If soil removal is necessary during closure, residues containing detectable levels of chemical agent will be thermally treated in the mobile incinerator, and disposed of at approved offsite hazardous waste treatment, storage, or disposal facility. (If a mobile incinerator is not permitted and available for use at UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.)

I-1e(3) Closure of Disposal Units/Contingent Closures
[40 CFR 270.14(b)(13), 270.17(f), 270.18(h), 270.21(e), 264.197(b), 264.197(c)(1), 264.228(a)(2), 264.228(c)(1)(i), 264.258(c)(1)(i), 264.310(a), 264.601; OAR 340-105-0014, 340-104-0001]

The Chemical Stockpile Disposal Program will not have disposal units. Therefore, the requirements of this section are not applicable.

I-1e(4) Closure of Containers
[40 CFR 264.178; OAR 340-104-0001]

Container Handling Building

It is anticipated that the Container Handling Building will be one of the first hazardous waste management units to be decommissioned during UMCDF closure activities. All waste munitions and bulk items will have been processed through the UMCDF prior to initiation of UMCDF closure.

Closure of the Container Handling Building will involve the following activities:

- Initial 3X decontamination following final munitions/bulk items campaign (3X decontamination verification will be based on the final chemical agent processed and as per normal chemical agent monitoring during UMCDF operations). Decontamination procedures to be used are similar to those described previously for the Munitions Demilitarization Building. All interior surfaces will be decontaminated with the appropriate chemical agent decontamination solution provided in Table I-1-4. Spent decontamination solution will be collected in the drain system within the structure, placed in drums or portable tanks, and transferred to a spent decontamination holding tank in the Spent Decontamination System Room. All decontamination solution will be incinerated in the Liquid Incinerators.

  and

- One or both of the following closure verification steps will be completed:

  Clean-Closure Sampling. Random and systematic sampling of the epoxy floor and sump coating system, respectively, will be conducted to confirm the effectiveness of the decontamination methods. Sampling methods will be in accordance with procedures established in SW-846 and as provided below.
  For areas with less than 400 square feet, a minimum of four random scrape samples from the floor area coating and a minimum of one additional sample from each containment or collection sump and/or collection trench will be collected then analyzed (as per Section C-2, "Waste Analysis Plan") for all chemical agents processed at the UMCDF.

  In areas larger than 400 square feet, random scrape samples at a frequency of one per 100 square feet will be collected. In areas with multiple sumps, a minimum of one sample per sump will be collected. Trench collection systems will be sampled at a frequency of one sample per 10 linear feet of trench.

  If analysis indicates nondetectable concentrations of all chemical agents, no additional decontamination will be conducted. If chemical agent is detected, then additional decontamination and verification analysis steps may be undertaken (with manual collection of the liquid using portable equipment) or the procedure for coating system removal, below, will be employed.

Coating System Removal. The epoxy coating and the top 0.25 centimeter of concrete (or to exposed aggregate, whichever occurs first) will be removed by grit-blast techniques. Grit-blast residues will be collected, containerized, and handled as hazardous waste in a manner consistent with the last chemical agent processed. The final decontamination step will be to rinse the walls, floor, sumps, and trenches with fresh water, or to steam clean. Rinsewater or condensate will be manually collected from the sump(s) and incinerated in the Liquid Incinerators. No additional sampling of the decontaminated area will be conducted.

and

- Postdecontamination chemical agent monitoring for a minimum of 3 months inside Container Handling Building verifies final 3X decontamination closure status.

Closure verification sampling and cleanup contingencies for the soil and roadway surfaces in the immediate vicinity of the entrance apron to the building are addressed in Section I-1e(1), under "Facility Soils Investigation at Closure."

Residue Handling Area

Closure of the Residue Handling Area will involve the removal and disposal at an approved offsite hazardous waste treatment, storage, or disposal facility of all containerized hazardous wastes in storage at the time closure of the Brine Reduction Area commences, followed by decontamination of the building's interior surfaces (walls and floor). Closure of this area will be in conjunction with closure of the Brine Reduction Area that is located adjacent to the temporary storage area. The projected types of containerized waste that will have to be shipped offsite to an approved offsite hazardous waste treatment, storage, or disposal facility during closure are:

- Brine salts
- Incinerator ash
- Baghouse and cyclone residues
- Miscellaneous nonchemical-agent-related wastes.

Upon removal of the final quantity of waste from the Process and Utility Building, the interior walls and floor adjacent to the Residue Handling Area will be spray-rinsed or steam-cleaned with general purpose decontamination solution (see Table I-1-4) or a heavy-duty solution, as appropriate, to remove brine dust and residues. The interior of the building adjacent to the storage area will then be rinsed with fresh water. It is anticipated that one to two additional washings with the decontamination solution may be necessary to complete closure of this area. The wash and rinse waters will be collected and transported to the

Liquid Incinerators or mobile incinerator for incineration. (If a mobile incinerator is not permitted and available for use at the UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.) It is not anticipated that physical decontamination methods such as grit blasting will be necessary to complete closure. If grit blasting is employed, residue management will be as indicated for the Brine Reduction Area closure procedures.

J-Block Closure Activities

The removal and treatment/disposal of the munitions-related hazardous waste inventory stored in J-Block will be performed prior to initiation of closure.

Following removal of the waste inventory, each permitted igloo in J-Block that has been used to store hazardous waste will be air monitored as described in Section I-1e(1). If the monitoring results show no agent exceeding its respective vapor concentration as defined in Section I-1e(1), the igloo will be designated as a 3X-decontaminated structure. If the monitoring results indicate agent contamination exceeding the 3X level, the structure will be decontaminated to the 3X level, following the appropriate agent decontamination procedures. Decontamination will be verified by performing additional air monitoring after the decontamination process. If air monitoring continues to indicate the presence of contamination, the sequence of decontamination followed by air monitoring will be repeated until a 3X designation is verified by the air monitoring. The waste and residue resulting from the decontamination will be collected, sampled, and analyzed for hazardous waste characteristics and managed in accordance with applicable requirements.

Permitted J-Block igloos that were not used for hazardous waste storage will be considered clean closed without additional activities. During the closure certification process, the independent, registered professional engineer will evaluate UMCDF documentation to ensure that the clean closure determination is substantiated.

Following air monitoring and decontamination of the igloos located in J-Block, the facility operating records will be reviewed to identify any igloos that represent a high probability for contamination. This would include those igloos in which liquid wastes were managed and waste spills occurred. These igloos will be regarded as worst-case baseline for contamination and subject to sampling and analysis to detect contamination. If the sampling and analysis results for these worst-case igloos do not indicate the presence of contamination at levels exceeding clean-closure levels, it will then be concluded that the remaining igloos meet the criteria for clean closure. The closure process is illustrated in Figure I-1-6.

I-1e(5) Closure of Tank Systems
[40 CFR 264.197; OAR 340-104-0001]

The UMCDF will have three separate permitted hazardous waste tank systems as well as two RCRA-regulated (less than 90 day storage) but nonpermitted systems: LAB Chemical Waste Storage Tank System and the Liquid Waste Holding Tank System. These tank systems will vary in design and complexity, and will consist of any or all of the following system components: tanks, collection sumps, secondary containment sumps, concrete (in-floor) collection trenches, pumps, valves, and other ancillary equipment. These tank systems include:

- Agent Collection Tank System - This tank system will include the chemical agent collection systems in the Explosive Containment Room and the Munitions Processing Bay as well as all associated piping and ancillary equipment, and will extend to the inlet of the Liquid Incinerators. The Agent Collection Tank System will also include the agent holding tanks (ACS-TANK-101, ACS-TANK-102, and ACS-TANK-108), sumps, pumps, and associated piping. There will be no floor sumps or trenches located in process areas associated with the Agent Collection Tank System. However, a collection sump and trenches are part of the tanks' secondary containment system. The Agent Collection Tank System is located entirely within Category A areas in the Munitions Demilitarization Building.

- Spent Decontamination Holding Tank System - While not intended specifically for chemical agent collection, the Spent Decontamination Holding Tank System will collect incidental quantities of chemical agent from routine decontamination operations within the Munitions Demilitarization Building. Laboratory wastes will be pumped to the spent decontamination solution holding tanks for incineration in the Liquid Incinerators. The Spent Decontamination Holding Tank System will consist of numerous sumps and concrete collection trenches of varying length, pumps, ancillary piping and equipment, and the two spent decontamination holding tanks to be located in the Spent Decontamination System (SDS) Room. Three separate pipe headers and pump systems will compose the Spent Decontamination Holding Tank System--one each originating from Category A and A/B, Category B, and Category C process areas. The secondary containment system in the SDS Room will be provided by a sump and containment area. The Spill Tank System portion of the SDS tank system extends from sumps in the TOX and SDS Room to the spill tanks, and from the spill tanks to the ACS tanks in the TOX and the SDS tanks in the SDS Room. This system includes the spill tanks, sumps in the TOX and SDS Room, pump, and associated piping. The 2,260-gallon tank (ACS-TANK-401 A/B) consists of two 4.5’ diameter x 9.5’ high vessels connected by piping so the vessels act as one. The tank system utilizes a common feed to the tanks and a common suction to a spill transfer pump, ACS-PUMP-105. Secondary containment for the Spill Tank System is provided by the four-inch curb of the MPB and seven sumps with the capacity of approximately 11,000 gallons. The feed to the spill tank is from existing local Category A sump pumps through existing agent feed and Category A sump pump discharge piping.

- Brine Surge Tank System - This system will extend from the incinerators pollution abatement systems to the brine surge tanks, which will be adjacent to the Process and Utility Building. It will include four brine surge tanks, sumps, pumps, vault, and associated piping.

- LAB Chemical Waste Storage Tank System - The LAB chemical waste storage tank will receive miscellaneous wastes from routine laboratory operations. This 1,600-gallon tank will be enclosed in a below ground reinforced-concrete vault.

- Liquid Waste Holding Tank System - The Liquid Waste Holding Tank System will receive spent decontamination solution and rinse washings in the event an emergency develops in which personnel are accidentally exposed to chemical agents and need to be decontaminated at the infirmary in the Personnel and Maintenance Building. The tank system will consist of a 595-gallon tank, sump, pump, vault and associated piping.

A summary of the principal tank systems and their individual capacities is provided in Table I-1-5. Sumps used as primary and secondary containment devices are summarized in Tables I-1-6 and I-1-7, respectively, and sumps not regulated as hazardous waste management units are listed in Table I-1-8.

Agent Collection Tank System

Following completion of the final chemical agent demilitarization campaign, but prior to the official commencement of closure operations, the Munitions Demilitarization Building will be initially decontaminated to 3X according to normal operating procedures. This initial effort will include 3X decontamination of the Agent Collection Tank System. While the Liquid Incinerators will remain in service to support UMCDF closure operations, the Agent Collection Tank System will no longer be needed.

The Agent Collection Tank System will be closed following removal of all munitions and bulk items draining equipment located in the Explosive Containment Room and the Munitions Processing Bay. Equipment in both of these areas will be directly connected to the Agent Collection Tank System. (Note: The Explosive Containment Room and the Munitions Processing Bay will be closed as an element of the Spent Decontamination Holding Tank System.) No sumps will be associated with the Agent Collection Tank System, except the secondary containment sump located under the agent holding tanks in the Toxic Cubicle.

The appropriate decontamination solution from Table I-1-4 used in the final chemical agent campaign will be flushed through the piping system until no chemical agent is detected in samples of the decontamination solution as it enters the Agent Collection Tank System. Chemical agent analysis will be in accordance with methods identified in Section C-2, "Waste Analysis Plan." All decontamination solution will be incinerated in the Liquid Incinerators. Following decontamination, the collection lines will be purged with a fresh water rinse, with the rinse water also incinerated in the Liquid Incinerators. (If a mobile incinerator is not permitted and available for use at UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.)

All aspects of the Agent Collection Tank System, including the tanks, piping, pumps, and other ancillary equipment originating from Category A areas will be decontaminated, disassembled, and cut into pieces as necessary to be 5X decontaminated in either the Metal Parts Furnace or the mobile incinerator. (If a mobile incinerator is not permitted and available for use at UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.) Only the floor area and secondary containment sump in the Toxic Cubicle will remain following disassembly of the tank system (see discussion below).

Following 5X decontamination and certification by the UMCD Commander's representative and the independent engineer, the scrap will be released from government custody. The 5X decontamination verification techniques will be as done during normal UMCDF operations for munitions scrap.

The floor and secondary containment sump will be finally decontaminated by employing one or both of the following procedures:

- Clean-Closure Sampling. Random and systematic sampling of the epoxy floor and sump coating system, respectively, will be conducted to confirm the effectiveness of the decontamination methods. Sampling methods will be in accordance with procedures established in SW-846 and as provided below.

  In floor areas with less than 400 square feet, a minimum of four random scrape samples from the floor area coating and a minimum of one additional sample from each containment or collection sump and/or collection trench will be collected, then analyzed (as per Section C-2, "Waste Analysis Plan") for all chemical agents processed at the UMCDF.

  For floor areas larger than 400 square feet, random scrape samples at a frequency of one per 100 square feet will be collected. In areas with multiple sumps, a minimum of one sample per sump will be collected. Trench collection systems will be sampled at a frequency of one sample per 10 linear feet of trench.

  If analysis indicates nondetectable concentrations of all chemical agents, no additional decontamination will be conducted. If a chemical agent is detected, then additional decontamination and verification analysis steps may be undertaken (with manual collection of the liquid using portable equipment) or the procedure for coating system removal, below, will be employed.

- Coating System Removal. The epoxy coating and the top 0.25 centimeter of concrete (or to exposed aggregate, whichever occurs first) will be removed by grit-blast techniques. Grit-blast residues will be collected, containerized, and handled as hazardous waste in a manner consistent with the last chemical agent processed. The final decontamination step will be to rinse the walls, floor, sumps, and trenches with fresh water or to steam clean. Rinsewater or condensate will be manually collected from the sump(s) and incinerated in the Liquid Incinerators. No additional sampling of the decontaminated area will be conducted.

Individual unit closure (i.e., partial closure) of the Agent Collection Tank System will be considered complete following completion of the above tasks. The certifying engineer will note the date of completion in the closure logbook. Closure certification will be made following completion closure of the Spent Decontamination Holding Tank System and of the 3-month postdecontamination chemical agent monitoring program for the entire Munitions Demilitarization Building.

Spent Decontamination Holding Tank System

The Spent Decontamination Holding Tank System will be closed systematically with the general decommissioning of the Munitions Demilitarization Building. Final closure of this tank system cannot be completed until all removable equipment (including sumps and trenches that are fitted with removable steel liners) in Category A, A/B, B, and C process areas have been disassembled, decontaminated, and removed from the building. Elements of the Spent Decontamination Holding Tank System located in Category A and B process areas will be disassembled and thermally treated to 5X decontamination. Equipment from Category C process areas will only receive 3X decontamination.

The Spent Decontamination Holding Tank System will be closed following initial 3X decontamination of the Munitions Demilitarization Building after the final chemical agent campaign, removal of all demilitarization equipment, and closure of the Agent Collection Tank System. Following closure of the Agent Collection Tank System (in the Munitions Processing Bay and Explosive Containment Room), final decontamination and disassembly of the Spent Decontamination Holding Tank System will proceed.

Decontamination solution wash(es) of the individual process area walls, floors, sumps, etc. will be conducted until no chemical agent constituents are detectable in samples collected at the inlet to the three tanks in the Spent Decontamination System Room. The pump and piping systems will then receive a final fresh water rinse. All rinsate will be incinerated in the Liquid Incinerators. When this is achieved, the sump pump assemblies will be removed and the pipelines will be capped at the connection to the 2-inch-diameter pipe that will run to the tanks. The 2-inch-diameter pipelines will be systematically removed as each area is decommissioned.

One or both of the following closure verification steps will be undertaken:

- Clean-Closure Sampling. Random and systematic sampling of the epoxy floor and sump coating system, respectively, will be conducted to confirm the effectiveness of the decontamination methods. Sampling methods will be in accordance with procedures established in SW-846 and as provided below.

  For floor areas with less than 400 square feet, a minimum of four random scrape samples from the floor area coating and a minimum of one additional sample from each containment or collection sump and/or collection trench will be collected, then analyzed (as per Section C-2, "Waste Analysis Plan") for all chemical agents processed at the UMCDF.

In areas larger than 400 square feet, random scrape samples at a frequency of one per 100 square feet will be collected. In areas with multiple sumps, a minimum of one sample per sump will be collected. Trench collection systems will be sampled at a frequency of one sample per 10 linear feet of trench.

If analysis indicates nondetectable concentrations of all chemical agents, no additional decontamination will be conducted. If a chemical agent is detected, then additional decontamination and verification analysis steps may be undertaken (with manual collection of the liquid using portable equipment) or the procedure for coating system removal, below, will be employed.

- Coating System Removal. The epoxy coating and the top 0.25 centimeter of concrete (or to exposed aggregate, whichever occurs first) will be removed by grit-blast techniques. Grit-blast residues will be collected, containerized, and handled as hazardous waste in a manner consistent with the last chemical agent processed. The final decontamination step will be to rinse the walls, floor, sumps, and trenches with fresh water or to steam clean. Rinsewater or condensate will be manually collected from the sump(s) and incinerated in the Liquid Incinerators. Verification sampling and analysis will be conducted to confirm that decontamination was effective.

Initially one of the two spent decontamination holding tanks will be removed from service, disassembled, and 5X decontaminated in the Metal Parts Furnace or the mobile incinerator. The second tank will remain as the only operable feed tank to the Liquid Incinerators during remaining decontamination efforts conducted during closure of the UMCDF. Closure of the second tank and any remaining elements of the three collection system pipelines will be disassembled, cut into pieces as necessary, and decontaminated (5X) in the mobile incinerator. (If a mobile incinerator is not permitted and available for use at UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.)

Closure of the Spent Decontamination System Room that serves as the secondary containment system for the spent decontamination solution holding tanks will be finally decontaminated following disassembly of the last spent decontamination holding tank and remaining ancillary equipment. Closure verification for the common trench and sump system and the individual containment sumps for the three spent decontamination holding tanks will be in the same manner as that described above for the collection portion of the Spent Decontamination Holding Tank System. The sump for the Agent Holding Tank System will be finally decontaminated prior to closure of the last spent decontamination holding tank.

Closure of the Spent Decontamination Holding Tank System will be considered complete following completion of the above tasks. The certifying engineer will note the date of completion in the closure logbook. Closure verification will be included with completion of the 3-month postdecontamination chemical agent monitoring program for the entire Munitions Demilitarization Building.

The Spill Tank System portion of the SDS Tank system consists of two 4.5' diameter x 9.5' high vessels connected by piping so the vessels act as one, located in the Munitions Processing Bay (MPB). The Spill Tank System will be closed following the closure of one Spent Decontamination System (SDS) Tank. If the Spill Tank System was used to contain hazardous waste, the appropriate decontamination solution from Table I-1-4 used in the final chemical agent campaign will be flushed through the piping system into the tanks until no chemical agent is detected in samples of the decontamination solution as it enters the SDS tank. Chemical agent analysis will be in accordance with methods identified in Permit Attachment 2, "Waste Analysis Plan." All spent decontamination solution will be incinerated in the Liquid Incinerators. Following decontamination, the collection lines will be purged with a fresh water rinse, with the rinse water also incinerated in the Liquid Incinerators or mobile incinerator. (If a mobile incinerator is not permitted and available for use at UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.)

After the decontamination of the tanks and associated equipment has been completed, the tanks, piping, and ancillary equipment will be cut into small pieces. Following 5X decontamination and certification by the UMCD Commander's representative and the independent engineer, the scrap will be released from government custody. The 5X decontamination verification techniques will be as done during normal UMCDF operations for munitions scrap.

<u>Brine Surge Tank System</u>

The Brine Surge Tank System will consist of four 47,000-gallon brine surge tanks to be located outside of the Process and Utility Building, the vault, and all ancillary piping and secondary containment devices. The Brine Reduction Area will be operational until no further use is needed (i.e., when the Liquid Incinerators and mobile incinerator, if connected to the Brine Reduction Area during closure activities, are closed). At this point, as much as 206,800 gallons of brine (capacity of the four brine surge tanks and ancillary equipment) could be on hand. This brine will be processed through the Brine Reduction Area evaporator packages and drum dryers prior to commencement of unit closure.

The Brine Surge Tank System will be disassembled, brushed, scraped, or grit blasted, as appropriate, to remove heavy residue (salt) accumulation, and washed or steam-cleaned using a detergent and/or heavy-duty cleaning solution (see Table I-1-4) until no residues are visibly apparent.

After the decontamination of the tanks and associated equipment has been completed, the tanks, piping, and ancillary equipment will be cut into small pieces, where practicable, for scrap, and released from government custody.

In all instances where grit-blast techniques are employed during closure, blast residues will be collected using normal hand tools (e.g., shovels, brooms, etc.) and heavy-duty portable and wheeled vacuum sweepers (as necessary), containerized, and disposed of in a manner that is consistent with the brine salts of the most recent chemical agent demilitarization campaign.

<u>LAB Chemical Waste Storage Tank System</u>

The LAB Chemical Waste Storage Tank System will be closed after the Munitions Demilitarization Building is decontaminated to a 3X condition. Final closure of the Laboratory cannot be completed until it is determined that there is no chemical agent contamination remaining onsite. The Laboratory will be used in final monitoring of the UMCDF. The pipelines will be flushed with decontamination solution until there is no detectable chemical agent in the decontamination solution. The pipelines will then be flushed with fresh water. The liquids will be incinerated in the mobile incinerator. (If a mobile incinerator is not permitted and available for use at the UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.)

<u>Liquid Waste Holding Tank System</u>

The Liquid Waste Holding Tank System will be closed concurrently with the closure of the LAB Chemical Waste Storage Tank System. The tank system will be flushed with decontamination solution until there is no detectable chemical agent in the decontamination solution. The tank system will then be flushed with fresh water. The liquids will be incinerated in the mobile incinerator. If a mobile incinerator is not permitted and available for use at the UMCDF closure, these wastes will be shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.

I-1e(6) Closure of Waste Piles
[40 CFR 270.18(h), 264.258; OAR 340-105-0014, 340-104-0001]

The UMCDF will not have any waste pile management units. Therefore, the requirements of this section are not applicable.

I-1e(7) Closure of Surface Impoundments
[40 CFR 270.17(f), 264.228; OAR 340-105-0014, 340-104-0001]

The UMCDF will not have any surface impoundment management units. Therefore, the requirements of this section are not applicable.

I-1e(8) Closure of Incinerators
[40 CFR 264.351; OAR 340-104-0001]

The incinerators, including their pollution abatement systems, will be shut down and permanently taken out of service, sequentially, as indicated in Table I-1-9. Any remaining waste materials that are part of the chemical agent demilitarization campaign will be processed through the respective system prior to initiation of closure. Similar to normal operational procedures, all of the incineration systems will then be initially 3X decontaminated. To augment the closure of the UMCDF, incinerator closure and disassembly will occur in a sequential manner with the decontamination residues and disassembled parts thermally treated in one of the remaining active units. Although not addressed in this RCRA permit application, a mobile incinerator will be brought to the UMCDF to support closure as the onsite incinerators are decommissioned. If a mobile incinerator is not permitted and available for use at the UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.

Disassembled incineration equipment will be decontaminated as follows:

- Deactivation Furnace System

  3X From outlet of afterburner through pollution abatement system

  5X From munitions feed chute through heated discharge conveyor, and through afterburner

- Metal Parts Furnace

  3X From discharge of afterburner through the pollution abatement system

5X From inlet airlock through exit airlock, and through afterburner

- Two Liquid Incinerators

3X From outlet of secondary chambers through pollution abatement system, including stack

5X From chemical agent feed in the primary chambers through the secondary chambers.

Following initial decontamination, removal, disassembly, and 3X or 5X final parts decontamination of each respective incinerator, as indicated above, the room(s) in the Munitions Demilitarization Building in which the system was formerly housed will be finally 3X decontaminated. All interior surfaces will be decontaminated with the appropriate chemical agent decontamination solution provided in Table I-1-4. Spent decontamination solution will be collected from the decontamination sump(s) or trenches using portable equipment, and transferred either to the spent decontamination holding tank (if still in service) for incineration in the Liquid Incinerators or to the mobile incineration system. (If a mobile incinerator is not permitted and available for use at UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.) The portable equipment used to collect and transfer spent decontamination solutions will be rinsed with fresh decontamination solution followed by a clean water rinse. The collected solutions will then be added to the spent decontamination solutions for disposition.

As provided below, verification sampling and/or removal of the epoxy concrete coating system will be performed to confirm the effectiveness of the final surface decontamination procedures:

- <u>Clean-Closure Sampling</u>. Random and systematic sampling of the epoxy floor and sump coating system, respectively, will be conducted to confirm the effectiveness of the decontamination methods. Sampling methods will be in accordance with procedures established in SW-846 and as provided below.

  For floor areas with less than 400 square feet, a minimum of four random scrape samples from the floor area coating and a minimum of one additional sample from each containment or collection sump and/or collection trench will be collected then analyzed (as per Section C-2, "Waste Analysis Plan") for all chemical agents processed at the UMCDF.

  In areas larger than 400 square feet, random scrape samples at a frequency of one per 100 square feet will be collected. In areas with multiple sumps, a minimum of one sample per sump will be collected. Trench collection systems will be sampled at a frequency of one sample per 10 linear feet of trench.

If analysis indicates nondetectable concentrations of all chemical agents, no additional decontamination will be conducted. If a chemical agent is detected, then additional decontamination and verification analysis steps may be undertaken (with manual collection of the liquid using portable equipment) or the procedure for coating system removal, below, will be employed.

- Coating System Removal. The epoxy coating and the top 0.25 centimeter of concrete (or to exposed aggregate, whichever occurs first) will be removed by grit-blast techniques. Grit-blast residues will be collected, containerized, and handled as hazardous waste in a manner consistent with the last chemical agent processed. The final decontamination step will be to rinse the walls, floor, sumps, and trenches with fresh water or steam clean. Rinsewater or steam cleaning condensate will be manually collected from the sump(s) and will be incinerated in the Liquid Incinerators or mobile incinerator, as applicable. (If a mobile incinerator is not permitted and is available for use at UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.) Verification sampling and analysis will be conducted to confirm that the decontamination was effective.

I-1e(9) Closure of Landfills
[40 CFR 270.21(e), 264.310(a); OAR 340-105-0014, 340-104-0001]

The UMCDF will not have any landfill units. Therefore, the requirements of this section are not applicable.

I-1e(10) Closure of Land Treatment Facilities
[40 CFR 270.20(f), 264.280(a) and (b); OAR 340-105-0014, 340-104-0001]

The UMCDF will not have any land treatment units. Therefore, the requirements of this section are not applicable.

I-1e(11) Closure of Miscellaneous Units
[40 CFR 264.601, 270.23(a)(2); OAR 340-104-0001, 340-105-0014]

There will be the following miscellaneous units at the UMCDF:

- Two flash evaporator packages (each consisting of a flash evaporator, a heat exchanger, two circulation pumps, and associated piping) and three rotary drum dryers. These units will be located in the Brine Reduction Area inside the Process and Utility Building.

The Brine Reduction Area evaporator packages and drum dryers will be used to concentrate and dry the brines produced by the pollution abatement systems for the Deactivation Furnace, Liquid Incinerators, Metal Parts Furnace; and softener regeneration waste. Closure of the evaporator packages, drum dryers, and ancillary equipment will begin after final processing of all the brine on hand at the time the Liquid Incinerator (or mobile incinerator if connected to the Brine Reduction Area during the closure activities) are closed. Consequently, the Brine Reduction Area evaporator packages and drum dryers will be some of the last units to be closed at the UMCDF.

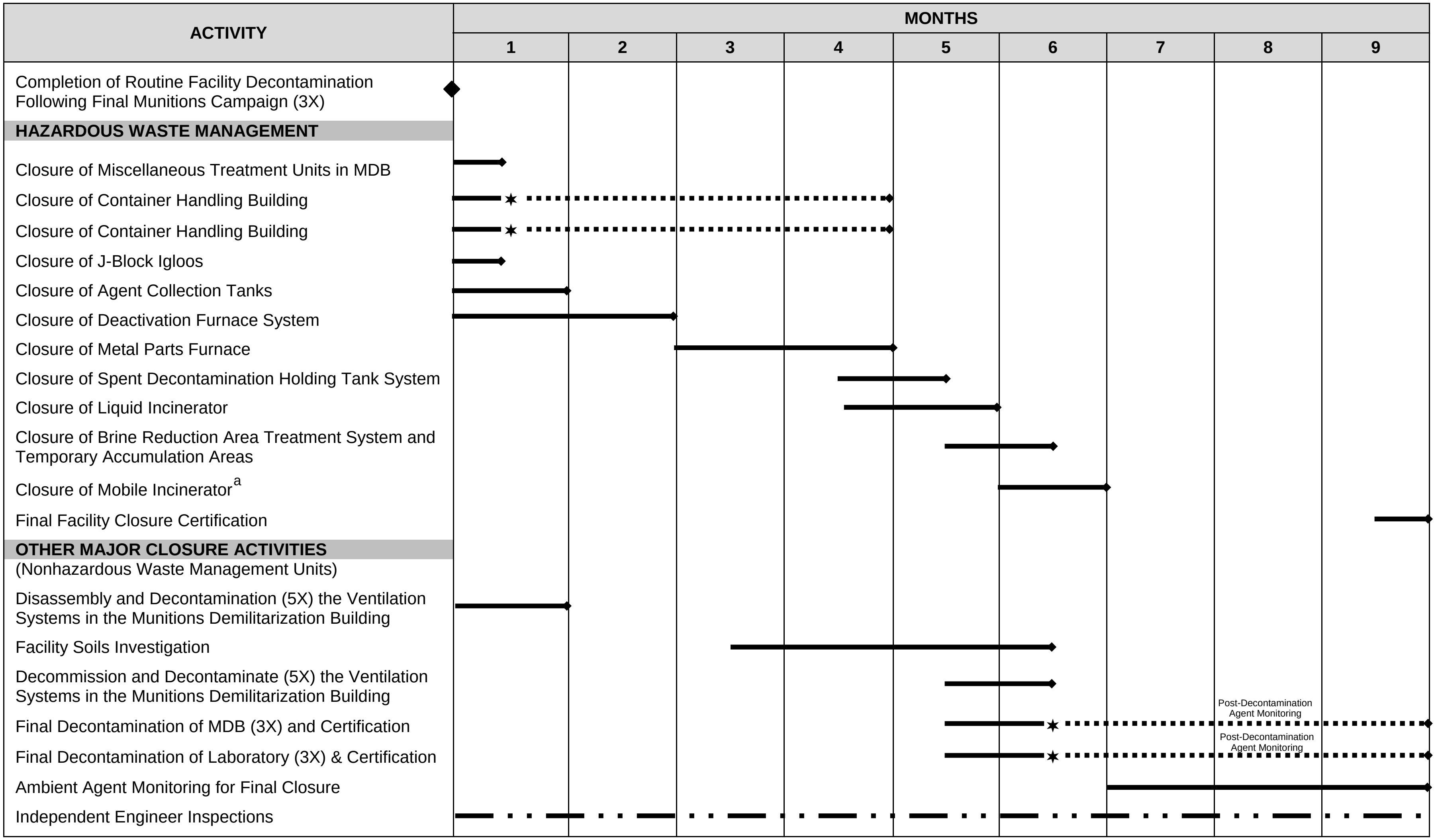
- The Depressurization Glove Box miscellaneous unit is located inside of the Container Handling Building Unpack Area and will be used to vent pressurized HD ton containers. Exhaust filter units for the Depressurization Glove Box are located outside between the Munitions Demilitarization Building and the Container Handling Building. Closure of the Depressurization Glove Box miscellaneous unit may begin after completion of venting operations of the pressurized HD ton containers.

- The bulk drain station miscellaneous treatment units are located in the Munitions Demilitarization Building. The heel transfer system, which is part of each bulk drain stations, will be used to treat HD ton containers with a high volume of mustard crust, commonly referred to as "heel." Closure of the miscellaneous unit may begin after the last ton container is processed through the BDS.

Closure of the Residue Handling Area will occur in conjunction with the closure of the Brine Reduction Area evaporator packages and drum dryers. All process equipment will be decontaminated using physical (e.g., grit blasting) and/or liquid residue removal methods. The equipment will then be disassembled, brushed, scraped, or grit blasted, as appropriate, to remove any heavy residue (salt) accumulation, and washed or steam cleaned using a detergent and/or heavy-duty cleaning solution (see Table I-1-4) until no residues are visibly apparent. After the decontamination is completed, the equipment will then be cut into small pieces, where practicable, and released from Government custody as scrap. Following the removal of the equipment from the Brine Reduction Area, and the removal of all hazardous wastes from the Residue Handling Area, the interior structures and floors of the Process and Utility Building where these two areas were located will be decontaminated. Decontamination will consist of high-pressure water washing and/or steam cleaning, using the general or heavy-duty cleaning solutions identified in Table I-1-4.

Depending on the extent of salt residues remaining after the equipment is removed, grit-blasting techniques may need to be employed before washing and/or steam cleaning. Whenever surface removal activities such as grit blasting are performed during closure activities, a particulate collection device will be used to prevent the dispersion of particulate material. Any blasting residues will be collected, containerized, and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.

Figure I-1-1 Closure Schedule



[a] Closure of the mobile incinerator is not addressed in this Application. The RCRA operating permit for the mobile incinerator is separate from and independent of this Application.

NOTE: Facility closure is anticipated to take nine months to complete based on conditions during closure, the overall closure period may take up to one year.

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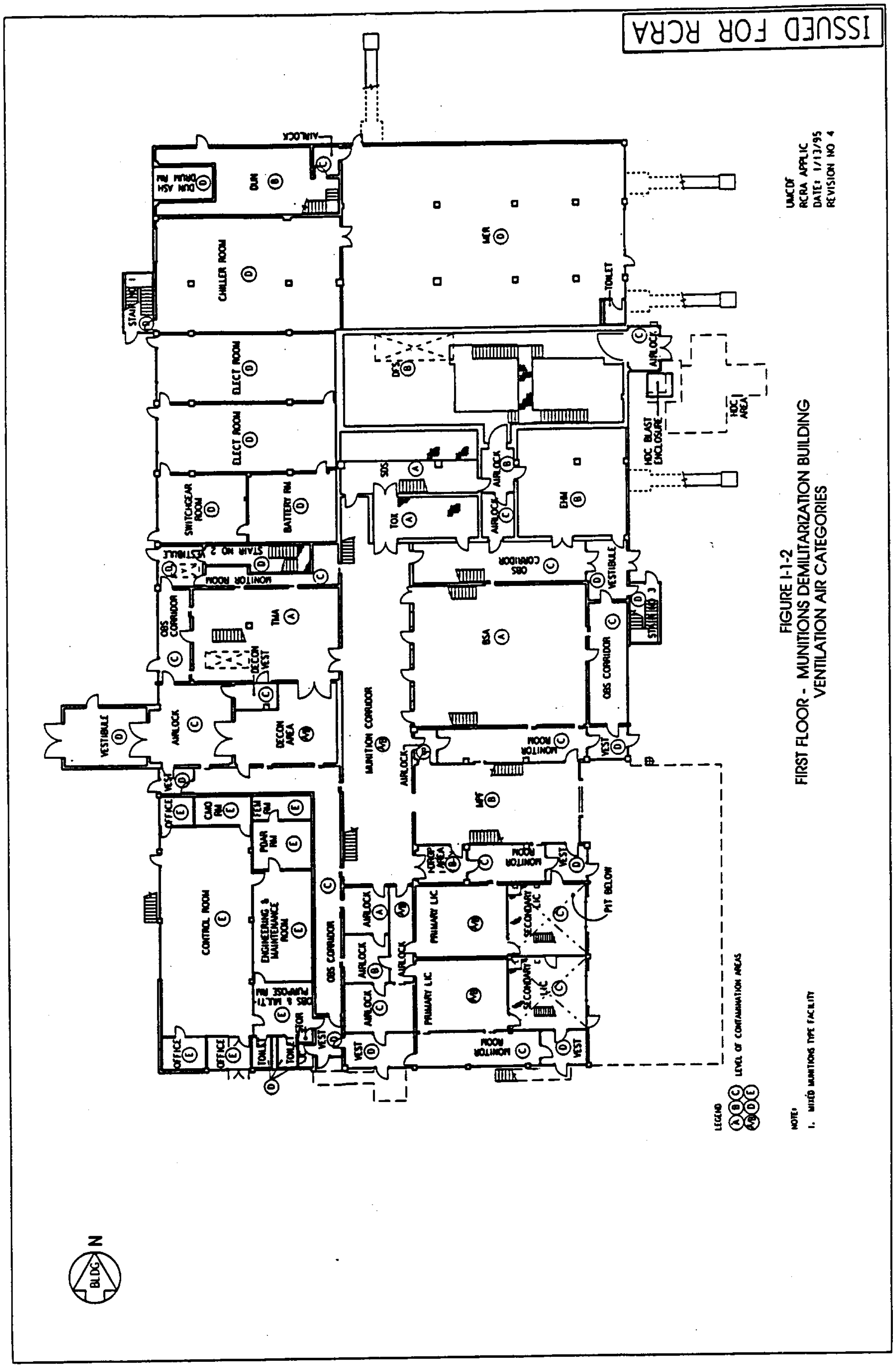

Figure I-1-2 First Floor Munitions Demilitarization Building Ventilation Air Categories

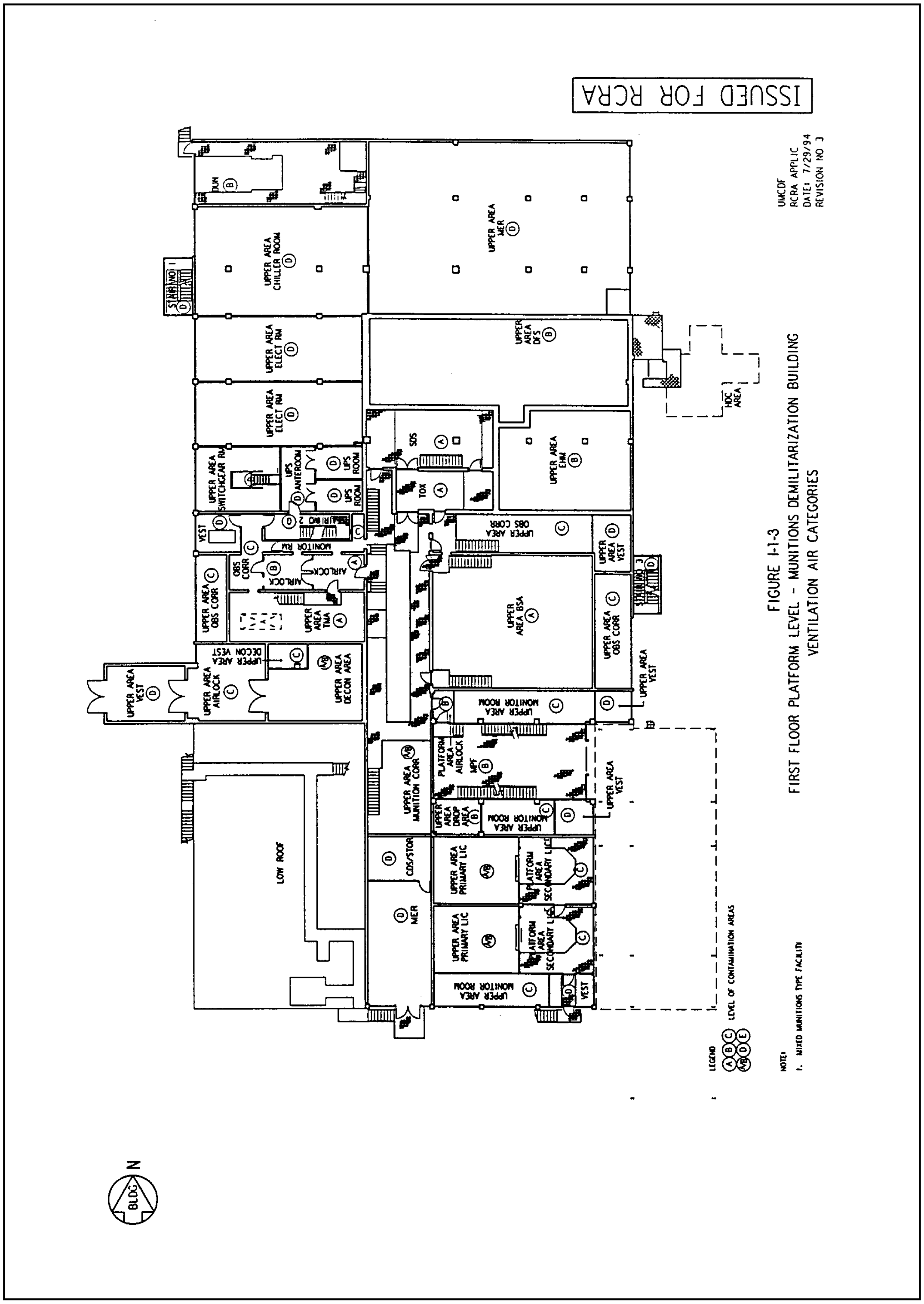

Figure I-1-3 First Floor Platform Level – Munitions Demilitarization Building Ventilation Air Categories

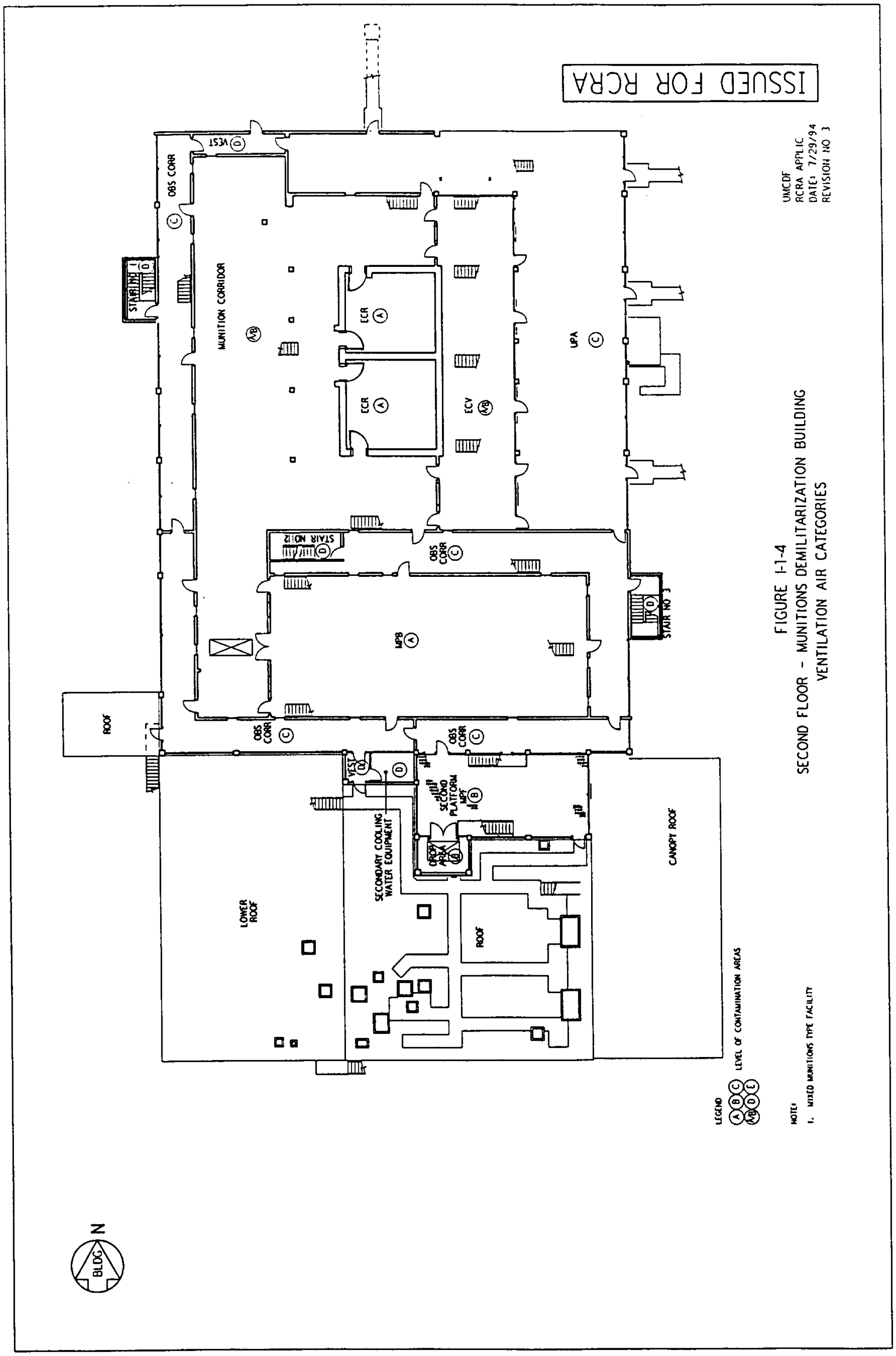

Figure I-1-4 Second Floor – Munitions Demilitarization Building Ventilation Air Categories

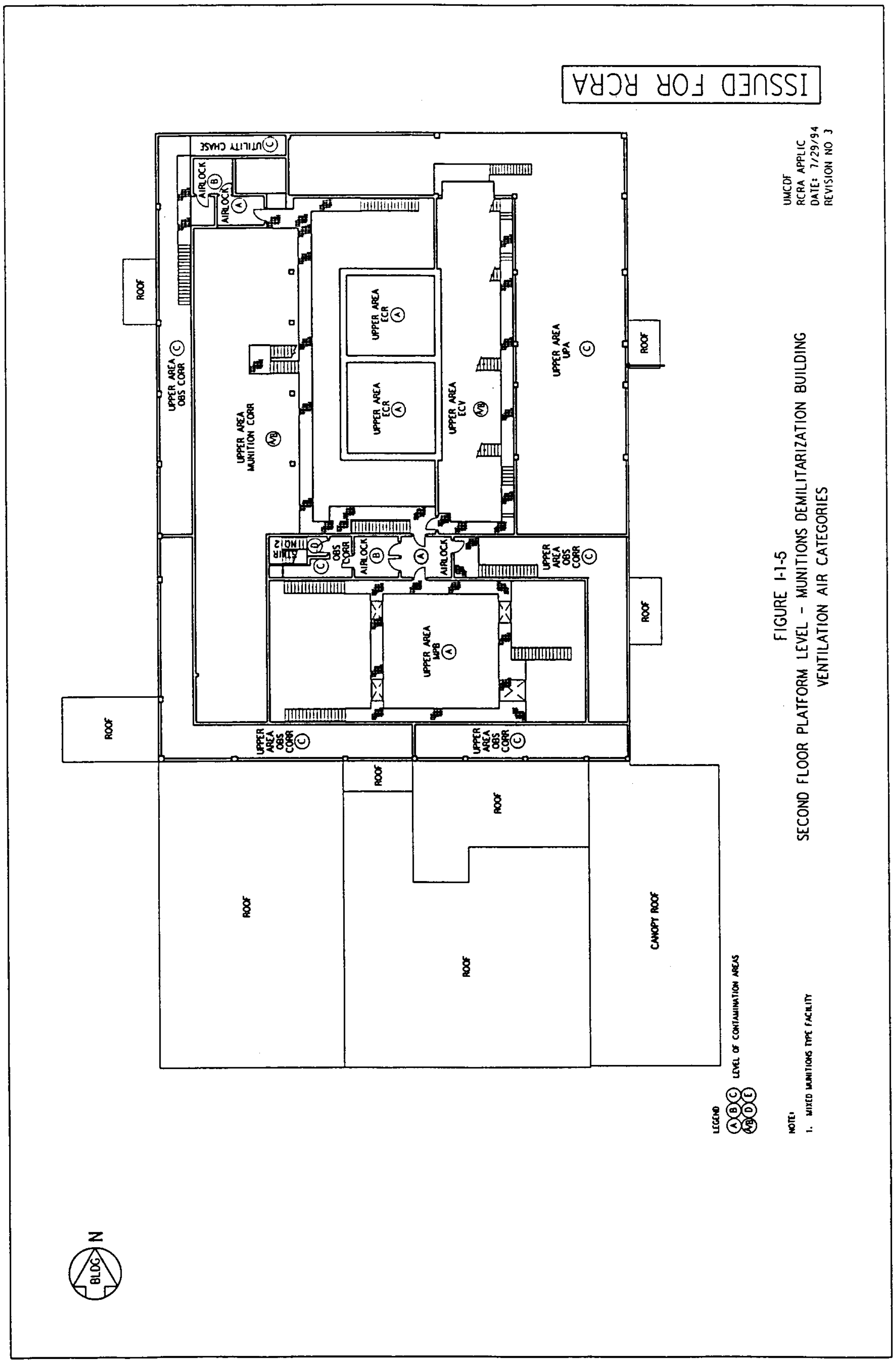

Figure I-1-5 Second Floor Platform Level – Munitions Demilitarization Building Ventilation Air Categories

1
2 **Figure I-1-6: J-Block Closure Process Flow Diagram**

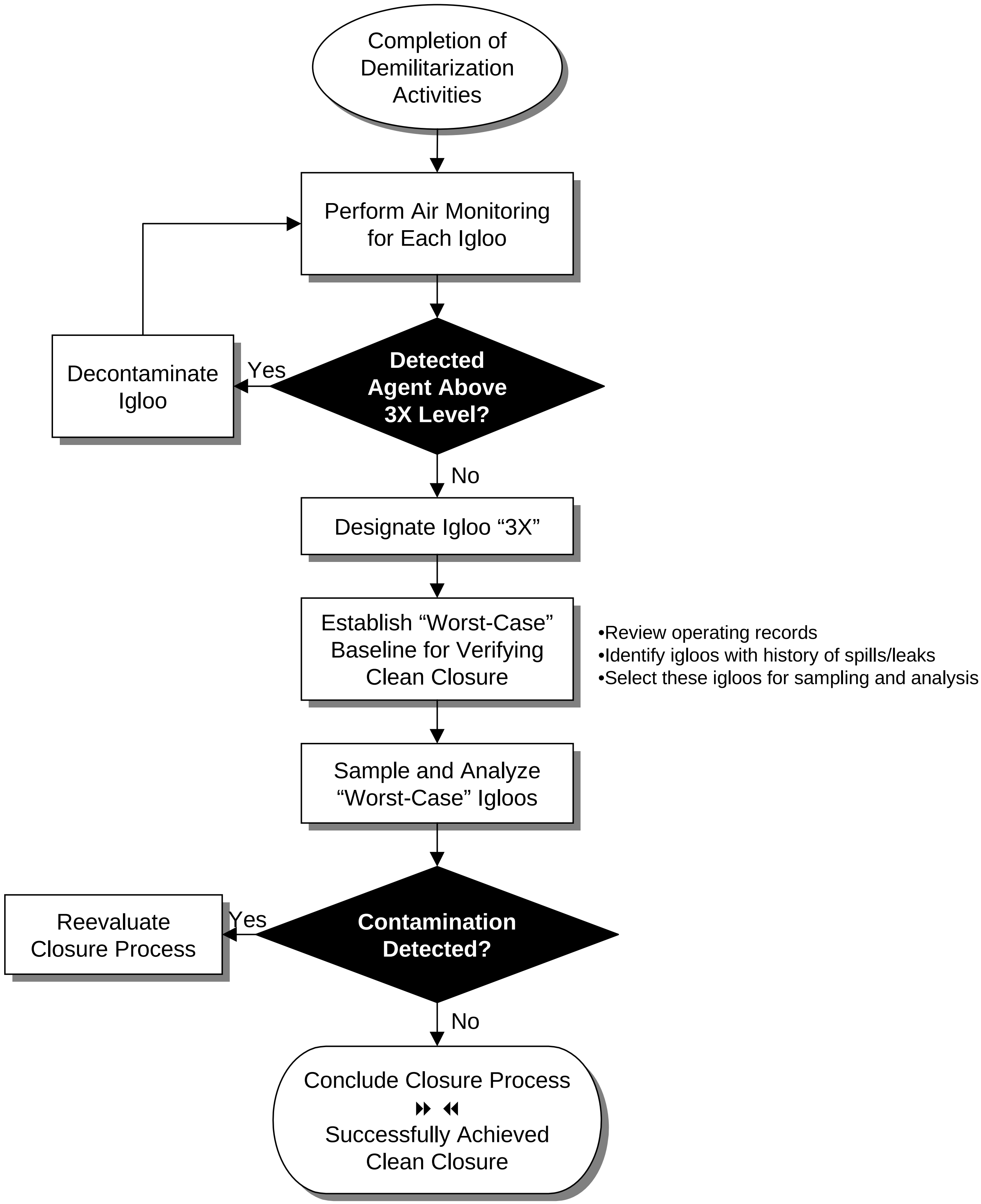

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Table I-1-1 UMCDF Facility Closure Summary

Facility or Unit	Description of Closure Activity Following Removal From Service
Preclosure Activities Following Final Chemical Agent Processing Campaign	
Initial decontamination (3X)[a]	Initial decontamination (3X)[a] and certification of all areas as would be done during routine shutdown or during changes in chemical agent, bulk items, or munitions type demilitarization processing.
Closure of RCRA-Regulated Hazardous Waste Management Units	
Depressurization Glove Box Miscellaneous Unit	The Depressurization Glove Box miscellaneous unit will close following final treatment of pressurized HD ton containers. Initial decontamination (3X) and disassembly of glove box and appurtenant equipment, then final decontamination cleaning. The exhaust filter units will be disassembled following closure of the Depressurization Glove Box.
Container Handling Building	All waste munitions and bulk items will be completely processed prior to commencement of closure. The structure will be decontaminated to 3X[a] level. The structure will remain intact following closure. Decontamination solution will be incinerated in the Liquid Incinerators.
J-Block Igloos	All waste will be completely processed prior to commencement of closure. The structure will be decontaminated to 3X[a] level and will also be evaluated for possible hazardous waste contamination other than chemical agent. The structure will remain intact following closure. Decontamination solution will be incinerated in the Liquid Incinerators.
Agent Collection Tank System, Spent Decontamination Holding Tank System and Spill Tank System	Agent tank systems will be emptied prior to commencement of closure. One of the two spent decontamination holding tanks will be emptied and removed from service, while the second will remain in service until the Liquid Incinerators are closed. Tank systems will be initially decontaminated (3X)[a] and disassembled, followed by final decontamination (5X)[a] in the Metal Parts Furnace or mobile incinerator[b,d,e] of all tank system components except those portions associated with the structure of the Munitions Demilitarization Building (i.e., concrete). The Spill Tank System will be emptied and removed from service after one spent decontamination holding tank is emptied and

Table I-1-1 UMCDF Facility Closure Summary

Facility or Unit	Description of Closure Activity Following Removal From Service
	removed from service.
Deactivation Furnace System (feed chute, rotary retort, cyclone, heated discharge conveyor, and afterburner	Initial decontamination (3X)[a] and incinerator disassembly will be followed by final decontamination (5X)[a] of disassembled parts[c] in the Metal Parts Furnace or mobile incinerator.[b,d,e]
Metal Parts Furnace (feed conveyor, burnout chamber, and afterburner)	Initial decontamination (3X)[a] and incinerator disassembly will be followed by final decontamination (5X)[a] of disassembled parts[c] in the mobile incinerator.[b,d,e]
Two Liquid Incinerators (two primary chambers, two secondary chambers, and the second spent decontamination holding tank)	Initial decontamination (3X)[a] and incinerator and tank system disassembly will be followed by final decontamination (5X)[a] of disassembled parts[c] in the mobile incinerator.[b,d,e]
Brine Reduction Area (brine surge tanks, evaporator packages, and drum dryers)	The Brine Reduction Area will close following final processing of materials through the Liquid Incinerators. If the mobile incinerator is connected to the Brine Reduction Area, then Brine Reduction Area closure will occur following the end of mobile incineration.[b,d,e] Removal of brine salts and residues to container storage; disassembly of tanks, evaporator packages, drum dryers, and appurtenant equipment; then final decontamination cleaning.
Brine Reduction Area (brine surge tanks, evaporator packages, and drum dryers) (continued)	Collection containers of brine salts will be transferred to the UMCDF Residue Handling Area for eventual shipment offsite to an approved hazardous waste treatment, storage, or disposal facility. Decontamination wastes generated during cleaning of equipment will be disposed of at an approved offsite hazardous waste treatment, storage, or disposal facility.
Mobile Incinerator(s)[b,d,e]	Closure of the mobile incinerator(s) is not included in this closure plan since this unit must obtain a separate and independent RCRA operating permit, and must comply with Oregon Administrative Rules, Chapter 340, Division 120 Siting Requirements.
Incinerator Pollution Abatement Systems	Disassembly of each incinerator pollution abatement system will be concurrent with the closure of the corresponding

Table I-1-1 UMCDF Facility Closure Summary

Facility or Unit	Description of Closure Activity Following Removal From Service
	incinerator. Decontamination will be by nonthermal methods (e.g., grit blast or hydroblast and high-pressure general decontamination solution wash).
Brine Reduction Area Pollution Abatement System	Disassembly of the Brine Reduction Area pollution abatement system will be concurrent with closure of the Brine Reduction Area. Decontamination will be by nonthermal methods (e.g., grit blast or hydroblast and high-pressure general decontamination solution wash).
Residue Handling Area and Spent Filter Media Storage Area (container storage areas for brine salts, incinerator ash and residues, baghouse and cyclone residues, and spent filter media)	All containerized wastes from the Residue Handling Area will be shipped directly to an approved offsite hazardous waste treatment, storage, or disposal facility during closure of incineration system units and Brine Reduction Area. All spent filter media from demilitarization operations from the Spent Filter Media Storage Area will have been incinerated prior to the commencement of closure activities. Following removal of final shipment of containerized waste, the Residue Handling Area and Spent Filter Media Storage Area will be closed by decontamination (nonthermal cleaning methods). Decontamination solution will be incinerated in the Liquid Incinerators or mobile incinerator.[b,d,e]
LAB Chemical Waste Storage Tank System and the Liquid Waste Holding Tank System	Will follow same general decontamination and disassembly procedures as tank systems located in the Munitions Demilitarization Building for (3X)[a] and (5X)[a] decontamination. Disassembled parts[c] will be treated in the Metal Parts Furnace, or mobile incinerator.[b,d,e] Closure of the Laboratory Waste Tank System and the Liquid Waste Holding Tank System will be coordinated with decommissioning of the Laboratory.

Table I-1-1 UMCDF Facility Closure Summary

Facility or Unit	**Description of Closure Activity Following Removal From Service**
Other Facilities Disassembly of Process Equipment Located in Category A, A/B, and B Areas (including demilitarization machines, conveyors, and other miscellaneous equipment)	Upon final processing of munitions through the UMCDF, the Munitions Demilitarization Building and all associated facilities and equipment will be initially decontaminated (3X)[a] according to routine operating procedures that are performed during a change in chemical agent or munitions demilitarization processing. All demilitarization process-related equipment (such as the Rocket Drain Station, Rocket Shear Station, Bulk Drain Station, and other mechanical demilitarization equipment), and associated conveyors and support equipment will be disassembled. Disassembled parts[c] will be decontaminated (5X)[a] in the Metal Parts Furnace, or mobile incinerator.[b,d,e]
Munitions Demilitarization Building	Upon final processing of munitions through the UMCDF, the Munitions Demilitarization Building and all associated equipment will be initially decontaminated (3X)[a] according to routine operating procedures that are performed during a change in chemical agent, bulk items, or munitions demilitarization processing. Following initial decontamination, equipment removal will commence as noted above for individual hazardous waste management units and demilitarization process equipment. Following all equipment removal and closure of all RCRA-regulated tank systems and incineration equipment housed in the building, the Munitions Demilitarization Building will be finally decontaminated to a 3X[a] level and will be monitored for chemical agent for a minimum of 3 months as the final closure activity. Epoxy floor coating systems in Category A, A/B, and B process areas will be sampled for presence of agent. If contaminated, coating system will be removed by grit-blast techniques before the final (3X)[a] decontamination step. Decontamination solution from initial decontamination will be incinerated in the Liquid Incinerators (normal practice). Any decontamination solution produced after the Liquid Incinerators are decommissioned will be incinerated in the mobile incinerator.[b,d,e]

Table I-1-1 UMCDF Facility Closure Summary

Facility or Unit	Description of Closure Activity Following Removal From Service
Munitions Demilitarization Building Ventilation System	Following shutdown and closure of the Liquid Incinerators, the Munitions Demilitarization Building Ventilation System will be removed from service. Spent carbon and filters will be heat-treated in the mobile incinerator[b,d,e] depending on the schedule for decommissioning the incinerators. The remainder of the ventilation system will be initially decontaminated (3X)[a] and disassembled. Following disassembly, the parts[c] will be finally decontaminated (5X)[a] in the mobile incinerator.[b,d,e]
Laboratory Building Ventilation System	Will follow the same general closure procedures in chemical agent-contaminated areas as for the Munitions Demilitarization Building and its ventilation system. Closure of this area will occur prior to shutdown of the mobile incinerator.[b,d,e]

NOTES:
[a] See Section I-1e for description of decontamination procedures.
[b] Operational specifications of the mobile incinerator are not discussed in this application; the RCRA operating permit for the mobile incinerator will be separate from, and independent of, this application. If a mobile incinerator is not permitted and available for use at the UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.
[c] Following 5X decontamination procedures, saleable scrap metal may be released from government custody.
[d] Disassembled equipment larger than 4 feet by 4 feet will be thermally treated (i.e., 5X decontamination) in the mobile incinerator.
[e] If the mobile incinerator is permitted and used, the mobile incinerator may be fitted during closure to use the pollution abatement system and/or Brine Reduction Area System during its operation.

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Table I-1-2 MAXIMUM WASTE INVENTORY[a]

Hazardous Waste Management Unit	Waste	Volume	Unit
Container Handling Building	Mustard agent (H)	15,405 gallons (96 ton containers)	Ton containers
Agent Collection Tank System (660-gallon, 1,309-gallon, 2300-gallon holding tanks, and ancillary equipment[b])	Chemical agents GB, VX, Mustard (HD)	4,469 gallons	N/A
Brine Surge Tank System (four tanks @ 47,000 gallons each and ancillary equipment[b])	Brine	206,800 gallons	N/A
Brine Reduction Area Evaporator Packages and Drum Dryers (two evaporators @ 1,060 gallons each, three double drum dryers @ 325 gallons each, two heat exchangers @ 1,000 gallons each, and ancillary equipment[c])	Brine	5,605 gallons	N/A
Spent Decontamination Holding Tank System (two holding tanks @ 2,300 gallons each, Spill Tank System [two tanks @ 1,300 gallons each],and ancillary equipment[c]: 1 sump @ 500 gallons; 33 sumps @ 89 gallons, 53 sumps @ 85 gallons, and pumps and piping)[d]	Decontamination solution for holding tanks and spill tanks or agent for spill tanks if used	18,522 gallons	N/A

Table I-1-2 MAXIMUM WASTE INVENTORY[a]

Hazardous Waste Management Unit	Waste	Volume	Unit
Other wastes onsite but not in a permitted hazardous waste management unit:			
Residue Handling Area (includes salt storage, incinerator ash, and cyclone/baghouse residues)	Containerized brine salt; ash; and cyclone and baghouse residues	39,880 gallons	N/A
LAB Chemical Waste Storage Tank System (one 1,600-gallon tank and ancillary equipment[b])	Laboratory Wastes	1,760 gallons	N/A
Spent Filter Media Storage Area	Spent filter media	5,453 gallons	N/A
Liquid Waste Holding Tank System (one 595-gallon tank and ancillary equipment[b])	Decontamination solution	655 gallons	N/A
J-Block Storage Igloos	Secondary waste from UMCDF operations	1,263,240 gallons	N/A
MDB Containment Building	Munitions and bulk containers	36.8 cubic yards	N/A

NOTES:

[a] The maximum waste inventory is based on the quantity of waste that may be on site during the maximum extent of operation of the Chemical Stockpile Disposal Program facility. These estimates are not reflective of wastes that will be onsite when closure is commenced. As mandated by Public Law 99-415, all chemical agents and agent-contaminated munitions must be completely processed through the facility prior to closure.

[b] Volume of ancillary equipment (piping, sumps, trenches, etc.) is assumed to be 10 percent of tank vessel capacity.

[c] Volume of pumps and piping estimated to be 20 percent of total waste management unit volume.

N/A = Not applicable

Table I-1-3 FACILITY CLOSURE SEQUENCE

Closure Sequence[a]	Hazardous Waste Management Unit	Other Closure Activity Underway Nonhazardous Waste Management Units	Estimated Time to Complete Closure or Activity
1	Closure of Container Handling Building (3X), J-Block Igloos (3X), and Closure of Agent Collection Tank System (5X)	Disassembly and decontamination (5X) of processing equipment (e.g., Rocket Drain Station, Rocket Shear Station, Bulk Drain Station, mechanical demilitarization equipment, conveyors, etc.).	4 months (includes post decontamination chemical agent monitoring of holding areas)
	Partial Closure Spent Decontamination Holding Tank System (5X)	Disassemble and decontaminate (5X) all but one spent decontamination holding tank.	
2	Closure of Spill Tank System	Disassemble and decontaminate (5X)	2 months
3	Closure of Deactivation Furnace System (5X) (feed chute, rotary retort, heated discharge conveyor, cyclone, and afterburner)	Disassembly of Deactivation Furnace System pollution abatement system. Decontamination will be by nonthermal methods (e.g., grit blast or hydroblast and high pressure general decontamination solution wash).	2 months

Table I-1-3 FACILITY CLOSURE SEQUENCE

Closure Sequence[a]	Hazardous Waste Management Unit	Other Closure Activity Underway Nonhazardous Waste Management Units	Estimated Time to Complete Closure or Activity
4	Closure of Metal Parts Furnace (5X) (conveyor, burnout chamber, and afterburner)	Disassembly of Metal Parts Furnace pollution abatement system. Decontamination will be by nonthermal methods (e.g., grit blast or hydroblast and high pressure general decontamination solution wash).	2 months
5	Closure of Liquid Incinerators (5X) (primary and secondary chambers)	Disassembly of Liquid Incinerators pollution abatement system. Decontamination will be by nonthermal methods (e.g., grit blast or hydroblast and high pressure general decontamination solution wash).	1.5 months
6	Closure of Depressurization Glove Box miscellaneous unit (glove box, appurtenant equipment, and exhaust filter units)	Disassembly and decontamination of the glove box and appurtenant equipment and disassembly of glove box exhaust filter units.	1 month
	Final Closure of Spent Decontamination Holding Tank System	Disassembly and decontamination (5X) of the third spent decontamination holding tank.	
		Final decontamination of Munitions Demilitarization Building (3X).	
		Deactivation and removal of Munitions Demilitarization Building ventilation system.	

Table I-1-3 FACILITY CLOSURE SEQUENCE

Closure Sequence[a]	Hazardous Waste Management Unit	Other Closure Activity Underway Nonhazardous Waste Management Units	Estimated Time to Complete Closure or Activity
7	Closure of Brine Reduction Area (brine surge tanks, evaporator packages, drum dryers)	Removal of final containerized waste from closure operations. Disassembly of Brine Reduction Area pollution abatement system. Decontamination will be by nonthermal methods (e.g., grit blast or hydroblast and high pressure general decontamination solution wash).	1 month
8	Closure of Mobile Incinerator and Removal from UMCDF (not part of this RCRA permit application)	--	
9	Completion of Chemical Agent Monitoring Programs	--	3 months
10	Closure of LAB Chemical Waste Storage Tank System and the Liquid Waste Holding Tank System	Completion of chemical agent monitoring activities and removal of all residuals from the UMCDF.	2 months
11	Certification of Closure		Periodic inspections during closure activities.

NOTE:

[a] Closure sequence may vary slightly, depending on conditions during closure.

Table I-1-4 Solutions for Chemical Agent Decontamination

Process	Type of Chemical Agent Most Recently Handled: GB	VX	Mustard
Decontamination Solution	Aqueous NaOH Solution	Aqueous NaOH* Solution	Aqueous NaOH* Solution
Flushing Solution	Process or Fresh Water	Process or Fresh Water	Process or Fresh Water
General Purpose Decontamination Solution; used for equipment and metallic surfaces (not for chemical agent decontamination)	Trisodium phosphate (TSP) wash (1 pound of TSP per 10 gallons of water). Rinse with copious quantities of process or fresh water.		
Heavy Duty Cleaning Solution[a]; for nonmetal surfaces (e.g., concrete) and equipment with prolonged contact with inorganic (i.e., metals) contaminants (not for chemical agent decontamination)	Tetrasodium ethylenediamine tetraacetate (1 to 2 percent), sodium tripolyphosphate 3 percent), TSP (anhydrous) (1 to 3 percent), water (balance). Rinse with copious quantities of process or fresh water.		

*Other U.S. Army-approved decontamination solutions may be used.

NOTE:

[a] The heavy duty cleaning solution may be diluted with water in ratios of up to 1:10, and is suitable for use in high pressure sprayer systems. Tetrasodium ethylenediamine tetraacetate is a chelating agent, which dissolves transition metal compounds, including those of lead, nickel, copper, and mercury, making them susceptible to removal from contaminated equipment. The sodium tripolyphosphate and trisodium phosphate help prevent precipitation of hardness (calcium and magnesium) from the alkaline solution and buffer the solution in the alkaline region.

Table I-1-5 Tank Summary Table

Tank Designation	Total Tank Use	Working Capacity (Gallons)	Total Capacity (Gallons)
ACS-TANK-101	Agent Holding Tank	396	660
ACS-TANK-102	Agent Holding Tank	833	1,309
ACS-TANK-108	Agent Holding Tank	1,851	2,300
SDS-TANK-101	Spent Decontamination Holding Tank	1,855	2,300
SDS-TANK-102	Spent Decontamination Holding Tank	1,855	2,300
ACS-TANK-401A	Spill Tank System	1,130	1,300
ACS-TANK-401B	Spill Tank System	1,130	1,300
BRA-TANK-101	Brine Surge Tank	40,000	47,000
BRA-TANK-102	Brine Surge Tank	40,000	47,000
BRA-TANK-201	Brine Surge Tank	40,000	47,000
BRA-TANK-202	Brine Surge Tank	40,000	47,000
LAB-TANK-101[a]	LAB Chemical Waste Storage Tank	1,000	1,600
PMB-TANK-101[a]	Liquid Waste Holding Tank System	500	595

NOTES:

[a]These tanks are less than 90 day storage and therefore will not be permitted.

Table I-1-6 Reserved

Table I-1-7 SUMPS USED AS PRIMARY CONTAINMENT DEVICES[1]

Area	Floor[2]	Room	Sump Tag No.	Sump No.[3]	Location (Building Column Lines)	Sump Size (gal.)	Air Category	Comments	Purpose
MDB	1	TMA	MDB-SUMP-135	1	L-3	89	A		SDS Collection
MDB	1	TMA	MDB-SUMP-154	2	L-6	89	A		SDS Collection
MDB	1	Decon Area	MDB-SUMP-153	3	P-5	89	A/B		SDS Collection
MDB	1	Munitions Corridor	MDB-SUMP-184	4	Q-6	89	A/B		SDS Collection
MDB	1	Munitions Corridor	MDB-SUMP-179	5	M-6	89	A/B		SDS Collection
MDB	1	BSA	MDB-SUMP-190	6	M-9	89	A		SDS Collection
MDB	1	BSA	MDB-SUMP-164	7	M-11	89	A		SDS Collection
MDB	1	Munitions Corridor Airlock	MDB-SUMP-134	8	T-6	89	A		SDS Collection
MDB	1P	TMA Airlock	MDB-SUMP-125	9	L-5	89	A		SDS Collection
MDB	2	ECV	MDB-SUMP-110	10	B-10	89	A/B		SDS Collection
MDB	2	ECV	MDB-SUMP-109	11	D-10	89	A/B		SDS Collection
MDB	2	ECV	MDB-SUMP-108	12	J-10	89	A/B		SDS Collection
MDB	2	ECR	MDB-SUMP-107	13	C-6	89	A	with trench	SDS Collection
MDB	2	ECR	MDB-SUMP-106	14	H-6	89	A	with trench	SDS Collection
MDB	2	Munitions Corridor	MDB-SUMP-116	15	B.1-3	89	A/B		SDS Collection
MDB	2	Munitions Corridor	MDB-SUMP-115	16	D-3	89	A/B		SDS Collection
MDB	2	Munitions Corridor	MDB-SUMP-114	17	H-3	89	A/B		SDS Collection
MDB	2	Munitions Corridor	MDB-SUMP-113	18	M-3	89	A/B		SDS Collection
MDB	2	Munitions Corridor	MDB-SUMP-117	19	N-3	89	A/B		SDS Collection
MDB	2	Munitions Corridor	MDB-SUMP-174	20	D-6	89	A/B		SDS Collection
MDB	2	Munitions Corridor	MDB-SUMP-169	21	H-6	89	A/B		SDS Collection
MDB	2	Munitions Corridor	MDB-SUMP-112	22	B-7	89	A/B		SDS Collection
MDB	2	Munitions Corridor	MDB-SUMP-189	23	K-7	89	A/B		SDS Collection
MDB	2	Munitions Corridor	MDB-SUMP-118	24	B-5	89	A/B		SDS Collection
MDB	2	MPB	MDB-SUMP-149	25	L-6	89	A	with trench	SDS Collection

Table I-1-7 SUMPS USED AS PRIMARY CONTAINMENT DEVICES[1]

Area	Floor[2]	Room	Sump Tag No.	Sump No.[3]	Location (Building Column Lines)	Sump Size (gal.)	Air Category	Comments	Purpose
MDB	2	MPB	MDB-SUMP-168	26	N-6	89	A		SDS Collection
MDB	2	MPB	MDB-SUMP-148	27	L-8	89	A		SDS Collection
MDB	2	MPB	MDB-SUMP-146	28	N-8	89	A	with trench	SDS Collection
MDB	2	MPB	MDB-SUMP-175	29	M-11	89	A		SDS Collection
MDB	2	MPB	MDB-SUMP-147	30	L-11	89	A	with trench	SDS Collection
MDB	2	MPB	MDB-SUMP-145	31	N-11	89	A		SDS Collection
MDB	2P	Munitions Corridor Airlock	MDB-SUMP-124	32	B.1-4	89	A		SDS Collection
MDB	2P	MPB Airlock	MDB-SUMP-126	33	L-8	89	A		SDS Collection

NOTES:

[1] The maximum allowable liquid height is 3.0 inches. This is the maximum level at which the low-level alarm shows on the Control Room advisor screen, and prompts the Control Room operator to energize the sump pump. When the alarm clears, the Programmable Logic Controller will automatically turn off the sump pump.

[2] Indicates sump number for use wFigures D-4-1, D-4-2, D-4-3, and D-4-4.

[3] ”P” indicates located on platform level.

BSA =Buffer Storage Area
Decon =Decontamination
ECR =Explosive Containment Room
ECV =Explosive Containment Vestibule
MDB =Munitions Demilitarization Building
MPB =Munitions Processing Bay
TMA =Toxic Maintenance Area

Table I-1-8 NONPERMITTED SUMPS WITH SECONDARY DESIGN IN THE MUNITIONS DEMILITARIZATION BUILDING

Area	Room	Sump Tag No.	Sump Number	Location (Building Column Lines)	Sump Size (gal.)	Air Category	Comments	Purpose
1	Control Room	-	39	U-2	85	E		Water collection sump
1	Drop Area	MDB-SUMP-159	40	S-8	85	B		SDS Collection
1	MPF Monitor Room	MDB-SUMP-130	41	P-11	85	C		SDS Collection
1	OBS Corridor	MDB-SUMP-143	43	Q-3	85	C		SDS Collection
1	OBS Corridor	MDB-SUMP-122	44	T-6	85	C		SDS Collection
1	Munition Corridor Airlock	MDB-SUMP-185	45	V-6	85	C		SDS Collection
1	LIC Monitor Room	MDB-SUMP-181	46	W-9	85	C		SDS Collection
1	Secondary LIC	MDB-SUMP-144	47	W-12	85	C		SDS Collection
1	Primary LIC	MDB-SUMP-157	48	U-9	85	A/B		SDS Collection
1	LIC Monitor Room	MDB-SUMP-158	49	S-11	85	C		SDS Collection
1	Secondary LIC	MDB-SUMP-156	50	S-12	85	C		SDS Collection
1	Primary LIC	MDB-SUMP-188	51	S-9	85	A/B		SDS Collection
1	TAT	MDB-SUMP-128	52	B-4	85	C		Training
1	TAT Airlock	MDB-SUMP-129	53	A-5	85	C		Training
1	DFS Airlock	MDB-SUMP-161	54	H-9	85	B		SDS Collection
1	DFS	MDB-SUMP-163	55	G-11	85	B	with trench	SDS Collection
1	DFS Airlock	MDB-SUMP-132	56	K-10	85	C		SDS Collection
1	DFS Airlock	MDB-SUMP-162	57	E-14	85	C		SDS Collection
1	EHM	MDB-SUMP-166	58	H-14	85	B	with trench	SDS Collection
1	TMA Decon Airlock	MDB-SUMP-198	59	N-4	85	C		SDS Collection
1	OBS Corridor	MDB-SUMP-193	60	K-9	85	C		SDS Collection
1	OBS Corridor	MDB-SUMP-133	61	M-2	85	C		SDS Collection
1	TMA Monitor Room	MDB-SUMP-197	62	L-6	85	C		SDS Collection
1	OBS Corridor	MDB-SUMP-131	63	M-13	85	C		SDS Collection
1	MPF	MDB-SUMP-187	64	Q-7	85	B	with trench	SDS Collection
1	LIC Airlock	MDB-SUMP-180	65	T-7	85	A/B		SDS Collection
1	LIC Airlock	MDB-SUMP-160	66	U-6	85	B		SDS Collection
1	Munition Corridor Airlock	MDB-SUMP-194	67	P-8	85	B		SDS Collection
1P	OBS Corridor	MDB-SUMP-173	68	M-3	85	C		SDS Collection
1P	Monitor Room	MDB-SUMP-196	69	L-6	85	C		SDS Collection
1P	TMA Airlock	MDB-SUMP-182	70	L-4	85	B		SDS Collection
2	OBS Corridor	MDB-SUMP-136	71	C-2	85	C		SDS Collection
2	OBS Corridor	MDB-SUMP-137	72	G-2	85	C		SDS Collection
2	OBS Corridor	MDB-SUMP-138	73	M-2	85	C		SDS Collection
2	OBS Corridor	MDB-SUMP-139	74	P-4	85	C		SDS Collection
2	OBS Corridor	MDB-SUMP-140	75	N-6	85	C		SDS Collection
2	OBS Corridor	MDB-SUMP-141	76	O-10	85	C		SDS Collection
2	OBS Corridor	MDB-SUMP-167	77	M-13	85	C		SDS Collection

Table I-1-8 NONPERMITTED SUMPS WITH SECONDARY DESIGN IN THE MUNITIONS DEMILITARIZATION BUILDING

Area	Room	Sump Tag No.	Sump Number	Location (Building Column Lines)	Sump Size (gal.)	Air Category	Comments	Purpose
2	OBS Corridor	MDB-SUMP-142	78	L-10	85	C		SDS Collection
2P	MPB Airlock	MDB-SUMP-192	83	L-5	85	C		SDS Collection
2P	Airlock	MDB-SUMP-123	84	A-3	85	B		SDS Collection
2P	MPB Airlock	MDB-SUMP-127	85	L-7	85	B		SDS Collection
OUT	Lab Waste Receiving Area	-	86	W-8	85	OUT		SDS Collection
OUT	Emergency Exit	-	87	L-2	85	OUT		SDS Collection
OUT	Emergency Exit	-	88	T-2	85	OUT		SDS Collection
OUT	Emergency Exit	-	89	V.7-13	85	OUT		SDS Collection
OUT	Emergency Exit	-	90	N-14	85	OUT		SDS Collection
OUT	Emergency Exit	-	91	K-14	85	OUT		SDS Collection

NOTES:
Decon: Decontamination
OUT: Indicates outside.
P: Indicates located on platform level.

DFS = Deactivation Furnace System
EHM = Equipment Hydraulic Module
LIC = Liquid Incinerator
MPB = Munitions Processing Bay
MPF = Metal Parts Furnace
OBS = Observation
TMA = Toxic Maintenance Area

Table I-1-9 MUNITIONS DEMILITARIZATION BUILDING INCINERATOR CLOSURE SEQUENCE AND FATE

Sequence of Closure	Fate
MUNITIONS DEMILITARIZATION BUILDING	
1. Deactivation Furnace System	• Spent decontamination solutions to Liquid Incinerators • Disassembled parts to Metal Parts Furnace
2. Metal Parts Furnace	• All feed and disassembled parts to mobile incinerator[a] • Spent decontamination solutions to Liquid Incinerators
3. Liquid Incinerators	• Spent decontamination solution and disassembled parts to mobile incinerator[a]
MOBILE INCINERATOR[a]	• Remove from site

NOTE:
[a] If a mobile incinerator is required, it will be brought onsite prior to or at closure of the first incinerator unit closure. If a mobile incinerator is not permitted and available for use at the UMCDF closure, these wastes will be containerized and shipped offsite to an approved hazardous waste treatment, storage, or disposal facility.

I-2 POST-CLOSURE PLAN

[40 CFR 270.14(b)(13), 270.17(f), 270.18(h), 270.20(f), 270.21(e), 264.117, 264.118(a), 264.228(b) and (c), 264.280(c), 264.310(b); OAR 340-105-0014, 340-104-0001]

A post-closure plan is not required because hazardous wastes will not remain at the UMCDF after closure. However, if it is determined during closure that contamination has infiltrated the surrounding soil, surface water, or ground water and cannot be removed, a post-closure plan will be prepared and submitted to ODEQ and EPA.

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I-3 NOTICES REQUIRED FOR DISPOSAL FACILITIES [40 CFR 264.119; OAR 340-104-0001]

This requirement applies only to property used as a hazardous waste disposal facility, and is therefore not applicable to this RCRA permit application.

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I-4 CLOSURE COST ESTIMATE

[40 CFR 270.14(b)(15), 264.142(a) and (b); OAR 340-105-0014, 340-104-0001]

A closure cost estimate is not required for this RCRA permit application. 40 CFR 264.140(c) [OAR 340-104-0001(2)] exempts the federal government from the financial requirements of Subpart H of 40 CFR 264.

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I-5 FINANCIAL ASSURANCE MECHANISM FOR CLOSURE
[40 CFR 270.14(b)(15), 264.143, 264.151; OAR 340-105-0014, 340-104-0001]

No financial assurance mechanism for the closure of UMCDF is required. 40 CFR 264.140(c) exempts the federal government from the financial requirements of Subpart H of 40 CFR 264.

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I-6 POST-CLOSURE COST ESTIMATE

[40 CFR 270.14(b)(16), 264.144; OAR 340-105-014, 340-104-001]

A post-closure cost estimate is not required for this RCRA permit application. The UMCDF will not need to perform post-closure activities because hazardous wastes or hazardous waste constituents will not remain at the UMCDF after closure.

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I-7 FINANCIAL ASSURANCE MECHANISM FOR POSTCLOSURE CARE
[40 CFR 270.14(b)(16), 264.145, 264.151; OAR 340-105-0014, 340-104-0001]

Postclosure financial assurance is not required for this RCRA permit application. The UMCDF will not need to perform post-closure activities because hazardous wastes or hazardous waste constituents will not remain at the UMCDF after closure. In addition, 40 CFR 264.140(c) exempts the federal government from the financial requirements of Subpart H of 40 CFR 264.

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I-8 LIABILITY REQUIREMENTS

[40 CFR 270.14(b)(17), 264.147(a) and (b); OAR 340-105-0014, 340-104-0001]

Liability insurance is not required for UMCDF because the federal government is exempt from this requirement in accordance with 40 CFR 264.140(c).

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I-9 STATE FINANCIAL MECHANISM

[40 CFR 270.14(b)(18); OAR 340-105-0014]

Proof of coverage by a state financial mechanism is not required for UMCDF because no financial assurance mechanism for the closure of UMCDF is required. 40 CFR 264.140(c) exempts the federal government from the financial requirements of Subpart H of 40 CFR 264.

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ATTACHMENT I-1

FACILITY CHEMICAL AGENT EXPOSURE SUMMARY

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Attachment I-1 Facility Chemical Agent Exposure Summary

The UMCDF will be divided into areas or categories. These categories will be based on the anticipated type and degree of potential chemical agent contamination from normal UMCDF operations and are defined below:

Category A: Toxic process area under negative pressure, routine contamination with either chemical agent liquid or vapor; a high hazard area.

Category A/B: An A/B area meets all design criteria for an A area, but in typical service acts as a B area (i.e., only a vapor chemical agent hazard is present), but under some circumstances a liquid chemical agent hazard may be present; hence, the need for design to meet A area requirements.

Category B: Toxic process area under negative pressure, high probability of chemical agent vapor contamination resulting from routine operations; a high hazard area.

Category C: Work area under negative pressure and subject to inadvertent vapor contamination; a negligible hazard area.

Category D: Work area under ambient pressure that will not be subject to contamination; a negligible hazard area. These areas will be adjacent to or open to the out-of-doors.

Category E: Work area under positive pressure that will not be subject to contamination; a negligible hazard area.

The appropriate levels of personal protective equipment will be based on these potential contamination areas, with Category A being the most severe.

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ATTACHMENT I-2

PROTECTIVE CLOTHING REQUIREMENTS BY AREA AND FUNCTION

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Attachment I-2 Protective Clothing Requirements by Area and Function

1. General

Protective clothing levels and equipment are specified both here and in the appropriate Standing Operating Procedures at each work station. The contents of this section should be taken as a guide, with any specific Standing Operating Procedures instruction taking precedence. The levels noted below are Army-established levels and not Occupational Safety and Health Administration level designations.

2. Requirements by Area and Function

a. Control Room, normal operations
Operators: Level F
Maintenance: Level E
Supervisors: Level F
Transients: Level F

b. Container Handling Building, Loading Dock and Elevator, normal operations
Operators: Level E with work gloves
Supervisors: Level F
Transients: Level F

c. Unpack Area, normal operations
Operators: Level E
Operators handling munitions: Level D with butyl gloves and boots
Supervisors: Level F
Transients: Level F

d. Observation Corridors, normal operations
Operators: Level E
Supervisors: Level F
Transients: Level F

e. Power and Mechanical Equipment Rooms, normal operations
Operators: Level E
Supervisors: Level F
Transients: Level F

f. Residue Handling Area, normal operations
Operators: Level E with work gloves
Supervisors: Level F
Transients: Level F

g. Central Decontamination Supply Room
Operators: Level E
Supervisors: Level F

h. Pollution Abatement System, normal operations
Operators: Level E
Supervisors: Level F
Transients: Level F

i. Toxic Maintenance Area, maintenance operations
All Personnel, Category A area:
Demilitarization Protective Ensemble
All Personnel, Category B area:
Level B (prior to monitoring)
Level C (if high-level monitor clears area)
Level D for other maintenance
Transients/Supervisors, Category C area:
Level F (unless heating or disassembly in progress, then same as operators)

j. Equipment/Hydraulic Module Room, maintenance operations
All Personnel:
Level A (before and during monitoring)
Level C (if high-level monitor clears area)

k. Incinerator Rooms, maintenance operations
Note: The Deactivation Furnace System Explosive Containment Room is not entered while processing of munitions is in progress. Other incinerator rooms may be entered when munitions or bulk items are being processed and when the temperature is less than 120°F. Duration of stay will be dependent upon room temperature, according to the time periods listed in draft Army Regulation AR 385-61, Army Toxic Chemical Agent Safety Program.
All Personnel:
Level A (prior to monitoring, or if chemical agent is being processed)
Level C (if high-level monitor clears area, and only if chemical agent is not being processed)

l. First Floor Munitions Corridor, maintenance operations
All Personnel:
Demilitarization Protective Ensemble

m. First Floor Buffer Storage Area, maintenance operations
All Personnel:
Demilitarization Protective Ensemble

n. Toxic Storage Room, maintenance operations

All Personnel:
Demilitarization Protective Ensemble

o. Emergency Equipment Area, maintenance operations
All Personnel:
Demilitarization Protective Ensemble

p. Second Floor Munitions Corridor, maintenance operations
All Personnel:
Level A except when processing leakers
Demilitarization Protective Ensemble when processing leakers

q. Munitions Processing Bay, maintenance operations
All Personnel:
Demilitarization Protective Ensemble

r. Explosive Containment Room Vestibule, maintenance operations
All Personnel:
Level A except when processing leakers
Demilitarization Protective Ensemble when processing leakers

s. Explosive Containment Rooms, maintenance operations
Note: The Explosive Containment Room will be entered only when the processing equipment has been shut down for maintenance. If a munition is in the room, it will be cleared to the Explosive Containment Room Vestibule or the Deactivation Furnace System prior to proceeding with maintenance. Reject items (rounds that do not process normally with the equipment) will be drilled, punched, or sheared remotely, then drained and decontaminated by personnel in the Explosive Containment Room.
All Personnel:
Demilitarization Protective Ensemble

t. Laboratory, normal operations
Operators: Level E
Supervisors: Level F
Transients: Level F

u. Brine Reduction Area, normal operations
Operators: Level E
Supervisors: Level F
Transients: Level F

v. Brine Reduction Area or Baghouse, maintenance operations
All Personnel:

Dust Protective Clothing

w. Emergency Operations

Refer to the chemical agent, process equipment, and explosive emergency procedures in Section G-5, and maintenance safety procedures in Section G-6.2 for specified levels of protective clothing.

x. J-Block Storage, normal operations

Operators:	Level E
Supervisors:	Level F
Transients:	Level F

ATTACHMENT I-3

PROCEDURES FOR ESTABLISHING CLEAN-CLOSURE TARGET LEVELS

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Attachment I-3 Procedures for Establishing Clean-Closure Target Levels

INTRODUCTION

This attachment presents the procedure that will be used by the UMCDF to evaluate regulated waste management unit clean-closure target levels for soils, surface water, groundwater, and air.

The following procedure includes the identification of the intake assumptions for soil and water that will be used to establish proposed acceptable intake or exposure levels and the equations to be used to calculate health-risk based clean-closure target levels. The procedure is based on the following EPA guidance:

- Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Final Rule, Federal Register, March 19, 1987, 52 FR 8704.

- Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities; Clarification, Federal Register, March 28, 1988, 53 FR 9944.

- Interim Final RCRA Facility Investigation (RFI) Guidance, Volume I, U.S. EPA, Office of Solid Waste and Emergency Response (OSWER) Directive No. 9502.00-6C, May 1989, Section 8.

- Closure Requirements, U.S. EPA, OSWER Directive No. 9476.00-12, February 2, 1988.

- Interim Final Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites, U.S. EPA, OSWER Directive No. 9283.1-2, December 1988.

INTAKE ASSUMPTIONS

The intake assumptions that will be used to estimate the clean-closure target levels for soil, surface water, groundwater, and air are outlined below:

- For hazardous constituents that are known or suspected carcinogens, a soil ingestion rate of 0.1 gram/day for a 70-kilogram adult over a 70-year lifetime exposure period will be used.

- For systemic toxicants, a soil ingestion rate of 0.2 gram/day (0.0002 kilogram/day) for a 16-kilogram child over a 5-year exposure period (age 1 through 6) will be used.

- For surface water and groundwater, an ingestion rate of 2 liters/day for a 70-kilogram adult over a 70-year lifetime exposure period will be used.

- For air, an inhalation rate of 20 cubic meters of air per day for a 70-kilogram adult for a 70-year lifetime exposure period will be used.

PROPOSED ACCEPTABLE HEALTH RISK LEVELS

The proposed levels of acceptable risk will be taken from the following sources:

- Verified Reference Doses (RfDs) developed by EPA's Risk Assessment Forum will be used for noncarcinogenic systemic toxicants. The RfDs are daily intake levels at which no adverse effects are likely to occur over the specified chronic exposure period (EPA Integrated Risk Information System [IRIS] Database will be used to obtain the most recently updated RfDs.)

- Published Agency Carcinogenic Slope Factors (CSFs) developed by EPA's Carcinogenic Assessment Group will be used for known or suspected carcinogenic constituents. CSFs are a measure of the probability of a carcinogenic response per unit intake of a chemical over the exposure period. The CSF is the slope of the dose-response curve based on the linearized multistage model. Guidance provided by EPA at a site with no access restrictions suggests increased cancer risk for Class A and B carcinogens be set at a 10^{-6} risk level. For Class C carcinogens, the suggested risk level is 10^{-5}. (The EPA IRIS Database will be used to obtain the most up-to-date CSFs.)

The UMCDF will use these suggested risk levels in computing clean-closure target levels.

Health-risk information available to the UMCDF at the time of closure will be tabulated by the certifying independent engineer for submission to the ODEQ.

CLEAN-CLOSURE TARGET LEVEL EQUATIONS

The equations to be used for calculating individual constituent health-risk based clean-closure target levels have been adapted from EPA guidelines noted previously. The equations are provided below:

Systemic Toxicants

$$CCT_{ST} = RfD * (W / I)$$

Where,

CCT_{ST} = Clean-closure target for systemic toxicants (mg/kilogram for soils, mg/L for water, ug/m^3 for air)

RfD = Published reference doses (mg/kilogram-day)

W = Assumed body weight (kilogram)

I = Intake assumption (kilogram/day for soil, L/day for water)

Carcinogens

$$CCT_C = (R / CSF) * (W / I)$$

Where,

CCT_C = Clean-closure target level for carcinogens (mg/kilogram for soils, mg/L for water, ug/m^3 for air)

R = Assumed risk factor (dimensionless, 10^{-6} for Class A and B, 10^{-5} for Class C)

CSF = Published carcinogenic slope factor (mg/kilogram-day)$^{-1}$

W = Assumed body weight (kilogram)

I = Intake assumption (kilogram/day for soil, L/day for water)

EVALUATION OF CONSTITUENT MIXTURES

The guidelines for the health risk assessment of chemical mixtures (51 FR 34014, September 24, 1986) and the Interim Final RFI Guidance describes an approach that can be used in evaluating the cumulative chronic effects of exposure to a chemical mixture. Using these guidelines, additive effects for carcinogens and systemic toxicants can be assumed, although their additive mechanisms must be evaluated separately.

The overall mixture of constituent groups can then be evaluated through the use of a hazard index (HI) that will be generated for systemic toxicants and carcinogens, respectively.

Systemic Toxicants

$$HI_{ST} = \sum_{i=1}^{n} \frac{E_i}{CCT_{ST(i)}}$$

Where,

HI_{ST} = Hazard index for systemic toxicants

E_i = Environmental concentration of the iTH constituent

$CCT_{ST(i)}$ = Calculated clean-closure target for the iTH systemic toxicant

n = Total number of detected systemic toxicants for which clean-closure targets have been estimated

Known or Suspected Carcinogens

$$HI_C = \sum_{i=1}^{n} \frac{E_i}{CCT_{C(i)}}$$

Where,

E_i = Exposure level of the iTH constituent

$CCT_{C(i)}$ = Calculated clean-closure target for the iTH carcinogen

n = Total number of detected carcinogens for which clean-closure targets have been estimated.

SITE CLEAN-CLOSURE PERFORMANCE STANDARD

For those constituents shown to exceed the computed background limits, the UMCDF will perform a clean-closure assessment using EPA-approved health-risk information. The clean-closure performance standard will be based on the following approach:

(1) Compute individual constituent soil clean-closure target (CCT_{soil}) levels for systemic toxicants and carcinogens. The CCT will be based on the soil ingestion model and intake assumptions given in Section 8 of the Interim Final RCRA Facility Investigation (RFI) Guidance (EPA, May 1989), and as described in this Attachment.

(2) The soil ingestion Hazard Index (HI_{soil}) will be computed for carcinogens and systemic toxicants, respectively, using the observed closure verification sample results (total values) and the CCTs from (1), above.

(3) If both HI_{soil}'s are less than 1.0, then clean-closure will be considered complete for soil. If either of the HI_{soil}'s are greater than or equal to 1.0, then proceed to step (10), below.

(4) Compute individual constituent surface water and groundwater clean-closure target (CCT_{water}) levels for systemic toxicants and carcinogens. The CCT will be based on the water ingestion model and intake assumptions given in Section 8 of the Interim Final RCRA Facility Investigation (RFI) Guidance (EPA, May 1989), and as described in this Attachment.

(5) The water ingestion Hazard Index (HI_{water}) will be computed for carcinogens and systemic toxicants using the observed closure verification sample results (synthetic leach test values, Method 1312) and the CCTs from step (4), above.

(6) If both HI_{water}'s are less than 1.0, then clean-closure will be considered complete for surface water and groundwater. If either HI_{water} is greater than or equal to 1.0, then proceed to step (10), below.

(7) Individual constituent air clean-closure target (CCT_{air}) levels will be computed for volatile organic systemic toxicants and carcinogens. The CCT will be based on the air inhalation model and intake assumptions given in Section 8 of the Interim Final RCRA Facility Investigation (RFI) Guidance (EPA, May 1989), and as described in this Attachment.

(8) Estimate air emission rates for volatile organics (VO) using the verification soil sample results from the individual sampling area(s). For the purposes of estimating emissions, the exposed soil will be assumed to be a waste pile. Short-term emission rates will be estimated by using the RTI land treatment model for open-landfills/waste piles presented in Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF) - Air Emission Models (EPA, EPA-450/3-87-026, December 1987). Information regarding this model is included with this Attachment. Emission rates will be computed using the computer model CHEMDAT6, available with the referenced documentation.

Health-risk exposure levels will be estimated using the CHEMDAT6 model computed 48-hour emission rate (g/cm^2-sec). For the purposes of closure, this value will be assumed to be the steady-state flux rate, at a time when general facility traffic could resume entry in the area following closure activities. The ambient mixing zone will be assumed to be 2 meters in height over the exposed soil surface area (nominal breathing zone). The wind velocity will be assumed to be 0.5 meter per second (1.1 miles per hour). With these assumptions a steady-state air concentration (gram per cubic centimeter) will be computed. These values will be used to compute Hazard Indexes for air.

(9) If both HI_{air}'s are less than 1.0, then clean-closure will be considered complete for air and complete for the area being closed. If either HI_{air} is greater than or equal to 1.0, then proceed to step (10), below.

(10) Contingent clean-closure alternatives will be considered, including soil removal or additional decontamination steps. If additional removal or decontamination efforts are completed, subsequent verification sampling and analysis will be completed only for those constituents leading to the initial failure of the clean-closure evaluation and for only the media/pathway that was in non-conformance with the closure performance standard. Return to step (2), above, following completion of additional closure steps.

SAMPLE CALCULATIONS FOR DETERMINING CLEAN-CLOSURE TARGET LEVELS

Governing Equations for Calculating Clean-Closure Levels

Systemic Toxicants

$$CCT_{ST} = RfD * (W / I)$$

Where,

CCT_{ST} = Clean-closure target level in medium (units are media-dependent)

RfD = Reference dose (mg/kg-day)

W = Body weight (kg)

I = Intake assumption (units are media-dependent)

Carcinogenic Constituents

$$CCT_{C} = (R / CSF) * (W / I)$$

Where,

CCT_C = Clean-closure target level in medium (units are media-dependent)

R = Assumed risk level (dimensionless) (10^{-6} for Class A & B; 10^{-5} for Class C carcinogens)

CSF = Carcinogenic slope factor $(mg/kg\text{-}day)^{-1}$

W = Body weight (kg)

LT = Assumed lifetime (years)

I = Intake assumption (units are media-dependent)

SAMPLE CALCULATIONS FOR HAZARDOUS CONSTITUENTS IN SOILS

Systemic Toxicants

Example calculations for pentachlorophenol:

CCT_{st} = [0.03 (mg/kg-day) * (16 (kg)/0.2(g/day)) * 1000 (g/kg)]
= 2,400 mg/kg

Where,

CCT_{st} = Clean-closure target level for pentachlorophenol in soil (mg/kg)

RfD = 0.03 mg/kg-day for pentachlorophenol

W = 16 kg (5-year-old child)

I = 0.2 g/day

Carcinogenic Constituents

Sample calculations for carbon tetrachloride:

CCT_c = [(10^{-6} /0.13 $(mg/kg\text{-}day)^{-1}$) * (70 (kg)/0.1 (g/day)) * 100 (g/kg)]

= 5.38 mg/kg

Where,

CCT_c = Clean-closure target level for carbon tetrachloride in soil (mg/kg)

R = 10^{-6} (carbon tetrachloride is a Class B carcinogen)

W = 70-kg (adult)

CSF = 0.13 $(mg/kg\text{-}day)^{-1}$

I = 0.1 g/day

The following discussion (14 pages) has been excerpted from EPA-450/3-87-026, December, 1987, Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF) - Air Emission Models. This describes how air emission rates for volatile organics will be estimated as a part of demonstrating clean closure of the Chemical Stockpile Disposal Program facility.

OPEN LANDFILLS AND WASTE PILES

Emission Model Equations

The RTI land treatment model (also known as the Allen model), is used to estimate the air emission rate of the constituent of interest from open active) landfills and waste piles. This model is based on the theory of diffusion out of an infinite flat slab and was intended originally for use in estimating emissions from land treatment operations. The intent of this section is to discuss use of the model with regard to the estimation of emissions from open landfills and waste piles; a detailed description of the model relevant to land treatment operations and the theoretical basis for the model will not be included here.

A land-treatment-type model was selected for estimating emissions from open landfills and waste piles because: (1) no adequate models exist for these sources, and (2) there are a number of similarities in physical characteristics of open landfills, waste piles, and land treatment operations. A previous EPA study dedicated to the evaluation of models for estimating emissions from hazardous waste TSDF identified only one model for open waste dumps such as landfills and waste piles--the open dump model. A serious limitation of the model for this application, however, is that it does not account for depletion of the volatilizing chemical from the waste surface. Hence, the open dump model is judged unsuitable for the estimation of emissions from landfills and waste piles over the time period of interest (months or longer).

The similarity in physical characteristics among open landfills, waste piles, and land treatment operations is apparent upon close examination. In all three, the waste liquid is ultimately mixed homogeneously with a "carrier" matrix (soil in the case of land treatment; dry fixative in the case of active landfills; and soil, fixative, or some other solid matrix in the case of waste piles). In all cases, the matrix is porous and permeable, allowing the diffusion of the constituent of interest through the matrix and into the air. Hence, in all cases, diffusion theory can be used to model the emission rate. The notable difference between land treatment operations and open landfills/waste piles is the presence of an additional mechanism affecting emissions in the case of land treatment--biological decay of the constituent. Because biodegradation is not thought to occur[1] in open landfills/waste piles, however, its effect is not accounted for in the modeling of air emissions.

The RTI land treatment model, which was selected for estimating emissions from open landfills and waste piles, has the following characteristics: a sound basis in scientific theory, limited validation against measured emissions from land treatment operations, and reasonably available input data. The model considers effects such as evaporation of the constituent of interest from interstitial surfaces of the carrier matrix and diffusion of material through air-filled pore spaces.

The equations necessary to apply the land treatment model to open landfills and waste piles are summarized in Table I-1. These equations can be used to estimate the fraction of the constituent emitted (F_t) and the instantaneous emission rate (E). It should be noted that the absence of biodegradation represents a special case that allows some simplification of several of the equations. (The absence of biomass implies that biomass concentration equals 0. Hence t_b, the time constant for biological decay, equals infinity. Consequently, the exponential term e^{-t/t_b} becomes unity.) Also, the absence of biodegradation implies that the fraction of the constituent emitted after a long time, F_a, would equal unity.

Because the land treatment model was derived originally for land treatment operations, model input parameters are not necessarily in the most convenient units and terminology for open landfills and waste piles. Hence, several points should be noted:

- Fixed waste is analogous (for modeling purposes) to the waste-laden soil in land treatment.

- M_o, the area-loading of the constituent in grams per square centimeter is geared toward land treatment operations. For open landfills and waste piles, it should be computed as indicated in Table I-1.

- No "tilling" is performed in open landfills or waste piles.

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[1] There is no evidence that there is significant biomass (necessary for biological decay) in any chemical waste landfill. It is assumed that the toxic property of the waste will inhibit biological processes.

- Waste liquid is "applied" or mixed with fixative only once. Hence, waste "reapplication" does not occur in open landfills and waste piles.

- The waste bed depth in open landfills and waste piles is analogous to the "depth to which waste is mixed" in land treatment.

The approach required to estimate emissions from open landfills or waste piles is as follows, based on equations in Table I-1:

1. Compute the loading of waste liquid (L) in the fixative or soil, using the known waste composition. (For two-phase aqueous organics or organic liquid wastes, L should be computed as grams of organic phase per cubic centimeter of solid material. For dilute aqueous waste liquids, L equals grams of aqueous liquid per cubic centimeter of solid material.)

2. Compute the effective diffusion coefficient (D_e).

3. Compute the partition coefficient (Keq).

4. Use the appropriate emission equation to compute the fraction of constituent emitted (F_t) and/or the instantaneous emission rate (E). For waste pile calculations, the time input to these equations should be no greater than the life of the waste pile (retention time).

The sensitivity of the land treatment model to some parameters differs in its application to open landfills and waste piles from that in land treatment operations because of the difference (in some cases) in the expected range of the parameters. In general, it can be stated that, for application to open landfills and waste piles, the model is sensitive to the air porosity of the solid waste, the liquid loading in the solid waste, the waste depth, the concentration of the constituent in the waste, and the volatility of the constituent under consideration. In contrast, the mode exhibits a relatively low sensitivity to the diffusion coefficient of the constituent in air.

The following major assumptions are associated with the RTI land treatment model and its application to open landfills and waste piles:

- The waste liquid is mixed uniformly with the carrier matrix (either fixative, soil, or some other granular solid material) before placement in an open landfill or waste pile.

- The liquid waste containing the constituent of interest is assumed to be bound in the waste after fixation and placement in the open landfill or waste pile.

- The waste liquid does not flow within the carrier matrix.

- The adsorption isotherm of the constituent of interest is linear within the depth of the waste and does not change with time.

- No bulk flow of gas is induced within the waste matrix.

- The diffusion coefficient does not vary with either concentration or time.

- The concentration of the constituent of interest in the gas phase at the surface of the open landfill/waste pile is much lower than the concentration of the constituent of interest in the gas phase within the waste matrix.

- No diffusion of the waste liquid into depths below the waste layer is assumed.

- Liquid-vapor equilibrium is established at all times within the waste matrix.

- For the case of fixed waste in the landfill or waste pile, the fixed waste mixture behaves as a soil with regard to diffusion of the constituent of interest.

- No biodegradation of the constituent of interest occurs in open landfills or waste piles.

Model Plant Parameters for Open Landfills and Waste piles

The characteristics of model facilities for open landfills and waste piles are discussed here. The model open landfill facility is used as the basis for an example calculation using the model.

Parameters for Open Landfills. The model facility for open landfills has a surface area of 1.42 x 10^8 x cm^2 (3.5 acres). This value represents an approximately midrange value from the Westat survey. A reasonable value of landfill depth from the Westat survey was 458 centimeters (15 feet). The model open landfill is assumed to be half full, and hence has a waste depth of 229 centimeters (7.5 feet). The landfill is assumed to contain fixed waste. A standard temperature of 25°C is assumed to apply.

The waste liquid (before fixation) selected for this model facility is assumed to be a two-phase aqueous/organic containing 20 percent chloroform, 20 percent low-volatility organic, and 60 percent water (by weight). This liquid has an average density of 1.16 grams per cubic centimeter. The fixation industry indicates that waste liquid, when combined with fixative, may increase in volume by up to 50 percent, depending on the specific combination of waste and fixative. In view of the inherent variability in the fixation process and the lack of real data on volume changes, for purposes of this report, the assumption is made that the waste volume does not change during fixation. Measurements performed on various types of fixed waste yielded a broad range of total porosities. Fifty (50) percent[2], as used in

[2] These porosity values are assumed to be representative of waste in an open landfill, rather than waste that has

this study, is a reasonable estimate of this parameter. A 25-percent[2] air porosity appears to be a reasonable value; this value was inferred from measurements of total porosity and moisture content. As discussed previously, there is no evidence of significant biomass in any chemical waste landfill. Therefore, in this analysis it is assumed, as suggested in the literature, that the toxic property of the waste will inhibit biological processes and thus prevent biogas generation. Hence, the waste biomass concentration is taken to be 0 gram per cubic centimeter.

The properties of chloroform that are pertinent to this analysis include the molecular weight (119.4 g/g mol), pure component vapor pressure (208 millimeters of mercury), and diffusivity in air (0.104 square centimeter per second). The low-volatility organic liquid present in the waste has a molecular weight of 147 g/g mol.

Table I-2 summarizes the model facility parameters for open landfills used in the example calculation later in this section.

Parameters for Waste Piles. A review of information in the Westat survey led to the selection of an approximately midrange value for basal area of 4.65×10^6 square centimeters. For modeling purposes, the pile is assumed to be flat. A uniform height of 100 centimeters was inferred, using the Westat information and engineering judgment. All waste ultimately disposed of in the landfill is assumed to be stored initially in the waste pile. The open landfill described previously is assumed to be filled to capacity in 1 year. Based on the filled landfill volume (1.42×10^8 cm^2 x 458 cm depth = 6.50×10^{10} cm^3), the waste pile volume (4.65×10^6 cm^2 x 100 cm = 4.65×10^8 cm^3), and the filling time of 1 year, it can be concluded that the waste pile undergoes a turnover rate of 140 turnovers per year. Hence, the waste pile retention time is 2.6 days per turnover. The properties of the waste liquid and the resulting fixed waste accommodated by the model waste pile are identical to those for the open landfill and will not be repeated here. Table I-3 summarizes the model facility parameters used for waste piles.

Example Calculation for Open Landfill

This section presents a step-by-step calculation of emissions from an open landfill. The equations identified in Table I-1 are used with the model unit parameters in the previous section to estimate emissions from a fixed, two-phase aqueous/organic waste containing chloroform; the same equations would be applied to the estimation of emissions from waste piles:

- Waste liquid (before fixation): 20 percent chloroform, 20 percent low-volatility organic liquid, 60 percent water

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recently undergone fixation.

- Liquid/fixative: 1 unit volume liquid + dry fixative = 1 unit volume fixed waste
- Waste biomass concentration: 0 gram per cubic centimeter
- Landfill area: 1.42×10^{8} square centimeter (3.5 acres)
- Landfill depth: 229 centimeters (7.5 feet)
- Temperature: 25°C
- Time period for emission calculation: 3.15×10^{7} seconds (1 year).

a. Compute waste loading, L:

Liquid density before fixation = 1.16 grams per cubic centimeter

1 cm^3 liquid waste + fixative = 1 cubic centimeter fixed waste

L = g organic phase per cubic centimeter fixed waste

= (0.20 + 0.20) x 1.16 grams per cubic centimeter = 0.46 grams per cubic centimeter

(Note that weight fraction of chloroform in the oil phase [C] = 0.2/(0.2 + 0.2) = 0.50.)

b. Compute effective diffusion coefficient for fixed waste:

$$D_e = D_a \frac{\epsilon_a^{3.33}}{\epsilon_T^{2}}$$

where

ϵ_a = air porosity fixed waste = 0.25

ϵ_T = total porosity fixed waste = 0.50

Then

D_a = diffusivity of chloroform in air = 0.104 square centimeter per second

$$D_e = (0.104 \text{ square centimeter per second}) \frac{(0.25)^{3.33}}{(0.50)^2}$$

$$D_e = 4.11 \times 10^{-3} \text{ square centimeter per second})$$

(Note: $D_e/Da = 3.96 \times 10^{-2}$)

c. Compute "partition" coefficient, Keq (ratio of gas-phase chloroform to total chloroform in the waste):

For oily waste,

$$Keq = \frac{P^* MW_{oil} \in_a}{R\,T \quad L}$$

where

P^* = pure component vapor pressure of chloroform = (208 mm Hg)/(760 mm Hg/atm) = 0.274 atm

MW_{oil} = molecular weight low-volatility organic = 147 g/g mol

R = ideal gas constant = 82.05 cm^3•atm/g mol•K

T = temperature within solid waste, K
= 273 K + 25 °C = 298 K

$$Keq = \frac{(0.274 \text{ atm})(147 \text{ g/g mol})(0.25)}{(82.05 \text{ cm}^3\text{•atm/g mol•K})(298 \text{ K})(0.46 \text{ g/cm}^3)}$$

$$Keq = 8.95 \times 10^{-4}$$

d. Compute fraction of total chloroform emitted, F_t, after 1 year:

First, determine which solution applies by computing $\frac{Keq\ D_e t}{1^2}$ (Table I):

$$\frac{Keq_i D_e}{1^2} = \frac{8.95 \times 10^{-4} \times 4.11 \times 10^{-3}\ cm^2/s}{(229\ cm)^2}$$

$$= 7.01 \times 10^{-11}\ s^{-1}$$

Therefore,

$$\frac{Keq\ d_e t}{1^2} = 7.01 \times 10^{-11}\ s^{-1} \times 3.15 \times 10^{7}\ s$$

$$= 2.21 \times 10^{-3}$$

$$K_d t = \frac{Keq\ D_e t}{1^2} \frac{\pi^2}{4} = 5.45\ (10^{-3})$$

Because Keq $D_e t/1^2$ is less than 0.25, the first equation of Table I applies, and

$$F_t = 0.72\ (K_d t)^{1/2}$$

$$F_t = 0.72\ (5.45 \times 10^{-3})^{1/2}$$

$$F_t = 0.053$$

e. Compute instantaneous emission rate, E, after 1 yr:

1. Compute initial mass of chloroform in landfill:

M_{oil} = 1 L C

where

1 = waste depth = 229 centimeters

L = grams of organic per cubic centimeter (fixed waste = 0.46 grams per cubic centimeter

C = weight fraction chloroform in oil = 0.50

Then

M_O = (229 centimeters)(0.46 grams per cubic centimeter)(0.50)

M_O = 52.7 grams per cubic centimeter

2. Compute instantaneous emission rate, E_i. Because Keq $D_e t/1^2 < 0.213$, use the following equation to compute the emission rate:

$$E = \frac{Mo}{1}\left[\frac{1}{\frac{\in a}{k_G\ Keq} + \sqrt{\frac{\pi t}{Keq\ D_e}}}\right]$$

k_G = $4.82\ (10^{-3})\ U^{0.78}\ Sc_G^{-0.67}\ de^{-0.11}$

U = windspeed = 4.92 m/s

de = effective diameter of landfill area

$$= \left[\frac{4A}{\pi}\right]^{0.5} = 134\ m$$

$$Sc_G = \frac{\mu g}{P_a D_a}$$

where

μg = viscosity of air = $1.8\ (10^{-4})$ g/cm/s
P_a = Density of air = $1.2\ (10^{-3})$ g/cm^3
D_a = 0.104 cm^2/s

$$Sc_G = \frac{1.81\,(10^{-3})}{1.2\,(10^{-3})\,(0.104)} = 1.45$$

k_G = $4.82\ (10^{-3})\ (4.92)^{0.78}\ (1.45)^{-0.67}\ (134)^{-0.11}$

$$= 0.0076 \text{ m/s} = 0.76 \text{ cm/s}$$

$$E = \frac{52.7}{229}\left[\frac{1}{\dfrac{0.25}{0.76 \times 8.95(10^{-4})} + \sqrt{\dfrac{3.14 \times 31.5(10^{7})}{8.95(10^{-4} \times 4.11(10^{-3})}}}\right] = 0.230\left[\frac{1}{368 + 5.18\ 10^{6}}\right]$$

$$E = 4.43\ (10^{-8})\ \text{g/cm}^2\text{/s.}$$

<u>REFERENCES</u>

1. GCA Corporation. Air Emissions from Land Treatment-Emissions Data and Model Review. Draft Technical Note. Prepared for U.S. Environmental Protection Agency. Research Triangle Park, NC. August 1985. 120 pp.

Table I-1
RTT Land Treatment Model Applied to Open Landfills and Waste Piles (No Biodegradation)

Emission fraction[a]

$$F_{at} = 0.72\,(K_d\,t)^{1/2} \text{ for } \frac{Keg\ D_e t}{1^2} < 0.25 \text{ (valid for no biodegradation only)}$$

$$F_{at} = \frac{8}{\pi^2}\left[1 - \exp(-k_d\,t)\right] + 0.1878 \left(\text{for } \frac{Keq\ D_e t}{1^2} \geq 0.25 \text{ - no biodegradation}\right)$$

$$F_a = 1\ (\ t \rightarrow \infty \text{ - no biodegradation})$$

$$K_d = \frac{Keq\ D_e \pi^2}{41^2}$$

$$D_e = D_a\ \in_a^{3.33} / \in_T^{\ 2} \qquad \left[\ D_e / D_a = \in_a^{3.33} / \in_T^{\ 2}\ \right]$$

$$Keq = \frac{H_c\ (10^6\,cm^2 / m^3)}{RT} \quad x \quad \frac{\in_a}{\in_{waste}} \text{ (for aqueous waste)}$$

$$Keq = \frac{P * MW_{oil}}{RT} \quad \frac{\in_a}{L} \text{ (for two-phase aqueous/organic or organic liquid waste)}$$

Emission rate

$$E = \frac{2\ M_o\ \ Keq\ D_e}{1^2} \left[\exp(-\tau)\right] \text{ for } Keq\ D_e t / 1^2 \geq 0.213$$

$$E = \frac{Mo}{1} \left[\frac{1}{\dfrac{\in_a}{k_G\ Keq} + \left[\dfrac{\pi t}{keq\ D_e}\right]^{1/2}} \right]$$

Table I-1
RTT Land Treatment Model Applied to Open Landfills and Waste Piles (No Biodegradation)

$$\tau = \frac{D_e Keq\ \pi^2 t}{41^2}$$

$$M_O = 1\ L\ C$$

$$d_e = (4A/\pi)^{1/2}$$

$$k^G = 4.82\ (10^{-3})\ U^{0.78}\ Sc_G^{-067}\ de^{-0.11}$$

Variable	Definition	Data source
C	Weight fraction of constituent in the oil (organic) phase (for two-phase or organic liquid waste), or weight fraction of constituent in the water (for aqueous waste)	Definition
D_a	Diffusion coefficient of constituent in air, cm^2/s	Database
D_e	Effective diffusion coefficient of constituent in the solid waste, cm^2/s	Calculated
E	Emission rate of constituent, $g/cm^2/s$	Calculated
F_a	Fraction of constituent emitted to the atmosphere at infinity (equals unity for no biodegradation)	Definition
F_t	Fraction of constituent emitted to the atmosphere after time t	Calculated
H_c	Henry's law constant for constituent, $atm \cdot m^3/g$ mol	Database
K_d	Volatilization constant for constituent, s^{-1}	Calculated
k_G	Gas-phase mass transfer coefficient, m/s	Calculated
Keq	Ratio of gas-phase constituent to total constituent in the solid waste	Calculated
l	Depth of waste in open landfill or waste pile, cm	Literature
L	Waste loading in fixative or soil. For two-phase aqueous/organics or organic liquids L = g organic (oil) phase/cm^3 solid material. For dilute aqueous waste liquids, L = g aqueous liquid/cm^3 solid material	Definition
A	Area of open landfill, m^2	Definition
M_O	Area loading of constituent, g/cm^2	Calculated
MW_{oil}	Average molecular weight of the oil (less constituent), g/g mol	Estimated
P*	Pure component vapor pressure of constituent, atm	Database
R	Ideal gas constant, 82.05 $atm \cdot cm^3/g\ mol \cdot K$	Literature
T	Temperature of vapor in solid waste, K	Assumed

Table I-1
RTT Land Treatment Model Applied to Open Landfills and Waste Piles (No Biodegradation)

U	Windspeed (m/s)	Assumed
t	Time variable for emission calculation, s (represents time lapse from initial waste composition)	Definition
τ	Dimensionless parameter used in the instantaneous emission rate expression	Calculated
ϵ_a	Void fraction (air porosity) of solid waste (dimensionless)	Estimated from fixed waste property data
d_e	Effective diameter of land treatment area, m	Calculated
Sc_G	Schmidt number	Calculated
ϵ_T	Total porosity of solid waste (dimensionless)	Industry personnel
ϵ_{waste}	Volume fraction of waste liquid in solid waste (dimensionless) (can be computed as L/[density aqueous liquid in g/cm^3])	Calculated

NOTES:
[a] The first equation presented represents a special case of Equation (5-7) for no biodegradation.
[b] This equation represents the first term of the series in Equation (5-5), for the special case of no biodegradation. The exponential terms are expressed, for convenience, in terms of the dimensionless parameter "τ".

Table I-2
Input Parameters – Open Landfill

Area	1.42×10^{8} cm^2 (3.5 acres)
Waste depth	229 cm (7.5 ft)[a]
Volume	3.25×10^{10} cm^3
Temperature	25°C
Waste liquid (before fixation)	Two-phase aqueous/organic
Liquid composition	20% chloroform, 20% low-volatility organic, 60% water (by weight)
Liquid density (average)	1.16 g/cm^3
Liquid/fixative	1 unit volume liquid + dry fixative = 1 unit volume fixed waste
Air porosity fixed waste	0.25 (25%)
Total porosity fixed waste	0.50 (50%)
Biomass concentration	0 g/cm^3
<u>Chloroform properties</u>	
Molecular weight	119.4 g/g mol
Vapor pressure	208 mm Hg
Diffusivity in air	0.104 cm^2/s
<u>Low-volatility organic properties</u>	
Molecular weight	147 g/g mol

NOTE:
[a] Represents half full.

Table I-3
INPUT PARAMETERS--WASTE PILES

Surface area	4.65 x 10^6 cm^2
Average height	100 cm
Turnover rate	139/yr
Retention time	2.6 d
Temperature	25°C
Windspeed	4.92 m/s
Waste type	Fixed waste
Waste liquid (before fixation)	Two-phase aqueous/organic
Liquid composition	20% chloroform, 20% low-volatility organic, 60% water (by weight)
Liquid density (average)	1.16 g/cm^3
Liquid/fixative	1 unit volume liquid + dry fixative = 1 unit volume fixed waste
Air porosity fixed waste	0.25 (25%)
Total porosity fixed waste	0.50 (50%)
Biomass concentration	0 g/cm^3
<u>Chloroform properties</u>	
Molecular weight	119.4 g/g mol
Vapor pressure (25°C)	208 mm Hg
Diffusivity in air (25°C)	0.104 cm^2 s
<u>Low-volatility organic properties</u>	
Molecular weight	147 g/g mol

METHOD 1312: SYNTHETIC ACID PRECIPITATION LEACH TEST FOR SOILS

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METHOD 1312

SYNTHETIC PRECIPITATION LEACH TEST FOR SOILS

1.0 SCOPE AND APPLICATION

1.1 Method 1312 is designed to determine the mobility of both organic and inorganic contaminants present in soils.

1.2 If a total analysis of the soil demonstrates that individual contaminants are not present in the soil, or that they are present but at such low concentrations that the appropriate regulatory thresholds could not possibly be exceeded, Method 1312 need not be run.

2.0 SUMMARY OF METHOD

2.1 The particle size of the soil is reduced (if necessary) and is extracted with an amount of extraction fluid equal to 20 times the weight of the soil. The extraction fluid employed is a function of the region of the country where the soil site is located. A special extractor vessel is used when testing for volatiles. Following extraction, the liquid extract is separated from the soil by 0.6-0.8 micron glass fiber filter.

3.0 INTERFERENCES

3.1 Potential interferences that may be encountered during analysis are discussed in the individual analytical methods.

4.0 APPARATUS AND MATERIALS

4.1 Agitation apparatus - an acceptable agitation apparatus is one which is capable of rotating the extraction vessel in an end-over-end fashion at 30 ± 2 rpm. Suitable devices known to EPA are identified in Table 2.

4.2 Extraction vessel - acceptable extraction vessels are those that are listed below:

4.2.1 Zero Headspace Extraction Vessel (ZHE) - This device is for use only when the soil is being tested for the mobility of volatile constituents (see Table 1). The ZHE is an extraction vessel that allows for liquid/solid separation within the device and which effectively precludes headspace. This type of vessel allows for initial liquid/solid separation, extraction, and final extract filtration without having to open the vessel (see Step 4.3.1). These vessels shall have an internal volume of 500 to 600 mL and be equipped to accommodate a 90-mm filter. Suitable ZHE devices known to EPA are identified in Table 3. These devices contain viton O-rings which should be replaced frequently. For the ZHE to be acceptable for use, the piston within the ZHE should be able to be moved with approximately 15 psi or less. If it takes more pressure to move the piston, the O-rings in the device should be replaced. If this does not solve the problem, the ZHE is unacceptable for 1312 analyses and the manufacturer should be contacted. The ZHE should be checked after every extraction. If the device contains a built-in pressure gauge, pressurize the device to 50 psi, allow it to stand unattended for 1 hour, and recheck the pressure. If the device does not have a built-in pressure gauge, pressurize the device to 50 psi, submerge it in water and check for the presence of air bubbles escaping from any of the fittings. If pressure is lost, check all fittings and inspect and replace O-rings, if necessary. Retest the device. If leakage problems cannot be solved, the manufacturer should be contacted.

4.2.2 When the soil is being evaluated for other than volatile contaminants, an extraction vessel that does not preclude headspace (e.g., a 2-liter bottle) is used. Suitable extraction vessels include bottles made from various materials, depending on the contaminants to be analyzed and the nature of the waste (see Step 4.3.3). It is recommended that borosilicate glass bottles be used over other types of glass, especially when inorganics are of concern. Plastic bottles may be used only if inorganics are to be investigated. Bottles are available from a number of laboratory suppliers. When this type of extraction vessel is used, the filtration device discussed in Step 4.3.2 is used for initial liquid/solid separation and final extract filtration.

4.2.3 Some ZHEs use gas pressure to actuate the ZHE piston, while others use mechanical pressure (see Table 3). Whereas the volatiles procedure (see Step 7.4) refers to pounds-per-square inch (psi), for the mechanically actuated piston, the pressure applied is measured in torque-inch-pounds. Refer to the manufacturer's instructions as to the proper conversion.

4.3 Filtration devices - It is recommended that all filtrations be performed in a hood.

4.3.1 Zero-Headspace Extractor Vessel - When the waste is being evaluated for volatiles, the zero-headspace extraction vessel is used for filtration. The device shall be capable of supporting and keeping in place the fiber filter, and be able to withstand the pressure needed to accomplish separation (50 psi).

NOTE: When it is suspected that the glass fiber filter has been ruptured, an in-line glass fiber filter may be used to filter the material within the ZHE.

4.3.2 Filter holder - when the soil is being evaluated for other than volatile compounds, a filter holder capable of supporting a glass fiber filter and able to withstand 50 psi or more of pressure shall be used. These devices shall have a minimum internal volume of 300 mL and be equipped to accommodate a minimum filter size of 47 mm (filter holders having an internal capacity of 1.5 liters or greater are recommended).

4.3.3 Materials of construction - filtration devices shall be made of inert materials which will not leach or absorb soil components. Glass, polytetrafluoroethylene (PTFE) or type 316 stainless steel equipment may be used when evaluating the mobility of both organic and inorganic components. Devices made of high density polyethylene (HDPE), polypropylene, or polyvinyl chloride may be used only when evaluating the mobility of metals. Borosilicate glass bottles are recommended for use over other types of glass bottles, especially when inorganics are constituents of concern.

4.4 Filters - filters shall be made of borosilicate glass fiber, shall have an effective pore size of 0.6-0.8 micron and shall contain no binder materials. Filters known to EPA to meet these requirements are identified in Table 5. When evaluating the mobility of metals, filters should be acid-washed prior to use by rinsing with 1.0N nitric acid followed by three consecutive rinses with deionized distilled water (a minimum of 1-liter per rinse is recommended). Glass fiber filters are fragile and should be handled with care.

4.5 pH meters - any of the commonly available pH meters are acceptable.

4.6 ZHE extract collection devices - TEDLAR® bags, glass, stainless steel or PTFE gas tight syringes are used to collect the volatile extract.

4.7 Laboratory balance - any laboratory balance accurate to within ±0.01 g may be used (all weight measurements are to be within ±0.1 g).

4.8 ZHE extraction fluid transfer devices - any device capable of transferring the extraction fluid into the ZHE without changing the nature of the extraction fluid is recommended.

5.0 REAGENTS

5.1 Reagent water - reagent water is defined as water in which an interferent is not observed at or above the method detection limit of the analyte(s) of interest. For non-volatile extractions, ASTM Type II water, or equivalent meets the definition of reagent water. For volatile extractions, it is recommended that reagent water be generated by any of the following methods. Reagent water should be monitored periodically for impurities.

5.1.1 Reagent water for volatile extractions may be generated by passing tap water through a carbon filter bed containing about 500 g of activated carbon (Calgon Corp., Filtrasorb 300, or equivalent).

5.1.2 A water purification system (Millipore Super-Q or equivalent) may also be used to generate reagent water for volatile extractions.

5.1.3 Reagent water for volatile extractions may also be prepared by boiling water for 15 minutes. Subsequently, while maintaining the water temperature at 90 ± 5°C, bubble a contaminant-free inert gas (e.g., nitrogen) through the water for 1 hour. While still hot, transfer the water to a narrow-mouth screw-cap bottle under zero headspace and seal with a Teflon lined septum and cap.

5.2 Sulfuric acid/nitric acid (60/40 weight percent mixture) H_2SO_4/HNO_3. Cautiously mix 60 g of concentrated sulfuric acid with 40 g of concentrated nitric acid.

5.3 Extraction fluids:

5.3.1 Extraction fluid #1 - this fluid is made by adding the 60/40 weight percent mixture of sulfuric and nitric acids to reagent water until the pH is 4.20 ± 0.05.

5.3.2 Extraction fluid #2 - this fluid is made by adding the 60/40 weight percent mixture of sulfuric and nitric acids to reagent water until the pH is 5.00 ± 0.05.

5.3.3 Extraction fluid #3 - this fluid is reagent water (ASTM Type II water, or equivalent) used to determine cyanide leachability.

Note: It is suggested that these extraction fluids be monitored frequently for impurities. The pH should be checked prior to use to ensure that these fluids are made up accurately.

5.4 Analytical standards shall be prepared according to the appropriate analytical method.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 All samples shall be collected using an appropriate sampling plan.

6.2 At least two separate representative samples of a soil should be collected. The first sample is used to determine if the soil requires particle-size reduction and, if desired, the percent solids of the soil. The second sample is used for extraction of volatiles and non-volatiles.

6.3 Preservatives shall not be added to samples.

6.4 Samples shall be refrigerated to minimize loss of volatile organics and to retard biological activity.

6.5 When the soil is to be evaluated for volatile contaminants, care should be taken to minimize the loss of volatiles. Samples shall be taken and stored in a manner to prevent the loss of volatile contaminants. If possible, it is recommended that any necessary particle-size reduction be conducted as a sample is being taken.

6.6 1312 extracts should be prepared for analysis and analyzed as soon as possible following extraction. If they need to be stored, even for a short period of time, storage shall be at 4°C, and samples for volatiles analysis shall not be allowed to come into contact with the atmosphere (i.e., no headspace). See Section 8.0 (Quality Control) for acceptable sample and extract holding times.

7.0 PROCEDURE

7.1 The preliminary 1312 evaluations are performed on a minimum 100 g representative sample of soil that will not actually undergo 1312 extraction (designated as the first sample in Step 6.2).

7.1.1 Determine whether the soil requires particle-size reduction. If the soil passes through a 9.5 mm (0.375-inch) standard sieve, particle-size reduction is not required (proceed to Step 7.2).

If portions of the sample do not pass through the sieve, then the oversize portion of the soil will have to be prepared for extraction by crushing the soil to pass the 9.5 mm sieve.

7.1.2 Determine the percent solids if desired.

7.2 Procedure when volatiles are not involved - Enough solids should be generated for extraction such that the volume of 1312 extract will be sufficient to support all of the analyses required. However, a minimum sample size of 100 grams shall be used. If the amount of extract generated by a single 1312 extract will not be sufficient to perform all of the analyses, it is recommended that more than one extraction be performed and the extracts be combined and then aliquoted for analysis.

7.2.1 Weigh out a representative subsample of the soil and transfer to the filter holder extractor vessel.

7.2.2 Determine the appropriate extraction fluid to use. If the soil is from a site that is east of the Mississippi River, extraction fluid #1 should be used. If the soil is from a site that is west of the Mississippi River, extraction fluid #2 should be used. If the soil is to be tested for cyanide leachability, extraction fluid #3 should be used.

Note: Extraction fluid #3 (reagent water) must be used when evaluating cyanide-containing soils because leaching of cyanide-containing soils under acidic conditions may result in the formation of hydrogen cyanide gas.

7.2.3 Determine the amount of extraction fluid to add based on the following formula:

amount of extraction fluid (mL) = 20 x weight of soil (g)

Slowly add the amount of appropriate extraction fluid to the extractor vessel. Close the extractor bottle tightly (it is recommended that Teflon tape be used to ensure a tight seal), secure in rotary extractor device, and rotate at 30 ± 2 rpm for 18 ± 2 hours. Ambient temperature (i.e., temperature of room in which extraction is to take place) shall be maintained at 22 ± 3°C during the extraction period.

Note: As agitation continues, pressure may build up within the extractor bottle for some types of soil (e.g., limed or calcium carbonate containing soil may evolve gases such as carbon dioxide). To relieve excess pressure, the extractor bottle may be periodically opened (e.g., after 15 minutes, 30 minutes, and 1 hour) and vented into a hood.

7.2.4 Following the 18 ± 2 hour extraction, the material in the extractor vessel is separated into its component liquid and solid phases by filtering through a glass fiber filter.

7.2.5 Following collection of the 1312 extract it is recommended that the pH of the extract be recorded. The extract should be immediately aliquoted for analysis and properly preserved [metals aliquots must be acidified with nitric acid to pH < 2; all other aliquots must be stored under refrigeration (4°C) until analyzed]. The 1312 extract shall be prepared and analyzed according to appropriate analytical methods. 1312 extracts to be analyzed for metals, other than mercury, shall be acid digested.

7.2.6 The contaminant concentrations in the 1312 extract are compared to thresholds in the clean closure guidance manual. Refer to Section 8.0 for Quality Control requirements.

7.3 Procedure when volatiles are involved:

7.3.1 The ZHE device is used to obtain 1312 extracts for volatile analysis only. Extract resulting from the use of the ZHE shall not be used to evaluate the mobility of non-volatile analytes (e.g., metals, pesticides, etc.). The ZHE device has approximately a 500 mL internal capacity. Although a minimum sample size of 100 g was required in Step 7.2 procedure, the ZHE can only accommodate a maximum of 25 g of solid, due to the need to add an amount of extraction fluid equal to 20 times the weight of the soil. The ZHE is charged with sample only once and the device is not opened until the final extract has been collected. Although the following procedure allows for particle-size reduction during the conduct of the procedure, this could result in the loss of volatile compounds. If possible particle-size reduction (see Step 7.1.1) should be conducted on the sample as it is being taken (e.g., particle-size may be reduced by crumbling). If necessary, particle-size reduction may be conducted during the procedure. In carrying out the following steps, do not allow the soil to be exposed to the atmosphere for any more time than is absolutely necessary. Any manipulation of these materials should be done when cold (4°C) to minimize the loss of volatiles. Pre-weigh the evacuated container which will receive the filtrate (see Step 4.6), and set aside. If using a TEDLAR® bag, all air must be expressed from the device.

7.3.2 Place the ZHE piston within the body of the ZHE (it may be helpful first to moisten the piston O-rings slightly with extraction fluid). Adjust the piston within the ZHE body to a height that will minimize the distance the piston will have to move once it is charged with sample. Secure the gas inlet/outlet flange (bottom flange) onto the ZHE body in accordance with the manufacturer's instructions. Secure the glass fiber filter between the support screens and set aside. Set liquid inlet/outlet flange (top flange) aside.

7.3.3 Quantitatively transfer 25 g of soil to the ZHE. Secure the filter and support screens into the top flange of the device and secure the top flange to the ZHE body in accordance with the manufacturer's instructions. Tighten all ZHE fittings and place the device in the vertical position (gas inlet/outlet flange on the bottom). Do not attach the extraction collection device to the top plate. Attach a gas line to the gas inlet/outlet valve (bottom flange) and, with the liquid inlet/outlet valve (top flange) open, begin applying gentle pressure of 1-10 psi to a maximum of 50 psi to force most of the headspace out of the device.

7.3.4 With the ZHE in the vertical position, attach a line from the extraction fluid reservoir to the liquid inlet/outlet valve. The line used shall contain fresh extraction fluid and should be preflushed with fluid to eliminate any air pockets in the line. Release gas pressure on the ZHE piston (from the gas inlet/outlet valve), open the liquid inlet/outlet valve, and begin transferring extraction fluid (by pumping or similar means) into the ZHE. Continue pumping extraction fluid into the ZHE until the appropriate amount of fluid has been introduced into the device.

7.3.5 After the extraction fluid has been added, immediately close the inlet/outlet valve and disconnect the extraction fluid line. Check the ZHE to ensure that all valves are in their closed positions. Physically rotate the device in an end-over-end fashion 2 or 3 times. Reposition the ZHE in the vertical position with the liquid inlet/outlet valve on top. Put 5-10 psi behind the piston (if necessary) and slowly open the liquid inlet/outlet valve to bleed out any headspace (into a hood) that may have been introduced due to the addition of extraction fluid. This bleeding shall be done quickly and shall be stopped at the first appearance of liquid from the valve. Re-pressurize the ZHE with 5-10 psi and check all ZHE fittings to ensure that they are closed.

7.3.6 Place the ZHE in the rotary extractor apparatus (if it is not already there) and rotate the ZHE at 30 ± 2 rpm for 18 ± 2 hours. Ambient temperature (i.e., temperature of the room in which extraction is to occur) shall be maintained at 22 ± 3°C during agitation.

7.3.7 Following the 18 ± 2 hour agitation period, check the pressure behind the ZHE piston by quickly opening and closing the gas inlet/outlet valve and noting the escape of gas. If the pressure has not been maintained (i.e., no gas release observed), the device is leaking. Check the ZHE for leaking and redo the extraction with a new sample of soil. If the pressure within the device has been maintained, the material in the extractor vessel is separated into its component liquid and solid phases.

7.3.8 Attach the evacuated pre-weighed filtrate collection container to the liquid inlet/outlet valve and open the valve. Begin applying gentle pressure of 1-10 psi to force the liquid phase into the filtrate collection container. If no additional liquid has passed through the filter in any 2 minute interval, slowly increase the pressure in 10-psi increments to a maximum of 50 psi. After each incremental increase of 10 psi, if no additional liquid has passed through the filter in any 2-minute interval, proceed to the next 10-psi increment. When liquid flow has ceased such that continued pressure filtration at 50 psi does not result in any additional filtrate within any 2-minute period, filtration is stopped. Close the inlet/outlet valve, discontinue pressure to the piston, and disconnect the filtration collection container.

NOTE: Instantaneous application of high pressure can degrade the glass fiber filter and may cause premature plugging.

7.3.9 Following collection of the 1312 extract, the extract should be immediately aliquoted for analysis and stored with minimal headspace at 4°C until analyzed. The 1312 extract will be prepared and analyzed according to the appropriate analytical methods.

8.0 QUALITY CONTROL

8.1 All data, including quality assurance data, should be maintained and available for reference or inspection.

8.2 A minimum of one blank (extraction fluid #1) for every ten extractions that have been conducted in an extraction vessel shall be employed as a check to determine if any memory effects from the extraction equipment are occurring.

8.3 For each analytical batch (up to twenty samples), it is recommended that a matrix spike be performed. Addition of matrix spikes should occur once the 1312 extract has been generated (i.e., should not occur prior to performance of the 1312 procedure). The purpose of the matrix spike is to monitor the adequacy of the analytical methods used on the 1312 extract and for determining if matrix interferences exist in analyte detection.

8.4 All quality control measures described in the appropriate analytical methods shall be followed.

8.5 The method of standard addition shall be employed for each analyte if: 1) recovery of the compound from the 1312 extract is not between 50 and 150%, or 2) if the concentration of the constituent measured in the extract is within 20% of the appropriate regulatory threshold. If more than one extraction is being run on samples of the same waste (up to twenty samples), the method of standard addition need to be applied only once and the percent recoveries applied on the remainder of the extractions.

8.6 Samples must undergo 1312 extraction within the following time period after sample receipt: Volatiles, 14 days; Semi-Volatiles, 40 days; Mercury, 28 days; and other Metals, 180 days. 1312 extracts shall be analyzed after generation and preservation within the following periods: Volatiles, 14 days; Semi-Volatiles, 40 days; Mercury, 28 days; and other Metals, 180 days.

9.0 METHOD PERFORMANCE

9.1 None available.

10.0 REFERENCES

10.1 None available.

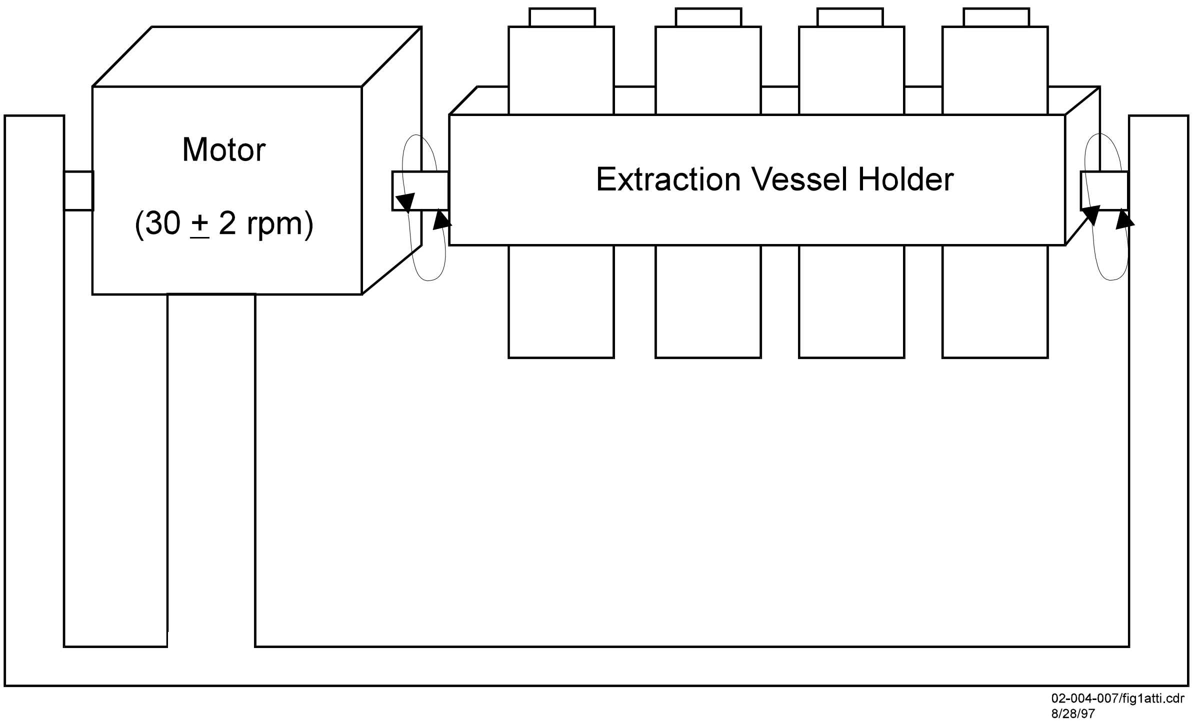


Figure 1. Rotary Agitation

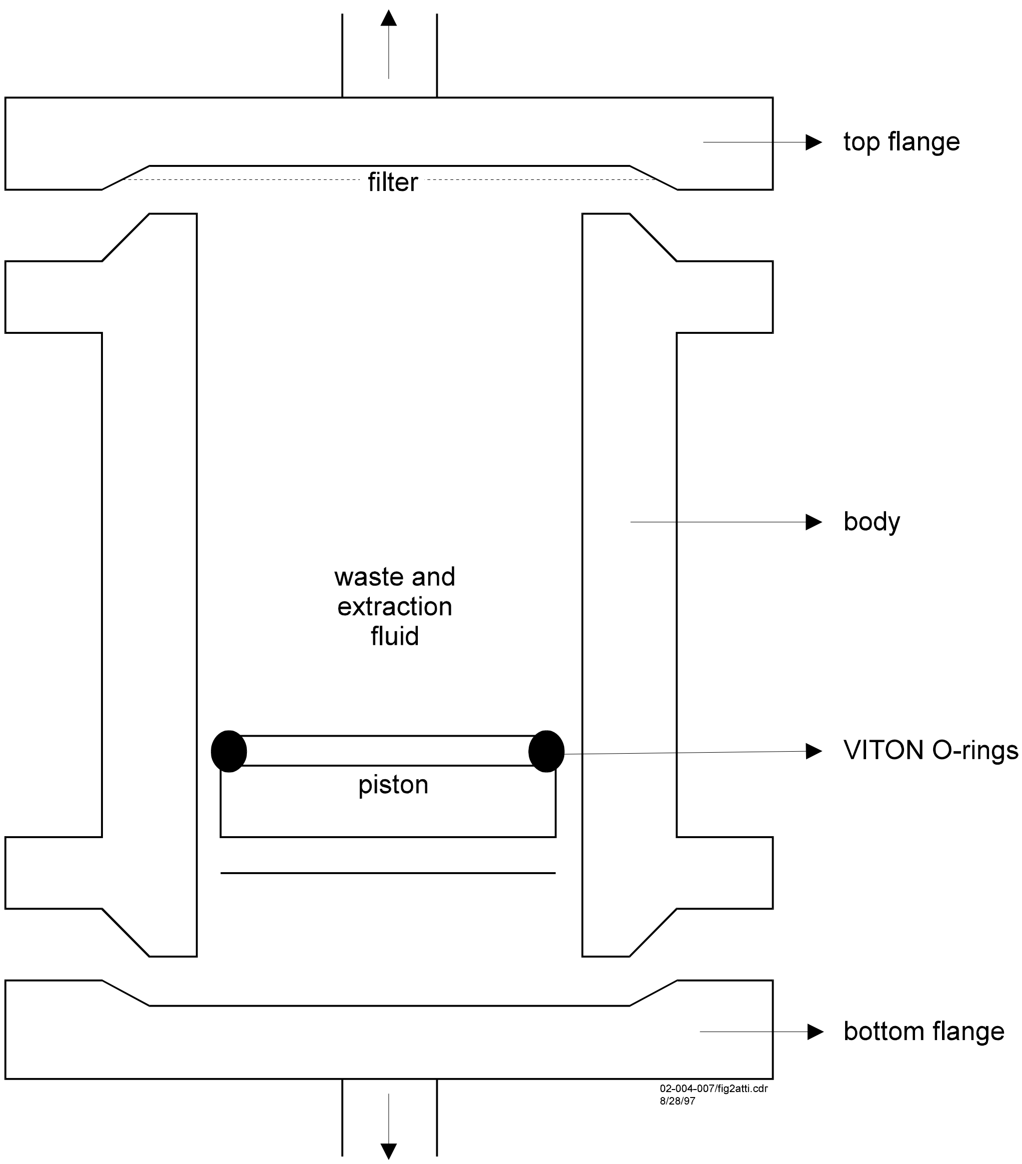
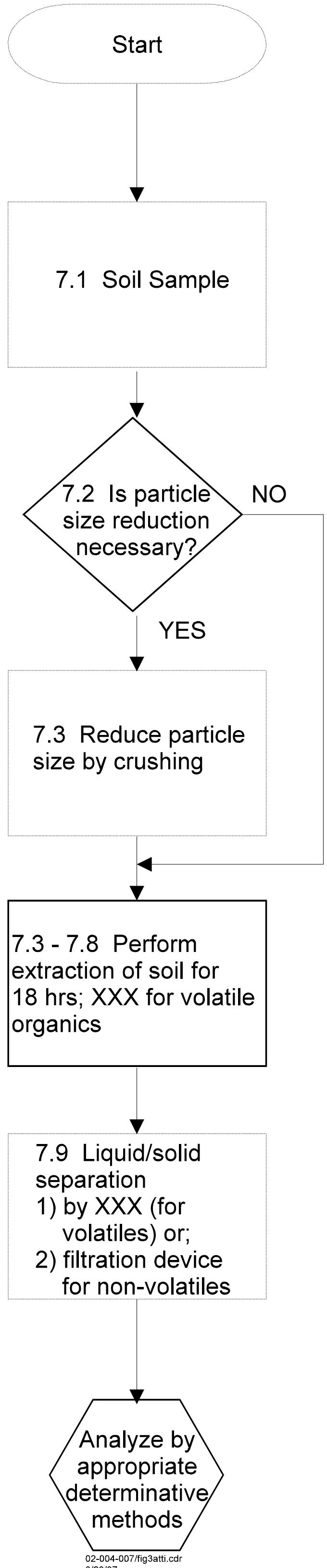


Figure 2. Zero-Headspace Extraction Vessel



1 Figure 3. Synthetic Acid Precipitation Leach Test for Soils

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Table 1
VOLATILE CONTAMINANTS

Compounds	CAS Number
Acetone	67-64-1
Acrylonitrile	107-13-1
Benzene	71-43-2
n-Butyl alcohol	71-36-6
Carbon disulfide	75-15-0
Carbon tetrachloride	56-23-5
Chlorobenzene	108-90-7
Chloroform	67-66-3
1,2-Dichloroethane	107-06-2
1,2-Dichloroethylene	75-35-4
Ethyl acetate	141-78-6
Ethyl benzene	100-41-4
Ethyl ether	60-29-7
Isobutanol	78-83-1
Methanol	67-56-1
Methylene chloride	75-09-2

Compounds	CAS Number
Methyl ethyl ketone...	78-93-3
Methyl isobutyl ketone...	108-10-1
1,1,1,2-Tetrachloroethane......................................	630-20-6
1,1,2,2-Tetrachloroethane......................................	79-34-5
Tetrachloroethylene...	127-18-4
Toluene...	108-88-3
1,1,1-Trichloroethane..	71-55-6
1,1,2-Trichloroethane..	79-00-5
Trichloroethylene...	79-01-6
Trichlorofluoromethane...	75-69-4
1,1,2-Trichloro-1,2,2-trifluoroethane..........................	76-13-1
Vinyl chloride..	75-01-7
Xylene...	1330-20-7

Table 2
SUITABLE ROTARY AGITATION APPARATUS[a]

Company	Location	Model
Analytical Testing and Consulting Services, Inc.	Warrington, PA (215) 343-4490	4-vessel device
Associated Design and Manufacturing Company	Alexandria, VA (703) 549-5999	4-vessel device, 6-vessel device
Environmental Machine and Design, Inc.	Lynchburg, VA (804) 845-6424	4-vessel device, 6-vessel device
IRA Machine Shop and Laboratory	Santurce, PR (809) 752-4004	16-vessel device
Lars Lande Manufacturing	Whitmore Lake, MI (313) 449-4116	10-vessel device 5-vessel device
Millipore Corp.	Bedford, MA (800) 225-3384	4-vessel ZHE device or 4-one liter bottle extractor device
REXNORD	Milwaukee, WI (414) 643-2850	6-vessel device

NOTES:
[a] Any device that rotates the extraction vessel in an end-over-end fashion at 30 ± 2 rpm is acceptable.

ZHE = Zero Headspace Extraction Vessel

Table 3
SUITABLE ZERO-HEADSPACE EXTRACTOR VESSELS

Company	Location	Model Number
Analytical Testing & Consulting Services, Inc.	Warrington, PA (215) 343-4490	C102, Mechanical Pressure Device
Associated Design & Manufacturing Co.	Alexandria, VA (703) 549-5999	3740-ZHB, Gas Pressure Device
Lars Lande Mfg.	Whitmore Lake, MI (313) 449-4116	Gas Pressure Device
Millipore Corp.	Bedford, MA (800) 225-3384	SD1 P581 C5, Gas Pressure Device

Table 4
SUITABLE ZHE FILTER HOLDERS[a]

Company	Location	Model	Size
Micro Filtration Systems	Dublin, CA (415) 828-6010	302400	142 mm
Millipore Corp.	Bedford, MA (800) 225-3384	YT30142HW XX1004700	142 mm 47 mm
Nucleopore Corp.	Pleasanton, CA (800) 882-7711	425910 410400	142 mm 47 mm

NOTES:
[a] Any device capable of separating the liquid from the solid phase of the soil is suitable, providing that it is chemically compatible with the soil and the constituents to be analyzed. Plastic devices (not listed above) may be used when only inorganic contaminants are of concern. The 142 mm size filter holder is recommended.

Table 5

SUITABLE FILTER MEDIA

Company	Location	Model	Size[a]
Millipore Corp.	Bedford, MA (800) 225-3384	AP40	0.7
Nucleopore Corp.	Pleasanton, CA (415) 463-2530	211625	0.7
Whatman Laboratory Products, Inc.	Clifton, NJ (201) 773-5800	GFF	0.7

NOTES:
[a] Nominal pore size.

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Attachment I-4 Final Report for Background Soils Investigation at the Umatilla Chemical Agent Disposal Facility (UMCDF)

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Final Report
for Background Soils Investigation
at the
Umatilla Chemical Agent Disposal Facility
(UMCDF)

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December 1998

Quanterra Project Number: 4481378

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E Statistical Evaluation

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Acronyms/List of Initialisms

BH	Borehole
COC	Chain-of-Custody
EB	Equipment Blank
GC/MS	Gas Chromatography/Mass Spectrometry
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PCB	Polychlorinated Biphenyl
PCDD	Polychlorinated Dibenzo-p-dioxin
PCDF	Polychlorinated Dibenzofuran
PQL	Practical Quantitation Limit
QA	Quality Assurance
QAPjP	Quality Assurance Project Plan
QC	Quality Control
RFA	Request for Analysis
RPD	Relative Percent Difference
SDG	Sample Delivery Group
SOP	Standard Operating Procedure
SVOC	Semivolatile Organic Compound
TB	Trip Blank
TRPH	Total Recoverable Petroleum Hydrocarbon
UMCDF	Umatilla Chemical Agent Disposal Facility
UMCD	Umatilla Chemical Depot
VOC	Volatile Organic Compound

1.0 Executive Summary

This Final Report was prepared for Raytheon Demilitarization Company in support of the Background Soils Investigation performed at the Umatilla Chemical Agent Disposal Facility (UMCDF). This report contains the analytical data derived from the soil samples that were collected from the UMCDF site. This report also provides a statistical analysis of the analytical data derived from the soil samples. A summary of the statistical analysis which provides project analyte background concentrations is given in Table 1.

Back up documentation including analytical data, statistical data validation data, and field logs pertinent to this Background Soils Investigation have been appended to this report.

Table 1. Umatilla Chemical Agent Disposal Facility (UMCDF) Background Soil Investigation - Background Concentrations for All Analytes

Analyte	Number of Samples	Number of Detects	Calculate Background?	Background Concentration
Chemical Agents				
GB	40	0	No	<0.005 ug/g
VX	40	0	No	<0.01 ug/g
HD	40	0	No	<0.01 ug/g
Anions				
Chloride	40	40	Yes	<5.1 mg/Kg
Cyanide, Total	40	0	No	<0.5 mg/Kg
Nitrate (as N)	40	40	Yes	7.2 mg/Kg[1], 2.2 mg/Kg[2]
Nitrite (as N)	40	0	No	<0.25 mg/Kg
Sulfate	40	40	Yes	18.3 mg/Kg
Semi-Volatile Organic Compounds				
Acenaphthene	40	0	No	<330 ug/Kg
Acenaphthylene	40	0	No	<330 ug/Kg
Anthracene	40	0	No	<330 ug/Kg
Benzo(a)anthracene	40	0	No	<330 ug/Kg
Benzo(b)fluoranthene	40	0	No	<330 ug/Kg
Benzo(k)fluoranthene	40	0	No	<330 ug/Kg
Benzo(g,h,i)perylene	40	0	No	<330 ug/Kg
Benzo(a)pyrene	40	0	No	<330 ug/Kg
4-Bromophenyl phenyl ether	40	0	No	<330 ug/Kg
Butyl benzyl phthalate	40	0	No	<330 ug/Kg
4-Chloroaniline	40	0	No	<330 ug/Kg
bis(2-Chloroethoxy)-methane	40	0	No	<330 ug/Kg
bis(2-Chloroethyl)ether	40	0	No	<330 ug/Kg
2,2'-Oxybis(1-chloropropane)	40	0	No	<330 ug/Kg
4-Chloro-3-methylphenol	40	0	No	<330 ug/Kg
2-Chloronaphthalene	40	0	No	<330 ug/Kg
2-Chlorophenol	40	0	No	<330 ug/Kg
4-Chlorophenyl phenyl ether	40	0	No	<330 ug/Kg
Chrysene	40	0	No	<330 ug/Kg
Dibenz(a,h)anthracene	40	0	No	<330 ug/Kg
Dibenzofuran	40	0	No	<330 ug/Kg
Di-n-butyl phthalate	40	0	Yes	165 ug/Kg
1,2-Dichlorobenzene	40	0	No	<330 ug/Kg
1,3-Dichlorobenzene	40	0	No	<330 ug/Kg
1,4-Dichlorobenzene	40	0	No	<330 ug/Kg
3,3'-Dichlorobenzidine	40	0	No	<1600 ug/Kg
2,4-Dichlorophenol	40	0	No	<330 ug/Kg
Semi-Volatile Organic Compounds (continued)				
Diethyl phthalate	40	0	No	<330 ug/Kg
2,4-Dimethylphenol	40	0	No	<330 ug/Kg
Dimethyl phthalate	40	0	No	<330 ug/Kg

[1] Background concentration for fill soil.
[2] Background concentration for native soil.

Table 1. Umatilla Chemical Agent Disposal Facility (UMCDF) Background Soil Investigation - Background Concentrations for All Analytes (Continued)

Analyte	Number of Samples	Number of Detects	Calculate Background?	Background Concentration
4,6-Dinitro-2-methylphenol	40	0	No	<1600 ug/Kg
2,4-Dinitrophenol	40	0	No	<1600 ug/Kg
2,4-Dinitrotoluene	40	0	No	<330 ug/Kg
2,6-Dinitrotoluene	40	0	No	<330 ug/Kg
Di-n-octyl phthalate	40	0	No	<330 ug/Kg
bis(2-Ethylhexyl)-phthalate	40	0	No	<330 ug/Kg
Fluoranthene	40	0	No	<330 ug/Kg
Fluorene	40	0	No	<330 ug/Kg
Hexachlorobenzene	40	0	No	<330 ug/Kg
Hexachlorobutadiene	40	0	No	<330 ug/Kg
Hexachlorocyclopentadiene	40	0	No	<1600 ug/Kg
Hexachloroethane	40	0	No	<330 ug/Kg
Indeno(1,2,3-cd)pyrene	40	0	No	<330 ug/Kg
Isophorone	40	0	No	<330 ug/Kg
2-Methylnaphthalene	40	0	No	<330 ug/Kg
2-Methylphenol	40	0	No	<330 ug/Kg
4-Methylphenol	40	0	No	<330 ug/Kg
Naphthalene	40	0	No	<330 ug/Kg
2-Nitroaniline	40	0	No	<1600 ug/Kg
3-Nitroaniline	40	0	No	<1600 ug/Kg
4-Nitroaniline	40	0	No	<1600 ug/Kg
Nitrobenzene	40	0	No	<330 ug/Kg
2-Nitrophenol	40	0	No	<330 ug/Kg
4-Nitrophenol	40	0	No	<1600 ug/Kg
N-Nitrosodiphenylamine	40	0	No	<330 ug/Kg
N-Nitroso-di-n-propylamine	40	0	No	<330 ug/Kg
Pentachlorophenol	40	0	No	<1600 ug/Kg
Phenanthrene	40	0	No	<330 ug/Kg
Phenol	40	0	No	<330 ug/Kg
Pyrene	40	0	No	<330 ug/Kg
1,2,4-Trichlorobenzene	40	0	No	<330 ug/Kg
2,4,5-Trichlorophenol	40	0	No	<330 ug/Kg
2,4,6-Trichlorophenol	40	0	No	<330 ug/Kg
Aniline	40	0	No	<330 ug/Kg
Benzyl alcohol	40	0	No	<330 ug/Kg
Benzoic acid	40	0	No	<1600 ug/Kg
1,2-Diphenylhydrazine	40	0	No	<330 ug/Kg
Benzidine	40	0	No	<3300 ug/Kg
N-Nitrosodimethylamine	40	0	No	<330 ug/Kg
Dioxin/Furans				
1,2,3,4,6,7,8-HpCDD	40	4	Yes	2.5 pg/g
1,2,3,4,6,7,8-HpCDF	40	0	No	<0.2 pg/g
1,2,3,4,7,8,9-HpCDF	40	0	No	<0.2 pg/g
1,2,3,4,7,8-HxCDD	40	0	No	<0.3 pg/g
1,2,3,4,7,8-HxCDF	40	0	No	<0.2 pg/g
1,2,3,6,7,8-HxCDD	40	0	No	<0.3 pg/g
1,2,3,6,7,8-HxCDF	40	0	No	<0.1 pg/g
1,2,3,7,8,9-HxCDD	40	0	No	<0.3 pg/g

Analyte	Number of Samples	Number of Detects	Calculate Background?	Background Concentration
1,2,3,7,8,9-HxCDF	40	0	No	<0.2 pg/g
1,2,3,7,8-PeCDD	40	0	No	<0.4 pg/g
1,2,3,7,8-PeCDF	40	0	No	<0.2 pg/g
2,3,4,6,7,8-HxCDF	40	0	No	<0.2 pg/g
2,3,4,7,8-PeCDF	40	0	No	<0.2 pg/g
2,3,7,8-TCDD	40	0	No	<0.2 pg/g
2,3,7,8-TCDF	40	0	No	<0.2 pg/g
OCDD	40	19	Yes	28 pg/g[1], 11 pg/g[2]
OCDF	40	0	No	<0.7 pg/g
Total-HpCDD	40	5	Yes	<0.77 pg/g
Total-HpCDF	40	0	No	<0.3 pg/g
Total-HxCDD	40	0	No	<0.4 pg/g
Total-HxCDF	40	0	No	<2.4 pg/g
Total-PeCDD	40	0	No	<0.5 pg/g
Total-PeCDF	40	0	No	<0.2 pg/g
Total-TCDD	40	0	No	<0.3 pg/g
Total-TCDF	40	0	No	<0.2 pg/g
Explosives				
HMX	40	0	No	<0.25 mg/Kg
1,3,5-Trinitrobenzene	40	0	No	<0.25 mg/Kg
RDX	40	0	No	<0.25 mg/Kg
Nitrobenzene	40	1	Yes	1.0 mg/Kg
2,4,6-Trinitrotoluene	40	0	No	<0.25 mg/Kg
2,4-Dinitrotoluene	40	0	No	<0.25 mg/Kg
2,6-Dinitrotoluene	40	0	No	<0.25 mg/Kg
2-Amino-4,6-dinitrotoluene	40	0	No	<0.25 mg/Kg
4-Amino-2,6-dinitrotoluene	40	0	No	<0.25 mg/Kg
2-Nitrotoluene	40	0	No	<0.25 mg/Kg
4-Nitrotoluene	40	0	No	<0.25 mg/Kg
3-Nitrotoluene	40	0	No	<0.25 mg/Kg
Herbicides				
2,4-D	40	0	No	<80 ug/Kg
2,4,5-T	40	0	No	<20 ug/Kg
Herbicides (continued)				
2,4,5-TP (Silvex)	40	0	No	<20 ug/Kg
Metals				
Chromium+6	40	15	Yes	0.14 mg/Kg[1], 0.03 mg/Kg[2]
Antimony (Sb)	40	39	Yes	1.3 mg/Kg[1], 1.3 mg/Kg[2]
Arsenic (As)	40	40	Yes	4.8 mg/Kg
Beryllium (Be)	40	39	Yes	0.36 mg/Kg
Cadmium (Cd)	40	4	Yes	2.0 mg/Kg
Chromium (Cr)	40	40	Yes	10.0 mg/Kg
Copper (Cu)	40	40	Yes	15.3 mg/Kg
Lead (Pb)	40	40	Yes	6.4 mg/Kg
Manganese (Mn)	40	40	Yes	403 mg/Kg
Mercury (Hg)	40	4	Yes	0.5 mg/Kg
Nickel (Ni)	40	40	Yes	11.9 mg/Kg
Selenium (Se)	40	27	Yes	1.16 mg/Kg

Table 1. Umatilla Chemical Agent Disposal Facility (UMCDF) Background Soil Investigation - Background Concentrations for All Analytes (Continued)

Analyte	Number of Samples	Number of Detects	Calculate Background?	Background Concentration
Silver (Ag)	40	27	Yes	1.33 mg/Kg
Thallium (Tl)	40	32	Yes	1.0 mg/Kg[1], 0.7 mg/Kg[2]
Zinc (Zn)	40	40	Yes	60.2 mg/Kg
Organochlorine Pesticides				
Endrin Ketone	40	0	No	<3.4 ug/Kg
Aldrin	40	0	No	<1.7 ug/Kg
Alpha-BHC	40	0	No	<1.7 ug/Kg
Beta-BHC	40	6	Yes	0.85 ug/Kg[1], 0.85 ug/Kg[2]
Delta-BHC	40	0	No	<1.7 ug/Kg
Gamma-BHC (Lindane)	40	0	No	<1.7 ug/Kg
Alpha-chlordane	40	0	No	<1.7 ug/Kg
Gamma-chlordane	40	0	No	<1.7 ug/Kg
Dieldrin	40	0	No	<3.4 ug/Kg
4,4-DDD	40	0	No	<3.4 ug/Kg
4,4-DDE	40	0	No	<3.4 ug/Kg
4,4-DDT	40	0	No	<3.4 ug/Kg
Endrin	40	0	No	<3.4 ug/Kg
Endrin aldehyde	40	0	No	<3.4 ug/Kg
Endosulfan I	40	1	Yes	4.5 ug/Kg
Endosulfan II	40	1	Yes	4.5 ug/Kg
Endosulfan Sulfate	40	0	No	<3.4 ug/Kg
Heptachlor	40	0	No	<1.7 ug/Kg
Heptachlor epoxide	40	0	No	<1.7 ug/Kg
Methoxychlor	40	0	No	<17 ug/Kg
Toxaphene	40	0	No	<67 ug/Kg
Organophosphorous Pesticides				
Methyl azinphos (Guthion)	40	0	No	<33 ug/Kg
Chlorpyrifos	40	0	No	<33 ug/Kg
Coumaphos	40	0	No	<33 ug/Kg
Demeton-O	40	0	No	<33 ug/Kg
Demeton-S	40	0	No	<33 ug/Kg
Diazinon	40	0	No	<33 ug/Kg
Dichlorvos (DDVP)	40	0	No	<33 ug/Kg
Thionazin	40	0	No	<33 ug/Kg
Dimethoate	40	0	No	<33 ug/Kg
Disulfoton	40	0	No	<33 ug/Kg
Famphur	40	0	No	<33 ug/Kg
Fensulfothion	40	0	No	<33 ug/Kg
Fenthion	40	0	No	<33 ug/Kg
Methyl parathion	40	0	No	<33 ug/Kg
Parathion	40	0	No	<33 ug/Kg
Phorate	40	0	No	<33 ug/Kg
Ronnel	40	0	No	<33 ug/Kg
Stirophos (Tetrachlorovinphos)	40	0	No	<33 ug/Kg
Tokuthion (Protothiofos)	40	0	No	<33 ug/Kg
Trichloronate	40	0	No	<33 ug/Kg

Analyte	Number of Samples	Number of Detects	Calculate Background?	Background Concentration
O,O,O-Triethyl phosphorothio	40	0	No	<33 ug/Kg
Sulfotepp	40	0	No	<33 ug/Kg
Malathion	40	0	No	<33 ug/Kg
PCBs				
Aroclor 1016	40	0	No	<33 ug/Kg
Aroclor 1221	40	0	No	<33 ug/Kg
Aroclor 1232	40	0	No	<33 ug/Kg
Aroclor 1242	40	0	No	<33 ug/Kg
Aroclor 1248	40	0	No	<33 ug/Kg
Aroclor 1254	40	0	No	<33 ug/Kg
Aroclor 1260	40	0	No	<33 ug/Kg
Total Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons	40	4	Yes	13 mg/Kg
Volatile Organic Compounds				
Benzene	39	0	No	<4.8 ug/Kg
Bromobenzene	39	0	No	<4.8 ug/Kg
Bromochloromethane	39	0	No	<4.8 ug/Kg
Bromodichloromethane	39	0	No	<4.8 ug/Kg
Bromoform	39	0	No	<4.8 ug/Kg
Bromomethane	39	0	No	<4.8 ug/Kg
Volatile Organic Compounds (continued)				
n-Butylbenzene	39	0	No	<4.8 ug/Kg
sec-Butylbenzene	39	0	No	<4.8 ug/Kg
tert-Butylbenzene	39	0	No	<4.8 ug/Kg
Carbon tetrachloride	39	0	No	<4.8 ug/Kg
Chlorobenzene	39	0	No	<4.8 ug/Kg
Chloroethane	39	0	No	<4.8 ug/Kg
Chloroform	39	0	No	<4.8 ug/Kg
Chloromethane	39	0	No	<4.8 ug/Kg
2-Chlorotoluene	39	0	No	<4.8 ug/Kg
4-Chlorotoluene	39	0	No	<4.8 ug/Kg
Dibromochloromethane	39	0	No	<4.8 ug/Kg
DBCP (1,2-Dibromo-3-chloropropane)	39	0	No	<9.6 ug/Kg
1,2-Dibromoethane	39	0	No	<4.8 ug/Kg
Dibromomethane	39	0	No	<4.8 ug/Kg
1,2-Dichlorobenzene	39	0	No	<4.8 ug/Kg
1,3-Dichlorobenzene	39	0	No	<4.8 ug/Kg
1,4-Dichlorobenzene	39	0	No	<4.8 ug/Kg
Dichlorodifluoromethane (Freon-12)	39	30	Yes	6.7 ug/Kg
1,1-Dichloroethane	39	0	No	<4.8 ug/Kg
1,2-Dichloroethane	39	0	No	<4.8 ug/Kg
1,1-Dichloroethene	39	0	No	<4.8 ug/Kg
cis-1,2-Dichloroethene	39	0	No	<4.8 ug/Kg
trans-1,2-Dichloroethene	39	0	No	<4.8 ug/Kg
1,2-Dichloropropane	39	0	No	<4.8 ug/Kg
1,3-Dichloropropane	39	0	No	<4.8 ug/Kg
2,2-Dichloropropane	39	0	No	<4.8 ug/Kg
1,1-Dichloropropene	39	0	No	<4.8 ug/Kg

Table 1. Umatilla Chemical Agent Disposal Facility (UMCDF) Background Soil Investigation - Background Concentrations for All Analytes (Continued)

Analyte	Number of Samples	Number of Detects	Calculate Background?	Background Concentration
cis-1,3-Dichloropropene	39	0	No	<4.8 ug/Kg
trans-1,3-Dichloropropene	39	0	No	<4.8 ug/Kg
Ethylbenzene	39	0	No	<4.8 ug/Kg
Hexachlorobutadiene	39	0	No	<4.8 ug/Kg
Toluene	39	1	Yes	5.5 ug/Kg
Isopropylbenzene (1-Methylethylbenzene)	39	0	No	<4.8 ug/Kg
P-cymene (Isopropyltoluene)	39	0	No	<4.8 ug/Kg
Methylene chloride	39	1	Yes	6.5 ug/Kg
Naphthalene	39	0	No	<4.8 ug/Kg
n-Propyl benzene	39	0	No	<9.6 ug/Kg
Styrene	39	0	No	<4.8 ug/Kg
1,1,1,2-Tetrachloroethane	39	0	No	<4.8 ug/Kg
1,1,2,2-Tetrachloroethane	39	0	No	<4.8 ug/Kg
Tetrachloroethene	39	0	No	<4.8 ug/Kg
1,2,3-Trichlorobenzene	39	3	Yes	5.5 ug/Kg
1,2,4-Trichlorobenzene	39	1	Yes	5.5 ug/Kg
Volatile Organic Compounds (continued)				
1,1,1-Trichloroethane	39	0	No	<4.8 ug/Kg
1,1,2-Trichloroethane	39	0	No	<4.8 ug/Kg
Trichloroethene	39	0	No	<4.8 ug/Kg
Trichlorofluoromethane (Freon-11)	39	0	No	<4.8 ug/Kg
1,2,3-Trichloropropane	39	0	No	<4.8 ug/Kg
1,2,4-Trimethylbenzene	39	0	No	<4.8 ug/Kg
1,3,5-Trimethylbenzene	39	0	No	<4.8 ug/Kg
Vinyl chloride	39	0	No	<4.8 ug/Kg
m & p-Xylene(s)	39	2	Yes	5.5 ug/Kg
o-Xylene	39	0	No	<4.8 ug/Kg
Acetone	39	28	Yes	146 ug/Kg
Carbon disulfide	39	10	Yes	6.5 ug/Kg
2-Butanone	39	0	No	<9.6 ug/Kg
4-Methyl-2-pentanone	39	0	No	<9.6 ug/Kg
2-Hexanone	39	0	No	<9.6 ug/Kg

2.0 Introduction

This Final Report covers all of the samples collected and analyzed for the Background Soils Investigation at the future site of the Umatilla Chemical Agent Disposal Facility (UMCDF) located in Hermiston, Oregon. The UMCDF will be constructed for the purpose of destroying the Umatilla Chemical Depot (UMCD) stockpiled chemical agents in projectiles, ton containers, rockets, bombs, spray tanks, and land mines.

The analytical data given in this report will provide the background contaminant levels in soil samples collected from eight (8) borehole locations. The eight borehole locations were pre-selected as having a high potential for possible contamination from UMCDF activities.

The borehole soil samples and the equipment and trip blank samples were analyzed in accordance with the UMCDF QAPjP[1].

This Final Report provides validated analytical results for all eight boreholes, as well as for equipment blanks and trip blanks that were collected and analyzed in order to assess the maintenance of the integrity of the soil samples during the collection and shipping activities. The analytical data, summarized and tabulated in Appendices A, B, C, D, and E of this report, show the data qualifiers, or flags, that were assigned by the analytical laboratory, with the addition of the qualifiers that were assigned as a result of the data validation process. This report also includes a statistical analysis of the analytical data derived from the soil samples. This statistical analysis provides project analyte background concentrations as shown in Table 1.

2.1 Background Investigation Soil Samples Collected

Approximately 580 soil samples were collected from the borehole drilling activities at eight different boreholes. Samples from each borehole were obtained from 5 different intervals, or depths. These intervals were the following:

[1] "Quality Assurance Project Plan for Background Soils Investigation at the Umatilla Chemical Agent Disposal Facility", Revision No. 9, February 1998.

- Surface Grab
- 0-2 ft. Interval
- 2-4 ft. Interval
- 4-6 ft. Interval
- 8-10 ft. Interval

Each borehole interval was sampled for the required analytical parameters.

Approximately fifty-six (56) soil samples were collected as duplicate samples and were sampled for the same analytical parameters as the original samples.

Two types of field blanks were also collected and analyzed as part of this analytical program. Equipment Blank samples were obtained and analyzed to assess the cleanliness of the sampling equipment. Trip Blanks were obtained and analyzed to determine if cross-contamination occurred during either sample collection or sample shipment. Results for all Equipment Blanks and Trip Blanks are given in the data certificate section of this report. An assessment of these field blanks on the soil sample results is given in each parameter section of this report. The relationship between the field blanks and the borehole soil samples is given in Table 2.

Each Borehole Sample, Equipment Blank, and Trip Blank collected are listed in Table 3. This table is the Quanterra Master Sample List for the UMCDF Background Soils Investigation and contains the following information about the samples:

Table 2. Relationship Between Field Blanks and Borehole Soil Samples Collected at the UMCDF Site

Field Sample Number	Borehole Number	Sample Depth or Interval (ft.)	Date Sampled	Applicable Equipment Blank Name	Applicable Equipment Blank Field Number	Applicable Trip Blank Name	Applicable Trip Blank Field Number
Volatile Organic Compounds (VOCs)							
BH1-00-VOC-R	1	Surface	22-Sep-98	Equipment Blank #4	EB4-QC-VOC	Trip Blank #4	TB4-QC-VOC
BH1-02-VOC-R	1	0-2'	22-Sep-98	Equipment Blank #4	EB4-QC-VOC	Trip Blank #4	TB4-QC-VOC
BH1-04-VOC-R	1	2-4'	22-Sep-98	Equipment Blank #4	EB4-QC-VOC	Trip Blank #4	TB4-QC-VOC
BH1-06-VOC-R	1	4-6'	22-Sep-98	Equipment Blank #4	EB4-QC-VOC	Trip Blank #4	TB4-QC-VOC
BH1-10-VOC-R	1	8-10'	22-Sep-98	Equipment Blank #4	EB4-QC-VOC	Trip Blank #4	TB4-QC-VOC
BD1-10-VOC-R	1	8-10'	22-Sep-98	Equipment Blank #4	EB4-QC-VOC	Trip Blank #4	TB4-QC-VOC
BH2-00-VOC-R	2	Surface	22-Sep-98	Equipment Blank #4	EB4-QC-VOC	Trip Blank #4	TB4-QC-VOC
BH2-02-VOC-R	2	0-2'	22-Sep-98	Equipment Blank #4	EB4-QC-VOC	Trip Blank #4	TB4-QC-VOC
BH2-04-VOC-R	2	2-4'	22-Sep-98	Equipment Blank #4	EB4-QC-VOC	Trip Blank #4	TB4-QC-VOC
BD2-04-VOC-R	2	2-4'	22-Sep-98	Equipment Blank #4	EB4-QC-VOC	Trip Blank #4	TB4-QC-VOC
BH2-06-VOC-R	2	4-6'	22-Sep-98	Equipment Blank #4	EB4-QC-VOC	Trip Blank #4	TB4-QC-VOC
BH2-10-VOC-R	2	8-10'	22-Sep-98	Equipment Blank #4	EB4-QC-VOC	Trip Blank #4	TB4-QC-VOC
BH3-00-VOC	3	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-VOC	Trip Blank #1	TB1-QC-VOC
BH3-02-VOC	3	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-VOC	Trip Blank #1	TB1-QC-VOC
BH3-04-VOC	3	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-VOC	Trip Blank #1	TB1-QC-VOC
BH3-06-VOC	3	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-VOC	Trip Blank #1	TB1-QC-VOC
BH3-10-VOC	3	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-VOC	Trip Blank #1	TB1-QC-VOC
BH4-00-VOC	4	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH4-02-VOC	4	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH4-04-VOC	4	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH4-06-VOC	4	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH4-10-VOC	4	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH5-00-VOC	5	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-VOC	Trip Blank #1	TB1-QC-VOC
BH5-02-VOC	5	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-VOC	Trip Blank #1	TB1-QC-VOC
BH5-04-VOC	5	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-VOC	Trip Blank #1	TB1-QC-VOC
BH5-06-VOC	5	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-VOC	Trip Blank #1	TB1-QC-VOC
BH5-10-VOC	5	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-VOC	Trip Blank #1	TB1-QC-VOC
BH6-00-VOC	6	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH6-02-VOC	6	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH6-04-VOC	6	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH6-06-VOC	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BD6-06-VOC	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH6-10-VOC	6	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH7-00-VOC	7	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH7-02-VOC	7	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH7-04-VOC	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BD7-04-VOC	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH7-06-VOC	7	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH7-10-VOC	7	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH8-00-VOC	8	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH8-02-VOC	8	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH8-04-VOC	8	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
BH8-06-VOC	8	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC

Table 2. Relationship Between Field Blanks and Borehole Soil Samples Collected at the UMCDF Site (Continued)

Field Sample Number	Borehole Number	Sample Depth or Interval (ft.)	Date Sampled	Applicable Equipment Blank Name	Applicable Equipment Blank Field Number	Applicable Trip Blank Name	Applicable Trip Blank Field Number
BH8-10-VOC	8	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-VOC	Trip Blank #2	TB2-QC-VOC
Semivolatile Organic Compounds							
BH1-00-BNA	1	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-BNA	Trip Blank #3	TB3-QC-BNA
BH1-02-BNA	1	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-BNA	Trip Blank #3	TB3-QC-BNA
BH1-04-BNA	1	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-BNA	Trip Blank #3	TB3-QC-BNA
BH1-06-BNA	1	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-BNA	Trip Blank #3	TB3-QC-BNA
BH1-10-BNA	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-BNA	Trip Blank #3	TB3-QC-BNA
BD1-10-BNA	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-BNA	Trip Blank #3	TB3-QC-BNA
BH2-00-BNA	2	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-BNA	Trip Blank #3	TB3-QC-BNA
BH2-02-BNA	2	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-BNA	Trip Blank #3	TB3-QC-BNA
BH2-04-BNA	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-BNA	Trip Blank #3	TB3-QC-BNA
BD2-04-BNA	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-BNA	Trip Blank #3	TB3-QC-BNA
BH2-06-BNA	2	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-BNA	Trip Blank #3	TB3-QC-BNA
BH2-10-BNA	2	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-BNA	Trip Blank #3	TB3-QC-BNA
BH3-00-BNA	3	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-BNA	Trip Blank #1	TB1-QC-BNA
BH3-02-BNA	3	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-BNA	Trip Blank #1	TB1-QC-BNA
BH3-04-BNA	3	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-BNA	Trip Blank #1	TB1-QC-BNA
BH3-06-BNA	3	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-BNA	Trip Blank #1	TB1-QC-BNA
BH3-10-BNA	3	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-BNA	Trip Blank #1	TB1-QC-BNA
BH4-00-BNA	4	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH4-02-BNA	4	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH4-04-BNA	4	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH4-06-BNA	4	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH4-10-BNA	4	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH5-00-BNA	5	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-BNA	Trip Blank #1	TB1-QC-BNA
BH5-02-BNA	5	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-BNA	Trip Blank #1	TB1-QC-BNA
BH5-04-BNA	5	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-BNA	Trip Blank #1	TB1-QC-BNA
BH5-06-BNA	5	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-BNA	Trip Blank #1	TB1-QC-BNA
BH5-10-BNA	5	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-BNA	Trip Blank #1	TB1-QC-BNA
BH6-00-BNA	6	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH6-02-BNA	6	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH6-04-BNA	6	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH6-06-BNA	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BD6-06-BNA	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH6-10-BNA	6	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH7-00-BNA	7	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH7-02-BNA	7	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH7-04-BNA	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BD7-04-BNA	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH7-06-BNA	7	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH7-10-BNA	7	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH8-00-BNA	8	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH8-02-BNA	8	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA

Field Sample Number	Borehole Number	Sample Depth or Interval (ft.)	Date Sampled	Applicable Equipment Blank Name	Applicable Equipment Blank Field Number	Applicable Trip Blank Name	Applicable Trip Blank Field Number
BH8-04-BNA	8	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH8-06-BNA	8	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
BH8-10-BNA	8	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-BNA	Trip Blank #2	TB2-QC-BNA
Polychlorinated Biphenyls (PCBs)							
BH1-00-PCB	1	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-PCB	Trip Blank #3	TB3-QC-PCB
BH1-02-PCB	1	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-PCB	Trip Blank #3	TB3-QC-PCB
BH1-04-PCB	1	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-PCB	Trip Blank #3	TB3-QC-PCB
BH1-06-PCB	1	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-PCB	Trip Blank #3	TB3-QC-PCB
BH1-10-PCB	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-PCB	Trip Blank #3	TB3-QC-PCB
BD1-10-PCB	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-PCB	Trip Blank #3	TB3-QC-PCB
BH2-00-PCB	2	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-PCB	Trip Blank #3	TB3-QC-PCB
BH2-02-PCB	2	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-PCB	Trip Blank #3	TB3-QC-PCB
BH2-04-PCB	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-PCB	Trip Blank #3	TB3-QC-PCB
BD2-04-PCB	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-PCB	Trip Blank #3	TB3-QC-PCB
BH2-06-PCB	2	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-PCB	Trip Blank #3	TB3-QC-PCB
BH2-10-PCB	2	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-PCB	Trip Blank #3	TB3-QC-PCB
BH3-00-PCB	3	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-PCB	Trip Blank #1	TB1-QC-PCB
BH3-02-PCB	3	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-PCB	Trip Blank #1	TB1-QC-PCB
BH3-04-PCB	3	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-PCB	Trip Blank #1	TB1-QC-PCB
BH3-06-PCB	3	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-PCB	Trip Blank #1	TB1-QC-PCB
BH3-10-PCB	3	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-PCB	Trip Blank #1	TB1-QC-PCB
BH4-00-PCB	4	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH4-02-PCB	4	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH4-04-PCB	4	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH4-06-PCB	4	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH4-10-PCB	4	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH5-00-PCB	5	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-PCB	Trip Blank #1	TB1-QC-PCB
BH5-02-PCB	5	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-PCB	Trip Blank #1	TB1-QC-PCB
BH5-04-PCB	5	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-PCB	Trip Blank #1	TB1-QC-PCB
BH5-06-PCB	5	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-PCB	Trip Blank #1	TB1-QC-PCB
BH5-10-PCB	5	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-PCB	Trip Blank #1	TB1-QC-PCB
BH6-00-PCB	6	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH6-02-PCB	6	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH6-04-PCB	6	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH6-06-PCB	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BD6-06-PCB	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH6-10-PCB	6	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH7-00-PCB	7	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH7-02-PCB	7	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH7-04-PCB	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BD7-04-PCB	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH7-06-PCB	7	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH7-10-PCB	7	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH8-00-PCB	8	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH8-02-PCB	8	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB

Table 2. Relationship Between Field Blanks and Borehole Soil Samples Collected at the UMCDF Site (Continued)

Field Sample Number	Borehole Number	Sample Depth or Interval (ft.)	Date Sampled	Applicable Equipment Blank Name	Applicable Equipment Blank Field Number	Applicable Trip Blank Name	Applicable Trip Blank Field Number
BH8-04-PCB	8	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH8-06-PCB	8	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
BH8-10-PCB	8	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-PCB	Trip Blank #2	TB2-QC-PCB
Organochlorine Pesticides							
BH1-00-OCP	1	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-OCP	Trip Blank #3	TB3-QC-OCP
BH1-02-OCP	1	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-OCP	Trip Blank #3	TB3-QC-OCP
BH1-04-OCP	1	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-OCP	Trip Blank #3	TB3-QC-OCP
BH1-06-OCP	1	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-OCP	Trip Blank #3	TB3-QC-OCP
BH1-10-OCP	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-OCP	Trip Blank #3	TB3-QC-OCP
BD1-10-OCP	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-OCP	Trip Blank #3	TB3-QC-OCP
BH2-00-OCP	2	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-OCP	Trip Blank #3	TB3-QC-OCP
BH2-02-OCP	2	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-OCP	Trip Blank #3	TB3-QC-OCP
BH2-04-OCP	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-OCP	Trip Blank #3	TB3-QC-OCP
BD2-04-OCP	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-OCP	Trip Blank #3	TB3-QC-OCP
BH2-06-OCP	2	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-OCP	Trip Blank #3	TB3-QC-OCP
BH2-10-OCP	2	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-OCP	Trip Blank #3	TB3-QC-OCP
BH3-00-OCP	3	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-OCP	Trip Blank #1	TB1-QC-OCP
BH3-02-OCP	3	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-OCP	Trip Blank #1	TB1-QC-OCP
BH3-04-OCP	3	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-OCP	Trip Blank #1	TB1-QC-OCP
BH3-06-OCP	3	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-OCP	Trip Blank #1	TB1-QC-OCP
BH3-10-OCP	3	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-OCP	Trip Blank #1	TB1-QC-OCP
BH4-00-OCP	4	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH4-02-OCP	4	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH4-04-OCP	4	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH4-06-OCP	4	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH4-10-OCP	4	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH5-00-OCP	5	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-OCP	Trip Blank #1	TB1-QC-OCP
BH5-02-OCP	5	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-OCP	Trip Blank #1	TB1-QC-OCP
BH5-04-OCP	5	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-OCP	Trip Blank #1	TB1-QC-OCP
BH5-06-OCP	5	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-OCP	Trip Blank #1	TB1-QC-OCP
BH5-10-OCP	5	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-OCP	Trip Blank #1	TB1-QC-OCP
BH6-00-OCP	6	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH6-02-OCP	6	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH6-04-OCP	6	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH6-06-OCP	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BD6-06-OCP	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH6-10-OCP	6	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH7-00-OCP	7	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH7-02-OCP	7	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH7-04-OCP	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BD7-04-OCP	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH7-06-OCP	7	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH7-10-OCP	7	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP

Field Sample Number	Borehole Number	Sample Depth or Interval (ft.)	Date Sampled	Applicable Equipment Blank Name	Applicable Equipment Blank Field Number	Applicable Trip Blank Name	Applicable Trip Blank Field Number
BH8-00-OCP	8	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH8-02-OCP	8	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH8-04-OCP	8	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH8-06-OCP	8	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
BH8-10-OCP	8	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-OCP	Trip Blank #2	TB2-QC-OCP
Organophosphorous Pesticides							
BH1-00-OPP	1	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-OPP	Trip Blank #3	TB3-QC-OPP
BH1-02-OPP	1	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-OPP	Trip Blank #3	TB3-QC-OPP
BH1-04-OPP	1	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-OPP	Trip Blank #3	TB3-QC-OPP
BH1-06-OPP	1	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-OPP	Trip Blank #3	TB3-QC-OPP
BH1-10-OPP	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-OPP	Trip Blank #3	TB3-QC-OPP
BD1-10-OPP	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-OPP	Trip Blank #3	TB3-QC-OPP
BH2-00-OPP	2	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-OPP	Trip Blank #3	TB3-QC-OPP
BH2-02-OPP	2	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-OPP	Trip Blank #3	TB3-QC-OPP
BH2-04-OPP	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-OPP	Trip Blank #3	TB3-QC-OPP
BD2-04-OPP	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-OPP	Trip Blank #3	TB3-QC-OPP
BH2-06-OPP	2	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-OPP	Trip Blank #3	TB3-QC-OPP
BH2-10-OPP	2	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-OPP	Trip Blank #3	TB3-QC-OPP
BH3-00-OPP	3	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-OPP	Trip Blank #1	TB1-QC-OPP
BH3-02-OPP	3	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-OPP	Trip Blank #1	TB1-QC-OPP
BH3-04-OPP	3	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-OPP	Trip Blank #1	TB1-QC-OPP
BH3-06-OPP	3	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-OPP	Trip Blank #1	TB1-QC-OPP
BH3-10-OPP	3	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-OPP	Trip Blank #1	TB1-QC-OPP
BH4-00-OPP	4	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH4-02-OPP	4	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH4-04-OPP	4	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH4-06-OPP	4	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH4-10-OPP	4	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH5-00-OPP	5	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-OPP	Trip Blank #1	TB1-QC-OPP
BH5-02-OPP	5	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-OPP	Trip Blank #1	TB1-QC-OPP
BH5-04-OPP	5	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-OPP	Trip Blank #1	TB1-QC-OPP
BH5-06-OPP	5	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-OPP	Trip Blank #1	TB1-QC-OPP
BH5-10-OPP	5	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-OPP	Trip Blank #1	TB1-QC-OPP
BH6-00-OPP	6	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH6-02-OPP	6	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH6-04-OPP	6	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH6-06-OPP	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BD6-06-OPP	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH6-10-OPP	6	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH7-00-OPP	7	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH7-02-OPP	7	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH7-04-OPP	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BD7-04-OPP	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH7-06-OPP	7	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH7-10-OPP	7	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP

Table 2. Relationship Between Field Blanks and Borehole Soil Samples Collected at the UMCDF Site (Continued)

Field Sample Number	Borehole Number	Sample Depth or Interval (ft.)	Date Sampled	Applicable Equipment Blank Name	Applicable Equipment Blank Field Number	Applicable Trip Blank Name	Applicable Trip Blank Field Number
BH8-00-OPP	8	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH8-02-OPP	8	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH8-04-OPP	8	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH8-06-OPP	8	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
BH8-10-OPP	8	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-OPP	Trip Blank #2	TB2-QC-OPP
Dioxins/Furans							
BH1-00-DXF	1	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-DXF	Trip Blank #3	TB3-QC-DXF
BH1-02-DXF	1	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-DXF	Trip Blank #3	TB3-QC-DXF
BH1-04-DXF	1	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-DXF	Trip Blank #3	TB3-QC-DXF
BH1-06-DXF	1	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-DXF	Trip Blank #3	TB3-QC-DXF
BH1-10-DXF	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-DXF	Trip Blank #3	TB3-QC-DXF
BD1-10-DXF	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-DXF	Trip Blank #3	TB3-QC-DXF
BH2-00-DXF	2	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-DXF	Trip Blank #3	TB3-QC-DXF
BH2-02-DXF	2	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-DXF	Trip Blank #3	TB3-QC-DXF
BH2-04-DXF	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-DXF	Trip Blank #3	TB3-QC-DXF
BD2-04-DXF	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-DXF	Trip Blank #3	TB3-QC-DXF
BH2-06-DXF	2	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-DXF	Trip Blank #3	TB3-QC-DXF
BH2-10-DXF	2	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-DXF	Trip Blank #3	TB3-QC-DXF
BH3-00-DXF	3	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-DXF	Trip Blank #1	TB1-QC-DXF
BH3-02-DXF	3	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-DXF	Trip Blank #1	TB1-QC-DXF
BH3-04-DXF	3	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-DXF	Trip Blank #1	TB1-QC-DXF
BH3-06-DXF	3	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-DXF	Trip Blank #1	TB1-QC-DXF
BH3-10-DXF	3	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-DXF	Trip Blank #1	TB1-QC-DXF
BH4-00-DXF	4	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH4-02-DXF	4	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH4-04-DXF	4	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH4-06-DXF	4	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH4-10-DXF	4	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH5-00-DXF	5	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-DXF	Trip Blank #1	TB1-QC-DXF
BH5-02-DXF	5	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-DXF	Trip Blank #1	TB1-QC-DXF
BH5-04-DXF	5	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-DXF	Trip Blank #1	TB1-QC-DXF
BH5-06-DXF	5	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-DXF	Trip Blank #1	TB1-QC-DXF
BH5-10-DXF	5	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-DXF	Trip Blank #1	TB1-QC-DXF
BH6-00-DXF	6	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH6-02-DXF	6	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH6-04-DXF	6	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH6-06-DXF	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BD6-06-DXF	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH6-10-DXF	6	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH7-00-DXF	7	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH7-02-DXF	7	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH7-04-DXF	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BD7-04-DXF	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF

Field Sample Number	Borehole Number	Sample Depth or Interval (ft.)	Date Sampled	Applicable Equipment Blank Name	Applicable Equipment Blank Field Number	Applicable Trip Blank Name	Applicable Trip Blank Field Number
BH7-06-DXF	7	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH7-10-DXF	7	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH8-00-DXF	8	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH8-02-DXF	8	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH8-04-DXF	8	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH8-06-DXF	8	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
BH8-10-DXF	8	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-DXF	Trip Blank #2	TB2-QC-DXF
Chlorinated Herbicides							
BH1-00-HRB	1	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-HRB	Trip Blank #3	TB3-QC-HRB
BH1-02-HRB	1	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-HRB	Trip Blank #3	TB3-QC-HRB
BH1-04-HRB	1	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-HRB	Trip Blank #3	TB3-QC-HRB
BH1-06-HRB	1	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-HRB	Trip Blank #3	TB3-QC-HRB
BH1-10-HRB	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-HRB	Trip Blank #3	TB3-QC-HRB
BD1-10-HRB	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-HRB	Trip Blank #3	TB3-QC-HRB
BH2-00-HRB	2	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-HRB	Trip Blank #3	TB3-QC-HRB
BH2-02-HRB	2	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-HRB	Trip Blank #3	TB3-QC-HRB
BH2-04-HRB	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-HRB	Trip Blank #3	TB3-QC-HRB
BD2-04-HRB	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-HRB	Trip Blank #3	TB3-QC-HRB
BH2-06-HRB	2	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-HRB	Trip Blank #3	TB3-QC-HRB
BH2-10-HRB	2	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-HRB	Trip Blank #3	TB3-QC-HRB
BH3-00-HRB	3	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-HRB	Trip Blank #1	TB1-QC-HRB
BH3-02-HRB	3	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-HRB	Trip Blank #1	TB1-QC-HRB
BH3-04-HRB	3	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-HRB	Trip Blank #1	TB1-QC-HRB
BH3-06-HRB	3	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-HRB	Trip Blank #1	TB1-QC-HRB
BH3-10-HRB	3	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-HRB	Trip Blank #1	TB1-QC-HRB
BH4-00-HRB	4	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH4-02-HRB	4	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH4-04-HRB	4	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH4-06-HRB	4	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH4-10-HRB	4	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH5-00-HRB	5	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-HRB	Trip Blank #1	TB1-QC-HRB
BH5-02-HRB	5	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-HRB	Trip Blank #1	TB1-QC-HRB
BH5-04-HRB	5	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-HRB	Trip Blank #1	TB1-QC-HRB
BH5-06-HRB	5	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-HRB	Trip Blank #1	TB1-QC-HRB
BH5-10-HRB	5	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-HRB	Trip Blank #1	TB1-QC-HRB
BH6-00-HRB	6	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH6-02-HRB	6	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH6-04-HRB	6	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH6-06-HRB	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BD6-06-HRB	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH6-10-HRB	6	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH7-00-HRB	7	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH7-02-HRB	7	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH7-04-HRB	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BD7-04-HRB	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB

Table 2. Relationship Between Field Blanks and Borehole Soil Samples Collected at the UMCDF Site (Continued)

Field Sample Number	Borehole Number	Sample Depth or Interval (ft.)	Date Sampled	Applicable Equipment Blank Name	Applicable Equipment Blank Field Number	Applicable Trip Blank Name	Applicable Trip Blank Field Number
BH7-06-HRB	7	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH7-10-HRB	7	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH8-00-HRB	8	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH8-02-HRB	8	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH8-04-HRB	8	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH8-06-HRB	8	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
BH8-10-HRB	8	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-HRB	Trip Blank #2	TB2-QC-HRB
Explosives							
BH1-00-EXP	1	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-EXP	Trip Blank #3	TB3-QC-EXP
BH1-02-EXP	1	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-EXP	Trip Blank #3	TB3-QC-EXP
BH1-04-EXP	1	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-EXP	Trip Blank #3	TB3-QC-EXP
BH1-06-EXP	1	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-EXP	Trip Blank #3	TB3-QC-EXP
BH1-10-EXP	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-EXP	Trip Blank #3	TB3-QC-EXP
BD1-10-EXP	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-EXP	Trip Blank #3	TB3-QC-EXP
BH2-00-EXP	2	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-EXP	Trip Blank #3	TB3-QC-EXP
BH2-02-EXP	2	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-EXP	Trip Blank #3	TB3-QC-EXP
BH2-04-EXP	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-EXP	Trip Blank #3	TB3-QC-EXP
BD2-04-EXP	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-EXP	Trip Blank #3	TB3-QC-EXP
BH2-06-EXP	2	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-EXP	Trip Blank #3	TB3-QC-EXP
BH2-10-EXP	2	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-EXP	Trip Blank #3	TB3-QC-EXP
BH3-00-EXP	3	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-EXP	Trip Blank #1	TB1-QC-EXP
BH3-02-EXP	3	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-EXP	Trip Blank #1	TB1-QC-EXP
BH3-04-EXP	3	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-EXP	Trip Blank #1	TB1-QC-EXP
BH3-06-EXP	3	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-EXP	Trip Blank #1	TB1-QC-EXP
BH3-10-EXP	3	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-EXP	Trip Blank #1	TB1-QC-EXP
BH4-00-EXP	4	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH4-02-EXP	4	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH4-04-EXP	4	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH4-06-EXP	4	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH4-10-EXP	4	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH5-00-EXP	5	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-EXP	Trip Blank #1	TB1-QC-EXP
BH5-02-EXP	5	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-EXP	Trip Blank #1	TB1-QC-EXP
BH5-04-EXP	5	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-EXP	Trip Blank #1	TB1-QC-EXP
BH5-06-EXP	5	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-EXP	Trip Blank #1	TB1-QC-EXP
BH5-10-EXP	5	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-EXP	Trip Blank #1	TB1-QC-EXP
BH6-00-EXP	6	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH6-02-EXP	6	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH6-04-EXP	6	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH6-06-EXP	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BD6-06-EXP	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH6-10-EXP	6	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH7-00-EXP	7	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH7-02-EXP	7	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP

Field Sample Number	Borehole Number	Sample Depth or Interval (ft.)	Date Sampled	Applicable Equipment Blank Name	Applicable Equipment Blank Field Number	Applicable Trip Blank Name	Applicable Trip Blank Field Number
BH7-04-EXP	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BD7-04-EXP	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH7-06-EXP	7	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH7-10-EXP	7	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH8-00-EXP	8	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH8-02-EXP	8	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH8-04-EXP	8	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH8-06-EXP	8	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
BH8-10-EXP	8	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-EXP	Trip Blank #2	TB2-QC-EXP
Metals							
BH1-00-MET	1	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-MET	Trip Blank #3	TB3-QC-MET
BH1-02-MET	1	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-MET	Trip Blank #3	TB3-QC-MET
BH1-04-MET	1	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-MET	Trip Blank #3	TB3-QC-MET
BH1-06-MET	1	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-MET	Trip Blank #3	TB3-QC-MET
BH1-10-MET	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-MET	Trip Blank #3	TB3-QC-MET
BD1-10-MET	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-MET	Trip Blank #3	TB3-QC-MET
BH2-00-MET	2	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-MET	Trip Blank #3	TB3-QC-MET
BH2-02-MET	2	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-MET	Trip Blank #3	TB3-QC-MET
BH2-04-MET	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-MET	Trip Blank #3	TB3-QC-MET
BD2-04-MET	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-MET	Trip Blank #3	TB3-QC-MET
BH2-06-MET	2	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-MET	Trip Blank #3	TB3-QC-MET
BH2-10-MET	2	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-MET	Trip Blank #3	TB3-QC-MET
BH3-00-MET	3	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-MET	Trip Blank #1	TB1-QC-MET
BH3-02-MET	3	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-MET	Trip Blank #1	TB1-QC-MET
BH3-04-MET	3	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-MET	Trip Blank #1	TB1-QC-MET
BH3-06-MET	3	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-MET	Trip Blank #1	TB1-QC-MET
BH3-10-MET	3	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-MET	Trip Blank #1	TB1-QC-MET
BH4-00-MET	4	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH4-02-MET	4	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH4-04-MET	4	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH4-06-MET	4	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH4-10-MET	4	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH5-00-MET	5	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-MET	Trip Blank #1	TB1-QC-MET
BH5-02-MET	5	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-MET	Trip Blank #1	TB1-QC-MET
BH5-04-MET	5	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-MET	Trip Blank #1	TB1-QC-MET
BH5-06-MET	5	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-MET	Trip Blank #1	TB1-QC-MET
BH5-10-MET	5	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-MET	Trip Blank #1	TB1-QC-MET
BH6-00-MET	6	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH6-02-MET	6	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH6-04-MET	6	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH6-06-MET	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BD6-06-MET	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH6-10-MET	6	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH7-00-MET	7	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH7-02-MET	7	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET

Table 2. Relationship Between Field Blanks and Borehole Soil Samples Collected at the UMCDF Site (Continued)

Field Sample Number	Borehole Number	Sample Depth or Interval (ft.)	Date Sampled	Applicable Equipment Blank Name	Applicable Equipment Blank Field Number	Applicable Trip Blank Name	Applicable Trip Blank Field Number
BH7-04-MET	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BD7-04-MET	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH7-06-MET	7	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH7-10-MET	7	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH8-00-MET	8	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH8-02-MET	8	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH8-04-MET	8	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH8-06-MET	8	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
BH8-10-MET	8	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-MET	Trip Blank #2	TB2-QC-MET
Hexavalent Chromium							
BH1-00-CHR	1	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-CHR	Trip Blank #3	TB3-QC-CHR
BH1-02-CHR	1	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-CHR	Trip Blank #3	TB3-QC-CHR
BH1-04-CHR	1	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-CHR	Trip Blank #3	TB3-QC-CHR
BH1-06-CHR	1	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-CHR	Trip Blank #3	TB3-QC-CHR
BH1-10-CHR	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-CHR	Trip Blank #3	TB3-QC-CHR
BD1-10-CHR	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-CHR	Trip Blank #3	TB3-QC-CHR
BH2-00-CHR	2	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-CHR	Trip Blank #3	TB3-QC-CHR
BH2-02-CHR	2	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-CHR	Trip Blank #3	TB3-QC-CHR
BH2-04-CHR	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-CHR	Trip Blank #3	TB3-QC-CHR
BD2-04-CHR	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-CHR	Trip Blank #3	TB3-QC-CHR
BH2-06-CHR	2	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-CHR	Trip Blank #3	TB3-QC-CHR
BH2-10-CHR	2	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-CHR	Trip Blank #3	TB3-QC-CHR
BH3-00-CHR	3	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-CHR	Trip Blank #1	TB1-QC-CHR
BH3-02-CHR	3	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-CHR	Trip Blank #1	TB1-QC-CHR
BH3-04-CHR	3	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-CHR	Trip Blank #1	TB1-QC-CHR
BH3-06-CHR	3	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-CHR	Trip Blank #1	TB1-QC-CHR
BH3-10-CHR	3	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-CHR	Trip Blank #1	TB1-QC-CHR
BH4-00-CHR	4	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH4-02-CHR	4	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH4-04-CHR	4	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH4-06-CHR	4	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH4-10-CHR	4	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH5-00-CHR	5	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-CHR	Trip Blank #1	TB1-QC-CHR
BH5-02-CHR	5	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-CHR	Trip Blank #1	TB1-QC-CHR
BH5-04-CHR	5	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-CHR	Trip Blank #1	TB1-QC-CHR
BH5-06-CHR	5	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-CHR	Trip Blank #1	TB1-QC-CHR
BH5-10-CHR	5	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-CHR	Trip Blank #1	TB1-QC-CHR
BH6-00-CHR	6	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH6-02-CHR	6	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH6-04-CHR	6	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH6-06-CHR	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BD6-06-CHR	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH6-10-CHR	6	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR

Field Sample Number	Borehole Number	Sample Depth or Interval (ft.)	Date Sampled	Applicable Equipment Blank Name	Applicable Equipment Blank Field Number	Applicable Trip Blank Name	Applicable Trip Blank Field Number
BH7-00-CHR	7	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH7-02-CHR	7	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH7-04-CHR	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BD7-04-CHR	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH7-06-CHR	7	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH7-10-CHR	7	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH8-00-CHR	8	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH8-02-CHR	8	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH8-04-CHR	8	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH8-06-CHR	8	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
BH8-10-CHR	8	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-CHR	Trip Blank #2	TB2-QC-CHR
Total Recoverable Petroleum Hydrocarbons							
BH1-00-TPH	1	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-TPH	Trip Blank #3	TB3-QC-TPH
BH1-02-TPH	1	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-TPH	Trip Blank #3	TB3-QC-TPH
BH1-04-TPH	1	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-TPH	Trip Blank #3	TB3-QC-TPH
BH1-06-TPH	1	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-TPH	Trip Blank #3	TB3-QC-TPH
BH1-10-TPH	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-TPH	Trip Blank #3	TB3-QC-TPH
BD1-10-TPH	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-TPH	Trip Blank #3	TB3-QC-TPH
BH2-00-TPH	2	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-TPH	Trip Blank #3	TB3-QC-TPH
BH2-02-TPH	2	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-TPH	Trip Blank #3	TB3-QC-TPH
BH2-04-TPH	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-TPH	Trip Blank #3	TB3-QC-TPH
BD2-04-TPH	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-TPH	Trip Blank #3	TB3-QC-TPH
BH2-06-TPH	2	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-TPH	Trip Blank #3	TB3-QC-TPH
BH2-10-TPH	2	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-TPH	Trip Blank #3	TB3-QC-TPH
BH3-00-TPH	3	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-TPH	Trip Blank #1	TB1-QC-TPH
BH3-02-TPH	3	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-TPH	Trip Blank #1	TB1-QC-TPH
BH3-04-TPH	3	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-TPH	Trip Blank #1	TB1-QC-TPH
BH3-06-TPH	3	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-TPH	Trip Blank #1	TB1-QC-TPH
BH3-10-TPH	3	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-TPH	Trip Blank #1	TB1-QC-TPH
BH4-00-TPH	4	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH4-02-TPH	4	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH4-04-TPH	4	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH4-06-TPH	4	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH4-10-TPH	4	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH5-00-TPH	5	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-TPH	Trip Blank #1	TB1-QC-TPH
BH5-02-TPH	5	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-TPH	Trip Blank #1	TB1-QC-TPH
BH5-04-TPH	5	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-TPH	Trip Blank #1	TB1-QC-TPH
BH5-06-TPH	5	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-TPH	Trip Blank #1	TB1-QC-TPH
BH5-10-TPH	5	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-TPH	Trip Blank #1	TB1-QC-TPH
BH6-00-TPH	6	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH6-02-TPH	6	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH6-04-TPH	6	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH6-06-TPH	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BD6-06-TPH	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH6-10-TPH	6	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH

Table 2. Relationship Between Field Blanks and Borehole Soil Samples Collected at the UMCDF Site (Continued)

Field Sample Number	Borehole Number	Sample Depth or Interval (ft.)	Date Sampled	Applicable Equipment Blank Name	Applicable Equipment Blank Field Number	Applicable Trip Blank Name	Applicable Trip Blank Field Number
BH7-00-TPH	7	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH7-02-TPH	7	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH7-04-TPH	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BD7-04-TPH	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH7-06-TPH	7	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH7-10-TPH	7	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH8-00-TPH	8	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH8-02-TPH	8	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH8-04-TPH	8	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH8-06-TPH	8	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
BH8-10-TPH	8	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-TPH	Trip Blank #2	TB2-QC-TPH
Inorganic Anions							
BH1-00-ANI	1	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-ANI	Trip Blank #3	TB3-QC-ANI
BH1-02-ANI	1	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-ANI	Trip Blank #3	TB3-QC-ANI
BH1-04-ANI	1	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-ANI	Trip Blank #3	TB3-QC-ANI
BH1-06-ANI	1	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-ANI	Trip Blank #3	TB3-QC-ANI
BH1-10-ANI	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-ANI	Trip Blank #3	TB3-QC-ANI
BD1-10-ANI	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-ANI	Trip Blank #3	TB3-QC-ANI
BH2-00-ANI	2	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-ANI	Trip Blank #3	TB3-QC-ANI
BH2-02-ANI	2	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-ANI	Trip Blank #3	TB3-QC-ANI
BH2-04-ANI	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-ANI	Trip Blank #3	TB3-QC-ANI
BD2-04-ANI	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-ANI	Trip Blank #3	TB3-QC-ANI
BH2-06-ANI	2	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-ANI	Trip Blank #3	TB3-QC-ANI
BH2-10-ANI	2	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-ANI	Trip Blank #3	TB3-QC-ANI
BH3-00-ANI	3	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-ANI	Trip Blank #1	TB1-QC-ANI
BH3-02-ANI	3	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-ANI	Trip Blank #1	TB1-QC-ANI
BH3-04-ANI	3	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-ANI	Trip Blank #1	TB1-QC-ANI
BH3-06-ANI	3	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-ANI	Trip Blank #1	TB1-QC-ANI
BH3-10-ANI	3	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-ANI	Trip Blank #1	TB1-QC-ANI
BH4-00-ANI	4	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH4-02-ANI	4	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH4-04-ANI	4	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH4-06-ANI	4	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH4-10-ANI	4	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH5-00-ANI	5	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-ANI	Trip Blank #1	TB1-QC-ANI
BH5-02-ANI	5	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-ANI	Trip Blank #1	TB1-QC-ANI
BH5-04-ANI	5	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-ANI	Trip Blank #1	TB1-QC-ANI
BH5-06-ANI	5	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-ANI	Trip Blank #1	TB1-QC-ANI
BH5-10-ANI	5	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-ANI	Trip Blank #1	TB1-QC-ANI
BH6-00-ANI	6	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH6-02-ANI	6	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH6-04-ANI	6	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH6-06-ANI	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI

Field Sample Number	Borehole Number	Sample Depth or Interval (ft.)	Date Sampled	Applicable Equipment Blank Name	Applicable Equipment Blank Field Number	Applicable Trip Blank Name	Applicable Trip Blank Field Number
BD6-06-ANI	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH6-10-ANI	6	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH7-00-ANI	7	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH7-02-ANI	7	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH7-04-ANI	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BD7-04-ANI	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH7-06-ANI	7	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH7-10-ANI	7	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH8-00-ANI	8	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH8-02-ANI	8	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH8-04-ANI	8	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH8-06-ANI	8	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
BH8-10-ANI	8	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-ANI	Trip Blank #2	TB2-QC-ANI
Cyanide							
BH1-00-CYN	1	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-CYN	Trip Blank #3	TB3-QC-CYN
BH1-02-CYN	1	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-CYN	Trip Blank #3	TB3-QC-CYN
BH1-04-CYN	1	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-CYN	Trip Blank #3	TB3-QC-CYN
BH1-06-CYN	1	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-CYN	Trip Blank #3	TB3-QC-CYN
BH1-10-CYN	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-CYN	Trip Blank #3	TB3-QC-CYN
BD1-10-CYN	1	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-CYN	Trip Blank #3	TB3-QC-CYN
BH2-00-CYN	2	Surface	03-Sep-98	Equipment Blank #3	EB3-QC-CYN	Trip Blank #3	TB3-QC-CYN
BH2-02-CYN	2	0-2'	03-Sep-98	Equipment Blank #3	EB3-QC-CYN	Trip Blank #3	TB3-QC-CYN
BH2-04-CYN	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-CYN	Trip Blank #3	TB3-QC-CYN
BD2-04-CYN	2	2-4'	03-Sep-98	Equipment Blank #3	EB3-QC-CYN	Trip Blank #3	TB3-QC-CYN
BH2-06-CYN	2	4-6'	03-Sep-98	Equipment Blank #3	EB3-QC-CYN	Trip Blank #3	TB3-QC-CYN
BH2-10-CYN	2	8-10'	03-Sep-98	Equipment Blank #3	EB3-QC-CYN	Trip Blank #3	TB3-QC-CYN
BH3-00-CYN	3	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-CYN	Trip Blank #1	TB1-QC-CYN
BH3-02-CYN	3	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-CYN	Trip Blank #1	TB1-QC-CYN
BH3-04-CYN	3	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-CYN	Trip Blank #1	TB1-QC-CYN
BH3-06-CYN	3	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-CYN	Trip Blank #1	TB1-QC-CYN
BH3-10-CYN	3	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-CYN	Trip Blank #1	TB1-QC-CYN
BH4-00-CYN	4	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH4-02-CYN	4	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH4-04-CYN	4	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH4-06-CYN	4	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH4-10-CYN	4	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH5-00-CYN	5	Surface	01-Sep-98	Equipment Blank #1	EB1-QC-CYN	Trip Blank #1	TB1-QC-CYN
BH5-02-CYN	5	0-2'	01-Sep-98	Equipment Blank #1	EB1-QC-CYN	Trip Blank #1	TB1-QC-CYN
BH5-04-CYN	5	2-4'	01-Sep-98	Equipment Blank #1	EB1-QC-CYN	Trip Blank #1	TB1-QC-CYN
BH5-06-CYN	5	4-6'	01-Sep-98	Equipment Blank #1	EB1-QC-CYN	Trip Blank #1	TB1-QC-CYN
BH5-10-CYN	5	8-10'	01-Sep-98	Equipment Blank #1	EB1-QC-CYN	Trip Blank #1	TB1-QC-CYN
BH6-00-CYN	6	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH6-02-CYN	6	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH6-04-CYN	6	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH6-06-CYN	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN

Table 2. Relationship Between Field Blanks and Borehole Soil Samples Collected at the UMCDF Site (Continued)

Field Sample Number	Borehole Number	Sample Depth or Interval (ft.)	Date Sampled	Applicable Equipment Blank Name	Applicable Equipment Blank Field Number	Applicable Trip Blank Name	Applicable Trip Blank Field Number
BD6-06-CYN	6	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH6-10-CYN	6	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH7-00-CYN	7	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH7-02-CYN	7	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH7-04-CYN	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BD7-04-CYN	7	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH7-06-CYN	7	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH7-10-CYN	7	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH8-00-CYN	8	Surface	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH8-02-CYN	8	0-2'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH8-04-CYN	8	2-4'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH8-06-CYN	8	4-6'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
BH8-10-CYN	8	8-10'	02-Sep-98	Equipment Blank #2	EB2-QC-CYN	Trip Blank #2	TB2-QC-CYN
Chemical Agent							
BH1-00-AGT-RR	1	Surface	19-Nov-98	Equipment Blank #7	EB7-QC-AGT	Trip Blank #7	TB7-QC-AGT
BH1-02-AGT-RR	1	0-2'	19-Nov-98	Equipment Blank #7	EB7-QC-AGT	Trip Blank #7	TB7-QC-AGT
BH1-04-AGT-RR	1	2-4'	19-Nov-98	Equipment Blank #7	EB7-QC-AGT	Trip Blank #7	TB7-QC-AGT
BH1-06-AGT-RR	1	4-6'	19-Nov-98	Equipment Blank #7	EB7-QC-AGT	Trip Blank #7	TB7-QC-AGT
BH1-10-AGT-RR	1	8-10'	19-Nov-98	Equipment Blank #7	EB7-QC-AGT	Trip Blank #7	TB7-QC-AGT
BD1-10-AGT-RR	1	8-10'	19-Nov-98	Equipment Blank #7	EB7-QC-AGT	Trip Blank #7	TB7-QC-AGT
BH2-00-AGT-RR	2	Surface	19-Nov-98	Equipment Blank #7	EB7-QC-AGT	Trip Blank #7	TB7-QC-AGT
BH2-02-AGT-RR	2	0-2'	19-Nov-98	Equipment Blank #7	EB7-QC-AGT	Trip Blank #7	TB7-QC-AGT
BH2-04-AGT-RR	2	2-4'	19-Nov-98	Equipment Blank #7	EB7-QC-AGT	Trip Blank #7	TB7-QC-AGT
BD2-04-AGT-RR	2	2-4'	19-Nov-98	Equipment Blank #7	EB7-QC-AGT	Trip Blank #7	TB7-QC-AGT
BH2-06-AGT-RR	2	4-6'	19-Nov-98	Equipment Blank #7	EB7-QC-AGT	Trip Blank #7	TB7-QC-AGT
BH2-10-AGT-RR	2	8-10'	19-Nov-98	Equipment Blank #7	EB7-QC-AGT	Trip Blank #7	TB7-QC-AGT
BH3-00-AGT-R	3	Surface	17-Nov-98	Equipment Blank #5	EB5-QC-AGT	Trip Blank #5	TB5-QC-AGT
BH3-02-AGT-R	3	0-2'	17-Nov-98	Equipment Blank #5	EB5-QC-AGT	Trip Blank #5	TB5-QC-AGT
BH3-04-AGT-R	3	2-4'	17-Nov-98	Equipment Blank #5	EB5-QC-AGT	Trip Blank #5	TB5-QC-AGT
BH3-06-AGT-R	3	4-6'	17-Nov-98	Equipment Blank #5	EB5-QC-AGT	Trip Blank #5	TB5-QC-AGT
BH3-10-AGT-R	3	8-10'	17-Nov-98	Equipment Blank #5	EB5-QC-AGT	Trip Blank #5	TB5-QC-AGT
BH4-00-AGT-R	4	Surface	18-Nov-98	Equipment Blank #6	EB6-QC-AGT	Trip Blank #6	TB6-QC-AGT
BH4-02-AGT-R	4	0-2'	18-Nov-98	Equipment Blank #6	EB6-QC-AGT	Trip Blank #6	TB6-QC-AGT
BH4-04-AGT-R	4	2-4'	18-Nov-98	Equipment Blank #6	EB6-QC-AGT	Trip Blank #6	TB6-QC-AGT
BH4-06-AGT-R	4	4-6'	18-Nov-98	Equipment Blank #6	EB6-QC-AGT	Trip Blank #6	TB6-QC-AGT
BH4-10-AGT-R	4	8-10'	18-Nov-98	Equipment Blank #6	EB6-QC-AGT	Trip Blank #6	TB6-QC-AGT
BH5-00-AGT-R	5	Surface	17-Nov-98	Equipment Blank #5	EB5-QC-AGT	Trip Blank #5	TB5-QC-AGT
BH5-02-AGT-R	5	0-2'	17-Nov-98	Equipment Blank #5	EB5-QC-AGT	Trip Blank #5	TB5-QC-AGT
BH5-04-AGT-R	5	2-4'	17-Nov-98	Equipment Blank #5	EB5-QC-AGT	Trip Blank #5	TB5-QC-AGT
BH5-06-AGT-R	5	4-6'	17-Nov-98	Equipment Blank #5	EB5-QC-AGT	Trip Blank #5	TB5-QC-AGT
BH5-10-AGT-R	5	8-10'	17-Nov-98	Equipment Blank #5	EB5-QC-AGT	Trip Blank #5	TB5-QC-AGT
BH6-00-AGT-R	6	Surface	17-Nov-98	Equipment Blank #5	EB5-QC-AGT	Trip Blank #5	TB5-QC-AGT
BH6-02-AGT-R	6	0-2'	17-Nov-98	Equipment Blank #5	EB5-QC-AGT	Trip Blank #5	TB5-QC-AGT

Field Sample Number	Borehole Number	Sample Depth or Interval (ft.)	Date Sampled	Applicable Equipment Blank Name	Applicable Equipment Blank Field Number	Applicable Trip Blank Name	Applicable Trip Blank Field Number
BH6-04-AGT-R	6	2-4'	17-Nov-98	Equipment Blank #5	EB5-QC-AGT	Trip Blank #5	TB5-QC-AGT
BH6-06-AGT-R	6	4-6'	17-Nov-98	Equipment Blank #5	EB5-QC-AGT	Trip Blank #5	TB5-QC-AGT
BD6-06-AGT-R	6	4-6'	17-Nov-98	Equipment Blank #5	EB5-QC-AGT	Trip Blank #5	TB5-QC-AGT
BH6-10-AGT-R	6	8-10'	17-Nov-98	Equipment Blank #5	EB5-QC-AGT	Trip Blank #5	TB5-QC-AGT
BH7-00-AGT-R	7	Surface	18-Nov-98	Equipment Blank #6	EB6-QC-AGT	Trip Blank #6	TB6-QC-AGT
BH7-02-AGT-R	7	0-2'	18-Nov-98	Equipment Blank #6	EB6-QC-AGT	Trip Blank #6	TB6-QC-AGT
BH7-04-AGT-R	7	2-4'	18-Nov-98	Equipment Blank #6	EB6-QC-AGT	Trip Blank #6	TB6-QC-AGT
BD7-04-AGT-R	7	2-4'	18-Nov-98	Equipment Blank #6	EB6-QC-AGT	Trip Blank #6	TB6-QC-AGT
BH7-06-AGT-R	7	4-6'	18-Nov-98	Equipment Blank #6	EB6-QC-AGT	Trip Blank #6	TB6-QC-AGT
BH7-10-AGT-R	7	8-10'	18-Nov-98	Equipment Blank #6	EB6-QC-AGT	Trip Blank #6	TB6-QC-AGT
BH8-00-AGT-R	8	Surface	18-Nov-98	Equipment Blank #6	EB6-QC-AGT	Trip Blank #6	TB6-QC-AGT
BH8-02-AGT-R	8	0-2'	18-Nov-98	Equipment Blank #6	EB6-QC-AGT	Trip Blank #6	TB6-QC-AGT
BH8-04-AGT-R	8	2-4'	18-Nov-98	Equipment Blank #6	EB6-QC-AGT	Trip Blank #6	TB6-QC-AGT
BH8-06-AGT-R	8	4-6'	18-Nov-98	Equipment Blank #6	EB6-QC-AGT	Trip Blank #6	TB6-QC-AGT
BH8-10-AGT-R	8	8-10'	18-Nov-98	Equipment Blank #6	EB6-QC-AGT	Trip Blank #6	TB6-QC-AGT

Table 3. Quanterra Master Sample List for Umatilla Chemical Agent Disposal Facility (UMCDF) Background Soils Investigation

Field Sample No.	Borehole No.	Sample Depth or Interval (ft.)	RFA No.(1)	Sample Description	Date Sampled	Analytical Parameter	Laboratory	GB, VX, Mustard	Volatiles	Semivolatiles	Organochlorine Pesticides	PCBs	Metals (including Hg)	Chromium (VI)	Cyanide	Oranophosphorous Cmpds.	Chlorinated Herbicides	Petroleum Hydrocarbons	Dioxins & Furans	Explosives	Anions	QC Sample Type	Sample Container	Preservative
TB1-QC-VOC	N/A	N/A	034	Trip Blank	01-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□	TB	2 x 40 mL VOA vials	Cool, 4ºC, HCl to pH < 2
TB1-QC-BNA	N/A	N/A	034	Trip Blank	01-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB1-QC-OCP	N/A	N/A	034	Trip Blank	01-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB1-QC-PCB	N/A	N/A	034	Trip Blank	01-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB1-QC-MET	N/A	N/A	034	Trip Blank	01-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□	TB	250 mL Bottle	Cool, 4ºC, HNO_3 to pH < 2
TB1-QC-CYN	N/A	N/A	034	Trip Blank	01-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC, NaOH to pH > 12
TB1-QC-OPP	N/A	N/A	035	Trip Blank	01-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB1-QC-HRB	N/A	N/A	035	Trip Blank	01-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB1-QC-TPH	N/A	N/A	035	Trip Blank	01-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□	TB	1 Liter Bottle	Cool, 4ºC, 5 mL 1:1 HCl
TB1-QC-DXF	N/A	N/A	034	Trip Blank	01-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB1-QC-EXP	N/A	N/A	034	Trip Blank	01-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□	TB	1 Liter Bottle	Cool, 4ºC
TB1-QC-ANI	N/A	N/A	034	Trip Blank	01-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√	TB	1 Liter Bottle	Cool, 4ºC
TB2-QC-VOC	N/A	N/A	037	Trip Blank	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□	TB	2 x 40 mL VOA vials	Cool, 4ºC, HCl to pH < 2
TB2-QC-BNA	N/A	N/A	037	Trip Blank	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB2-QC-OCP	N/A	N/A	037	Trip Blank	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB2-QC-PCB	N/A	N/A	037	Trip Blank	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB2-QC-MET	N/A	N/A	037	Trip Blank	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□	TB	250 mL Bottle	Cool, 4ºC, HNO_3 to pH < 2
TB2-QC-CYN	N/A	N/A	037	Trip Blank	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC, NaOH to pH > 12
TB2-QC-OPP	N/A	N/A	038	Trip Blank	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB2-QC-HRB	N/A	N/A	038	Trip Blank	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB2-QC-TPH	N/A	N/A	038	Trip Blank	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□	TB	1 Liter Bottle	Cool, 4ºC, 5 mL 1:1 HCl
TB2-QC-DXF	N/A	N/A	037	Trip Blank	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB2-QC-EXP	N/A	N/A	037	Trip Blank	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□	TB	1 Liter Bottle	Cool, 4ºC
TB2-QC-ANI	N/A	N/A	037	Trip Blank	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√	TB	1 Liter Bottle	Cool, 4ºC
TB3-QC-BNA	N/A	N/A	040	Trip Blank	03-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB3-QC-OCP	N/A	N/A	040	Trip Blank	03-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB3-QC-PCB	N/A	N/A	040	Trip Blank	03-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB3-QC-MET	N/A	N/A	040	Trip Blank	03-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□	TB	250 mL Bottle	Cool, 4ºC, HNO_3 to pH < 2
TB3-QC-CYN	N/A	N/A	040	Trip Blank	03-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC, NaOH to pH > 12
TB3-QC-OPP	N/A	N/A	041	Trip Blank	03-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB3-QC-HRB	N/A	N/A	041	Trip Blank	03-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB3-QC-TPH	N/A	N/A	041	Trip Blank	03-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□	TB	1 Liter Bottle	Cool, 4ºC, 5 mL 1:1 HCl
TB3-QC-DXF	N/A	N/A	040	Trip Blank	03-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□	TB	1 Liter Bottle	Cool, 4ºC
TB3-QC-EXP	N/A	N/A	040	Trip Blank	03-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□	TB	1 Liter Bottle	Cool, 4ºC
TB3-QC-ANI	N/A	N/A	040	Trip Blank	03-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√	TB	1 Liter Bottle	Cool, 4ºC
TB4-QC-VOC	N/A	N/A	049	Trip Blank	22-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□	TB	2 x 40 mL VOA vials	Cool, 4ºC, HCl to pH < 2
TB5-QC-AGT	N/A	N/A	050	Trip Blank	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□	TB	3 x 1L Bottles	Cool, 4ºC
TB6-QC-AGT	N/A	N/A	050	Trip Blank	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□	TB	3 x 1L Bottles	Cool, 4ºC
TB7-QC-AGT	N/A	N/A	050	Trip Blank	19-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□	TB & MS/MSD	3 x 1L Bottles	Cool, 4ºC
EB1-QC-VOC	N/A	N/A	025	Equipment Blank	01-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□	EB	2 x 40 mL VOA vials	Cool, 4ºC, HCl to pH < 2
EB1-QC-BNA	N/A	N/A	025	Equipment Blank	01-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB1-QC-OCP	N/A	N/A	025	Equipment Blank	01-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB1-QC-PCB	N/A	N/A	025	Equipment Blank	01-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB1-QC-MET	N/A	N/A	025	Equipment Blank	01-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□	EB	250 mL Bottle	Cool, 4ºC, HNO_3 to pH < 2
EB1-QC-CYN	N/A	N/A	025	Equipment Blank	01-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC, NaOH to pH > 12
EB1-QC-OPP	N/A	N/A	026	Equipment Blank	01-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB1-QC-HRB	N/A	N/A	026	Equipment Blank	01-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB1-QC-TPH	N/A	N/A	026	Equipment Blank	01-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□	EB	1 Liter Bottle	Cool, 4ºC, 5 mL 1:1 HCl

Field Sample No.	Borehole No.	Sample Depth or Interval (ft.)	RFA No.[1]	Sample Description	Date Sampled	Analytical Parameter	Laboratory	GB, VX, Mustard	Volatiles	Semivolatiles	Organochlorine Pesticides	PCBs	Metals (including Hg)	Chromium (VI)	Cyanide	Oranophosphorous Cmpds.	Chlorinated Herbicides	Petroleum Hydrocarbons	Dioxins & Furans	Explosives	Anions	QC Sample Type	Sample Container	Preservative
EB1-QC-DXF	N/A	N/A	025	Equipment Blank	01-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB1-QC-EXP	N/A	N/A	025	Equipment Blank	01-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□	EB	1 Liter Bottle	Cool, 4ºC
EB1-QC-ANI	N/A	N/A	025	Equipment Blank	01-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√	EB	1 Liter Bottle	Cool, 4ºC
EB2-QC-VOC	N/A	N/A	028	Equipment Blank	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□	EB	2 x 40 mL VOA vials	Cool, 4ºC, HCl to pH < 2
EB2-QC-BNA	N/A	N/A	028	Equipment Blank	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB2-QC-OCP	N/A	N/A	028	Equipment Blank	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB2-QC-PCB	N/A	N/A	028	Equipment Blank	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB2-QC-MET	N/A	N/A	028	Equipment Blank	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□	EB	250 mL Bottle	Cool, 4ºC, HNO_3 to pH < 2
EB2-QC-CYN	N/A	N/A	028	Equipment Blank	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC, NaOH to pH > 12
EB2-QC-OPP	N/A	N/A	029	Equipment Blank	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB2-QC-HRB	N/A	N/A	029	Equipment Blank	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB2-QC-TPH	N/A	N/A	029	Equipment Blank	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□	EB	1 Liter Bottle	Cool, 4ºC, 5 mL 1:1 HCl
EB2-QC-DXF	N/A	N/A	028	Equipment Blank	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB2-QC-EXP	N/A	N/A	028	Equipment Blank	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□	EB	1 Liter Bottle	Cool, 4ºC
EB2-QC-ANI	N/A	N/A	028	Equipment Blank	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√	EB	1 Liter Bottle	Cool, 4ºC
EB3-QC-BNA	N/A	N/A	031	Equipment Blank	03-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB3-QC-OCP	N/A	N/A	031	Equipment Blank	03-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB3-QC-PCB	N/A	N/A	031	Equipment Blank	03-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB3-QC-MET	N/A	N/A	031	Equipment Blank	03-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□	EB	250 mL Bottle	Cool, 4ºC, HNO_3 to pH < 2
EB3-QC-CYN	N/A	N/A	031	Equipment Blank	03-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC, NaOH to pH > 12
EB3-QC-OPP	N/A	N/A	032	Equipment Blank	03-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB3-QC-HRB	N/A	N/A	032	Equipment Blank	03-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB3-QC-TPH	N/A	N/A	032	Equipment Blank	03-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□	EB	1 Liter Bottle	Cool, 4ºC, 5 mL 1:1 HCl
EB3-QC-DXF	N/A	N/A	031	Equipment Blank	03-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□	EB	1 Liter Bottle	Cool, 4ºC
EB3-QC-EXP	N/A	N/A	031	Equipment Blank	03-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□	EB	1 Liter Bottle	Cool, 4ºC
EB3-QC-ANI	N/A	N/A	031	Equipment Blank	03-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√	EB	1 Liter Bottle	Cool, 4ºC
EB4-QC-VOC	N/A	N/A	047	Equipment Blank	22-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□	EB	2 x 40 mL VOA vials	Cool, 4ºC, HCl to pH < 2
EB5-QC-AGT	N/A	N/A	048	Equipment Blank	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□	EB	3 x 1L Bottles	Cool, 4ºC
EB6-QC-AGT	N/A	N/A	048	Equipment Blank	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□	EB	3 x 1L Bottles	Cool, 4ºC
EB7-QC-AGT	N/A	N/A	048	Equipment Blank	19-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□	EB	3 x 1L Bottles	Cool, 4ºC
BH1-00-AGT-RR	1	Surface	044	Soil	19-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH1-00-VOC-R	1	Surface	044	Soil	22-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4ºC, EnCore into MeOH 48 hours
BH1-00-BNA	1	Surface	001	Soil	03-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH1-00-OCP	1	Surface	001	Soil	03-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH1-00-PCB	1	Surface	001	Soil	03-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH1-00-MET	1	Surface	001	Soil	03-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH1-00-CHR	1	Surface	001	Soil	03-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH1-00-CYN	1	Surface	001	Soil	03-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH1-00-OPP	1	Surface	002	Soil	03-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH1-00-HRB	1	Surface	002	Soil	03-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4ºC
BH1-00-TPH	1	Surface	002	Soil	03-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH1-00-DXF	1	Surface	001	Soil	03-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4ºC
BH1-00-EXP	1	Surface	001	Soil	03-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4ºC
BH1-00-ANI	1	Surface	001	Soil	03-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4ºC
BH1-02-AGT-RR	1	0-2'	044	Soil	19-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH1-02-VOC-R	1	0-2'	044	Soil	22-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4ºC, EnCore into MeOH 48 hours
BH1-02-BNA	1	0-2'	001	Soil	03-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH1-02-OCP	1	0-2'	001	Soil	03-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH1-02-PCB	1	0-2'	001	Soil	03-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC

Table 3. Quanterra Master Sample List for Umatilla Chemical Agent Disposal Facility (UMCDF) Background Soils Investigation (Continued)

Field Sample No.	Borehole No.	Sample Depth or Interval (ft.)	RFA No.[1]	Sample Description	Date Sampled	Analytical Parameter	Laboratory	GB, VX, Mustard	Volatiles	Semivolatiles	Organochlorine Pesticides	PCBs	Metals (including Hg)	Chromium (VI)	Cyanide	Oranophosphorous Cmpds.	Chlorinated Herbicides	Petroleum Hydrocarbons	Dioxins & Furans	Explosives	Anions	QC Sample Type	Sample Container	Preservative
BH1-02-MET	1	0-2'	001	Soil	03-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-02-CHR	1	0-2'	001	Soil	03-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-02-CYN	1	0-2'	001	Soil	03-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-02-OPP	1	0-2'	002	Soil	03-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-02-HRB	1	0-2'	002	Soil	03-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-02-TPH	1	0-2'	002	Soil	03-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-02-DXF	1	0-2'	001	Soil	03-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-02-EXP	1	0-2'	001	Soil	03-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH1-02-ANI	1	0-2'	001	Soil	03-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH1-04-AGT-RR	1	2-4'	044	Soil	19-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH1-04-VOC-R	1	2-4'	044	Soil	22-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□	MS/MSD	EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH1-04-BNA	1	2-4'	001	Soil	03-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH1-04-OCP	1	2-4'	001	Soil	03-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH1-04-PCB	1	2-4'	001	Soil	03-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH1-04-MET	1	2-4'	001	Soil	03-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH1-04-CHR	1	2-4'	001	Soil	03-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH1-04-CYN	1	2-4'	001	Soil	03-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH1-04-OPP	1	2-4'	002	Soil	03-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH1-04-HRB	1	2-4'	002	Soil	03-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-04-TPH	1	2-4'	002	Soil	03-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH1-04-DXF	1	2-4'	001	Soil	03-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH1-04-EXP	1	2-4'	001	Soil	03-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH1-04-ANI	1	2-4'	001	Soil	03-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH1-06-AGT-RR	1	4-6'	044	Soil	19-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-06-VOC-R	1	4-6'	044	Soil	22-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH1-06-BNA	1	4-6'	001	Soil	03-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-06-OCP	1	4-6'	001	Soil	03-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-06-PCB	1	4-6'	001	Soil	03-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-06-MET	1	4-6'	001	Soil	03-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-06-CHR	1	4-6'	001	Soil	03-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-06-CYN	1	4-6'	001	Soil	03-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-06-OPP	1	4-6'	002	Soil	03-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-06-HRB	1	4-6'	002	Soil	03-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-06-TPH	1	4-6'	002	Soil	03-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-06-DXF	1	4-6'	001	Soil	03-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-06-EXP	1	4-6'	001	Soil	03-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH1-06-ANI	1	4-6'	001	Soil	03-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH1-10-AGT-RR	1	8-10'	044	Soil	19-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-10-VOC-R	1	8-10'	044	Soil	22-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH1-10-BNA	1	8-10'	001	Soil	03-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-10-OCP	1	8-10'	001	Soil	03-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-10-PCB	1	8-10'	001	Soil	03-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-10-MET	1	8-10'	001	Soil	03-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-10-CHR	1	8-10'	001	Soil	03-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-10-CYN	1	8-10'	001	Soil	03-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-10-OPP	1	8-10'	002	Soil	03-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-10-HRB	1	8-10'	002	Soil	03-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-10-TPH	1	8-10'	002	Soil	03-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C

Field Sample No.	Borehole No.	Sample Depth or Interval (ft.)	RFA No.(1)	Sample Description	Date Sampled	Analytical Parameter	Laboratory	GB, VX, Mustard	Volatiles	Semivolatiles	Organochlorine Pesticides	PCBs	Metals (including Hg)	Chromium (VI)	Cyanide	Oranophosphorous Cmpds.	Chlorinated Herbicides	Petroleum Hydrocarbons	Dioxins & Furans	Explosives	Anions	QC Sample Type	Sample Container	Preservative
BH1-10-DXF	1	8-10'	001	Soil	03-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH1-10-EXP	1	8-10'	001	Soil	03-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH1-10-ANI	1	8-10'	001	Soil	03-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BD1-10-AGT-RR	1	8-10'	044	Soil Duplicate	19-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD1-10-VOC-R	1	8-10'	044	Soil Duplicate	22-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□	DUP	EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BD1-10-BNA	1	8-10'	001	Soil Duplicate	03-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD1-10-OCP	1	8-10'	001	Soil Duplicate	03-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD1-10-PCB	1	8-10'	001	Soil Duplicate	03-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD1-10-MET	1	8-10'	001	Soil Duplicate	03-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD1-10-CHR	1	8-10'	001	Soil Duplicate	03-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD1-10-CYN	1	8-10'	001	Soil Duplicate	03-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD1-10-OPP	1	8-10'	002	Soil Duplicate	03-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD1-10-HRB	1	8-10'	002	Soil Duplicate	03-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD1-10-TPH	1	8-10'	002	Soil Duplicate	03-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD1-10-DXF	1	8-10'	001	Soil Duplicate	03-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD1-10-EXP	1	8-10'	001	Soil Duplicate	03-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD1-10-ANI	1	8-10'	001	Soil Duplicate	03-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√	DUP	8 oz. widemouth glass	Cool, 4°C
BH2-00-AGT-RR	2	Surface	043	Soil	19-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-00-VOC-R	2	Surface	043	Soil	22-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH2-00-BNA	2	Surface	004	Soil	03-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-00-OCP	2	Surface	004	Soil	03-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-00-PCB	2	Surface	004	Soil	03-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-00-MET	2	Surface	004	Soil	03-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-00-CHR	2	Surface	004	Soil	03-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-00-CYN	2	Surface	004	Soil	03-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-00-OPP	2	Surface	005	Soil	03-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-00-HRB	2	Surface	005	Soil	03-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-00-TPH	2	Surface	005	Soil	03-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-00-DXF	2	Surface	004	Soil	03-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-00-EXP	2	Surface	004	Soil	03-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH2-00-ANI	2	Surface	004	Soil	03-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH2-02-AGT-RR	2	0-2'	043	Soil	19-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-02-VOC-R	2	0-2'	043	Soil	22-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH2-02-BNA	2	0-2'	004	Soil	03-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-02-OCP	2	0-2'	004	Soil	03-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-02-PCB	2	0-2'	004	Soil	03-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-02-MET	2	0-2'	004	Soil	03-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-02-CHR	2	0-2'	004	Soil	03-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-02-CYN	2	0-2'	004	Soil	03-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-02-OPP	2	0-2'	005	Soil	03-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-02-HRB	2	0-2'	005	Soil	03-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-02-TPH	2	0-2'	005	Soil	03-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-02-DXF	2	0-2'	004	Soil	03-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-02-EXP	2	0-2'	004	Soil	03-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH2-02-ANI	2	0-2'	004	Soil	03-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH2-04-AGT-RR	2	2-4'	043	Soil	19-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-04-VOC-R	2	2-4'	043	Soil	22-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH2-04-BNA	2	2-4'	004	Soil	03-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-04-OCP	2	2-4'	004	Soil	03-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C

Table 3. Quanterra Master Sample List for Umatilla Chemical Agent Disposal Facility (UMCDF) Background Soils Investigation (Continued)

Field Sample No.	Borehole No.	Sample Depth or Interval (ft.)	RFA No.(1)	Sample Description	Date Sampled	Analytical Parameter	Laboratory	GB, VX, Mustard	Volatiles	Semivolatiles	Organochlorine Pesticides	PCBs	Metals (including Hg)	Chromium (VI)	Cyanide	Oranophosphorous Cmpds.	Chlorinated Herbicides	Petroleum Hydrocarbons	Dioxins & Furans	Explosives	Anions	QC Sample Type	Sample Container	Preservative
BH2-04-PCB	2	2-4'	004	Soil	03-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-04-MET	2	2-4'	004	Soil	03-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-04-CHR	2	2-4'	004	Soil	03-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-04-CYN	2	2-4'	004	Soil	03-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-04-OPP	2	2-4'	005	Soil	03-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-04-HRB	2	2-4'	005	Soil	03-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-04-TPH	2	2-4'	005	Soil	03-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-04-DXF	2	2-4'	004	Soil	03-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-04-EXP	2	2-4'	004	Soil	03-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH2-04-ANI	2	2-4'	004	Soil	03-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BD2-04-AGT-RR	2	2-4'	043	Soil Duplicate	19-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD2-04-VOC-R	2	2-4'	043	Soil Duplicate	22-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□	DUP	EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BD2-04-BNA	2	2-4'	004	Soil Duplicate	03-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD2-04-OCP	2	2-4'	004	Soil Duplicate	03-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD2-04-PCB	2	2-4'	004	Soil Duplicate	03-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD2-04-MET	2	2-4'	004	Soil Duplicate	03-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD2-04-CHR	2	2-4'	004	Soil Duplicate	03-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD2-04-CYN	2	2-4'	004	Soil Duplicate	03-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD2-04-OPP	2	2-4'	005	Soil Duplicate	03-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD2-04-HRB	2	2-4'	005	Soil Duplicate	03-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD2-04-TPH	2	2-4'	005	Soil Duplicate	03-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD2-04-DXF	2	2-4'	004	Soil Duplicate	03-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD2-04-EXP	2	2-4'	004	Soil Duplicate	03-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD2-04-ANI	2	2-4'	004	Soil Duplicate	03-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√	DUP	8 oz. widemouth glass	Cool, 4°C
BH2-06-AGT-RR	2	4-6'	043	Soil	19-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-06-VOC-R	2	4-6'	043	Soil	22-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH2-06-BNA	2	4-6'	004	Soil	03-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-06-OCP	2	4-6'	004	Soil	03-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-06-PCB	2	4-6'	004	Soil	03-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-06-MET	2	4-6'	004	Soil	03-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-06-CHR	2	4-6'	004	Soil	03-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-06-CYN	2	4-6'	004	Soil	03-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-06-OPP	2	4-6'	005	Soil	03-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-06-HRB	2	4-6'	005	Soil	03-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-06-TPH	2	4-6'	005	Soil	03-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-06-DXF	2	4-6'	004	Soil	03-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-06-EXP	2	4-6'	004	Soil	03-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH2-06-ANI	2	4-6'	004	Soil	03-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH2-10-AGT-RR	2	8-10'	043	Soil	19-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-10-VOC-R	2	8-10'	043	Soil	22-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH2-10-BNA	2	8-10'	004	Soil	03-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-10-OCP	2	8-10'	004	Soil	03-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-10-PCB	2	8-10'	004	Soil	03-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-10-MET	2	8-10'	004	Soil	03-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-10-CHR	2	8-10'	004	Soil	03-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-10-CYN	2	8-10'	004	Soil	03-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-10-OPP	2	8-10'	005	Soil	03-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH2-10-HRB	2	8-10'	005	Soil	03-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C

Field Sample No.	Borehole No.	Sample Depth or Interval (ft.)	RFA No.(1)	Sample Description	Date Sampled	Analytical Parameter	Laboratory	GB, VX, Mustard	Volatiles	Semivolatiles	Organochlorine Pesticides	PCBs	Metals (including Hg)	Chromium (VI)	Cyanide	Oranophosphorous Cmpds.	Chlorinated Herbicides	Petroleum Hydrocarbons	Dioxins & Furans	Explosives	Anions	QC Sample Type	Sample Container	Preservative
BH2-10-TPH	2	8-10'	005	Soil	03-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH2-10-DXF	2	8-10'	004	Soil	03-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4ºC
BH2-10-EXP	2	8-10'	004	Soil	03-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4ºC
BH2-10-ANI	2	8-10'	004	Soil	03-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4ºC
BH3-00-AGT-R	3	Surface	009	Soil	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□	MS/MSD	120 mL glass	Cool, 4ºC
BH3-00-VOC	3	Surface	007	Soil	01-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4ºC, EnCore into MeOH 48 hours
BH3-00-BNA	3	Surface	007	Soil	01-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-00-OCP	3	Surface	007	Soil	01-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-00-PCB	3	Surface	007	Soil	01-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-00-MET	3	Surface	007	Soil	01-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-00-CHR	3	Surface	007	Soil	01-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-00-CYN	3	Surface	007	Soil	01-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-00-OPP	3	Surface	008	Soil	01-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-00-HRB	3	Surface	008	Soil	01-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-00-TPH	3	Surface	008	Soil	01-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-00-DXF	3	Surface	007	Soil	01-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-00-EXP	3	Surface	007	Soil	01-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4ºC
BH3-00-ANI	3	Surface	007	Soil	01-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4ºC
BH3-02-AGT-R	3	0-2'	009	Soil	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4ºC
BH3-02-VOC	3	0-2'	007	Soil	01-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4ºC, EnCore into MeOH 48 hours
BH3-02-BNA	3	0-2'	007	Soil	01-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-02-OCP	3	0-2'	007	Soil	01-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-02-PCB	3	0-2'	007	Soil	01-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-02-MET	3	0-2'	007	Soil	01-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-02-CHR	3	0-2'	007	Soil	01-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-02-CYN	3	0-2'	007	Soil	01-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-02-OPP	3	0-2'	008	Soil	01-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-02-HRB	3	0-2'	008	Soil	01-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-02-TPH	3	0-2'	008	Soil	01-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-02-DXF	3	0-2'	007	Soil	01-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-02-EXP	3	0-2'	007	Soil	01-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4ºC
BH3-02-ANI	3	0-2'	007	Soil	01-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4ºC
BH3-04-AGT-R	3	2-4'	009	Soil	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4ºC
BH3-04-VOC	3	2-4'	007	Soil	01-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4ºC, EnCore into MeOH 48 hours
BH3-04-BNA	3	2-4'	007	Soil	01-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-04-OCP	3	2-4'	007	Soil	01-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-04-PCB	3	2-4'	007	Soil	01-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-04-MET	3	2-4'	007	Soil	01-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-04-CHR	3	2-4'	007	Soil	01-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-04-CYN	3	2-4'	007	Soil	01-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-04-OPP	3	2-4'	008	Soil	01-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-04-HRB	3	2-4'	008	Soil	01-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-04-TPH	3	2-4'	008	Soil	01-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-04-DXF	3	2-4'	007	Soil	01-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4ºC
BH3-04-EXP	3	2-4'	007	Soil	01-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4ºC
BH3-04-ANI	3	2-4'	007	Soil	01-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4ºC
BH3-06-AGT-R	3	4-6'	009	Soil	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4ºC
BH3-06-VOC	3	4-6'	007	Soil	01-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4ºC, EnCore into MeOH 48 hours
BH3-06-BNA	3	4-6'	007	Soil	01-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC

Table 3. Quanterra Master Sample List for Umatilla Chemical Agent Disposal Facility (UMCDF) Background Soils Investigation (Continued)

Field Sample No.	Borehole No.	Sample Depth or Interval (ft.)	RFA No.(1)	Sample Description	Date Sampled	Analytical Parameter	Laboratory	GB, VX, Mustard	Volatiles	Semivolatiles	Organochlorine Pesticides	PCBs	Metals (including Hg)	Chromium (VI)	Cyanide	Oranophosphorous Cmpds.	Chlorinated Herbicides	Petroleum Hydrocarbons	Dioxins & Furans	Explosives	Anions	QC Sample Type	Sample Container	Preservative
BH3-06-OCP	3	4-6'	007	Soil	01-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-06-PCB	3	4-6'	007	Soil	01-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-06-MET	3	4-6'	007	Soil	01-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-06-CHR	3	4-6'	007	Soil	01-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-06-CYN	3	4-6'	007	Soil	01-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-06-OPP	3	4-6'	008	Soil	01-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-06-HRB	3	4-6'	008	Soil	01-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-06-TPH	3	4-6'	008	Soil	01-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-06-DXF	3	4-6'	007	Soil	01-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-06-EXP	3	4-6'	007	Soil	01-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH3-06-ANI	3	4-6'	007	Soil	01-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH3-10-AGT-R	3	8-10'	009	Soil	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH3-10-VOC	3	8-10'	007	Soil	01-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH3-10-BNA	3	8-10'	007	Soil	01-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-10-OCP	3	8-10'	007	Soil	01-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-10-PCB	3	8-10'	007	Soil	01-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-10-MET	3	8-10'	007	Soil	01-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-10-CHR	3	8-10'	007	Soil	01-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-10-CYN	3	8-10'	007	Soil	01-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-10-OPP	3	8-10'	008	Soil	01-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-10-HRB	3	8-10'	008	Soil	01-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-10-TPH	3	8-10'	008	Soil	01-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-10-DXF	3	8-10'	007	Soil	01-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH3-10-EXP	3	8-10'	007	Soil	01-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH3-10-ANI	3	8-10'	007	Soil	01-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH4-00-AGT-R	4	Surface	012	Soil	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH4-00-VOC	4	Surface	010	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH4-00-BNA	4	Surface	010	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-00-OCP	4	Surface	010	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-00-PCB	4	Surface	010	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-00-MET	4	Surface	010	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-00-CHR	4	Surface	010	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-00-CYN	4	Surface	010	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-00-OPP	4	Surface	011	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-00-HRB	4	Surface	011	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-00-TPH	4	Surface	011	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-00-DXF	4	Surface	010	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-00-EXP	4	Surface	010	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH4-00-ANI	4	Surface	010	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH4-02-AGT-R	4	0-2'	012	Soil	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH4-02-VOC	4	0-2'	010	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH4-02-BNA	4	0-2'	010	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-02-OCP	4	0-2'	010	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-02-PCB	4	0-2'	010	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-02-MET	4	0-2'	010	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-02-CHR	4	0-2'	010	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-02-CYN	4	0-2'	010	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-02-OPP	4	0-2'	011	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C

Field Sample No.	Borehole No.	Sample Depth or Interval (ft.)	RFA No.(1)	Sample Description	Date Sampled	Analytical Parameter	Laboratory	GB, VX, Mustard	Volatiles	Semivolatiles	Organochlorine Pesticides	PCBs	Metals (including Hg)	Chromium (VI)	Cyanide	Oranophosphorous Cmpds.	Chlorinated Herbicides	Petroleum Hydrocarbons	Dioxins & Furans	Explosives	Anions	QC Sample Type	Sample Container	Preservative
BH4-02-HRB	4	0-2'	011	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-02-TPH	4	0-2'	011	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-02-DXF	4	0-2'	010	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-02-EXP	4	0-2'	010	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH4-02-ANI	4	0-2'	010	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH4-04-AGT-R	4	2-4'	012	Soil	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH4-04-VOC	4	2-4'	010	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH4-04-BNA	4	2-4'	010	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-04-OCP	4	2-4'	010	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-04-PCB	4	2-4'	010	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-04-MET	4	2-4'	010	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-04-CHR	4	2-4'	010	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-04-CYN	4	2-4'	010	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-04-OPP	4	2-4'	011	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-04-HRB	4	2-4'	011	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-04-TPH	4	2-4'	011	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-04-DXF	4	2-4'	010	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-04-EXP	4	2-4'	010	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH4-04-ANI	4	2-4'	010	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH4-06-AGT-R	4	4-6'	012	Soil	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□	MS/MSD	120 mL glass	Cool, 4°C
BH4-06-VOC	4	4-6'	010	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH4-06-BNA	4	4-6'	010	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH4-06-OCP	4	4-6'	010	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH4-06-PCB	4	4-6'	010	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH4-06-MET	4	4-6'	010	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH4-06-CHR	4	4-6'	010	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH4-06-CYN	4	4-6'	010	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH4-06-OPP	4	4-6'	011	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH4-06-HRB	4	4-6'	011	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH4-06-TPH	4	4-6'	011	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH4-06-DXF	4	4-6'	010	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH4-06-EXP	4	4-6'	010	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH4-06-ANI	4	4-6'	010	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH4-10-AGT-R	4	8-10'	012	Soil	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH4-10-VOC	4	8-10'	010	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH4-10-BNA	4	8-10'	010	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-10-OCP	4	8-10'	010	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-10-PCB	4	8-10'	010	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-10-MET	4	8-10'	010	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-10-CHR	4	8-10'	010	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-10-CYN	4	8-10'	010	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-10-OPP	4	8-10'	011	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-10-HRB	4	8-10'	011	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-10-TPH	4	8-10'	011	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-10-DXF	4	8-10'	010	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH4-10-EXP	4	8-10'	010	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH4-10-ANI	4	8-10'	010	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH5-00-AGT-R	5	Surface	015	Soil	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH5-00-VOC	5	Surface	013	Soil	01-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours

Table 3. Quanterra Master Sample List for Umatilla Chemical Agent Disposal Facility (UMCDF) Background Soils Investigation (Continued)

Field Sample No.	Borehole No.	Sample Depth or Interval (ft.)	RFA No.(1)	Sample Description	Date Sampled	Analytical Parameter	Laboratory	GB, VX, Mustard	Volatiles	Semivolatiles	Organochlorine Pesticides	PCBs	Metals (including Hg)	Chromium (VI)	Cyanide	Oranophosphorous Cmpds.	Chlorinated Herbicides	Petroleum Hydrocarbons	Dioxins & Furans	Explosives	Anions	QC Sample Type	Sample Container	Preservative
BH5-00-BNA	5	Surface	013	Soil	01-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-00-OCP	5	Surface	013	Soil	01-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-00-PCB	5	Surface	013	Soil	01-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-00-MET	5	Surface	013	Soil	01-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-00-CHR	5	Surface	013	Soil	01-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-00-CYN	5	Surface	013	Soil	01-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-00-OPP	5	Surface	014	Soil	01-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-00-HRB	5	Surface	014	Soil	01-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-00-TPH	5	Surface	014	Soil	01-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-00-DXF	5	Surface	013	Soil	01-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-00-EXP	5	Surface	013	Soil	01-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH5-00-ANI	5	Surface	013	Soil	01-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH5-02-AGT-R	5	0-2'	015	Soil	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH5-02-VOC	5	0-2'	013	Soil	01-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH5-02-BNA	5	0-2'	013	Soil	01-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-02-OCP	5	0-2'	013	Soil	01-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-02-PCB	5	0-2'	013	Soil	01-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-02-MET	5	0-2'	013	Soil	01-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-02-CHR	5	0-2'	013	Soil	01-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-02-CYN	5	0-2'	013	Soil	01-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-02-OPP	5	0-2'	014	Soil	01-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-02-HRB	5	0-2'	014	Soil	01-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-02-TPH	5	0-2'	014	Soil	01-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-02-DXF	5	0-2'	013	Soil	01-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-02-EXP	5	0-2'	013	Soil	01-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH5-02-ANI	5	0-2'	013	Soil	01-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH5-04-AGT-R	5	2-4'	015	Soil	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH5-04-VOC	5	2-4'	013	Soil	01-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH5-04-BNA	5	2-4'	013	Soil	01-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-04-OCP	5	2-4'	013	Soil	01-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-04-PCB	5	2-4'	013	Soil	01-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-04-MET	5	2-4'	013	Soil	01-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-04-CHR	5	2-4'	013	Soil	01-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-04-CYN	5	2-4'	013	Soil	01-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-04-OPP	5	2-4'	014	Soil	01-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-04-HRB	5	2-4'	014	Soil	01-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-04-TPH	5	2-4'	014	Soil	01-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-04-DXF	5	2-4'	013	Soil	01-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-04-EXP	5	2-4'	013	Soil	01-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH5-04-ANI	5	2-4'	013	Soil	01-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH5-06-AGT-R	5	4-6'	015	Soil	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH5-06-VOC	5	4-6'	013	Soil	01-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH5-06-BNA	5	4-6'	013	Soil	01-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-06-OCP	5	4-6'	013	Soil	01-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-06-PCB	5	4-6'	013	Soil	01-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-06-MET	5	4-6'	013	Soil	01-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-06-CHR	5	4-6'	013	Soil	01-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH5-06-CYN	5	4-6'	013	Soil	01-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C

Field Sample No.	Borehole No.	Sample Depth or Interval (ft.)	RFA No.(1)	Sample Description	Date Sampled	Analytical Parameter	Laboratory	GB, VX, Mustard	Volatiles	Semivolatiles	Organochlorine Pesticides	PCBs	Metals (including Hg)	Chromium (VI)	Cyanide	Oranophosphorous Cmpds.	Chlorinated Herbicides	Petroleum Hydrocarbons	Dioxins & Furans	Explosives	Anions	QC Sample Type	Sample Container	Preservative
BH5-06-OPP	5	4-6'	014	Soil	01-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH5-06-HRB	5	4-6'	014	Soil	01-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH5-06-TPH	5	4-6'	014	Soil	01-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH5-06-DXF	5	4-6'	013	Soil	01-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4ºC
BH5-06-EXP	5	4-6'	013	Soil	01-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4ºC
BH5-06-ANI	5	4-6'	013	Soil	01-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4ºC
BH5-10-AGT-R	5	8-10'	015	Soil	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4ºC
BH5-10-VOC	5	8-10'	013	Soil	01-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4ºC, EnCore into MeOH 48 hours
BH5-10-BNA	5	8-10'	013	Soil	01-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH5-10-OCP	5	8-10'	013	Soil	01-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH5-10-PCB	5	8-10'	013	Soil	01-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH5-10-MET	5	8-10'	013	Soil	01-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH5-10-CHR	5	8-10'	013	Soil	01-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH5-10-CYN	5	8-10'	013	Soil	01-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH5-10-OPP	5	8-10'	014	Soil	01-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH5-10-HRB	5	8-10'	014	Soil	01-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH5-10-TPH	5	8-10'	014	Soil	01-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH5-10-DXF	5	8-10'	013	Soil	01-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4ºC
BH5-10-EXP	5	8-10'	013	Soil	01-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4ºC
BH5-10-ANI	5	8-10'	013	Soil	01-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4ºC
BH6-00-AGT-R	6	Surface	018	Soil	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4ºC
BH6-00-VOC	6	Surface	016	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4ºC, EnCore into MeOH 48 hours
BH6-00-BNA	6	Surface	016	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-00-OCP	6	Surface	016	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-00-PCB	6	Surface	016	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-00-MET	6	Surface	016	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-00-CHR	6	Surface	016	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-00-CYN	6	Surface	016	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-00-OPP	6	Surface	017	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-00-HRB	6	Surface	017	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-00-TPH	6	Surface	017	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-00-DXF	6	Surface	016	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-00-EXP	6	Surface	016	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4ºC
BH6-00-ANI	6	Surface	016	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4ºC
BH6-02-AGT-R	6	0-2'	018	Soil	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4ºC
BH6-02-VOC	6	0-2'	016	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4ºC, EnCore into MeOH 48 hours
BH6-02-BNA	6	0-2'	016	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-02-OCP	6	0-2'	016	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-02-PCB	6	0-2'	016	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-02-MET	6	0-2'	016	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-02-CHR	6	0-2'	016	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-02-CYN	6	0-2'	016	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-02-OPP	6	0-2'	017	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-02-HRB	6	0-2'	017	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-02-TPH	6	0-2'	017	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-02-DXF	6	0-2'	016	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4ºC
BH6-02-EXP	6	0-2'	016	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4ºC
BH6-02-ANI	6	0-2'	016	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4ºC
BH6-04-AGT-R	6	2-4'	018	Soil	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4ºC

Table 3. Quanterra Master Sample List for Umatilla Chemical Agent Disposal Facility (UMCDF) Background Soils Investigation (Continued)

Field Sample No.	Borehole No.	Sample Depth or Interval (ft.)	RFA No.(1)	Sample Description	Date Sampled	Analytical Parameter	Laboratory	GB, VX, Mustard	Volatiles	Semivolatiles	Organochlorine Pesticides	PCBs	Metals (including Hg)	Chromium (VI)	Cyanide	Oranophosphorous Cmpds.	Chlorinated Herbicides	Petroleum Hydrocarbons	Dioxins & Furans	Explosives	Anions	QC Sample Type	Sample Container	Preservative
BH6-04-VOC	6	2-4'	016	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH6-04-BNA	6	2-4'	016	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-04-OCP	6	2-4'	016	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-04-PCB	6	2-4'	016	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-04-MET	6	2-4'	016	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-04-CHR	6	2-4'	016	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-04-CYN	6	2-4'	016	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-04-OPP	6	2-4'	017	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-04-HRB	6	2-4'	017	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-04-TPH	6	2-4'	017	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-04-DXF	6	2-4'	016	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-04-EXP	6	2-4'	016	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH6-04-ANI	6	2-4'	016	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH6-06-AGT-R	6	4-6'	018	Soil	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH6-06-VOC	6	4-6'	016	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH6-06-BNA	6	4-6'	016	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-06-OCP	6	4-6'	016	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-06-PCB	6	4-6'	016	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-06-MET	6	4-6'	016	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-06-CHR	6	4-6'	016	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-06-CYN	6	4-6'	016	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-06-OPP	6	4-6'	017	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-06-HRB	6	4-6'	017	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-06-TPH	6	4-6'	017	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-06-DXF	6	4-6'	016	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-06-EXP	6	4-6'	016	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH6-06-ANI	6	4-6'	016	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BD6-06-AGT-R	6	4-6'	018	Soil Duplicate	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BD6-06-VOC	6	4-6'	016	Soil Duplicate	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□	DUP	EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BD6-06-BNA	6	4-6'	016	Soil Duplicate	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD6-06-OCP	6	4-6'	016	Soil Duplicate	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD6-06-PCB	6	4-6'	016	Soil Duplicate	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD6-06-MET	6	4-6'	016	Soil Duplicate	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD6-06-CHR	6	4-6'	016	Soil Duplicate	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD6-06-CYN	6	4-6'	016	Soil Duplicate	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD6-06-OPP	6	4-6'	017	Soil Duplicate	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD6-06-HRB	6	4-6'	017	Soil Duplicate	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD6-06-TPH	6	4-6'	017	Soil Duplicate	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD6-06-DXF	6	4-6'	016	Soil Duplicate	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD6-06-EXP	6	4-6'	016	Soil Duplicate	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD6-06-ANI	6	4-6'	016	Soil Duplicate	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√	DUP	8 oz. widemouth glass	Cool, 4°C
BH6-10-AGT-R	6	8-10'	018	Soil	17-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH6-10-VOC	6	8-10'	016	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH6-10-BNA	6	8-10'	016	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-10-OCP	6	8-10'	016	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-10-PCB	6	8-10'	016	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-10-MET	6	8-10'	016	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-10-CHR	6	8-10'	016	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C

Field Sample No.	Borehole No.	Sample Depth or Interval (ft.)	RFA No.(1)	Sample Description	Date Sampled	Analytical Parameter	Laboratory	GB, VX, Mustard	Volatiles	Semivolatiles	Organochlorine Pesticides	PCBs	Metals (including Hg)	Chromium (VI)	Cyanide	Oranophosphorous Cmpds.	Chlorinated Herbicides	Petroleum Hydrocarbons	Dioxins & Furans	Explosives	Anions	QC Sample Type	Sample Container	Preservative
BH6-10-CYN	6	8-10'	016	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-10-OPP	6	8-10'	017	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-10-HRB	6	8-10'	017	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-10-TPH	6	8-10'	017	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-10-DXF	6	8-10'	016	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH6-10-EXP	6	8-10'	016	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH6-10-ANI	6	8-10'	016	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH7-00-AGT-R	7	Surface	021	Soil	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH7-00-VOC	7	Surface	019	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH7-00-BNA	7	Surface	019	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-00-OCP	7	Surface	019	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-00-PCB	7	Surface	019	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-00-MET	7	Surface	019	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-00-CHR	7	Surface	019	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-00-CYN	7	Surface	019	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-00-OPP	7	Surface	020	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-00-HRB	7	Surface	020	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-00-TPH	7	Surface	020	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-00-DXF	7	Surface	019	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-00-EXP	7	Surface	019	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH7-00-ANI	7	Surface	019	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH7-02-AGT-R	7	0-2'	021	Soil	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH7-02-VOC	7	0-2'	019	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH7-02-BNA	7	0-2'	019	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-02-OCP	7	0-2'	019	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-02-PCB	7	0-2'	019	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-02-MET	7	0-2'	019	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-02-CHR	7	0-2'	019	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-02-CYN	7	0-2'	019	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-02-OPP	7	0-2'	020	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-02-HRB	7	0-2'	020	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-02-TPH	7	0-2'	020	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-02-DXF	7	0-2'	019	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-02-EXP	7	0-2'	019	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH7-02-ANI	7	0-2'	019	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH7-04-AGT-R	7	2-4'	021	Soil	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH7-04-VOC	7	2-4'	019	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH7-04-BNA	7	2-4'	019	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-04-OCP	7	2-4'	019	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-04-PCB	7	2-4'	019	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-04-MET	7	2-4'	019	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-04-CHR	7	2-4'	019	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-04-CYN	7	2-4'	019	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-04-OPP	7	2-4'	020	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-04-HRB	7	2-4'	020	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-04-TPH	7	2-4'	020	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-04-DXF	7	2-4'	019	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-04-EXP	7	2-4'	019	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH7-04-ANI	7	2-4'	019	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C

Table 3. Quanterra Master Sample List for Umatilla Chemical Agent Disposal Facility (UMCDF) Background Soils Investigation (Continued)

Field Sample No.	Borehole No.	Sample Depth or Interval (ft.)	RFA No.[1]	Sample Description	Date Sampled	Analytical Parameter	Laboratory	GB, VX, Mustard	Volatiles	Semivolatiles	Organochlorine Pesticides	PCBs	Metals (including Hg)	Chromium (VI)	Cyanide	Oranophosphorous Cmpds.	Chlorinated Herbicides	Petroleum Hydrocarbons	Dioxins & Furans	Explosives	Anions	QC Sample Type	Sample Container	Preservative
BD7-04-AGT-R	7	2-4'	021	Soil Duplicate	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BD7-04-VOC	7	2-4'	019	Soil Duplicate	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□	DUP	EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BD7-04-BNA	7	2-4'	019	Soil Duplicate	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD7-04-OCP	7	2-4'	019	Soil Duplicate	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD7-04-PCB	7	2-4'	019	Soil Duplicate	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD7-04-MET	7	2-4'	019	Soil Duplicate	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD7-04-CHR	7	2-4'	019	Soil Duplicate	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD7-04-CYN	7	2-4'	019	Soil Duplicate	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD7-04-OPP	7	2-4'	020	Soil Duplicate	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD7-04-HRB	7	2-4'	020	Soil Duplicate	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD7-04-TPH	7	2-4'	020	Soil Duplicate	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD7-04-DXF	7	2-4'	019	Soil Duplicate	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD7-04-EXP	7	2-4'	019	Soil Duplicate	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□	DUP	8 oz. widemouth glass	Cool, 4°C
BD7-04-ANI	7	2-4'	019	Soil Duplicate	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√	DUP	8 oz. widemouth glass	Cool, 4°C
BH7-06-AGT-R	7	4-6'	021	Soil	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH7-06-VOC	7	4-6'	019	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH7-06-BNA	7	4-6'	019	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-06-OCP	7	4-6'	019	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-06-PCB	7	4-6'	019	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-06-MET	7	4-6'	019	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-06-CHR	7	4-6'	019	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-06-CYN	7	4-6'	019	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-06-OPP	7	4-6'	020	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-06-HRB	7	4-6'	020	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-06-TPH	7	4-6'	020	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-06-DXF	7	4-6'	019	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-06-EXP	7	4-6'	019	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH7-06-ANI	7	4-6'	019	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH7-10-AGT-R	7	8-10'	021	Soil	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH7-10-VOC	7	8-10'	019	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH7-10-BNA	7	8-10'	019	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-10-OCP	7	8-10'	019	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-10-PCB	7	8-10'	019	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-10-MET	7	8-10'	019	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-10-CHR	7	8-10'	019	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-10-CYN	7	8-10'	019	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-10-OPP	7	8-10'	020	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-10-HRB	7	8-10'	020	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-10-TPH	7	8-10'	020	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-10-DXF	7	8-10'	019	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4°C
BH7-10-EXP	7	8-10'	019	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4°C
BH7-10-ANI	7	8-10'	019	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH8-00-AGT-R	8	Surface	024	Soil	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4°C
BH8-00-VOC	8	Surface	022	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH8-00-BNA	8	Surface	022	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH8-00-OCP	8	Surface	022	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH8-00-PCB	8	Surface	022	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C
BH8-00-MET	8	Surface	022	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4°C

Field Sample No.	Borehole No.	Sample Depth or Interval (ft.)	RFA No.(1)	Sample Description	Date Sampled	Analytical Parameter	Laboratory	GB, VX, Mustard	Volatiles	Semivolatiles	Organochlorine Pesticides	PCBs	Metals (including Hg)	Chromium (VI)	Cyanide	Oranophosphorous Cmpds.	Chlorinated Herbicides	Petroleum Hydrocarbons	Dioxins & Furans	Explosives	Anions	QC Sample Type	Sample Container	Preservative
BH8-00-CHR	8	Surface	022	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-00-CYN	8	Surface	022	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-00-OPP	8	Surface	023	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-00-HRB	8	Surface	023	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-00-TPH	8	Surface	023	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-00-DXF	8	Surface	022	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-00-EXP	8	Surface	022	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4ºC
BH8-00-ANI	8	Surface	022	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4ºC
BH8-02-AGT-R	8	0-2'	024	Soil	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4ºC
BH8-02-VOC	8	0-2'	022	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4ºC, EnCore into MeOH 48 hours
BH8-02-BNA	8	0-2'	022	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-02-OCP	8	0-2'	022	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-02-PCB	8	0-2'	022	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-02-MET	8	0-2'	022	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-02-CHR	8	0-2'	022	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-02-CYN	8	0-2'	022	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-02-OPP	8	0-2'	023	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-02-HRB	8	0-2'	023	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-02-TPH	8	0-2'	023	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-02-DXF	8	0-2'	022	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-02-EXP	8	0-2'	022	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4ºC
BH8-02-ANI	8	0-2'	022	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4ºC
BH8-04-AGT-R	8	2-4'	024	Soil	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4ºC
BH8-04-VOC	8	2-4'	022	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4ºC, EnCore into MeOH 48 hours
BH8-04-BNA	8	2-4'	022	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-04-OCP	8	2-4'	022	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-04-PCB	8	2-4'	022	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-04-MET	8	2-4'	022	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-04-CHR	8	2-4'	022	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-04-CYN	8	2-4'	022	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-04-OPP	8	2-4'	023	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-04-HRB	8	2-4'	023	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-04-TPH	8	2-4'	023	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-04-DXF	8	2-4'	022	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-04-EXP	8	2-4'	022	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4ºC
BH8-04-ANI	8	2-4'	022	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4ºC
BH8-06-AGT-R	8	4-6'	024	Soil	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□		120 mL glass	Cool, 4ºC
BH8-06-VOC	8	4-6'	022	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4ºC, EnCore into MeOH 48 hours
BH8-06-BNA	8	4-6'	022	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-06-OCP	8	4-6'	022	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-06-PCB	8	4-6'	022	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-06-MET	8	4-6'	022	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-06-CHR	8	4-6'	022	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-06-CYN	8	4-6'	022	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-06-OPP	8	4-6'	023	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-06-HRB	8	4-6'	023	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-06-TPH	8	4-6'	023	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-06-DXF	8	4-6'	022	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□		8 oz. widemouth glass	Cool, 4ºC
BH8-06-EXP	8	4-6'	022	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□		8 oz. widemouth glass	Cool, 4ºC

Table 3. Quanterra Master Sample List for Umatilla Chemical Agent Disposal Facility (UMCDF) Background Soils Investigation (Continued)

Field Sample No.	Borehole No.	Sample Depth or Interval (ft.)	RFA No.(1)	Sample Description	Date Sampled	Analytical Parameter	Laboratory	GB, VX, Mustard	Volatiles	Semivolatiles	Organochlorine Pesticides	PCBs	Metals (including Hg)	Chromium (VI)	Cyanide	Oranophosphorous Cmpds.	Chlorinated Herbicides	Petroleum Hydrocarbons	Dioxins & Furans	Explosives	Anions	QC Sample Type	Sample Container	Preservative
BH8-06-ANI	8	4-6'	022	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√		8 oz. widemouth glass	Cool, 4°C
BH8-10-AGT-R	8	8-10'	024	Soil	18-Nov-98	Chemical Agent	Battelle-West Jefferson, OH	√	□	□	□	□	□	□	□	□	□	□	□	□	□	MS/MSD	120 mL glass	Cool, 4°C
BH8-10-VOC	8	8-10'	022	Soil	02-Sep-98	Volatile Organic Compounds (VOCs)	Quanterra-W. Sacramento, CA	□	√	□	□	□	□	□	□	□	□	□	□	□	□		EnCore Sampler	Cool, 4°C, EnCore into MeOH 48 hours
BH8-10-BNA	8	8-10'	022	Soil	02-Sep-98	Semivolatile Organic Compounds (SVOCs)	Quanterra-W. Sacramento, CA	□	□	√	□	□	□	□	□	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH8-10-OCP	8	8-10'	022	Soil	02-Sep-98	Organochlorine Pesticides	Quanterra-W. Sacramento, CA	□	□	□	√	□	□	□	□	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH8-10-PCB	8	8-10'	022	Soil	02-Sep-98	Polychlorinated Biphenyls (PCBs)	Quanterra-W. Sacramento, CA	□	□	□	□	√	□	□	□	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH8-10-MET	8	8-10'	022	Soil	02-Sep-98	Metals	Quanterra-W. Sacramento, CA	□	□	□	□	□	√	□	□	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH8-10-CHR	8	8-10'	022	Soil	02-Sep-98	Hexavalent Chromium	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	√	□	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH8-10-CYN	8	8-10'	022	Soil	02-Sep-98	Cyanide	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	√	□	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH8-10-OPP	8	8-10'	023	Soil	02-Sep-98	Organophosphorous Pesticides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	√	□	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH8-10-HRB	8	8-10'	023	Soil	02-Sep-98	Chlorinated Herbicides	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	√	□	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH8-10-TPH	8	8-10'	023	Soil	02-Sep-98	Total Recoverable Petroleum Hydrocarbons	Quanterra-N. Canton, OH	□	□	□	□	□	□	□	□	□	□	√	□	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH8-10-DXF	8	8-10'	022	Soil	02-Sep-98	Dioxins/Furans	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	√	□	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH8-10-EXP	8	8-10'	022	Soil	02-Sep-98	Explosives	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	√	□	MS/MSD	8 oz. widemouth glass	Cool, 4°C
BH8-10-ANI	8	8-10'	022	Soil	02-Sep-98	Inorganic Anions	Quanterra-W. Sacramento, CA	□	□	□	□	□	□	□	□	□	□	□	□	□	√	MS/MSD	8 oz. widemouth glass	Cool, 4°C

Abbreviations:

EB	Equipment Blank
TB	Trip Blank
DUP	Duplicate Sample
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MeOH	Methanol

- Field Sample Number
- Date Sampled
- Analytical Testing Parameter
- Laboratory where the analysis was performed
- QC Sample Type
- Sample Container Used
- Preservative Used

The samples originally collected from Boreholes 1 and 2 were required to be resampled for the volatile organic compounds and chemical agent parameters. The samples scheduled for volatiles analysis arrived at the Quanterra West Sacramento laboratory out of holding time. The samples scheduled for chemical agent analysis arrived at the Battelle laboratory outside of the required temperature range. This resampling event was performed on September 22, 1998. All of the samples obtained during the resampling event were successfully analyzed with the exception of the chemical agent analysis. A second resampling event was performed on November 17-20, 1998 for the collection of samples from Boreholes 1 through 8 for chemical agent analysis. These samples were successfully analyzed.

The sampling events occurred on the dates shown in Table 4. Boring logs recorded during these sampling events are shown in Appendix G.

Table 4. Sampling Dates for Borehole Soil Samples

Borehole Number	Date Sampled	Date Resampled[1]	Date Resampled[2]
1	September 3, 1998	September 22, 1998	November 19, 1998
2	September 3, 1998	September 22, 1998	November 19, 1998
3	September 1, 1998	NA	November 17, 1998
4	September 2, 1998	NA	November 18, 1998
5	September 1, 1998	NA	November 17, 1998
6	September 2, 1998	NA	November 17, 1998
7	September 2, 1998	NA	November 18, 1998
8	September 2, 1998	NA	November 18, 1998

[1] This resampling event was performed only for the analysis of volatile organic compounds and chemical agent only.
[2] This resampling event was performed only for the analysis of chemical agent only.

2.2 Field Sample Numbering Scheme

The samples collected as part of the UMCDF Background Soils Investigation were numbered according to the following scheme:

- Soil sample numbers were assigned with the following as an example: BH-00-VOC, where BH = Borehole, 00 is the depth of the interval, and VOC is the code for the analytical parameter scheduled.
- Aqueous sample numbers were assigned with the following as an example: EB1-QC-VOC, where EB1 = Equipment Blank #1, QC = quality control, and VOC is the code for the analytical parameter scheduled.
- Samples that were collected during the resampling activities on September 22, 1998 followed the above numbering scheme, but had "-R" tagged on to the end of the number. Samples that were collected during the resampling activities on November 17-19, 1998 followed the above numbering scheme, but had "-RR" tagged on to the end of the number.

The analytical parameter codes are given in Table 3 of this report.

3.0 Analytical Specifications

3.1 Analytical Methods

The analytical methods that were utilized for the soil and aqueous samples are taken from the reference sources listed below:

- Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, (SW-846), Third Edition, September 1986. Contains Final Update I (July 1992), Final Update IIA (August 1993), Final Update II (September 1994), Final Update IIB (January 1995), and Final Update III (December 1996).

- Methods for Chemical Analysis of Water and Wastes, EPA 600/4-79-020.

The chemical agent analytical data was derived using laboratory-specific methods. The standard operating procedure (SOP) utilized by Battelle is as follows:

- Battelle SOP No. HMRC III-013-01: "Standard Operating Procedure for the Extraction of Agents and Degradation Products from Environmental Samples"

The preparation and analytical methods utilized are given for each sample on the data certificates attached to this report.

3.2 Sample Custody and Distribution

The distribution of samples to laboratories was handled by Quanterra's Analytical Services Group and Battelle Pacific Northwest National Laboratory under the direction of the Subcontractor Background Soils Investigation Project Manager. Samples were submitted to the appropriate laboratory accompanied by a Request-for-Analysis Form (RFA). The RFAs provide project-specific analytical specifications and quality control instructions to the laboratories. As part of the RFA documentation, a Chain-of-Custody (COC) and traceability record was maintained for sample transfers to the laboratories. Some COC forms were inadvertently not signed prior to shipment to the laboratory. Custody records were generated in the form of a transmittal letter which, when combined with the original COCs, provide a record of traceability for the sample transfers.

Table 5 lists the RFA/COCs that were generated for the collection of the Background Soils Investigation.

3.3 Laboratory Qualifications

Quanterra's West Sacramento, California laboratory and Quanterra's North Canton Laboratory in Knoxville, Tennessee performed the majority of the sample preparations and analyses on the Background Soils Investigation samples. The Quanterra laboratories maintain several state certifications. Quanterra participates in annual performance evaluations and the required audits for various state and federal certifications. Additionally, Quanterra routinely analyzes performance test samples associated with other similar performance test analytical programs. Battelle Laboratory was the provider of analytical services for the chemical agent analyses. The Quanterra West Sacramento and Battelle laboratories were audited by Raytheon before samples were processed. An audit was not conducted at the Quanterra North Canton facility because both Quanterra laboratories operate under the same Quality Assurance Program. Table 6 lists the laboratories utilized and the parameters that were analyzed for at each.

3.4 General Analysis Quality Control

The procedures utilized for the analysis of the soil and aqueous samples followed the methods cited on the data certificates attached to this report. These methods are described in detail in laboratory standard operating procedures (SOPs). The SOPs include the following quality control (QC) elements, when applicable:

Table 5. Request for Analysis/Chain-of-Custody (RFA/COC) Forms Used in the Collection of Background Soils Investigation Samples

RFA/COC Number	Sample Description	Analytical Laboratory Utilized	RFA/COC MS Word Filename	Resample Parameter(s)
001	Borehole #1 Soils	Quanterra-West Sacramento, CA	001-WS-BH1	NA
002	Borehole #1 Soils	Quanterra-North Canton, OH	002-NC-BH1	NA
003	Borehole #1 Soils	Battelle-Columbus, IN	003-BA-BH1	NA
004	Borehole #2 Soils	Quanterra-West Sacramento, CA	004-WS-BH2	NA
005	Borehole #2 Soils	Quanterra-North Canton, OH	005-NC-BH2	NA
006	Borehole #2 Soils	Battelle-Columbus, IN	006-BA-BH2	NA
007	Borehole #3 Soils	Quanterra-West Sacramento, CA	007-WS-BH3	NA
008	Borehole #3 Soils	Quanterra-North Canton, OH	008-NC-BH3	NA
009	Borehole #3 Soils	Battelle-Columbus, IN	009-BA-BH3	NA
010	Borehole #4 Soils	Quanterra-West Sacramento, CA	010-WS-BH4	NA
011	Borehole #4 Soils	Quanterra-North Canton, OH	011-NC-BH4	NA
012	Borehole #4 Soils	Battelle-Columbus, IN	012-BA-BH4	NA
013	Borehole #5 Soils	Quanterra-West Sacramento, CA	013-WS-BH5	NA
014	Borehole #5 Soils	Quanterra-North Canton, OH	014-NC-BH5	NA
015	Borehole #5 Soils	Battelle-Columbus, IN	015-BA-BH5	NA
016	Borehole #6 Soils	Quanterra-West Sacramento, CA	016-WS-BH6	NA
017	Borehole #6 Soils	Quanterra-North Canton, OH	017-NC-BH6	NA
018	Borehole #6 Soils	Battelle-Columbus, IN	018-BA-BH6	NA
019	Borehole #7 Soils	Quanterra-West Sacramento, CA	019-WS-BH7	NA
020	Borehole #7 Soils	Quanterra-North Canton, OH	020-NC-BH7	NA
021	Borehole #7 Soils	Battelle-Columbus, IN	021-BA-BH7	NA
022	Borehole #8 Soils	Quanterra-West Sacramento, CA	022-WS-BH8	NA
023	Borehole #8 Soils	Quanterra-North Canton, OH	023-NC-BH8	NA
024	Borehole #8 Soils	Battelle-Columbus, IN	024-BA-BH8	NA
025	Equipment Blank #1	Quanterra-West Sacramento, CA	025-WS-EB1	NA
026	Equipment Blank #1	Quanterra-North Canton, OH	026-NC-EB1	NA

RFA/COC Number	Sample Description	Analytical Laboratory Utilized	RFA/COC MS Word Filename	Resample Parameter(s)
027	Equipment Blank #1	Battelle-Columbus, IN	027-BA-EB1	NA
028	Equipment Blank #2	Quanterra-West Sacramento, CA	028-WS-EB2	NA
029	Equipment Blank #2	Quanterra-North Canton, OH	029-NC-EB2	NA
030	Equipment Blank #2	Battelle-Columbus, IN	030-BA-EB2	NA
031	Equipment Blank #3	Quanterra-West Sacramento, CA	031-WS-EB3	NA
032	Equipment Blank #3	Quanterra-North Canton, OH	032-NC-EB3	NA
033	Equipment Blank #3	Battelle-Columbus, IN	033-BA-EB3	NA
034	Trip Blank #1	Quanterra-West Sacramento, CA	034-WS-TB1	NA
035	Trip Blank #1	Quanterra-North Canton, OH	035-NC-TB1	NA
036	Trip Blank #1	Battelle-Columbus, IN	036-BA-TB1	NA
037	Trip Blank #2	Quanterra-West Sacramento, CA	037-WS-TB2	NA
038	Trip Blank #2	Quanterra-North Canton, OH	038-NC-TB2	NA
039	Trip Blank #2	Battelle-Columbus, IN	039-BA-TB2	NA
040	Trip Blank #3	Quanterra-West Sacramento, CA	040-WS-TB3	NA
041	Trip Blank #3	Quanterra-North Canton, OH	041-NC-TB3	NA
042	Trip Blank #3	Battelle-Columbus, IN	042-BA-TB3	NA
043	Borehole #1 Soils [Resample]	Quanterra-West Sacramento, CA	043-WS-BH1-R	Volatiles
044	Borehole #1 Soils [Resample]	Battelle-Columbus, IN	044-BA-BH1-R	Chemical Agent
045	Borehole #2 Soils [Resample]	Quanterra-West Sacramento, CA	045-WS-BH2-R	Volatiles
046	Borehole #2 Soils [Resample]	Battelle-Columbus, IN	046-BA-BH2-R	Chemical Agent
047	Equipment Blank #4	Quanterra-West Sacramento, CA	047-WS-EB4	Volatiles
048	Equipment Blank #4	Battelle-Columbus, IN	048-BA-EB4	Chemical Agent
049	Trip Blank #4	Quanterra-West Sacramento, CA	049-WS-TB4	Volatiles
050	Trip Blank #4	Battelle-Columbus, IN	050-BA-TB4	Chemical Agent
051	Borehole #3 Soils [Resample]	Battelle-Columbus, IN	051-BA-BH3-R	Chemical Agent
052	Borehole #4 Soils [Resample]	Battelle-Columbus, IN	052-BA-BH4-R	Chemical Agent
053	Borehole #5 Soils [Resample]	Battelle-Columbus, IN	053-BA-BH5-R	Chemical Agent
054	Borehole #6 Soils [Resample]	Battelle-Columbus, IN	054-BA-BH6-R	Chemical Agent

Table 5. Request for Analysis/Chain-of-Custody (RFA/COC) Forms Used in the Collection of Background Soils Investigation Samples (Continued)

RFA/COC Number	Sample Description	Analytical Laboratory Utilized	RFA/COC MS Word Filename	Resample Parameter(s)
055	Borehole #7 Soils [Resample]	Battelle-Columbus, IN	055-BA-BH7-R	Chemical Agent
056	Borehole #8 Soils [Resample]	Battelle-Columbus, IN	056-BA-BH8-R	Chemical Agent
057	Equipment Blank #5	Battelle-Columbus, IN	057-BA-EB5	Chemical Agent
058	Trip Blank #5	Battelle-Columbus, IN	058-BA-TB5	Chemical Agent
059	Equipment Blank #6	Battelle-Columbus, IN	059-BA-EB6	Chemical Agent
060	Trip Blank #6	Battelle-Columbus, IN	060-BA-TB6	Chemical Agent
061	Equipment Blank #7	Battelle-Columbus, IN	061-BA-EB7	Chemical Agent
062	Trip Blank #7	Battelle-Columbus, IN	062-BA-TB7	Chemical Agent
063	Borehole #1 [Second Resample]	Battelle-Columbus, IN	063-BA-BH1-RR	Chemical Agent
064	Borehole #2 [Second Resample]	Battelle-Columbus, IN	064-BA-BH2-RR	Chemical Agent

Table 6. Laboratories Utilized for the Analysis of Soils Collected at the UMCDF Site

Laboratory Name	Laboratory Location	Analytical Testing Parameters
Quanterra, Inc.®	880 Riverside Parkway West Sacramento, California 95605	Volatile Organic Compounds (VOCs)
		Semivolatile Organic Compounds (SVOCs)
		Polychlorinated Biphenyls (PCBs)
		Organochlorine Pesticides
		Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs)
		Explosives
		Metals
		Inorganic Anions
Quanterra, Inc.®	4101 Shuffel Drive, NW North Canton, Ohio 44720	Organophosphorous Pesticides
		Chlorinated Herbicides
		Total Recoverable Petroleum Hydrocarbons (TRPH)
Battelle Pacific Northwest National Laboratory	Battelle 1425 State Route 142 West Jefferson, Ohio 43162	Chemical Agent (GB, VX, HD)

- daily calibrations
- initial calibrations
- continuing calibrations
- daily check standards
- surrogate spikes
- internal standards spikes
- method blank analyses
- isotope dilution internal standard spikes
- MS/MSD analyses

The QC acceptance ranges for the above QC elements are given in the SOPs. The acceptance ranges for surrogate recoveries and matrix spike/matrix spike duplicate (MS/MSD) spike recoveries are given in the data certificate tables attached to this report. The recoveries that were outside of the laboratory's acceptance range were flagged as such.

Complete analytical data packages, including raw data, that document the execution of the analytical procedures are found in the data package compilation of this report.

3.5 Sample Holding Time and Preservation Specifications

Analytical holding times and sample preservations were designated prior to the collection of samples. The holding times and preservation requirements for the borehole and aqueous samples are given in Table 7. The assessment of holding times and preservation was included in the data validation procedures performed on these samples.

Table 7. Sample Holding Time and Preservation Requirements

Measurement	Matrix	Preservation[1]	Holding Time[2]
Volatiles (VOCs)	Soils	chill with ice ≤ 4°C, EnCores® into methanol 48 hours	14 days to analysis
	Trip Blanks & Equipment Rinsates (Equipment Blanks)	chill with ice ≤ 4°C, HCl to pH <2	14 days to analysis
Semivolatiles (SVOCs)	Soils	chill with ice ≤ 4°C	14 days to extraction, 40 days from extraction to analysis
	Trip Blanks & Equipment Rinsates (Equipment Blanks)	chill with ice ≤ 4°C	7 days to extraction, 40 days from extraction to analysis
Organochlorine Pesticides	Soils	chill with ice ≤ 4°C	14 days to extraction, 40 days from extraction to analysis
	Trip Blanks & Equipment Rinsates (Equipment Blanks)	chill with ice ≤ 4°C	7 days to extraction, 40 days from extraction to analysis
Organophosphorous Pesticides	Soils	chill with ice ≤ 4°C	14 days to extraction, 40 days from extraction to analysis
	Trip Blanks & Equipment Rinsates (Equipment Blanks)	chill with ice ≤ 4°C	7 days to extraction, 40 days from extraction to analysis
PCBs	Soils	chill with ice ≤ 4°C	14 days to extraction, 40 days from extraction to analysis
	Trip Blanks & Equipment Rinsates (Equipment Blanks)	chill with ice ≤ 4°C	7 days to extraction, 40 days from extraction to analysis
Chlorinated Herbicides	Soils	chill with ice ≤ 4°C	14 days to extraction, 40 days from extraction to analysis
	Trip Blanks & Equipment Rinsates (Equipment Blanks)	chill with ice ≤ 4°C	7 days to extraction, 40 days from extraction to analysis
Explosives	Soils	chill with ice ≤ 4°C	14 days to extraction, 40 days from extraction to analysis

[1] All samples will be preserved on ice from the time of collection through delivery to the analytical laboratory.
[2] Holding times are calculated from the date of collection.

Table 7. Sample Holding Time and Preservation Requirements (Continued)

Measurement	Matrix	Preservation[1]	Holding Time[2]
	Trip Blanks & Equipment Rinsates (Equipment Blanks)	chill with ice ≤ 4°C	7 days to extraction, 40 days from extraction to analysis
Dioxins & Furans	Soils	chill with ice ≤ 4°C	30 days to extraction, 45 days from extraction to analysis
	Trip Blanks & Equipment Rinsates (Equipment Blanks)	chill with ice ≤ 4°C	30 days to extraction, 45 days from extraction to analysis
Metals	Soils	chill with ice ≤ 4°C	180 days to analysis
	Trip Blanks & Equipment Rinsates (Equipment Blanks)	chill with ice ≤ 4°C, HNO_3 to pH < 2	180 days to analysis
Mercury	Soils	chill with ice ≤ 4°C	28 days to analysis
	Trip Blanks & Equipment Rinsates (Equipment Blanks)	chill with ice ≤ 4°C, HNO_3 to pH < 2	28 days to analysis
Chromium (VI) (Cr^{+6})	Soils	chill with ice ≤ 4°C	30 days to extraction, 24 hours from extraction to analysis
	Trip Blanks & Equipment Rinsates (Equipment Blanks)	NA	NA
Cyanide (CN^-)	Soils	chill with ice ≤ 4°C	14 days to analysis
	Trip Blanks & Equipment Rinsates (Equipment Blanks)	chill with ice ≤ 4°C, NaOH to pH > 12	14 days to analysis
Chloride (Cl^-), Sulfate (SO_4^{2-}), Nitrate (NO_3^-), Nitrite (NO_2^-)	Soils	chill with ice ≤ 4°C	28 days to analysis
	Trip Blanks & Equipment Rinsates (Equipment Blanks)	chill with ice ≤ 4°C	28 days to analysis
Petroleum Hydrocarbons	Soils	chill with ice ≤ 4°C	28 days to analysis

Measurement	**Matrix**	**Preservation**[1]	**Holding Time**[2]
	Trip Blanks & Equipment Rinsates (Equipment Blanks)	chill with ice ≤ 4°C, addition of 5 mL of 1:1 HCl to each 1 Liter sample	28 days to analysis
Chemical Agents (GB, VX, and Mustard)	Soils	chill with ice ≤ 4°C	7 days to extraction, 7 days from extraction to analysis
	Trip Blanks & Equipment Rinsates (Equipment Blanks)	chill with ice ≤ 4°C	7 days to extraction, 7 days from extraction to analysis

3.6 Analytical Standards Source Summary

In order to provide analytical results that accurately reflect the analytical concentrations in each sample, it is important that standards of the highest purity and stability be used for all analytical determinations.

Materials used as analytical standards at the laboratories were purchased from vendors who routinely provide primary and secondary source standards. These analytical standards were certified by the vendors to be of a known concentration and purity. Manufacturer's certificates of traceability of all standards are on file at the laboratories. Standards were used by the analyst to calibrate the instrumentation and to provide verification of method performance. Based on these known concentrations, the standards were diluted by the laboratories to prepare analytical calibration standards.

The results of the initial and continuing calibrations are documented in the analytical data packages. Initial calibrations for all gas chromatography (GC) and gas chromatography/mass spectrometry (GC/MS) determinations were followed by a calibration check standard from an independent standard source as a method verification. The protocols used for the acceptance criteria for initial, daily, and continuing calibrations are provided as standard procedures in each of the SW-846 methods used for analysis of these samples.

3.7 Borehole Soil Field Duplicates

Duplicate borehole soil samples were collected from different boreholes in order to determine precision of the sampling and analytical processes. Precision of the duplicates was calculated as either range or relative percent difference (RPD). The determination as to whether range or RPD was calculated followed the QAPjP requirements. If either the sample or the duplicate sample values were less than five (5) times the PQL, the precision was calculated as range. If both the sample and the duplicate sample values were greater than five (5) times the PQL, the precision was calculated as RPD. The values that were used in precision calculations as pracitcal quantitation limits (PQLs) were the laboratory reporting limits.

Table 8 shows the samples that were collected as duplicates. Analytical results for all of the duplicate samples collected, as well as the range or RPD, as appropriate, are given in Appendix C of this report.

Table 8. List of Borehole Soil Duplicate Samples Taken at UMCDF

Borehole Number	Interval (Depth)	Quanterra Field Sample Number	Analytical Testing Parameter
1	8-10 ft.	BD1-10-VOL-R	Volatile Organic Compounds (VOCs)
		BD1-10-BNA	Semivolatile Organic Compounds (SVOCs)
		BD1-10-PCB	Polychlorinated Biphenyls (PCBs)
		BD1-10-OCP	Organochlorine Pesticides
		BD1-10-DXF	Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs)
		BD1-10-EXP	Explosives
		BD1-10-MET BD1-10-CHR	Metals
		BD1-10-ANI BD1-10-CYN	Inorganic Anions
		BD1-10-OPP	Organophosphorous Pesticides
		BD1-10-HRB	Chlorinated Herbicides
		BD1-10-TPH	Total Recoverable Petroleum Hydrocarbons (TRPH)
		BD1-10-AGT-RR	Chemical Agent (GB, VX, HD)
2	2-4 ft.	BD2-04-VOL-R	Volatile Organic Compounds (VOCs)
		BD2-04-BNA	Semivolatile Organic Compounds (SVOCs)
		BD2-04-PCB	Polychlorinated Biphenyls (PCBs)
		BD2-04-OCP	Organochlorine Pesticides
		BD2-04-DXF	Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs)
		BD2-04-EXP	Explosives
		BD2-04-MET BD2-04-CHR	Metals
		BD2-04-ANI BD2-04-CYN	Inorganic Anions
		BD2-04-OPP	Organophosphorous Pesticides
		BD2-04-HRB	Chlorinated Herbicides
		BD2-04-TPH	Total Recoverable Petroleum Hydrocarbons (TRPH)
		BD2-04-AGT-RR	Chemical Agent (GB, VX, HD)
6	4-6 ft.	BD6-06-VOL	Volatile Organic Compounds (VOCs)
		BD6-06-BNA	Semivolatile Organic Compounds (SVOCs)
		BD6-06-PCB	Polychlorinated Biphenyls (PCBs)
		BD6-06-OCP	Organochlorine Pesticides
		BD6-06-DXF	Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs)
		BD6-06-EXP	Explosives
		BD6-06-MET BD-06-CHR	Metals
6 (continued)		BD6-06-ANI BD6-06-CYN	Inorganic Anions
		BD6-06-OPP	Organophosphorous Pesticides

Table 8. List of Borehole Soil Duplicate Samples Taken at UMCDF (Continued)

Borehole Number	Interval (Depth)	Quanterra Field Sample Number	Analytical Testing Parameter
		BD6-06-HRB	Chlorinated Herbicides
		BD6-06-TPH	Total Recoverable Petroleum Hydrocarbons (TRPH)
		BD6-06-AGT-RR	Chemical Agent (GB, VX, HD)
7	2-4 ft.	BD7-04-VOL	Volatile Organic Compounds (VOCs)
		BD7-04-BNA	Semivolatile Organic Compounds (SVOCs)
		BD7-04-PCB	Polychlorinated Biphenyls (PCBs)
		BD7-04-OCP	Organochlorine Pesticides
		BD7-04-DXF	Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs)
		BD7-04-EXO	Explosives
		BD7-04-MET BD7-04-CHR	Metals
		BD7-04-ANI BD7-04-CYN	Inorganic Anions
		BD7-04-OPP	Organophosphorous Pesticides
		BD7-04-HRB	Chlorinated Herbicides
		BD7-04-TPH	Total Recoverable Petroleum Hydrocarbons (TRPH)
		BD7-04-AGT-RR	Chemical Agent (GB, VX, HD)

3.8 Borehole Soil Matrix Spike/Matrix Spike Duplicates and Surrogates

Matrix spikes were applied to borehole samples in duplicate as shown in Table 9. Table 10 shows the analytes that were spiked onto the samples. The analysis of matrix spike and matrix spike duplicate samples is performed for the purpose of assessing the general accuracy and precision of the analytical processes. Matrix spike and matrix spike duplicate sample results are discussed in each analytical section of this report.

Surrogate spikes were applied to samples to evaluate the analytical efficiency by measuring recovery. Surrogate recoveries are discussed in each parameter section, where applicable, of this report. Surrogate compounds that were spiked onto the UMCDF samples are given by parameter in Table 11.

3.9 Completeness Assessment

Completeness is defined as the amount of valid data obtained from the analytical measurement system for a given set of data. Completeness for this Background Soils Investigation project defines the "valid data" in the above definition as the set of analytical parameter data that was assigned to each sample collected. Completeness is calculated using the following equation:

$$\%\ Completeness = \frac{V}{n} \times 100\%$$

where: V = the number of measurements judged valid (or "valid data"), and

n = total number of measurements necessary to achieve a specified statistical level of confidence in decision making

The percent completeness was calculated for each parameter of interest and is given in Table 12. The target completeness objective was 90%. This objective was achieved for all analytical parameters for the Background Soils Investigation borehole samples. Samples that were collected, but were not analyzed are described below:

Table 9. List of Borehole Soil Matrix Spike/Matrix Spike Duplicate Samples Analyzed

Borehole Number	Interval (Depth)	Quanterra Field Sample Number	Analytical Testing Parameter
1	2-4 ft.	BH1-04-VOL-R	Volatile Organic Compounds (VOCs)
		BH1-04-BNA	Semivolatile Organic Compounds (SVOCs)
		BH1-04-PCB	Polychlorinated Biphenyls (PCBs)
		BH1-04-OCP	Organochlorine Pesticides
		BH1-04-DXF	Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs)
		BH1-04-EXP	Explosives
		BH1-04-MET BH1-04-CHR	Metals
		BH1-04-ANI BH1-04-CYN	Inorganic Anions
		BH1-04-OPP	Organophosphorous Pesticides
		BH1-00-HRB	Chlorinated Herbicides
		BH1-04-AGT-RR	Chemical Agent (GB, VX, HD)
3	Surface	BH3-00-AGT-R	Chemical Agent (GB, VX, HD)
4	4-6 ft.	BH4-06-BNA	Semivolatile Organic Compounds (SVOCs)
		BH4-06-PCB	Polychlorinated Biphenyls (PCBs)
		BH4-06-OCP	Organochlorine Pesticides
		BH4-06-DXF	Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs)
		BH4-06-EXP	Explosives
		BH4-06-MET BH4-06-CHR	Metals
		BH4-06-ANI BH4-06-CYN	Inorganic Anions
		BH4-06-OPP	Organophosphorous Pesticides
		BH4-06-HRB	Chlorinated Herbicides
		BH4-06-TPH	Total Recoverable Petroleum Hydrocarbons (TRPH)
		BH4-06-AGT-R	Chemical Agent (GB, VX, HD)
8	8-10 ft.	BH8-10-BNA	Semivolatile Organic Compounds (SVOCs)
		BH8-10-PCB	Polychlorinated Biphenyls (PCBs)
		BH8-10-OCP	Organochlorine Pesticides
		BH8-10-DXF	Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs)
		BH8-10-EXP	Explosives
		BH8-10-MET BH8-10-CHR	Metals
		BH8-10-ANI BH8-10-CYN	Inorganic Anions
		BH8-10-OPP	Organophosphorous Pesticides
8 (continued)		BH8-10-HRB	Chlorinated Herbicides
		BH8-10-TPH	Total Recoverable Petroleum Hydrocarbons (TRPH)

Borehole Number	Interval (Depth)	Quanterra Field Sample Number	Analytical Testing Parameter
		BH8-10-AGT-R	Chemical Agent (GB, VX, HD)

Table 10. Compounds Spiked onto UMCDF Soil Samples for MS/MSD Analysis (Continued)

Table 10. Compounds Spiked Onto UMCDF Soil Samples for MS/MSD Analysis

Parameter	**Compounds Spiked onto Soil Samples**
Volatile Organic Compounds (VOCs)	• 1,1-Dichloroethene • Trichloroethene • Benzene • Toluene • Chlorobenzene
Semivolatile Organic Compounds (SVOCs)	• Acenaphthene • 2-Chlorophenol • 4-Chloro-3-methylphenol • 1,4-Dichlorobenzene • 2,4-Dinitrotoluene • N-Nitroso-di-n-propylamine • 4-Nitrophenol • Phenol • Pentachlorophenol • Pyrene • 1,2,4-Trichlorobenzene
Polychlorinated Biphenyls (PCBs)	• Aroclor 1016 • Aroclor 1260
Organochlorine Pesticides	• Aldrin • Gamma (χ)-BHC (Lindane) • Dieldrin • 4,4-DDT • Endrin • Heptachlor
Organophosphorous Pesticides	• Thionazin • Sulfotepp • Phorate • Disulfoton • Methyl parathion • Parathion • Famphur • O,O,O-Triethyl phosphorothio • Dimethoate
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs)	• 2,3,7,8-TCDF • 1,2,3,7,8-PeCDF • 2,3,4,7,8-PeCDF • 1,2,3,4,7,8-HxCDF • 1,2,3,6,7,8-HxCDF • 2,3,4,6,7,8-HxCDF • 1,2,3,7,8,9-HxCDF • 1,2,3,4,6,7,8-HpCDF

Parameter	**Compounds Spiked onto Soil Samples**
	• 1,2,3,4,7,8,9-HpCDF • OCDF • 2,3,7,8-TCDD • 1,2,3,7,8-PeCDD • 1,2,3,4,7,8-HxCDD • 1,2,3,6,7,8-HxCDD • 1,2,3,7,8,9-HxCDD • 1,2,3,4,6,7,8-HpCDD • OCDD
Chlorinated Herbicides	• 2,4-D • 2,4,5-T • 2,4,5-TP (Silvex)
Explosives	• HMX • 1,3,5-Trinitrobenzene • RDX • Nitrobenzene • 2,4,6-Trinitrotoluene • 2,4-Dinitrotoluene • 2,6-Dinitrotoluene • 2-Amino-4,6-dinitrotoluene • 4-Amino-2,6-dinitrotoluene • 2-Nitrotoluene • 4-Nitrotoluene • 3-Nitrotoluene
Metals	• Antimony (Sb) • Arsenic (As) • Beryllium (Be) • Cadmium (Cd) • Chromium (Cr) • Copper (Cu) • Lead (Pb) • Manganese (Mn) • Mercury (Hg) • Nickel (Ni) • Selenium (Se) • Silver (Ag) • Thallium (Tl) • Zinc (Zn) • Chromium^{+6}
Total Recoverable Petroleum Hydrocarbons (TRPH)	• Petroleum Hydrocarbons
Inorganic Anions	• Chloride

Table 10. Compounds Spiked onto UMCDF Soil Samples for MS/MSD Analysis (Continued)

Parameter	**Compounds Spiked onto Soil Samples**
	• Cyanide, Total • Nitrate (as N) • Nitrite (as N) • Sulfate
Chemical Agent (GB, VX, HD)	• GB • VX • HD

Table 11. Surrogate Compounds Spiked onto UMCDF Soil Samples

Parameter	Surrogate Compounds Spiked onto Soil Samples
Volatile Organic Compounds (VOCs)	• Toluene-d_8 • Bromofluorobenzene • 1,2-Dichloroethane-d_4
Semivolatile Organic Compounds (SVOCs)	• Nitrobenzene-d_5 • 2-Fluorobiphenyl • Terphenyl-d_{14} • Phenol-d_5 • 2-Fluorophenol • 2,4,6-Tribromophenol • 2-Chlorophenol-d_4 • 1,2-Dichlorobenzene-d_4
Polychlorinated Biphenyls (PCBs)	• Tetrachloro-m-xylene • Decachlorobiphenyl
Organochlorine Pesticides	• Tetrachloro-m-xylene • Decachlorobiphenyl
Organophosphorous Pesticides	• Triphenyl phosphate
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs)	Isotope Dilution Internal Standards: • $^{13}C_{12}$-2,3,7,8-TCDF • $^{13}C_{12}$-2,3,7,8-TCDD • $^{13}C_{12}$-1,2,3,7,8-PeCDF • $^{13}C_{12}$-1,2,3,7,8-PeCDD • $^{13}C_{12}$-1,2,3,6,7,8-HxCDF • $^{13}C_{12}$-1,2,3,6,7,8-HxCDD • $^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF • $^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD • $^{13}C_{12}$-1,2,3,4,6,7,8,9-OCDD
Chlorinated Herbicides	• 2,4-Dichlorophenylacetic acid
Explosives	• 2,4-Dinitrofluorobenzene
Metals	Not Applicable
Total Recoverable Petroleum Hydrocarbons (TRPH)	Not Applicable
Inorganic Anions	Not Applicable
Chemical Agent (GB, VX, HD)	• Diisopropylmethyl-phosphonate (DIMP) • Tributylphosphate (TBP) • 1,3-Dithiane (1,3-DITH)

Table 12. Completeness Results of UMCDF Borehole Soil Samples by Parameter

Parameter	Number of Valid Measurements	Total Number of Borehole Soil Samples Collected	Percent Completeness (%)
Volatile Organic Compounds (VOCs)	46	47	98%
Semivolatile Organic Compounds (SVOCs)	47	47	100%
Polychlorinated Biphenyls (PCBs)	47	47	100%
Organochlorine Pesticides	47	47	100%
Organophosphorous Pesticides	47	47	100%
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs)	47	47	100%
Chlorinated Herbicides	47	47	100%
Explosives	47	47	100%
Metals	47	47	100%
Hexavalent Chromium	47	47	100%
Total Recoverable Petroleum Hydrocarbons (TRPH)	47	47	100%
Inorganic Anions	47	47	100%
Cyanide	47	47	100%
Chemical Agent (GB, VX, HD)	47	47	100%
Totals for Borehole Soil Samples	***657***	***658***	***99.8%***

Samples that were collected but were not analyzed are described as follows:

- Field Sample Number BH1-00-VOC-R (Borehole 1, Surface Grab, Volatiles analysis, Resampled) was not analyzed due to laboratory error.
- Field Sample Number EB1-QC-OPP (Equipment Blank #1 for Organophosphorous Pesticides analysis) was not analyzed due to the laboratory claim that the sample was never received.
- Field Sample Number TB1-QC-OPP (Trip Blank #1 for Organophosphorous Pesticides analysis) was not analyzed due to the laboratory claim that the sample was never received.

4.0 Analysis of Borehole Soil Samples for the Background Soils Investigation

This section describes each analytical parameter that was analyzed for in the soil samples, as well as the aqueous equipment blank and trip blank samples. Data certificates of analysis for these samples are given in Appendix A of this report.

4.1 Analysis of Volatile Organic Compounds (VOCs) in Borehole Soil Samples

4.1.1 Preparation and Analysis Methods

The volatile organic compound (VOC) analysis was performed using the following methods:

- SW-846 Method 5035: "Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples"
- SW-846 Method 8260B: "Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)"

4.1.2 Surrogate Recovery

Three (3) surrogate compounds were spiked onto all of the soil and aqueous samples prior to sample extraction. The surrogates are given in Table 11.

All surrogate recoveries were within the laboratory acceptance range of 70-130% for all of the soil and aqueous samples collected and analyzed in support of the Background Soils Investigation.

4.1.3 Duplicate Sample Precision (Representativeness of Field Duplicates)

Four (4) borehole soil samples were collected in duplicate for the UMCDF Background Soils Investigation as required by the UMCDF QAPjP. The same analytical parameters that were analyzed for in the original borehole soil samples were analyzed for in the duplicate samples. Table 8 shows the samples that were taken as duplicates.

Most of the sample analyte results for the duplicate soil samples were “ND” or not detected at or above the laboratory reporting limit for these samples. Therefore, the calculation of only a few relative percent differences (RPDs) was possible. The borehole sample duplicate results, along with RPDs or ranges, are presented in Appendix C of this report.

4.1.4 Borehole Soil Sample Matrix Spike/Matrix Spike Duplicate (MS/MSD) and Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD) Recovery and Precision

Due to the limited amount of soil that can be collected in an EnCore® sample container, insufficient sample volume was submitted to the laboratory for MS/MSD analysis. The laboratory, instead, analyzed laboratory control samples (LCSs) in duplicate. For the resampling event, sufficient sample was submitted for MS/MSD analysis. In summary, one (1) MS/MSD analysis was performed and two (2) LCS/LCSD analyses were performed for the volatiles determination. The compounds that were spiked onto the samples are given in Table 9.

All percent recoveries for the MS/MSD and LCS/LCSD samples were within the laboratory acceptance range. All relative percent differences (RPDs) calculated on the spiked duplicate samples were within the laboratory acceptance range. Borehole sample MS/MSD and LCS/LCSD analytical results, along with percent recoveries and relative percent difference (RPD), when applicable, are given in Appendix D of this report.

4.2 Analysis of Semivolatile Organic Compounds (SVOCs) in Borehole Soil Samples

4.2.1 Preparation and Analysis Methods

The semivolatile organic compound (SVOC) analysis was performed using the following methods:

- SW-846 Method 3540C: "Soxhlet Extraction"
- SW-846 Method 8270C: "Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)"

4.2.2 Surrogate Recovery

Eight (8) surrogate compounds were spiked onto all of the soil and aqueous samples prior to sample extraction. The surrogates are given in Table 11.

The surrogate recoveries in the borehole soil samples from the eight boreholes ranged from 40-101% as shown below.

Borehole Soil Sample Surrogate Recoveries:

Surrogate Compound	Laboratory Acceptance Range	Surrogate Recovery Range
Nitrobenzene-d_5	70-130%	51-82%
2-Fluorobiphenyl	70-130%	52-94%
Terphenyl-d_{14}	70-130%	63-99%
Phenol-d_5	70-130%	66-93%
2-Fluorophenol	70-130%	62-85%
2,4,6-Tribromophenol	70-130%	68-101%
2-Chlorophenol-d_4	70-130%	63-87%
1,2-Dichlorobenzene-d_4	70-130%	40-99%

The surrogate recoveries in the aqueous samples which consisted of equipment blanks and trip blanks ranged from 23-98% as shown below.

Aqueous Sample (Equipment Blanks and Trip Blanks) Surrogate Recoveries:

Surrogate Compound	Laboratory Acceptance Range	Surrogate Recovery Range
Nitrobenzene-d_5	70-130%	71-84%
2-Fluorobiphenyl	70-130%	68-82%

Terphenyl-d_{14}	70-130%	75-80%
Phenol-d_5	70-130%	23-34%
2-Fluorophenol	70-130%	36-51%
2,4,6-Tribromophenol	70-130%	86-98%
2-Chlorophenol-d_4	70-130%	69-82%
1,2-Dichlorobenzene-d_4	70-130%	53-61%

4.2.3 Duplicate Sample Precision (Representativeness of Field Duplicates)

Four (4) borehole soil samples were collected in duplicate for the UMCDF Background Soils Investigation as required by the UMCDF QAPjP. The same analytical parameters that were analyzed for in the original borehole soil samples were analyzed for in the duplicate samples. Table 8 shows the samples that were taken as duplicates.

Most of the sample analyte results for the duplicate soil samples were "ND" or not detected at or above the laboratory reporting limit for these samples. Therefore, the calculation of only a few relative percent differences (RPDs) was possible. The borehole sample duplicate results, along with RPDs or ranges, are presented in Appendix C of this report.

4.2.4 Borehole Soil Sample Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

Three (3) borehole soil samples were spiked in duplicate by the laboratory prior to sample extraction in support of the UMCDF Background Soils Investigation. The compounds that were spiked onto the samples are given in Table 9.

Borehole sample MS/MSD analytical results, along with percent recoveries and relative percent difference (RPD), when applicable, are given in Appendix D of this report.

4.3 Analysis of Polychlorinated Biphenyls (PCBs) in Borehole Soil Samples

4.3.1 Preparation and Analysis Methods

The polychlorinated biphenyl (PCB) analysis for Aroclors was performed using the following methods:

- SW-846 Method 3540C: "Soxhlet Extraction"
- SW-846 Method 8082: "Polychlorinated Biphenyls (PCBs) by Gas Chromatography"

4.3.2 Surrogate Recovery

Two (2) surrogate compounds were spiked onto all of the soil and aqueous samples prior to sample extraction. The surrogates are given in Table 11.

The surrogate recoveries in the borehole soil samples from the eight boreholes ranged from 58-105% as shown below.

Borehole Soil Sample Surrogate Recoveries:

Surrogate Compound	Laboratory Acceptance Range	Surrogate Recovery Range
Tetrachloro-m-xylene	70-130%	58-89%
Decachlorobiphenyl	70-130%	71-105%

The surrogate recoveries in the aqueous samples which consisted of equipment blanks and trip blanks ranged from 22-86% as shown below.

Aqueous Sample (Equipment Blanks and Trip Blanks) Surrogate Recoveries:

Surrogate Compound	Laboratory Acceptance Range	Surrogate Recovery Range
Tetrachloro-m-xylene	70-130%	47-74%
Decachlorobiphenyl	70-130%	22-86%

4.3.3 Duplicate Sample Precision (Representativeness of Field Duplicates)

Four (4) borehole soil samples were collected in duplicate for the UMCDF Background Soils Investigation as required by the UMCDF QAPjP. The same analytical parameters that were analyzed for in the original borehole soil samples were analyzed for in the duplicate samples. Table 8 shows the samples that were taken as duplicates.

All of the sample analyte results for the duplicate soil samples were “ND” or not detected at or above the laboratory reporting limit for these samples. Therefore, the calculation of relative percent difference (RPD) was not possible. The borehole sample duplicate results and precision ranges are presented in Appendix C of this report.

4.3.4 Borehole Soil Sample Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

Three (3) borehole soil samples were spiked in duplicate by the laboratory prior to sample extraction in support of the UMCDF Background Soils Investigation. The Aroclors that were spiked onto the samples are given in Table 9.

All percent recoveries for the MS/MSD samples were within the laboratory acceptance range. All relative percent differences (RPDs) calculated on the spiked duplicate samples were within the laboratory acceptance range. Borehole sample MS/MSD analytical results, along with percent recoveries and relative percent difference (RPD), when applicable, are given in Appendix D of this report.

4.4 Analysis of Organochlorine Pesticides in Borehole Soil Samples

4.4.1 Preparation and Analysis Methods

The organochlorine pesticides analysis was performed using the following methods:

- SW-846 Method 3540C: "Soxhlet Extraction"
- SW-846 Method 8081A: "Organochlorine Pesticides by Gas Chromatography"

4.4.2 Surrogate Recovery

Two (2) surrogate compounds were spiked onto all of the soil and aqueous samples prior to sample extraction. The surrogates are given in Table 11.

The surrogate recoveries in the borehole soil samples from the eight boreholes ranged from 65-110% as shown below.

Borehole Soil Sample Surrogate Recoveries:

Surrogate Compound	Laboratory Acceptance Range	Surrogate Recovery Range
Tetrachloro-m-xylene	70-130%	65-94%
Decachlorobiphenyl	70-130%	78-110%

The surrogate recoveries in the aqueous samples which consisted of equipment blanks and trip blanks ranged from 31-100% as shown below.

Aqueous Sample (Equipment Blanks and Trip Blanks) Surrogate Recoveries:

Surrogate Compound	Laboratory Acceptance Range	Surrogate Recovery Range
Tetrachloro-m-xylene	70-130%	72-89%
Decachlorobiphenyl	70-130%	31-100%

4.4.3 Duplicate Sample Precision (Representativeness of Field Duplicates)

Four (4) borehole soil samples were collected in duplicate for the UMCDF Background Soils Investigation as required by the UMCDF QAPjP. The same analytical parameters that were analyzed for in the original borehole soil samples were analyzed for in the duplicate samples. Table 8 shows the samples that were taken as duplicates.

All of the sample analyte results for the duplicate soil samples were “ND” or not detected at or above the laboratory reporting limit for these samples. Therefore, the calculation of relative percent difference (RPD) was not possible. The borehole sample duplicate results and precision ranges are presented in Appendix C of this report.

4.4.4 Borehole Soil Sample Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

Three (3) borehole soil samples were spiked in duplicate by the laboratory prior to sample extraction in support of the UMCDF Background Soils Investigation. The compounds that were spiked onto the samples are given in Table 9.

Borehole sample MS/MSD analytical results, along with percent recoveries and relative percent difference (RPD), when applicable, are given in Appendix D of this report.

4.5 Analysis of Organophosphorous Pesticides in Borehole Soil Samples

4.5.1 Preparation and Analysis Methods

The organophosphorous pesticides analysis was performed using the following methods:

- SW-846 Method 3540C: "Soxhlet Extraction"
- SW-846 Method 8141A: "Organophosphorous Compounds by Gas Chromatography: Capillary Column Technique"

4.5.2 Surrogate Recovery

One (1) surrogate compound was spiked onto all of the soil and aqueous samples prior to sample extraction. The surrogate is given in Table 11.

All surrogate recoveries were within the laboratory acceptance range of 20-157% for all of the soil and aqueous samples collected and analyzed in support of the Background Soils Investigation.

4.5.3 Duplicate Sample Precision (Representativeness of Field Duplicates)

Four (4) borehole soil samples were collected in duplicate for the UMCDF Background Soils Investigation as required by the UMCDF QAPjP. The same analytical parameters that were analyzed for in the original borehole soil samples were analyzed for in the duplicate samples. Table 8 shows the samples that were taken as duplicates.

All of the sample analyte results for the soil samples were "ND" or not detected at or above the laboratory reporting limit for these samples. Therefore, the calculation of relative percent difference (RPD) was not possible. The borehole sample duplicate results and precision ranges are presented in Appendix C of this report.

4.5.4 Borehole Soil Sample Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

Three (3) borehole soil samples were spiked in duplicate by the laboratory prior to sample extraction in support of the UMCDF Background Soils Investigation. The compounds that were spiked onto the samples are given in Table 9.

All percent recoveries for the MS/MSD samples were within the laboratory acceptance range. All relative percent differences (RPDs) calculated on the spiked duplicate samples were within the laboratory acceptance range. Borehole sample MS/MSD analytical results, along with percent recoveries and relative percent difference (RPD), when applicable, are given in Appendix D of this report.

4.6 Analysis of Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) in Borehole Soil Samples

4.6.1 Preparation and Analysis Methods

The polychlorinated dibenzodioxin (PCDD) and polychlorinated dibenzofuran (PCDF) analysis was performed using the following methods:

- SW-846 Method 3540C: "Soxhlet Extraction"
- SW-846 Method 8290: "Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by High-Resolution Gas Chromatography/High-Resolution Mass Spectrometry (HRGC/HRMS)"

4.6.2 Isotope Dilution Internal Standard Recovery

Nine (9) isotope dilution internal standard were spiked onto all of the soil and aqueous samples prior to sample extraction. The isotope dilution internal standard compounds are given in Table 11.

The isotope dilution internal standard recoveries in the borehole soil samples from the eight boreholes ranged from 20-126% as shown below.

Borehole Soil Sample Isotope Dilution Internal Standard Recoveries:

Surrogate Compound	Laboratory Acceptance Range	Surrogate Recovery Range
$^{13}C_{12}$-2,3,7,8-TCDF	40-135%	29-86%
$^{13}C_{12}$-2,3,7,8-TCDD	40-135%	28-91%
$^{13}C_{12}$-1,2,3,7,8-PeCDF	40-135%	25-90%
$^{13}C_{12}$-1,2,3,7,8-PeCDD	40-135%	20-88%
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	40-135%	37-125%
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	40-135%	35-123%
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	40-135%	26-116%
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	40-135%	30-126%
$^{13}C_{12}$-1,2,3,4,6,7,8,9-OCDD	40-135%	23-116%

The surrogate recoveries in the aqueous samples which consisted of equipment blanks and trip blanks ranged from 51-110% as shown below.

Aqueous Sample (Equipment Blanks and Trip Blanks) Isotope Dilution Internal Standard Recoveries:

Surrogate Compound	Laboratory Acceptance Range	Surrogate Recovery Range
$^{13}C_{12}$-2,3,7,8-TCDF	40-135%	67-80%
$^{13}C_{12}$-2,3,7,8-TCDD	40-135%	74-80%
$^{13}C_{12}$-1,2,3,7,8-PeCDF	40-135%	51-85%
$^{13}C_{12}$-1,2,3,7,8-PeCDD	40-135%	64-87%
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	40-135%	93-106%
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	40-135%	96-110%
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	40-135%	90-102%
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	40-135%	94-102%
$^{13}C_{12}$-1,2,3,4,6,7,8,9-OCDD	40-135%	57-103%

4.6.3 Duplicate Sample Precision (Representativeness of Field Duplicates)

Four (4) borehole soil samples were collected in duplicate for the UMCDF Background Soils Investigation as required by the UMCDF QAPjP. The same analytical parameters that were analyzed for in the original borehole soil samples were analyzed for in the duplicate samples. Table 8 shows the samples that were taken as duplicates.

All of the sample analyte results for the duplicate soil samples were “ND” or not detected at or above the laboratory reporting limit for these samples. Therefore, the calculation of relative percent difference (RPD) was not possible. The borehole sample duplicate results and precision ranges are presented in Appendix C of this report.

4.6.4 Borehole Soil Sample Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

Three (3) borehole soil samples were spiked in duplicate by the laboratory prior to sample extraction in support of the UMCDF Background Soils Investigation. The compounds that were spiked onto the samples are given in Table 9.

All percent recoveries for the MS/MSD samples were within the laboratory acceptance range. All relative percent differences (RPDs) calculated on the spiked duplicate samples were within the laboratory acceptance range. Borehole sample MS/MSD analytical results, along with percent recoveries and relative percent difference (RPD), when applicable, are given in Appendix D of this report.

4.7 Analysis of Chlorinated Herbicides in Borehole Soil Samples

4.7.1 Preparation and Analysis Methods

The chlorinated herbicides analysis was performed using the following methods:

- SW-846 Method 3550B: "Ultrasonic Extraction"
- SW-846 Method 8151A: "Chlorinated Herbicides by GC Using Methylation or Pentafluorobenzylation Derivatization"

4.7.2 Surrogate Recovery

One (1) surrogate compound was spiked onto all of the soil and aqueous samples prior to sample extraction. The surrogate is given in Table 11.

All surrogate recoveries were within the laboratory acceptance range of 30-130% for all of the soil and aqueous samples collected and analyzed in support of the Background Soils Investigation.

4.7.3 Duplicate Sample Precision (Representativeness of Field Duplicates)

Four (4) borehole soil samples were collected in duplicate for the UMCDF Background Soils Investigation as required by the UMCDF QAPjP. The same analytical parameters that were analyzed for in the original borehole soil samples were analyzed for in the duplicate samples. Table 8 shows the samples that were taken as duplicates.

All of the sample analyte results for the duplicate soil samples were "ND" or not detected at or above the laboratory reporting limit for these samples. Therefore, the calculation of relative percent difference (RPD) was not possible. The borehole sample duplicate results and precision ranges are presented in Appendix C of this report.

4.7.4 Borehole Soil Sample Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

Three (3) borehole soil samples were spiked in duplicate by the laboratory prior to sample extraction in support of the UMCDF Background Soils Investigation. The compounds that were spiked onto the samples are given in Table 9.

All percent recoveries for the MS/MSD samples were within the laboratory acceptance range. All relative percent differences (RPDs) calculated on the spiked duplicate samples were within the laboratory acceptance range. Borehole sample MS/MSD analytical results, along with percent recoveries and relative percent difference (RPD), when applicable, are given in Appendix D of this report.

4.8 Analysis of Explosives in Borehole Soil Samples

4.8.1 Preparation and Analysis Methods

The explosives analysis was performed using the following methods:

- SW-846 Method 3550B: "Ultrasonic Extraction"
- SW-846 Method 8330: "Nitroaromatics and Nitroamines by High Performance Liquid Chromatography (HPLC)"

4.8.2 Surrogate Recovery

One (1) surrogate compound was spiked onto all of the soil and aqueous samples prior to sample extraction. The surrogate is given in Table 11.

All surrogate recoveries were within the laboratory acceptance range of 65-135% for all of the soil samples with the exception of Field Sample Number BH2-00-EXP (Borehole 2, Surface Grab) which had a recovery of 28%. All of the surrogate recoveries for the aqueous samples collected and analyzed were within the laboratory acceptance range.

4.8.3 Duplicate Sample Precision (Representativeness of Field Duplicates)

Four (4) borehole soil samples were collected in duplicate for the UMCDF Background Soils Investigation as required by the UMCDF QAPjP. The same analytical parameters that were analyzed for in the original borehole soil samples were analyzed for in the duplicate samples. Table 8 shows the samples that were taken as duplicates.

All of the sample analyte results for the duplicate soil samples were "ND" or not detected at or above the laboratory reporting limit for these samples. Therefore, the calculation of relative percent difference (RPD) was not possible. The borehole sample duplicate results and precision ranges are presented in Appendix C of this report.

4.8.4 Borehole Soil Sample Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

Three (3) borehole soil samples were spiked in duplicate by the laboratory prior to sample extraction in support of the UMCDF Background Soils Investigation. The compounds that were spiked onto the samples are given in Table 9.

All percent recoveries for the MS/MSD samples were within the laboratory acceptance range. All relative percent differences (RPDs) calculated on the spiked duplicate samples were within the laboratory acceptance range. Borehole sample MS/MSD analytical results, along with percent recoveries and relative percent difference (RPD), when applicable, are given in Appendix D of this report.

4.9 Analysis of Metallic Analytes in Borehole Soil Samples

4.9.1 Preparation and Analysis Methods

The metals analysis was performed using the following methods:

- SW-846 Method 3050B: “Acid Digestion of Sediments, Sludges, and Soils”
- SW-846 Method 3051: “Microwave Assisted Acid Digestion of Sediments, Sludges, Soils, and Oils”
- SW-846 Method 7471A: "Mercury in Solid or Semisolid Waste (Manual Cold Vapor Technique)"
- SW-846 Method 6010B: "Inductively Coupled Plasma - Atomic Emission Spectroscopy"
- SW-846 Method 7196A: "Chromium, Hexavalent (Colorimetric)"

4.9.2 Duplicate Sample Precision (Representativeness of Field Duplicates)

Four (4) borehole soil samples were collected in duplicate for the UMCDF Background Soils Investigation as required by the UMCDF QAPjP. The same analytical parameters that were analyzed for in the original borehole soil samples were analyzed for in the duplicate samples. Table 8 shows the samples that were taken as duplicates.

The borehole sample duplicate results, along with RPDs or ranges, are presented in Appendix C of this report.

4.9.3 Borehole Soil Sample Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

Three (3) borehole soil samples were spiked in duplicate by the laboratory prior to sample extraction in support of the UMCDF Background Soils Investigation. The compounds that were spiked onto the samples are given in Table 9.

Borehole sample MS/MSD analytical results, along with percent recoveries and relative percent difference (RPD), when applicable, are given in Appendix D of this report.

4.10 Analysis of Total Recoverable Petroleum Hydrocarbons (TRPH) in Borehole Soil Samples

4.10.1 Preparation and Analysis Methods

The total recoverable petroleum hydrocarbons (TRPH) analysis was performed using EPA Method 418.1, "Petroleum Hydrocarbons, Total Recoverable (Spectrophotometric, Infrared)".

4.10.2 Duplicate Sample Precision (Representativeness of Field Duplicates)

Four (4) borehole soil samples were collected in duplicate for the UMCDF Background Soils Investigation as required by the UMCDF QAPjP. The same analytical parameters that were analyzed for in the original borehole soil samples were analyzed for in the duplicate samples. Table 8 shows the samples that were taken as duplicates.

All of the sample analyte results for the duplicate soil samples were "ND" or not detected at or above the laboratory reporting limit for these samples. Therefore, the calculation of relative percent difference (RPD) was not possible. The borehole sample duplicate results and precision ranges are presented in Appendix C of this report.

4.10.3 Borehole Soil Sample Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

Two (2) borehole soil samples were spiked in duplicate by the laboratory prior to sample extraction in support of the UMCDF Background Soils Investigation. Borehole sample MS/MSD analytical results, along with percent recoveries and relative percent difference (RPD), when applicable, are given in Appendix D of this report.

4.11 Analysis of Inorganic Anions in Borehole Soil Samples

4.11.1 Preparation and Analysis Methods

The inorganic anion determination was performed using the following methods:

- EPA Method 300.0: "Determination of Inorganic Anions by Ion Chromatography"
- SW-846 Method 9012A: "Total and Amenable Cyanide (Automated Colorimetric, with Off-Line Distillation)"

4.11.2 Duplicate Sample Precision (Representativeness of Field Duplicates)

Four (4) borehole soil samples were collected in duplicate for the UMCDF Background Soils Investigation as required by the UMCDF QAPjP. The same analytical parameters that were analyzed for in the original borehole soil samples were analyzed for in the duplicate samples. Table 8 shows the samples that were taken as duplicates.

The borehole sample duplicate results, along with RPDs or ranges, are presented in Appendix C of this report.

4.11.3 Borehole Soil Sample Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

Three (3) borehole soil samples were spiked in duplicate by the laboratory prior to sample extraction in support of the UMCDF Background Soils Investigation. The compounds that were spiked onto the samples are given in Table 9.

All percent recoveries for the MS/MSD samples were within the laboratory acceptance range. All relative percent differences (RPDs) calculated on the spiked duplicate samples were within the laboratory acceptance range. Borehole sample MS/MSD analytical results, along with percent recoveries and relative percent difference (RPD), when applicable, are given in Appendix D of this report.

4.12 Analysis of Chemical Agent in Borehole Soil Samples

4.12.1 Preparation and Analysis Methods

The chemical agent analysis was performed using the following Battelle Laboratory standard operating procedure (SOP):

- Battelle SOP No. HMRC III-013-01: "Standard Operating Procedure for the Extraction of Agents and Degradation Products from Environmental Samples"

4.12.2 Surrogate Recovery

Three (3) surrogate compounds were spiked onto all of the soil and aqueous samples prior to sample extraction. The surrogates are given in Table 11.

The surrogate recoveries in the borehole soil samples from the eight boreholes ranged from 54.7%106% as shown below.

Borehole Soil Sample Surrogate Recoveries:

Surrogate Compound	Laboratory Acceptance Range	Surrogate Recovery Range
Diisopropylmethyl-phosphonate (DIMP)	20-120%	73.0-100%
Tributylphosphate (TBP)	20-120%	64.6-106%
1,3-Dithiane (1,3-DITH)	20-120%	54.7-89.6%

The surrogate recoveries in the aqueous samples which consisted of equipment blanks and trip blanks ranged from 48.8-100% as shown below.

Aqueous Sample (Equipment Blanks and Trip Blanks) Surrogate Recoveries:

Surrogate Compound	Laboratory Acceptance Range	Surrogate Recovery Range
Diisopropylmethyl-phosphonate (DIMP)	20-120%	73.1-87.0%
Tributylphosphate (TBP)	20-120%	90.2-100%
1,3-Dithiane (1,3-DITH)	20-120%	48.8-94.1%

4.12.3 Duplicate Sample Precision (Representativeness of Field Duplicates)

Four (4) borehole soil samples were collected in duplicate for the UMCDF Background Soils Investigation as required by the UMCDF QAPjP. The same analytical parameters that were analyzed for in the original borehole soil samples were analyzed for in the duplicate samples. Table 8 shows the samples that were taken as duplicates.

All of the sample analyte results for the duplicate soil samples were “ND” or not detected at or above the laboratory reporting limit for these samples. Therefore, the calculation of relative percent difference (RPD) was not possible. The borehole sample duplicate results and precision ranges are presented in Appendix C of this report.

4.12.4 Borehole Soil Sample Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and Precision

Four (4) borehole soil samples were spiked in duplicate by the laboratory prior to sample extraction in support of the UMCDF Background Soils Investigation. Aliquots of two of those samples underwent a second set of matrix spikes. Also, a trip blank was spiked in duplicate. The compounds that were spiked onto the samples are given in Table 9.

All percent recoveries for the MS/MSD samples were within the laboratory acceptance range. Borehole sample MS/MSD analytical results, along with percent recoveries and relative percent difference (RPD), when applicable, are given in Appendix D of this report.

4.13 Determination of Moisture in Borehole Soil Samples

A moisture determination was performed on each interval of each borehole drilled and sampled at the UMCDF site. All analytical results presented in this Final Report are on a wet weight basis; they have not been corrected for percent moisture. The results from the moisture determinations on the borehole soil samples are given in Table 14.

Table 13. Soil Sample Moisture Content Summary

Borehole No.	Interval (Depth) (ft.)	Quanterra Sample ID	Laboratory Sample ID	Water Content (%)
1	Surface Grab	BH1-00	301425-0001-SA	8.2%
1	0-2	BH1-02	301425-0002-SA	2.6%
1	2-4	BH1-04	301425-0003-SA	3.5%
1	4-6	BH1-06	301425-0004-SA	4.5%
1	8-10	BH1-10	301425-0005-SA	11%
1	8-10 (Duplicate)	BD1-10	301425-0006-SA	27%
2	Surface Grab	BH2-00	301425-0007-SA	3.9%
2	0-2	BH2-02	301425-0008-SA	4.2%
2	2-4	BH2-04	301425-0009-SA	6.0%
2	2-4 (Duplicate)	BD2-04	301425-0010-SA	5.3%
2	4-6	BH2-06	301425-0011-SA	6.6%
2	8-10	BH2-10	301425-0012-SA	5.5%
3	Surface Grab	BH3-00	301318-0001-SA	4.0%
3	0-2	BH3-02	301318-0002-SA	7.2%
3	2-4	BH3-04	301318-0003-SA	5.8%
3	4-6	BH3-06	301318-0004-SA	12%
3	8-10	BH3-10	301318-0005-SA	5.2%
4	Surface Grab	BH4-00	301395-0001-SA	22%
4	0-2	BH4-02	301395-0002-SA	7.7%
4	2-4	BH4-04	301395-0003-SA	9.0%
4	4-6	BH4-06	301395-0004-SA	8.6%
4	8-10	BH4-10	301395-0005-SA	6.4%
5	Surface Grab	BH5-00	301318-0006-SA	3.8%
5	0-2	BH5-02	301318-0007-SA	4.9%
5	2-4	BH5-04	301318-0008-SA	12%
5	4-6	BH5-06	301318-0009-SA	6.0%
5	8-10	BH5-10	301318-0010-SA	4.0%
6	Surface Grab	BH6-00	301395-0007-SA	5.1%
6	0-2	BH6-02	301395-0008-SA	7.3%
6	2-4	BH6-04	301395-0009-SA	24%
6	4-6	BH6-06	301395-0010-SA	5.3%
6	4-6 (Duplicate)	BD6-06	301395-0006-SA	5.3%
6	8-10	BH6-10	301395-0011-SA	6.4%
7	Surface Grab	BH7-00	301395-0012-SA	1.6%
7	0-2	BH7-02	301395-0013-SA	1.8%
7	2-4	BH7-04	301395-0014-SA	6.2%

Table 13. Soil Sample Moisture Content Summary (Continued)

Borehole No.	Interval (Depth) (ft.)	Quanterra Sample ID	Laboratory Sample ID	Water Content (%)
7	2-4 (Duplicate)	BD7-04	301395-0015-SA	18%
7	4-6	BH7-06	301395-0016-SA	18%
7	8-10	BH7-10	301395-0017-SA	9.1%
8	Surface Grab	BH8-00	301395-0018-SA	11%
8	0-2	BH8-02	301395-0019-SA	9.0%
8	2-4	BH8-04	301395-0020-SA	6.4%
8	4-6	BH8-06	301395-0021-SA	6.8%
8	8-10	BH8-10	301395-0022-SA	6.4%

5.0 Statistical Analysis

5.1 Introduction

The statistical analyses of the analytical results obtained from the UMCDF Background Soils Investigation were performed by Battelle Pacific Northwest National Laboratory. Table 1 shows the summary of the statistical analysis and provides project analyte background concentrations.

5.2 Calculation of Background Concentrations

Background concentrations were calculated for all analytes with detected values based on the statistical approach in the *Quality Assurance Project Plan for Background Soils Investigation at the Umatilla Chemical Agent Disposal Facility* (February 1998). Table 1 contains a list of all analytes, the number of samples analyzed, the number of detected values for each analyte, whether background concentrations were calculated, and the background concentration for that analyte.

Statistical analyses were performed after data validation of the analytical results. Since none of the results were rejected in data validation process, all of the values were included in the statistical analyses. Estimated values were also included in the statistical analyses.

The data was first examined for the number of detected values. If all of the results for a particular analyte were nondetects, then the background concentration was listed as less than the Practical Quantitation Limit (PQL) in Table 1. For example, there were 40 samples analyzed for Nitrite (as N) and there were no results above detection noted for any of the samples. The background threshold value for Nitrite (as N) was therefore listed as less than the PQL. For those analytes where the PQL depends on the sample weight, the average of the PQL values was reported (e.g., volatile organic compounds and dioxin/furans).

Figure 1 shows the process used to calculate the background concentrations for the analytes with detected values. Field duplicate samples were considered as one sample, and the two results were averaged. When one of the duplicate results was a nondetect and the other was a detect, the average was calculated using one-half of the detection limit for the nondetect value. When both of the duplicate results were nondetects, the PQL was used as the average.

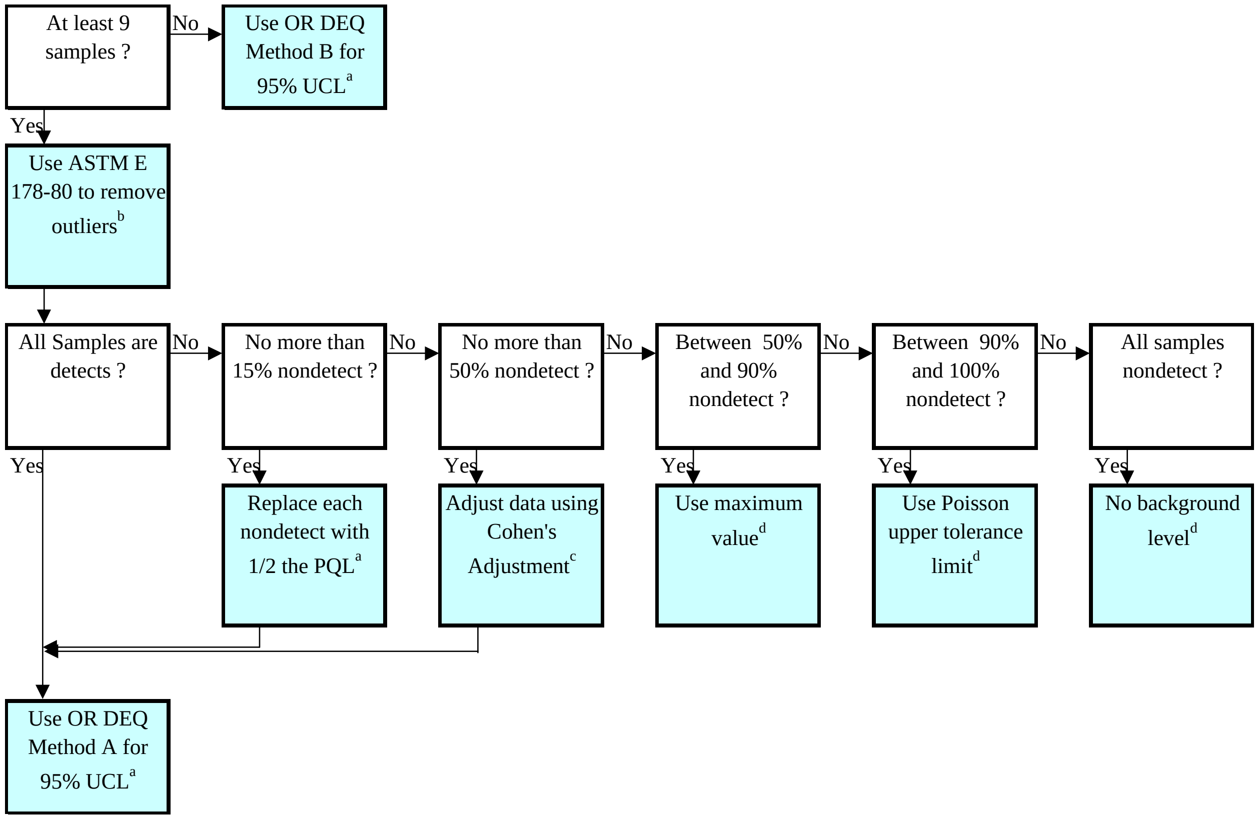
Since there was more than nine samples for each analyte, the next step was to remove outliers from the data points for an analyte from a borehole (e.g., nitrate (as N) in borehole 1). After outliers were removed, the statistical variation between fill and native soil was determined using the process in Figure 2. The data points were separated into fill and native soil data sets based on information provided by Raytheon Constructors, Inc (Table 14).

The results of calculating the background concentrations for the analytes with detected values is summarized in Table 15. This process follows the approach for determining soil background concentrations in the *Quality Assurance Project Plan for Background Soils Investigation at the Umatilla Chemical Agent Disposal Facility.* The number of outliers removed and the background concentration calculated for each analyte are included in Table 15.

There were six analytes with results that were significantly different between the native and fill soil. Therefore, two background concentrations were calculated, one for the native soil and one for the fill soil. The background concentrations for all the other analytes were calculated combining the results of the native and fill soil.

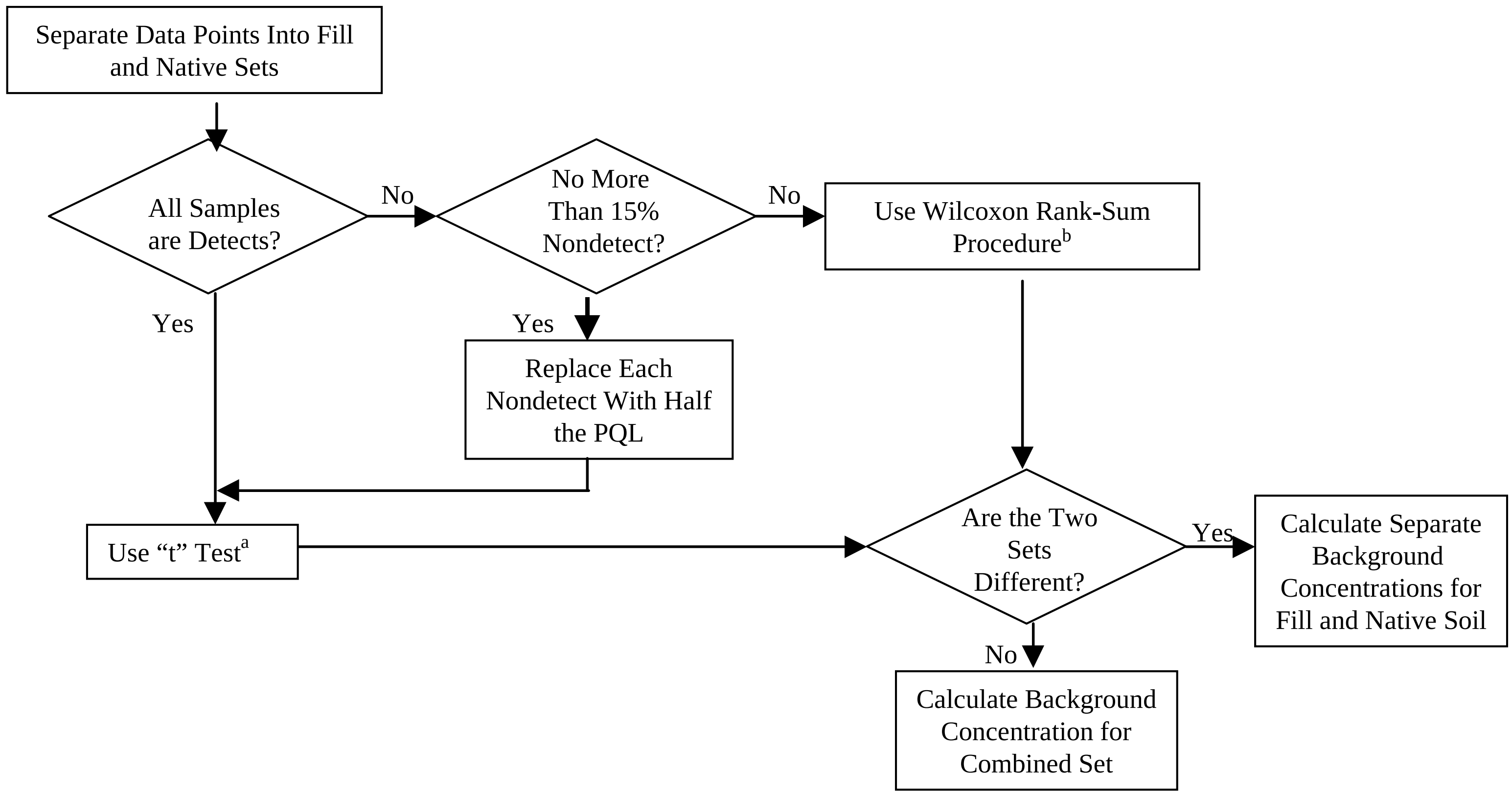
Details of the statistical analyses can be found in Appendix E with the certified statistical results. These sheets show how the data was analyzed in accordance with the processes outlined in Figures 1 and 2.

Figure 1. Process for Determining Soil Background Concentrations (figure reprinted from Quality Assurance Project Plan for Background Soils Investigation at the Umatilla Chemical Agent Disposal Facility, February 1998).



[a] Oregon Department of Environmental Quality, *Soil Cleanup Manual*, Appendix C: Guidelines for Determining Background Concentrations, April 1994.
[b] American Society for Testing Materials, *Standard Practice for Dealing With Outlying Observations*, Designation: E 178-80.
[c] U.S. Environmental Protection Agency, *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities*, Interim Final Guidance, Office of Solid Waste, Permits and State Programs Division, 1989, EPA/530-SW-89-026.
[d] U.S. Environmental Protection Agency, *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities*, Addendum to Interim Final Guidance, Office of Solid Waste, Permits and State Programs Division, June 1992, EPA/530-R-93-003.

Figure 2. Determining Statistical Variation Between Fill and Native Soil (figure reprinted from Quality Assurance Project Plan for Background Soils Investigation at the Umatilla Chemical Agent Disposal Facility, February 1998).



References:

[a] U.S. Environmental Protection Agency, *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities*, Interim Final Guidance, Office of Solid Waste, Permits and State Programs Division, 1989, EPA/530-SW-89-026.

[b] U.S. Environmental Protection Agency, *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities*, Addendum to Interim Final Guidance, Office of Solid Waste, Permits and State Programs Division, June 1992, EPA/530-R-93-003.

Table 14. Determination of Fill vs. Native Soil for all Boreholes and Depths (information provided by Raytheon Constructors, Inc.).

Borehole	Depth	Fill/Native	Sample Number
1	Surface	Fill	BH1-00-ANI
1	0-2 ft.	Fill	BH1-02-ANI
1	2-4 ft.	Fill	BH1-04-ANI
1	4-6 ft.	Fill	BH1-06-ANI
1	8-10 ft.	Fill	BH1-10-ANI
2	Surface	Native	BH2-00-ANI
2	0-2 ft.	Native	BH2-02-ANI
2	2-4 ft.	Native	BH2-04-ANI
2	4-6 ft.	Native	BH2-06-ANI
2	8-10 ft.	Native	BH2-10-ANI
3	Surface	Fill	BH3-00-ANI
3	0-2 ft.	Fill	BH3-02-ANI
3	2-4 ft.	Fill	BH3-04-ANI
3	4-6 ft.	Native	BH3-06-ANI
3	8-10 ft.	Native	BH3-10-ANI
4	Surface	Fill	BH4-00-ANI
4	0-2 ft.	Fill	BH4-02-ANI
4	2-4 ft.	Fill	BH4-04-ANI
4	4-6 ft.	Native	BH4-06-ANI
4	8-10 ft.	Native	BH4-10-ANI
5	Surface	Fill	BH5-00-ANI
5	0-2 ft.	Fill	BH5-02-ANI
5	2-4 ft.	Fill	BH5-04-ANI
5	4-6 ft.	Fill	BH5-06-ANI
5	8-10 ft.	Native	BH5-10-ANI
6	Surface	Native	BH6-00-ANI
6	0-2 ft.	Native	BH6-02-ANI
6	2-4 ft.	Native	BH6-04-ANI
6	4-6 ft.	Native	BH6-06-ANI
6	8-10 ft.	Native	BH6-10-ANI
7	Surface	Native	BH7-00-ANI
7	0-2 ft.	Native	BH7-02-ANI
7	2-4 ft.	Native	BH7-04-ANI
7	4-6 ft.	Native	BH7-06-ANI
7	8-10 ft.	Native	BH7-10-ANI
8	Surface	Native	BH8-00-ANI
8	0-2 ft.	Native	BH8-02-ANI
8	2-4 ft.	Native	BH8-04-ANI
8	4-6 ft.	Native	BH8-06-ANI
8	8-10 ft.	Native	BH8-10-ANI

Table 15: Process Used to Calculate the Background Concentrations for the Analytes with Detected Values (Continued)

Table 15. Process Used to Calculate the Background Concentrations for the Analytes with Detected Values

Analyte	Number of Samples	Number of Detects	Outliers Deleted		Difference of Means	Background Threshold		
			Fill	Native	Test Result	Fill	Native	Combined
Anions								
Chloride	40	6	3	3	NA	NA	NA	<5.1 mg/kg
Nitrate (as N)	40	40	0	3	Separate	7.2 mg/kg	2.2 mg/kg	NA
Sulfate	40	40	3	3	Combine	NA	NA	18.3 mg/kg
Semi-Volatile Organic Compounds								
Di-n-butyl phthalate	40	6	0	0	Separate	199 ug/kg	165 ug/kg	NA
Dioxin/Furans								
1,2,3,4,6,7,8-HpCDD	40	4	0	0	Combine	NA	NA	2.5 pg/g
OCDD	40	19	1	2	Separate	28 pg/g	11 pg/g	NA
Total-HpCDD	40	5	3	2	NA	NA	NA	<0.77 pg/g
Explosives								
Nitrobenzene	40	1	0	0	NA	NA	NA	1.0 mg/kg
Metals								
Chromium+6	40	15	0	1	Separate	0.14 mg/kg	0.03 mg/kg	NA
Antimony (Sb)	40	17	0	0	Separate	1.3 mg/kg	1.3 mg/kg	NA
Arsenic (As)	40	40	0	2	Combine	NA	NA	4.8 mg/kg
Beryllium (Be)	40	39	0	0	Combine	NA	NA	0.36 mg/kg
Cadmium (Cd)	40	4	0	0	NA	NA	NA	2.0 mg/kg
Chromium (Cr)	40	40	1	2	Combine	NA	NA	10.0 mg/kg
Copper (Cu)	40	40	0	0	Combine	NA	NA	15.3 mg/kg
Lead (Pb)	40	40	0	0	Combine	NA	NA	6.4 mg/kg
Manganese (Mn)	40	40	0	1	Combine	NA	NA	403 mg/kg
Mercury (Hg)	40	4	0	0	NA	NA	NA	0.5 mg/kg
Nickel (Ni)	40	40	0	1	Combine	NA	NA	11.9 mg/kg
Selenium (Se)	40	28	0	0	Combine	NA	NA	1.16 mg/kg

Analyte	***Number of Samples***	***Number of Detects***	***Outliers Deleted***		***Difference of Means***	***Background Threshold***		
			Fill	***Native***	***Test Result***	***Fill***	***Native***	***Combined***
Silver (Ag)	40	26	0	2	Combine	NA	NA	1.33 mg/kg
Thallium (Tl)	40	13	0	1	Separate	1.0 mg/kg	0.7 mg/kg	NA
Zinc (Zn)	40	40	0	2	Combine	NA	NA	60.2 mg/kg
Organophosphorous Pesticides								
Beta-BHC	40	6	0	0	Separate	0.85 ug/kg	0.85 ug/kg	NA
Endosulfan II	40	1	0	0	NA	NA	NA	4.5 ug/kg
Total Petroleum Hydrocarbons								
Total Recoverable Petroleum Hydrocarbons	40	4	0	0	NA	NA	NA	13 mg/kg
Volatile Organic Compounds								
Dichlorodifluoromethane (Freon-12)	39	30	0	0	Combine	NA	NA	6.7 ug/kg
Toluene	39	1	0	0	NA	NA	NA	5.5 ug/kg
Methylene chloride	39	1	0	0	NA	NA	NA	6.5 ug/kg
1,2,3-Trichlorobenzene	39	3	0	0	NA	NA	NA	5.5 ug/kg
1,2,4-Trichlorobenzene	39	1	0	0	NA	NA	NA	5.5 ug/kg
m & p-Xylene(s)	39	2	0	0	NA	NA	NA	5.5 ug/kg
Acetone	39	27	2	0	Combine	NA	NA	146 ug/kg
Carbon disulfide	39	9	0	0	Combine	NA	NA	6.5 ug/kg

NA = Not Applicable.

6.0 Data Validation Procedures

The validation of the analytical results obtained from the UMCDF Background Soils Investigation was performed by Golder Associates. The validation was performed in accordance with “Background Soils Investigation Data Validation Procedures”, Revision 1, July 1998. This document was prepared by Raytheon Demilitarization Company for the UMCDF Background Soils Investigation. The results of the validation procedures performed are given in Appendix F of this report.

Permit Attachment 9

Umatilla Chemical Agent Disposal Facility

Contingency Plan

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Table of Contents

Figures

Tables

Acronym List

ACAMS	Automatic Continuous Air Monitoring System
AEL	Airborne Exposure Limit
AMRT	Air Monitoring Response Team
ASB	Administrative Support Building
ASC	Allowable Stack Concentration
BCS	Bulk Chemical Storage (System)
BRA	Brine Reduction Area
CAI	Chemical Accident/Incident
CCTV	Closed Circuit Television
CDS	Central Decontamination Station
CFR	Code of Federal Regulations
CHB	Container Handling Building
CMA	U.S. Army Chemical Materials Activity
CMP	Comprehensive Monitoring Program
CON	Control Room – This term has a dual meaning. It may refer either to the physical location of the Control Room in the MDB or that the CON serves as the UMCDF control center.
CPU	Chemical Protective Undergarment
CSDP	Chemical Stockpile Disposal Program
CRS	Control Room Supervisor
DAAMS	Depot Area Air Monitoring System
DEQ	Oregon Department of Environmental Quality
DFS	Deactivation Furnace System
DPE	Demilitarization Protective Ensemble
DSA	DPE Support Area
EC	Emergency Coordinator
ECF	Entry Control Facility
ECR	Explosive Containment Room
ECV	ECR Vestibule
EMIS	Emergency Management Information System
EPA	U.S. Environmental Protection Agency
ERO	Emergency Response Organization
FEM	Fire Extinguishing Medium
FR	Federal Register
GPL	General Population Limit
IDLH	Immediately Dangerous to Life and Health
LCOs	Limiting Conditions of Operations
LIC	Liquid Incinerator
LPG	Liquefied Petroleum Gas
MDB	Munitions Demilitarization Building
MPF	Metal Parts Furnace
NaOCl	Sodium Hypochlorite
NaOH	Sodium Hydroxide
NIOSH	National Institute for Occupational Safety and Health
OAR	Oregon Administrative Rule

PA	Public Address
PAS	Pollution Abatement System
PEC	Protocol and Environmental Compliance Building
PFS	PAS Filter System
PLC	Programmable Logic Controller
PMB	Personnel and Maintenance Building
PMN	Perimeter Monitoring Network
PPE	Personal Protective Equipment
PPS	Primary Power System
PSB	Process Support Building
PUB	Process and Utility Building
QA	Quality Assurance
RCRA	Resource Conservation and Recovery Act
RDTE	Research, Development, Test, and Evaluation
RHA	Residue Handling Area
RL	Reportable Limit
RTAP	Real-Time Analytical Platform
SCBA	Self-Contained Breathing Apparatus
SDS	Spent Decontamination System
SOP	Standing Operating Procedure
STEL	Short-Term Exposure Limit
TAP	Toxicological Agent Protective
UMCD	Umatilla Chemical Depot
UMCDF	Umatilla Chemical Agent Disposal Facility
UPA	Unpack Area
USAOHC	U.S. Army Occupational Health Clinic (located at UMCD)
VSL	Vapor Screening Level
WPL	Worker Population Limit

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Attachment 9
Contingency Plan

[40 CFR §§264.37, 264.51 et seq;
ORS 466.105(4); OAR 340-100-0002, 340-104-0001, 340-104-0056]

1.0 General Information

1.1. General Information – Overview

This contingency plan is for the Umatilla Chemical Agent Disposal Facility (UMCDF), a hazardous waste facility, which is located on the Umatilla Chemical Depot (UMCD). A current copy of this plan is maintained at the facility. The primary purpose of the UMCDF is to thermally treat the UMCD chemical weapons stockpile, which consisted of munitions and bulk items containing GB and VX nerve agent and ton containers of HD blister agent. The UMCDF has completed treatment of GB and VX munitions and bulk items. As of May 2011, only HD and HD ton containers remain in the UMCD chemical weapons stockpile, and only secondary hazardous waste contaminated with GB, VX, and HD remain in storage. This plan was developed because owners and operators of hazardous waste facilities are required to have a contingency plan for the facility. The Contingency Plan is designed to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or nonsudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water. The Contingency Plan must be carried out immediately whenever there is an imminent, potential, or actual emergency situation, such as a fire, explosion, or release of hazardous waste or hazardous waste constituents, which could threaten human health or the environment. At all times protection of human health and the environment is of paramount importance.

1.2. UMCDF Operations

The UMCDF is located on the UMCD, which is owned by the U.S. Department of the Army.
The location map of the UMCD and the UMCDF site is shown in Figure 1-1. (The layout of the UMCDF treatment facility and support buildings is shown in Figure 4-6.) The UMCD is located in Umatilla and Morrow counties in Northeastern Oregon and is approximately five miles in length and five miles in width, about 20,000 acres in total.

As noted in Section1.1, the UMCDF is designed and operated to thermally treat nerve agents GB and VX, mustard agent HD, and munitions in a process called demilitarization. GB and VX stockpiles have been processed. All that remains to be processed are the HD ton containers. In addition, the UMCDF will also process and treat secondary wastes generated from the treatment of the munitions. The thermal treatment of the UMCDF stockpile is subject to the federal Resource Conservation and Recovery Act (RCRA) and the Oregon Administrative Rules (OAR), as administered by the Oregon Department of Environmental Quality (DEQ).

1.3. Organization of the UMCDF Contingency Plan

The UMCDF Contingency Plan is organized into eight sections as follows:

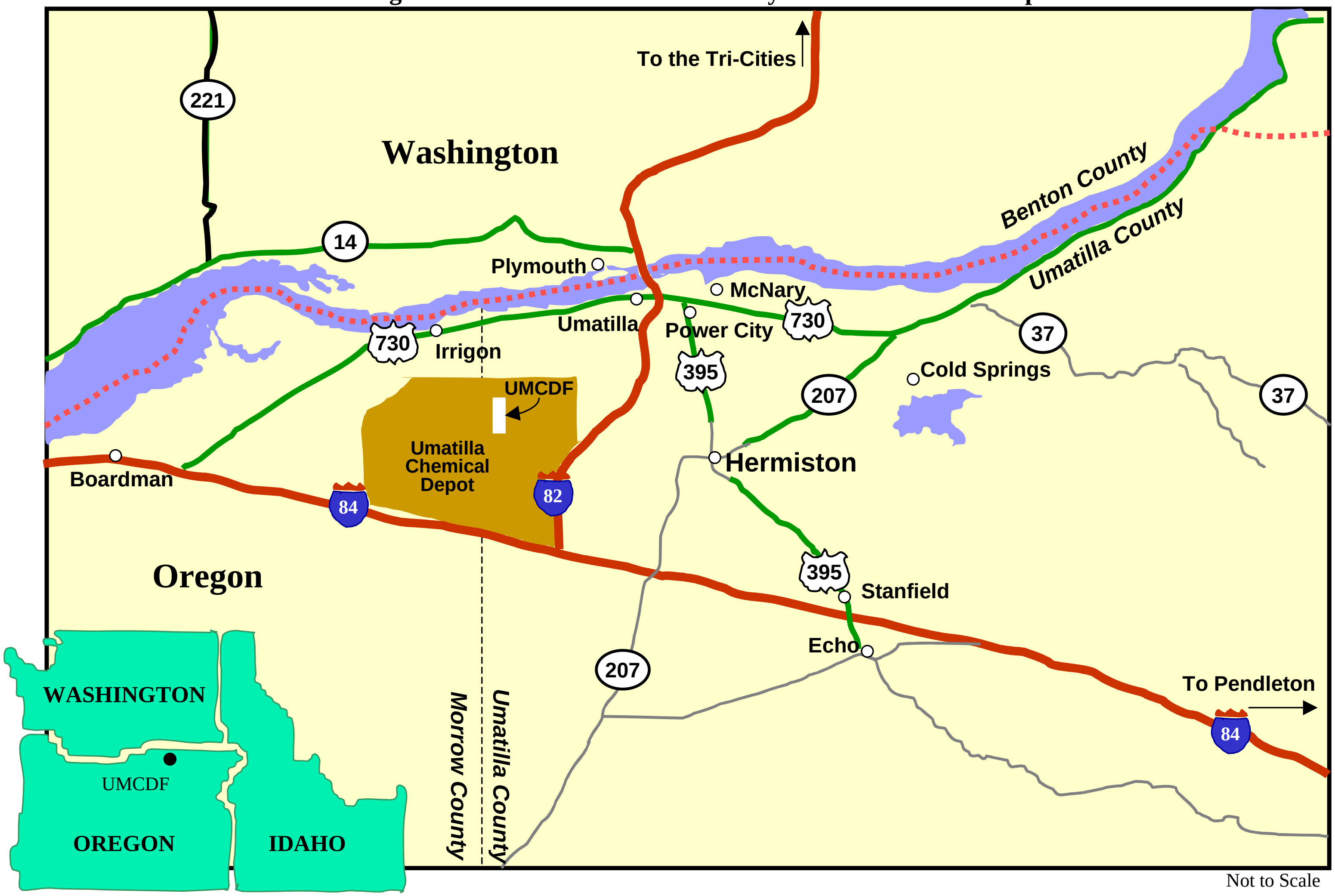
- Section 1.0 contains a general description of the Contingency Plan, including the review and update of the Contingency Plan.

- Section 2.0 identifies the Emergency Coordinator (EC) and Emergency Response Organization (ERO) responsibilities, including a discussion of the interrelationships between the UMCDF and the UMCD.
- Section 3.0 identifies the initial response actions to include notification, characterization, and hazard assessment. It includes the immediate reporting required by the DEQ for imminent or actual incidents that could endanger human health or the environment. This section also includes a description of the munitions and agent characteristics, including the chemical agent contingency levels.
- Section 4.0 contains the evacuation plan, which describes where personnel will evacuate to in case of an event. The evacuation descriptions include where to evacuate both on the UMCDF and the UMCD. This section also includes figures showing the rally points and evacuation routes, including those that are inside and outside the double-fenced area of the UMCDF.
- Section 5.0 contains a summary of emergency response actions and procedures to be taken by plant personnel in response to fire, explosion, or release of hazardous waste or hazardous waste constituents, which could threaten human health or the environment.
- Section 6.0 contains the postincident activities that describe clean-up activities and reporting requirements following implementation of the Contingency Plan. The postincident activities, including maintenance, ensure that all emergency equipment used in the emergency response will be cleaned, decontaminated, and inspected to determine if it is fit for future use. The section includes a discussion of the process for resumption of operations. The section also provides for the postincident notification requirements to the appropriate authorities. The discussion includes notification that the response operations are satisfactorily completed and all waste materials are stored or disposed of in an appropriate manner.
- Section 7.0 describes the emergency systems and equipment available at the UMCDF, including emergency equipment (see Table 7-3), communications, and alarm systems, and decontamination equipment available for response. The section also describes the cascade ventilation system that prevents the release or spread of contamination using cascaded pressure control, the provisions for explosion, detection, alarm, and suppression both in areas with the presence of chemical agent and without the presence of chemical agent. The spill control systems and equipment at the UMCDF and the backup emergency power are also described in this section.
- Section 8.0 identifies UMCD coordination agreements for medical support, mutual aid and fire protection, and mutual assistance and support. It also discusses the off-site evacuation shelters.

1.4. Coordination of the UMCDF Contingency Plan with UMCD Emergency Response Plans

This Contingency Plan is developed in coordination with the Contingency Plan in the UMCD hazardous waste storage permit . The UMCDF Contingency Plan governs local (UMCDF) response to a contingency event.

Figure 1-1. Location of the U.S. Army Umatilla Chemical Depot



1.5. Administration of the Contingency Plan

The EC is responsible for issuing and updating the Contingency Plan, using input from senior management and ERO members.

An electronic copy of the current Contingency Plan is made available to all local police departments, fire departments, hospitals, and state and local emergency response teams that may be called upon to provide emergency services (40 CFR §264.37; §264.53). The permittee shall provide the updated contingency plan to the web master for update of the web page no later than seven calendar days after changes to the Contingency Plan are effective. The UMCDF shall notify each off-site emergency response organization as identified in 40 CFR §264.37 and/or Section 8.0 of this plan whenever the contingency plan is revised. The notice shall include the web page access information.

The EC is responsible for ensuring the Contingency Plan is reviewed and updated, as necessary. If the plan fails in an emergency; the facility permit is revised; or an evaluation of facility changes determines a material increase in the potential for fires, explosions, or releases of hazardous waste/hazardous waste constituents exists, or a change in an emergency response is needed, the Contingency Plan will be updated in a timely manner.

1.6. Training

All employees will be instructed on the requirements of the Contingency Plan. Specific emergency response training requirements are detailed in Attachment 10, Personnel Training, of the UMCDF Hazardous Waste Permit. Additionally, if the Contingency Plan is revised, employees will be trained on the revised requirements of the plan.

1.7. Contingency Event Notifications and Reporting

The EC is responsible to ensure appropriate notifications are made during a contingency response and follow-up reporting is completed after a confirmed incident.

1.7.1. Notifications during a Contingency Response

If the EC determines that a contingency event is imminent or has occurred, on- and off-site notifications will be made in accordance with Section 3.2. If the EC determines the facility has had an actual release, fire, or explosion that could threaten human health or the environment, immediate notifications will be made in accordance with Section 3.2.2.

1.7.2. Postincident Reporting Requirements

Subsequent to a confirmed contingency event, the EC is responsible to ensure the reporting requirements are completed as described in Section 6.9. If the plan is activated a report documenting activation of the plan will be submitted to the DEQ within 15 days of the event (reference Section 6.9.2). In addition, if the event met the immediate notification requirements of Section 3.2.2 (an actual release, fire, or explosion that threatened human health or the environment), a report will be submitted to the DEQ within five days of the event (reference Section 6.9.1). The 5-day report may also satisfy the 15-day reporting requirement provided the 5-day report includes all the information required in the 15-day report.

2.0 Emergency Coordinator

2.1. Emergency Coordinator

The UMCDF EC will assess the severity of a hazard presented by an incident to determine the required response, and has the authority to commit the resources needed to carry out the Contingency Plan. The EC has overall responsibility for the UMCDF emergency response program, which includes emergency response training and procedures, and update of the Contingency Plan. At all times, there will be at least one employee on the facility with the responsibility to serve as EC and coordinate emergency response measures. The UMCDF plant manager will fulfill the responsibilities of the EC. In the event that the plant manager is not available, an alternate (as identified in Table 2-1) will assume full responsibility. As used in this plan, EC refers to the EC as identified in Table 2-1 and/or any persons to whom the EC has delegated authority.

Overall responsibilities of the EC, as set forth in 40 CFR 264.56, in the event of an imminent or actual emergency, are:

- Coordination of all emergency-response measures.
- Whenever there is an imminent or actual emergency situation:
- Ensure that UMCDF alarms and communication systems are activated.
- Ensure notification of appropriate state or local agencies with designated response roles if their help is needed, in accordance with Section 3.2.2.
- Whenever there is a release, fire, or explosion, immediately identify the character, exact source, amount, and the extent of any released materials.
- Assess possible hazards to human health and/or the environment that may result from the release, fire, or explosion.
- Take all reasonable measures during an emergency to ensure that fires, explosions, and releases do not occur, recur, or spread to other hazardous waste at the facility.
- Ensure the UMCDF is monitored for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment, wherever appropriate, if the facility stops operations in response to a fire, explosion, or release.
- Immediately after an emergency, provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion at the facility.
- Ensure that in the affected area(s) of the facility:
- No waste that may be incompatible with the released material is treated, stored, or disposed of until cleanup procedures are completed; and
- All emergency equipment listed in the Contingency Plan is cleaned and fit for its intended purpose before operations are resumed.

The UMCDF Plant Manager position meets the criteria set forth in 40 CFR 264.55, and thus will serve as the primary EC. Due to logistics and an anticipated 24-hour, 7-day-per-week operating schedule, establishing a primary EC and alternate ECs has been determined the most effective organizational structure for the UMCDF. Therefore, in keeping with 40 CFR 264.52(d), alternates are listed in the order in which they would assume responsibility as the EC, as follows:

- The primary EC – Plant Manager;
- The first alternate – Assistant Plant Manager;
- The second alternate – Operations Manager;
- The third alternate – Assistant Operations or Decommissioning Manager; and
- The fourth alternate – Shift Superintendent on duty at the time of the incident.

The UMCDF Plant Manager will typically be on-site during normal daytime work hours, while alternate ECs will provide coverage during night shifts, over weekends, etc. Thus, the EC's role will not normally transfer to an alternate unless the EC is incapacitated or leaves the site premises or an even t or potential event occurs during night shifts or over weekends. Whenever the transfer of the on-site role of EC occurs during a contingency event, a full briefing to the assuming EC will occur (if circumstances allow), and the transfer will be noted in the UMCDF CON log. The alternate ECs are fully qualified and trained to properly respond to emergency situations that may occur while the primary EC is off-site. The Plant Manager will assume the EC response responsibilities upon arrival at the UMCDF after full briefing of the situation.

Table 2-1. UMCDF Emergency Coordinator List

	Position	Name	Address	Work Phone	Home Phone
Primary	Plant Manager	Robert Dikeman	78068 Ordnance Rd. Hermiston, OR 97838	(541) 564-7413	*Confidential*—Listed on Call-Down List in CON
1st Alternate	Assistant Plant Manager	Will Leslie	78068 Ordnance Rd. Hermiston, OR 97838	(541) 564-7256	
2nd Alternate	Operations Manager	Kim Jackson		(541) 564-7491	
3rd Alternate[1]	Decommissioning Manager Assistant Operations Manager	Lance Pappas Ted Pappas		(541) 564-7114 (541) 564-7353	
4th Alternate[2]	On-Duty Shift Superintendent	Alan Ajirogi Walter Barrazza Murel Benson Ed Best Mark Evans Ron Horn Heather McCrory Stacy Padden Steve Pankey Rick Romero Kelly Sikes Doug Wisehart		(541) 564-7208 (541) 564-7318	

1 At times, there may be more than one 3rd alternate emergency coordinator on site; however, the 3rd alternate emergency coordinator will be identified in the Limiting Conditions of Operations (LCOs) for each shift.

2 The shift superintendent on duty at the time of an incident will be the fourth alternate EC. At times there may be more than one shift superintendent on site; however, the shift superintendent on duty will be identified in the LCOs for each shift and will serve as the fourth alternate emergency coordinator.

2.2. UMCDF/UMCD Interaction

There will be a high degree of interaction between the UMCD and UMCDF. Although both facilities will maintain individual contingency plans and emergency response procedures, in the event that emergency response is necessary at either facility, the ECs at both the UMCDF and UMCD will communicate to coordinate response actions. The UMCD has overall control and responsibility for all contingency events occurring on the UMCD (reference AR 525-27 and National Incident Management System) of which the UMCDF is a tenant. Decision authority for UMCDF contingency events has been delegated to the UMCDF EC by the UMCD. The UMCDF EC will have primacy for UMCDF contingency events, whereas the UMCD EC will have primacy and coordinate the activities of UMCDF personnel with the UMCDF EC during UMCD contingency events. Circumstances may require UMCD to direct the UMCDF EC during a contingency event.

The EC will have the authority to commit all required UMCDF resources to adequately implement response actions. The EC's authority is specific to UMCDF resources. If requested by the UMCD, the EC can commit UMCDF resources to assist the UMCD; and, conversely, the EC may request UMCD assistance. All necessary UMCDF and UMCD resources will be utilized during a contingency event.

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3.0 Initial Response Actions

3.1. Initial Response Actions – Overview

Upon receiving information an emergency incident that could threaten human health and/or the environment is imminent or underway (reference Permit Condition I.U.1); the EC will initiate actions for notification, hazard identification, and hazard assessment of the event. Briefly,

- Notification is the communication of a potential or actual emergency condition,
- Hazard Identification provides the EC with a physical description of the problem, and
- Hazard Assessment is the evaluation of the actual or potential danger that the incident may impose upon human health or the environment. Hazard assessment identifies any actual or potential danger to human health and/or the environment that is caused by the incident and compels the EC to consider protective actions accordingly.

3.2. Notification

The Contingency Plan focuses on two types of notification:

- Alerting site personnel of a potential or actual incident (Section 3.2.1) and
- Notifying off-site agencies (Section 3.2.2)

3.2.1. Alerting Site Personnel

At the UMCDF, emergency notifications will begin by verbally contacting the CON first by radio or telephone.

Table 3-1. UMCDF Emergency Notification Phone Numbers

UMCDF CON	**Telephone – (541) 564-7311**

The CON will notify the UMCDF EC and other emergency responders at UMCDF as appropriate, based on an initial evaluation of the incident.

Upon determination that the Contingency Plan should be implemented (see Section 3.4), site personnel will be notified over the public address (PA) system, which is controlled from the CON, with speakers installed and audible throughout the UMCDF and surrounding grounds, and/or radio. This determination will be made by the EC. The announcement will contain the following information: who the message is for, the condition and the location of the affected area, and what actions are to be taken. As an example, the CON could announce that UMCDF personnel are to:

- evacuate to a designated rally point;
- report to a rally point; or
- mask and shelter in place and wait for further instructions from the CON.

The appropriate instructions will also be communicated to personnel in the J-Block and warehouse areas via two-way radio and/or telephone.

In addition to audible notification of site personnel, an emergency warning light system will be activated in the event of a site alarm.

Specific notification requirements for each type of contingency event are identified in the emergency responses in Section5.0, Emergency Response Procedures. Emergency responders will be called on an as-needed basis. Information will include a description of the emergency situation, and appropriate actions that should be taken, or directions to remain on stand-by for further information and instructions.

3.2.2. EC Notifications [40 CFR 264.56; OAR 340-104-0056]

The EC will ensure immediate notification of a contingency event is made to state and local agencies as required.

NOTES:

- It is the responsibility of the UMCD to make initial notifications to the UMCD Commander, UMCD Security, UMCD Fire Department, and other internal UMCD organizations, as appropriate, which may be called upon as first responders to an incident.
- If the incident could threaten human health or the environment, it is the responsibility of the EC to make immediate initial notifications to off-site agencies (e.g., federal, state, or local law enforcement; fire and rescue; media, etc.) of all information contained in Table 3-2.

It is important that the UMCDF keep personnel and responders both on-site and off-site informed on two aspects of the emergency event:

Identification of any Associated Released Hazardous Materials or Hazardous Materials that have Potentially been Released

Available details about the character, exact source, amount, and the extent of any associated hazardous materials released or that may have been released as a result of the incident are to be collected by the UMCDF and communicated.

Information for Immediate Reporting Required for Potential Endangerment to Human Health and the Environment

The following events require immediate reporting to the DEQ by the permittees with the information contained in Table 3-2:

- Release of any hazardous waste that may endanger public drinking water supplies.
- A release or discharge of hazardous waste or of a fire or explosion at the UMCDF that could endanger human health or the environment.
- Any major confirmed agent incident or explosion, outside of engineering controls.

It is the responsibility of the EC to ensure communication with state and local authorities about hazard assessment. If an incident at the UMCDF it is the responsibility of the UMCDF to provide complete information to the on-site and off-site responders. The UMCDF EC should provide all the information as is listed in Table 3-2.

Table 3-2. Information on Hazardous Conditions or Chemical Accidents/Incidents That Could Endanger Human Health or the Environment and Must be Immediately Reported to the DEQ

A description of the release or discharge and its cause including, at a minimum: • Name, title, and telephone number of individual reporting • Name, address, and telephone number of the owner or operator • Name, address, and telephone number of the UMCDF • Date, time, and type of incident • Location and cause of incident • Name and quantity of materials involved • Extent of injuries, if any • An assessment of actual or potential hazard to the environment and human health, where this is applicable • Description of any emergency action taken to minimize the threat to human health and the environment • Estimated quantity and disposition of recovered material that resulted from the incident, and • Any other information necessary to fully evaluate the situation and develop an appropriate course of action.

*UMCDF Hazardous Waste Permit (ORQ 000 009 431-01), Condition I.U.2

3.3. Hazard Identification

3.3.1. Overview

Should an emergency incident occur--and as soon as it is possible--the first person to observe the incident or to respond to the scene will notify the CON or send another individual to notify the CON and report the nature of the emergency, its location, the condition of any injured personnel, and the quantity of any involved materials. The CON will use this information to identify the character, source, amount, and extent of the incident and any associated released materials. The CON will notify the EC and keep the EC advised of the status. The CON also will dispatch a Hazmat Team to the scene, which can provide follow-up information that the EC can use. Additionally, the EC may review material safety data sheets (MSDS), facility records, or manifests (including shipping papers and bills of lading), and request chemical analyses of any collected materials to assist in the hazard identification process.

3.3.2. Identification of Chemical Agent Hazard

To identify any releases of chemical agents, the EC will consider the type of chemical agent in storage at the UMCD slated for destruction at the UMCDF, and the GB-, VX-., and HD-contaminated secondary wastes stored in drums located at J-Block. The blistering mustard agent HD is stored in ton containers. Munitions characteristics are shown in Table 3-3. The ton containers filled with HD are stored in standard one ton containers. They are not equipped with any energetic components.

Table 3-3. Composition of Stockpile

Munition	Agent	Fuse	Burster	Propellant
Ton Containers	HD	No	No	No

SOURCE:: *CSDP, UMCDF Process Design Analysis Calculations, Parsons Infrastructure & Technology Group Inc.,* January 1994

If any ton containers are discovered to be leaking while in storage, they will be repaired in place. In extreme circumstances they may be overpacked.

The physical and toxic properties of the three chemical agents (HD, GB, and VX) are summarized in Table 3-4 and Table 3-5. They are discussed in more detail in the RCRA Tank Assessment in Permit Attachment 12

Table 3-4. Chemical and Physical Properties of Chemical Agents

Chemical Agent	Chemical Formula	Molecular Weight	Boiling Point		Freezing Point		Vapor Pressure (mm Hg)
			°C	°F	°C	°F	
HD	$C_4H_8C1_2S$	159.08	217	422.6	14	57.2	0.072 (20°C/68°F)
GB	$C_4H_{10}FO_2P$	140.10	158	316.4	-56	-68.8	2.9 (25°C/ 77°F)
VX	$C_{11}H_{26}NO_2PS$	267.37	300	572	< -39	< -38.2	0.00066 (25°C/ 77°F)

SOURCE: *RCRA Tank Assessment for the Department of the Army Umatilla Chemical Agent Disposal Facility Hazardous Waste Storage Tanks, Chemical Stockpile Disposal Program, Washington Group International, Inc.,* January 9, 2006

Table 3-5. Toxic Properties of Chemical Agents

Chemical Agent	LD_{50}	LCt_{50} (mg-min/m^3)	AEL STEL (mg/m^3)	AEL WPL (mg/m^3)
HD	Skin, Liquid = 100 mg/kg Oral = 0.7 mg/kg	Inhalation = 1,500 Skin, Vapor = 10,000	0.003	0.00027
GB	Skin, Liquid = 1,700 mg/70 kg man	Inhalation = 70	0.0001	0.00002
VX	Skin, Liquid = 10 mg/70 kg man	Inhalation = 30	0.00001	0.00000067

AEL Airborne Exposure Limit
STEL Short-Term Exposure Limit
WPL Worker Population Limit (12-hour time-weighted average)

Source:

"Final Recommendation for Protecting Human Health From Adverse Effects of Exposure to GA (Tabun), GB (Sarin), and VX," *Federal Register,* Volume 68, No. 196, U.S. National Archives and Records Administration (NARA), October 9, 2003, pp. 58348-58351 (68 FR 58348).

"Interim Recommendations for Airborne Exposure Limits for Chemical Warfare Agents H and HD (Sulfur Mustard)," *Federal Register*, Volume 69, No. 85, NARA, May 3, 2004, pp. 24164-24168 (69 FR 24164).

"Material Safety Data Sheet (MSDS), Distilled Mustard (HD)," U.S. Army Research, Development and Engineering Command (RDECOM), Edgewood Chemical Biological Center (ECBC), Aberdeen Proving Ground, Maryland, August 10, 2004.

"MSDS, Lethal Nerve Agent (GB)," RDECOM, ECBC, Aberdeen Proving Ground, Maryland, August 10, 2004.

"MSDS, Lethal Nerve Agent (VX)," RDECOM, ECBC, Aberdeen Proving Ground, Maryland, August 10, 2004.

3.3.3. Other Potentially Hazardous Substances or Wastes Generated at the UMCDF

In addition to the chemical agents, the UMCDF may have other potentially hazardous materials or substances on site. For materials that are in containers, the containers will be clearly labeled with the contents in accordance with on-site procedures.

Some of the materials can be detected visually such as ash from the operation of the incinerators. Other materials are detected visually, by touch, and odor. For example, the No. 2 fuel oil used in the UMCDF is a low-viscosity, straw-colored liquid that floats on water. It has the feel of a very light lubricant and can create slippery footing on smooth concrete floors. It also has a familiar odor, which is characteristic of petroleum products. Other material releases may be detected by odor such as liquefied petroleum gas (LPG) or natural gas leaks. Although pure LPG and natural gas have no odor, the commercial grade procured for the UMCDF will be odorized for safety.

3.4. Hazard Assessment

3.4.1. Hazard Assessment – Overview

The preceding section describes criteria for hazard identification. A more detailed hazard assessment involves a decision by the EC if the incident occurs within UMCDF boundaries. An assessment of the magnitude of the incident is critical to determining the correct response. This section describes the general assessment process and provides criteria on events that are considered major and must be responded to according to the Contingency Plan.

3.4.2. Assessment Process

In order to assess the hazard of an accident or incident, the EC will determine if:

- the nature of the hazard is known, unknown, or can be reasonably assumed;
- the accident or incident threatens human health or the environment;
- the degree of toxicity of (any) released material is known;
- the presence of (any) toxic, irritating, or asphyxiating gases, which may result from controlling a fire or explosion, is known;
- any spills are contained, or not;
- wastes or water used in fire control to either ground or surface waters have migrated, and if so, to what extent; and
- emergency response teams are able to contain and/or mitigate the emergency.

If the incident could endanger the public health and/or the environment, the EC will notify off-site agencies. Additionally, the coordination agreements between the UMCD and these agencies are listed in Section 8.0, Coordination Agreements, of the Contingency Plan.

Another tool for hazard assessment is the U.S. Army-approved downwind hazard-prediction model, which was developed by the U.S. Army and can be used by the UMCD for rapid hazard prediction in the event of an accidental release of chemical agents on the site. It is designed to allow the user to predict a worst-case downwind chemical hazard, given a worst-case release scenario and current weather conditions. In order to take the most conservative approach, the worst-case scenario information will be initially generated, and the modeling results will be updated as more information becomes available.

4.0 Evacuation Plan

4.1. Evacuation Plan – Overview

This section describes the signals used to alert personnel of an evacuation and the routes of evacuation. This section applies to any situation that requires evacuation of personnel at the UMCDF.

All personnel will be trained in evacuation procedures and means of exit from their respective work areas. All visitors will be trained in evacuation procedures and means of exit from their respective work areas and/or will be escorted at all times by UMCDF personnel with the appropriate training. It is anticipated that 90 percent of emergency events at the UMCDF will occur within engineering controls. As a response to these incidents, many workers would simply be required to don their masks and remain at their workstations (i.e., shelter-in-place) where they will continue to receive instructions via the plant PA system, two-way radio, or by telephone.

4.2. Evacuation Signals

Notification to proceed with an evacuation will be communicated via the UMCDF two-way radio, PA, Hazards Alert Radio (HAR) system, and/or on-site telephone systems as well as the UMCD emergency siren system. The CON will deliver specific follow-up instructions over the PA system.

In addition to audible notification of site personnel, an emergency warning light system will be activated in the event of a site alarm. Persons approaching the UMCDF are to follow the instructions as indicated in the radio message.

4.3. Personnel Accountability

Designated personnel (e.g., supervisors), upon their arrival at the evacuation control point, will determine (by roll call or other means) the presence or absence of their personnel. They will notify the UMCDF CON that all personnel have been accounted for, or will furnish the names and tentative locations of missing personnel.

4.4. Protective Actions inside the Double-Fenced Area of the UMCDF

4.4.1. Emergency Rally Points – Inside the Double Fence

Emergency rally points have been identified for the area inside the double-fenced area of the UMCDF and are identified in Figure 4-1.

The designated rally points(s) will be announced over the site PA system, two-way radio system, and/or the on-site telephone system. Personnel, who have not been contacted to serve on an emergency response team, are to report to the designated rally points(s) and be accounted for there.

The following criteria will be used to select the emergency rally points(s):

- Location of the incident,
- Prevailing wind direction,
- Potential for fire or explosion hazards,

- Areas required for emergency response personnel, and
- Ease of relocating to the rally area.

Although not part of the formally designated (i.e., numbered) rally point system, the Personnel Maintenance Building (PMB) lunchroom provides a ready means to rally a large number of personnel inside the double fence in a sheltered configuration.

4.4.2. Evacuation of the Munitions Demilitarization Building

NOTE:	Normal routes of building egress and emergency evacuation routes are the same.

Evacuations of the MDB are to be undertaken by prescribed routes for all incidents, e.g., chemical agent-, process-, or disaster-related incidents. These routes will be prominently displayed on diagrams posted throughout the building. Emergency exits will be identified by signage on the door reading “Toxic Emergency Exit.”

Figure 4-2 through Figure 4-5 show the evacuation routes for the first and second floors of the MDB.

Figure 4-1. UMCDF Emergency Rally Points

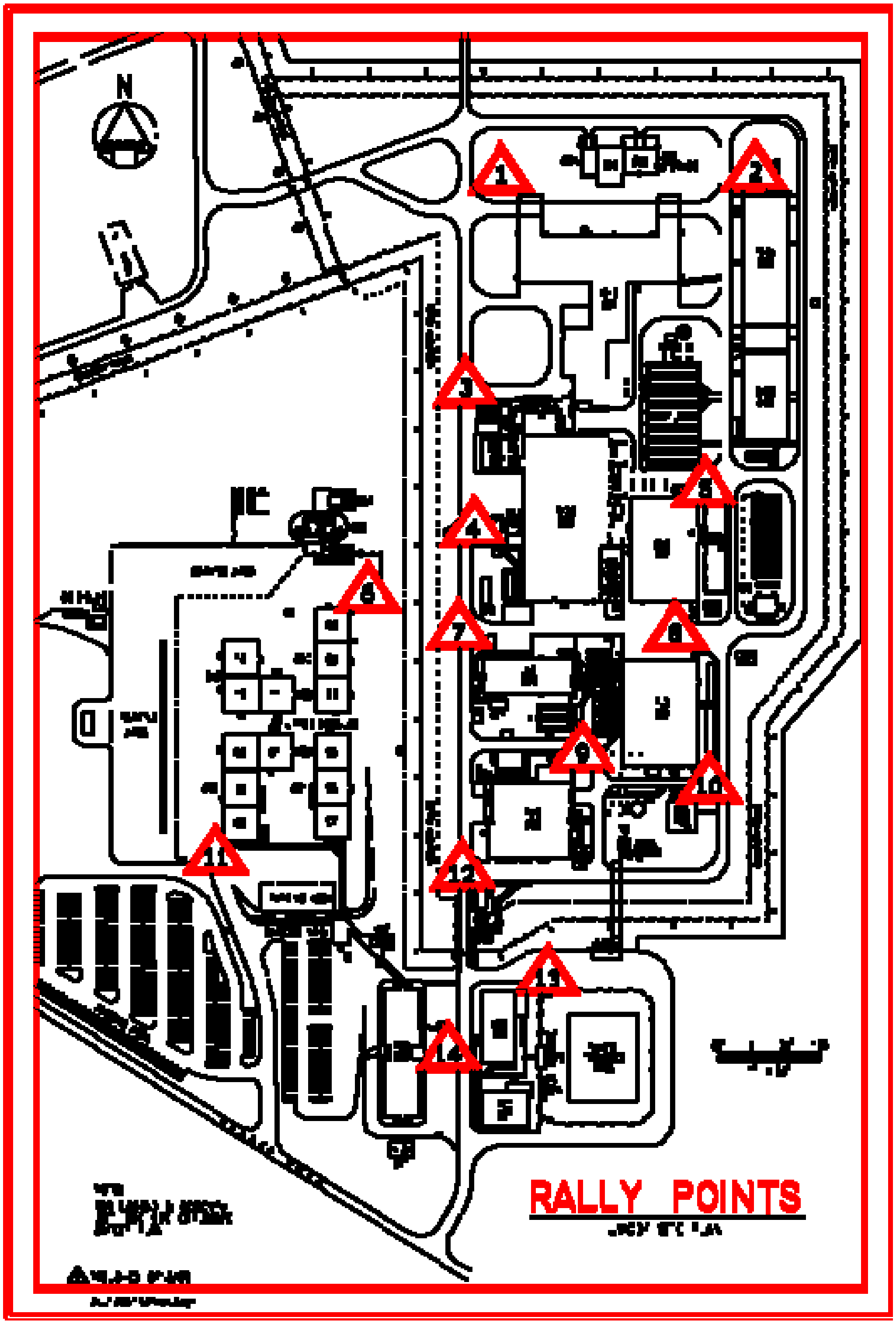
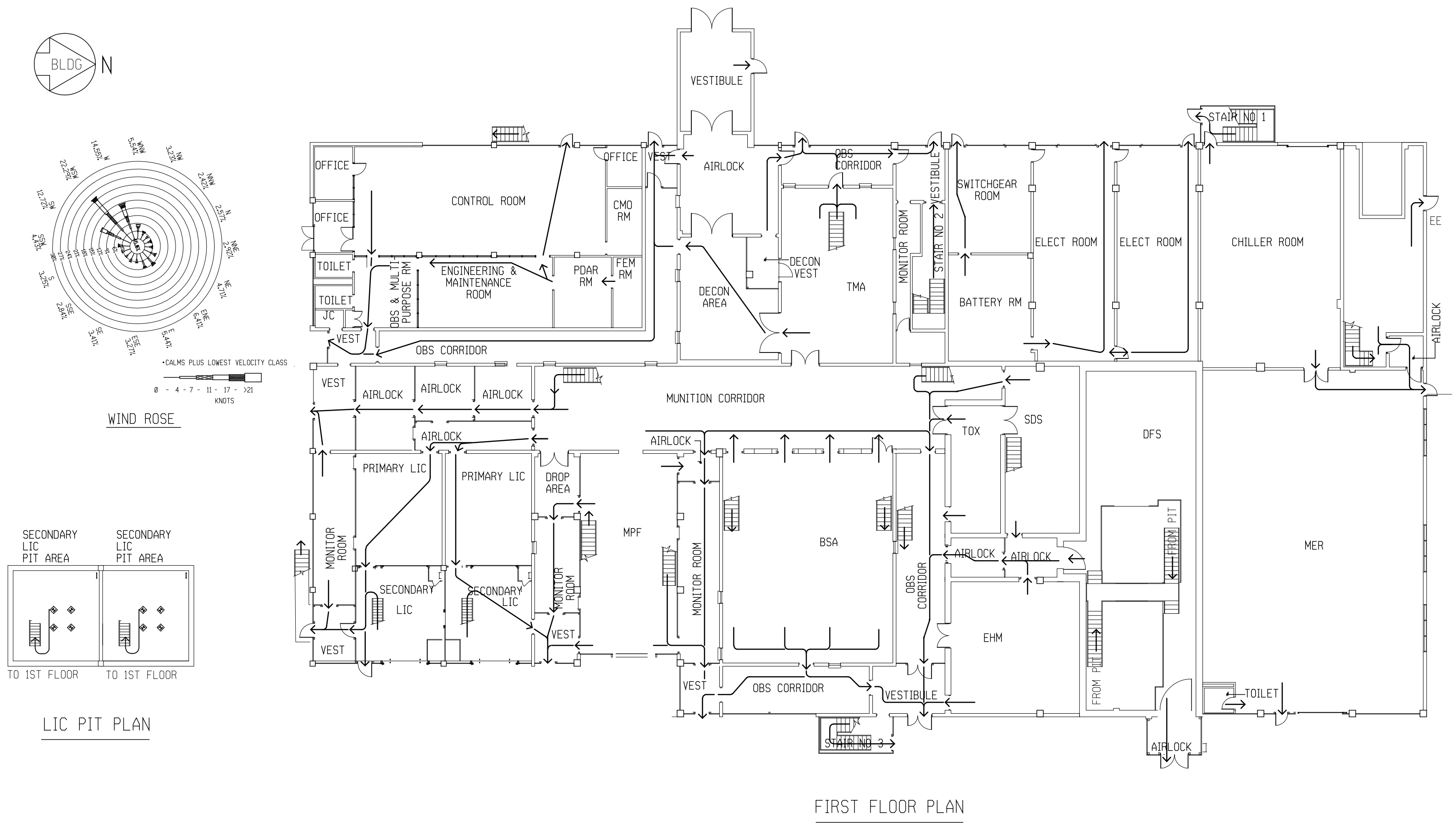
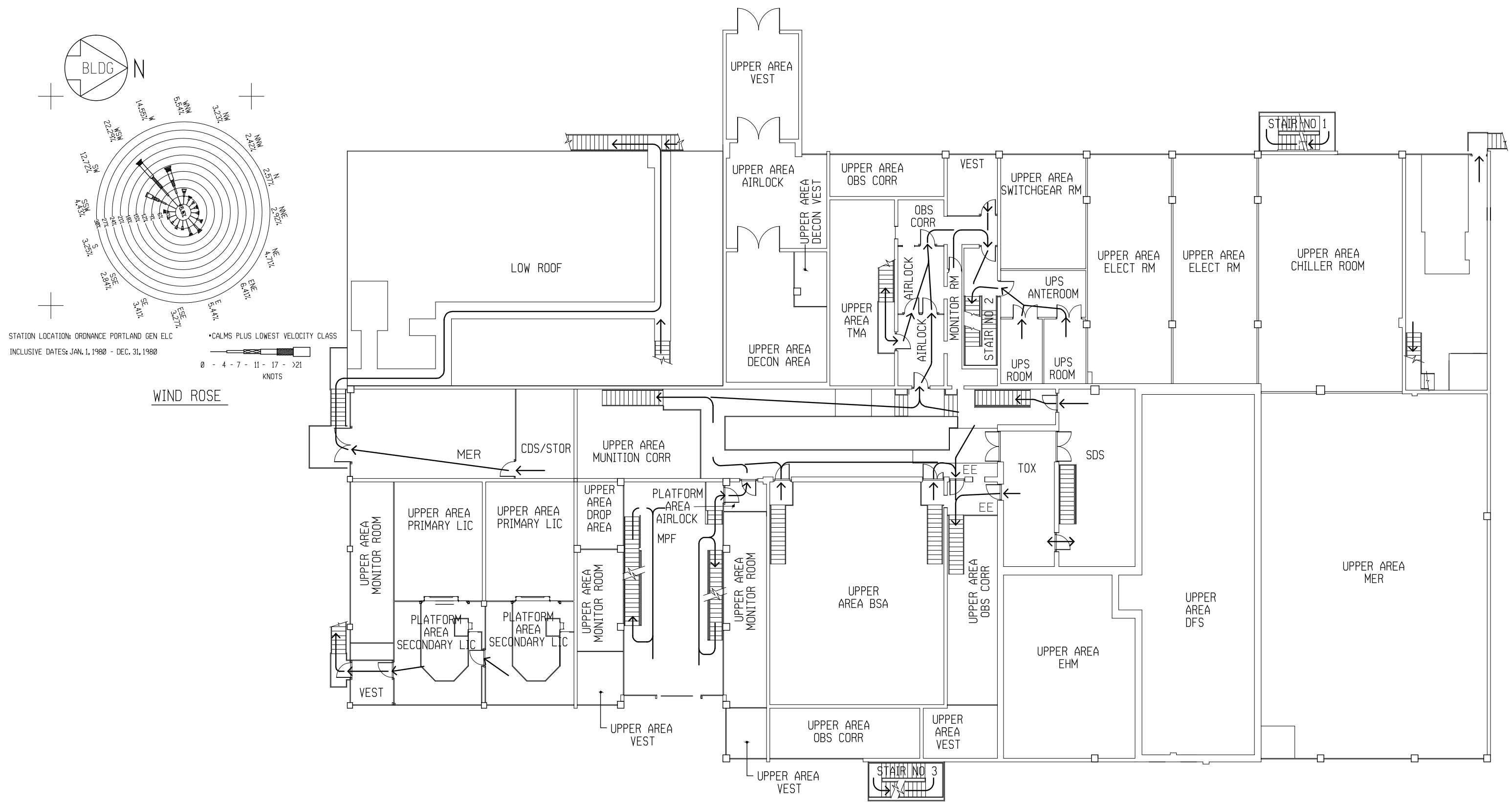


Figure 4-2. First Floor and LIC Pit – Munitions Demilitarization Building Evacuation Plan



FIRST FLOOR & LIC PIT - MUNITIONS DEMILITARIZATION BUILDING
EVACUATION PLAN

Figure 4-3. First Floor Platform Level – Munitions Demilitarization Building Evacuation Plan



FIRST FLOOR PLATFORM LEVEL- MUNITIONS DEMILITARIZATION BUILDING
EVACUATION PLAN

Figure 4-4. Second Floor – Munitions Demilitarization Building Evacuation Plan

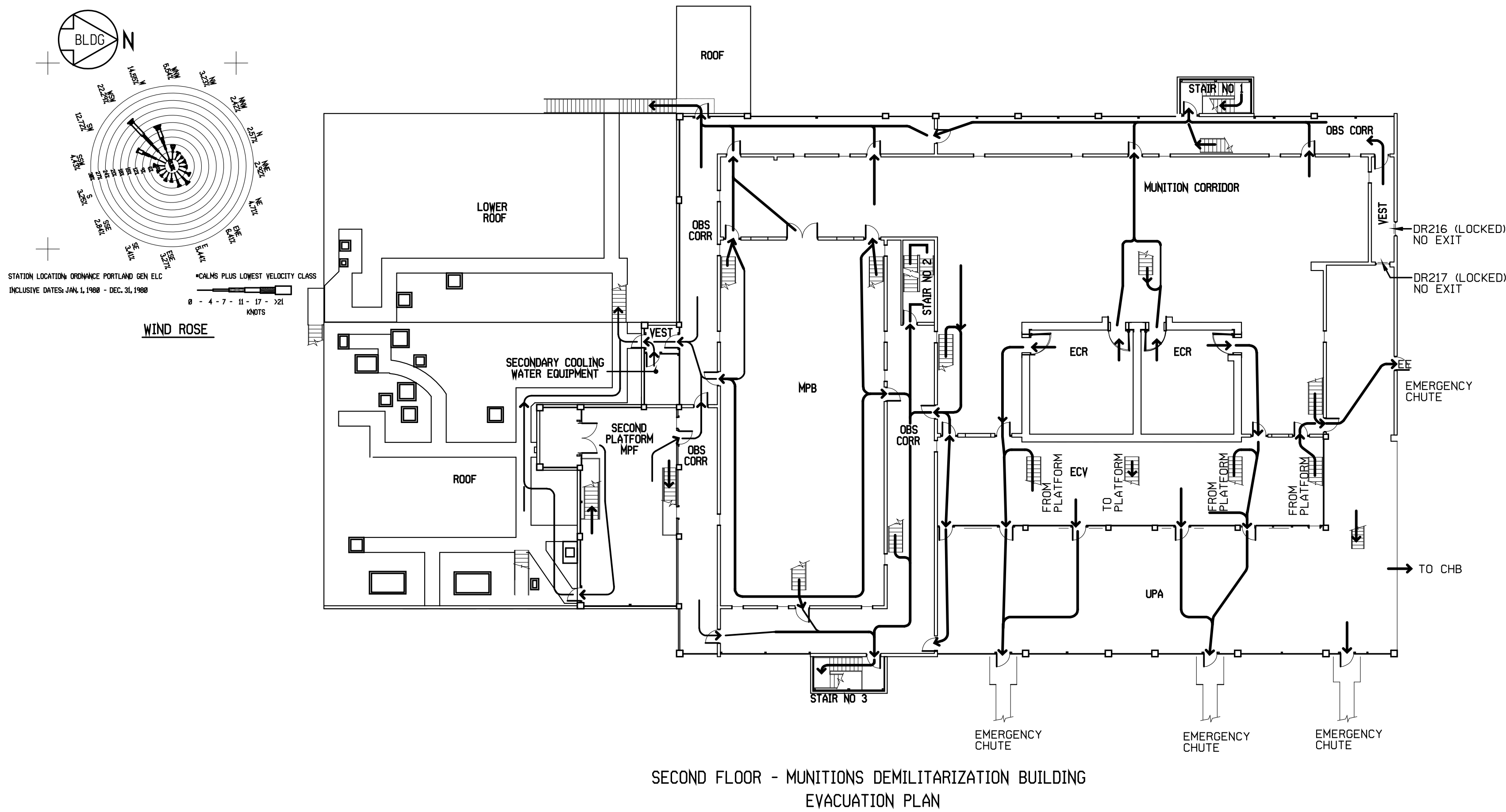
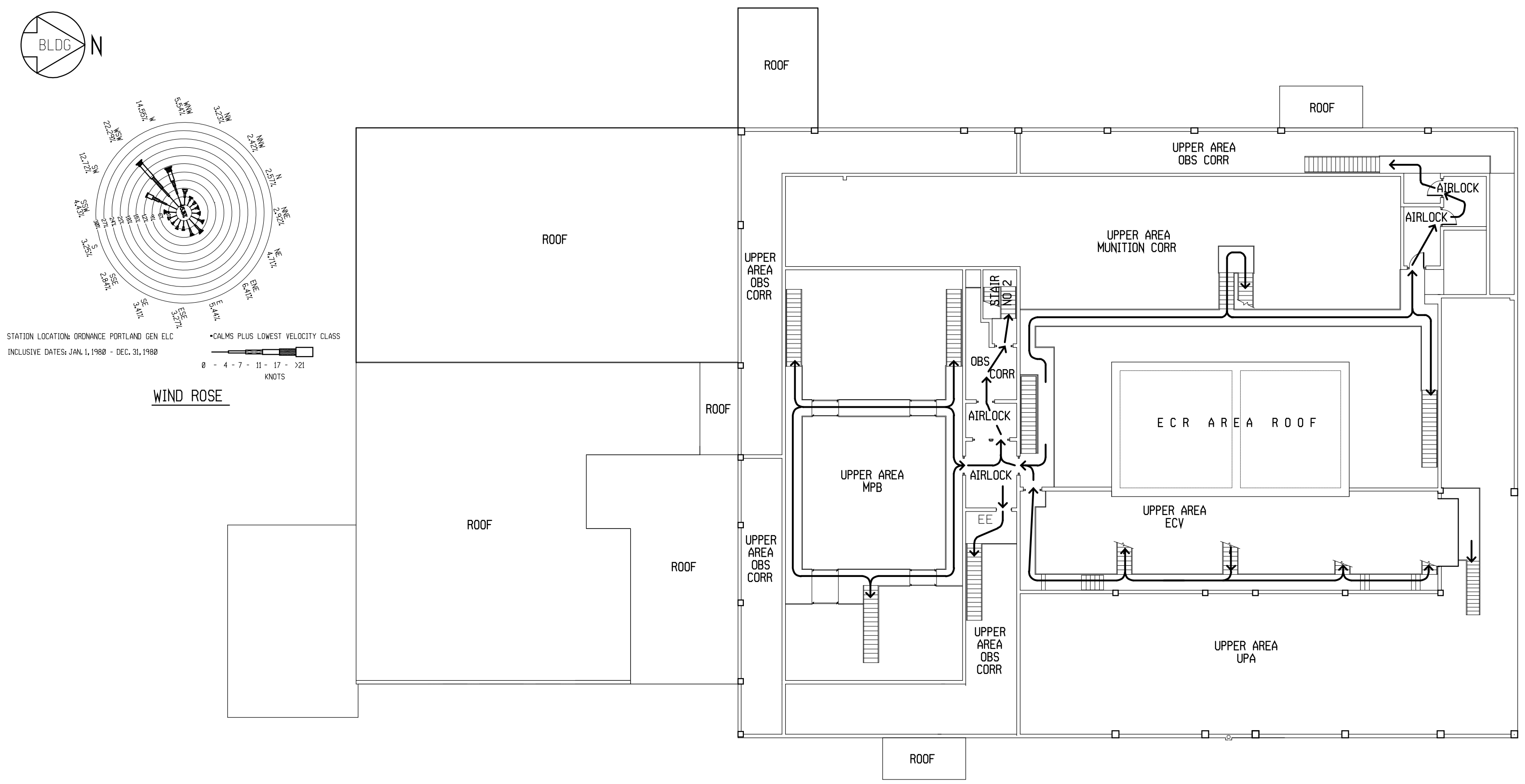


Figure 4-5. Second Floor Platform – Munitions Demilitarization Building Evacuation Plan



SECOND FLOOR PLATFORM LEVEL- MUNITIONS DEMILITARIZATION BUILDING
EVACUATION PLAN

4.5. Protective Actions outside the Double-Fenced Area of the UMCDF

There are areas outside of the double-fenced area of the UMCDF that are still considered to be part of the facility including, but not limited to: the Human Resources trailer, 201 Warehouse, 402 Warehouse, J Block, the Process Support Building (PSB), the Administrative Support Building (ASB), the Protocol and Environmental Compliance Building (PEC), and the upper buildings complex. Protective actions and personnel accountability for these areas are conducted in accordance with applicable site procedure(s).

Except for J-Block (see Section 4.5.3), all of these locations have designated emergency rally points for UMCDF personnel who may be working there at the time of an incident. The rally points will be clearly identified by signage. Additionally, personnel working near these areas will be trained to report to these areas, as directed during an emergency.

Emergency communications at these facilities will be via two-way radio and/or telephone.

4.5.1. 201 Warehouse

Personnel at the 201 Warehouse will be directed to take one of the following three protective actions:

- Shelter in Place – If an incident occurs at the UMCDF that could result in the exposure of personnel working at the 201 Warehouse to hazardous materials, workers there will report to the 201 Warehouse administration office for accountability and remain sheltered inside the warehouse until instructed to do otherwise.
- Emergency Rally Point – 201 Warehouse laydown area – If an incident occurs within the 201 Warehouse, personnel will evacuate the building and report for accountability at the emergency rally point in the laydown area. The laydown area is located east of the 201 Warehouse and the rally point is identified by signage.
- Evacuation to A Block – If an incident occurs at the UMCDF that results in a site-wide evacuation of nonessential personnel, and if it safe to do so, Warehouse 201 personnel will be instructed to report to A Block. Accountability of 201 Warehouse workers will occur there.

4.5.2. 402 Warehouse

Personnel at the 402 Warehouse will be directed to take one of the following three protective actions:

- •Shelter in Place – If an incident occurs at the UMCDF that could result in the exposure of personnel working at the 402 Warehouse to hazardous materials, workers there will report to the 402 Warehouse administration office for accountability and remain sheltered inside the warehouse until instructed to do otherwise.
- •Emergency Rally Point – 402 Warehouse parking lot – If an incident occurs within the 402 Warehouse, personnel will evacuate the building and report for accountability to the emergency rally point in the main parking lot, adjacent to Magazine Road. The parking lot is located south of the 402 Warehouse and the rally point is identified by signage.
- •Evacuation to A Block – If an incident occurs at the UMCDF that results in a site-wide evacuation of nonessential personnel, and if it safe to do so, 402 Warehouse personnel will be instructed to report to A Block and be accounted for there.

4.5.3. J-Block

Based on the origination of the incident (whether at J-Block or at the UMCDF), personnel in J-Block will be directed to comply with one of the protective actions described below.

Incident in J-Block

If an incident occurs at J-Block, workers there will notify the CON. The EC will dispatch the appropriate emergency responders to J-Block (Hazmat Team, paramedics, etc.). Depending on the circumstances, J-Block personnel may also be directed to comply with one of the following actions:

- Undergo decontamination at J-Block and then report to the UMCDF medical clinic for follow-up treatment and accountability
- Undergo decontamination at J-Block and then report to A-Block for accountability.

Incident at the UMCDF

Evacuation to A-Block – There is no suitable rally point or shelter area in J-Block. Therefore, if an incident occurs at the UMCDF, and if it is safe to do so, J-Block workers will be instructed to report to A Block and be accounted for there. Otherwise, they will be directed to mask and remain in place.

4.5.4. Upper and Lower Building Complexes

The upper and lower building complexes consist of the buildings outside of the double fence but in the immediate vicinity of the UMCDF treatment area. The upper buildings complex encompasses all the buildings situated on the raised area immediately west of the UMCDF treatment area and includes, but is not limited to, the modules comprising Buildings 350, 351, 352, and 353 as well as Building 359. The lower buildings complex encompasses all the buildings south and southwest of the UMCDF treatment area and includes, but it not limited to the ASB, PEC, PSB, the waste transfer area, and masking and medical trailers. Personnel in the upper and lower building complexes will be directed to comply with one of the following three personal protective actions.

- Shelter in Place – If an incident occurs at the UMCDF that could result in the exposure of personnel working in the upper and/or lower building complexes to hazardous materials, they will report for accountability and remain sheltered inside their respective buildings until instructed to do otherwise.
- Emergency Rally Point – If an incident occurs that requires personnel to evacuate the upper and/or lower building complexes (for example, a fire in a building), they will report for accountability at the appropriate emergency rally point (see Figure 4-1). The rally points are identified by signage.
- Evacuation to A-Block – If an incident occurs at the UMCDF that results in a site-wide evacuation of nonessential personnel, and if it safe to do so, upper and lower building complexes personnel will be instructed to report to A-Block and be accounted for there.

4.5.5. Building 355 at the E-38 Gate

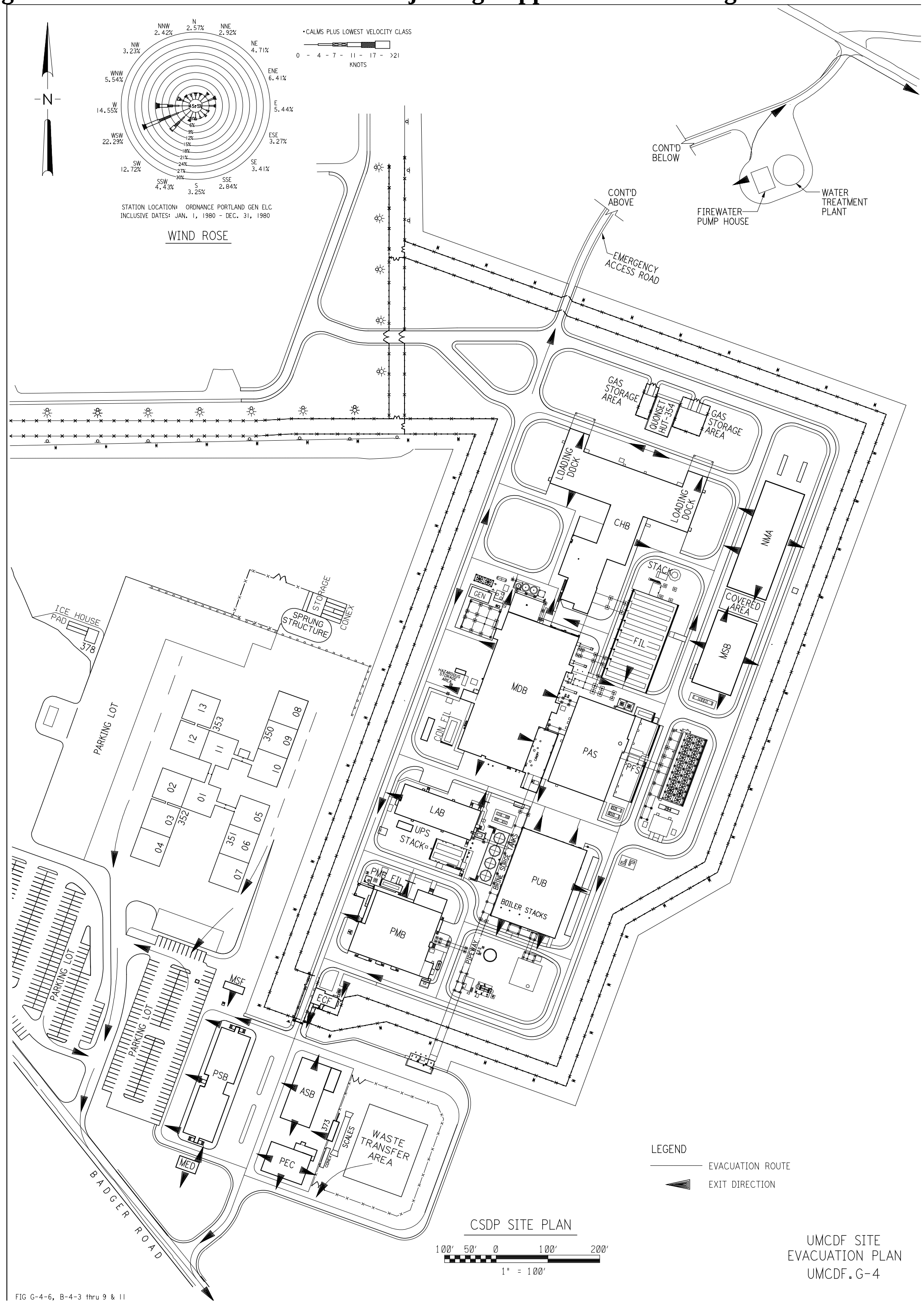
Building 355 (a/k/a the Human Resources Trailer) is intermittently occupied. If occupied during an event, personnel in the building will be directed to comply with one of the following two personal protective actions.

- •Shelter in Place – If an incident occurs at the UMCDF that could result in the exposure of personnel working at the Human Resources trailer to hazardous materials, workers there will report to the Human Resources administration office for accountability and remain sheltered inside the building until instructed to do otherwise.
- •Emergency Rally Point – Southwest of the Human Resources Trailer – If an incident occurs within the Human Resources Trailer, personnel will evacuate the building and report for accountability at the emergency rally point. The emergency rally point is located southeast of the Human Resources trailer in the parking area and is identified by signage.

4.6. Evacuation from the UMCDF Treatment and Adjoining Support Area Buildings

Evacuation from the UMCDF treatment and adjoining support area buildings, both inside and outside of the double-fenced area, will be accomplished in an orderly manner. Figure 4-6 portrays egress routes from the UMCDF treatment and adjoining support area buildings.

Figure 4-6. UMCDF Treatment and Adjoining Support Area Building Evacuation Routes



4.7. Evacuation to A-Block

As shown in Figure 4-6, evacuation from UMCDF buildings will be accomplished in an orderly fashion. The prescribed routes for evacuation to A-Block after exiting the UMCDF and areas outside of the double-fenced area are addressed in Sections 4.7.1 through 4.7.4 and an overview is shown in Figure 4-7. Figure 4-7 also includes the primary evacuation routes for the warehouse and J-Block (Roads A, B, C, and D) areas.

The evacuation process is governed by an on-site procedure, which directs personnel to drive their personal vehicles along the following routes.

4.7.1. Facility Primary Evacuation Route

- Drive east on Badger Road.
- Merge onto Rim Road, heading south.
- At East Center Road, turn left.
- At Aspen Road, turn right heading south.
- At “J” Street (located in A-Block), turn right heading west.
- At Birch Road, turn left heading south.
- Proceed to the predesignated rally point.

4.7.2. Fire Water Pump House Primary Evacuation Route

- Drive east on Rabbit Road.
- At Rim Road, turn right heading southwest.
- At East Center Road, turn left.
- As Aspen Road, turn right heading south
- At “J” Street (located in A-Block), turn right heading west.
- At Birch Road, turn left heading south.
- Proceed to the predesignated rally point.

4.7.3. J-Block Primary Evacuation Route

- Turn left onto Greasewood Road, heading north.
- Turn right onto Road E, heading east.
- Turn right onto Badger Road, heading east.
- Follow the Facility primary evacuation route.

4.7.4. Warehouses (400 and 200 Areas)

- Drive east on Magazine Road/F Street to A-Block.
- Proceed to the predesignated rally point (e.g., at the end of F Street)

4.8. Alternate Evacuation Routes

The decision as to which alternate evacuation route should be utilized is a coordinated decision. Based on the hazard prediction prepared by EC, with support from the UMCD as needed, the EC will provide direction as to which route of evacuation the UMCDF will take. The UMCDF is a tenant organization of the UMCD; therefore, alternate evacuation procedures and routes are coordinated with UMCD. If it is necessary for UMCDF personnel to take an alternate route from the facility, they will do so under the control of the UMCD in accordance with evacuation procedures. Although the EC may determine a different route of evacuation, the most probable alternate routes have been established for the facility, J-Block, and warehouse areas and are described in Sections 4.8.1 through 4.8.4 below. Figure 4-8 provides an overview of the alternate evacuation routes.

4.8.1. Facility Alternate Evacuation Route

- Drive west on Badger Road.
- Drive south on Greasewood Road.
- Drive east on Magazine Road/F Street through A Block.
- Drive south on East Patrol Road.
- Proceed to Gate E-38.

4.8.2. Fire Water Pump House Alternate Evacuation Route

- Drive east on Rabbit Road.
- At Rim Road, turn left heading northeast.
- At Road F turn right heading east.
- At Aspen Road turn right heading south.
- Turn left on Road D heading east.
- Turn left on East Patrol Road heading north.
- Turn left on North Patrol Road heading west.
- Proceed to Gate E-35.

4.8.3. J-Block

- Turn right on Greasewood Road heading south.
- Turn right on Magazine Road/F Street heading west.
- Turn right on West Patrol Road heading north.

- Proceed to Gate E-35.

4.8.4. Warehouses (400 and 200 Areas)

200 Area Warehouses

- Drive east out of the 200 Area to West Patrol Road.
- At West Patrol Road, turn left heading north.
- Proceed to Gate E-35 (a/k/a Irrigon Gate).

400 Area Warehouses

- Drive West on F Street to West Patrol Road.
- At West Patrol Road, turn right heading north.
- Proceed to Gate E-35 (a/k/a Irrigon Gate).

4.9. Off-Site Evacuation

The EC will determine, on a case-by-case basis, if off-site evacuation is required. If it is determined that UMCDF personnel should be evacuated off-site, they will either be directed to return home or provided written direction as to where personnel are to report. If instructed to evacuate to an evacuation reception center, the reader boards at Gate E-38 and on major highways will also provide instructions. The permittees have coordinated through the American Red Cross (ARC) for shelters and receiving centers in Pendleton, Heppner, and The Dalles, Oregon (see Table 4-1). The EC will coordinate with the receiving evacuation reception center(s) and notify the Oregon State Police and surrounding communities if further evacuation from A-Block is required.

Table 4-1. Off-Site Shelter and Receiving Areas

City	Initial Screening	Services/Shelter Direction Location	Directions
Heppner, Oregon	Kinzua Mill Hwy 74	Pioneer Memorial Hospital 564 E. Pioneer Way Heppner, Oregon (541) 676-9133	Proceed eastbound on Interstate 84 to Hwy. 207, Exit #182. Travel south on Hwy 207 to Junction 207/74 (Lexington). Travel east (left, 9 miles) to Heppner. Authorities will be standing by at the old Kinzua Mill location for initial screening before directing you to Pioneer Memorial Hospital.
Pendleton, Oregon	I-84 between Exits #188 and #193	St. Anthony Hospital 1601 SE Court Avenue Pendleton, Oregon (541) 276-5121	Proceed eastbound on Interstate 84 to initial screening station (between Exits #188 and #193). • After initial screening, continue on Interstate 84 eastbound to Exit 216. Turn left and proceed to the Wildhorse Casino to receive further directions. • If directed to the hospital, continue from screening station to Exit #210. Turn left and proceed down the hill where it intersects with Court Avenue (traffic light). Turn right at the intersection and proceed over the overpass on Southeast Court to St. Anthony Hospital, which will be on the left side of the roadway.
The Dalles, Oregon	I-84 Boardman Rest Area	The Dalles (I-84 Exit #84)	Proceed westbound on Interstate 84 to Arlington. Authorities will be standing by at the Boardman Rest Area for initial screening. Once cleared, continue westbound on I-84 to The Dalles. You may stop at Exit #137, (Arlington) for emergency supplies (e.g., gasoline). Personnel at The Dalles Exit #84 (third exit) will direct you to receiving and shelter areas.

Upon leaving the UMCD, UMCDF personnel will be under the control of the local emergency planning jurisdictions (Benton, Morrow, and Umatilla Counties; state offices of emergency management; and the Federal Emergency Management Agency [FEMA], with assistance from the ARC).

4.10. Evacuation Training

All workers will receive initial training to familiarize them with protective actions and evacuation routes. Periodic drills will be conducted to refresh personnel on evacuation routes.

Figure 4-7. Overview of Primary UMCDF Evacuation Routes

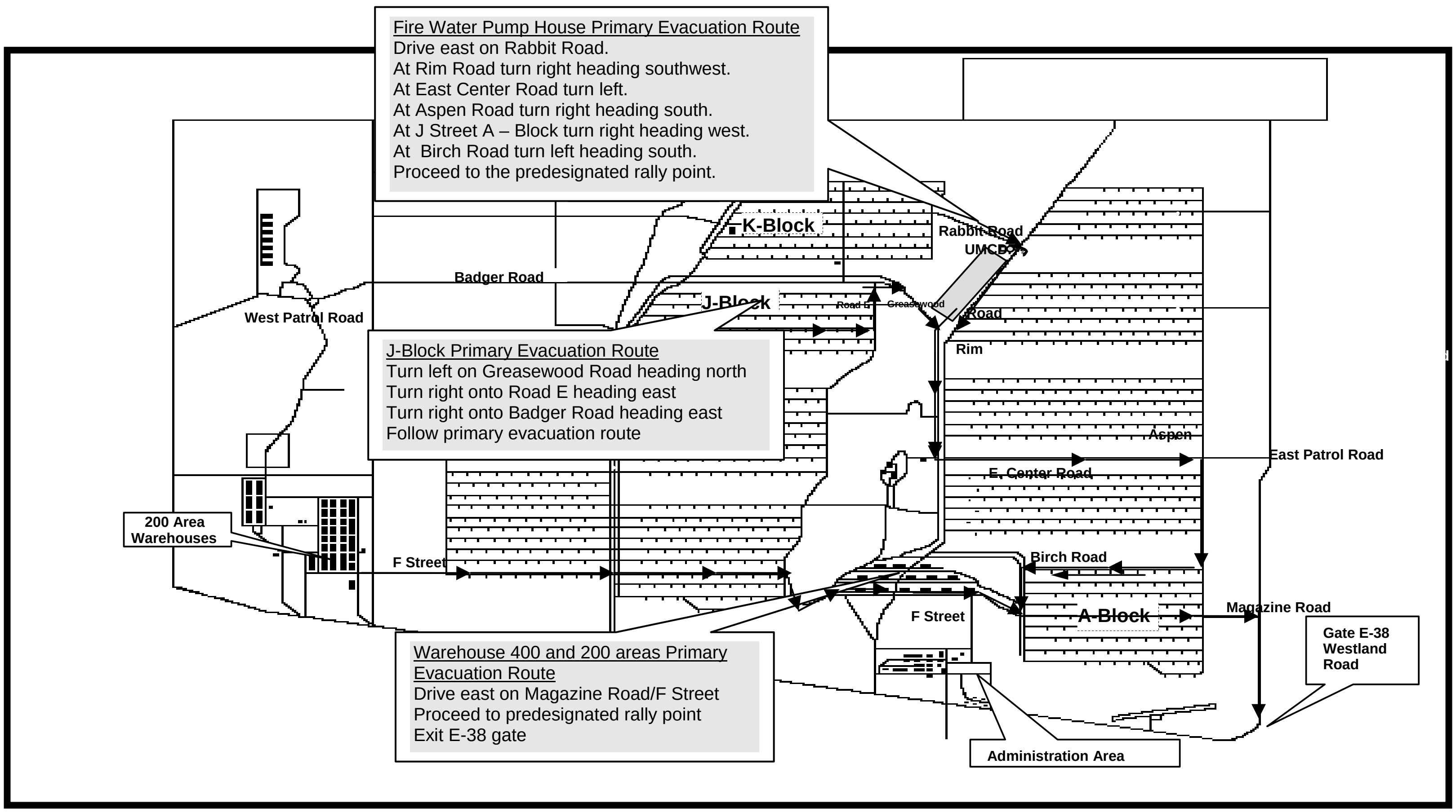
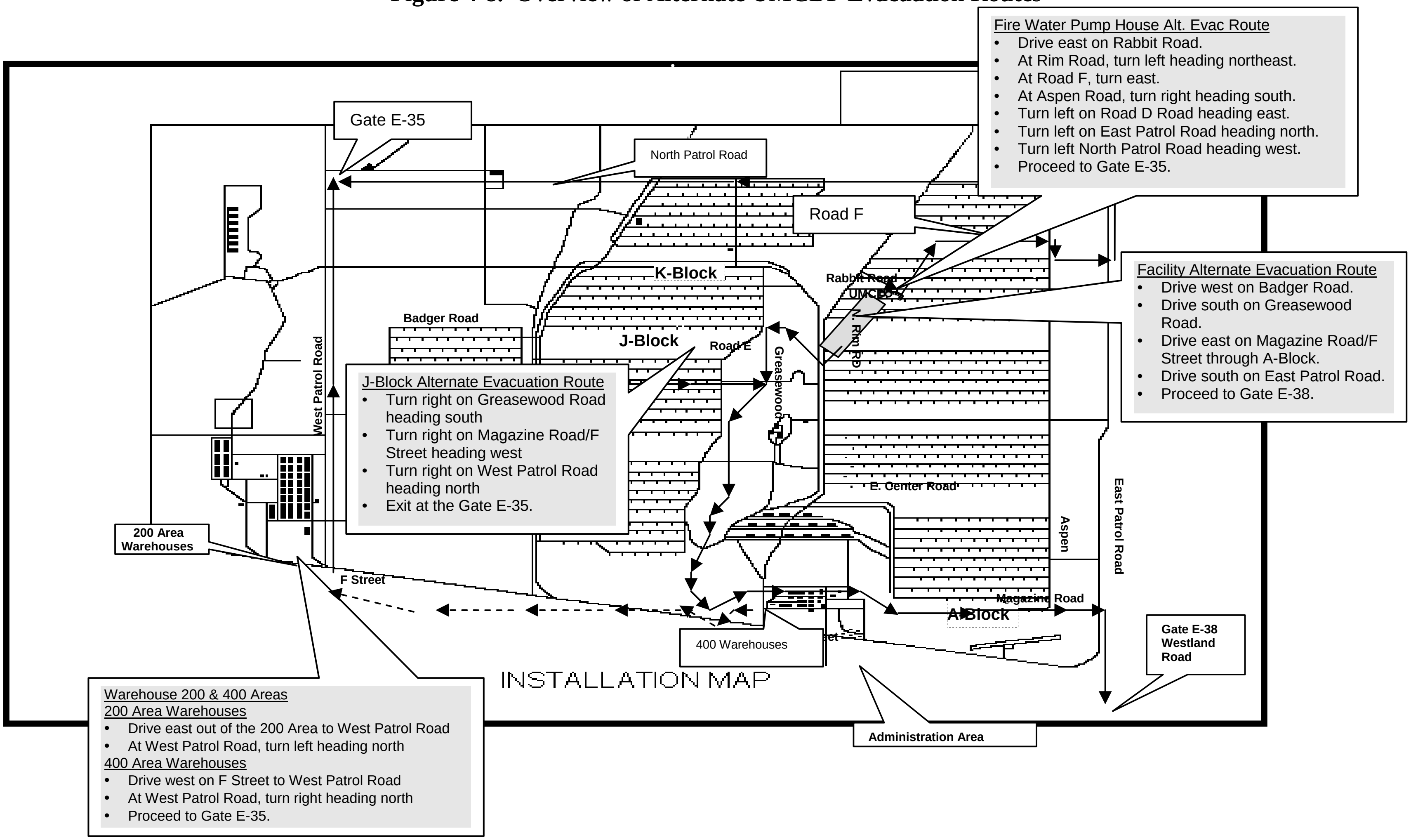


Figure 4-8. Overview of Alternate UMCDF Evacuation Routes



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5.0 Emergency Response Procedures

This section describes actions that the EC will take whenever there is an imminent or actual incident at the UMCDF that could endanger the public health or environment. Emergency response actions to be taken by facility personnel in support of these actions are addressed in site procedures.

Should a contingency event occur as described above, the EC shall follow the UMCDF Emergency Response Plan (UM-PL-028) and will enact the following emergency procedures.

- The EC will immediately:
  - Activate internal facility alarms or communication systems, as applicable, to notify all facility personnel; and
  - Notify the on-site and appropriate off-site state and/or local agencies with designated response roles.
- The EC will immediately identify the character, exact source, amount, and the extent of any released materials. This may be done by observation or review of facility records or manifests, and, if necessary, by chemical analysis.
- Concurrently, the EC will assess possible hazards to human health or the environment that may result from the release, fire, or explosion. This assessment will consider both direct and indirect effects of any toxic, irritating, or asphyxiating gases that are generated, or the effects of any hazardous surface water run-off from water or chemical agents used to control fire and heat-induced explosions.
- If the EC determines that the facility has had a release, fire, or explosion that could threaten human health or the environment the findings will be reported as follows:
  - If the assessment indicates evacuation of the local areas may be advisable, the EC will ensure notification is made to the appropriate local authorities. The EC will be available to help appropriate officials decide whether local areas should be evacuated.
  - The EC will ensure immediate notifications are made to either the Department or the Oregon Emergency Management Division (using their 24-hour toll-free number 1-800-452-0311). The report will include:
    - Name and number of reporter;
    - Name and address of facility;
    - Time and type of incident (e.g., release, fire);
    - The extent of injuries, if any, and
    - The possible hazards to human health or the environment, outside the facility.
  - During the emergency, the EC will take all reasonable measures necessary to ensure that fires, explosions, and releases do not recur, or spread to other hazardous waste at the facility. These measures will include, where applicable, stopping processes and operations, collecting and containing release waste, and removing or isolating containers.

- If the facility stops operations in response to a fire, explosion or release, the EC will monitor for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment, wherever this is appropriate.

6.0 Postincident Activities

Several actions must be completed as part of the postincident emergency response process. Equipment used to mitigate the incident must be cleaned and returned to storage, emergency systems will be checked for operability, wastes must be collected, and reports issued. In general, the facility must be restored to operating condition. The general damage assessment utilized at the UMCDF is presented in Section 6.1. Section 6.2 provides general personnel protective measures employed at the UMCDF during postincident maintenance of the facility. Sections 6.3 through 6.8 describe postincident activities that will be employed for specific situations. Section 6.9 details the postincident reporting requirements.

6.1. Damage Assessment Process

Following a contingency event that may have caused damage to the facility or equipment (such as a fire or explosion), UMCDF personnel will be dispatched to the affected areas to assess damage. Damage assessment activities may involve the following:

- Verifying that the UMCDF monitors are operational
- Verifying that ACAMS and DAAMS are operational
- Determining whether the facility or equipment has been damaged, is operational, or requires maintenance
- Determining postincident cleanup activities
- Determining what actions need to be completed prior to the resumption of normal operations.

6.2. Postincident Facility Maintenance/Personnel Protective Measures

Postincident maintenance is critical to restoring the facility to operating condition. At the same time, the protection of personnel while conducting maintenance activities is of utmost importance. This section identifies general personnel protective measures adhered to at the UMCDF.

6.2.1. Personal Protective Clothing

The level of protective clothing worn in each area of the UMCDF will be consistent with the hazard anticipated for the category of room being entered and will be determined in accordance with applicable site procedures.

6.2.2. 30-Minute Observation of Personnel for Exposure to Agent

Personnel engaged in contaminated work operations will be observed for signs or symptoms of exposure to agent for 30 minutes following the completion of such work or at the end of each shift.

6.2.3. Two-Person Rule

The two-person rule will be strictly enforced in all chemical exclusion areas of the UMCDF to assure both safety and security of the UMCDF and its workforce.

NOTE:	Any individual in a chemical exclusion area of the UMCDF must be within visual contact of another individual in order to detect unauthorized actions, and to provide rescue or render first aid in the event of an incident or accident.

In chemical agent areas, a minimum of two individuals will be assigned to any job. Emergency backup will be staged at a predetermined egress point. The emergency backup will be prepared to:

- enter the Category A area;
- assist in any necessary rescue; or
- render emergency assistance to suited personnel.

6.2.4. Nonhazardous Areas

In the areas of the facility where no hazardous levels of chemical agent or other hazardous chemicals are present, such as the Mechanical Equipment Room, the Control Room, observation corridors, etc., maintenance may be performed in the appropriate level of protective clothing.

6.3. Postincident Fires and Chemical Agent Release Recovery

After a fire involving chemical agents has been controlled and extinguished, the affected areas will be closely monitored using low-level monitoring equipment (reference Section 7.10) to ensure that all traces of chemical agents have been decontaminated. This will involve ensuring that all monitors have returned to a normal level.

Runoff from fires inside the MDB will be collected in sumps that will be pumped to the spent decontamination solution (SDS) tanks. From there, the runoffs will be fed to the Liquid Incinerators.

Any remaining materials in the fire area that may have been exposed to chemical agent will be decontaminated with decontamination solution and either be fed to an incinerator for treatment or placed in storage for eventual thermal treatment.

Each fire will be investigated to determine its cause and how best to prevent a recurrence. An appropriate recovery plan, to include any necessary repairs and maintenance, will be developed based on the damage assessment.

6.4. Postincident Resumption of Normal Power

Resumption of normal power will be done in accordance with applicable site procedures and involves the following.

6.4.1. Resume Operations from the Emergency Generator

Upon resumption of normal power supply from an operating emergency generator, the UMCDF will resume operations utilizing the power system Programmable Logic Controller (PLC) to transfer loads from the emergency generator to normal power and energize loads in the appropriate sequence to protect the main power plant. During restart of the UMCDF, all chemical agent monitors will be verified to be operating and all work areas will be monitored. Following verification that work areas are chemical agent free, permission to unmask will be announced over the PA system.

6.4.2. Resume Operations when Emergency Generator Failed

When normal power is returned in the situation where the emergency generator did not start, monitoring for chemical agent in the MDB will be performed before permitting reentry. Masks (or other appropriate level of PPE) will be worn upon reentry. All chemical agent monitors will be verified to be operating and all work areas will be monitored. Operations may be resumed while monitoring is in progress. Permission to unmask will be announced over the PA system when work areas are confirmed as being chemical agent free.

6.5. Postincident Facility Decontamination

Following a contingency event involving chemical agent or other hazardous waste, the facility will be decontaminated in accordance with Department of the Army Pamphlet (DA PAM) 385-61, Toxic Chemical Agent Safety Standards. All collected waste materials will be containerized and stored in accordance with Section 6.8.

The UMCDF is divided into areas that reflect the possibility of agent contamination. These categories are based upon the anticipated type and degree of contamination, as shown in Table 7-1.

6.5.1. Decontamination within the MDB

The affected areas and all equipment in the area(s) will be washed with decontamination solution and rinsed with water until the areas have been decontaminated to normal operating levels. Monitoring will be conducted to determine whether decontamination of the areas has been achieved. All runoff will be rinsed into the room sump and pumped to the spent decontamination holding tank in the SDS Room.

> NOTE: Washing walls above waist level or ceilings is not generally necessary unless monitor readings in the room continue above acceptable levels. All three chemical agents (GB, VX, and HD) are heavier than air, and their vapors are generally nonpersistent, although liquid VX and HD are very persistent. Liquids will normally seek cracks or crevices, and specific attention should be paid to decontaminating these areas on equipment or at floor level.

Additional decontamination activities in the UPA and the Explosive Containment Room (ECR) involve securing any unexploded ordnance.

UMCDF personnel will attempt to contain nonagent hazardous waste spills and prevent further leakage at its source.

6.5.2. Facility Decontamination outside the MDB

The affected areas will be closely monitored using low-level monitoring equipment (see Section 7.10) to ensure decontamination. This will involve ensuring that the monitors have returned to a normal level and that no detectable chemical agent remains above the VSL.

For an agent event at the UMCDF, such as an agent transportation accident involving fire, runoff will be controlled as much as practical and either containerized or absorbed by pads or other absorbent material. All collected material will either be fed to an incinerator for treatment or placed in storage for eventual thermal treatment. If feasible, the area may be rinsed with decontamination solution and/or water in order to neutralize any small quantities of chemical that could potentially remain.

Any remaining materials that may have been exposed to chemical agent will be decontaminated with decontamination solution and either be fed to an incinerator for treatment or placed in storage for eventual thermal treatment.

UMCDF personnel will attempt to contain nonagent hazardous waste spills and prevent further leakage at its source. If applicable, the substrate will be analyzed to determine whether all the contaminated soil has been removed.

6.6. Postincident Equipment Decontamination

Following a contingency event involving chemical agent or other hazardous waste, the facility equipment and/or equipment used in response to the event must be decontaminated in accordance with DA PAM 385-61, Toxic Chemical Agent Safety Standards. Equipment considered usable (see Section 6.7) will be sampled by a low-level monitor (see Section 7.10) to ensure adequate decontamination. All collected waste material will be containerized and stored in accordance with Section 6.8.

6.6.1. Equipment Decontamination within Engineering Controls

If the item is to be worked on in the Category C area, then:

1. Personnel in DPE or Level A clothing will decontaminate the maintenance item with aqueous decontamination solution.
2. The item will be dried to the best possible extent.
3. The item will be placed in the airlock and sampled to ensure decontamination.

> NOTE: Certain small items with crevices, cavities, etc., may also be heated in the electric induction heater in the airlock hood to dry them and/or dry off any residual chemical agent vapor.

4. Once the item is decontaminated, it may be removed to the Category C portion of the Toxic Maintenance Area (TMA).

6.6.2. Decontamination of Agent-Related Items on Which Additional Maintenance Will Be Performed At UMCD Shops

If work on an item will be in one of the UMCD shops (example: the motor-rewind area of the electrical shop), the items will be certified clean as follows:

- Disassembly – All disassembly will be accomplished in the Category C area of the Toxic Maintenance Area (TMA) prior to allowing the item to exit the UMCDF.
- Sampling – The item will be sampled to ensure decontamination.
- Quality Assurance – QA will affix a decontamination certification tag, which states that the item is to remain at the UMCD.

- Removal – The item will be removed from the Toxic Maintenance Area through the Category D vestibule for transfer to the designated UMCD maintenance shop.
- Item Control – A UMCDF employee will accompany the item and ensure no additional disassembly or unauthorized heating occurs. (Motor rewinds are permitted.)

6.6.3. Decontamination of Agent-Related Items to be sent Off-Site of the UMCD for Maintenance

NOTE:	If an item has NEVER BEEN CONTAMINATED (such as a circuit board from the CON microprocessor), the following process is not required for that item.

Decontamination for maintenance off-site of the UMCD will be decided on a case-by-case basis. It will require treatment of the item to ensure decontamination in accordance with DA PAM 385-61.

Quality Assurance will verify the heat treatment, and will tag the item as completely decontaminated.

The tag will be removed by the UMCD before the item leaves the UMCD.

6.6.4. Nonhazardous Areas

Decontamination of equipment from these work areas is unnecessary

6.7. <u>Postincident Equipment Maintenance</u>

Facility equipment involved in a contingency event will be examined to assure it is fit for reuse. The equipment will be evaluated based on appropriate specifications and/or vendor/preventive maintenance manuals. If it fails the examination, the appropriate maintenance will be performed.

Any emergency equipment that was used to mitigate an incident must be cleaned and examined to assure it is fit for reuse. If it fails the examination, the item must be discarded and replaced by a new item. The EC is responsible for ensuring that postincident equipment inspections are performed. (A description of UMCDF emergency systems and equipment appears in Section 7.0.) For specific maintenance information on each piece of equipment, the appropriate vendor maintenance manual or preventive maintenance manual will be consulted. Details of repair, overhaul, etc. are only covered in this section as they affect and safety aspects of the operation.

If a maintenance task is judged to be too extensive to take on for the level of protection required in the particular UMCDF area, the equipment will either be removed or decontaminated.

6.7.1. Equipment Removal to the Toxic Maintenance Area

Equipment moved to the TMA will be handled in either the Category A or C area. DPE or Level A clothing must be worn if the item is to be worked on in the Category A area.

If the item is to be worked on in the Category C area, then:

- Personnel in DPE or Level A clothing will decontaminate the item (see Section 6.6).
- Once the item is decontaminated, it may be removed to the Category C portion of the TMA.

- Maintenance in the Category C area will be performed in the appropriate level of protective clothing.

6.7.2. Removal of Agent-Related Items for Additional Maintenance at UMCD Shops

If work on an item will be done in one of the UMCD shops (e.g., the motor-rewind area of the electrical shop), the items will be decontaminated in accordance with Section 6.6.2 prior to removal. The item will be removed from the TMA through the Category D vestibule for transfer to the designated UMCD maintenance shop, and a UMCDF employee will accompany the item to ensure no additional disassembly or unauthorized heating occurs. (Motor rewinds are permitted.)

6.7.3. Removal of Agent-Related Items for Maintenance to be Performed Off-Site of the UMCD

If work on an item will be done off-site of the UMCD, it will first be decontaminated in accordance with Section 6.6.3. The decontamination tag will be removed by the UMCD before the item leaves the UMCD. The maintenance items being repaired off-site of the UMCD will be tracked by the UMCDF.

6.7.4. Maintenance Following Nonagent-Related Hazardous Waste Storage Tank Spill/Release

The level of protective clothing appropriate to any hazards in the area will be worn.

If the spill is caused by a defective tank component, temporary seals will be placed on the tank (if needed), the tank will be emptied, and the containment pad will be cleaned within 24 hours of the incident. The tank will be taken out of service until permanent repairs can be made.

If no repair of the tanks is needed, the containment pad will be cleaned within 24 hours and before placing the tank back in service.

6.7.5. Maintenance Following a Spill/Release from an Evaporator Package, Drum Dryer, or Ancillary Equipment

The level of protective clothing appropriate to any hazards in the area will be worn.

If the spill is caused by defective equipment, the spilled material will be collected; temporary seals will be placed on the damaged equipment; the equipment will be emptied, if required; and the containment pad will be cleaned within 24 hours of the incident.

The affected evaporator package, drum dryer, or ancillary equipment will be taken out of service until permanent repairs can be made.

If no repairs are needed, the containment pad will be cleaned within 24 hours and before placing the equipment back in service.

6.7.6. Equipment Maintenance Following a Natural Gas or LPG Leak

Following are considerations for repairing a gas leak.

- Protective Clothing

    The level of protective clothing appropriate to any hazards in the area will be worn.

- Monitoring

  Before entry to the area, the Safety Department will monitor the area for natural gas or LPG vapor and oxygen to verify it is safe for maintenance. The Safety Department will review and approve the maintenance to be performed to ensure that hazards are controlled. Maintenance will then be performed according to the specific maintenance procedure for the given piece of equipment.

6.7.7. Equipment Maintenance in Nonhazardous Areas

In these areas of the facility where no hazardous levels of chemical agent or other hazardous chemicals are present, such as the Mechanical Equipment Room, Control Room, and observation corridors, agent decontamination of parts is unnecessary and maintenance may be performed in Level E protective clothing.

During such operations, parts will be replaced and the defective part(s) will be transported to the Maintenance Shop for study, repair, or disposal. There will be no restrictions on the movement of these items within the UMCDF.

6.8. Postincident Waste Collection and Disposal

Immediately after an emergency, the EC will ensure arrangements are made for the treatment, storage, or disposal of recovered waste, contaminated soil, surface water, or any other contaminated material. In general, the recovered wastes and contaminated materials will be placed in drums and stored within a container storage area, treated on-site by incineration, or treated or disposed off-site as a solid waste or listed hazardous waste.

In the event that liquid materials are involved or the materials are spilled into or otherwise exposed to water (e.g., water that was used to fight a fire), sorbent materials and/or containment berms will be used. In this case, sorbent materials such as sand, sawdust, commercial sorbents, etc. will be placed directly on the waste to prevent further spread and to aid in recovery. Berms of earthen or sorbent materials will be used to contain larger waterborne spills and will be constructed downstream of the leading edge.

Postincident cleanup wastes will be managed in accordance with 40 CFR 262.34 requirements.

6.8.1. Postincident Agent-Related Waste Collection and Disposal

Inside the MDB

Agent-related liquid spills within the MDB will be transferred to the UMCDF tanks via the existing SDS collection system. Contaminated or spilled solids will be placed into containers and treated or disposed in an appropriate manner.

Runoff from fires inside the MDB will be collected in sumps that will be pumped to the SDS tanks. From there, the runoffs will be fed to the Liquid Incinerators.

Outside the MDB

Spilled agent-related liquid waste outside the MDB will be pumped into tanks, drums, or a vacuum truck and then transferred into the SDS tanks. Contaminated or spilled solids will be shoveled into containers or excavated with a backhoe and treated or disposed in an appropriate manner.

Runoff from agent-related events outside the MDB (e.g., agent transportation accident) will be controlled as much as practical and either containerized or absorbed by pads or other absorbent material. All collected material will either be fed to an incinerator for treatment or placed in storage for eventual thermal treatment.

Any remaining materials in the affected area that may have been exposed to chemical agent will be decontaminated with decontamination solution and either be fed to an incinerator for treatment or placed in storage for eventual thermal treatment.

6.8.2. Postincident Nonagent-Related Waste Collection and Disposal

Spilled or contaminated materials resulting from nonagent-related incidents will be collected and properly stored as hazardous waste until the waste is either treated or disposed of in accordance with permit and regulatory requirements.

Any contaminated sorbents or earthen materials will be collected and placed in drums for proper storage, treatment, or disposal.

6.8.3. Postincident Handling of Incompatible Wastes

At no time during a postincident response to an incident shall incompatible materials be stored or transported together. Incompatible materials will remain segregated. Cleanup wastes will be managed in accordance with 40 CFR 262.34 requirements.

6.8.4. Postincident Sampling and Analysis

Following are the postincident sampling procedures to be used following a chemical agent transportation accident or any spill of hazardous material to the ground.

Soil Sampling

Soil sampling will be conducted at points where contamination is known or suspected to have occurred as the result of a leak or spill. Sampling is to occur following surface cleanup of a spill site. A sample will be taken using a clean shovel, trowel, scoop, 1-inch core sampler, an auger, or other appropriate method.

Samples are to be taken at the center of the spill and at two points that designate the horizontal limits (periphery) of the spill. Sample depth will be determined by visual inspection of the initial core (one foot) for evidence of a spill, such as wetness. The cores will be analyzed for the presence of the spilled material. The definition provided by the sampling will be used to designate the depth to be cleaned up. The samples will be extracted and the extract will be analyzed for appropriate contaminants. The extractant is dependent upon the type of spill.

The potentially contaminated soils (defined by sampling horizontally and vertically above the area) will be removed and placed in 55-gallon drums. If the soil sampling indicates that chemical agent contamination exists, these drums will either be fed to an incinerator for treatment or placed in storage for eventual thermal treatment.

Unknown Free-Standing Liquids

Free-standing pools of liquids are to be sampled using chemical agent indicators for vapors. Additionally, colorimetric indicator paper will be dipped into the pool of unknown liquid. If these results are negative for chemical agent, a volatile organic analysis vial with Teflon-lined septum (or equivalent) will be filled completely (no ullage) and will be delivered to the UMCDF laboratory for analysis.

6.9. Postincident Reporting Responsibilities – Overview

Whenever the Contingency Plan is implemented, a report must be filed with the DEQ within 15 calendar days of the incident. If the incident meets the immediate reporting requirements of Section 3.2.2, a report must be submitted to the DEQ within five calendar days. This 5-day report may be used to satisfy the requirements of the 15-day report, if it includes all of the information required by the 15-day report.

In addition, if the incident meets the immediate reporting requirements of Section 3.2.2, a request for resumption of operations must also be submitted to the DEQ. Operations may not resume until the DEQ has provided the UMCDF with written approval to resume operations.

6.9.1. Five-Day Postincident Report

A written submission will be provided to the DEQ within five calendar days following an incident with the potential to endanger human health or the environment. The report will contain the following information:

1. Name, address, and telephone number of the individual reporting.
2. Description of the incident, including the cause, location, extent of injuries, if any, and an assessment of actual or potential hazard to the environmental and human health.
3. Period in which the incident occurred, including exact dates and times.
4. Whether the results of the incident remain a threat to human health and the environment (whether it has been corrected or adequately cleaned up).
5. If not corrected, the anticipated time it is expected to continue and the steps taken or planned to reduce, eliminate, and prevent recurrence and the steps taken or planned to adequately clean up the release.

6.9.2. 15-Day Postincident Report [40 CFR §264.56; OAR 340-104-0056]

Whenever the Contingency Plan in implemented, a report must be filed with the DEQ within 15 calendar days of the incident. As discussed previously, the 5-day report may be used to satisfy the 15-day reporting requirement. In order to satisfy the requirement for the 15-day report, the 5-day report must also include the information required by the 15-day report. The 15-day report will include the following:

1. Name, address, and telephone number of the owner or operator.

2. Name, address, and telephone number of unit and person(s) in charge at the UMCDF.
3. Location of incident and specific areas affected.
4. Date, time, and type of incident or time of discovery.
5. Name of material(s) involved in incident.
6. Quantity of material(s) involved in incident.
7. Cause of incident, including a failure analysis of system(s) in which the failure occurred. Describe any unique problems encountered.
8. The extent of injuries, if any.
9. An assessment of actual or potential hazard(s) to human health and/or environment, where this is applicable.
10. Description of (any) emergency actions taken to minimize threat to human health and/or environment, where this is applicable.
11. Postincident corrective actions, including resources committed, attempts to reclaim released substance, and/or countermeasures taken.
12. Estimated quantity and disposition of recovered material.
13. Preventive measures taken or contemplated to minimize the possibility of a recurrence of an incident.
14. Evaluation of the emergency systems and equipment used for the emergency in terms of quality and quantity.
15. Describe any changes that are to be made to the Contingency Plan as a result of the postincident evaluation of emergency response activities.
16. Any other information necessary to fully evaluate the situation and to develop an appropriate course of action.
17. If the incident is not corrected, the anticipated time that it is expected to continue and the steps taken or planned to reduce or eliminate the incident.

The report will be signed by the U.S. Army Chemical Materials Activity (CMA) Site Project Manager or delegate, and Washington Demilitarization Company, LLC Project Manager.

6.9.3. Request to Resume Operations

If the shutdown meets the immediate reporting requirements of Section 3.2.2, the UMCDF must submit a request to resume operations to the DEQ. For the incident and affected area, the request will include the following information.

1. Detailed description of the accident/incident.
2. Description of the cause of the accident as determined by the results of the investigation of the accident.
3. Description of the corrective action(s) taken.

4. Confirmation that no wastes incompatible with the released material was treated, stored, or disposed of until cleanup procedures were completed.
5. Confirmation that all emergency systems and equipment listed in the Contingency Plan and used for the emergency response are examined, cleaned, and/or decontaminated, as applicable, and their fitness evaluated. If it is determined they are fit for reuse, they will be returned to proper storage locations; or if determined unfit for use, they will be discarded and replaced by new items.
6. Copy of the notification received by the permittees from the U.S. Army Chemical Materials Activity that operations are authorized to resume.

Operations may not resume until the DEQ has provided the UMCDF with written approval to resume operations.

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7.0 Emergency Response Systems and Equipment

7.1. Emergency Response Systems and Equipment – Overview

This section describes the UMCDF emergency systems and equipment, including emergency equipment, communications, and alarm systems, and decontamination equipment available for response to a fire, explosion, or sudden or nonsudden release of chemical agent at the UMCDF.

7.2. Inventory

The UMCDF equipment inspection program, which is described in Attachment 3 of the UMCDF Hazardous Waste Permit (ORQ 000 009 431-01), ensures that emergency equipment is examined for deterioration. In those instances when deteriorated and/or damaged equipment is being replaced, it is possible that the minimum inventory of emergency equipment will not be present immediately after a contingency event.

7.3. Postincident Cleaning of Emergency Equipment

Following an incident, and before operations are resumed, the EC will ensure any emergency equipment that was used will either be cleaned so that it is fit for reuse or it will be discarded and replaced.

7.4. Emergency Communication Systems

Telephones, the PA system, two-way radios, and CCTV systems will be used for emergency communications throughout UMCDF treatment areas. If an emergency occurs at the J-Block storage area, personnel will communicate via cellular telephones and two-way radios. The Chemical Hazard Alerting System (CHAS) lighting and HAR systems have been established to warn persons who might approach the plant during upset or emergency conditions. Signage and warning beacons have been established along all major roadways leading to the UMCDF. Activation of the CHAS and HAR systems is controlled by the UMCDF Control Room. When the emergency beacons are activated, persons driving toward the UMCDF are directed to tune their vehicle AM radio dials to 1600 for important emergency information, current plant status, and/or instructions.

7.5. Demilitarization Equipment Controls/Alarms

The demilitarization process is composed of several processes, all of which must operate in order to safely and effectively unpack, disassemble, separate, and treat chemical agents and munitions. These processes are monitored and controlled by a PLC, which is a central process control system. Built into the PLC is a series of alarms to warn the operators if any one or several of the processes are not operating within the programmed control range. The alarm levels are as follows:

- The first level of alarms warns the operator that a parameter is out of its programmed range; troubleshooting and corrective actions are required but the process can continue to operate safely.
- The second level of alarms alerts the operator that a parameter is going out of control and that a preprogrammed corrective action (typically shutdown of the operation) will commence within a specified time.
- The third level of alarms informs the operator that the process is out of control and activates the automatic waste-feed cutoff system.

- A fourth level of alarms may be provided to warn of an emergency situation and initiate a total shutdown of the entire process.

With this hierarchical system, the operator is warned of maintenance requirements, immediate corrective action requirements, loss of control, waste-feed cutoff before failure occurs, and failure of the process in a step-by-step progression. The operator can interrupt this progression by taking corrective action early and can call on other field operators, the supervisor, the maintenance staff, and the engineering staff for assistance in responding to these alarms.

7.6. Cascade Ventilation System

The cascade ventilation system in the MDB prevents the release or spread of contamination by using cascaded pressure control. The building ventilation flow is set up so that air flows from the least toxic (Category C) to the most toxic (Category A) areas. The CON is maintained at a positive pressure with respect to the atmosphere, while toxic areas are maintained at a negative pressure with respect the atmosphere. Each room in the MDB is designated as A, B, C, D, or E, reflecting the potential for agent contamination of that room. The ventilation categories are:

Table 7-1. UMCDF Chemical Agent Areas

Category	Description
A	Toxic process area under negative pressure, routine contamination with either chemical agent liquid or vapor; a high hazard area.
A/B	An A/B area meets all design criteria for an A area, but in typical service acts as a B area; that is, only vapor chemical agent hazard is present. In some circumstances, a liquid chemical agent hazard may be present, hence the need for design to meet A area requirements.
B	Toxic process area under negative pressure, high probability of chemical agent vapor contamination resulting from routine operations; a high hazard area.
C	Work area under negative pressure and subject to inadvertent vapor contamination; a negligible hazard area.
D	Work area under ambient pressure that will not be subject to contamination; a negligible hazard area. These areas will be adjacent to or open to the out-of-doors.
E	Work area under positive pressure that will not be subject to contamination; a negligible hazard area. (In the MDB, only the Control Room is a Category E Room.)

The ventilation system is equipped with pressure control instrumentation to alleviate system upsets that could subject the MDB to excessive differential pressures. In the event a pressure upset is detected in the supply air header or in the common exhaust duct of the ventilation system, the system is designed to automatically switch from a normal flow control mode to a pressure control mode. This mode is pressure controlled to reduce the supply air flow to the MDB and exhaust flow to the air filtration units to maintain approximately –2.5 inches water column (wc) in the exhaust duct and approximately 0.0 in. wc in the supply header.

7.7. Tank Systems

The design of the facility tank systems ensures that incompatible wastes are not allowed to comingle.

Only certain process brines go through the brine surge tanks in the Brine Reduction Area. All the brines, whether processing GB, VX, or HD, will be compatible.

SDS from the sumps will go to the SDS tanks. The SDS, sodium hypochlorite, sodium hydroxide, or other U.S. Army-approved decontamination solutions will be compatible.

Dilute liquid laboratory waste will be collected in the laboratory chemical waste storage tank before being pumped to the SDS holding tanks. The liquid laboratory waste will be primarily water, so there should not be any adverse reactions of this waste with the SDS.

Chemical agent from the demilitarization machines will go to the Agent Collection System (ACS). When changing from one chemical agent to another, the tanks in the ACS will be rinsed to remove residual chemical agent from the previous agent campaign.

7.8. Fire Detection, Alarm, and Suppression Systems

7.8.1. Visual Observation

Upon observing fire or smoke, personnel will notify the CON regardless of the size of the fire. The preferred method of notifying the CON is use of the nearest and safest manual-pull alarm. New UMCDF employees are trained on these processes.

The manual-pull alarms will be mounted five feet above the floor, near exit doors, on the nonhinge side of the wall. In outdoor areas of the facility, they are located within 25 feet of the general work area on an available steel pole. The manual-pull alarms are contained in red cast housing with a label depicting their use.

Because telephones also may be used for fire reporting, appropriate emergency numbers will be posted on or near the telephones. It is also possible for a CON operator to observe a fire via the CON CCTV system.

Firefighting equipment consists of both automatic systems and manual fire extinguishing equipment. Automatic systems initiate when installed monitoring devices detect the presence of a fire. They, in turn, energize indicators on the CON annunciator panel indicating that a fire is detected and that extinguishing systems are automatically activated. Installed fire detection systems are designed to provide immediate indication of a fire and, for some areas, automatic actions to stop the fire and minimize resulting equipment damage.

There are two types of portable fire extinguishers, carbon dioxide and multipurpose (dry chemical), throughout the UMCDF for use on small fires. Because of the agent/explosive environment and because Level A/B PPE is not self-extinguishable, entrants into Category A, A/B, and B areas of the MDB cannot utilize portable fire extinguishers to fight fires. However, portable fire extinguishers will be stationed for use during hot work operations in MDB Category A, A/B, and B areas.

7.8.2. Automatic Fire Detection

There are two types of automatic signaling devices: bells and horns/strobes. The CON will use the PA system for site notification and announcements relative to a fire. Bells and horns both have a sound rating of approximately 87 decibels above ambient noise at 10 feet. Alarm strobe lights corresponding to a fire alarm will remain illuminated until the fire alarm is manually turned off. Flashing lights (strobes) with vibrating horns are used in all areas of the MDB.

Horns/strobes are used in all areas, including exterior yard areas. In addition to horns/strobes, bells and strobes are installed in rooms that are protected by the FEM (heptafluoropropane) suppression system. In the MDB, two types of automatic fire detectors can activate alarms: thermal and smoke detectors. Any fire sensed by these detectors will initiate an alarm on an annunciator panel in the CON, indicating the exact location of the fire. Simultaneously, the detectors will activate an audible/visual fire alarm in the affected work areas. In addition, a signal from the CON annunciator panel will activate alarms at the UMCD Fire Department and the Entry Control Facility (ECF). Unlike the annunciator panel in the CON, the panels in the Fire Department and ECF indicate only the building in which a fire has been detected, but not its exact location.

The components of the fire suppression system are as follows.

Sprinkler System

Preaction sprinkler systems are installed in the CHB and UPA. Each can be manually activated (manual pull station). Smoke and/or thermal fire detectors can also automatically trigger the system. The system includes a fire alarm panel, which controls system initiation, alarms, horns/strobes, and activates the CON fire alarm annunciator panel. The system is pressurized with air and floods when the deluge valve receives an actuation signal. Upon receipt of an alarm signal, area horns/strobes actuate. A fire alarm is received locally, at the CON fire alarm annunciator panel and at the ECF. The deluge valve opens and pressurizes all sprinkler lines so that the headers fill and water may be discharged from any open sprinkler heads.

Fire Extinguishing Medium (FEM) System

Automatic, total-flooding FEM systems will protect the CON, its associated computer room, the UPS system, the switchgear room, and the Pollution Abatement System (PAS) electrical building. A FEM system located in the Personnel and Maintenance Building (PMB) Communications room is installed to protect equipment only. The systems release colorless heptafluoropropane that is an environmentally acceptable replacement for Halon 1301, which does not damage electrical equipment and has a very low-relative toxicity to humans. On FEM discharge, area strobes are activated.

The FEM systems are actuated by photoelectric smoke detectors. The systems are configured for a two-stage function: prealarm and discharge. When one detector is activated, a warning bell sounds. However, the system will start the actuation sequence only when a second detector activates. The activation of a second detector sets the system into a 30-second time-delay mode. The delay allows CON operators to activate an abort switch if they determine that the fire can be extinguished manually or if it is a false alarm. The delay also provides the time needed for personnel to evacuate the area, if necessary.

If the fire is small and if it can be fought safely, operators may abort the automatic release on the system and use manual carbon dioxide fire extinguishers. A manual discharge switch can be used, should the automatic system fail.

The automatic, total-flooding fire-extinguishing medium system will protect the following areas of the MDB:

Table 7-2. FEM-Protected Areas of the MDB

Area Protected by FEM	Location of FEM Abort Buttons
CON (#08-110) (its medium system is in Room #08-106) Offices (#08-108, -109, and –111) Communications Room (#30-112)	By both CON emergency exit doors and by the Communications Room exit door
Multipurpose Room (#08-107), FEM (#08-106), Process Data Acquisition and Recording Room (#08-113), and Engineering and Maintenance Room (#08-114)	Inside the PDAR Room by Doors 018 and 003
Switchgear Room (#52-124) (its medium system is in Room #52-174)	By exit doors to the Electric Room and exit door to the vestibule
UPS Anteroom (#52-174) and Rooms (#52-175 and –176)	Anteroom #52-174
Building 388 PFS Electric Equipment Room (#114-01 and –02) (its medium system is in Room #114-101)	By the exit doors to each room

Primary power to the system is backed by a set of 12-volt direct current rechargeable batteries.

Dry Chemical Fire Suppression System

The dry chemical system is designed to detect and extinguish lubricant oil fires to provide protection from fires in the Toxic Cubicle Room (#11-141) (the suppression system is in Room #09-142). (The Toxic Cubicle contains the agent holding tanks.)

The Toxic Cubicle contains a combination of fixed-temperature alarm setpoint and rate-of-temperature-rise design thermal detectors. The rate-of-temperature-rise feature allows initiation of a fire signal due a marked temperature increase in the vicinity of the detector without waiting for the static temperature setpoint to be reached.

The dry chemical control panel controls initiation of dry chemical discharge upon receipt of a fire signal from the detector system. This panel also sends fire alarm signals to the CON fire alarm annunciator panel and to equipment that isolates the Toxic Cubicle in the event of a fire.
Dry chemical distribution piping is in the ceiling of the Toxic Cubicle. Nozzles are installed at regular intervals to provide even distribution of dry chemical when discharged. Nitrogen cylinders provide the motive force to move dry chemical from their tanks to distribution lines and nozzles.

The Toxic Cubicle depends on any two detectors transmitting an alarm signal to the local panel in order for a dry chemical discharge to initiate. The automatic dry chemical system is actuated when a second detector is activated. Discharge occurs by the tripping of the second alarm that sets the system into a 30-second time-delay mode. The delay allows time to warn personnel of impending system discharge. If a manual pull station is activated, discharge is immediate.

Automatic Response to Fire in the Explosive Containment Room

The rocket shear machine (RSM) flame detector in the explosive containment room (ECR) will automatically start a washdown of the Deactivation Furnace System (DFS) blast gates in the event of a fire in the ECR. The DFS feed gates will be cycled and the process water sprays opened. After five seconds, the DFS feed gates will be cycled again. The water sprays will automatically close when a flame is no longer detected.

7.9. Explosion Detection, Alarm, and Suppression Systems

GB and VX agent stockpiles, including munitions containing energetic components, have been destroyed. The remaining HD ton containers do not contain energetic components; therefore this section no longer applies.

7.10. Agent Detection Systems

Chemical agent monitors and alarms are present in each active treatment unit chemical-agent work area. Additionally, waste storage areas containing contaminated wastes are periodically monitored for agent. The types of monitors used varies based on the chemical agent being processed, because the contents of various chemical agent munitions and bulk items differ. The alarms and indications do not vary. They consist of visual alerts (strobe beacons or panel lamps) and audible alerts (horns). Instructions are given from the CON via the PA system, informing personnel of the immediate actions to take following a chemical agent alarm.

7.10.1. Observation of Agent

Chemical agent spill or leaks are detected either visually or by an odor. Visual observation of a chemical agent spill or leaking vapor in a work area or detection of the garlic odor of mustard constitutes a chemical agent emergency. Observation of a worker exhibiting chemical agent exposure symptoms also constitutes a chemical agent emergency. Such observations must be reported immediately to the CON. An announcement over the PA system will communicate the situation to the entire UMCDF treatment area.

7.10.2. Alarms

The UMCDF uses two types of monitors to sample the air for the presence of chemical agent within the process area of the UMCDF. The primary monitor is the ACAMS and the secondary (for confirmation) monitor is the Depot Area Air Monitoring System (DAAMS).

The UMCDF process area agent alarms are accompanied by audible and visual alarms in both the local area and the CON. Visual alarms consist of rotating beacons and/or CON annunciator panel lights. Audible alarms consist of a 10- to 20-second continuous, high-pitched tone indicating that all personnel are to mask.

Within J-Block, Real-Time Analytical Platforms (RTAP) are used as the primary means of monitoring for the presence of chemical agent, and miniature continuous air monitors are secondary monitors.

Automatic Continuous Air Monitoring System (ACAMS)

The primary purpose of the ACAMS is to warn personnel by initiating an audible and visible alarm if the monitored air exceeds the applicable hazard level. The ACAMS is considered to be a near-real-time analyzer designed to detect and report high or low concentrations of chemical agents, depending on the mode of operation.

The ACAMS is programmed to alarm if the agent concentration exceeds its monitoring level (e.g., 0.5 VSL, 0.5 ASC), indicating a spill or other type of inadvertent release of chemical agent. It is designed to detect and report the concentrations of chemical agents GB, VX, or HD, in ambient air, but not all at the same time. It will activate a red ALARM lamp and ALARM horn when the chemical agent concentration goes beyond the preset alarm level. (A V-to-G conversion filter is required to detect VX.) The ACAMS alarms and actions are as follows:

- Low-Level Monitoring and Notification Alarms – When low levels of chemical agent are detected in levels that exceed predetermined concentrations, a notification alarm will be activated to signify that something is either abnormal or requires correction.
- High-Level Monitoring and Shutdown Alarms – When high levels of chemical agent are detected in work areas, the shutdown alarm is triggered, which necessitates actions to immediately control the problem and to protect personnel.

Depot Area Air Monitoring System (DAAMS)

The DAAMS sample station samples the air for the presence of GB, HD, or VX in and around the UMCDF. The DAAMS sample station uses sample tubes containing a solid sorbent material through which sample air is drawn. Agent present is absorbed onto the sorbent material and is subsequently analyzed by the laboratory using a gas chromatograph.

The DAAMS station is primarily used to confirm (or refute) the presence of chemical agent following an ACAMS alarm. In this application, the DAAMS sample station is co-located with an associated ACAMS stations (referred to as an ACAMS-DAAMS station) and samples the same area or process as the corresponding ACAMS.

The DAAMS sample station is also used to provide a historical record in locations that are not analyzed by an ACAMS. These DAAMS sample stations are called historical samplers because they provide data that is used to document that no agent was present in the monitored air on a specific day, at a specific time, and at a specific location in and around the plant. When used in this capacity the DAAMS sample stations are referred to as stand-alone or DAAMS-only stations. Stand-alone DAAMS stations are used mainly at locations around the site perimeter, but are also used for monitoring the Life Support Air System, ECF, and other areas not monitored by the ACAMS.

Real-Time Analytical Platforms (RTAP)

The RTAP is used at the UMCDF to sample the air for the presence of GB, HD, or VX prior to entry into potentially contaminated areas. It is a self-contained mobile platform that can be moved from site to site for sampling and analysis of potentially agent-contaminated air. It is considered a near-real-time analyzer designed to detect and report low concentrations of chemical agents.

The RTAP combines a vehicle with two gas chromatographs: the Hewlett Packard (HP) 5890/6890 gas chromatograph (GC) and/or a miniature continuous air monitor (MINICAM). (The MINICAM is very similar to, but smaller than, the ACAMS.) Typically, a MINICAM, is used to confirm or refute the HP GC results.

The UMCDF also has two methods to passively monitor for chemical agent. These methods are the PMN and the CMP. Both of these systems are considered passive alarm systems because they are not connected to a real-time emergency response detection/alarm system.

7.11. Spill Control Systems and Equipment

7.11.1. Spill Control Systems and Equipment – Overview

At the UMCDF, all aboveground storage tanks will be on concrete containment pads. The tanks and piping will be inspected in accordance with Attachment 3 of the UMCDF Hazardous Waste Permit. If a large leak or spill occurs, the material will be contained on the pad.

Leaks from fuel oil could occur at any point in the system. The most likely leak points are at piping joints within the diked area around the fuel storage tank, in the distribution piping, around the emergency generator, and at the generator.

Spills from caustic acid, brine, slag, or brine salt could occur at various locations in and around the MDB, such as at the receiving area, the brine fill station, or in transit. The most likely locations for spills are at the points of making or breaking hose connections for transfer of liquids or where containers are filled such as:

- Caustic tanker truck load and unload stations.
- Brine salt drum loading positions in the Brine Reduction Area.
- The diked storage areas such as the bulk chemical storage and brine surge tanks.
- Any point in the systems resulting from mechanical failure or accident. The greatest probability is in the PAS areas of the munitions/bulk items incinerators because of the concentration of individual caustic and brine pipe runs.
- Tanker trucks/vacuum trucks.
- Brine salt transport trucks and brine salt storage area.

The evaporator packages, drum dryers, and ancillary equipment in the Brine Reduction Area are designed and operated in a manner to reduce the risk of waste constituents to the environment. Specific design features include a concrete slab with a steel-lined, epoxy-coated sump. The sump provides secondary containment to collect any leakage of the brines outside of the processing units in case of a failure of a treatment unit, pump, or piping.

7.11.2. Spill Response Equipment

In the event of a chemical agent or industrial chemical spill, the first responder will notify the CON of the spill material and location and quantity of the spill. The incident will be responded to in accordance with Sections, Initial Response Actions, and5.0, Emergency Response Procedures. All used equipment will be cleaned and examined for usability, and any damaged equipment will be replenished in accordance with Section 6.0, Postincident Activities. A list of spill control and cleanup equipment appears in Table 7-3, Emergency Equipment List, under “Hazmat Truck.”

7.12. Personnel Decontamination and Medical Treatment Equipment

7.12.1. Medical Facility

The following listed equipment is to be stored at the UMCDF Medical Clinic. A sufficient inventory of supplies will be maintained to ensure appropriate medical treatment can be provided for all anticipated contingencies.

Ambu bags	Oxygen cylinders
Defibrillator	Litters
Antidote Treatment, Nerve Agent, Auto-injector (ATNAA)	Protective clothing
Protective masks	Tourniquets
Splint sets	Decontamination solution (sodium hypochlorite [bleach])
Bandages	First aid kits

7.12.2. Ambulances

An ambulance is on-site to transport casualties to the UMCDF Medical Clinic or local hospital, if needed. The vehicle normally is parked under a canopy at the PMB. In addition, a first-aid personnel transport van is also located at that location to assist with nonemergency personnel or mass casualty transport. In the event of an evacuation, additional ambulances or other emergency vehicles may be made available upon request from the UMCD or off-site agencies (see Section 8.2.2, Backup Ambulance Service). The determination as to whether additional ambulances will be needed will be made on a case-by-case basis by the EC.

7.12.3. Emergency Decontamination Stations

Emergency decontamination stations contain the emergency decontamination equipment identified in Table 7-3, Emergency Equipment List. These stations are located throughout the MDB first and second floors to support emergency decontamination activities. Normally, decontamination at the conclusion of a Level A (DPE) entry is done in the airlocks prior to exiting. During an emergency, however, the emergency decontamination stations provide a means for decontamination of the entrant at the emergency exit door. The mobile emergency decontamination stations will provide personnel decontamination in case of a life-threatening egress of a Level A (DPE) entry.

7.12.4. Decontamination Trailer

The decontamination trailer will normally be parked in the NMA; however, its location may vary depending on weather conditions. In the event of an agent or industrial chemical release or spill outside of engineering controls, the decontamination trailer is used to move decontamination equipment to the location where personnel are found in or exiting a suspect contaminated area.

7.12.5. Decontamination Shower Stations

Decontamination shower stations are installed in all agent treatment unit work areas. Decontamination showers are used after a hazardous material response to wash the personal protective equipment of residual chemical agent prior to removing the suit.

7.12.6. Emergency Shower/Eyewash Stations

Eyewash stations are installed throughout the facility. The purpose of the emergency shower/eyewash station is to provide immediate relief from exposure of the skin, eyes, or mucous membranes to a toxic or hazardous substance.

7.13. Personal Protective Equipment

The selection of PPE is based upon the concentration of agent release (if any) and/or the emergency response activities to be performed, the task-specific conditions, the duration of work, and any other potential hazards.

Personnel responding to emergency situations may be exposed to hazardous materials in several ways: contacting vapors, gases, mists or particulates in the air; contacting or being splashed by materials while sampling or opening containers or while controlling/containing spills; walking through spilled liquids or contaminated soils; and while using contaminated instruments or equipment. Use of appropriate PPE is, therefore, mandatory for personnel involved in emergency response activities and the appropriate level of PPE is determined in accordance with site procedures.

7.14. Backup Emergency Power

7.14.1. Primary Power System

Under normal working conditions, primary power is supplied to the UMCDF by a 115-kilovolt (kV) off-site substation, which is fed by two independent 115-kV lines. From the substation, two separate 4160 volt circuits feed the main plant switchgear.

The Primary Power System (PPS) distributes 4160-volt power to 480-V transformers and system users. The PPS consists of two sections of switchgear: PPS-SWGR-101 and PPS-SWGR–102. Each main switchgear is sized to handle 100 percent of the UMCDF electrical load. Loads may be transferred from one side of the power system to the other through switchgear PPS-SWGR-103. If necessary in the event of a fire or other contingency, the CON operator has the capability of isolating the switchgear.

7.14.2. Secondary Power System

During normal operations, each side of the 480-volt switchgear (SPS-SWGR-101 and –102) shares approximately 50 percent of the load. In the event of a loss of primary power to one of the switchgears, the other switchgear assumes the load by opening the main breaker of the faulted switchgear, and closing the tie-breaker between the switchgear. The main breakers and the tie-breaker are hard-wire interlocked so that, if both mains are closed, the tie-breaker cannot be closed when the local-remote selector switch is in the remote position. In addition, if one main and the tie-breaker are closed, the other main cannot be closed when in the remote position. However, with the selector switch in the local position and in conjunction with the trip selector switch, all three switches can be closed simultaneously for a short time. This allows the power to be maintained continuously on both buses upon return of normal power after a single feeder loss or when performing maintenance on a feeder.

7.14.3. Uninterruptible Power Supply System – Critical Loads

Critical loads are those that cannot tolerate any interruption in service and are required to maintain safe plant operations. Critical loads are connected to the UPS system.

In the event of a power system failure, the UPS system is designed to provide continuous power to critical equipment loads with battery backup for 45 minutes. The batteries of each UPS module are designed to carry these loads with no interruption until the emergency generator system has started and is online.

7.14.4. Emergency Generator System – Essential Loads

Essential loads are those that can tolerate a momentary loss of power and are required to bring the plant operations to a safe level. Essential loads are restarted on the emergency generator when utility power fails. The emergency generator system consists of a diesel-powered generator (GEN-GENR-101) and associated support equipment. The generator automatically provides 4160-volts power to the PPS in the event of a total failure of incoming power from the off-site power supply and distribution network.

If a full-power failure of both feeders occurs, the UPS system automatically provides power to PLC processors and selected control elements. A start signal will be sent to the generator and a digital intercontroller communication output will be sent to all PLCs indicating that there is a complete power loss. The automatic starting of the generator takes less than five seconds. The generator is ready to accept a load within 10 seconds after the receipt of an automatic starting signal from the PLC, and full loading of the generator is accomplished within 90 seconds.

7.15. List of Emergency Equipment

Table 7-3, Emergency Equipment List, lists the emergency equipment available to support contingency response activities. Attachment 3 of the UMCDF Hazardous Waste Permit (ORQ 000 009 431-01) specifies the equipment to be inspected as well as the frequency, type, and method of inspection to be conducted.

Table 7-3. Emergency Equipment List

Emergency Equipment List			
Equipment	**Physical Description**	**Capability**	**Location**
Communications Equipment			
Telephones	The UMCDF telephone system can support both digital and analog telephone equipment.	• Capable of supporting 750 telephone lines. • Provides direct emergency communication to and from the CON.	Throughout the UMCDF, excluding J-Block.
Radios	*Two-Way (Mobile) Radios*—a digital-trunked radio system.	Can provide two-way radio service in open areas within an approximate six-mile radius of the Personnel and Maintenance Building (PMB). It will provide continuous two-way emergency communications capability between the CON, security, and emergency response teams who will be using fixed, mobile, and hand-portable radios.	Throughout the UMCDF
	Level A (DPE) Radios—a low-power radio system using radiating-line, internal building antennae. Individual radio units are located within the Level A (DPE) suits, and the system is controlled from the master control console in the MDB.	Full duplex (talk and listen simultaneously). It is mainly used for communication between the CON and emergency response personnel who have donned Level A (DPE) and are poised for dispatch to an emergency scene.	UMCDF treatment areas.
Public Address System	The PA system is energized by the MDB power supply, and is backed-up by the Uninterruptible Power Supply (UPS) system.	Provides audible notification throughout UMCDF treatment area and adjacent administrative support buildings.	PA speakers are located throughout the UMCDF process area and adjacent administrative support buildings.

Emergency Equipment List

Equipment	Physical Description	Capability	Location
CHAS and HAR System	Flashing red beacon emergency warning lights have been placed to cover all entrances to the UMCDF, thus surrounding the UMCDF with the emergency warning light system (CHAS). The HAR system is an amplitude modulation (AM) radio system that operates on an assigned radio frequency of 1600 kHz. It has an adjustable power output, rated at 10 watts. The HAR system makes it possible to communicate response actions appropriate to each situation. The CHAS and HAR system are activated from the UMCDF CON in conjunction with the site emergency alarm system.	The CHAS and HAR system work in conjunction with each other, but are functionally independent. Activation of the CHAS lights (flashing red beacon) alerts oncoming traffic of an emergency condition at the UMCDF. Per signage below the CHAS lights, personnel tune their radios to 1600 AM and follow the instructions broadcast by the HAR system.	• East Patrol Road and East Center Road intersection • North Patrol Road and Rim Road intersection • North Patrol Road and Ironwood Road intersection • Maple Road and Badger Road intersection • Main entrance to the UMCDF parking lot • East Center Road and Rim Road intersection
Fire Detection, Alarm, and Suppression Systems			
Automatic Fire Detection	• Thermal detector • Ultraviolet smoke detector • Photoelectric smoke detector	Detects fires and activates an alarm to notify personnel of a fire. If a fire is detected in the MDB, the ECF and UMCD Fire Department will also be notified, and the exact location is indicated in the CON.	Throughout the UMCDF, excluding J-Block and upper buildings complex.
Fire Alarms	• Manual-Pull • Bells • Horns • Lights • PA System	Visually and/or audibly alerts personnel of a fire.	Throughout the UMCDF, excluding J-Block and upper buildings complex.
Fire Suppression	• Sprinkler System	Discharges water from the open sprinkler heads.	CHB, UPA, and PMB.
	• Fire Extinguishing Medium (FEM) System	Releases a colorless halocarbon equivalent.	CON, associated computer room, the UPS system, switchgear room, and PFS electrical building.
	• Dry Chemical Fire Suppression System	Designed to detect and extinguish lubricant oil fires.	Toxic Cubicle Room.
	• Portable Fire Extinguisher	Designed to manually extinguish small fires.	Throughout the UMCDF.

Emergency Equipment List

Equipment	Physical Description	Capability	Location
Agent Detection and Alarm Systems			
Agent Alarms	• Strobe Beacons • Panel Lamps • Horns	Provide visual and audible alert of agent detection.	MDB, PAS, LAB, and ECF.
Agent Detection Equipment	• UMCDF Footprint • ACAMS (initial detection) • DAAMS (confirmation)	ACAMS and RTAPs provide near real-time monitoring of air for agent. DAAMS and MINICAMS are used for confirmation or longer-term (i.e., 12-hour period) agent monitoring.	BRA, CHB, ECF, LAB, MDB, PAS, and PUB.
	• J-Block • RTAPs (initial detection) • MINICAMS (confirmation)		J-Block.
	• Perimeter Monitoring • DAAMS		UMCD.
Spill Control Systems and Equipment			
Hazmat Truck Miscellaneous Supplies	Emergency response equipment and supplies applicable to the current agent/munitions campaign.	Used for cleanup of a hazardous material release or spill.	Maintained in Hazmat truck, which will be parked within the UMCDF boundary. During emergency response, the location of the Hazmat truck will depend on wind direction.

Emergency Equipment List			
Equipment	**Physical Description**	**Capability**	**Location**
Personnel Decontamination, Shower, and Eyewash Stations			
Emergency Decontamination Station Equipment	Emergency decontamination equipment and supplies applicable to the current agent/munitions campaign.	Used for decontamination of entrants in the event of a Level A (DPE) emergency exit.	Unpack Area; 1st floor Observation Corridor; 2nd floor Observation Corridor; TMA.
Decontamination Trailer Emergency Equipment	Emergency decontamination equipment and supplies applicable to the current agent/munitions campaign.	Used for decontamination in response to an incident that has occurred outside of engineering controls.	Normally, the trailer will be parked within the UMCDF boundary. During an incident, location for deployment will depend on wind direction.
Decontamination Shower Stations	Shower will discharge sodium hypochlorite (bleach), or sodium hydroxide or a U.S. Army-approved decontamination solution.	Used to perform a gross-decontamination wash of Level A (DPE) after egress.	MDB
Emergency Shower/Eyewash Stations	Shower/eyewash discharges water.	Provides immediate relief from exposure of the skin, eyes, or mucous membranes to a toxic or hazardous substance.	MDB, CHB, PUB, BRA, LAB, PAS, and PMB.
Medical Facility Decontamination Room	Emergency (tempered water) shower room with decontamination solution (sodium hypochlorite [bleach]) available.	May be used in lieu of the hot line for personnel decontamination.	Medical Clinic.
Ground Ambulance	A fully-equipped ambulance is on-site to transport casualties to the UMCDF Medical Clinic or local hospital, if needed.	Emergency medical treatment.	UMCDF ambulance is normally parked under PMB canopy.

Emergency Equipment List

Equipment	Physical Description	Capability	Location
Personal Protective Equipment			
Level A Protective Clothing (Demilitarization Protective Equipment)	Level A protective clothing and associated equipment per DA PAM 385-61.	Used when any of the following conditions are met: • High degree of respiratory hazard • High degree of skin hazard • Concentration of airborne contaminants not known • Airborne agent concentrations greater than immediately dangerous to life and health (IDLH) • Liquid agent present	DSA and MDB.
Personal Protective Equipment/Clothing	Elements of PPE appropriate to the current agent/munitions campaign as required by site procedures.	Used when any of the following conditions are met: • High degree of respiratory hazard • High degree of skin hazard • Concentration of airborne contaminants not known • Airborne agent concentrations greater than IDLH • Liquid agent present	Inventory of all PPE will be maintained in the PMB.
Additional Emergency Equipment			
Nerve Agent Antidote Kit Note: These kits are required until all VX secondary waste has been processed. Currently, there is no antidote for HD.	Atropine/ 2 PAM chloride autoinjectors	Used in Category C and other appropriate areas in response to chemical-agent exposure emergencies involving personnel dressed in Level A (DPE).	Unpack Area, Observation Corridor – 1st floor, Observation Corridor – 2nd floor, TMA, Decon Trailer, Hazmat truck, Medical Treatment Facility, Emergency Decon Stations, and LAB.

8.0 Coordination Agreements

8.1. Coordination Agreements – Overview

The UMCD has entered into coordination agreements with off-site agencies for supplementary medical, fire, and law-enforcement services. As a tenant organization of the UMCD, the UMCDF is a beneficiary of these agreements. These agreements are available to draw upon in the event of an emergency when additional resources and services would be needed. The off-site agencies that have entered into these coordination agreements will receive copies of the Contingency Plan including any revisions to the plan.

At a minimum, all coordination agreements will be reviewed annually and updated as necessary. The Contingency Plan will be modified accordingly in accordance with 40 CFR §270.42.

8.2. Medical Support

8.2.1. Hospital Services

It is recognized that, should a major emergency occur, some resources may not be sufficient to provide complete emergency medical treatment. Consequently, the Commander, Madigan Army Medical Center, in coordination with the Commander, UMCD, has entered into agreements with several local medical institutions to ensure supplementary support. All emergency medical services rendered are to meet or exceed the standards set by the State of Oregon and any other governing agency. Additionally, the agreements provide for training of emergency room and nursing staff on the care of chemical casualties as well as the opportunity to participate annually in at least one chemical accident/incident training exercise hosted by the UMCD. The following toxic chemical antidotes will be provided to subject medical facilities for the corresponding state, either Oregon or Washington. Please note that chemical antidotes are required until all VX secondary waste has been processed. Currently, there is no known antidote for HD.

Atropine Sulfate

Atropine in bulk vials will be supplied in prepositioned quantities sufficient to treat four to six casualties for 24 hours and in packets to be delivered with the chemical casualty at the time of transfer in quantities sufficient to provide immediate care of the casualty. The formula to be used is 2 mg intravenous slow push every 1-3 minutes, approximately one 50-mg vial per patient per 24 hours.

#2-PAM-Chloride

A stock of Food and Drug Administration-approved #2-PAM-Chloride in 1000 mg vials will be provided to and maintained in the subject medical facilities. Additional quantities are to be sent with the casualties at the time of transfer sufficient to provide immediate care of the casualties. The formula to be used is 1 gram 2-PAM Chloride in 250 cc of normal saline, infused over 20-30 minutes, not to exceed a total of 3 grams over 3 hours.

Other details of the agreement include:

- twenty-four-hour, seven-day-a-week treatment and care of casualties;
- drawing of red blood in purple-top tubes with subsequent draws at 8-to-24-hour intervals for acetylcholinesterase testing at the U.S. Army Occupational Health Center (USAOHC);

- additional testing as deemed necessary (e.g., pseudocholinesterase); and
- submission of hospital treatment records to the USAOHC.

For hospital services, the coordination agreements listed in Table 8-1 apply.

Table 8-1. Coordination Agreements for Hospital Services

Agreement Number	Facility	Location
MCHJ-137-08	Good Shepherd Medical Center	610 N. w. 11th Street Hermiston, OR 97838
MCHJ-140-08	Kadlec Medical Center	888 Swift Blvd. Richland, WA 99352
MCHJ-139-08	Saint Anthony Hospital	1601 S. E. Court Avenue Pendleton, OR 97801
MCHJ-141-08	Lourdes Medical Center	520 North 4th Avenue Pasco, WA 99301
MCHJ-142-08	Kennewick General Hospital	900 South Auburn Kennewick, WA 99336

8.2.2. Backup Ambulance Service

If personnel are injured during UMCDF operations, they will be stabilized and transported by UMCD/UMCDF ambulances to local hospitals. However, in anticipation of an emergency incident where multiple injuries could occur, UMCD has entered into an agreement with Hermiston Fire and Emergency Services for backup ambulance support. In the event there are multiple casualties requiring transport to hospitals, casualties will be stabilized and moved to the UMCD U.S. Army Occupational Health Clinic (USAOHC) where they will be transferred to the Hermiston ambulance.

In the event of a chemical casualty, the patient must be declared decontaminated by either UMCDF or UMCD physician before transportation off-site. (Decontamination of chemical casualties is the primary responsibility of the U.S. Army personnel.) If deemed necessary by emergency room physicians, ambulances also may be stocked with the following toxic chemical antidotes: (Please note that chemical antidotes are required until all VX secondary waste has been processed. Currently, there is no known antidote for HD.)

- 25 mL vials of 2 mg/mL atropine solution, and
- 1000 mg vials of #2-PAM-Chloride

The coordination agreement for advanced life support ambulance service is listed in Table 8-2:

Table 8-2. Coordination Agreement for Advanced Life Support

Agreement Number	Facility	Location
MCHJ-137-08	Hermiston Fire and Emergency Services	330 South First Street, Hermiston, OR 97838

8.2.3. Emergency Response and Medical Assistance

An agreement of mutual medical support was issued to ensure the cooperative availability of the two medical clinics located at the UMCD site:

- The Medical Clinic located at UMCDF – operated by WDC for the U.S. Army Chemical Materials Agency UMCD.
- The USAOHC located at UMCD – considered to be an operating agent of the Madigan Army Medical Center in Tacoma, Washington.

The agreement provides for cooperative medical support in the event of a disaster. It defines a "chemical or non-chemical [sic] disaster" as a mass casualty situation such as a massive train derailment, earthquake, etc.

Each clinic will make available to the other an ambulance or patient transport vehicle staffed by qualified medical personnel who will stabilize patients and transport them to the best possible medical facility for treatment. The head clinician(s) for the participating clinic(s) will relay information about the medical treatment, condition, and disposition of casualties to the UMCD USAOHC.

Additionally, through this memorandum of understanding the UMCD will ensure UMCD personnel are trained in cardiopulmonary resuscitation and first aid.

Agreement specifics provide that medical staff at each of the clinics will:

- Be available to provide additional medical coverage.
- Inform each other, as well as the UMCD as needed, of the status of any treated patients and where they may be transported.
- Provide photocopies of all relevant medical records for the treated patients, upon request.
- Provide relevant medical information about treated patients from records maintained by the clinic, as might be useful for the provision of emergency and follow-up medical treatment and as is within the guidelines of the Privacy Act.

The coordination agreement for advanced life support ambulance service is listed in Table 8-3:

Table 8-3. Emergency Response and Medical Assistance

Agreement Number	Facility	Location
MCHJ-107-04	UMCDF Medical Clinic *and* UMCD Medical Clinic	78068 Ordnance Road Hermiston, OR 97838 and 78978 Ordnance Rd. Hermiston, OR 97838

8.3. Agreement for Mutual Aid and Fire Protection

Agreements between UMCD and the fire-fighting agencies listed below establish, for each, the benefits of mutual aid in fire prevention, the protection of life and property from fire, and firefighting support in those geographical areas where jurisdictions overlap. While provisions for such support are not mandatory for either party, the memoranda of agreement (MOAs) state that the party receiving the request for assistance should immediately inform the requesting department if, for any reason, assistance cannot be rendered. No community fire fighters will be dispatched to an area where there could be possible contact with chemical agents or explosives.

Other provisions of the MOAs are:

- the amount and type of equipment to be used, and number of personnel to be dispatched, is to be determined by the responding party;
- the responding party is under the control of the commanding officer from the requesting party;
- the UMCD Fire Department will take charge of response to a crash of aircraft owned or operated by the U.S., military, or foreign nation, including if the crash occurs within rural fire district jurisdiction;
- each party waives claims against the other for compensation of any loss, damage, injury, or death resulting as a consequence of this agreement; and
- extension of reciprocal invitations to tour each other's facilities and participate in response planning inspections and drills.

The coordination agreements for mutual aid and fire protection are listed in Table 8-4.

Table 8-4. Coordination Agreements for Mutual Aid and Fire Protection

Agreement Number	Facility	Location
None	Boardman Rural Fire Protection District	Wilson Road Boardman, OR 97818
None	Hermiston Fire and Emergency Services	330 South First Street Hermiston, OR 97838
None	Irrigon Rural Fire Protection District	705 N. E. Main Ave. Irrigon, OR 97844
None	Umatilla Rural Fire Protection District	921 Sixth Umatilla, OR 97882

8.4. Mutual Assistance and Support Agreement

Agreements with local law enforcement agencies provide for the following types of support activities (coordinated through the Hermiston Safety Center and, if necessary, the Oregon Emergency Center):

- notification and evacuation of residents within an affected area;
- establishment of roadblocks – control of pedestrian, vehicular, and rail traffic;
- assistance in apprehension of unauthorized persons who have penetrated the UMCD;
- assistance in control of demonstrations or civil disturbances adjacent to or within the confines of the UMCD; and
- assistance in the recovery of chemical material wrongfully removed from the UMCD.

Agreements with Umatilla and Morrow Counties ensures notification of the Hermiston Safety Center, the Oregon State Police, and other appropriate state agencies (e.g., the Oregon Emergency Center).

The coordination agreements for mutual assistance and support are listed in Table 8-5.

Table 8-5. Coordination Agreements for Mutual Assistance and Support

Agreement Number	Facility	Location
None	Morrow County Sheriff Department	325 Willowview Drive Heppner, OR 97836
None	Umatilla County Sheriff Department	4700 N. W. Pioneer Place Pendleton, OR 97801

8.5. Off-Site Evacuation Shelters

If evacuation of the UMCDF site is necessary, the ECs for both the UMCDF and UMCD will coordinate their individual evacuation plans. If evacuation of the entire UMCD is necessary, direction will be provided by the EC. Additional information regarding the off-site evacuation shelters is located in Section 4.9.

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Permit Attachment 10

Umatilla Chemical Agent Disposal Facility

UMCDF Training Plan

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Attachment 10
UMCDF Training Plan

[40 CFR §264.16; ORS 466.105(6); OAR 340-100-0002, 340-104-0001]

1.0 Introduction

This training program was developed to meet the requirements of 40 CFR 264.16 and 40 CFR 270.14. The training program was designed to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems.

The training program covers personnel safety, release prevention, decontamination procedures, hazardous operations, emergency response and contingency plan implementation, inspection, and normal (including startup and shutdown) UMCDF operation and maintenance. Various training techniques are utilized, including classroom courses, simulations, training materials, and hands-on experience. A control room simulator is provided for control room operators to learn tasks and practice team building. The training program provides for both initial and continuing training for supervisors and personnel involved in handling hazardous waste or operating and maintaining hazardous waste management equipment.

This training program must be periodically updated to reflect changes in the UMCDF personnel training plan. The UMCDF personnel training plan is reviewed by the UMCDF training manager at least annually and updated, if necessary. Changes in regulations, waste types, UMCDF design or operation, waste management equipment or techniques, or administrative, Contingency Plan, and operating procedures may necessitate a change to the program.

2.0 Outline of Training Program

All personnel receive training pertinent to their job duties. Initial training includes emergency response actions and hazardous waste recognition. Personnel receive additional training relative to their specific job duties. Training may include classroom instruction, demonstrations of the operation of processes and equipment, and hands-on training on implementing UMCDF procedures involving hazardous waste. Training required by RCRA is completed within six months of beginning employment or a new assignment. In addition to formal training, key UMCDF staff and operation and maintenance personnel may participate in UMCDF performance testing and evaluations. Personnel directly involved in the management of hazardous waste are required to demonstrate proficiency in all duties relevant to their responsibilities. Table 10-1 is an outline of the introductory and continuing training program. Minimum introductory and continuing training course requirements and training requirements by job position are maintained in the UMCDF site training records and operating record.

Sections 2.0 through 11.0 address job titles/job descriptions; training content frequency and techniques; the UMCDF training manager; relevance of training to job position; training for emergency response; and training documents and records.

3.0 Job Title/Job Description

[40 CFR 264.16(d)(l) and (2); OAR 340-104-0001]

Job descriptions, including title, office, duties, and minimum qualifications/training for each position related to hazardous waste management must be maintained at the UMCDF. The exact job descriptions and training requirements are subject to change to reflect changing conditions, requirements, and needs.

All personnel working in the UMCDF are required to have the training relevant to their positions in order to:

- Demonstrate the ability to understand and apply both oral and written instructions at a level appropriate to the assigned job
- Develop the aptitude and attitude necessary to ensure compliance with regulatory requirements.
- Be able to respond to contingency events in accordance with their duties and responsibilities.

4.0 Training Content, Frequency, and Techniques

[40 CFR 264.16(a)(3), 264.16(c), 264.16(d)(3); OAR 340-104-0001]

The training program provides initial, refresher, and continuing training for operations, maintenance, laboratory, and other UMCDF personnel involved in the waste management unit operations.
The principal objectives of the training program are:

- Train UMCDF personnel to safely operate, maintain, and monitor the UMCDF.
- Train UMCDF personnel to respond effectively to emergencies by familiarizing them with emergency procedures, equipment, and systems.

The training program covers personnel safety (including Occupational Safety and Health Administration training in accordance with 29 CFR 1910.120), chemical agent release prevention, decontamination procedures, hazardous waste management operations, emergency response and Contingency Plan implementation, inspections, normal processing, and critical UMCDF operations and maintenance.
The training program consists of initial classroom training, hands-on training, and continuation training and refresher courses. The training program consists of initial classroom training, hands-on training, and continuing training and refresher courses. The training program is designed to prepare UMCDF employees to operate the UMCDF in a uniform and consistent manner that provides protection to human health and the environment, both on and off the UMCDF.

Personnel are required to complete both the initial and continuing training applicable to their job position. In addition to completing assigned operations and maintenance courses, certain employees must understand the basic operation of the UMCDF, as well as Army regulations applicable to chemical surety, security, and safety. Other training topics applicable to all employees are what to do if UMCDF or Umatilla Army Depot alarms sound, how to handle cases of chemical agent exposure, and how to render general first aid. All employees are provided training on the Employee Concerns Program. This program identifies employee responsibility to report safety and/or environmental concerns, mechanisms to report these concerns, and employee protections from reprisal by the company as required in condition II.S of this permit.

All new employees receive familiarization training, and applicable courses for hazardous waste management, environmental protection, and safety must be satisfactorily completed before workers are allowed to work unsupervised.

Examinations measure skill and/or knowledge and document proficiency or comprehension.

Each UMCDF operations and maintenance course consists of classroom and/or on-the-job training. The taken in classroom training and on-the-job training are described in the following paragraphs. A detailed description of each course is maintained at the UMCDF. Continuing training, refresher courses, and necessary requirements for their completion are described below.

5.0 Classroom Training

During classroom training, the training staff uses training materials and instructional aids to train the personnel who operate the UMCDF. The type and length of training is dependent on the specific job assignment.

6.0 On-the-Job Training

Once classroom training is completed, personnel work in the facility under direct supervision of process supervisors and/or individuals certified in the job duty. The personnel gain knowledge through practicing skills and must demonstrate competency and knowledge through practical demonstrations that certify them in their job positions.

Personnel may not perform job tasks unsupervised until they successfully complete the necessary certifications (performance demonstrations) for the task.

7.0 Continuing Training and Refresher Courses
[40 CFR 264.16(c), OAR 340-104-0001]

Each person is given initial training when hired and/or assigned to the UMCDF workforce. Refresher training, including that concerning chemical agent characteristics, symptoms, first aid, and Contingency Plan procedures, is conducted within ±30 days of anniversary dates and whenever the process changes. Operations and maintenance training is conducted whenever significant process changes are implemented. The training courses, including refresher courses, are tailored to the specific workload, as appropriate.

Additional training requirements for specific personnel are based on observation and critique by safety and supervisory personnel, and remedial training is conducted whenever necessary. The minimum recommended continuing training program for specified job positions is maintained in the UMCDF site training records and operating record.

8.0 UMCDF Training Manager
[40 CFR 264.16(a)(2); OAR 340-104-0001]

The UMCDF training manager is responsible for the training program at the UMCDF. The UMCDF training manager must be knowledgeable in the operation of the UMCDF and hazardous waste management. The requirements and responsibilities of the UMCDF training manager are to:

- Ensure that UMCDF personnel are properly trained in the safe operation of the UMCDF in accordance with federal, state, and local environmental regulations and the UMCDF's RCRA permit
- Assist in the resolution of problems involving permits and licenses from regulatory agencies, where such problems affect personnel training
- Assist in review of operating and maintenance procedures
- Supervise the preparation of training aids and materials
- Provide initial training to new personnel, continuing training as necessary to inform UMCDF personnel of new procedures, and at least annual refresher training

The UMCDF training manager must be trained in hazardous waste management. If possible, a UMCDF training manager must be selected who already has such a background. Otherwise, the UMCDF training manager must become thoroughly familiar with hazardous waste management requirements and operations prior to exercising control over training in this area.

Instructors must be knowledgeable in the topics they will be teaching. Course materials are reviewed by UMCDF management to ensure compliance with chemical surety, safety, and environmental requirements. Bulk items handling, safety, surety, and security personnel from the U.S. government provide guidance during the development of training materials for these courses. The Systems Contractor, overseen by the Army, is responsible for developing training materials and other course materials, and for conducting initial, refresher, and continuing training of UMCDF personnel. Equipment vendors may also provide certain equipment-specific training. Technical training may also be conducted by competent third parties contracted to provide specialized training not available at UMCDF.

9.0 Relevance of Training to Job Position
[40 CFR 264.16(a)(2); OAR 340-104-0001]

Individuals filling each UMCDF job position receive training relevant to the duties and responsibilities specified by that job position. The training requirements for each UMCDF job position is maintained in the training records and UMCDF operating record. All UMCDF personnel receive New Employee Orientation Training (NEOT), New Employee Safety Training (NEST), Site Environmental Compliance Training (SECT), Chemical Surety Program (Chem Surety), Cardiopulmonary Resuscitation/First Aid (CPR/FA), and Emergency Response Training-1 (ERP-1) as well as Consolidated Annual Refresher Training (CART 1/2). UMCDF personnel receive additional training appropriate for the job position. Further training applicable to individual job responsibilities may also be provided. Visitors and vendors to the UMCDF receive training on emergency response, basic site rules, and chemical surety. Visitors and vendors who require unescorted access to the chemical limited area receive the same initial training as employees performing the same tasks.

10.0 Training for Emergency Response
[40 CFR 264.16(a)(3); OAR 340-104-0001]

Emergency response training is designed and structured to ensure that all UMCDF personnel must be trained to respond properly to emergency situations as outlined in the UMCDF Contingency Plan Attachment 9, and comply with applicable permit requirements and environmental regulations.

Emergency response personnel receive training that addresses nonroutine situations that could lead to an emergency involving hazardous wastes, if proper responses are not implemented, such as:

- Procedures for locating, using, inspecting, repairing, and replacing UMCDF emergency and monitoring equipment (addressed in ERP-1, and/or the Inspection Schedule, Attachment 3 of the Permit)
- Key parameters for automatic waste feed cut-off systems (addressed in the applicable operating procedures, plant systems training, and Control Room operator training classes)
- Communications or alarms (addressed in NEOT and ERP-1, and/or applicable operating procedures, and the UMCDF Contingency Plan)
- Response to fires, explosions, or other releases (addressed in NEOT, Chem Surety, and ERP-1, and/or applicable operating procedures, and the UMCDF Contingency Plan)
- Response to groundwater contamination incidents (addressed in SECT and ERP-1)
- Shutdown of operations and evacuation (addressed in NEOT and ERP-1 and/or the UMCDF Contingency Plan).

Additional topics covered during emergency response training include:

- The chemical characteristics of the wastes personnel will be assigned to manage (ignitability, corrosivity, reactivity, and toxicity characteristic) and presence of chemical agent (SECT)
- Knowledge of what to do in the event of a spill or leak (ERP-1)
- The types of protective equipment, including the DPE, gas masks, and other protective clothing to be worn (NEST and ERP-1)
- Knowledge of basic first aid and cardio pulmonary resuscitation (CPR/FA)
- First responder contact information in the event of an emergency (NEST and ERP-1)

11.0 Employee Whistleblower Protection Training
[40 CFR 264.16(a)(3); OAR 340-104-0001; GASP III, Case No. 0009 09349]

The initial and annual refresher training requirements of the UMCDF training program must include instruction on the employee whistleblower protection as required by the July 26, 2004, Opinion and Order on Judicial Review, Case No. 0009 09349 *(GASP III)*. The training must include, but is not limited to:

- The workers' obligation to report good-faith concerns regarding the safety of workers, the public, or the environment, and related noncompliance with permit requirements;

- The workers' obligation to convey such concerns to the Department if those concerns are not otherwise sufficiently resolved; and

- Assurance that no worker shall be disadvantaged in any way by communicating such concerns in good faith.

12.0 Training Documents and Records

[40 CFR 264.16(d), 40 CFR 264.16(de); OAR 340-104-0001]

Records of the following must be maintained at the facility for current personnel, until closure and for former employees for at least 3 years from the date the employee last worked at the facility. Personnel training records may accompany personnel transferred within the same company.

- The job title for each position at the facility related to hazardous waste management, and the name of the employee filling each job;
- A written job description for each position listed in (i) above. This description may be consistent in its degree of specificity with descriptions for other similar positions in the same company location or bargaining unit, but must include the requisite skill, education, or other qualifications, and duties of employees assigned to each position;
- A written description of the type and amount of both introductory and continuing training that must be given to each person filling a position listed in (i) above;
- Records that document that the training or job experience required in Table 10-3 has been given to, and completed by, facility personnel listed in (i) above.

Table 10-1. Outline of Initial and Continuing Training Process

I. Validation of Training Materials Described in Appendix A

II. Initial Training

- A. Classroom Instructions
  1. Instructive course work
  2. Explanation of relevance of training to job position for all UMCDF personnel
  3. Instruction in response to emergencies
  4. Supervised practice operation on simulated demilitarization equipment, where applicable
- B. On-the-Job-Training
  1. Acquire skills and complete performance demonstrations
  2. UMCDF operation

III. Continuing Training

- A. Classroom Instructions
  1. Continuing training and refresher courses
  2. Safety meetings
  3. Review of Contingency Plan
  4. Review of recordkeeping (e.g., logbooks)
  5. Review of maintenance procedures
- B. On-the-job-training, to include regular performance of jobs and duties by all UMCDF personnel
- C. Continual observation by supervision to verify job competency and performance demonstrations as needed

Permit Attachment 10

Umatilla Chemical Agent Disposal Facility

UMCDF Training Plan

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Attachment 10
UMCDF Training Plan

[40 CFR §264.16; ORS 466.105(6); OAR 340-100-0002, 340-104-0001]

1.0 Introduction

This training program was developed to meet the requirements of 40 CFR 264.16 and 40 CFR 270.14. The training program was designed to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems.

The training program covers personnel safety, release prevention, decontamination procedures, hazardous operations, emergency response and contingency plan implementation, inspection, and normal (including startup and shutdown) UMCDF operation and maintenance. Various training techniques are utilized, including classroom courses, simulations, training materials, and hands-on experience. A control room simulator is provided for control room operators to learn tasks and practice team building. The training program provides for both initial and continuing training for supervisors and personnel involved in handling hazardous waste or operating and maintaining hazardous waste management equipment.

This training program must be periodically updated to reflect changes in the UMCDF personnel training plan. The UMCDF personnel training plan is reviewed by the UMCDF training manager at least annually and updated, if necessary. Changes in regulations, waste types, UMCDF design or operation, waste management equipment or techniques, or administrative, Contingency Plan, and operating procedures may necessitate a change to the program.

2.0 Outline of Training Program

All personnel receive training pertinent to their job duties. Initial training includes emergency response actions and hazardous waste recognition. Personnel receive additional training relative to their specific job duties. Training may include classroom instruction, demonstrations of the operation of processes and equipment, and hands-on training on implementing UMCDF procedures involving hazardous waste. Training required by RCRA is completed within six months of beginning employment or a new assignment. In addition to formal training, key UMCDF staff and operation and maintenance personnel may participate in UMCDF performance testing and evaluations. Personnel directly involved in the management of hazardous waste are required to demonstrate proficiency in all duties relevant to their responsibilities. Table 10-1 is an outline of the introductory and continuing training program. Minimum introductory and continuing training course requirements and training requirements by job position are maintained in the UMCDF site training records and operating record.

Sections 2.0 through 11.0 address job titles/job descriptions; training content frequency and techniques; the UMCDF training manager; relevance of training to job position; training for emergency response; and training documents and records.

3.0 Job Title/Job Description

[40 CFR 264.16(d)(l) and (2); OAR 340-104-0001]

Job descriptions, including title, office, duties, and minimum qualifications/training for each position related to hazardous waste management must be maintained at the UMCDF. The exact job descriptions and training requirements are subject to change to reflect changing conditions, requirements, and needs.

All personnel working in the UMCDF are required to have the training relevant to their positions in order to:

- Demonstrate the ability to understand and apply both oral and written instructions at a level appropriate to the assigned job
- Develop the aptitude and attitude necessary to ensure compliance with regulatory requirements.
- Be able to respond to contingency events in accordance with their duties and responsibilities.

4.0 Training Content, Frequency, and Techniques

[40 CFR 264.16(a)(3), 264.16(c), 264.16(d)(3); OAR 340-104-0001]

The training program provides initial, refresher, and continuing training for operations, maintenance, laboratory, and other UMCDF personnel involved in the waste management unit operations.
The principal objectives of the training program are:

- Train UMCDF personnel to safely operate, maintain, and monitor the UMCDF.
- Train UMCDF personnel to respond effectively to emergencies by familiarizing them with emergency procedures, equipment, and systems.

The training program covers personnel safety (including Occupational Safety and Health Administration training in accordance with 29 CFR 1910.120), chemical agent release prevention, decontamination procedures, hazardous waste management operations, emergency response and Contingency Plan implementation, inspections, normal processing, and critical UMCDF operations and maintenance.
The training program consists of initial classroom training, hands-on training, and continuation training and refresher courses. The training program consists of initial classroom training, hands-on training, and continuing training and refresher courses. The training program is designed to prepare UMCDF employees to operate the UMCDF in a uniform and consistent manner that provides protection to human health and the environment, both on and off the UMCDF.

Personnel are required to complete both the initial and continuing training applicable to their job position. In addition to completing assigned operations and maintenance courses, certain employees must understand the basic operation of the UMCDF, as well as Army regulations applicable to chemical surety, security, and safety. Other training topics applicable to all employees are what to do if UMCDF or Umatilla Army Depot alarms sound, how to handle cases of chemical agent exposure, and how to render general first aid. All employees are provided training on the Employee Concerns Program. This program identifies employee responsibility to report safety and/or environmental concerns, mechanisms to report these concerns, and employee protections from reprisal by the company as required in condition II.S of this permit.

All new employees receive familiarization training, and applicable courses for hazardous waste management, environmental protection, and safety must be satisfactorily completed before workers are allowed to work unsupervised.

Examinations measure skill and/or knowledge and document proficiency or comprehension.

Each UMCDF operations and maintenance course consists of classroom and/or on-the-job training. The taken in classroom training and on-the-job training are described in the following paragraphs. A detailed description of each course is maintained at the UMCDF. Continuing training, refresher courses, and necessary requirements for their completion are described below.

5.0 Classroom Training

During classroom training, the training staff uses training materials and instructional aids to train the personnel who operate the UMCDF. The type and length of training is dependent on the specific job assignment.

6.0 On-the-Job Training

Once classroom training is completed, personnel work in the facility under direct supervision of process supervisors and/or individuals certified in the job duty. The personnel gain knowledge through practicing skills and must demonstrate competency and knowledge through practical demonstrations that certify them in their job positions.

Personnel may not perform job tasks unsupervised until they successfully complete the necessary certifications (performance demonstrations) for the task.

7.0 Continuing Training and Refresher Courses
[40 CFR 264.16(c), OAR 340-104-0001]

Each person is given initial training when hired and/or assigned to the UMCDF workforce. Refresher training, including that concerning chemical agent characteristics, symptoms, first aid, and Contingency Plan procedures, is conducted within ±30 days of anniversary dates and whenever the process changes. Operations and maintenance training is conducted whenever significant process changes are implemented. The training courses, including refresher courses, are tailored to the specific workload, as appropriate.

Additional training requirements for specific personnel are based on observation and critique by safety and supervisory personnel, and remedial training is conducted whenever necessary. The minimum recommended continuing training program for specified job positions is maintained in the UMCDF site training records and operating record.

8.0 UMCDF Training Manager

[40 CFR 264.16(a)(2); OAR 340-104-0001]

The UMCDF training manager is responsible for the training program at the UMCDF. The UMCDF training manager must be knowledgeable in the operation of the UMCDF and hazardous waste management. The requirements and responsibilities of the UMCDF training manager are to:

- Ensure that UMCDF personnel are properly trained in the safe operation of the UMCDF in accordance with federal, state, and local environmental regulations and the UMCDF's RCRA permit
- Assist in the resolution of problems involving permits and licenses from regulatory agencies, where such problems affect personnel training
- Assist in review of operating and maintenance procedures
- Supervise the preparation of training aids and materials
- Provide initial training to new personnel, continuing training as necessary to inform UMCDF personnel of new procedures, and at least annual refresher training

The UMCDF training manager must be trained in hazardous waste management. If possible, a UMCDF training manager must be selected who already has such a background. Otherwise, the UMCDF training manager must become thoroughly familiar with hazardous waste management requirements and operations prior to exercising control over training in this area.

Instructors must be knowledgeable in the topics they will be teaching. Course materials are reviewed by UMCDF management to ensure compliance with chemical surety, safety, and environmental requirements. Bulk items handling, safety, surety, and security personnel from the U.S. government provide guidance during the development of training materials for these courses. The Systems Contractor, overseen by the Army, is responsible for developing training materials and other course materials, and for conducting initial, refresher, and continuing training of UMCDF personnel. Equipment vendors may also provide certain equipment-specific training. Technical training may also be conducted by competent third parties contracted to provide specialized training not available at UMCDF.

9.0 Relevance of Training to Job Position

[40 CFR 264.16(a)(2); OAR 340-104-0001]

Individuals filling each UMCDF job position receive training relevant to the duties and responsibilities specified by that job position. The training requirements for each UMCDF job position is maintained in the training records and UMCDF operating record. All UMCDF personnel receive New Employee Orientation Training (NEOT), New Employee Safety Training (NEST), Site Environmental Compliance Training (SECT), Chemical Surety Program (Chem Surety), Cardiopulmonary Resuscitation/First Aid (CPR/FA), and Emergency Response Training-1 (ERP-1) as well as Consolidated Annual Refresher Training (CART 1/2). UMCDF personnel receive additional training appropriate for the job position. Further training applicable to individual job responsibilities may also be provided. Visitors and vendors to the UMCDF receive training on emergency response, basic site rules, and chemical surety. Visitors and vendors who require unescorted access to the chemical limited area receive the same initial training as employees performing the same tasks.

10.0 Training for Emergency Response

[40 CFR 264.16(a)(3); OAR 340-104-0001]

Emergency response training is designed and structured to ensure that all UMCDF personnel must be trained to respond properly to emergency situations as outlined in the UMCDF Contingency Plan Attachment 9, and comply with applicable permit requirements and environmental regulations.

Emergency response personnel receive training that addresses nonroutine situations that could lead to an emergency involving hazardous wastes, if proper responses are not implemented, such as:

- Procedures for locating, using, inspecting, repairing, and replacing UMCDF emergency and monitoring equipment (addressed in ERP-1, and/or the Inspection Schedule, Attachment 3 of the Permit)
- Key parameters for automatic waste feed cut-off systems (addressed in the applicable operating procedures, plant systems training, and Control Room operator training classes)
- Communications or alarms (addressed in NEOT and ERP-1, and/or applicable operating procedures, and the UMCDF Contingency Plan)
- Response to fires, explosions, or other releases (addressed in NEOT, Chem Surety, and ERP-1, and/or applicable operating procedures, and the UMCDF Contingency Plan)
- Response to groundwater contamination incidents (addressed in SECT and ERP-1)
- Shutdown of operations and evacuation (addressed in NEOT and ERP-1 and/or the UMCDF Contingency Plan).

Additional topics covered during emergency response training include:

- The chemical characteristics of the wastes personnel will be assigned to manage (ignitability, corrosivity, reactivity, and toxicity characteristic) and presence of chemical agent (SECT)
- Knowledge of what to do in the event of a spill or leak (ERP-1)
- The types of protective equipment, including the DPE, gas masks, and other protective clothing to be worn (NEST and ERP-1)
- Knowledge of basic first aid and cardio pulmonary resuscitation (CPR/FA)
- First responder contact information in the event of an emergency (NEST and ERP-1)

11.0 Employee Whistleblower Protection Training

[40 CFR 264.16(a)(3); OAR 340-104-0001; GASP III, Case No. 0009 09349]

The initial and annual refresher training requirements of the UMCDF training program must include instruction on the employee whistleblower protection as required by the July 26, 2004, Opinion and Order on Judicial Review, Case No. 0009 09349 *(GASP III)*. The training must include, but is not limited to:

- The workers' obligation to report good-faith concerns regarding the safety of workers, the public, or the environment, and related noncompliance with permit requirements;

- The workers' obligation to convey such concerns to the Department if those concerns are not otherwise sufficiently resolved; and

- Assurance that no worker shall be disadvantaged in any way by communicating such concerns in good faith.

12.0 Training Documents and Records
[40 CFR 264.16(d), 40 CFR 264.16(de); OAR 340-104-0001]

Records of the following must be maintained at the facility for current personnel, until closure and for former employees for at least 3 years from the date the employee last worked at the facility. Personnel training records may accompany personnel transferred within the same company.

- The job title for each position at the facility related to hazardous waste management, and the name of the employee filling each job;
- A written job description for each position listed in (i) above. This description may be consistent in its degree of specificity with descriptions for other similar positions in the same company location or bargaining unit, but must include the requisite skill, education, or other qualifications, and duties of employees assigned to each position;
- A written description of the type and amount of both introductory and continuing training that must be given to each person filling a position listed in (i) above;
- Records that document that the training or job experience required in Table 10-3 has been given to, and completed by, facility personnel listed in (i) above.

Table 10-1. Outline of Initial and Continuing Training Process

I. Validation of Training Materials Described in Appendix A

II. Initial Training

A. Classroom Instructions
   1. Instructive course work
   2. Explanation of relevance of training to job position for all UMCDF personnel
   3. Instruction in response to emergencies
   4. Supervised practice operation on simulated demilitarization equipment, where applicable

B. On-the-Job-Training
   1. Acquire skills and complete performance demonstrations
   2. UMCDF operation

III. Continuing Training

A. Classroom Instructions
   1. Continuing training and refresher courses
   2. Safety meetings
   3. Review of Contingency Plan
   4. Review of recordkeeping (e.g., logbooks)
   5. Review of maintenance procedures

B. On-the-job-training, to include regular performance of jobs and duties by all UMCDF personnel

C. Continual observation by supervision to verify job competency and performance demonstrations as needed

Umatilla Chemical Agent Disposal Facility

ATTACHMENT 11

CALIBRATION PROCEDURES AND IN SITU CONTINUOUS EMISSIONS MONITORING SYSTEMS

ATTACHMENT 11
CONTENTS

CALIBRATION PROCEDURES

"IN-SITU" CONTINUOUS EMISSION MONITORING SYSTEMS

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CALIBRATION PROCEDURES

[40 CFR 270.31; OAR 340-100-0002]

1. Oxygen, Carbon Monoxide, and Mercury (Hg) Analyzer Calibration Procedures

Attached calibration procedure and analyzer performance specification are as follows:

1.1 Initial Certification

After installation and prior to surrogate trial burns, the Continuous Emissions Monitoring System (CEMS) underwent initial certification in accordance with the UMCDF CEMS Certification Test Plan. The UMCDF CEMS Certification Test Plan is derived from the UMCDF Hazardous Waste Permit, UMCD Air Contaminant Discharge Permit, and UMCD Title V Permit and is in accordance with 40 CFR 60 (Standards of performance for new stationary sources) and 63 Appendix to Subpart EEE (Quality Assurance Procedures for Continuous Emissions Monitors Used for Hazardous Waste Combustors).

After installation and prior to the start of HD trial burn, the mercury (Hg) monitoring system CEMS underwent initial certification in accordance with the UMCDF CEMS Certification Test Plan, EPA Performance Specification 12A, and 40 CFR Part 75, Appendix K.

Initial performance test certification included calibration drift (CD), response time (RT), absolute calibration audit (ACA)/calibration error (CE)/cylinder gas audit (CGA), and relative accuracy (RA), as applicable. All four tests must occur within a 168-hour (7-day) period when the furnace system is operating at or above 50% thermal load.

1.2 Subsequent/Continuing Calibration

The CEMS must meet the calibration and QC requirements set forth in the UMCDF Hazardous Waste Permit and UMCD Air Contaminant Discharge Permit and Title V Permit.

The CEMS must be calibrated daily using certified (or higher quality) gases. The daily calibration drift check is a two point check (zero and span gas). For the CO CEMS, a zero and span gas check must be conducted for the low level range (0 – 200 ppm) and the high level range (0 – 3,000 ppm).

Prior to the daily calibration of the monitors, preoperational setup checks must be performed. These checks include, but are not limited to: gas line connections, strip chart and recorder, flow control panel, and verification of electrical power to the monitors. The calibration is performed in accordance with UM-0000-M-608, "Non-Agent *[sic]* Monitoring," that is based upon the Code of Federal Regulations (CFR), Title 40, Part 63, Appendix to Subpart EEE, and manufacturer's manuals.

The Hg CEMS and calibration requirements are identified in Permit Attachment 7.

1.3 Quarterly Performance Audit

1.3.1 Every quarter the CEMS must undergo a performance audit in accordance with federal regulations. Three of the quarterly audits are performed as follows:

1.3.1.1 The CO and O2 must consist of an absolute calibration audit (ACA)/calibration error (CE) tests in accordance with 40 CFR 60 Appendix B, Performance Specification 4B.

1.3.1.2 The Hg must consist of a system integrity test with three reference gas values of elemental and oxidized Hg in accordance with 40 CFR 60 Appendix B, Performance Specification 12A.

1.3.1.3 Quarterly audits must be conducted using EPA Protocol 1 or higher quality gases.

1.3.2 The fourth quarterly audit must be performed as follows:

1.3.2.1 An independent contractor must perform one annual audit in each calendar year.

1.3.2.2 The CO and O_2 CEMS annual audit must consist of a relative accuracy test audit (RATA) in accordance with 40 CFR 60 Appendix B, Performance Specification PS 4B.

1.3.2.3 The Hg CEMS annual audit must consist of a relative accuracy test audit (RATA) in accordance with 40 CFR 60 Appendix B, Performance Specification PS 12A using Method 29 or Method 30B.

1.3.2.4 The annual audit will fulfill the quarterly audit for the quarter during which it is performed.

2. Process Instrument Calibration

2.1 General

This section describes the calibration of instruments controlled by the UMCDF Permit. The following provides supplemental information regarding some of the most common types of instruments at this facility. Because calibration and testing processes are often governed by manufacturer recommendations, other codes and standards, these discussion are general in nature.

2.1.1 Each instrument must be calibrated in accordance with manufacturer's recommendations and/or as specified in appropriate UMCDF preventive maintenance instrument (PMI) procedures. All instrument calibrations must be accomplished using measurement & test equipment (M&TE) with accuracy traceable to the National Institute of Standards and Technology (NIST) or other accepted national or international standards.

2.1.2 Calibration results must be documented on appropriate calibration records. Upon completion of a successful instrument calibration, the documentation must be entered into the operating record indicating the instrument calibration date, and calibration due date (interval between required calibration).

2.1.3 The calibration frequency, required instrument calibrated range, expected operating range or setpoint and instrument loop accuracy must be as specified in Tables 5-4 (Module V) for BRA instrumentation, Table 5-9 (Module V) for BDS instrumentation, Table 7-1a (Module VII) for LIC1 instrumentation, Table 7-1b (Module VII) for LIC2 instrumentation, Table 7-3 (Module VII) for MPF instrumentation, and Table 7-5 (Module VII) for DFS instrumentation, as applicable.

2.2 Definitions

Calibration - To ascertain outputs of a device corresponding to a series of values of a quantity, that the device is to measure, receive, or transmit. Accomplished by comparison measurements of unknown accuracy to standards of known accuracy in order to detect, correlate, report, or eliminate by adjustment variation in accuracy of the instrument being compared.

Accuracy - The degree of conformity of an indicated value to a recognized standard value, ideal value.

Loop Accuracy – Accuracy of a series of individual components within a measurement or control loop, expressed as = $(a_1^{\ 2} + a_2^{\ 2} + \ldots a_n^{\ 2})^{0.5}$, where a_1 through a_n represents the accuracies of the loop components expressed as a percent.

Loop Test – A test whereby a known process signal is applied to simulate an output from a field sensing device and the resulting process signal is observed at the end point (final readout device) and verified to be within acceptable limits.

Calibrated Instrument Range – The region between the calibrated limits of a measurement device, expressed by stating the lower and upper measurement values of the device.

Span – The calibrated arithmetic difference between upper and lower range values.

Setpoint (Digital) – The setpoint is the measured or process value at which an electrical/electronic switch or other on/off device actuates or changes state.

Setpoint (Analog) – The control point of an analog control system or instrument that represents the desired value of the controlled variable.

AWFCO - Automatic waste feed cut-off

2.3 Pressure Instruments

Pressure instruments must be calibrated and checked, as a minimum, at 0, 50, and 100% of calibrated span, as governed by the specific application. Pressure switches must be calibrated at the specific point(s), as governed by the specific application. Differential pressure instruments must have appropriate differential pressure applied using suitable M&TE.

2.4 Flow and Differential Pressure Instruments (Used for Flow Measurement)

2.4.1 Flow and differential pressure instruments (used for flow measurement) must be calibrated and checked at 0, 50, and 100% of calibrated span or at specific point, as governed by its application. Differential pressure instruments (used for flow measurement) must have appropriate differential pressure applied using suitable M&TE.

2.4.2 For primary flow elements the manufacturer's certified data must be used for determining device accuracy, flow versus differential pressure values (orifices, venturies, and annubars) and meter and calibration factor values (electromagnetic, coriolis, and turbine-type flowmeters). Electromagnetic, coriolis, and turbine-type flowmeters must be calibrated or programmed in accordance with manufacturer's recommendations, utilizing the manufacturer's standard substitution/calibrator device and/or appropriate M&TE.

2.5 Temperature Instruments

2.5.1 Temperature instruments must be calibrated and checked, as a minimum, at 0, 50, and 100% of calibrated span or at specific point, as governed by its application.

2.5.2 Temperature instruments with thermocouple or RTD sensors must be tested by injecting a simulated temperature signal (millivolts or resistance, as applicable) at the sensor head (where practical) and reading the resultant temperature value at the receiving instrument. Appropriate NIST reference tables or certified manufacturer's equivalency tables shall apply to thermocouples and RTDs. The manufacturer's certification for materials and accuracy shall be acceptable.

2.5.3 Capillary filled-type temperature sensing system must be calibrated by immersing the temperature sensing element in a controlled temperature bath, or dry block calibrator utilizing appropriate M&TE to monitor the bath/calibrator temperature and resulting device output and switch actuation points.

2.6 Level Instruments

2.6.1 Level instruments must be calibrated and checked at a minimum of 0, 50, and 100% of calibrated span or at specific points, as governed by its application.

2.6.2 Differential pressure instruments used for level measurement, must have appropriate differential pressures applied, using suitable M&TE (equivalent to the required level range, including corrections for specific gravity, fill fluid density, and head corrections, as necessary).

2.6.3 Ultrasonic level transmitters must be calibrated (or programmed) to accommodate the range, span, and/or setpoint requirements of the Permit. The manufacturer's instructions must be utilized for these calibrations. These instruments must be functionally checked to ensure proper operation by varying the measured variable level, where practical.

2.6.4 Point contact sonic level switches must be calibrated (or programmed) to accommodate the setpoint requirements of the application. The manufacturer's instructions must be utilized for these calibrations. These instruments must be functionally checked to ensure proper operation by removing the switch sensor and immersing it in liquid or by varying the measured variable level.

2.7 Analyzers

Analyzer instruments must be calibrated and checked at 0, 50, and 100% of calibrated span, where practical. For analyzers requiring a certified sample gas or sample solution for the calibration standard, a one- or two-point check is acceptable (e.g., pH buffer solution at 4.0 and 10.0 pH).

Moisture/humidity instruments must be calibrated (or programmed) to accommodate the range, span, and/or setpoint requirements of the application. The manufacturer's instructions must be utilized for these calibrations.

2.8 Switches

2.8.1 Flame Supervision Sensors - must be checked for proper operation in accordance with the vendor's recommended checkout procedures. This must include checking the programmer module output contacts for proper operation.

2.8.2 Position and Speed Switches - Position switches must be checked by stroking valves or actuating equipment and confirming that switch actuation occurs at the proper position. Speed switches must be checked by operating the equipment in such a manner as to verify the proper operation of the switch or by using the vendor's recommended calibration procedure.

2.8.3 Motor Operation Switches - Auxiliary motor starter contacts must be checked for proper operation by manually starting and stopping the corresponding motor and confirming relay and contact actuation.

2.8.4 Electronic Switches (with Analog Sensing Element) - Transmitters must be calibrated by introducing a variable signal from a calibration unit and verifying that the corresponding output is correct. Electronic switches are then calibrated by simulating either the transmitter process input variable or corresponding transmitter output signal of the required set point and verifying that the switch actuates properly. Electronic temperature switches are checked by introducing a multivolt signal at the thermocouple head that corresponds to the required set point and by verifying proper switch actuation.

2.9 Weight Measuring Systems

2.9.1 Load cell-type weight measurement instruments must be configured and calibrated (or programmed) for the specific weight measurement requirements, as governed by its specific application. The manufacturer's instructions must be used for initial setup. After initial setup, the weight measuring system accuracy must be verified, by dead load weight comparison. Certified weights of known quantity shall be added incrementally to the scale/vessel and compared to the final readout values.

The dead weight calibration procedure is a four-point calibration curve. This calibration procedure tests the function and accuracy of the entire weight system including load cells and transmitters. The weights measured during the calibration shall be indicated in the Control Room and recorded in PDARS to verify the loop accuracy. The calibration is performed in the following manner:

- The weight system to the empty BDS conveyor is zeroed.
- An empty flat tray of known weight is added to the conveyor and the calibration of the system is adjusted to match.
- An approximately 2,500-lb weight is added and the calibration of the system is adjusted to match.
- An additional approximately 2,500-lb weight is added for a total of 6,216 lbs, and the calibration of the system is adjusted to match.
- Measurements are taken at each of the four calibration points and the ±24-lb accuracy of the scale system is verified. A repeatability of ±0.64% must be achieved.

3. Waste Feed Cut-Off Testing

In order to demonstrate and maintain the effectiveness of the automatic waste feed cut-off (AWFCO) system, tests to simulate malfunction and methods of calibration have been devised. In addition, the operating staff are trained to work in concert with the automatic waste feed cut-off system in response to malfunctions. The scope of the AWFCO system and testing of the waste feed cut-off system is included in site procedures and are described as follows:

3.1 Scope and implementation of Automatic Waste-Feed Cut-Off System

3.1.1 The automatic waste feed cut-off system consists of devices that stop the flow of waste-feed into or out of a process area along with all instruments and control systems that automatically actuate these shut-off devices in the event of an upset of malfunction that could lead to incomplete destruction or excess emissions.

3.1.2 Process areas considered include LIC1, LIC2, DFS, MPF, and the BRA.

3.1.3 AWFCOs include all items for the incinerators and the BRA.

3.1.4 Control systems are designed to be "fail-safe." In the event of an instrument, interlock, or power failure, the controls involved will go to or stay at the safest position for them to maintain when control is lost. For example, waste-feed cut-off valves will close when any of the instruments or interlocks within the control circuits fails.

3.1.5 The majority of the AWFCOs listed in the Permit have prealarms. Some AWFCO parameters do not have prealarms such as loss of flame, low pressure in the agent feed line, the slag discharge gate not closed, the PFS carbon filter bypass valve not closed. Information on the prealarms for each incinerator or BRA AWFCO are provided in the alarm and interlock matrices for each incinerator and BRA. Operators monitor operating conditions and watch for trends that could indicate a pending upset condition. The operators must try to correct an upset condition observed or indicated by a pre-alarm. They must continue to monitor abnormal operating conditions to verify that any automatic corrective actions are completed and to watch for the possibility of worsening conditions that would indicate a pending shutdown condition. An automatic shutdown will occur if an upset condition has not been corrected. Upon observing a shutdown alarm, the operators monitor the operating system involved to verify that all automatic operations are completed properly (i.e., waste-feed cut-off valves have closed, burners shutdown, etc., as appropriate to the shutdown action required).

3.2 Initial Calibration and Functional Check-Out of AWFCO Instruments and Control Systems

3.2.1 All instruments and devices for the entire facility must be initially calibrated per Section 2 of this attachment in accordance with manufacturer's recommended procedures and/or preventive maintenance instrument (PMI) procedures.

3.2.2 All wiring and connections must be checked for continuity. All loops are checked for polarity and voltage level.

3.2.3 All control loops and interlocks must be checked for proper operation by simulating a process variable for each field sensing instrument and confirming that the final control device functions properly.

3.2.4 Each waste feed cut-off device (valve, gate, door, pump shutdown, etc.) must be checked for proper operation. Each device must properly respond to open/close or start/stop signals. Full closure of cut-off devices must be confirmed by verifying that the appropriate interlocks are activated.

3.3 Periodic Testing of UMCDF Automatic Waste-Feed Cut-Off Systems

The following narrative explains how each part of the AWFCO system contributes to preventing hazards to health and the human environment. Refer to the definitions in the previous section for terms used in this discussion.

- An instrument senses a change in the process.
- The input loop brings the instrument data to the control system.
- The control system evaluates the instrument data. If the data requires an AWFCO action, a software interlock is activated to change the signal to an output loop.
- The output loop signals a change in the state of a device in the field
- The device changes state to stop waste feed.

Requirements for the weekly testing of AWFCO systems at UMCDF are as follows.

3.3.1 Instruments which activate the AWFCO systems are specified in the Hazardous Waste Permit Module V, Table 5-5 for the BRA; Module VI, Tables 6-3 for the LIC1 and LIC2, 6-5 and 6-7 for the MPF, and 6-11 for the DFS; and Module VII, Tables 7-2 for the LIC1 and LIC2, 7-4 and 7-4a for the MPF, and 7-6 for the DFS. These instruments must be calibrated in accordance with Section 2.0 of this attachment. The calibration of these instruments must include confirmation of the input loops to the control system.

3.3.2 Automatic waste feed cut-offs activated during the previous week while treating hazardous waste in the incinerator or BRA are deemed to have been tested and will be documented on the inspection check sheet. PDAR system data will be attached to the inspection check sheet documenting activation of the AWFCO system. Software interlocks, for the AWFCOs that did not activate in the previous week, must be tested weekly by an offline method that will not require the activation or deactivation of devices in the field.

3.3.3 In the offline method, input loop values shall be forced into states requiring activation of the AWFCO system and output loop values shall be confirmed (via activation of the appropriate interlock) to go to the state required for the AWFCO.

3.3.4 In the offline method, calculated values (e.g. the rolling one-hour average of an input loop value) shall be forced into states requiring activation of the AWFCO system and output loop values shall be confirmed (via activation of the appropriate interlock) to go to the state required for AWFCO.

3.3.5 In order to perform the offline AWFCO software interlock test, waste feed must be stopped to the treatment unit and the incinerators or BRA cleared of waste.

3.3.6 Weekly testing of AWFCO software interlocks shall not be required for any system which has not processed waste in the preceding week.

3.3.7 When a system is to resume feeding of waste, the weekly testing must be performed before feed is resumed and weekly testing must resume on the established day and time, e.g. Midnight on Saturday or noon on Sunday, etc.

3.3.8 Output loops and devices which perform AWFCO actions to start and stop waste feed shall not require scheduled testing. The normal operations of the UMCDF will start and stop waste feed several times each week during any period when waste is being treated.

User staff must confirm the proper operation of these output devices as a routine matter in performance of operating and maintenance procedures.

3.3.9 Documentation of the weekly testing of the AWFCO alarms (including the PDAR report indicating which AWFCO alarms activated during the previous week) will be maintained in the operating record.

"IN-SITU" CONTINUOUS EMISSIONS MONITORING SYSTEMS (CEMS)

The Continuous Emissions Monitor Systems (CEMS) are used for continuously monitoring the exhaust gas from the UMCDF furnace systems for carbon monoxide (CO), oxygen (O_2), carbon dioxide (CO_2), and mercury (Hg). The UMCDF Hazardous Waste Permit requires the exhaust gas from the furnace systems to be monitored for CO, O_2, and Hg. The CO_2 concentration in the Deactivation Furnace System (DFS) exhaust gas was required to be monitored to satisfy the Toxic Substances Control Act (TSCA) requirements for treating polychlorinated biphenyls (PCBs) in M55 rocket shipping and firing tubes.

The UMCDF Hazardous Waste Permit requires the CO and O_2 CEMS located downstream of the I.D. blowers for the DFS, Liquid Incinerators (LIC) and the Metal Parts Furnace (MPF) to be interlocked to activate the automatic waste feed cut-off (AWFCO) system. The CEMS monitoring the exhaust gas are configured with two sets of monitoring systems (primary and backup) that can be independently calibrated and maintained. Only one set (CO and O_2) of CEMS are designated as the "monitors of record" for compliance purposes. In the event that the online "monitors of record" require maintenance activities, the backup set of CEMS are placed online and are then designated the "monitors of record." Only the "monitors of record" will activate the AWFCO system when the operating ranges exceed permitted levels.

The UMCDF Hazardous Waste Permit requires Hg CEMS in the Pollution Abatement System Carbon Filter System (PFS). The remaining Hg adsorption capacity of the sulfur-impregnated carbon (SIC) is required to be monitored per Permit Attachment 7, and SIC change out and/or cessation of use of a PFS is based on the Hg levels measured by the CEMS.

The DFS exhaust gas CEMS consist of a primary and backup configuration that includes CO_2 in addition to CO and O_2. One analyzer is capable of both CO and CO_2 detection. Both analyzers are certified in accordance with the UMCDF CEMS Certification Plan. The UMCDF CEMS analyzers that are connected to the AWFCO will be audited quarterly to ensure a sound document trail for their accuracy from the time they are certified. All instruments are "in-situ" CEMS in compliance with specification requirements. The O_2 analyzers are based on zirconium oxide measurement technology. All other gas analyzers are based on gas filter correlation infrared measurement technology.

The method of analysis, analyzer type, and analytical range for the CEMS monitors are as follows:

- CO is continuously monitored (corrected to a dry basis) in the I.D. blower exhaust for the DFS, LICs, and MPF. The CO concentrations are measured by an "in-situ" nondispersive infrared analyzer (NDIR). The CO analyzer is a multirange instrument with a low range of 0-200 parts per million (ppm) and a high range of 0-3,000 ppm. The output of the monitor is displayed on the Control Room advisor screen both as a continuous reading corrected to 7% oxygen concentration and as a rolling average also corrected to 7% oxygen concentration. The data is archived by the Process Data Acquisition and Recording System (PDARS) and by chart recorders. The CO monitors will be certified using 40 CFR 60, Appendix B, Performance Specification 4B. The CO monitors will be calibrated in accordance with the Performance Specifications for Continuous Emission Monitoring Systems referenced by 40 CFR 63 Appendix to Subpart EEE.

- O_2 is continuously measured (corrected to a dry basis) in the I.D. blower exhaust for the DFS, LICs, and the MPF. O_2 is also continuously monitored downstream of the primary chamber exhaust for the DFS and the MPF, and downstream of the MPF afterburner. The O_2 concentrations are measured by "in-situ" zirconia oxide electrochemical monitors. The UMCDF will operate the O_2 analyzers in the 0-25% range. The output of the monitors is displayed on the Control Room advisor screen. The data is archived by the PDARS and by chart recorders. The O_2 monitors will be certified using 40 CFR 60, Appendix B, Performance Specification 4B. The O_2 monitors will be calibrated in accordance with the Performance Specifications for Continuous Emission Monitoring Systems referenced by 40 CFR 63 Appendix to Subpart EEE.

- The total vapor phase mass concentration of mercury (Hg) (elemental and oxidized forms) in the MPF exhaust gas is continuously sampled and monitored in the MPF pollution abatement system carbon filter system (PFS) by the mercury monitoring system (VEN-MERC-001). The mercury monitoring system CEMS are located after the MPF PFS and before the common stack. The mercury monitoring system CEMS units are listed in Permit Attachment 7, Table 1. The Hg monitors must be operated and calibrated in accordance with Permit Attachment 7.

The CEMS must be located in shelters constructed of composition panels that provide weather protection and insulation. Each shelter must be heated and cooled to provide the temperature control for the UMCDF CEMS. All the UMCDF CEMS equipment must be powered by commercial power and provided with uninteruptible power supply (UPS) backup.

Each CEMS has its own calibration system. This ensures the accuracy of each monitor. Calibrations can be done manually or automatically. The CEMS can be programmed to run automatic daily calibrations. The instruments will run the calibration cycle and will signal the plant distributed control system as to what calibration gas is flowing. The time of the automatic calibration runs is adjustable. The length of time each gas flows is programmable and will likely be changed to suit site conditions. The calibration system, with appropriate calibration gases, has the capability of verifying the zero and upscale response of each continuous gas analyzer. The gas is introduced into the UMCDF CEMS sampling system at the sample point through the analyzer. The gases are housed in the appropriate gas cylinder usage rack for each system. Daily calibration checks must be performed, and the readings must be recorded in two locations:

- The PDARS in the control room (CON) records all UMCDF CEMS readings including the data from daily calibrations. The PDARS software allows compilation of calibration data in several formats. One report is used to determine calibration drift (CD) for the Data Assessment Report (DAR) to be submitted with each quarterly audit report.

- The CEMS readings must be recorded on a chart recorder and the calibration data annotated on the strip chart.

CO and CO_2Analyzers

The model number for the CO and CO_2 analyzers are 210 LR manufactured by Procal Analytics, Ltd. Interference filters are placed in the path of a broadband infrared radiation (IR) source. Two filters are used per an analyte of interest. One selects a measuring wavelength while the other selects a reference wavelength. The filters are mounted on a rotating disc immediately in front of the IR source. This arrangement gives rise to an IR beam alternating rapidly between measuring wavelength and reference wavelength for each analyte. This alternating beam passes through the gas to be measured, eventually striking the IR detector in the form of pulses of radiation.

Filters have been selected so that if any of the gas to be measured is present, a significant amount of radiation will be absorbed at the measuring wavelength with very little or none at the reference wavelength. A logarithmic relationship exists between gas concentration and the ration of IR signal strengths at the measuring and reference wavelengths.

During calibration of the analyzer, the measured absorbance is recorded for known sample gas concentrations over the measuring range required for the specific application. Results of this exercise are recorded within the system's memory in the form of a look-up table. During operation, the system calculates concentration levels from absorbance levels by continual reference to the look-up table.

The analyzer ranges are:

CO: 0 – 200 ppm and 0 – 3000 ppm
CO_2: 0 – 12%

The analyzer features an optical head unit with IR source and rotating filter wheel. The sample gas component is identified by modulating a dual wavelength, nondispersive IR beam for the component through the sample gas chamber. Readings from the analyzer are adjusted to account for the moisture content of the matrix being sampled. The optical head unit includes a moisture analyzer. The analyzer control unit is located in a monitoring house and displays the analytical results and distributes an output signal to a strip chart recorder and to the PDARS.

Oxygen Analyzers

The model number for the O_2 analyzers is ZRM-ZTB manufactured by COSA Instrument Corporation. The O_2 analyzer uses a zirconium oxide (ZrO_2) ceramic sensing element to determine the concentration of O_2 in the exhaust gas. The analyzer is directly inserted into the furnace flue gas. Response is very fast due to the limited dead air space between the replaceable filter and the Zirconia sensor. The sensor measures the oxygen concentration by comparing the oxygen pressure of the sample side of the oxygen cell, to the pressure on the reference side of the cell. Standard atmospheric oxygen is the source for the reference side. The internal circuitry quantifies the signal generated by the oxygen cell and displays it as percent oxygen on the analyzer control unit.

The UMCDF analyzers must be operated in the 0 – 25% range.

The analyzer must be inserted directly into an alloy intake pipe that will deliver the sample to the analyzer. The sample is passed directly to the analyzer and the results are sent to the analyzer control unit where the outputs are directed to the strip chart recorder and to the PDARS.

Hg Monitors and Analysis

The Hg CEMS instrument and process parameters and sampling and analysis requirements are described in Permit Attachment 7.

Umatilla Chemical Agent Disposal Facility

ATTACHMENT 12

DESIGN AND SPILL/OVERFLOW PROTECTION CONTROL DOCUMENTS AND REQUIREMENTS

ATTACHMENT 12

UMCDF DESIGN AND SPILL/OVERFLOW PROTECTION CONTROL DOCUMENTS AND REQUIREMENTS

(electronic copies of the design documents are provided on CD)

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UMCDF RCRA Hazardous Waste
Permit Attachment 12

List of Design and Spill/Overflow Protection Control Documents

Drawing Design Documents

Design Doc #	Title	Rev
1050	Adsorber Cell Type II Ionex Model C1050	E
5942	Prefilter - 80% ASHRAE	C
5943	HEPA Filter	B
Figure D-1-1	Details of Magazine Ventilation System	N/A
Figure D-1-2, Sht 1/3	K- and J-Block Igloo Storage Units, Sheet 1	N/A
Figure D-1-2, Sht 2/3	K- and J-Block Igloo Storage Units, Sheet 2	N/A
Figure D-1-2, Sht 3/3	K- and J-Block Igloo Storage Units, Sheet 3	N/A
RC-35-MH-217	CSDP - Munitions Demilitarization Building; Fixtures For 105 and 155 Proj. Cradles For MC-1, MIC-94, Bombs, and One-Ton Container Type E Assemblies Plans and Sections	A
UM-00-D-901	CSDP - General; Symbols and Legend; Piping and Instrument Diagram	18
UM-00-H-901	CSDP - General; HVAC; Legend, Symbols and Abbreviations	03
UM-00-H-902	CSDP - General; Plumbing and Fire Protection; Symbols and Abbreviations	01
UM-00-H-903	CSDP - General; HVAC Piping and Instrumentation; Legend and Symbols	01
UM-00-S-909	CSDP - General; Typical Concrete Details	05
UM-01-D-009	CSDP - Munitions Demilitarization Building; Spent Decon Collection; Piping and Instrument Diagram	13
UM-01-D-010	CSDP - Munitions Demilitarization Building; Spent Decon Collection System; Piping and Instrument Diagram	10
UM-01-D-506	CSDP - Munitions Demilitarization Building; Projectile and Bulk Item Processing System (B); Piping and Instrument Diagram	04
UM-01-D-507	CSDP - Munitions Demilitarization Building; Tray/Dunnage Processing System (A); Piping and Instrument Diagram	08
UM-01-D-508	CSDP - Munitions Demilitarization Building; Tray/Dunnage Processing System (B); Piping and Instrument Diagram	08
UM-01-D-512	CSDP - Munitions Demilitarization Building; Buffer Storage/Charge Car (Second Floor); Piping and Instrument Diagram	05
UM-01-D-513/1	(Sht. 1) CSDP - Munitions Demilitarization Building; Buffer Storage; Piping and Instrument Diagram	05
UM-01-D-513/2	(Sht. 2) CSDP - Munitions Demilitarization Building; Buffer Storage; Piping and Instrument Diagram	02
UM-01-D-514	CSDP - Munitions Demilitarization Building; Multipurpose Demilitarization and Bulk Drain System (B); Piping and Instrument Diagram	16
UM-01-D-515	CSDP - Munitions Demilitarization Building; Multipurpose Demilitarization and Bulk Drain System (A); Piping and Instrument Diagram	17

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Design Doc #	Title	Rev
UM-01-D-516	CSDP - Munitions Demilitarization Building; Multipurpose Demilitarization and Bulk Drain System (A); Piping and Instrument Diagram	08
UM-01-D-517	CSDP - Munitions Demilitarization Building; Multipurpose Demilitarization and Bulk Drain System (B); Piping and Instrument Diagram	08
UM-01-D-522	CSDP - Munitions Demilitarization Building; Agent Collection System; Piping and Instrumentation Diagram	12
UM-01-D-526	CSDP, Munitions Demilitarization Building, LIC Furnace No. 1 - Primary Chamber, Piping and Instrument Diagram	21
UM-01-D-527/1	(Sht. 1) CSDP - Munitions Demilitarization Building; LIC Furnace No. 1 - Secondary Chamber; Piping and Instrument Diagram	19
UM-01-D-527/2	(Sht. 2) CSDP - Munitions Demilitarization Building; LIC Furnace No. 1 - Secondary Chamber; Piping and Instrument Diagram	08
UM-01-D-528/1	CSDP - Munitions Demilitarization Building; Metal Parts Furnace; Piping and Instrument Diagram	21
UM-01-D-528/2	CSDP - Munitions Demilitarization Building; Metal Parts Furnace; Piping and Instrument Diagram	04
UM-01-D-528/3	CSDP - Munitions Demilitarization Building; Metal Parts Furnace; Piping and Instrument Diagram	03
UM-01-D-528/4	CSDP - Munitions Demilitarization Building; Metal Parts Furnace; Piping and Instrument Diagram	03
UM-01-D-529	CSDP - Munitions Demilitarization Building; MPF Burners; Piping and Instrument Diagram	15
UM-01-D-530/1	(Sht. 1) CSDP - Munitions Demilitarization Building; MPF Details; Piping and Instrument Diagram	09
UM-01-D-530/2	(Sht. 2) CSDP - Munitions Demilitarization Building; MPF Details; Piping and Instrument Diagram	10
UM-01-D-531/1	(Sht. 1) CSDP - Munitions Demilitarization Building; DFS Retort; Piping and Instrument Diagram (Sheet 1 of 3)	16
UM-01-D-531/2	(Sht. 2) CSDP - Munitions Demilitarization Building; DFS Retort; Piping and Instrument Diagram (Sheet 2 of 3)	14
UM-01-D-531/3	(Sht. 3) CSDP - Munitions Demilitarization Building; DFS Retort; Piping and Instrument Diagram (Sheet 3 of 3)	07
UM-01-D-533	CSDP - Munitions Demilitarization Building; DFS Air Blower/Retort Lube Oil System; Piping and Instrument Diagram	09
UM-01-D-534	CSDP - Munitions Demilitarization Building; Toxic Cubicle - Spent Decon; Piping and Instrument Diagram	10
UM-01-D-535	CSDP - Munitions Demilitarization Building; Toxic Cubicle - Spent Decon; Piping and Instrument Diagram	11
UM-01-D-536	CSDP - Munitions Demilitarization Building; Toxic Cubicle - Agent; Piping and Instrument Diagram	13
UM-01-D-541	ASDP - Munitions Demilitarization Building; Spent Decon Sampling System; Piping and Instrument Diagram	07
UM-01-D-546	CSDP - Munitions Demilitarization Building; LIC Furnace No. 2 - Primary Chamber; Piping and Instrument Diagram	21
UM-01-D-547/1	(Sht. 1) CSDP - Munitions Demilitarization Building; LIC Furnace No. 2 - Secondary Chamber; Piping and Instrument Diagram	19

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List of Design and Spill/Overflow Protection Control Documents

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Design Doc #	Title	Rev
UM-01-D-547/2	(Sht. 2) CSDP - Munitions Demilitarization Building; LIC Furnace No. 2 - Secondary Chamber; Piping and Instrument Diagram	10
UM-01-D-593	MDB; Munitions Processing Bay; Heel Transfer System; P&ID	02
UM-01-D-595	CSDP; MDB; Munitions Processing Bay, Rinsate Collection System - BDS Interface, P&ID	01
UM-01-D-596	CSDP; MDB; Munitions Processing Bay, Rinsate Collection System - Filters, P&ID	01
UM-01-D-597	CSDP; MDB; Munitions Processing Bay, Rinsate Collection System - Tanks, P&ID	01
UM-01-D-598	CSDP; MDB; Munitions Processing Bay, Rinsate Collection System - Feed to LICs, P&ID	01
UM-01-G-501/1	CSDP, MDB, Major Equipment Legend, 1, General Arrangement	14
UM-01-G-501/2	CSDP, MDB, Major Equipment Legend, 1, General Arrangement	04
UM-01-G-502	CSDP, MDB, Major Equipment Legend, 2, General Arrangement	17
UM-01-G-503	CSDP, MDB, Major Equipment Legend, 3, General Arrangement	22
UM-01-G-504	CSDP, MDB, First Floor Plan, North, General Arrangement	24
UM-01-G-505	CSDP, MDB, First Floor Plan, South, General Arrangement	26
UM-01-G-506	CSDP, MDB, First Floor Platform Plan, North, General Arrangement	06
UM-01-G-507	CSDP, MDB, First Floor Platform Plan, South, General Arrangement	07
UM-01-G-508	CSDP, MDB, Second Floor Plan, North, General Arrangement	16
UM-01-G-509	CSDP, MDB, Second Floor Plan, South, General Arrangement	19
UM-01-G-510	CSDP, MDB, Second Floor Platform Plan, North, General Arrangement	07
UM-01-G-511	CSDP, MDB, Second Floor Platform Plan, South, General Arrangement	05
UM-01-H-002/1	CSDP - Munitions Demilitarization Building; HVAC; Air Flow and Control Diagram	18
UM-01-H-002/2	CSDP - Munitions Demilitarization Building; HVAC; Air Flow and Control Diagram	02
UM-01-H-003	CSDP - Munitions Demilitarization Building; HVAC; Control Room Air Flow Diagram	03
UM-01-H-005	CSDP - Munitions Demilitarization Building; HVAC; Process Areas Air Flow Diagram	08
UM-01-H-006/1	(Sht.1) CSDP - Munitions Demilitarization Building; HVAC; Supply and Exhaust Control Diagrams	14

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List of Design and Spill/Overflow Protection Control Documents

Drawing Design Documents

Design Doc #	Title	Rev
UM-01-H-006/2	(Sht.2) CSDP - Munitions Demilitarization Building; HVAC; Supply and Exhaust Control Diagrams	10
UM-01-H-031	CSDP - Munitions Demilitarization Building; HVAC; Exhaust Filter Pad Plan	11
UM-01-H-046	MPF Conveyor Enclosure, HVAC Section and Details, Air Flow Diagram	04
UM-01-S-060	CSDP - Munitions Demilitarization Building; Foundations	01
UM-02-D-501	CSDP - Process and Utility Building; Brine Surge Tanks and Pumps - Line 1; Piping and Instrument Diagram	19
UM-02-D-502	CSDP - Process and Utility Building; BRA Evaporator - Line 1; Piping and Instrument Diagram	15
UM-02-D-503	CSDP - Process and Utility Building; BRA Drum Dryer - Line 1; Piping and Instrument Diagram	16
UM-02-D-504	CSDP - Process and Utility Building; BRA Drum Dryer - Line 1; Piping and Instrument Diagram	17
UM-02-D-505	CSDP - Process and Utility Building; BRA PAS Burner and Manifold, Piping and Instrument Diagram	10
UM-02-D-511	CSDP, Process and Utility Building, Brine Surge Tanks and Pumps-line 2, Piping and Instrument Diagram	17
UM-02-D-512	CSDP, Process and Utility Building, BRA Evaporator-Line 2, Piping and Instrument Diagram	12
UM-02-D-513	CSDP, Process and Utility Building, BRA Drum Dryer-Line 2, Piping and Instrument Diagram	16
UM-02-D-514/1	Brine Tanker Loading System	04
UM-02-D-514/2	Brine Tanker Loading System, Sheet 2	02
UM-02-G-501	CSDP, Process and Utility Building, Major Equipment Legend, General Arrangement	08
UM-02-G-502	CSDP, Process and Utility Building, Floor Plan, General Arrangement	12
UM-02-H-002	Process and Utility Building Process and Utility Building HVAC Air Flow Diagram	06
UM-02-S-007	Process and Utility Building, Foundation and Section Details	06
UM-06-D-501	CSDP - Pollution Abatement System; LIC No. 1-PAS Quench and Scrubber Towers; Piping and Instrument Diagram	25
UM-06-D-502	CSDP - Pollution Abatement System; LIC No. 1-PAS Demister; Piping and Instrument Diagram	13
UM-06-D-504	CSDP - Pollution Abatement System; MPF PAS Quench and Scrubber Towers; Piping and Instrument Diagram	24
UM-06-D-505	CSDP - Pollution Abatement System; MPF PAS Mist Eliminator and Blowers; Piping and Instrument Diagram	20
UM-06-D-506	CSDP - Pollution Abatement System; DFS PAS Quench and Scrubber Towers; Piping and Instrument Diagram	24

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UM-06-D-507	CSDP - Pollution Abatement System; DFS Exhaust Blowers and Stack; Piping and Instrument Diagram	17
UM-06-D-508	CSDP - Pollution Abatement System; DFS PAS Mist Eliminator; Piping and Instrument Diagram	16
UM-06-D-509	CSDP - Pollution Abatement System; DFS Afterburner; Piping and Instrument Diagram	16
UM-06-D-511	CSDP - Pollution Abatement System; LIC No. 2 - PAS Quench and Scrubber Towers; Piping and Instrument Diagram	26
UM-06-D-512	CSDP - Pollution Abatement System; LIC No. 2 - PAS Mist Eliminator; Piping and Instrument Diagram	12
UM-06-D-517/1	(Sht. 1) CSDP - Pollution Abatement System; LIC No. 1 Exhaust Blower; Piping and Instrument Diagram, Sheet 1 of 2	12
UM-06-D-517/2	(Sht. 2) CSDP - Pollution Abatement System; LIC No. 2 Exhaust Blower, Piping and Instrument Diagram, Sheet 2 of 2	11
UM-06-D-523	CSDP - Pollution Abatement System, PFS Carbon Filter Units Detail, Piping and Instrument Diagram	14
UM-06-D-524	CSDP, Pollution Abatement System; DFS PFS Gas Reheater and Filters; Piping and Instrument Diagram	13
UM-06-D-525	CSDP, Pollution Abatement System; LIC No. 2 PFS Gas Reheater and Filters; Piping and Instrument Diagram	13
UM-06-D-526	CSDP, Pollution Abatement System; MPF PFS Gas Reheater and Filters; Piping and Instrument Diagram	15
UM-06-D-527	CSDP, Pollution Abatement System, MPF/DFS PAS Spare Mist Eliminator; Piping and Instrument Diagram	13
UM-06-D-528	CSDP, Pollution Abatement System; MPF Clean Liquor Air Cooler; Piping and Instrument Diagram	08
UM-06-D-529	CSDP, Pollution Abatement System; LIC No. 2 Clean Liquor Air Cooler; Piping and Instrument Diagram	07
UM-06-D-530	CSDP, Pollution Abatement System; DFS Clean Liquor Air Cooler (Bays A/B); Piping and Instrument Diagram	06
UM-06-D-531	CSDP, Pollution Abatement System; DFS Clean Liquor Air Cooler (Bays C/D); Piping and Instrument Diagram	06
UM-06-D-532	CSDP; Pollution Abatement System Strainers, Piping & Instrument Diagram	08
UM-06-D-533/1	(Sht. 1) CSDP; Pollution Abatement System, Non-Agent Monitor Details, Piping & Instrument Diagram, Sheet 1 of 4	04
UM-06-D-533/2	(Sht. 2) CSDP; Pollution Abatement System, Non-Agent Monitor Details, Piping & Instrument Diagram, Sheet 2 of 4	03
UM-06-D-533/3	(Sht. 3) CSDP; Pollution Abatement System, Non-Agent Monitor Details, Piping & Instrument Diagram, Sheet 3 of 4	03
UM-06-D-533/4	(Sht. 4) CSDP; Pollution Abatement System, Non-Agent Monitor Details, Piping & Instrument Diagram, Sheet 4 of 4	05
UM-06-D-535	CSDP, Pollution Abatement System; LIC No. 1 PFS Gas Reheater and Filters; Piping and Instrument Diagram	14
UM-06-D-539	CSDP, Pollution Abatement System; LIC No. 1-Clean Liquor Air Cooler, Piping and Instrument Diagram	07

Drawing Design Documents

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UM-06-G-501	CSDP, Pollution Abatement System (PAS); Major Equipment Legend; General Arrangement	14
UM-06-G-502	CSDP, Pollution Abatement System (PAS); Ground Floor Plan; General Arrangement	08
UM-06-G-503	CSDP, Pollution Abatement System (PAS); First Level Platform Plan; General Arrangement	08
UM-06-G-504	CSDP, Pollution Abatement System (PAS); Second Level Platform Plan; General Arrangement	05
UM-06-G-505	CSDP - Pollution Abatement System (PAS); Third Level Platform Plan; General Arrangement	09
UM-06-G-509	CSDP - PAS-Ground Floor Plan, Area 6-7, General Arrangement	04
UM-06-G-510	CSDP - PAS-Ground Floor Plan, Area 6-8, 9, 10, & ll, General Arrangement	04
UM-06-G-511	CSDP - PAS-Ground Floor Plan, Area 6-12, 13, & 14, General Arrangement	04
UM-06-H-504	CSDP - Pollution Abatement System; (PAS), DFS Cyclone Enclosure Filter HVAC, Exhaust Control Diagram	07
UM-06-H-505	CSDP - Pollution Abatement System; (PAS), DFS Cyclone Filter HVAC Floor Plan	03
UM-07-D-515	Container Handling Building; HD Ton Container	01
UM-07-G-501	CSDP - Container Handling Building; Major Equipment Legend; General Arrangement	04
UM-07-G-502	CSDP - Container Handling Building; Plan - East, Unloading/Storage; General Arrangement	03
UM-07-G-503	CSDP - Container Handling Building; Plan - West, Unloading/Storage; General Arrangement	03
UM-07-G-504	CSDP - Container Handling Building; Plan - Center Area; General Arrangement	00
UM-07-G-505	CSDP - Container Handling Building; First Floor Plan, Transition; General Arrangement	01
UM-07-G-506	CSDP - Container Handling Building; Second Floor Plan, Transition; General Arrangement	05
UM-07-L-001	CSDP - Container Handling Building; Unloading and Storage Area - East; Plumbing Plan	02
UM-07-L-002	CSDP - Container Handling Building; Unloading and Storage Area - West; Plumbing Plan	01
UM-07-L-004	CSDP - Container Handling Building; Plumbing Schedules and Details	01
UM-12-A-001	CSDP - Laboratory; Area 12-1; Floor Plan - West	05
UM-12-A-002	CSDP - Laboratory; Area 12-2; Floor Plan - East	05
UM-12-D-001	Chemical Stockpile Disposal Program - Lab Building; Lab Chemical Waste Storage Tank; Piping and Instrument Diagram	09

UMCDF RCRA Hazardous Waste
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List of Design and Spill/Overflow Protection Control Documents

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Design Doc #	Title	Rev
UM-14-D-002	CSDP - Personnel and Maintenance Building, Liquid Waste Storage, Piping and Instrument Diagram	03
UM-16-C-003	CSDP, Site Work, Area 1, Plot Plan	08
UM-16-C-004	CSDP, Site Work Area 2, Plot Plan	17
UM-16-C-005	CSDP, Site Work Area 3, Plot Plan	06
UM-16-C-006	CSDP, Site Work Area 1, Road Lay-out Plan	07
UM-16-C-037	CSDP, Site Work Area 1, Storm Drainage Plan	08
UM-16-C-038	CSDP, Site Work Area 2, Storm Drainage Plan	15
UM-16-C-039	CSDP, Site Work Area 3, Storm Drainage Plan	05
UM-16-C-040	CSDP - Site Work; Area 4; Storm Drainage Plan	08
UM-16-D-013	CSDP, Site Work, LIC fuel oil purge system, Piping and Instrument Diagram	08
UM-23-G-501	CSDP; Munitions Demilitarization Building Filter Plan - North; Major Equipment Legend; General Arrangement Diagram	10
UM-23-G-502	CSDP - Munitions Demilitarization Building Filter Plan - South; General Arrangement Diagram	06
UM-24-G-501	CSDP - Laboratory Filter Floor Plan; General Arrangement Diagram	05
UM-24-H-001	CSDP, Laboratory Filter HVAC, Exhaust Control Diagram	13
UM-24-H-002	CSDP, Laboratory Filter HVAC, Floor Plan Area 24-1	06
UM-27-D-501/1	(Sheet 1) CSDP - Process and Utility Building; BRA PAS Baghouses; Piping and Instrument Diagram	13
UM-27-D-501/2	(Sheet 2) CSDP - Process and Utility Building; BRA PAS Baghouses; Piping and Instrument Diagram	09
UM-27-D-502	CSDP - Process and Utility Building; BRA PAS Blower and Stacks; Piping and Instrument Diagram	12
UM-27-G-501	CSDP - BRA PAS Major Equipment Legend and Floor Plan, General Arrangement	05
UM-27-H-502	BRA PAS Baghouse Enclosure	01

Other Design Documents

Design Doc #	Title	Rev
Section D-4B-01	RCRA Tank Assessment of UMCDF	14

Other Design Documents

Design Doc #	Title	Rev
Section D-4B-02, Spec. 13201	Pressure Vessels	12
Section D-4B-03, Spec. 13202	Tanks	09
Section D-4B-04, Spec. 16641	Cathodic Protection System (Tanks)	04
Section D-4B-08, Spec. 15120	Process Piping, General	37
Section D-4B-17, Spec. 13215	Underground Storage Tank (Fiberglass Reinforced Plastic) Systems	03
Section D-4B-18, Spec. 09850	Special Coating System	09
Section D-4B-19, Spec. 15160	Pumps	11
Section D-4B-19A, Spec. 15161	GFE Pumps	09
Section D-5B-01, Spec. 13187	Liquid Incinerator System Specification	08
Section D-5B-02, Spec. 13211	Liquid Incinerator Pollution Abatement System Specification	07
Section D-5B-06	Liquid Incinerator System Residence Time Calculation	N/A
Section D-6B-01, Spec. 13188	Metal Parts Furnace Specification	15
Section D-6B-02, Spec. 13212	Metal Parts Furnace Pollution Abatement System Specification	09
Section D-8B-05, Spec. 15987	Pollution Abatement System (PAS) Filter Units	17

Preliminary Design Documents

PMR # UMCDF-10-010-LIC(3TA) **Title: HD Rinsate Storage Tank System and Treatment in the Liquid Incinerator**

Design Doc #	Title	Rev
UM-01-D-526	CSDP, Munitions Demilitarization Building, LIC Furnace No. 1 - Primary Chamber, Piping and Instrument Diagram	19-M1

Umatilla Chemical Agent Disposal Facility

ATTACHMENT 13

ENHANCED ON-SITE CONTAINER (EONC) SPECIFICATION

ATTACHMENT 13
ENHANCED ON-SITE CONTAINER SPECIFICATION

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M. MCALLASTER 6342
JENNINGS-WILLIAMS 2982
(Ssr54027)

GENERAL REQUIREMENTS, ENHANCED ON-SITE CONTAINER (EONC) (U)

CHANGE HISTORY

CONTROL NUMBER	ISSUE	RELEASE/CHANGE NO.	DATE
SS-R54027-000	B		03/98
	C		06/98

A

TABLE OF CONTENTS

1. GENERAL

1.1. Background, General Description.

a. The Enhanced On-Site Containers (EONC) have been designed to provide the safe transportation of lethal chemical munitions. Its primary role is to protect munitions from the thermal and structural assault that could result from a hypothetical accident sequence, and to provide a barrier against release of significant amounts of agent. The EONC will be used for the transport of stockpiled chemical munitions over road (within the confines of the government facility) that are housed at various government sites across the United States. The route will be from munitions storage bunkers to destruction facilities by means of a specially designed trailer.

b. The Container must have the ability to be decontaminated easily in the event of an internal leak or exposure to a contaminated environment.

c. The principal components of the Container are:

(1) The frame

(2) The outer vessel

(3) The foam impact limiter/thermal barrier

(4) The inner containment vessel and the closure mechanism.

(5) The trays and inserts

d. The primary role played by each of the above components is discussed below.

(1) The frame includes ISO (International Organization for Standardization) corners that provide for ease of handling. The frame is of stainless steel construction for ease of decontamination.

(2) The outermost stainless steel shell provides a basic function. This shell and closure mechanism when properly assembled provide an enclosure to encapsulate the foam and insulation from the environment. The thickness of the shell was designed to provide structural support, and to minimize penetration in a puncture scenario.

(3) The foam and ceramic fiber blanket provide the main energy-absorbing characteristics during an impact event. The thermal barrier is a combination of ceramic fiber blanket and urethane foam.

(4) The inner containment vessel provides the primary barrier against escape of the agent to the environment. A stainless steel shroud allows for decontamination in the event of a leak during transport. Guides are provided for the proper location of the contents within the container. The closure mechanism consists of a hydraulically driven rotating ring which engages tapered wedges on the flanges of the inner containment vessel and the inner containment vessel flanged and dished head. The closure mechanism provides the force necessary to secure the door during normal transport and the hypothetical accident scenario.

(5) Trays and inserts are used to support the munitions. The trays and inserts are designed to limit the potential damage to the Container caused by internal impacts.

e. Operations, General Description.

The EONC is normally transported on a trailer designed for use with the package. After leveling of the trailer, the access door to the mechanical interlock pin on the EONC is opened, a padlock removed from the pin, and the pin removed from the rotating locking ring. The mechanical interlock pin prevents inadvertent or unintentional rotation of the locking ring during transport.

The keyed 12vdc hydraulic power system is activated and power is provided from a connector on the trailer to the battery system on the tractor.

A pendant on a retractable cord reel contains switches to activate the three hydraulic cylinders on the system. One switch on the pendant activates two cylinders which operates the rotating locking ring and a second switch activates the hydraulic cylinder which swings the door open and closed. Lights on the pendant illuminate to indicate the position of the door and rotating locking ring.

Activation of a switch on the pendant allows the two hydraulic cylinders to drive the rotating locking ring into the open position. The movement of the rotating ring is restricted by two limit switches. One is preset to stop the rotating locking ring in the proper open position, and one is preset to stop the rotating locking ring in the proper closed position. If the limit switch which stops the rotating locking ring in the open position has not been activated, then the door open switch on the pendant cannot be activated.

After the rotating locking ring has been properly opened, the switch on the pendant which controls the door open cylinder is activated. The swing of the door is also restricted in both open and closed positions by two preset limit switches. The door open limit switch is factory preset at 120° which allows normal routine loading and unloading of the EONC. Some facility conditions may require the opening of the door to more than the preset 120° position. In these situations, a bypass valve on the hydraulic system allows the door to be manually pushed open to 165°. An additional 5° of swing is achieved by manually articulating spherical bearings contained in the door hinge system. This allows the door to be swung open to the maximum of 170°. When the door has been manually pushed into this 170° position an additional limit switch is engaged which prevents the hydraulic operation of the door swing system and an indicator light (articulate door) on the side of the hydraulic control box is illuminated.

When the door has been manually opened to the 170° position, it must be manually returned to the normal operation position. Deactivation of the articulate door limit switch is achieved by manually pushing the door back the 5° to eliminate the swing from the spherical bushings in the hinge and by manually pushing the door back to less than the 120° normal operation position. This allows the system to be hydraulically driven in the normal operation mode.

With the door in the normal open position, a tray of munitions is inserted with a forklift into the EONC between the alignment guide rails which are positioned on the inside walls of the EONC. Two tray and two insert assemblies accommodate all configurations of munitions transported by the EONC.

After loading of the munitions, the hydraulic system is again activated; the door is swung closed and the door closed limit switch engages, to allow the switch for the rotating locking ring closed cycle to be engaged. If the door closed limit switch is in the "not engaged", the rotating locking ring switch is deactivated. As the rotating locking ring is moved into the closed position, tapered wedges in the vessel flange and the door flange engage providing the necessary force to close the door in the closed position. With the rotating locking ring in the closed position, the mechanical interlock pin and padlock are replaced, the power to the hydraulic system is turned off and the leveling jacks on the trailer are retracted. The EONC and trailer are now prepared for transport.

Around the outside face of the EONC door sealing surface are two 3/8 diameter o-rings. These viton o-rings are compressed as the rotating locking ring reaches the closed position, thereby sealing the door and preventing the release of chemical agent into the atmosphere if a leak were to occur during transport. The area between the two 3/8 diameter o-rings provides a test path to leak test the door seal prior to transport. This area between the o-rings is evacuated using a mechanical vacuum pump. A pressure rise leak test ensures the EONC is properly sealed and ready for transport.

Two additional ports located on opposite sides of the EONC are used to sample the interior of the EONC to ensure no chemical agent leaks occurred during transport.

1.2. Scope.

This specification covers general product fabrication and inspection requirements for the Enhanced On-Site Container. It also provides interpretation of certain requirements specified on the drawings. Specific requirements on the drawings always take precedence over these general requirements and interpretations. This specification is applicable to customary U. S. (inch) dimensions. Unless otherwise stated, all linear dimensions are in inches in this specification.

1.3. Paragraph References.

A reference to a specification paragraph number includes all subordinate paragraphs.

1.4. Definitions.

For the purposes of this specification, the following definitions shall apply.

Design Agency.	The Design Agency is Sandia National Laboratories, Albuquerque, NM which is responsible primarily for the design, development, and evaluation of the Enhanced On-Site Container.
Buyer:	Bechtel National Inc. acting as agent for the U.S. Army Corps of Engineers.
Supplier:	The Supplier is responsible for furnishing the Enhanced On Site Container.
Subsupplier:	The subsupplier is an organization selling materials, parts, components, apparatus, or services to a supplier.

2. DOCUMENTS

The following documents form a part of this specification.

2170677	Rigid Polyurethane Foam, 4.0 to 25.0 PCF
9904301	Passivation, Corrosion Resistant Steel
9906008	Abrasive Blasting
9912117	Welding, Aluminum Alloys
9912119	Welding, Carbon, Low-Alloy, and Corrosion- Resistant Steels
9915022	Insert, Installation, Externally-Threaded, Screw-Thread
9919100	Marking, General Methods
9952037	Test Method for Determination of Char Formation and/or Intumescent Properties of Rigid Foams

ANSI/ASME B1.1 - 89	Unified Inch Screw Threads (UN and UNR Thread Form)
ANSI/ASME B1.2 - 83	Gages and Gaging for Unified Inch Screw Threads
ANSI/ASME B1.7 - 84	Nomenclature, Definitions, and Letter Symbols for Screw Threads
ANSI/B1.10 - 88	Unified Miniature Screw Threads
ANSI/ASME B1.20.3 - 91	Dryseal Pipe Threads
ANSI/ASME B1.20.1 -83	Pipe Threads
ANSI/ASME B46.1 - 85	Surface Texture
ANSI/ASME B94.6 - 84	Knurling
ANSI/ASME Y1.1 - 89	Abbreviations for Use on Drawing and in Text
ASME Y14.5M - 94	Dimensioning and Tolerancing Engineering Drawings and Related Practices
ASME Y14.6 - 94	Screw Thread Representation Engineering Drawing and Related Documentation Practices
ANSI/AWS A2.4 - 86	Symbols for Welding and Nondestructive Testing
ANSI N14.5 - 87	Radioactive Materials Leakage Tests on Packages for Shipment
SNT-TC-1A	American Society for Nondestructive Testing recommended practice No. SNT-TC-1A
QAPP	U.S. Army Program Manager for Chemical Demilitarization, Quality Assurance Program Plan, Rev. 2, dated 8/5/96
SAE-J514-1994	Hydraulic Tube Fittings
SAE-J516-1994	Hydraulic Hose Fittings
SAE-J517-1994	Hydraulic Hose
SAE-J518-1993	Hydraulic Flanged Tube, Pipe, and Hose Connections, 4-Bolt Split Flange Type
NEMA ICS 1-1993	General Standards for Industrial Control and Systems
NEMA ICS 2-1993	Industrial Control Devices, Controllers and Assemblies
NEMA ICS 4-1993	Industrial Control and Systems, Terminal Blocks
NEMA ICS 6-1993	Industrial Control and Systems, Enclosures
NEMA MG 1-1993	Motors and Generators

3. MATERIAL VERIFICATION

Supplier shall provide Certified Material Test Reports (CMTR), with heat number traceability, where applicable, at a minimum, for the items described below:

a. Foam, polyurethane, 5 lb/cu ft.

1. Density: provided with each shipment, based on material batch.
2. Compressive strength parallel to rise at 75°F: Provided with each shipment, based on material batch.
3. Compressive strength perpendicular to rise at 75°F: Provided once as a pre-qualified property.
4. Compressive strength parallel to rise at 255°F: Provided once as a pre-qualified property.
5. Thermal conductivity: Provided once as a pre-qualified property.
6. Char formation: Provided once as a pre-qualified property.

b. Insulation, ceramic fiber blanket or microporous insulation.

1. Density: Provided with each shipment, based on insulation set.
2. Thickness: Provided with each shipment, based on insulation set.
3. Thermal conductivity: Provided once as a pre-qualified property.
4. Loss-on-ignition: Provided with each shipment, based on insulation set.

c. Outer o-ring, viton, molded, 0.375 dia.

1. Dimensions: Provided with each shipment, based on batch control certification.
2. Hardness: Provided with each shipment, based on batch control certification
3. Tensile: Provided with each shipment, based on batch control certification.
4. Elongation: Provided with each shipment, based on batch control certification.

d. Inner o-ring, viton, molded, 0.375 dia.

1. Dimensions: Provided with each shipment, based on batch control certification.
2. Hardness: Provided with each shipment, based on batch control certification
3. Tensile: Provided with each shipment, based on batch control certification.

4. Elongation: Provided with each shipment, based on batch control certification.

e. Closure mechanism, door
   1. flange
   2. tapered wedges
   3. hinge arms

f. Closure mechanism, vessel
   1. flange
   2. tapered wedges
   3. rotating ring
   4. stiffening ring
   5. hinge arms

g. Inner vessel
   1. flanged and dished heads
   2. body

h. Outer vessel
   1. flanged and dished heads
   2. body

i. Nut, sample port

j. O-ring, valve stem, sample port

k. O-ring, body, sample port

l. Body, round, sample port

m. Valve, stem, short, sample port

n. ISO corner fittings

o. Tubing, rectangular, ISO leg

4. MATERIAL RESTRICTIONS

Materials or components made of brass, bronze, and aluminum shall not be used. These materials will react to the decontamination solution. The exceptions are the trays and insert assemblies which contain aluminum.

5. WELD REPAIR

The criteria below shall be followed when supplier/subsupplier performs a weld repair. The supplier/subsupplier shall maintain records of all weld repairs detailed below. Copie of these records are to be included in the quality verification documentation package of the assembly or part.

a. Welded repairs of base metal:

For any base metal repair which exceeds 3/8" or 10% of the nominal wall thickness, whichever is less, shall be considered a major repair which requires pri approval from the Buyer. Minor repairs (those which do not exceed the lesser of 3/8 " or 10% of the nominal wall thickness) made in accordance with approved weld procedures do not require prior approval from the Buyer.

b. Repair of Class II welds:

A repair of a Class II weld does not require prior approval from the Buyer if the repair is made per approved weld repair procedures.

c. Repair of class I welds:

A major repair to a Class I weld requires prior approval from the Buyer if the repairs made after the weld bad been accepted by final nondestructive exam or Minor repairs and repairs initiated as a result of in-process or final nondestructive examination, may be made without prior approval by the Buyer if the repair is made per approved procedures.

6. METAL HEAT TREATMENT REQUIREMENTS

a. When necessary to facilitate fabrication, parts made from heat-treatable alloys, fo which material is specified in terms of the final temper for condition required, ma be fabricated from raw stock of a temper or condition different from the final temper and then heat-treated to the specified temper or condition.

b. After the completion of in-process heat-treatment, sample parts from each heat-treat lot shall be tested to ensure the material properties influenced by heat-treatment conform to the applicable material specification requirements. If tests c actual parts are impractical, suitable samples of the same alloy and starting condition as the parts shall be heat-treated with the lot and tested for conformanc to the applicable requirements.

c. Parts specified to be made from a work-hardened temper of a non-heat-treatable alloy must be fabricated from material of the required temper or condition.

d. Thermal treatments such as hot forming, stress-relieving, drying, bonding, a baking shall not be used unless specified on the drawings.

7. POST FABRICATION TESTING REQUIRED OF THE SUPPLIER

7.1. Leak Test Requirements.

After assembly of the EONC, a leak test shall be performed in accordance with ANSI N14.5. The leak rate, as determined by a pressure rise test, shall be less than 1 x 10^{-3} atm cc/s. This leak test is to test the o-rings and the seal surface. The area that is to be evacuated for testing is the area between the two o-rings, not the entire volume of the EONC.

7.2. Tray and Insert Test.

The trays are to be placed on an insert and statically loaded with a 10,000-pound dead weight. The criterion for passing this test is no permanent deformation of the tray or insert.

7.3. Sample Port Test (Left and Right).

After assembly of the EONC, the sample port shall be closed and leak tested per ANSI N14.5. The leak rate shall be less than 1 x 10^{-3} atm cc/s.

7.4. O-Ring Test Port Test.

After assembly of the EONC, the o-ring test port shall be plugged inside the EONC and leak tested per ANSI N14.5. The leak rate shall be less than 1 x 10^{-3} atm cc/s. It shall be established before and after this test that a free flow path exists through the port.

8. POST FABRICATION OPERABILITY TESTS REQUIRED OF THE SUPPLIER

The following tests shall be performed on each completed EONC to demonstrate correct alignment, function, and limits of the operating systems.

a. Locking Ring and Door Swing Test. Demonstrate 5 successful cycles.

The padlock and interlock pin shall be removed from the rotating locking ring.

The "power" LED on the retractable pendant is illuminated when the hydraulic power system key is engaged. The rotating locking ring shall be hydraulically moved to the "unlock" position using the switch on the pendant. Engagement of the limit switch to correctly position the rotating locking ring in the unlock position shall be demonstrated by illumination of the locking ring "unlock" LED on the pendant.

The door swing hydraulic cylinder shall be activated using the switch on the pendant to correctly position the door in the 115-120° "open" position. Engagement of the door open limit switch shall be demonstrated by illumination of the "opened" LED on the pendant.

The door swing cylinder shall be activated using the switch on the pendant to correctly position the door in the closed position. Engagement of the door closed limit switch shall be demonstrated by illumination of the "closed" LED on the pendant.

The rotating locking ring shall be hydraulically returned to the correct locked position. Engagement of the rotating locking ring locked limit switch shall be demonstrated by the illumination of the "locked" LED on the pendant as well as engagement of the interlock pin into the rotating locking ring. This completes one cycle.

b. Hydraulic System Check.

At the conclusion of the five locking ring and door swing test series the hydraulic control box shall be opened, all hydraulic connections, ports and fittings shall be examined for leaks. Hydrostatically proof test to 5,520 psig, and hold for three minutes. All hydraulic connections, fittings and hydraulic cylinders on the EONC shall be examined for leaks. Visible evidence (fluid) of any hydraulic fluid leak will require tightening or replacement of the affected hardware and demonstration of 5 additional cycles described in (a.) above.

c. Manual Bypass Door Operation. Demonstrate one cycle.

With the door in the 115-120° open position as described in section 1.1.e, rotate 90° the hydraulic bypass valve labeled "bypass door open" in the hydraulic control box. Manually push the door open to 165° until it contacts the mechanical stop on the hinge assembly. Continue manually pushing the door another 5° to rotate the spherical bushings in the door hinge assembly. Successful engagement of the door articulated limit switch at 170° will be indicated by the illumination of the "articulate door" light on the outside panel of the hydraulic control box. Operation of the hydraulic system using the pendant is restricted when the articulate door limit switch and indicator light are engaged. Return the bypass door open valve to the normal operation position.

Rotate 90° the hydraulic valve in the control box labeled "bypass door closed" and manually push the door back to 115-120°. Successful realignment of the door into normal operation orientation and disengagement of the articulate door limit switch shall be indicated by the loss of illumination of the "articulate door" light on the outside panel of the hydraulic control box. Reposition the bypass door closed hydraulic valve into the normal operation position. The hydraulic system will not function until the articulate door limit switch and light are disengaged. This completes one cycle.

d. Manual Locking Ring and Door Swing Test. Demonstrate One Cycle.

Rotate 90° the four bypass valves in the hydraulic control box labeled, "bypass door open, bypass door closed, bypass ring lock, and bypass ring unlock". Remove the padlock and interlock pin from the rotating locking ring. Open the two access ports and remove the insulation cans for the rack and pinion system. Insert two wrenches and rotate in the unlock direction as indicated on the outside of the EONC outer vessel until the rotating locking ring is fully unlocked.

Attach a portable hydraulic cylinder with manual hand pump to the attachment brackets on the lower hinge system and open the door to the 115-120° normal open position.

Return the door to the closed position using the portable hydraulic cylinder and hand pump. Lock the rotating locking ring using the two wrenches in the rack and pinion manual locking system. Insert the interlock pin. Remove the two wrenches, insert the insulation cans, and close the access ports to the rack and pinion gears. Return the four bypass valves in the hydraulic control box to their normal operating position. This completes one cycle.

9. QUALITY ASSURANCE

The quality assurance program requirements shall be implemented in accordance with the U.S. Army Corps of Engineer's Quality Assurance Program Plan (QAPP), Rev. 2, dated 8/5/96, in addition to the provisions stated in Section 5 of the Purchase Contract.

10. LOT SAMPLING FOR DESTRUCTIVE TESTING

10.1. Purpose.

The requirements of this section are intended to ensure that, through random lot testing, all units will meet the safety criteria for the Enhanced On-Site Container Program.

10.2. Lot Definition.

A production lot is defined as one year's production.

10.3. Responsibility for Testing.

The tests shall be performed and controlled by the Design Agency to provide independence of results.

10.4. Production Units.

One of the first three units, and one unit annually thereafter, may be randomly selected, a the discretion of the Army, by the Design Agency and subjected to the prototype test sequence defined in Table 1. Failure to meet the pre- or post-test leak requirements, cr deformation, or thermal test internal temperature limits will result in rejection of the effected unit. Further testing and rejection of units from the effected lot will be at the discretion of the Army.

TABLE 1 - PROTOTYPE TEST SEQUENCE

Test Number	Description
1	50,000-Pound Crush Test
2	Drop - Side
3	Puncture - CG over Outer Closure Joint
4	Thermal
5	Leak Test

The tests are defined as follows.

a. Free Drop. A free drop of the specimen through a distance of 10 feet onto a flat, essentially unyielding surface, striking the surface in a position for which maximum damage is expected.

b. Puncture. A free drop of the specimen through a distance of 40 inches in a position in which maximum damage is expected onto the upper end of a solid, vertical, cylindrical, mild steel bar installed on an essentially unyielding horizontal surface. The bar must be 6 inches in diameter with the top horizontal and its edge rounded to a radius of not more than 0.25 inch, and of a length as to cause maximum damage. The long axis of the bar must be vertical.

c. Thermal. This test shall consist of exposure of the specimen, fully engulfed except for a simple support system, in a JP-8 fuel/air fire for a period of 15 minutes, minimum. The fuel source shall extend horizontally at least 3 feet beyond any external surface of the specimen, and the specimen shall be positioned 3 feet above the surface of the fuel source. The specimen may not be cooled artificially following the 15-minute exposure. The inner wall of the containment vessel shall not exceed 250°F as a result of this exposure.

d. Crush. The specimen shall be subjected, for a period of 24 hours, to a compressive load of 50,000 pounds applied to the top of the specimen in a position in which the package would normally be transported. This test shall be applied to an undamaged specimen. No permanent specimen deformation shall result from this test.

e. Leak Test. Prior to destructive testing a leak test shall be performed in accordance with ANSI N14.5. The leak rate shall be less than 1×10^{3} atm cc/sec. After the destructive testing the leak test shall be repeated, and the leak rate shall be less than 1×10^{-1} atm/sec.

10.5. Significant Design Changes.

In the event of any significant design change, as determined by the Design Agency, the random lot testing specified in 10.4 will be invoked for all production units fabricated with the design change.

Umatilla Chemical Agent Disposal Facility

ATTACHMENT 14

HD AGENT RINSATE EMISSIONS DEMONSTRATION TEST PLAN FOR LIQUID INCINERATORS 1 AND 2

UMATILLA CHEMICAL AGENT DISPOSAL FACILITY HD AGENT RINSATE EMISSIONS DEMONSTRATION TEST PLAN FOR LIQUID INCINERATORS 1 AND 2

Revision 3

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HD RINSATE EMISSIONS DEMONSTRATION TEST PLAN FOR LIQUID INCINERATORS 1 AND 2

OVERVIEW

The Umatilla Chemical Agent Disposal Facility (UMCDF), United States Environmental Protection Agency (EPA) Identification Number ORQ 000 009 431, operates under a Resource Conservation and Recovery Act (RCRA) permit issued pursuant to Oregon Revised Statutes Chapter 466 and the Hazardous Waste Regulations promulgated there under by the Oregon Department of Environmental Quality (DEQ) in Chapter 340 of the Oregon Administrative Rules (OAR).

The UMCDF is subject to the Maximum Achievable Control Technology (MACT) regulation for Hazardous Waste Combustors (HWC) promulgated September 30, 1999, and the final replacement standards that became effective December 12, 2005. To demonstrate compliance with the HWC MACT, the UMCDF has satisfied the comprehensive performance testing (CPT) and continuous monitoring system evaluation requirements found in 40 Code of Federal Regulations (CFR) §63.1207 and in 40 CFR §63.7 (MACT General Provisions). Initial CPT requirements under the interim standards (i.e., the standards published in the Federal Register [FR] on February 13, 2002, 67 FR 6792) have been satisfied for the Liquid Incinerator 1 (LIC1) and the Liquid Incinerator 2 (LIC2). In accordance with 40 CFR §63.1207(d)(4), all subsequent periodic comprehensive performance testing and confirmatory testing requirements were waived under the interim standards. In accordance with 40 CFR §63.1207(c)(3), the UMCDF conducted a CPT on HD agent to demonstrate compliance with the standards under 40 CFR §63.1219 from April 29, 2010 through June 26, 2010. The data from these tests have been submitted to DEQ under separate cover.

The UMCDF conducted HD agent trial burns (ATB) required by the UMCDF Hazardous Waste Permit and HWC MACT. This plan has been developed to address emission testing that will occur for LIC1 and LIC2 to feed a mustard agent derivative waste stream, HD rinsate. As both LIC1 and LIC2 will be tested, the acronym “LIC” may be used throughout the plan to reference LIC1, LIC2, or both. The term "RCRA" is commonly used in the plan when referencing the UMCDF Hazardous Waste Permit requirements. The UMCDF will comply with the governing permit requirements of RCRA and the Clean Air Act that are in place at the time this emissions testing is conducted.

The purpose of this plan is to provide emissions data from feeding HD rinsate to the LIC. Prior to conducting the emissions test, an evaluation of the Continuous Monitoring System (CMS) will be performed. Documentation of the adequacy of the CMS will be submitted to the operating record at least 15 days prior to the start of the HD rinsate emissions demonstration test.

The permitted operating parameter limits (OPLs) in effect at the time of testing will be used to process HD agent rinsate. No changes to these OPLs are proposed. The feed rate for HD rinsate and any spent decontamination solution (SDS) will be in accordance with the current RCRA, Title V, and/or Notice of Compliance (NOC) feed rates and OPLs.

The continuous operation of the MPF is required to supply the HD rinsate for the LIC HD rinsate emissions test, therefore, the testing period will span approximately 20 days for both LICs.

The objectives for each LIC HD rinsate emissions demonstration test are as follows:

- Demonstrate that HD agent emissions are within the permitted emission rate.

- Demonstrate particulate matter emissions do not exceed 34.3 milligram/dry standard cubic meter (dscm) and/or 0.013 grains per dry standard cubic foot corrected to 7% oxygen.
- Demonstrate hydrogen chloride emissions do not exceed 1.91E-02 grams per second or 4 pounds per hour and 32 parts per million by volume (ppmv) corrected to 7% oxygen (hydrogen chloride and chlorine gas, combined emissions, expressed as chloride equivalents, dry basis).
- Demonstrate dioxin and furan emissions do not exceed 0.40 nanograms (ng) toxicity equivalence per dry standard cubic meter (dscm) corrected to 7% oxygen.
- Demonstrate the carbon monoxide level corrected to 7% oxygen does not exceed the 100 ppmv, dry basis over a rolling one-hour average (ROHA).
- Demonstrate total hydrocarbon emissions do not exceed 10 ppmv, dry basis, over a ROHA corrected to 7% oxygen and reported as propane.
- Demonstrate metals emission rates are in compliance.
- Demonstration that volatile and semivolatile products of incomplete combustion (PIC) produced during incineration of HD rinsate are within the permitted levels.
- Demonstrate maximum HD rinsate feed rates and process operating conditions to ensure compliance with emission limits and confirm operating conditions for the LIC.

Conduct an emission factor verification test for sulfur dioxide and oxides of nitrogen.

The purpose of each LIC HD rinsate emissions demonstration test is to demonstrate the objectives listed above. During each LIC HD emissions test, the incineration system will be operated to confirm system operating conditions.

Samples collected during each LIC HD emissions test will be analyzed using appropriate analytical methods and the results will be compared to the HWC MACT standards, the UMCDF Title V Permit, and the UMCDF Hazardous Waste Permit limits. The HD rinsate feed rate will be less than or equal to the existing HD agent feed rate and the OPLs will be those established as a result of the HD ATB/CPT conducted in 2010.

SECTION 1.0 THE LIC HD EMISSIONS DEMONSTRATION TEST PLAN

1.1. INTRODUCTION

The United States Army (Army) designed and built a hazardous waste treatment facility for the destruction of the chemical agent munition stockpile at the Umatilla Chemical Depot (UMCD). The UMCD, located in northeastern Oregon, stores and maintains chemical munitions for Department of Defense agencies. It is near Hermiston, Oregon, approximately ten miles southwest of the city of Umatilla. The Umatilla Chemical Agent Disposal Facility (UMCDF) is located within the UMCD and is designed to treat nerve agents (GB and VX), blister/mustard agent (HD), drained munitions, secondary waste, bulk containers, liquid wastes, energetics, and propellant components.

Public Law 99-145 (Department of Defense Authorization Act, 1986) as amended, directs the Department of Defense to destroy the United States' stockpile of unitary chemical agents and munitions. The Army is the custodian of the chemical stockpile for the Department of Defense and stores chemical agents and munitions at the UMCD. The destruction and elimination of the stockpile was accomplished by first separating the agents, energetic components, and (with the exception of two munitions) the munition hardware. The agents, energetic components, and munitions hardware/ton containers were then separately treated by incineration. HD chemical agent is drained from ton containers and the agent and containers are incinerated. Since the HD agent is over 60 years old, some of the once liquid HD has solidified. The Heel Transfer System (HTS) is used to spray high pressure (3,000 psi) water at 126^{o}F to mobilize the solid heel. The addition of high pressure hot water creates what is known as rinsate. The UMCDF previously processed rinsate through the Metal Parts Furnace (MPF) in a ton container; however this process will prolong the mustard campaign at UMCDF. Processing the HD rinsate in one or both of the two LICs would allow the HD campaign to complete in a timeframe consistent with the deadline imposed by the Chemical Weapons Convention.

The UMCDF operates under a hazardous waste permit issued pursuant to Oregon Revised Statutes Chapter 466 and the hazardous waste regulations in Chapter 340 of the Oregon Administrative Rules (OAR). The Oregon Department of Environmental Quality (DEQ) originally issued a hazardous waste permit for the UMCDF on February 12, 1997. The permit was subsequently reissued with a new United States Environmental Protection Agency (EPA) Identification Number, ORQ 000 009 431, on January 29, 1999 and again in 2005. Under the conditions of the UMCDF Hazardous Waste Permit, each incineration system must demonstrate the ability to effectively treat any permitted hazardous waste such that human health and the environment are protected. Section 3004 of RCRA (1976) requires the promulgation of performance standards that establish the levels of environmental protection that treatment, storage, and disposal facilities for hazardous waste must achieve, and mandates the criteria against which applications for permits must be measured. The UMCDF met these requirements with the completion of the HD ATB/CPT. An update to the Human Health Risk Assessment (HHRA) was performed following the HD ATB/CPT. The HHRA will also be updated based on the data from this rinsate emissions demonstration test.

The UMCDF consists of four incineration systems. The four incinerators are: the two Liquid Incinerators (LIC), the Metal Parts Furnace (MPF), and the Deactivation Furnace System (DFS). The four incinerators, which are equipped individually with a wet pollution abatement system (PAS), share a common stack (PAS-STAK-102). The MPF and both of the LICs completed an HD ATB/CPT in summer 2010. The DFS will not be operated during the HD campaign.

Washington Demilitarization Company, LLC (WDC), the UMCDF systems contractor (SC), has the responsibility for operating the UMCDF and executing each LIC HD rinsate emissions demonstration test

(EDT). The SC will use a field sampling subcontractor (FSS) to perform emissions sampling, packaging, transportation of samples to the laboratory, sample analysis, and reporting of the results. The quality assurance/quality control (QA/QC) associated with these tasks is outlined in the UMCDF Quality Assurance Project Plan (QAPjP) found as Appendix A to this document.

For each LIC, HD rinsate emission testing will consist of a single condition and will be conducted at normal conditions at the lower temperature range. A minimum of three valid runs will be completed. The lower temperatures create a worst-case condition for organic emissions and the formation of products of incomplete combustion (PIC). If any run is not executed under steady-state conditions or if data is lost or compromised in any way, the run may be terminated or invalidated. An additional run to replace the suspect run may be executed. The UMCDF test director, with concurrence of UMCDF project management, and concurrence of the DEQ representative, will make a determination as to whether an additional run will be performed.

This UMCDF LIC HD rinsate emission demonstration test plan describes each LIC system, as well as the operating conditions and instrumentation that will be used to demonstrate the LIC1and LIC2 HD rinsate emission test objectives. The QAPjP (Appendix A) is included to provide an overview of the sampling effort by the FSS to collect samples and deliver them to the analytical laboratories. The QAPjP also contains specified QA/QC requirements for the sampling and laboratory analysis activities performed by the FSS; documents the precision, accuracy, representativeness, completeness, and comparability objectives for the data set

The purpose of the LIC1and LIC2 HD rinsate emissions demonstration test is to realize the objectives presented in the Overview section of this plan. During each LIC HD rinsate emissions test, the system will be operated to confirm applicable furnace operating conditions while maintaining HD emissions below the permitted limit. The LIC primary and secondary chamber exhaust gas temperatures will be maintained at the low end of normal setpoint during the HD rinsate emissions testing and the LIC PAS will be operated at a less than optimal efficiency rate to provide an environment less suitable to remove pollutants. The pH of the brine will be maintained at the lower end of the permitted range.

Normal system data will be collected in addition to the specific sampling and analysis conducted to demonstrate the objectives of the LIC HD rinsate emissions testing. To confirm Air Contaminant Discharge and Title V Permit requirements, a sulfur dioxide and oxides of nitrogen emission factor will be documented during each LIC HD rinsate emissions test. Table 1-1 provides a summary of the exhaust gas sampling for the LIC HD rinsate emissions demonstration tests. For more detailed information regarding sampling and analytical methods, refer to Table A-1 in Appendix A. EPA Methods 1, 2, 3, and 4 (40 CFR §60, Appendix A) will be used to determine exhaust gas flow rates, gas composition, and moisture. Documentation of non-cyclonic flow conditions at the isokinetic sampling location will be conducted before commencing the first run of each LIC HD rinsate emissions test. Carbon monoxide and oxygen concentrations will be determined by permanent facility monitors. The oxygen data collected via continuous emission monitoring system (CEMS) will be in accordance with 40 CFR §60, Appendix B, Performance Specification 4B, and used to correct all data, including particulate matter data for compliance with the HWC MACT particulate matter standard. The FSS will determine carbon dioxide and oxygen concentrations using EPA Method 3B which will be used to determine flue gas molecular weight and compile all particulate matter data corrections to 7% oxygen, for compliance with the RCRA particulate matter standard.

TABLE 1-1. LIC HD RINSATE EMISSIONS DEMONSTRATION TEST EXHAUST GAS SAMPLING SUMMARY

Sampling Train [e]	Target Analyte/Group
EPA Method 5/26A	Hydrogen chloride, chlorine, hydrogen fluoride, and particulate matter [f]
EPA Method 29	Metals
SW-846 Method 0010	Semivolatile organic compounds - PICs
SW-846 Method 0010	Total unspeciated semivolatile and nonvolatile organic compounds
SW-846 Method 0023A	Dioxins, furans, and PCBs
SW-846 Method 0031	Volatile organic compounds - PICs
SW-846 Method 0040	Total unspeciated volatile organic compounds
EPA Method 3B	Carbon dioxide and oxygen [a]
Facility CEMS	Carbon monoxide [b]
Facility CEMS	Oxygen [c]
EPA Method 7E	Nitrogen oxides
EPA Method 25A	Total hydrocarbons [d]
EPA Method 6C	Sulfur dioxide
Agent Monitoring	LIC ACAMS/DAAMS are on line as specified by permits

Notes:

[a] EPA Method 3B will be utilized to determine the flue gas molecular weight and to correct the particulate matter data to 7% oxygen, for compliance with the UMCDF Hazardous Waste Permit particulate matter standard, as applicable.

[b] Carbon monoxide emissions will be collected using facility monitors operated such that the requirements of 40 CFR §60, Appendix B, Performance Specification 4B, are met.

[c] Oxygen emissions will be collected using facility monitors operated such that the requirements of 40 CFR §60, Appendix B, Performance Specification 4B, are met. This oxygen data will be utilized to correct all HWC MACT data to 7% oxygen, where such correction is required.

[d] Total hydrocarbons, as propane, will be collected using EPA Method 25A such that the requirements of 40 CFR §60, Appendix B, Performance Specification 8A are met.

[e] EPA Methods are from 40 CFR §60, Appendix A. SW-846 Methods are from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA publication SW-846.

[f] Particulate matter is measured in accordance with Method 5 as described in Method 26A in conformance with the Title V Operating Permit.

Abbreviations:

CEMS	continuous emissions monitoring system
EPA	United States Environmental Protection Agency
PCB	polychlorinated biphenyls
PIC	products of incomplete combustion
UMCDF	Umatilla Chemical Agent Disposal Facility

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SECTION 2.0 DETAILED ENGINEERING DESCRIPTION OF THE LIQUID INCINERATOR SYSTEMS

2.1. PROCESS DESCRIPTION

There are two similar liquid incinerators (LIC1 and LIC2) at the UMCDF. This section presents the process description for either LIC. Both LICs are expected to be available during the HD campaign. The furnaces are identical in design; however, the instrument numbering system is unique to each furnace. When specific instrument identification numbers (tag numbers) are referenced, the LIC1 identification number is generally listed before the LIC2 identification number.

Each LIC is a two-chambered, refractory-lined incinerator specifically designed to incinerate agents GB, VX, and HD from munitions and bulk items. In addition, other liquid wastes generated on-site, such as SDS, will also be incinerated. During the LIC1and LIC2 HD rinsate emissions demonstration tests, the selected LIC will process HD rinsate in the primary combustion chamber and process water and/or SDS in the secondary combustion chamber.

Each LIC consists of three major components:

- Primary combustion chamber (PCC)
- Secondary combustion chamber (SCC)
- PAS

Figure 2-1 presents a simplified process flow diagram for a LIC. The process flow diagram for the LIC PAS is shown in Figure 2-2, and Figure 2-3 shows the process flow diagram for the LIC PAS Filter System (PFS). Table 2-1 provides a summary of the engineering description for the LICs.
Detailed drawings and equipment information for the process are maintained in the on-site operating record. Tables 2-2 and 2-3 are included to indicate the range of operation of the existing permits at the time the rinsate emission test will be performed. These tables contain the proposed OPLs from the HD ATB/CPT. Tables 2-2 and 2-3 may need to be updated once the OPL permit modification based on the HD ATB/CPT has been approved by DEQ. Tables 2-4 and 2-5 indicate the range of the instruments monitoring each OPL. Tables 2-4 and 2-5 may need to be updated once the OPL permit modification has been approved by DEQ. Tables 2-6 through 2-8 show the residence time of the range of mustard to rinsate ratio that may be processed during the emissions demonstration test.

In normal waste processing operations, various support systems sustain operation of the LICs. In addition to support systems such as air, hydraulics, and water, the support systems that are necessary include:

- Heating, ventilating, and air conditioning (HVAC) system
- Agent Collection System (ACS)
- SDS tank system
- Rinsate tank system
- Container Handling Building/Unpack Area
- Bulk Drain Station (BDS)
- Heel Transfer System (HTS)

2.1.1. Heating, Ventilating, and Air Conditioning System

The HVAC system ventilates the Munitions Demilitarization Building (MDB). The system is designed to bring in outside air and distribute it through various rooms. The air is moved from the least toxic to the most toxic areas and then through the MDB HVAC carbon filters before it is discharged to the atmosphere. This approach reduces any fugitive emissions from operations inside the MDB.

The MDB is divided into areas defined by categories. These categories are based on the anticipated type and degree of agent contamination as follows:

Category A	Toxic process area under negative pressure; routine contamination with either agent liquid or vapor; a high hazard area.
Category A/B	An A/B area meets all design criteria for an A area, but in typical service acts as a B area (i.e., only a vapor agent hazard is present), but under some circumstances, a liquid agent hazard may be present, hence the need for design to meet the A area requirements.
Category B	Toxic process area under negative pressure, high probability of agent vapor contamination resulting from routine operations; a high hazard area.
Category C	Work area under negative pressure and subject to inadvertent vapor contamination; a negligible hazard area.
Category D	Work area under ambient pressure that will not be subject to contamination; a negligible hazard area. These areas will be adjacent to or open to the out-of-doors.
Category E	Work area under positive pressure that will not be subject to contamination; a negligible hazard area.

All category A, A/B, B, and C areas are provided with appropriate ventilation systems to: (1) collect and monitor ventilation air from the work area that may contain agent vapors prior to being exhausted to the ambient air, (2) provide mixing of air that is essential for monitoring work areas with chemical agent detection devices, and (3) provide a negative pressure within the work areas to eliminate uncontrolled release of chemical agent vapors. Specific areas of the MDB are kept under negative pressure in such a way that the areas with the highest potential for contamination are at a greater negative pressure than the lower contamination level areas. This cascade ventilation system approach ensures that the air always flows from cleaner areas to the more contaminated ones. The air is collected from the more contaminated areas and is routed through a filter system before being exhausted to the atmosphere via a stack common to all the filter units. The ventilation filter system uses a series of filter units; each unit contains a filter train and a motor/blower. The filter train consists of pre-filters, high-efficiency particulate air (HEPA) filters, six banks of activated carbon filters, and a second bank of HEPA filters. Each filter bank is provided with gauges to indicate pressure drop across the filters. Chemical agent sampling ports are provided between selected banks of carbon filters and before the exhaust stack. Category E areas are positive pressure with carbon-filtered supply air.

2.1.2. Agent Collection System

The ACS includes components related to agent draining and agent storage and feed. During ton container processing, the ton containers are punched and drained at the BDS. A drain tube is inserted into the ton container and the agent is drained by an air-operated pump to the agent holding tank. The amount drained is determined by load cells at the BDS.

Two agent holding tanks (ACS-TANK-101 and ACS-TANK-102) and incinerator feed pumps (ACS-PUMP-101/102) are located within the Toxic Cubicle (TOX). A third agent holding tank (ACS-TANK-108) is located in the SDS room. These tanks and pumps are remotely monitored and controlled from the Control Room (CON). The working volumes (high-level alarm volume) of tanks ACS-TANK-101, ACS-TANK-102, and ACS-TANK-108 are 500 gallons, 1,020 gallons, and 1,851 gallons, respectively.

During agent operations in a LIC, the agent is pumped into the PCC where it is thermally destroyed. The amount of liquid agent treated in the PCC is quantified using two flow meters in series to ensure compliance with the maximum permitted feed rate limit. The agent feed rate is recorded as the average of the two flow meter readings. The metals concentrations measured in the ACS tank are multiplied by the flow meter readings to document the metal feed rates. The programmable logic controller (PLC) is programmed with an alarm and interlock to automatically ramp down agent feed when the two flow meters deviate at a predetermined level. The agent is periodically sampled in accordance with Attachment 2 (Waste Analysis Plan) [WAP]) of the Hazardous Waste Permit to determine the concentration of individual compounds in the feed. This sampling occurs as part of normal operations. Procedures are in place to minimize and control spills from the tanks.

2.1.3. Spent Decontamination Solution Collection/Storage Tank System and Rinsate Tanks

Decontamination solution will be an aqueous-based mixture of sodium hydroxide or other decontamination solution used to neutralize agent contamination on equipment, materials, or personal protective equipment. The decontamination solution is sprayed on the contaminated area, and then rinsed with water. The SDS is collected in a dedicated system.

The SDS is collected in a network of sumps and pumps covering areas where personnel, equipment, and materials are decontaminated. This sump/pump network collects the SDS and rinse water from the decontamination and wash-down of agent-contaminated equipment or personnel. The sumps have pumps and level sensors. The pump discharge piping is arranged to segregate the SDS piping from each of the classified areas (Categories A, A/B, B, or C) so that a failure of any check valve only allows liquid from the same category room to mix. These separate headers are routed to the SDS holding tank system (SDS-TANK-101 and SDS-TANK-102) in the SDS room, where SDS is stored for future treatment in the SCC of LIC1 or LIC2. The two SDS holding tanks are 2,300-gallon tanks with a maximum allowable capacity of 2,168 gallons (high-high level alarm) each. During agent operations, spill tanks are maintained in reserve for contingency purposes. The spill tanks are located in the Munitions Processing Bay (MPB).

During the LIC HD rinsate emissions demonstration testing, liquid from the SDS tanks will be processed in the SCC of the LIC being tested. It will be necessary to accumulate nine (9) hours of liquid in the SDS tanks to conduct a single test run. This is equivalent to approximately 18,000 pounds of liquid (or approximately 2,020 gallons). Therefore, accumulation of one tank batch is required to conduct a single test run. If insufficient SDS exists, process water will be added to the sump and pumped to the SDS tank to allow for completion of each HD rinsate emissions demonstration test run.

The rinsate will be stored in two dedicated tanks, RCS-TANK-101A/B. Each tank has a maximum capacity of 610 gallons and a working capacity of 412 gallons. For the HD rinsate emissions demonstration test, both tanks will be filled to the maximum capacity to ensure nine (9) hours of testing. The rinsate tanks are filled from the HTS pumps 9201 and 9101. To ensure 9,000 lbs of rinsate is available per run, both RCS tanks will be filled to a level below the high high level. Each tank will be sampled for metals prior to commencing a run of the HD rinsate emission test.

2.1.4. Container Handling Building/Unpack Area

The Container Handling Building receives bulk items in enhanced on-site containers (EONC) from the UMCD storage area. The purpose of the Unpack Area is to provide an area within the UMCDF to remove items from the EONCs and prepare the item for the demilitarization process. Ton containers have experienced some pressure build up, ranging from zero to 220 pounds per square inch at the Tooele Chemical Agent Disposal Facility (TOCDF). A depressurization glove box is installed in the unpack area to allow for the release of pressure from each ton container prior to that ton container being placed into a ton container cradle for movement through the MDB and to the MPF. The venting operations from the ton containers will be routed through a carbon filtration system prior to exhausting to the atmosphere.

2.1.5. Bulk Drain Station/Heel Transfer System

The BDS will be used to drain agent from ton containers. The ton container will first be weighed as part of the agent drain verification process at the BDS. It will then be punched, and a drain tube inserted into the casing. The agent will be drained via a pump that transfers the blister agent to the ACS tanks.
The load cells on the conveyor will be used to weigh the mass remaining in the ton container. The ton container will be weighed to quantify the remaining weight of HD in the ton container. If the amount that is not drainable (called a heel), is greater than 40 pounds, then the Heel Transfer System (HTS) will be used to spray high pressure hot water into the ton container which will mobilize a portion of the heel to allow for a transfer of the material to the rinsate tanks or to another ton container. Either before or after any HTS operation, two additional holes will be punched in the ton container for a total of three holes. These holes allow for venting of HD inside the ton container during MPF processing.

The UMCDF examined the possibility of treating the water addition to the ton as liquid HD or as SDS that could be fed to the LICs. The Hazardous Waste Permit limit for HD in the SDS is 200 parts per billion (ppb) as enumerated in Section 2.1.2 of the WAP. Given that the ton container had, nominally, 1,700 pounds or 170 gallons of distilled mustard added, the probability of the contents with hot water added, exceeding 200 ppb is very high. Thus, the HTS liquid was not considered as a possible SDS candidate. Modeling of HD in the SDS was completed in 1995 by Maumee Research and Engineering in a report entitled "LIC/SDS Agent Concentration Study," (see the reference materials submitted as part of PMR UMCDF-09-003-MISC(3), *HD Agent Trial Burn Plan*) and the study concluded that the SDS HD rate could be higher than 200 ppb provided good mixing and evaporation occurred. A second study by Selas Fluid Processing Corporation ("Process Study for EG&G Defense Materials Inc. for TOCDF Facility in Tooele, Utah," August 2003) (see reference materials submitted as part of the HD ATB plan PMR) determined that the organic content to the SCC should be no more than 10% to ensure the temperature and air flow through the furnace remain at permitted limits. Higher organic contents would require a larger induced draft fan and a different burner should higher organic loading be required. Should those improvements be made, the residence time would be negatively impacted. Thus, the primary limiting factor to HD in the LIC SCC is the existing permit limit.

The UMCDF also examined the possibility of putting the HTS liquid into an existing ACS tank and feeding the material to the primary chamber. The liquid effluent from the initial stage of hot water spraying was highly acidic with the pH less than 1. (See "Cleanout and Decontamination of a Mustard Agent Ton Container," June 1997, page 6-2 in the reference materials submitted as part of the HD ATB plan Permit Modification Request (PMR)). The material of construction of the ACS system is mild carbon steel which is not compatible with highly acidic material. The conclusion is that a new rinsate tank system should be installed that is compatible with the HD rinsate. The RCS tank system has been submitted to ODEQ as a permit modification. Secondly, the mixture of water and HD may impact the flame scanners on the Burner Management System (BMS). The BMS measures flame strength; if water is injected, the flame scanners may not detect a flame, the BMS senses loss of flame strength and will shut down the burner to avoid any build up of natural gas in the combustion zone. When operating the furnace at a temperature above the auto-ignition temperature of 1400°F, the build up of natural gas cannot occur. The BMS has been studied and engineering has concluded that the flame scanners automatic waste feed cut off can be taken off-line during rinsate processing when the combustion chamber is above the auto-ignition temperature specified by the National Fire Protection Association (NFPA) temperature standard for ovens and furnaces (NFPA-86). Thus, the impediment to feeding HD rinsate to the PCC has been studied and the issue can be overcome to include the cutoff of auxiliary fuel at above the auto ignition temperature as the minimum permitted temperature in the primary chamber or 2604°F for LIC1 and 2627°F for LIC2. Lastly, the exterior shell of the primary chamber is carbon steel which is lined with high alumina refractory to protect the steel shell. The primary chamber is lined with Thermal Ceramics SR-90 between the alumina refractory and the steel shell. The SR-90 is well suited for high temperatures and is resistant to thermal shock. To overcome this concern, Harbison-Walker, the refractory manufacturer, performed a test of high acidic mixture on the refractory. The study indicated that the current refractory in the LIC primary can withstand acid attack from HD rinsate. Since the three reasons previously offered in the HD Agent Trial Burn Plan as to why rinsate had to be processed in the MPF have been overcome, the HD rinsate is proposed to be processed in the LICs.

The UMCDF is permitted to process rinsate in a ton container through the MPF. While that permit provision will remain in place, the HD rinsate processing will also be to the LIC primary chamber.

2.2. TON CONTAINER PROCESSING

The UMCDF will use HD rinsate drained from ton containers to facilitate the LIC HD rinsate emission testing. The ton containers will be removed from the UMCD and transported to the UMCDF for treatment. The ton containers will be conveyed to the BDS/HTS in the MPB. The BDSs will punch and drain the HD in the ton container. The HD will be pumped to the ACS storage tanks pending subsequent treatment in the LIC. Any heel remaining in the ton container will be sent to the HTS for high pressure hot water addition. The rinsate will be pumped from the ton container to the RCS. After the BDS/HTS operations are completed, the ton containers are conveyed to the MPF for treatment.

2.3. AGENT FEED SYSTEMS

The agent feed system is designed with positive displacement pumps (ACS-PUMP-101/102/108) that will be remotely controlled. The agent is fed via the agent feed line with the automatic waste feed cut-off (AWFCO) system described in Section 2.14.1 in effect. The agent feed system is maintained in an engineering-controlled environment.

2.4. PRIMARY COMBUSTION CHAMBER

During HD operations, agent stored in the ACS tanks will be pumped at a continuous rate through a duplex strainer designed to remove large particles that may harm the agent feed pump or plug the PCC feed lines. Prior to entering the PCC, the agent feed stream will be dispersed into the burner block through an atomizing nozzle and mixed rapidly at a high temperature with combustion air and/or natural gas. This rapid mixing of the agent with air and/or natural gas at a high temperature will provide a short and stable flame pattern within the burner block. For the HD rinsate feed, rinsate stored in the rinsate tanks will be pumped at a continuous rate through a filter system designed to remove large particles that may harm the rinsate feed pump or plug the PCC feed lines. Prior to entering the PCC, the HD rinsate feed stream will be dispersed into the burner block through an atomizing nozzle and mixed rapidly at a high temperature with combustion air and/or natural gas.

The PCC is a refractory-lined cylinder with natural gas as the supplemental fuel. The high-temperature AWFCO and the low-temperature AWFCO will be in accordance with the current permitted values. During typical operations, supplemental fuel, waste, and atomizing air enter the chamber via the burner nozzle and are ignited. Combustion air is supplied through a wind box by a combustion air blower. Atomizing air is supplied from the plant air system.

The PCC is maintained at a negative internal operating pressure with respect to the room (which is maintained at a negative pressure with respect to the atmosphere) by regulating the flow rate of the exhaust blower located downstream of the PAS. A high-pressure pre-alarm alerts the operator of a potential upset condition. The room that houses the PCC is also maintained at a negative pressure with respect to the atmosphere by the flow rates of the PCC combustion air blower and by regulating the HVAC system.

During normal operations, the HD agent liquid waste can supply sufficient heat to maintain design temperature. However, supplemental fuel is added to ensure a stable flame pattern within the PCC and to maintain design temperatures when the waste feed rate is not at the design level. For HD rinsate operations, the system is designed to have supplemental fuel added as required to sustain minimum temperature.

2.5. SECONDARY COMBUSTION CHAMBER (AFTERBURNER)

The SCC or afterburner is a refractory-lined cylindrical enclosure that provides additional time at temperature for the gases leaving the PCC. Process water is normally introduced into the SCC to provide temperature control. The secondary combustion chamber can be used to destroy SDS regardless of what is being processed in the primary chamber. Even when agent is not being processed in the PCC, the SCC is used to destroy organic constituents in the SDS, which may be fed at a rate of up to the maximum rate allowed by the permit. In addition to SDS, the UMCDF is permitted to process personnel maintenance building and laboratory aqueous liquid wastes, UMCD liquid waste, and agent-contaminated hydraulic fluids and lubricating oils and SDS in the SCC. SDS is the largest waste stream both by volume and weight, fed to the SCC; hence, it will be fed during the HD rinsate emissions demonstration testing simultaneously with HD rinsate being fed to the PCC. SDS is sprayed through an atomizing nozzle at the top of the SCC (i.e., the normal flame zone of the secondary chamber) to cool exhaust gases.
The atomized solution mixes with the exhaust gases from the PCC, resulting in destruction of organics and evaporation of residual water. Process water is used for cooling if no SDS is available and/or when agent is being processed in the primary chamber. A SCC burner is used to maintain operating temperature during normal operations and when output from the PCC is limited. Combustion air from the SCC room is used, as necessary, to maintain excess air conditions in the SCC.

The UMCDF demonstrated DRE on SDS during the surrogate trial burns (STB) on each LIC. The LIC1 STB, completed in February 2003, fed 2,007 pounds/hr of SDS spiked with 2.85 pounds/hr of 1,2,4-trichlorobenzene (a Class 1 Principal Organic Hazardous Constituent [POHC]), and 5.33 pounds/hr of tetrachloroethylene (a Class 2 POHC) into the SCC. A DRE greater than 99.9999% was achieved for each POHC. The LIC2 STB, completed in August 2004, had an SDS feed rate of 2,040 pounds/hr spiked with 3.0 pounds/hr of 1,2,4-trichlorobenzene and 5.6 pounds/hr of tetrachloroethylene into the SCC. A DRE greater than 99.9999% DRE was achieved on material more difficult to incinerate than HD (a Class 4 POHC). The STB DRE results are valid to demonstrate HD destruction in the SDS feed.

The SCC will be maintained at a negative internal operating pressure with respect to the room (which is maintained at a negative pressure with respect to the atmosphere) by regulating the flow rate of the exhaust blower located downstream of the PAS. A high-pressure pre-alarm is provided to alert the operator of a potential upset condition.

Slag generated from incinerating the SDS will collect on the bottom of the SCC. The LICs were designed with slag removal systems to remove the slag through the use of a drill, slide gate, conveyors, hydraulic lifts, and a transfer conveyor. During the LIC HD rinsate emissions demonstration test, the heater and slide gate will not be operational.

2.6. LIC POLLUTION ABATEMENT SYSTEM

The flue gas from the SCC is ducted to the PAS. The PAS for each LIC consists of a quench tower, a venturi scrubber, scrubber tower, clean liquor air coolers, mist eliminator vessel, the gas reheat system, a carbon filter system, associated pumps and blowers, and an exhaust stack. During the HD campaign, the exhaust stack will combine treated flue gas from the LICs and MPF. The PAS configuration for each LIC is shown on Figure 2-2. The purpose of the PAS is to cool and scrub the acid exhaust gases and capture the fine particulate matter produced by the combustion process.

The absorption of acid pollutants into the brine in the venturi and the packed bed scrubbers results in a buildup of acidic components, lowering the pH. Caustic is added in response to the falling pH, resulting in an increase of sodium salts and thus an increase in density. Brine pH is maintained in a slightly alkaline pH range. High-density brine is transferred to the brine surge tanks located at the Brine Reduction Area (BRA). The density controller maintains the brine density at levels consistent with the solubility of the salts produced. Either make-up water from the recovered water tank or process water may be added to maintain packed bed scrubber sump level control to make up for evaporative losses and to replace purged brine. If the level in the scrubber tower bottom sump is high, excess water may be transferred to the brine surge tanks.

2.6.1. Quench Tower

Flue gas from the SCC enters a quench tower where it is cooled and saturated by spraying the gas with quench brine (recirculated brine, process water, or recovered water) from multiple spray nozzles. Water evaporates into the gas, cooling the gas to its dew point. Brine is sprayed into the tower at a flow rate that provides at least three times the maximum required evaporative load. The cooled and saturated flue gas from the quench tower passes to the venturi scrubber through an overhead duct, while the excess brine flows by gravity to the scrubber tower sump.

The quench tower is designed to provide sufficient residence time for heat transfer to occur by evaporation of water from spray droplets. The heat transfer area is the interfacial area between liquid and gas. Smaller droplets have a larger interfacial area for a given volume of liquid, and consequently provide faster water evaporation and heat transfer. The required residence time and quench tower volume is based on conservative estimates of droplet sizes. The nozzles are sized with a large free passage to minimize nozzle clogging. If salt deposition clogs some orifices, the remaining nozzles will still spray sufficient brine. The temperature at the quench tower outlet is monitored and, in the event of very high temperatures indicating insufficient quench, additional emergency sprays of process water are activated.

The quench brine pump is paired for preventive and repair maintenance, so that operations will continue in the event that one pump fails. The tower is constructed of Hastelloy (Alloy UNS-N10276) to resist corrosion and high temperature of the inlet gases.

2.6.2. Venturi Scrubber

The flue gas from the quench tower enters a venturi scrubber where quench brine from the scrubber tower sump will be used to remove particulate from the flue gas. The venturi scrubber has a variable throat that is controlled to maintain a constant pressure drop across the venturi scrubber. The nozzles for introduction of alkali brine are tangentially mounted. Particulate matter larger than about one-half micron is collected in the throat by the brine. Sufficient brine flow is maintained to ensure efficient collection of particulate matter. Gaseous pollutants are also absorbed by the brine. The venturi is constructed of Hastelloy (Alloy UNS-N10276) to resist corrosion.

2.6.3. Packed Bed Scrubber

The two-phase effluent (flue gas and liquid) from the venturi scrubber enters a packed bed scrubber tower near the bottom of the tower. The scrubber tower is designed to separate the entering liquid and gas, absorb pollutants from the gas, and eliminate large entrained liquid droplets from the overhead gas. Upon entering the tower, the liquid collects in the tower sump while the gas rises through the orifices of the reservoir tray. The swirling action of the gas aids in removal of entrained brine. A reservoir/orifice tray separates the scrubbing solution (clean liquor) for the packed bed scrubber from the sump liquid (quench brine) to prevent ash and particulate in the sump liquid from clogging the packed bed.

The reservoir tray has chimneys with sufficient flow area to limit the gas velocity. Multiple chimneys are used to aid in distributing the gas evenly across the packed bed scrubber. Crowned caps above the chimney top prevent liquid from falling directly from the packed bed scrubber to the scrubber sump. The reservoir tray is sloped, with the pump suction line at the lowest point, to prevent solids from collecting on the tray. The packed bed scrubber provides liquid-gas contact and is packed to a predetermined height in the scrubber. A distributor ensures even distribution of clean liquor across the bed. The packed bed height is adequate to absorb pollutants to meet the applicable emission standards.

As the gas passes through the packed bed, it contacts the alkaline clean liquor solution that absorbs the acidic gases and forms salts. The clean liquor solution percolates through the packed bed and falls to the reservoir tray. From there it is pumped out and passed through the clean liquor air coolers. The clean liquor air coolers cool the clean liquor to approximately 120^{o}F. The cooled clean liquor is recycled back to the top of the packed bed.

The rate of recirculation is controlled to ensure an adequate contact time between the clean liquor and flue gas at the expected maximum gas flow rate. Caustic is added to the clean liquor to maintain a basic pH, and process water may be added to adjust the density. Excess clean liquor overflows the chimneys and falls into the scrubber tower sump. Flue gas rising from the packed bed passes through a bank of mist eliminator pads in the top of the scrubber tower that coalesces and collects liquid droplets entrained in the gas. The liquid collected in the scrubber tower mist eliminator drains to the scrubber reservoir/chimney tray. Nozzles located under the mist eliminator pad intermittently wash away particulates with process water.

2.6.4. Mist Eliminator

Flue gas from the scrubber tower enters the bottom of a mist eliminator vessel and passes through the mist eliminator candles to the top of the tower. The mist eliminator candles remove fine mists formed when the exhaust gas is cooled with clean liquor. A significant amount of metal oxides and water droplets are also removed. Liquid accumulates in the vessel bottom pumped to the scrubber tower sump.

The LICs have a spare mist eliminator vessel for use during emergencies or maintenance. This spare mist eliminator vessel supports operations while mist eliminator candles are being replaced.

2.6.5. Gas Reheat System

Flue gas from the mist eliminator vessel is ducted to an in-line gas heater. The reheater is a natural gas-fired heater with approximately 201,600 British thermal units (Btu) per hour of heating capacity. The purpose of the reheater is to raise the flue gas temperature above its dew point and thereby reduce the amount of condensation in the carbon filters.

2.6.6. Carbon Filter System

During normal operations, after being reheated, the flue gas enters a carbon filter unit. The carbon filter unit is equipped with a bank of prefilters, two banks of HEPA filters, and four carbon banks in parallel. Each carbon bank consists of two carbon beds in series. When the flue gas enters the carbon filter unit, it flows sequentially through a bank of prefilters, a bank of HEPA filters, a carbon bank (i.e., two carbon beds in series), and a bank of HEPA filters before exiting the unit. Figure 2-4 shows the configuration of a carbon filter system. Figure 2-5 depicts the flow of flue gas through a carbon filter unit.

It is the intent to use the common spare filter when maintenance is being performed on a filter unit that services the LIC. When it is necessary to operate the common spare, the inlet and outlet dampers to the appropriate filter unit will be opened, and the inlet and outlet dampers to the filter unit being taken off line will be closed. Damper position switches allow the operator and control system to know which filter units are in use and which are in standby. Section 2.18 of this plan provides a description of the carbon loaded into each filter.

2.6.7. Exhaust Blower

From the carbon filter unit, the flue gas passes to an exhaust blower. The exhaust blower provides draft through the LIC and the LIC PAS. A variable-speed drive and/or inlet damper allows control of the draft to maintain a negative pressure within the LIC system and to maintain gas movement through the PAS. The exhaust blower discharges the process gas to the atmosphere via the common stack.

2.7. MANUFACTURER'S NAME, MODEL NUMBER, AND CAPACITY

The LICs were specifically developed by T-Thermal, Inc. for the Chemical Stockpile Disposal Program. Therefore, there is no model number designation due to the unique requirements and corresponding design.

The total capacity of the burner for each PCC is approximately 14 million Btu per hour. The capacity of the burner for each SCC is approximately 7 million Btu per hour.

2.8. TYPE OF INCINERATOR

Each PCC is a refractory-lined cylinder with a high-efficiency, high-temperature natural gas burner and pilot ignition that incinerates liquid agent by maintaining a nominal temperature of 2,700^{o}F. Each PCC burner has a total heat duty of 14 million Btu per hour and a minimum turndown ratio of 10:1 on the agents specified. The HD rinsate is fed through the PCC burner assembly.

Each SCC is a refractory-lined cylinder with an atomizing nozzle located at the top of the chamber and a single burner block located on the side. Each SCC burner, which has a 4:1 turndown ratio, completes the incineration of the flue gas from the PCC and also vaporizes and incinerates potential liquid organic waste present in the SDS by maintaining a nominal internal chamber temperature of approximately 2,000^{o}F.

2.9. LINEAR DIMENSIONS OF THE INCINERATOR

Each PCC is a refractory-lined cylinder with a 52-inch inside diameter and is 11 feet, 6 inches high. Each SCC is a refractory-lined cylinder with a 70-inch inside diameter and is 10 feet, 6 inches high. The calculated cross-sectional area of each PCC is approximately 14.7 square feet with a volume of 170 cubic feet. The calculated cross-sectional area of each SCC is approximately 26.7 square feet with a volume of 281 cubic feet. The approximate volume of the refractory-lined ducting between each SCC and each quench tower is 462 cubic feet based on a 38-1/8 inch inside diameter ducting with an approximate run of 58.3 feet.

2.10. DESIGN RANGE OF WASTE VISCOSITY

The T-Thermal LV-14 Vortex burner is able to successfully burn heavy oil with kinematic viscosities that range up to 10,000 Saybolt universal seconds (SUS). The viscosity of the HD is approximately 38 SUS. The specific gravity of HD rinsate is approximately four (4) centipoise which is equivalent to 38 SUS.

2.11. DESIGN RANGE OF ATOMIZATION AIR PRESSURE

The PCC atomizing air pressure setpoint is 55 pounds per square inch for agent feed and HD rinsate.

2.12. DESCRIPTION OF THE SUPPLEMENTAL FUEL SYSTEM

The auxiliary fuel for the PCC and SCC will be natural gas. Natural gas will be used for burner ignition in both the PCC and SCC. In the PCC, natural gas will be used for initial heating of the chamber at a rate compatible with the refractory liner. Once the PCC reaches operating temperature and waste feed begins, natural gas will be co-fired with the liquid waste to ensure a stable flame. In the SCC, natural gas will be used for initial heating of the chamber.

2.13. CAPACITY OF PRIME MOVER

2.13.1. Exhaust Blower

The exhaust blower for each LIC system is a two-stage induced-draft fan that draws flue gas through the LIC and LIC PAS and delivers it to the stack. The blowers have a design capacity of 9,220 actual cubic feet per minute of process gas when operating at a nominal differential pressure of 126 inches of water column.

2.13.2. Combustion Air Blowers

The flow of combustion air into the burner blocks is held constant and the fuel gas flow is modulated to maintain the chamber temperature. The PCC and SCC combustion air blowers are single-inlet, single-width centrifugal type blowers with design capacities of 3,100 and 1,400 cubic feet per minute, differential pressures of 52 and 46 inches of water column, and a horsepower rating of 50 and 25, respectively.

The combustion air blower for the PFS gas reheater is a centrifugal fan with design capacity of 42 standard cubic feet per minute, differential pressures of 42 inches of water column, and is rated at one (1) horsepower.

2.14. SAFETY FEATURES

2.14.1. Description of the Automatic Waste Feed Cut-Off Systems

Instrumentation monitors process conditions; provides data for ensuring compliance with regulatory requirements; ensures appropriate process response and control; and ensures operational flexibility, safety interlocking, and shutdown features. The AWFCO system is designed to shut off the agent feed valves and agent pumps and switch the SDS to process water. The AWFCO system is also designed to shut off the HD rinsate feed valves and HD rinsate pumps. Agent feed, HD rinsate feed, SDS feed, and supplemental fuel feed are automatically shut off under certain conditions. Waste feed is not restarted until the parameters causing the feed cut-off or lockout are restored and other conditions are within permitted limits.

A centralized automatic control system is used with a centralized control console, including closed-circuit television monitors for observing operations at various locations and locally mounted PLCs. Processing and sequencing operations are controlled automatically through the PLCs. Interlocks are monitored and continuous checking is undertaken to determine any lack of completion of a programmed step.
All abnormal conditions, operator entries into the system, and starting and stopping of equipment are logged with the time of occurrence by the Process Data Acquisition and Recording (PDAR) system.
The control system provides continuous automatic control of the incineration process. System interaction by the operator is limited to initiation of process systems or correction of abnormal conditions.
In monitoring critical functions, the automatic control system gives advanced warnings of alarms where possible, indicating that an alarm condition is developing and warning operators in time to take corrective action. Interlocks are provided to respond to various conditions. Shutdown is immediate or staged.

Agent and/or HD rinsate is fed to the PCC through pipeline 3/4"-AG-201/202-AE and valves 13-XV-761A/B or 13-XV-134A/B. If the AWFCO system is activated, then the BMS subroutine of the process control computer stops sending a signal to the solenoid valves 13-XY-761A/B or 13-XV-134A/B, and these valves close. The spring return in the actuator for 13-XV-761A/B or 13-XV-134A/B closes the valves (which stops feed of the agent or HD rinsate). Total elapsed time for shutoff of feed from the time the signal is sent is approximately one (1) second.

SDS is fed to the LIC SCC through pipeline 1"-SD-473/474-P and valves 13-XV-762A/ 766/102A/99. If the AWFCO system is activated, then the BMS subroutine of the process control computer stops sending a signal to the solenoid valves 13-XY-762A/-766/102A/99. The air supply to these valves then shuts off. These valves switch position to take process water instead of SDS. The spring return in the actuator closes the valve. Total elapsed time for shutoff of SDS feed from the time the signal is sent is approximately one (1) second.

These steps accomplish AWFCOs in response to monitored parameters being outside control limits. Natural gas continues to be fed to the LIC to maintain combustion until all monitored parameters are again within control limits and waste feed can be restarted.

Because all of the incinerators and their respective automatic shutoff systems are independent, self-contained units, operational problems or events that cause immediate shutdown in one incinerator will not affect the continued safe operation of the others.

The natural gas burners have a flame safeguard system that prevents or stops the flow of natural gas to the burner nozzle if any one of the following situations occurs:

- Flame is detected during pre-ignition
- Pilot fails to ignite
- Burner fails to ignite
- Loss of burner flame after ignition for HD agent only

The 2003 edition of National Fire Protection Association Code 86, Section 7.4.1.5, allows afterburner relight without purging the incinerator chamber if the chamber temperature is above the auto-ignition temperature of 1,400°F.

During the surrogate, GB agent, VX agent, and HD agent ramp up and trial burn periods, the installed flame detector was demonstrated to be reliable during the transition from natural gas to liquid waste feed. If there is a shutdown of either the PCC or SCC natural gas burner, there will be an automatic shutdown of all waste feed streams.

The AWFCO system and its associated alarms are tested weekly for systems that are in operation.

2.14.2. Description of Additional Safety Devices

All powered equipment has been reviewed and power sources have been characterized as critical, essential, or utility. Critical loads (e.g., PDAR, control consoles, ACAMS [Automatic Continuous Air Monitoring System]) are powered by uninterruptible power supply panel boards and do not experience an interruption in power if off-site power is lost. Essential loads (e.g., extension heaters, airlock doors) are required for safe shutdown of the facility, but can tolerate an interruption in power while being loaded on an on-site emergency diesel generator. Utility loads (e.g., combustion air blowers, fuel oil pumps) are those not required if off-site power is lost and are not powered by the on-site emergency diesel generator.

The firing chambers have high-high temperature switches that provide extreme temperature limit protection. Actuation of this system shuts down the agent feed, HD rinsate feed and SDS feed (which switches over to water), stops the fuel oil purge, and locks out the burners.

2.15. STACK GAS MONITORING AND POLLUTION CONTROL EQUIPMENT

The UMCDF is equipped with CEMS for carbon monoxide and oxygen and with an agent monitoring system (AMS) for the campaign agent.

2.15.1. Continuous Emission Monitoring System

The UMCDF CEMS QA/QC Plan describes the operation and maintenance of the CEMS.

The CEMS continuously monitor the exhaust gas from the incinerators/furnaces and PAS for carbon monoxide and oxygen. The CEMS that sample the exhaust gas between the induced-draft fan and the common stack provide data to cause an AWFCO to the respective furnace system. These monitors consist of a pair of carbon monoxide and a pair of oxygen analyzers that are configured for redundant monitoring systems (primary and backup) that can be independently calibrated and maintained.
The carbon monoxide analyzers are ProCal Analytics, Ltd., Model 210 L.R. The oxygen analyzers are COSA Instrument Corporation Model ZRM-ZTB. Each analyzer is certified in accordance with the

UMCDF CEMS Certification Test Plan. Either of the redundant analyzers can be used as the analyzer of record for reporting purposes.

The CEMS will be operated in a manner that ensures that the exhaust gas is continuously monitored. Although there are two sets of CEMS monitoring the exhaust gas, only one set will be designated the "monitors of record." When the "monitors of record" require maintenance activity, the second set of CEMS will be placed on line and designated the "monitors of record." The designated "monitors of record" will activate the AWFCO system if the concentrations exceed permitted limits. In order to increase the operational life of each unit, the CEMS are periodically purged as needed. This purge may occur as often as once per day during hazardous waste operations. Since there are backup CEMS, the purge cycle and calibration of each monitor is offset to allow uninterrupted recording of the monitored parameter.

For each LIC, oxygen and carbon monoxide will be monitored between the induced-draft fans and the common stack by CEMS. The CEMS are on-line whenever the induced draft fan is operating, that is, when there is exhaust gas flow through the PAS.

2.15.2. Agent Monitoring System

There are two systems that comprise the AMS. ACAMS are used to give a continuous readout of the concentration of agent. The ACAMS that sample the exhaust gas between the induced-draft fan and the common stack, at the common stack, and prior to the PFS provide data to cause an AWFCO to the respective furnace system. The Depot Area Air Monitoring System (DAAMS) collects agent on a sorbent that is later analyzed in the UMCDF laboratory to provide historical information regarding agent concentration.

The common stack is equipped with a "staggered" ACAMS configuration to allow for continuous sampling of the exhaust gas. During hazardous waste treatment operations, two of the three ACAMS must be monitoring the exhaust gas in a "staggered" sampling configuration. AWFCO interlocks are programmed as follows to ensure the "staggered" sampling configuration is in place during hazardous waste feed operations:

- When there are less than two ACAMS on line monitoring the common stack
- When the two ACAMS on line are not in the "staggered" sampling configuration
- When either of the two on-line ACAMS activates a malfunction alarm and the standby ACAMS cannot be brought on line to provide for continuous sampling of the exhaust gas.

The following subsections provide a more detailed description of the various agent monitoring devices and address monitoring of HD.

2.15.2.1. Automatic Continuous Air Monitoring System

The ACAMS are near-real-time monitors. ACAMS will provide data for AWFCOs for the LIC HD rinsate emissions demonstration test monitor at the allowable stack concentration (ASC). With the addition of a stack sampling apparatus, ACAMS may be used to monitor stack gases.

The ACAMS were chosen as one of the primary stack monitors because the instrumentation is proven technology for the detection and quantification of agents in both workplace and stack environments. The ACAMS is interfaced to the stack using a stack sampling apparatus to condition the stack gas before it contacts the solid sorbent in the ACAMS. The purpose of the stack sampling apparatus is to lower the dew point of the stack gas to a point where condensation does not occur within the ACAMS.

Testing and evaluation in all chemical agent modes has been completed. All monitors meet the 95% confidence level for ±25% accuracy as required by the Department of Health and Human Services.

HD airborne exposure limit:	ASC
HD sensitivity:	0.03 mg/m^3
HD response time:	5 minutes

Because it is a chromatographic system, the ACAMS is susceptible to analytical interferences. Any detected value that cannot be clearly interpreted as being an interferent or malfunction must be treated as a positive response until refuted.

The PLC for the furnaces will be programmed to utilize the oxygen analyzers located downstream of the induced-draft fans to correct ACAMS (before the PFS and downstream of the induced-draft fans) readings to 7% oxygen. The ACAMS readings will not be corrected to 7% oxygen if the CEMS oxygen concentration is less than or equal to 7% or if the ACAMS value is below 0.2 ASC. The ACAMS that sample the exhaust gas between the induced-draft fan and the common stack, at the common stack, and before the PFS provide data to cause an AWFCO to the respective furnace system. ACAMS are not used to provide information for the HHRA; however, the HHRA does use the permitted HD emission limit for ACAMS.

An ACAMS alarm during the HD rinsate emissions demonstration test will in general abort the run if it disrupts the feed timing due to the length of time required to refute an ACAMS alarm. Other ACAMS alarms that are not related to the LICs may not affect the HD rinsate emissions demonstration test (e.g., an ACAMS alarm in the MDB).

2.15.2.2. Depot Area Air Monitoring System

The DAAMS that provide data for the LIC HD rinsate emissions demonstration test detect to below the ASC. The technique can be used to monitor stack gases with a stack sampling apparatus to lower the stack gas dew point to prevent condensation in the sampling train. For the EDT, all DAAMS that are used in normal plant operations will be on-line along with the ACAMS.

The DAAMS analysis consists of gas chromatographic (GC) separation followed by simultaneous detection with a flame photometric detector (FPD) and mass spectrometer (MS). All approved laboratory procedures are available for use for the agent monitoring DAAMS.

Nozzle and Burner Design

The agent and rinsate nozzle, the SDS nozzle, and the auxiliary fuel air atomized burner (PCC and SCC) were supplied by T-Thermal. Agent or rinsate is introduced into a LIC through a LV-14 vortex burner having a heat duty capacity of 14 million Btu per hour. The burner assembly consists of a wind box, injector, and combustion area. The combustion air is introduced through the wind box. The auxiliary fuel and/or agent/rinsate are introduced through the injector assembly and are contacted by the impinging atomization air. Atomization takes place external to the nozzle tip. The spray mixes with high-velocity, spinning flow combustion air and enters the combustion area. The combustion process is nearly complete before the combustion gases exit the burner combustion area into the SCC.

The HV-645 burner in the SCC is rated at 7 million Btu per hour. The SCC burner uses combustion air to atomize the natural gas auxiliary fuel, which is burned with no less than 20% excess air.

The combustion burner is mounted in the side near the bottom of the PCC. The PCC burner combines a natural gas pilot for ignition, multi-fuel nozzle, an air atomizer, and combustion air. A burner is mounted in the side near the top of the SCC and combines a natural gas pilot for ignition, dual-fuel nozzle, and combustion air. The conventional, air-atomized burners are T-Thermal's Model LV-14 in the PCC and Model HV-645 in the SCC. The nozzle and burners are integrated as a single unit with a single model number.

Materials of Construction

Information regarding materials of construction for the LICs is listed in Table 2-1. The table provides information on both the shell and linings.

2.16. LOCATION AND DESCRIPTION OF TEMPERATURE, PRESSURE, AND FLOW-INDICATING AND CONTROL DEVICES

The locations of the indicating and control devices are shown on the piping and instrument diagrams included in the operating record maintained on site.

2.16.1. Liquid Incinerator Controls and Indicators

The temperature of each LIC is monitored at numerous locations to provide redundancy and reliable information on operating conditions. Thermocouples are typically equipped with one element.

The feed rate of agent fed to each LIC is measured by 13-FT-127 A/B or 731A/B. A redundant measure of the agent feed rate will be available by monitoring the level in tanks ACS-TANK-101, -102, and -108 with a calibration graph (pump speed versus volume) of the positive-displacement pumps. The feed rate of HD rinsate fed to each LIC is measured by 13-FE-9894A/B. A redundant measure of the rinsate feed rate will be available by monitoring the level in RCS-TANK-101A/B. The feed rate of spent decontamination solution to the SCC is monitored by 13-FIC-102/763. The feed rate of SDS is controlled by flow control valve 13-FV-102/763. A redundant measure of the SDS feed rate is available by monitoring the level of SDS with 11-LIT-20 (SDS-TANK-101), or 11-LIT-30 (SDS-TANK-102).

The flow rates for the combustion air blowers to the PCC and SCC are measured by 13-FIT-42/743 and 13-FIT-50/788, respectively. The pressure inside each LIC is monitored by 13-PIT-52/706 on the PCC and by 13-PIT-59/896 on the SCC. Flue gas flow rates for LIC are determined in different manners. For LIC1, flue gas flow rate is indicated by differential pressure transmitter 13-PDIT-854 operating across a venturi installed in the exhaust gas duct that discharges to the quench tower. The venturi measures differential pressure and triggers an AWFCO at the permitted setpoint. For LIC2, flue gas flow rate is calculated using data from permit-regulated instruments. The data includes the flow rate of combustion air and fuel gas to the primary and secondary chamber along with the waste feed rate, both agent or rinsate, to the primary chamber and the process water/SDS feed rate to the secondary chamber. The inputs are converted to moles per minute and summed. The ideal gas law is used to convert the sum of the molar flow rates to an exhaust gas flow rate. The calculated flue gas flow rate activates the AWFCO system when the maximum permitted setpoints are reached or exceeded. The current setpoints are shown in Table 2-2. A PLC permissive will be installed to ensure that when rinsate is selected, the flow rate is based on rinsate, not agent, feed. The calculation for rinsate feed indicates a 1% difference in flow between 100% HD (agent feed) and 100% water (worst case rinsate feed).

2.16.2. Liquid Incinerator Pollution Abatement System

The process water and brine entering the quench tower are monitored during quench tower operations. Process water or recovered water from PAS-TANK-103 is used for makeup water in the PAS. The pressure of the solutions entering the quench tower is monitored by 24-PI-100/838. The flow rate of the makeup water and brine in the quench tower is monitored by 24-FIC-84/827. The level of the brine at the bottom of the quench tower is monitored by 24-LIT-132/810.

The temperature of the flue gas entering the venturi scrubber is monitored by 24-TE-397/816. The differential pressure across the venturi scrubber is indicated and transmitted to the central controller by 24-PDIT-90/814, which then regulates the venturi by transmitting a signal to 24-PDIC-90/814. Pressure and flow rate of the brine delivered to the venturi are monitored by 24-PI-90/815 and 24-FIC-88/828, respectively.

The differential pressure across the mist eliminator pad and the packed bed in the scrubber tower is monitored and transmitted to the PLC by 24-PDIT-82/823 and 24-PDIT-108/822, respectively. The temperature of the clean liquor prior to entering the scrubber tower is indicated by 24-TE-299/276. The level of clean liquor present at the reservoir tray is measured by 24-LIT-113/824. The density, pH, pressure, and flow rate of the clean liquor entering the packed bed are monitored by 24-DE-117/826 and 24-AI-116A/B; 832A/B, 114-PIT-329/170, and 24-FIC-112/825, respectively. The clean liquor pH system is equipped with two analyzers (A/B). Only one analyzer controls the clean liquor pH loop, while the other analyzer serves as a backup. Typically, the pH analyzer is switched periodically to allow for flushing of the instrument. The level of brine within the scrubber tower sump is indicated and transmitted to the central controller by 24-LIC-115/818.

The clean liquor inlet temperature to the clean liquor air coolers is indicated by 114-TI-241/281. The differential pressure across the clean liquor air coolers is monitored and transmitted to the PLC by 114-PDIT-252/633 and 114-PDIT-253/617, respectively.

The differential pressure across the mist eliminator vessel, the spent process water level, and pH exiting the bottom of the vessel are monitored.

The temperature of the flue gas exiting the in-line reheater burner is measured by 114-TE-459/749. The exiting temperature is controlled by varying the firing rate of the burner.

The temperature of the flue gas prior to entering the filter unit is monitored by 114-TE-518/418.

114-PDIT-454/436 (A through I) internally indicate and transmit to the central controller differential pressures at the following locations in each carbon filter unit: across the prefilter, across the initial HEPA filter, across the final HEPA air filter, across each primary carbon filter bed, across the set of secondary carbon beds, and across the entire filter.

The final monitoring occurs within and after the exhaust blower. The temperature of the blower motors is measured by 24-TE-980/976(A through F) and 24-TE-58/711(A through F). After the flue gas has passed through the exhaust blower, it is monitored for carbon monoxide by 24-AIT-78A/B; 716A/B and by 24-AIT-210A/B; 717A/B for oxygen. In addition to upstream of the PFS, the common stack and downstream of the exhaust blower are also monitored for agent (GB, VX, and/or HD) by an ACAMS during agent operations.

2.17. PRINCIPAL ORGANIC HAZARDOUS CONSTITUENT SELECTION

The LIC HD ATB/CPTs used HD as a POHC. HD was selected as a POHC because demonstration of a DRE of 99.9999% for HD is required by the UMCDF Hazardous Waste Permit and a DRE of 99.9999% is required by the Title V operating permit. Monochlorobenzene was spiked into the agent feed line at a sufficient rate to determine 99.99% DRE for mustard impurities. The DRE for both HD and monochlorobenzene for each LIC was met during the HD ATB/CPT conducted in 2010.

The UMCDF demonstrated DRE on SDS during the STB on each LIC. The LIC1 STB, completed in February 2003, fed 2,007 pounds/hr of SDS spiked with 2.85 pounds/hr of 1,2,4-trichlorobenzene (a Class 1 POHC), and 5.33 pounds/hr of tetrachloroethylene (a Class 2 POHC) into the SCC. A DRE greater than 99.9999% was achieved for each POHC. The LIC2 STB, completed in August 2004, had an SDS feed rate of 2,040 pounds/hr spiked with 3.0 pounds/hr of 1,2,4-trichlorobenzene and 5.6 pounds/hr of tetrachloroethylene into the SCC. A DRE greater than 99.9999% DRE was achieved on material more difficult to incinerate than HD (a Class 4 POHC). The STB DRE results are valid to demonstrate HD destruction in the SDS feed. Since DRE is a one-time demonstration, the HD ATB/CPT DRE is valid to use for the HD rinsate emission demonstration test.

2.18. CARBON SPECIFICATION

The carbon beds of the primary LICs PFS units (i.e., PFS-109 and PFS-209) are loaded with sulfur impregnated carbon. Sulfur impregnated carbon is loaded in the spare (PFS-113). All carbon is supplied by the manufacturer of the PFS, Ionex. The carbon supplied by Ionex conforms to Specification 15987 and the specifications indicated in the NOC.

2.19. SYSTEM STEADY-STATE AND HAZARDOUS WASTE RESIDENCE TIME

Steady-state operation is defined as the condition in which the following combustion parameters do not vary significantly:

- Combustion temperature for the PCC and the SCC
- Combustion gas volumetric flow rate
- Waste feed rate
- Carbon monoxide concentration

Additionally, once steady-state operation is achieved in the combustion chambers, sufficient time must be allowed for the PAS to reach steady-state conditions. This will ensure that the gas sampled in the exhaust duct represents a steady-state operation for the entire system. Therefore, gas residence times through the system are calculated and compared against the gas volume changes through the system.

Based on experience developed during the ramp up and execution of the LIC STB, the LIC GB ATBs, the LIC1 and 2 VX ATB, and the LIC 1 and 2 HD ATB/CPT, 15 minutes is adequate time for the system to achieve steady-state operation. The exhaust gas residence times for the various pieces of equipment and ducts are provided in Tables 2-6, 2-7, 2-8 and 2-9. These residence times were determined using LIC HD rinsate mass and energy balances. The total system residence time of 101.36 seconds indicates 8.9 complete volume changes will occur within the 15-minute estimate for the conditioning period.
This number of complete volume changes ensures values of the measured process parameters are consistent with combustion conditions in the furnace and, further, indicates the likelihood that steady-state conditions have been achieved. Only one or two volume changes should be adequate to achieve

steady-state operation at the exhaust duct sampling location after steady-state operation has been achieved in the combustion chambers.

For LIC, the hazardous waste residence time is defined as the time elapsed from cutoff of the flow of hazardous waste into the primary combustion chamber until solid (excluding slag), liquid, and gaseous materials from the hazardous waste enter the common stack. In conformance with 40 CFR §63.1206(b)(11), this hazardous waste residence time is calculated as 101.36 seconds as shown on Table 2-6 through Table 2-8. Slag is collected in the slag pit at the bottom of the PCC and is periodically removed. The steady state conditions allow the emissions sampling crew to maintain the isokinetic sampling trains at the required 100% isokinetic, plus or minus 10% as defined in each sampling method, e.g., Methods 0010, 0023, 26, 29. Once full feed rate is established, the gas flow from the rinsate and SDS feed is calculated to reach the sampling location in 101.36 seconds. When sampling starts fifteen minutes after full feed rate has been achieved, it ensures the sampling contractor can both maintain isokinetic sampling and measure the emissions from the actual feed of rinsate and SDS.

TABLE 2-1. LIC ENGINEERING DESCRIPTION

Category	Description	
	Primary Combustion Chamber	**Secondary Combustion Chamber**
Name of manufacturer	T-Thermal Company no model number; custom fabricated	T-Thermal Company no model number; custom fabricated
Type	Vertical, up-fired Liquid wastes only	Vertical, down-fired Liquid wastes only
Dimensions	52" diameter x 11'-6" height Cross-sectional area: 14.7 square feet Volume: 170 cubic feet	70" diameter x 10'-6" height Cross-sectional area: 26.7 square feet Volume: 281 cubic feet
Materials	Fabricated carbon steel with 9" thick refractory brick with 9" thick refractory insulation	Fabricated carbon steel with 9" thick refractory brick with 4.5" thick refractory insulation
Burner	Burner: (1) Side-mounted near bottom T-Thermal LV-14 Vortex: natural gas pilot; 14 million Btu per hour Includes: • Fuel/agent injector assembly • Impinging atomizing air external to nozzle tip • High-velocity spinning flow combustion air from wind box • Combustion area external to nozzle • 65% excess air at operating temp.	Burner: (1) Side-mounted near top - T-Thermal HV-645: natural gas pilot; 7 million Btu per hour Utilizes: • Combustion air for atomizing • 20% minimum excess air
Auxiliary Fuel	• Natural gas (pilot and burner)	
Prime Mover	Two-stage induced-draft fans: Robinson 78" x 1-3/8" RB-1806 • Design capacity: 9,220 actual cubic feet per minute flue gas at a nominal differential pressure of 126 inches water column • Material: 316L SS hub, 316 SS, A240 alloy 255 wheel, epoxy-coated carbon steel fan • Motors: 250 horsepower each	
Combustion Air Blowers	PCC combustion air blowers: single-inlet, single-width centrifugal type • Design capacity: 3,100 standard cubic feet per minute at a nominal differential pressure of 52 inches water column • Material: carbon steel • Motor: 50 horsepower SCC combustion air blowers: Single-inlet, single-width centrifugal type • Design capacity: 1,400 standard cubic feet per minute at a nominal differential pressure of 46 inches water column • Material: carbon steel • Motor: 25 horsepower PFS reheater combustion air blowers: centrifugal type • Design capacity: 100 standard cubic feet per minute at a nominal differential pressure of 15 inches water column Motor: 1 horsepower	

TABLE 2-1. LIC ENGINEERING DESCRIPTION

Category	Description	
	Primary Combustion Chamber	**Secondary Combustion Chamber**
Quench Tower	Cylindrical vessel with spray nozzles • Dimensions: 6'-0" inner diameter x 40'-0" tangent to tangent • Design pressure: 15 psig and full vacuum • Design temperature: 1250°F • Nozzles: spaced on three levels - 8 brine (3/8" BETE, TF164FC) and 4 emergency (1/2" (BETE, TF24FC) • Quench media: brine, process water, and/or water from recovery tank (makeup water) • Materials: Hastelloy C, Alloy UNS-N10276 • Exhaust duct to scrubber: Hastelloy C, alloy UNS-N10276	
Venturi Scrubber	Design pressure: 15 psig and full vacuum • Design temperature: 250°F • Variable throat, range 5-50 inches water column • Scrubbing media: caustic brine (pH approximately 8.0) • Materials: Hastelloy C, alloy UNS-N10276	
Packed Bed Scrubber	Cylindrical vessel, four sections: sump, reservoir/chimney tray, packed bed, mist eliminator pad • Dimensions: 5'-6" inside diameter x 40'-0" tangent to tangent • Design pressure: 15 psig and full vacuum • Design temperature: 250°F • Packing: 10-foot height • Gas velocity: 35 feet per second • Differential pressure: 1-10 inches water column • Scrubbing media: clean liquor (pH approximately 8.0) • Exhaust duct: carbon steel • Materials: Hastelloy C, alloy UNS-N10276	
Clean Liquor Air Coolers	• Heat duty: 15.1 million Btu per hour • Design pressure: 125 psig • Design temperature: 215°F • Materials: carbon steel (stress relieved) • Motor: 30 horsepower each	
Mist Eliminator Vessel	• Dimensions: 11'-0" inner diameter x 31'-0" bottom tangent • Design pressure: 5 psig and -6 psig • Design temperature: 200°F • Cylindrical vessel with high-efficiency candle filters • Candles: 2' diameter x 20' height • Materials: fiber-reinforced plastic vessel, with ultraviolet absorbers; polyester candles • Inlet duct, isolation valve to vessel: carbon steel lined	
Gas Reheater	In-line gas burner • Heat duty: 201,600 Btu per hour	
Carbon Filter Unit	Design capacity: 12,000 actual cubic feet per minute • Components: prefilter bank, upstream HEPA filter bank, four parallel carbon banks (each consisting of two carbon beds in series), downstream HEPA filter bank • Housing material: 2205 duplex stainless steel	

Abbreviations:

%	percent
’	foot (feet)
”	inch(es)
°F	degrees Fahrenheit
Btu	British thermal units
HEPA	high efficiency particulate air
LPG	liquefied petroleum gas
PFS	Pollution Abatement System (PAS) Filter System
psig	pounds per square inch gauge
SS	stainless steel

TABLE 2-2: LIC1 OPERATING SETPOINTS

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Ranges	Basis
LIC-01 LIC(M)-1	Primary chamber pressure high-high	13-PSHH-233	-0.25 in. w.c. instantaneous	-0.25 in. w.c.	-0.25 to -18.00 in w.c.	Maintain furnace pressure lower than ambient pressure [40 CFR 1206(c)(5)(i)(B)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-02	Primary chamber exhaust temperature high-high	13-TAHH-610	—	2,761°F	2,500 – 2,900°F	Waste feed combustion temperature limits [40 CFR 264.345].
LIC(M)-2	Primary chamber exhaust temperature high-high	13-TAHH-610	2,761°F instantaneous	—	2,500 – 2,900°F	Established to limit metal volatilization [40 CFR 63.1209(g)(2)].
LIC-03	Primary chamber exhaust temperature low-low (instantaneous)	13-TSLL-610	—	2,604°F	2,500 – 2,900°F	Waste feed combustion temperature limits [40 CFR 264.345].
LIC(M)-3	Primary chamber exhaust temperature low-low (instantaneous)	13-TSLL-610	2,604°F instantaneous	—	2,500 – 2,900°F	Established as short-term limit on PIC[40 CFR 63.1209(g)(2)].
LIC(M)-4	Primary chamber exhaust temperature low-low (ROHA)	13-TALL-43	2,696°F ROHA	—	2,500 – 2,900°F	Control destruction removal efficiency (DRE), dioxins, and furans [63.1209(j)(1) and 63.1209(k)(2)].
LIC-04 LIC(M)-5	Spent decontamination solution feed pressure low	13-PSL-51	45 psig instantaneous	45 psig	> 45 psig	DRE [40 CFR 63.1209(j)(3)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-05 LIC(M)-6	Agent feed pressure low-low	13-PALL-113	5 psig (when feed>500 lbs/hr) instantaneous	5 psig (when feed rate >500 lb/hr)	> 5 psi (when feed rate >500 lb/hr)	Control dioxins and furans [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-06	Secondary chamber exhaust temperature low-low (instantaneous)	13-TSLL-129	—	1,827°F	1,800 – 2,002°F	Operating requirements, waste feed combustion temperature limits [40 CFR 264.345].
LIC(M)-7	Secondary chamber exhaust temperature low-low (instantaneous)	13-TSLL-129	1827°F instantaneous	1,827°F	1,800 – 2,002°F	Established as short-term limit on PIC [40 CFR 63.1209(g)(2)].
LIC(M)-8	Secondary chamber exhaust temperature low-low (ROHA)	13-TALL-129A	1,838°F ROHA	—	1,800 – 2,002°F	Control DRE, dioxins and furans [40 CFR 63.1209(j)(1) and 40 CFR 63.1209(k)(2)].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Ranges	Basis
LIC-07	Secondary chamber exhaust temperature high-high	13-TAHH-129	—	2,002°F	1,800 – 2,002°F	Operating requirements, waste feed combustion temperature limits [40 CFR 264.345].
LIC(M)-9	Secondary chamber exhaust temperature high-high	13-TAHH-129	2,002°F instantaneous	—	1,800 – 2,002°F	Established to limit metal volatilization [40 CFR 63.1209(g)(2)].
LIC-08 LIC(M)-10	Combustion air to secondary chamber burner pressure low-low	13-PSLL-200	30 in. w.c. instantaneous	30 in. w.c.	> 30 in. w.c.	Manufacturers recommendation [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-09	Secondary chamber exhaust pressure differential high (instantaneous)	13-PDAHH-854	—	1.1 in. w.c.	< 1.29 in. w.c.	Operating requirements, combustion gas velocity [40 CFR 264.345].
LIC(M)-11	Secondary chamber exhaust pressure differential high (instantaneous)	13-PDAHH-854	1.1 in. w.c. instantaneous	1.1 in. w.c.	< 1.29 in. w.c.	Established as a short-term limit PIC [40 CFR 63.1209(g)(2)].
LIC(M)-12	Secondary chamber exhaust pressure differential high (ROHA)	13-PDAH-854A	1.08 in. w.c. ROHA	1.08 in. w.c.	< 1.29 in. w.c.	Established as a short-term limit PIC, DRE, dioxins and furans, mercury, particulate matter, semivolatile and low-volatile metals, hydrogen chloride and chlorine gas [40 CFR 63.1209(j)(2), (k)(3), (l)(2), (m)(1)(i)(C), (m)(2), (n)(3), (n)(5), (o)(2), (o)(3)(v)].
LIC-10 LIC(M)-13	Agent feed rate high-high based on a ROHA	13-FAHH-127	1,286 HD/lb/hr ROHA 46.3lbs HD/2-minute rolling average	1,286 HD lb/hr	< 1,335 lb/hr < 48.1 lbs/ 2 minutes	Control mercury and particulate matter [40 CFR 63.1209(l)(1) and (m)(3)], operating requirements, waste feed rate [40 CFR 264.345].
LIC-11 LIC(M)-14	Process water/SDS feed rate high-high based on a ROHA	13-FAHH-102C	2,107 lb/hr ROHA 75.9 lbs/ 2 minute (2-minute rolling average)	2,107 lb/hr maximum; to be adjusted lower periodically or as necessary to comply with final metals and chlorine limitations	< 2,200 lb/hr < 79.2 lbs/ 2 minutes	Control semivolatile metals, low-volatile metals, hydrogen chloride, and chlorine gas [40 CFR 63.1209(n)(2), (n)(4), (o)(1)], Operating requirements, waste feed rate [40 CFR 264.345].
LIC-12 LIC(M)-15	Carbon monoxide (CO) concentration in PFS exhaust gas high-high	24-AAHH-78C	100 ppmv ROHA	100 ppm corrected to 7% oxygen, dry basis based on a ROHA	< 100 ppm CO < 38% water	Control CO and oxygen hydrocarbons, [40 CFR 63.1209(a)(1)(i) and (a)(7)], operating requirements, CO level in stack exhaust [40 CFR 264.345].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Ranges	Basis
LIC-13 LIC(M)-16	Primary atomizing air pressure low-low	13-PSLL-127C	55 psig instantaneous	55 psig	> 55 psig	Manufacturers recommendation [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-14 LIC(M)-17	Secondary atomizing air pressure low	13-PSL-58	65 psig instantaneous	65 psig	> 65 psig	Manufacturers recommendation [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-15	Venturi scrubber pressure drop low-low (instantaneous)	24-PDALL-90	—	25 in. w.c.	> 20 in. w.c.	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-18	Venturi scrubber pressure drop low-low (instantaneous)	24-PDALL-90	25 in. w.c. instantaneous	—	> 20 in. w.c.	Established as a short-term limit on PIC, mercury, particulate matter, semivolatile and low-volatile metals, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (m)(1)(i)(A), (n)(3), (o)(3)(i)].
LIC(M)-19	Venturi scrubber pressure drop low-low (ROHA)	24-PDALL-90A	Reserved	—	> 20 in. w.c.	Established as a short-term limit PIC, mercury, particulate matter, semivolatile and low-volatile metals, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (m)(1)(i)(A), (n)(3), (o)(3)(i)].
LIC-16	Clean liquor flow rate to scrubber tower low-low (instantaneous)	24-FALL-112	—	642 gpm	> 630 gpm	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-20	Clean liquor flow rate to scrubber tower low-low (instantaneous)	24-FALL-112	642 gpm instantaneous	—	> 630 gpm	Control mercury, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (o)(3)(v)].
LIC(M)-21	Clean liquor flow rate to scrubber tower low-low (ROHA)	24-FALL-112A	Reserved	—	> 630 gpm	Control mercury, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (o)(3)(v)].
LIC-17	Agent emission high-high based on instantaneous measurement	MON-ACAM-163	—	0.03 mg/m^3 HD	< 1.0 ASC	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-18	Agent emission high-high based on instantaneous measurement at common stack Continuous agent monitoring at the common stack	MON-ACAM-129 MON-ACAM-223 MON-ACAM-225	—	0.03 mg/m^3 HD	< 1.0 ASC	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Ranges	Basis
LIC-19	All brine surge tanks 101, 102, 201, 202 unavailable	23-LSHH-02/06/702/706	—	Unavailable is when level high-high at 18 feet-3 in. or tank is selected for feed to the BRA	<18 feet-3 in. in available tank	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-20	Clean liquor to scrubber tower pH low-low (instantaneous)	24-AALL-116	—	8.0 pH units	> 7.0 pH units	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-22	Clean liquor to scrubber tower pH low-low (instantaneous)	24-AALL-116	8.0 pH units instantaneous	8.0	> 7.0 pH units	Establish short-term limit on control of acid gases including hydrogen chloride and chlorine gas [40 CFR 63.1209(g)(2), (o)(3)(iv)].
LIC(M)-23	Clean liquor to scrubber tower pH low-low (ROHA)	24-AALL-116A/B	Reserved	—	> 7.0 pH units	Establish short-term limit on control of acid gases including hydrogen chloride and chlorine gas [40 CFR 63.1209(g)(2), (o)(3)(iv)].
LIC-21 LIC(M)-24	Clean liquor to scrubber tower Pressure low-low (instantaneous)	114-PALL-329	15 psig instantaneous	15 psig	> 15 psig	Manufacturer's recommendation to control mercury, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (o)(3)(iii)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-22	Quench tower exhaust gas temperature high-high	24-TSHH-89	—	225°F	< 225°F	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-23	Quench brine to venturi scrubber flow rate low-low (instantaneous)	24-FALL-88	—	125 gpm	> 120 gpm	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-25	Quench brine to venturi scrubber flow rate low-low (instantaneous)	24-FALL-88	125 gpm instantaneous	—	> 120 gpm	Control particulate matter, semivolatile and low-volatile metals, [40 CFR 63.1209(m)(1)(i)(C) and (n)(3)].
LIC(M)-26	Quench brine to venturi scrubber flow rate low-low (ROHA)	24-FALL-88A	Reserved	—	> 120 gpm	Control particulate matter, semivolatile and low-volatile metals, [40 CFR 63.1209(m)(1)(i)(C) and (n)(3)].
LIC-24	Brine density high-high (instantaneous)	24-DAHH-83	—	1.1 sgu	< 1.2 sgu	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-27	Brine density high-high (instantaneous)	24-DAHH-83	1.1 sgu instantaneous	—	< 1.2 sgu	Establish short-term limit on control of particulate emissions [40 CFR 63.1209(g)(2)].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Ranges	Basis
LIC(M)-28	Brine density high-high (12-HRA)	24-DAHH-83A	Reserved	—	< 1.2 sgu	Control particulate matter, semivolatile and low-volatile metals, [40 CFR 63.1209(m)(1)(i)(B)(2) and (n)(3)].
LIC-25	Scrubber tower sump liquid level high-high	24-LSHH-115	—	86 in. above bottom tangent line	< 86 in. above bottom tangent line	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-26	Oxygen concentration in PFS exhaust gas high-high (instantaneous)	24-AAHH-210A/210B	—	13% corrected to a dry basis	5.9% - 13% corrected to a dry basis	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-27 LIC(M)-29	Oxygen concentration in PFS exhaust gas low-low (instantaneous)	24-AALL-210C	5.9% 2-minute rolling average	5.9% corrected to a dry basis	5.9% - 13% corrected to a dry basis	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345]. [40 CFR §63.1209(j)(4)]
LIC-28 LIC(M)-30	Secondary chamber pressure high-high	13-PSHH-888	-0.25 in. w.c. instantaneous	-0.25 in. w.c.	-0.25 to -18.0 in. w.c.	Maintain lower than ambient pressure [40 CFR 1206(c)(5)(i)(B) and 1209(p)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-29	Scrubber tower sump level low-low	24-LSLL-115	—	50 in. above bottom tangent line	> 50 in. above bottom tangent line	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-30 [a] LIC(M)-31[a]	Flame loss in primary chamber burner for HD agent only	13-BSLL-912	Flame loss instantaneous	Flame loss	Flame on	No flame loss, control DRE [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-31 LIC(M)-32	Flame loss in secondary chamber burner	13-BSLL-909	Flame loss instantaneous	Flame loss	Flame on	No flame loss, control DRE [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-32	Slag discharge gate not closed	13-ZS-367B	—	Not closed	Closed	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-33	Slag discharge gate not closed	13-ZS-367B	Slag gate open (closure of slag gate is Title V permit) instantaneous	—	Closed	Slag gate must be closed [40 CFR 63.1209(j)(2)].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Ranges	Basis
LIC-33 LIC(M)-34	Prefilter differential pressure high-high	114-PDAHH-454A/436A/487A	4.0 in. w.c. instantaneous	4.0 in. w.c.	0.1 - 4.0 in. w.c.	Manufacturers recommendation, establish protection of carbon filter [40 CFR 63.1209(g)(2)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-34 LIC(M)-35	HEPA filter differential pressure high-high	114-PDAHH-454B/454H/436B/436H/487B/487H	3.0 in. w.c. instantaneous	3.0 in. w.c.	0.15 - 3.0 in. w.c.	Manufacturer's recommendation, establish protection of carbon filter [40 CFR 63.1209(g)(2)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-35 LIC(M)-36	Temperature of gas to carbon filter system high-high	114-TSHH-533 (instantaneous)	180°F (instantaneous) 167°F (ROHA)	180°F (instantaneous)	< 180°F (instantaneous)	Manufacturer's recommendation Establish protection of carbon filter, control dioxins and furans, mercury, semivolatile and low-volatile metals, hydrogen chloride and chlorine gas [40 CFR 63.1209(g)(2), (k)(1), (k)(7)(ii), (l)(4), (n)(1)]. Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-36	Moisture of gas to carbon filter system (either A or B or the average of the two measurements) high-high	114-MAHH-534A/B (instantaneous) 114-MAHH-534C (ROHA)	—	80% RH (instantaneous) 55% RH (ROHA)	< 80% RH (instantaneous) <55% RH (ROHA)	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-37	Moisture of gas to carbon filter system (either A or B or the average of the two measurements) high-high	114-MAHH-534A/B	80% RH instantaneous 55% RH ROHA	—	< 80% RH (instantaneous) <55% RH (ROHA)	Manufacturer's recommendation Establish protection of carbon filter. [40 CFR 63.1209(g)(2)]
LIC-37	Carbon filter bypass valve not closed	114-ZS-550B	—	Not closed	Closed	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-38	Minimum quench brine pH (ROHA)	24-AALL-91A/B	8.0 pH units ROHA	—	> 7.0 pH units ROHA	Establish short-term limit on control of acid gases, hydrogen chloride and chlorine gas [40 CFR 63.1209(g)(2), (o)(3)(iv)].
LIC(M)-39	Minimum packed bed pressure drop	24-PDALL-108A	0.30 in. w.c. ROHA	—	> 0.3 in. w.c. ROHA	Manufacturer's recommendation, control mercury, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2) and (o)(3)(ii)].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Ranges	Basis
LIC(M)-40	Clean liquor maximum specific gravity	24-DAHH-117A	1.03 sgu 12-hour rolling average	—	<1.03 sgu 12-hour rolling average	Control particulate matter, semivolatile and low-volatile metals, [40 CFR 63.1209(m)(1)(i)(B)(2) and (n)(3)].
LIC-38 LIC(M)-41	Maximum differential pressure across the mist eliminator	24-PDAHH-147/164	20 in. w.c. instantaneous	20 in. w.c.	< 20 in. w.c.	Manufacturer's recommendation [40 CFR 63.1209(g)(2)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-39	Agent emission high-high based on instantaneous measurement upstream of the PFS unit	MON-ACAM-354/356/357	—	0.03 mg/m^3 HD	<1.0 ASC	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-40	Relative humidity in PFS exhaust gas high-high	114-MAHH-109/209/113	—	55% RH (30-minute rolling average)	< 55% RH (30-minute rolling average)	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-41	Moisture in any furnace PAS	024-MAH-078A/B,-027A/B, -669A/B, -716 A/B		38% moisture (volume)	>38% moisture by volume	Operating requirements specified in the permit necessary to ensure required performance standards [40CFR264.345]
LIC(M)-42	Prefilter minimum pressure drop	114-PDALL-454A/436A/487A	0.1 in. w.c. 2-minute rolling average	—	0.1 - 4.0 in. w.c. (2-minute rolling average)	Manufacturer's recommendation [40 CFR 63.1209(g)(2)].
LIC(M)-43	Carbon filter inlet and outlet HEPA filter maximum pressure drop	114-PDALL-454B/454H/436B/436H/487B/487H	0.15 in. w.c. (instantaneous)	—	0.15 - 3.0 in. w.c. (instantaneous)	Manufacturer's recommendation [40 CFR 63.1209(g)(2)].

[a] Waste feed cut-off parameter for loss of flame does not apply to HD Rinsate feed to the LIC.

%	percent
>	greater than
ºF	degree(s) Fahrenheit
AAHH	analyzer alarm high-high
AALL	analyzer alarm low-low
ACAM	automatic continuous air monitor
acfm	actual cubic feet per minute
ASC	allowable stack concentration
ATB	agent trial burn
AWFCO	automatic waste feed cut-off
BRA	Brine Reduction Area
BSLL	burner flame switch low-low
CO	carbon monoxide
DAHH	density alarm high-high
FAHH	flow alarm high-high
FALL	flow alarm low-low
gpm	gallon(s) per minute

TABLE 2-3: LIC2 OPERATING SETPOINTS

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Range	Basis
LIC-01 LIC(M)-1	Primary chamber pressure high-high	13-PSHH-845	-0.25 in. w.c. instantaneous	-0.25 in. w.c.	-0.25 to -18.00 in. w.c.	Maintain furnace pressure lower than ambient pressure [40 CFR 1206(c)(5)(i)(B)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-02	Primary chamber exhaust temperature high-high	13-TAHH-710	—	2,768°F	2,500 – 2,900°F	Waste feed combustion temperature limits [40 CFR 264.345].
LIC(M)-2	Primary chamber exhaust temperature high-high	13-TAHH-710	2,768°F instantaneous	—	2,500 – 2,900°F	Established to limit metal volatilization [40 CFR 63.1209(g)(2)].
LIC-03	Primary chamber exhaust temperature low-low (instantaneous)	13-TSLL-710	—	2,627°F	2,500 – 2,900°F	Waste feed combustion temperature limits [40 CFR 264.345].
LIC(M)-3	Primary chamber exhaust temperature low-low (instantaneous)	13-TSLL-710	2,627°F instantaneous	—	2,500 – 2,900°F	Established as short-term limit on PIC [40 CFR 63.1209(g)(2)].
LIC(M)-4	Primary chamber exhaust temperature low-low (ROHA)	13-TALL-752A	2,711°F ROHA	—	2,500 – 2,900°F	Control DRE, dioxins and furans [63.1209(j)(1) and 63.1209(k)(2)].
LIC-04 LIC(M)-5	Spent decontamination solution feed pressure low	13-PSL-765	45 psig instantaneous	45 psig	> 45 psig	DRE [40 CFR 63.1209(j)(3)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-05 LIC(M)-6	Agent feed pressure low-low	13-PALL-761	5 psig (when feed>500 lb/hr) instantaneous	5 psig (when feed rate >500 lb/hr)	> 5 psig (when feed rate >500 lb/hr)	Control dioxins and furans [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-06	Secondary chamber exhaust temperature low-low (instantaneous)	13-TSLL-782	—	1,833°F	1,800 – 2,002°F	Operating requirements, waste feed combustion temperature limits [40 CFR 264.345].
LIC(M)-7	Secondary chamber exhaust temperature low-low (instantaneous)	13-TSLL-782A	1,833°F instantaneous	—	1,800 – 2,002°F	Established as short-term limit on PIC [40 CFR 63.1209(g)(2)].
LIC(M)-8	Secondary chamber exhaust temperature low-low (ROHA)	13-TALL-782	1,842°F ROHA	—	1,800 – 2,002°F	Control DRE, dioxins and furans [40 CFR 63.1209(j)(1) and 40 CFR 63.1209(k)(2)].
LIC-07	Secondary chamber exhaust temperature high-high	13-TAHH-782	—	2,008°F	1,800 – 2,002°F	Operating requirements, waste feed combustion temperature limits [40 CFR 264.345].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Range	Basis
LIC(M)-9	Secondary chamber exhaust temperature high-high	13-TAHH-782	2,008°F instantaneous	—	1,800 – 2,002°F	Established to limit metal volatilization [40 CFR 63.1209(g)(2)].
LIC-08 LIC(M)-10	Combustion air to secondary chamber burner pressure low-low	13-PSLL-795	30 in. w.c. instantaneous	30 in. w.c.	> 30 in. w.c.	Manufacturers recommendation [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-09	Secondary chamber exhaust pressure differential high (instantaneous)	13-FAHH-855 (calculated)	—	18,720acfm	< 25,000 acfm	Operating requirements, combustion gas velocity [40 CFR 264.345].
LIC(M)-11	Secondary chamber exhaust pressure differential high (instantaneous)	13-FAHH-855	18,720 acfm instantaneous	—	< 25,000 acfm	Established as a short-term limit on PIC [40 CFR 63.1209(g)(2)].
LIC(M)-12	Secondary chamber exhaust pressure differential high (ROHA)	13-FAHH-855A (calculated)	18,700 acfm ROHA	—	< 25,000 acfm	Established as a short-term limit on PIC, DRE, dioxins and furans, mercury, particulate matter, semivolatile and low-volatile metals, hydrogen chloride and chlorine gas [40 CFR 63.1209(j)(2), (k)(3), (l)(2), (m)(1)(i)(C), (m)(2), (n)(3), (n)(5), (o)(2), (o)(3)(v)].
LIC-10 LIC(M)-13	Agent feed rate high-high based on a ROHA	13-FAHH-731	1,313 lb HD/hr ROHA 47.3 lbs HD/2 minutes (2-minute rolling average)	HD 1,313 lb/hr	< 1,335 lb/hr < 48.1 lbs/ 2 minutes	Control mercury and particulate matter [40 CFR 63.1209(l)(1) and (m)(3)], operating requirements, waste feed rate [40 CFR 264.345].
LIC-11 LIC(M)-14	Process water/SDS feed rate high-high based on a ROHA	13-FAHH-763C	2,082 lb/hr ROHA 74.9 lbs/2 minute (2-minute rolling average)	2,082 lb/hr maximum; to be adjusted lower periodically or as necessary to comply with final metals and chlorine limitations	< 2,200 lb/hr < 79.2 lbs/ 2 minutes	Control semivolatile metals, low-volatile metals, hydrogen chloride, and chlorine gas [40 CFR 63.1209(n)(2), (n)(4), (o)(1)], operating requirements, waste feed rate [40 CFR 264.345].
LIC-12 LIC(M)-15	CO concentration in PFS exhaust gas high-high	24-AAHH-716C	100 ppmv ROHA	100 ppm corrected to 7% oxygen, dry basis based on a ROHA	< 100 ppm CO < 38% water	Control CO and oxygen hydrocarbons, [40 CFR 63.1209(a)(1)(i) and (a)(7)], operating requirements, CO level in stack exhaust [40 CFR 264.345].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Range	Basis
LIC-13 LIC(M)-16	Primary atomizing air pressure low-low	13-PSLL-737C	55 psig instantaneous	55 psig	> 55 psig	Manufacturer's recommendation [40 CFR 63.1209(j)(4)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-14 LIC(M)-17	Secondary atomizing air pressure low	13-PSL-809	65 psig instantaneous	65 psig	> 65 psig	Manufacturer's recommendation [40 CFR 63.1209(j)(4)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-15	Venturi scrubber pressure drop low-low (instantaneous)	24-PDALL-814	—	24 in. w.c.	> 20 in. w.c.	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-18	Venturi scrubber pressure drop low-low (instantaneous)	24-PDALL-814	24 in. w.c. instantaneous	—	> 20 in. w.c.	Established as a short-term limit on PIC, mercury, particulate matter, semivolatile and low-volatile metals, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (m)(1)(i)(A), (n)(3), (o)(3)(i)].
LIC(M)-19	Venturi scrubber pressure drop low-low (ROHA)	24-PDALL-814A	Reserved	—	> 20 in. w.c.	Established as a short-term limit on PIC, mercury, particulate matter, semivolatile and low-volatile metals, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (m)(1)(i)(A), (n)(3), (o)(3)(i)].
LIC-16	Clean liquor flow rate to scrubber tower low-low (instantaneous)	24-FALL-825	—	647 gpm	> 630 gpm	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-20	Clean liquor flow rate to scrubber tower low-low (instantaneous)	24-FALL-825	647 gpm instantaneous	—	> 630 gpm	Control mercury, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (o)(3)(v)].
LIC(M)-21	Clean liquor flow rate to scrubber tower low-low (ROHA)	24-FALL-825A	Reserved	—	> 630 gpm	Control mercury, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (o)(3)(v)].
LIC-17	Agent emission high-high based on instantaneous measurement	MON-ACAM-134	—	0.03 mg/m^3 HD	< 1.0 ASC	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Range	Basis
LIC-18	Agent emission high-high based on instantaneous measurement at common stack Continuous agent monitoring at the common stack	MON-ACAM-129 MON-ACAM-223 MON-ACAM-225	—	0.03 mg/m^3 HD	< 1.0 ASC	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-19	All brine surge tanks 101, 102, 201, 202 unavailable	23-LSHH-02/06/702/706	—	Unavailable is when level high-high at 18 feet-3 in. or tank is selected for feed to the BRA	< 18 feet-3 in. in available tank	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-20	Clean liquor to scrubber tower pH low-low (instantaneous)	24-AALL-832	—	8.0 pH units	> 7.0 pH units	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-22	Clean liquor to scrubber tower pH low-low (instantaneous)	24-AALL-832	8.0 pH units instantaneous	—	> 7.0 pH units	Establish short-term limit on control of acid gases including hydrogen chloride and chlorine gas [40 CFR 63.1209(g)(2), (o)(3)(iv)].
LIC(M)-23	Clean liquor to scrubber tower pH low-low (ROHA)	24-AALL-832A/B	Reserved	—	> 7.0 pH units	Establish short-term limit on control of acid gases including hydrogen chloride and chlorine gas [40 CFR 63.1209(g)(2), (o)(3)(iv)].
LIC-21 LIC(M)-24	Clean liquor to scrubber tower Pressure low-low (instantaneous)	114-PALL-170	15 psig instantaneous	15 psig	> 15 psig	Manufacturers recommendation to control mercury, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (o)(3)(iii)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-22	Quench tower exhaust gas temperature high-high	24-TSHH-800	—	225°F	< 225°F	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-23	Quench brine to venturi scrubber flow rate low-low (instantaneous)	24-FALL-828	—	127 gpm	> 120 gpm	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-25	Quench brine to venturi scrubber flow rate low-low (instantaneous)	24-FALL-828	127 gpm instantaneous	—	> 120 gpm	Control particulate matter, semivolatile and low-volatile metals, [40 CFR 63.1209(m)(1)(i)(C) and (n)(3)].
LIC(M)-26	Quench brine to venturi scrubber flow rate low-low (ROHA)	24-FALL-828A	Reserved	—	> 120 gpm	Control particulate matter, semivolatile and low-volatile metals, [40 CFR 63.1209(m)(1)(i)(C) and (n)(3)].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Range	Basis
LIC-24	Brine density high-high (instantaneous)	24-DAHH-835	—	1.09 sgu	< 1.2 sgu	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-27	Brine density high-high (instantaneous)	24-DAHH-835	1.09 sgu instantaneous	—	< 1.2 sgu	Establish short-term limit on control of particulate emissions [40 CFR 63.1209(g)(2)].
LIC(M)-28	Brine density high-high (12-HRA)	24-DAHH-835A	Reserved	—	< 1.2 sgu	Control particulate matter, semivolatile and low-volatile metals, [40 CFR 63.1209(m)(1)(i)(B)(2) and (n)(3)].
LIC-25	Scrubber tower sump liquid level high-high	24-LSHH-818	—	86 in. above bottom tangent line	< 86 in. above bottom tangent line	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-26	Oxygen concentration in PFS exhaust gas high-high (instantaneous)	24-AAHH-717A/717B	—	13% corrected to a dry basis	5.9% - 13% corrected to a dry basis	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-27 LIC(M)-29	Oxygen concentration in PFS exhaust gas low-low (instantaneous)	24-AALL-717C	5.5% 2-minute rolling average	5.5% corrected to a dry basis	5.9% - 13% corrected to a dry basis	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345] [40 CFR §63.1209(j)(4)]
LIC-28 LIC(M)-30	Secondary chamber pressure high-high	13-PSHH-896	-0.25 in. w.c. instantaneous	-0.25 in. w.c.	-0.25 to -18.0 in. w.c.	Maintain lower than ambient pressure [40 CFR 1206(c)(5)(i)(B) and 1209(p)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-29	Scrubber tower sump level low-low	24-LSLL-818	—	50 in. above bottom tangent line	> 50 in. above bottom tangent line	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-30 [a] LIC(M)-31[a]	Flame loss in primary chamber burner	13-BSLL-908	Flame loss instantaneous	Flame loss	Flame on	No flame loss, control DRE [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-31 LIC(M)-32	Flame loss in secondary chamber burner	13-BSLL-913	Flame loss instantaneous	Flame loss	Flame on	No flame loss, control DRE [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-32	Slag discharge gate not closed	13-ZS-567B	—	Not closed	Closed	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-33	Slag discharge gate not closed	13-ZS-567B	Slag gate open instantaneous	—	Closed	Slag gate must be closed [40 CFR 63.1209(j)(2)].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Range	Basis
LIC-33 LIC(M)-34	Prefilter differential pressure high-high	114-PDAHH-436A/487A/454A	4.0 in. w.c. instantaneous	4.0 in. w.c.	0.1 - 4.0 in. w.c.	Manufacturer's recommendation, establish protection of carbon filter [40 CFR 63.1209(g)(2)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-34 LIC(M)-35	HEPA filter differential pressure high-high	114-PDAHH-436B/436H/487B/487H/454B/454H	3.0 in. w.c. instantaneous	3.0 in. w.c.	0.15 - 3.0 in. w.c.	Manufacturer's recommendation, establish protection of carbon filter [40 CFR 63.1209(g)(2)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-35 LIC(M)-36	Temperature of gas to carbon filter system high-high	114-TSHH-433 (instantaneous)	180°F (instantaneous) 163°F ROHA	180°F (instantaneous)	< 180°F (instantaneous)	Manufacturer's recommendation Establish protection of carbon filter, control dioxins and furans, mercury, semivolatile and low-volatile metals, hydrogen chloride and chlorine gas [40 CFR 63.1209(g)(2), (k)(1), (k)(7)(ii), (l)(4), (n)(1)]. Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-36	Moisture of gas to carbon filter system (either A or B or the average of the two measurements) high-high	114-MAHH-434A/B (instantaneous) 114-MAHH-434C (ROHA)	—	80% RH (instantaneous) 55% RH (ROHA)	< 80% RH instantaneous < 55% RH ROHA	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-37	Moisture of gas to carbon filter system (either A or B or the average of the two measurements) high-high	114-MAHH-434A/B	80% RH (instantaneous) 55% RH (ROHA)	—	< 80% RH (instantaneous) < 55% RH (ROHA)	Manufacturer's recommendation Establish protection of carbon filter. [40 CFR 63.1209(g)(2)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-37	Carbon filter bypass valve not closed	114-ZS-450B	—	Not closed	Closed	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-38	Minimum quench brine pH (ROHA)	24-AALL-831A/B	8.1 pH units ROHA	—	> 7.0 pH units ROHA	Establish short-term limit on control of acid gases, hydrogen chloride and chlorine gas [40 CFR 63.1209(g)(2), (o)(3)(iv)].
LIC(M)-39	Minimum packed bed pressure drop	24-PDALL-822A	0.30 in. w.c. ROHA	—	> 0.3 in. w.c. ROHA	Manufacturers recommendation, control mercury, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2) and (o)(3)(ii)].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Range	Basis
LIC(M)-40	Clean liquor maximum specific gravity	24-DAHH-826A	1.03 sgu 12-hr rolling average	—	<1.03 sgu 12-hr rolling average	Control particulate matter, semivolatile and low-volatile metals, [40 CFR 63.1209(m)(1)(i)(B)(2) and (n)(3)].
LIC-38 LIC(M)-41	Maximum differential pressure across the mist eliminator	24-PDAHH-867/164	20 in .w.c. instantaneous	20 in. w.c.	< 20 in. w.c.	Manufacturer's recommendation [40 CFR 63.1209(g)(2)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-39	Agent emission high-high based on instantaneous measurement upstream of the PFS unit	MON-ACAM-354/356/357	—	0.03 mg/m^3 HD	<1.0 ASC	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-40	Relative humidity in PFS exhaust gas high-high	114-MAHH-109/209/113	—	55% RH (30-minute rolling average)	< 55% RH (30-minute rolling average)	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-41	Moisture in any furnace PAS	024-MAH-078A/B,-207A/B,-669A/B,-716A/B		38% moisture (volume)		Operating requirements specified in the permit necessary to ensure required performance standards [40CFR264.345]
LIC(M)-42	Prefilter minimum pressure drop	114-PDALL-436A/487A/454A	0.1 in. w.c. (2-minute rolling average)	—	0.1 - 4.0 in. w.c. (2-minute rolling average)	Manufacturer's recommendation [40 CFR 63.1209(g)(2)].
LIC(M)-43	Carbon filter inlet and outlet HEPA filter maximum pressure drop	114-PDALL-436B/436H/487B/487H/454B/454H	0.15 in. w.c. (instantaneous)	—	0.15 - 3.0 in. w.c. (instantaneous)	Manufacturer's recommendation [40 CFR 63.1209(g)(2)].

[a] Waste feed cut-off parameter for loss of flame does not apply to HD Rinsate feed to the LIC.

%	percent	ACAM	automatic continuous air monitor	AWFCO	automatic waste feed cut-off	DAHH	density alarm high-high
>	greater than	acfm	actual cubic feet per minute	BRA	Brine Reduction Area	FAHH	flow alarm high-high
ºF	degree(s) Fahrenheit	ASC	allowable stack concentration	BSLL	burner flame switch low-low	FALL	flow alarm low-low
AAHH	analyzer alarm high-high	ATB	agent trial burn	CO	carbon monoxide	gpm	gallon(s) per minute
AALL	analyzer alarm low-low						

TABLE 2-4. LIC1 SYSTEM INSTRUMENT AND PROCESS PARAMETER[A]

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency
1 [c]	Fuel gas to primary chamber LIC-FURN-101 13-FIT-120	Orifice Plate and D/P Cell	In-line	0-267 scfm	±8 scfm	Inst. Calib. Para 2.4 (180 days)
2 [b,c,d]	Chemical Agent from TOX to LIC-FURN-101 13-FT-127A/B	Mass Flow Meter Vibrating U-Tube Type	In-line	0-1,500 lb/hr	±7.5 lb/hr	Inst. Calib. Para. 2.4 (180 days)
3 [c]	Combustion Air to LIC-FURN-101 13-FIT-42	Annubar and D/P Cell	In-line	0-3,400 scfm	±136 scfm	Inst. Calib. Para 2.4 (180 days)
4 [b,c,d]	SDS to Secondary Chamber LIC-FURN-102 13-FIT-102	Mass Flow Meter Vibrating U-tube	In-line	0-2,250 lb/hr	±20 lb/hr	Inst. Calib. Para. 2.4 (180 days)
5 [c]	Fuel Gas to Secondary Chamber LIC-FURN-102 13-FIT-70	Orifice Plate and D/P Cell	In-line	0-150 scfm	±5 scfm	Inst. Calib. Para 2.4 (180 days)
6[c]	Combustion Air to LIC-FURN-102 13-FIT-50	Annubar and D/P Cell	In-line	0-1,400 scfm	±50 scfm	Inst. Calib. Para. 2.4 (180 days)
7[b,c,d]	Primary Chamber LIC-FURN-101 Pressure 13-PIT-52	Diaphragm	Incinerator	-20 to +5 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para. 2.3 (180 days)
8 [b,c,d]	Primary Chamber LIC-FURN-101 Flue Gas Temperature 13-TIT-43	Thermocouple	In-line	212-3,000°F	±20°F	Inst. Calib. Para. 2.5 (180 days)
9 [b,c,d]	Secondary Chamber LIC-FURN-102 Flue Gas Temperature 13-TIT-129	Thermocouple	In-line	32-2,400°F	±15°F	Inst. Calib. Para. 2.5 (180 days)
10	Secondary Chamber LIC-FURN-102 Pressure 13-PIT-59	Diaphragm	Incinerator	-20 to +5 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para. 2.3 (180 days)
11 [b,c,d]	Secondary Chamber LIC-FURN-102 Exhaust Gas Flow Rate 13-PDIT-854	Modified Venturi and D/P Cell	In-line	-2 to 1.75 in w.c.	±0.1 in. w.c.	Inst. Calib. Para. 2.4 (180 days)
12	Intentionally left blank					
13	Intentionally left blank					
14	Intentionally left blank					
15	Intentionally left blank					
16 [b,c,d]	Quench Tower PAS-TOWR-104 Exhaust Gas Temperature high-high 24-TSHH-89	Filled System	In-line	95-250°F	±5°F	Inst. Calib. Para. 2.5 (180 days)
17 [b,c,d]	LIC Quench Brine Density 24-DIT-83	Magnetically Vibrated Tube	PAS-PUMP-111/112/211/212 Discharge	0.95-1.25 sgu	±0.03 sgu	Inst. Calib. Para. 2.7 (180 days)
18	Intentionally left blank					
19 [b,c,d]	Quench Brine Flow to Venturi Scrubber PAS-SEPA-103 24-FIT-88	Electromagnetic Flow meter	In-line	0-150 gpm	±5.0 gpm	Inst. Calib. Para. 2.4 (365 days)

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency
20 [b,c,d]	Clean Liquor Flow to Scrubber Tower Sprays 24-FIT-112	Electromagnetic Flow meter	In-line	0-1,000 gpm	±10 gpm	Inst. Calib. Para. 2.4 (180 days)
21 [c,e]	Quench Tower PAS-TOWR-104 Level 24-LIT-132	Guided Wave Radar Transmitter	Vessel	-3 to 9 inches	±0.25 inches	Inst. Calib. Para 2.6 (180 days)
22	Intentionally left blank					
23	Intentionally left blank					
24	Intentionally left blank					
25 [b,c,d]	Venturi Scrubber Differential Pressure 24-PDIT-90	D/P Cell	Venturi Scrubber	0-50 in. w.c.	±0.5 in. w.c.	Inst. Calib. Para. 2.4 (180 days)
26 [b,c,d]	Brine From Scrubber Tower PAS-SCRB-103 pH 24-AIT-91 A/B	Electrodes	PAS-PUMP-111/112	0-13 pH units	±0.8 pH unit	Inst. Calib. Para. 2.7 (7/30 days) [k]
27 [c]	Clean Liquor pH 24-AIT-116 A/B	Electrode	PFS-PUMP-134/135 Discharge to Suction	0-13 pH units	±0.8 pH unit	Inst. Calib. Para. 2.7 (7/30 days) [k]
28 [c]	Clean Liquor Density 24-DIT-117	Magnetically Vibrated Tube	PFS-PUMP-134/135 Discharge to Suction	0.95-1.25 sgu	± 0.03 sgu	Inst. Calib. Para 2.4 (180 days)
29 [c,g]	Mist Eliminator Water pH 24-AIT-657/658	Electrodes	PAS-PUMP-131/136 Discharge to Suction	0-13 pH units	±0.8 pH unit	Inst. Calib. Para. 2.7 (7/30 days) [k]
30 [c,l]	Mist Eliminator PAS-DMIS-101/102 Differential Pressure 24-PDIT-147/164	D/P Cell	Vessel	0-30 in. w.c.	±0.3 in. w.c.	Inst. Calib. Para 2.4 (180 days)
31 [b,c,d]	Exhaust Blower PAS-BLOW-104 Exhaust Gas carbon monoxide 24-AIT-78C	Infrared cell analyzer	Blower Exhaust Line (In-situ)	0-200 and 0-3,000 ppm	±6 ppm low range ±90 ppm high range	Inst. Calib. Para. 1.1 and 1.2 (daily)
32 [c,h]	Exhaust Blower PAS-BLOW-104 Exhaust Gas oxygen 24-AIT-210C	Zirconium oxide cell analyzer	Blower Exhaust Line (In-situ)	0-25%	±0.5%	Inst. Calib. Para. 1.1 and 1.2 (daily)
33 [b,c,d]	Exhaust Blower PAS BLOW-104 Exhaust Gas Agent MON-ACAM-163	Gas chromatography	Blower Exhaust Line (Extractive)	See Permit App. Att. D-2	See Permit App. Att. D-2	See Permit App. Att. D-2
34 [b,c,d]	Brine Surge Tanks 101,102,201,202 Level 23-LT-03/07/703/707	Ultrasonic Level Transmitter	Brine Surge Tanks	0- 225 inches	±3 inches	Inst. Calib. Para. 2.6 (180 days)
35	Scrubber Tower Brine Pressure 24-PIT-100	D/P Cell	In-line	0-150 psig	±1.5 psig	Inst. Calib. Para. 2.3 (180 days)
36	Process Water/SDS Pressure Low 13-PSL-51	Diaphragm	In-line	0-100 psig	±2.0 psig	Inst. Calib. Para. 2.3 (180 days)
37	Combustion Air to Secondary Chamber burner pressure low-low 13-PSLL-200	Diaphragm	In-line	2.5-45 in. w.c.	±1.0 in. w.c.	Inst. Calib. Para. 2.3 (180 days)
38	Atomizing Air Pressure low-low 13-PSLL-127C	Diaphragm	In-line	12-100 psig	±2.0 psig	Inst. Calib. Para. 2.3 (180 days)

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency
39	Brine Surge Tanks level high-high 23-LSHH-702/706/02/06	Admittance-Type Level Switches	Brine Surge Tanks	On/Off	±0.75 inches	Inst. Calib. Para. 2.6 (180 days)
40 [b,c,d]	Secondary Chamber LIC-FURN-102 pressure high-high 13 PSHH-888	Diaphragm	Incinerator	-0.55 to -0.15 in. w.c.	±0.05 in. w.c.	Inst. Calib. Para. 2.3 (365 days)
41	Presence of Flame Primary Chamber 13-BSLL-912 HD	Flame Detector	Burner	N/A	N/A	Inst. Calib. Para 2.8
42	Presence of Flame Secondary Chamber 13-BSLL-909	Flame Detector	Burner	N/A	N/A	Inst. Calib. Para 2.8
43 [b,c]	Prefilter Differential Pressure 114-PDIT-454A/436A/ 487A	D/P Cell	Prefilter	0-6 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para 2.4 (180 days)
44 [b,c]	HEPA Filter Differential Pressure 114-PDIT-454B/454H/ 436B/436H/487B/487H	D/P Cell	HEPA Filter	0-6 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para 2.4 (180 days)
45 [b,c]	Temperature of gas to carbon filter system 114-TIT-518	Resistance Temperature Detector	In-line	0-250°F	±3°F	Inst. Calib. Para. 2.5 (180 days)
46 [b,c]	Moisture of gas to carbon filter system 114-MIT-534A/B	Humidity Sensor	In-line	0-90% RH	±3.5% RH	Inst. Calib. Para. 2.7 (180 days)
47 [b,c,d]	Stack PAS-STAK-102 exhaust gas agent MON-ACAM-129/223/225	Gas chromatography	Stack (extractive)	See Permit App. Att. D-2	See Permit App. Att. D-2	See Permit App. Att. D-2
48 [m]	PFS inlet gas agent monitor MON-ACAM- 354/356/357	Gas chromatography	Gas Reheater Outlet (extractive)	See Permit App. Att. D-2	See Permit App. Att. D-2	See Permit App. Att. D-2
49 [b,c]	LIC-FURN-101 Exhaust Gas Temperature 13-TIT-610	Thermocouple	In-line	212-3000°F	±15°F	Inst. Calib. Para. 2.5 (365 days)
50 [b]	Primary Chamber Pressure 13-PSHH-233	Diaphragm	Incinerator	-0.55 to -0.15 in. w.c.	±0.05 in. w.c.	Inst. Calib. Para. 2.3 (180 days)
51 [b,c,i]	LIC-FURN-101 Agent Feed Pressure 13-PIT-113	Diaphragm	Incinerator	0-25 psig	±0.5 psig	Inst. Calib. Para. 2.3 (180 days)
52[b]	LIC-FURN- 102 Secondary Chamber Atomizing Air Pressure 13-PSL-058	Diaphragm	Incinerator	15-100 psig	±2.0 psig	Inst. Calib. Para. 2.3 (180 days)
53 [b]	PAS-SCRB-103 Scrubber Tower Sump Level high-high 24-LSHH-115	Magnetic Level Meter Switch	Vessel	Point Contact	±0.5 inch	Inst. Calib. Para. 2.6 (180 days)
54 [b]	PAS-SCRB-103 Scrubber Tower Sump Level low-low 24-LSLL-115	Magnetic Level Meter Switch	Vessel	Point Contact	±0.5 inch	Inst. Calib. Para. 2.6 (180 days)
55 [b,c]	PFS-PUMP-134/135 Clean Liquor Pump Discharge Pressure 114-PIT-329	Diaphragm	Pump Discharge Line	0-120 psig	±1 psig	Inst. Calib. Para. 2.3 (365 days)
56 [b]	PFS-BURN-101 Temperature of the Gas Entering the Carbon Filter System High-High 114-TSHH-533	Capillary Filled System	Reheater Discharge Line	95-250°F	±3.0°F	Inst. Calib. Para. 2.5 (180 days)
57	Intentionally left blank					
58	Intentionally left blank					

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency
59 [b,c]	Packed bed Scrubber Differential Pressure 24-PDIT-108 (ROHA)	D/P Cell	Scrubber Vessel	0-10 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para. 2.4 (180 days)
60 [b,c,j]	Relative Humidity in PFS Exhaust Gas based on Temperature 114-TIT-9810/9811/9815	Resistance Temperature Detector	In-line	50-200°F	±3% RH	Inst Calib. Para 2.5 (180 days)
61 [b,c]	PAS-DMIS-101/102 Flue Gas Discharge Temperature 24-TIT-9813/9814	Resistance Temperature Detector	In-line	50-200°F	±1°F	Inst. Calib. Para. 2.5 (180 days)

Notes:

[a] Process instrument calibration procedures and the oxygen and carbon monoxide analyzer calibration procedures are described in applicable facility plans and procedures. The information in this table is derived from the information in Table 7-1a of the Hazardous Waste Permit.

[b] Continuous monitoring.

[c] Continuous recording.

[d] Maintenance, at a minimum, in accordance with equipment manufacturer's recommendations.

[e] Hazardous waste treatment may continue during maintenance activities conducted in accordance with site-specific standing operating procedures, for a maximum of 24 hours after the failure of the instrument.

[f] During a waste feed cut-off event, the feed line pressure may reach the maximum instrument calibrated range limit.

[g] Hazardous waste treatment may continue during maintenance activities in accordance with site specific standing operating procedure, provided the mist eliminator water is not being transferred to the scrubber tower.

[h] The minimum limit is based on a two-minute rolling average.

[i] The pressure in the waste feed line may exceed the operating range specified upon initiation of feed to the furnace system.

[j] The relative humidity of the PFS exhaust gas is calculated using the PFS outlet temperature and the clean liquor return temperature. The calibrated instrument range applies to the temperature-indicating transmitter, and the operating range and instrument loop accuracy apply to the calculated relative humidity.

[k] Initially, upon placement of the instrument, or if the instrument is found out of tolerance, the instrument will be checked every seven (7) days until it stabilizes (instrument check indicates it is "in-tolerance" – no adjustments needed). After the instrument stabilizes, it will be checked on a 30-day basis until found out of tolerance or it is replaced.

[l] Daily trending will be conducted on the Mist Eliminator differential pressure to identify potential deterioration of the candles.

[m] These ACAMS readings are corrected to 7% oxygen as described in Section 2.13.2.1.

Abbreviations:

%	percent	MON	monitor
±	plus or minus	No.	number
°F	degree(s) Fahrenheit	N/A	not applicable
ACAM	automatic continuous air monitor	PAS	pollution abatement system
AIT	analysis indicating transmitter	PDIT	pressure differential indicating transmitter
App.	Hazardous Waste Permit Application	PFS	Pollution Abatement System (PAS) Filter System
BLOW	blower	PIT	pressure indicating transmitter
BSLL	burner flame switch low-low	ppm	part(s) per million
D/P	differential pressure	PSHH	pressure switch high-high
DIT	density indicating transmitter	psig	pound(s) per square inch gauge
DMIS	mist eliminator	PSL	pressure switch low
FIT	flow indicating transmitter	PSLL	pressure switch low-low
FT	flow transmitter	RH	relative humidity
FURN	furnace	ROHA	rolling one-hour average
gpm	gallon(s) per minute	scfm	standard cubic feet per minute
HEPA	high efficiency particulate air	SCRB	scrubber
in. w.c.	inch(es) water column	SDS	spent decontamination solution

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency

lb/hr	pound(s) per hour	SEPA	separator
LIC	Liquid Incinerator	sgu	specific gravity units
LIT	level indicating transmitter	STAK	stack
LSHH	level switch high-high	TIT	temperature indicating transmitter
LSLL	level switch low-low	TOWR	tower
LT	level transmitter	TOX	Toxic Cubicle
MIT	moisture indicating transmitter	TSHH	temperature switch high-high

TABLE 2-5. LIC2 SYSTEM INSTRUMENT AND PROCESS PARAMETERS [a]

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency
1 [c]	Fuel Gas to Primary Chamber LIC-FURN-201 13-FIT-749	Orifice Plate and D/P Cell	In-line	0-267 scfm	±8 scfm	Inst. Calib. Para 2.4 (180 days)
2 [b,c,d]	Chemical Agent from TOX to LIC-FURN-201 13-FT-731A/B	Mass Flow meter Vibrating U-Tube Type	In-line	0-1,500 lb/hr	±7.5 lb/hr	Inst. Calib. Para. 2.4 (180 days)
3 [c]	Combustion Air to LIC-FURN-201 13-FIT-743	Annubar and D/P Cell	In-line	0-3,400 scfm	±136 scfm	Inst. Calib. Para 2.4 (180 days)
4 [b,c,d]	SDS to Secondary Chamber LIC-FURN-202 13-FIT-763	Mass Flow meter Vibrating U-tube	In-line	0-2,250 lb/hr	±20 lb/hr	Inst. Calib. Para. 2.4 (180 days)
5 [c]	Fuel Gas to Secondary Chamber LIC-FURN-202 13-FIT-787	Orifice Plate and D/P Cell	In-line	0-150 scfm	±5 scfm	Inst. Calib. Para. 2.4 (180 days)
6 [c]	Combustion Air to LIC-FURN-202 13-FIT-788	Annubar and D/P Cell	In-line	0-1,400 scfm	±50 scfm	Inst. Calib. Para. 2.4 (180 days)
7 [b,c,d]	Primary Chamber LIC-FURN-201 Pressure 13-PIT-706	Diaphragm	Incinerator	-20 to +5 in. w.c.	±0.1 in. w.c	Inst. Calib. Para. 2.3 (180 days)
8 [b,c,d]	Primary Chamber LIC-FURN-201 Flue Gas Temperature 13-TIT-752	Thermocouple	In-line	212-3,000°F	±20°F	Inst. Calib. Para. 2.5 (180 days)
9 [b,c,d]	Secondary Chamber LIC-FURN-202 Flue Gas Temperature 13-TIT-782	Thermocouple	In-line	32-2,400°F	±15°F	Inst. Calib. Para. 2.5 (180 days)
10	Secondary Chamber LIC-FURN-202 Pressure 13-PIT-703	Diaphragm	Incinerator	-20 to +5 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para. 2.3 (180 days)
11 [b,c,d,l]	Secondary Chamber LIC-FURN-202 Calculated Flue Gas Flow Rate 13-FIT-855	N/A	N/A	N/A	N/A	N/A
12	Intentionally left blank					
13	Intentionally left blank					
14	Intentionally left blank					
15	Intentionally left blank					

TABLE 2-5. LIC2 SYSTEM INSTRUMENT AND PROCESS PARAMETERS [a]

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency
16 [b,c,d]	Quench Tower PAS-TOWR-204 Exhaust Gas Temperature high-high 24-TSHH-800	Filled System	In-line	95-250°F	±5°F	Inst. Calib. Para. 2.5 (180 days)
17 [b,c,d]	LIC Quench Brine Density 24-DIT-835	Magnetically Vibrated Tube	PAS-PUMP-211/212 Discharge	0.95-1.25 sgu	±0.03 sgu	Inst. Calib. Para. 2.7 (180 days)
18	Intentionally left blank					
19 [b,c,d]	Quench Brine Flow to Venturi Scrubber PAS-SEPA-203 24-FIT-828	Electromagnetic Flow meter	In-line	0-150 gpm	±5.0 gpm	Inst. Calib. Para. 2.4 (365 days)
20 [b,c,d]	Clean Liquor Flow to Scrubber Tower Sprays 24-FIT-825	Electromagnetic Flow meter	In-line	0-1,000 gpm	±10 gpm	Inst. Calib. Para. 2.4 (180 days)
21 [c,e]	Quench Tower PAS-TOWR-204 Level 24-LIT-810	Guided Wave Radar Transmitter	Vessel	-3 to 9 inches	±0.25 inches	Inst. Calib. Para 2.6 (180 days)
22	Intentionally left blank					
23	Intentionally left blank					
24	Intentionally left blank					
25 [b,c,d]	Venturi Scrubber Differential Pressure 24-PDIT-814	D/P Cell	Venturi Scrubber	0-50 in. w.c.	±0.5 in. w.c.	Inst. Calib. Para. 2.4 (180 days)
26 [b,c,d]	Brine From Scrubber Tower PAS-SCRB-203 pH 24-AIT-831 A/B	Electrodes	PAS-PUMP-211/212	0-13 pH units	±0.8 pH unit	Inst. Calib. Para. 2.7 (7/30 days) [k]
27 [c]	Clean Liquor pH 24-AIT-832-A/B	Electrode	PFS-PUMP-234/235 Discharge to Suction	0-13 pH units	±0.8 pH unit	Inst. Calib. Para. 2.7 (7/30 days) [k]
28 [c]	Clean Liquor Density 24-DIT-826	Magnetically Vibrated Tube	PFS-PUMP 234/235 Discharge to Suction	0.95-1.25 sgu	±0.03 sgu	Inst. Calib. Para 2.4 (180 days)
29 [c,g]	Mist Eliminator Water pH 24-AIT-861/658	Electrodes	PAS-PUMP-136/222 Discharge to Suction	0-13 pH units	±0.8 pH unit	Inst. Calib. Para. 2.7 (7/30 days) [k]
30 [c]	Mist Eliminator PAS-DMIS-201/102 Differential Pressure 24-PDIT-867/164	D/P Cell	Vessel	0-30 in. w.c.	±0.3 in. w.c.	Inst. Calib. Para 2.4 (180 days)
31 [b,c,d]	Exhaust Blower PAS-BLOW-204 Exhaust Gas carbon monoxide 24-AIT-716C	Infrared Cell Analyzer	Blower Exhaust Line (In-situ)	0-200 and 0-3,000 ppm	±6 ppm low range ±90 ppm high range	Inst. Calib. Para. 1.1 and 1.2 (daily)
32 [c,h]	Exhaust Blower PAS-BLOW-204 Exhaust Gas oxygen 24-AIT-717A/717B	Zirconium Oxide Cell Analyzer	Blower Exhaust Line (In-situ)	0-25%	±0.5%	Inst. Calib. Para. 1.1 and 1.2 (daily)

TABLE 2-5. LIC2 SYSTEM INSTRUMENT AND PROCESS PARAMETERS [a]

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency
33 [b,c,d]	Exhaust Blower PAS-BLOW-204 Exhaust Gas Agent MON-ACAM-134	Gas chromatography	Blower Exhaust Line (Extractive)	See Permit App. Att. D-2	See Permit App. Att. D-2	See Permit App. Att. D-2
34 [b,c,d]	Brine Surge Tanks 101,102,201,202 Level 23-LT-03/07/703/707	Ultrasonic Level Transmitter	Brine Surge Tanks	0- 225 inches	±3 inches	Inst. Calib. Para. 2.6 (180 days)
35	Scrubber Tower Brine Pressure 24-PIT-838	D/P Cell	In-line	0-150 psig	±1.5 psig	Inst. Calib. Para. 2.3 (180 days)
36	Process Water/SDS Pressure Low 13-PSL-765	Diaphragm	In-line	0-100 psig	±2.0 psig	Inst. Calib. Para. 2.3 (180 days)
37	Combustion Air to Secondary Chamber Burner Pressure low-low 13-PSLL-795	Diaphragm	In-line	2.5-45 in. w.c.	±1.0 in. w.c.	Inst. Calib. Para. 2.3 (180 days)
38	Atomizing Air Pressure low-low 13-PSLL-737C	Diaphragm	In-line	12-100 psig	±2.0 psig	Inst. Calib. Para. 2.3 (180 days)
39	Brine Surge Tanks Level high-high 23-LSHH-702/706/02/06	Admittance-Type Level Switches	Brine Surge Tanks	On/Off	±0.75 inches	Inst. Calib. Para. 2.6 (180 days)
40 [b,c,d]	Secondary Chamber LIC-FURN-202 Pressure high-high 13-PSHH-896	Diaphragm	Incinerator	-0.55 to -0.15 in. w.c.	±0.05 in. w.c.	Inst. Calib. Para. 2.3 (365 days)
41	Presence of Flame Primary Chamber 13-BSLL-908 HD agent only	Flame Detector	Burner	N/A	N/A	Inst. Calib. Para 2.8
42	Presence of Flame Secondary Chamber 13-BSLL-913	Flame Detector	Burner	N/A	N/A	Inst. Calib. Para 2.8
43 [b,c]	Prefilter Differential Pressure 114-PDIT-436A/487A/454A	D/P Cell	Prefilter	0-6 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para 2.4 (180 days)
44 [b,c]	HEPA Filter Differential Pressure 114-PDIT-436B/436H/487B/487H/454B/454H	D/P Cell	HEPA Filter	0-6 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para 2.4 (180 days)
45 [b,c]	Temperature of gas to carbon filter system 114-TIT-418	Resistance Temperature Detector	In-line	0-250°F	±3°F	Inst. Calib. Para. 2.5 (180 days)
46 [b,c]	Moisture of gas to carbon filter system 114-MIT-434A/B	Humidity Sensor	In-line	0- 90% RH	±3.5% RH	Inst. Calib. Para. 2.7 (180 days)
47 [b,c,d]	Stack PAS-STAK-102 exhaust gas agent MON-ACAM-129/223/225	Gas chromatography	Stack (extractive)	See Permit App. Att. D-2	See Permit App. Att. D-2	See Permit App. Att. D-2
48	PFS inlet gas agent monitor MON-ACAM-354/356/357	Gas chromatography	Gas Reheater Outlet (extractive)	See Permit App. Att. D-2	See Permit App. Att. D-2	See Permit App. Att. D-2

TABLE 2-5. LIC2 SYSTEM INSTRUMENT AND PROCESS PARAMETERS [a]

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency
49 [b,c]	LIC-FURN-201 Exhaust Gas Temperature 13-TIT-710	Thermocouple	In-line	212-3000°F	±15°F	Inst. Calib. Para. 2.5 (365 days)
50 [b]	Primary Chamber Pressure 13-PSHH-845	Diaphragm	Incinerator	-0.55 to –0.15 in. w.c.	±0.05 in. w.c.	Inst. Calib. Para. 2.3 (180 days)
51 [b,c,i]	LIC-FURN-201 Agent Feed Pressure 13-PIT-761	Diaphragm	Incinerator	0-25 psig	±0.5 psig	Inst. Calib. Para. 2.3 (180 days)
52 [b]	LIC-FURN-202 Secondary Chamber Atomizing Air Pressure 13-PSL-809	Diaphragm	Incinerator	15-100 psig	±2.0 psig	Inst. Calib. Para. 2.3 (180 days)
53 [b]	PAS-SCRB-203 Scrubber Tower Sump Level high-high 24-LSHH-818	Magnetic Level Meter Switch	Vessel	Point Contact	±0.5 inch	Inst. Calib. Para. 2.6 (180 days)
54 [b]	PAS-SCRB-203 Scrubber Tower Sump Level low-low 24-LSLL-818	Magnetic Level Meter Switch	Vessel	Point Contact	±0.5 inch	Inst. Calib. Para. 2.6 (180 days)
55 [b,c]	PFS-PUMP-234/235 Clean Liquor Pump Discharge Pressure 114-PIT-170	Diaphragm	Pump Discharge Line	0-120 psig	±1 psig	Inst. Calib. Para. 2.3 (365 days)
56 [b]	PFS-BURN-102 Temperature of the Gas Entering the Carbon Filter System High-High 114-TSHH-433	Capillary Filled System	Reheater Discharge Line	95-250°F	±3.0°F	Inst. Calib. Para. 2.5 (180 days)
57	Intentionally left blank					
58	Intentionally left blank					
59 [b,c]	Packed bed Scrubber Differential Pressure 24-PDIT-822 (ROHA)	D/P Cell	Scrubber Vessel	0-10 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para. 2.4 (180 days)
60 [b,c,i,j]	Relative Humidity in PFS Exhaust Gas Based on Temperature 114-TIT-9810/9811/9815	Resistance Temperature Detector	In-line	50-200°F	±3% RH	Inst Calib. Para 2.5 (180 days)
61 [b,c]	PAS-DMIS-201/102 Flue Gas Discharge Temperature 24-TIT-9817/9814	Resistance Temperature Detector	In-line	50-200°F	±1°F	Inst. Calib. Para. 2.5 (180 days)

TABLE 2-5. LIC2 SYSTEM INSTRUMENT AND PROCESS PARAMETERS [a]

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency

Notes:

[a] Process instrument calibration procedures and the oxygen and carbon monoxide analyzer calibration procedures are described in applicable facility plans and procedures. The information in this table is derived from the information in Table 7-1b of the Hazardous Waste Permit.

[b] Continuous monitoring.

[c] Continuous recording.

[d] Maintenance, at a minimum, in accordance with equipment manufacturer's recommendations.

[e] Hazardous waste treatment may continue during maintenance activities conducted with site-specific standing operating procedures, for a maximum of 24 hours after the failure of the instrument.

[f] During a waste feed cut-off event, the feed line pressure may reach the maximum instrument calibrated range limit.

[g] Hazardous waste treatment may continue during maintenance activities in accordance with site-specific standing operating procedure, provided the mist eliminator water is not being transferred to the scrubber tower.

[h] The minimum limit is based on a two-minute rolling average.

[i] The pressure in the waste feed line may exceed the operating range specified upon initiation of feed to the furnace system.

[j] The relative humidity of the PFS exhaust gas is calculated using the PFS outlet temperature and the mist eliminator vessel outlet temperature. The calibrated instrument range applies to the temperature-indicating transmitter, and the operating range and instrument loop accuracy apply to the calculated relative humidity.

[k] Initially, upon replacement of the instrument, or if the instrument is found out of tolerance, the instrument will be checked every seven (7) days until it stabilizes (instrument check indicates it is "in-tolerance" – no adjustments needed). After the instrument stabilizes, it will be checked on a 30-day basis until found out of tolerance or it is replaced.

[l] The flue gas flow rate is calculated using data for parameters 1 through 6. The data are converted to molar flow rates and summed. The ideal gas law is used to convert the sum of the molar flow rates to a flue gas flow rate in actual cubic feet per minute.

Abbreviations:

%	percent
±	plus or minus
°F	degree(s) Fahrenheit
ACAM	automatic continuous air monitor
AIT	analysis indicating transmitter
App.	Hazardous Waste Permit Application
BLOW	blower
BSLL	burner flame switch low-low
D/P	differential pressure
DIT	density indicating transmitter
DMIS	mist eliminator
FIT	flow indicating transmitter
FT	flow transmitter
FURN	furnace
gpm	gallon(s) per minute
HEPA	high efficiency particulate air
in. w.c.	inch(es) water column
lb/hr	pound(s) per hour
LIC	Liquid Incinerator
LIT	level indicating transmitter
LSHH	level switch high-high
LSLL	level switch low-low
LT	level transmitter
MIT	moisture indicating transmitter
MON	monitor
No.	number
N/A	not applicable
PAS	Pollution Abatement System
PDIT	pressure differential indicating transmitter
PFS	Pollution Abatement System (PAS) Filter System
PIT	pressure indicating transmitter
ppm	part(s) per million
PSHH	pressure switch high-high
psig	pound(s) per square inch gauge
PSL	pressure switch low
PSLL	pressure switch low-low
RH	relative humidity
ROHA	rolling one-hour average
scfm	standard cubic feet per minute
SCRB	scrubber
SDS	spent decontamination solution
SEPA	separator
sgu	specific gravity units
STAK	stack
TIT	temperature indicating transmitter
TOWR	tower
TOX	Toxic Cubicle
TSHH	temperature switch high-high

LIC Mass Balance Calculated Values For:
Assumed feeding of Agent HD Rinsate breakdown products from Agent HD ton containers
==> ASSUME a ratio of pounds mass solid removed to pounds mass of water added of 1.0
Calculations performed by Continental Research & Engineering, 7/30/10

TABLE 2-6: LIC FLUE GAS RESIDENCE TIME CALCULATIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	LIC Primary Comb. Chamber	Crossover DUCT	Secondary Comb. Chamber	Exhaust DUCT	Quench Tower	DUCT: Quench Tower to Scrubber	Scrubber Tower	DUCT: Scrubber to Mist Elim. Vessel	Mist Elim. Vessel	DUCT: Mist Elim. Vessel to PFS Reheater	PFS Reheater & DUCT: Reheater to PFS Filter	PFS Filter	DUCT: PFS Filter to Blower	DUCT: Blower to Stack	SUM
Mass Flowrate, lb/hr	13,144	13,144	16,910	16,910	26,497	26,497	14,810	14,810	14,810	14,810	15,042	15,042	15,042	15,042	
Flowrate, lb-moles/hr	472	472	635	635	1,167	1,167	532	532	532	532	541	541	541	541	
Temperature, °F	2,700	2,700	2,000	2,000	187	187	125	125	125	125	160	160	160	255	
Pressure, psia	14.3	14.3	14.2	14.2	14.1	14.1	12.4	12.4	10.9	10.9	10.8	9.9	9.9	14.4	
Molecular Weight, lb/lb-mole	27.9	27.9	26.6	26.6	22.7	22.7	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	
ACFM	18,639	18,639	19,677	19,677	9,576	9,576	4,490	4,490	5,108	5,108	5,549	6,054	6,054	4,800	
Equipment Volume, ft^3	170.0	85.6	281.0	734.7	1,130.9	347.6	950.3	467.2	2,945.9	69.9	152.4	2,688.0	297.1	210.0	
Residence Time, sec.	0.55	0.28	0.86	2.24	7.09	2.18	12.70	6.24	34.60	0.82	1.65	26.64	2.94	2.63	101.41

Abbreviations:

°F	degree(s) Fahrenheit	P	pressure in psia
ACFM	actual cubic feet per minute	PFS	Pollution Abatement System Filter System
ft^3	cubic feet	psia	pounds per square inch atmospheric
hr	hour	sec	second
lbm	pounds-mass		
lb-moles	pound-moles		

LIC Mass Balance Calculated Values For:
Assumed feeding of Agent HD Rinsate breakdown products from Agent HD ton containers
==> ASSUME a ratio of pounds mass solid removed to pounds mass of water added of 1.3
Calculations performed by Continental Research & Engineering, 7/30/10

TABLE 2-7: LIC FLUE GAS RESIDENCE TIME CALCULATIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	LIC Primary Comb. Chamber	Crossover DUCT	Secondary Comb. Chamber	Exhaust DUCT	Quench Tower	DUCT: Quench Tower to Scrubber	Scrubber Tower	DUCT: Scrubber to Mist Elim. Vessel	Mist Elim. Vessel	DUCT: Mist Elim. Vessel to PFS Reheater	PFS Reheater & DUCT: Reheater to PFS Filter	PFS Filter	DUCT: PFS Filter to Blower	DUCT: Blower to Stack	SUM
Mass Flowrate, lb/hr	13,114	13,114	16,864	16,864	26,369	26,369	14,829	14,829	14,829	14,829	15,062	15,062	15,062	15,062	
Flowrate, lb-moles/hr	468	468	631	631	1,158	1,158	533	533	533	533	541	541	541	541	
Temperature, °F	2,700	2,700	2,000	2,000	187	187	125	125	125	125	160	160	160	255	
Pressure, psia	14.3	14.3	14.2	14.2	14.1	14.1	12.4	12.4	10.9	10.9	10.8	9.9	9.9	14.4	
Molecular Weight, lb/lb-mole	28.0	28.0	26.7	26.7	22.8	22.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	
ACFM	18,493	18,493	19,535	19,535	9,501	9,501	4,497	4,497	5,115	5,115	5,557	6,062	6,062	4,807	
Equipment Volume, ft^3	170.0	85.6	281.0	734.7	1,130.9	347.6	950.3	467.2	2,945.9	69.9	152.4	2,688.0	297.1	210.0	
Residence Time, sec.	0.55	0.28	0.86	2.26	7.14	2.20	12.68	6.23	34.55	0.82	1.65	26.60	2.94	2.62	101.38

Abbreviations:

°F	degree(s) Fahrenheit	P	pressure in psia
ACFM	actual cubic feet per minute	PFS	Pollution Abatement System Filter System
ft^3	cubic feet	psia	pounds per square inch atmospheric
hr	hour	sec	second
lbm	pounds-mass		
lb-moles	pound-moles		

LIC Mass Balance Calculated Values For:
Assumed feeding of Agent HD Rinsate breakdown products from Agent HD ton containers
==> ASSUME a ratio of pounds mass solid removed to pounds mass of water added of 1.8
Calculations performed by Continental Research & Engineering, 7/30/10

TABLE 2-8: LIC FLUE GAS RESIDENCE TIME CALCULATIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	LIC Primary Comb. Chamber	Crossover DUCT	Secondary Comb. Chamber	Exhaust DUCT	Quench Tower	DUCT: Quench Tower to Scrubber	Scrubber Tower	DUCT: Scrubber to Mist Elim. Vessel	Mist Elim. Vessel	DUCT: Mist Elim. Vessel to PFS Reheater	PFS Reheater & DUCT: Reheater to PFS Filter	PFS Filter	DUCT: PFS Filter to Blower	DUCT: Blower to Stack	SUM
Mass Flowrate, lb/hr	13,081	13,081	16,814	16,814	26,227	26,227	14,850	14,850	14,850	14,850	15,083	15,083	15,083	15,083	
Flowrate, lb-moles/hr	464	464	625	625	1,148	1,148	534	534	534	534	542	542	542	542	
Temperature, °F	2,700	2,700	2,000	2,000	187	187	125	125	125	125	160	160	160	255	
Pressure, psia	14.3	14.3	14.2	14.2	14.1	14.1	12.4	12.4	10.9	10.9	10.8	9.9	9.9	14.4	
Molecular Weight, lb/lb-mole	28.2	28.2	26.9	26.9	22.8	22.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	
ACFM	18,329	18,329	19,377	19,377	9,417	9,417	4,504	4,504	5,123	5,123	5,566	6,072	6,072	4,814	
Equipment Volume, ft^3	170.0	85.6	281.0	734.7	1,130.9	347.6	950.3	467.2	2,945.9	69.9	152.4	2,688.0	297.1	210.0	
Residence Time, sec.	0.56	0.28	0.87	2.28	7.21	2.21	12.66	6.22	34.50	0.82	1.64	26.56	2.94	2.62	101.36

Abbreviations:

°F	degree(s) Fahrenheit	P	pressure in psia
ACFM	actual cubic feet per minute	PFS	Pollution Abatement System Filter System
ft^3	cubic feet	psia	pounds per square inch atmospheric
hr	hour	sec	second
lbm	pounds-mass		
lb-moles	pound-moles		

LIC Mass Balance Calculated Values For:
Assumed feeding of Agent HD Rinsate breakdown products from Agent HD ton containers
==> <u>ASSUME</u> feed to the LIC is composed of 98 Weight % water and 2 Weight % Agent HD Rinsate breakdown products
Calculations performed by Continental Research & Engineering, 11/30/10

TABLE 2-9: LIC FLUE GAS RESIDENCE TIME CALCULATIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	LIC Primary Comb. Chamber	Crossover DUCT	Secondary Comb. Chamber	Exhaust DUCT	Quench Tower	DUCT: Quench Tower to Scrubber	Scrubber Tower	DUCT: Scrubber to Mist Elim. Vessel	Mist Elim. Vessel	DUCT: Mist Elim. Vessel to PFS Reheater	PFS Reheater & DUCT: Reheater to PFS Filter	PFS Filter	DUCT: PFS Filter to Blower	DUCT: Blower to Stack	SUM
Mass Flowrate, lbm/hr	13,225	13,225	17,019	17,019	26,762	26,762	15,257	15,257	15,257	15,257	15,490	15,490	15,490	15,490	
Flowrate, lb-moles/hr	482	482	647	647	1,188	1,188	549	549	549	549	558	558	558	558	
Temperature., °F	2,700	2,700	2,000	2,000	187	187	125	125	125	125	160	160	160	255	
Pressure, psia	14.3	14.3	14.2	14.2	14.1	14.1	12.4	12.4	10.9	10.9	10.8	9.9	9.9	14.4	
Molecular Weight, lb/lb-mole	27.5	27.5	26.3	26.3	22.5	22.5	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	
ACFM	19,039	19,039	20,038	20,038	9,742	9,742	4,632	4,632	5,270	5,270	5,722	6,242	6,242	4,950	
Equipment Volume, ft^3	170.0	85.6	281.0	734.7	1,130.9	347.6	950.3	467.2	2,945.9	69.9	152.4	2,688.0	297.1	210.0	
Residence Time, sec.	0.54	0.27	0.84	2.20	6.97	2.14	12.31	6.05	33.54	0.80	1.60	25.84	2.86	2.55	98.49

<u>Notes:</u>

<u>Abbreviations:</u>

°F	degree(s) Fahrenheit
ACFM	actual cubic feet per minute
ft^3	cubic feet
hr	hour
lbm	pounds-mass
lb-moles	pound-moles
P	pressure in psia
PFS	Pollution Abatement System Filter System
psia	pounds per square inch atmospheric
sec	second

FIGURE 2-1. SKETCH OF THE LIC PRIMARY AND SECONDARY COMBUSTION CHAMBERS

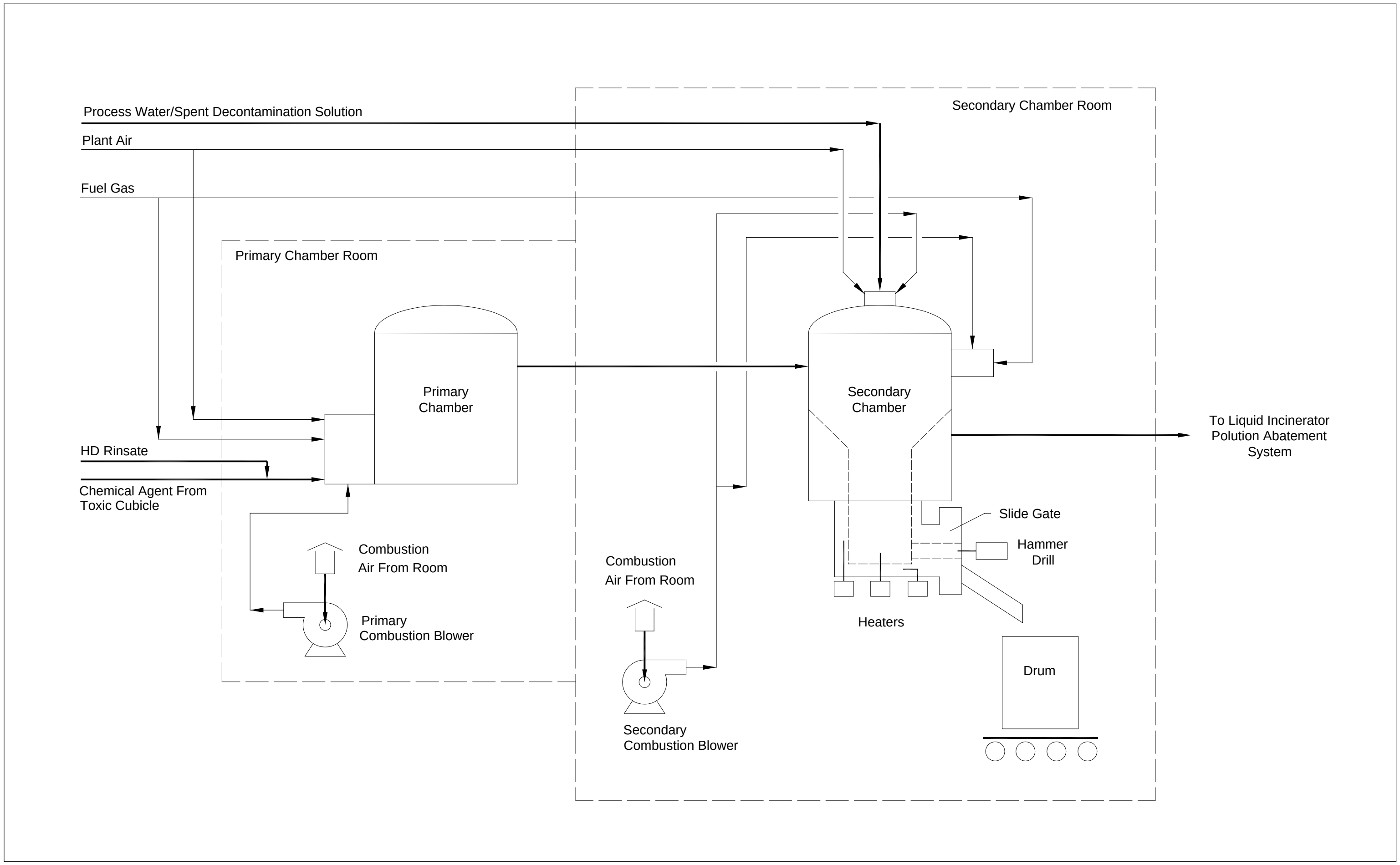


FIGURE 2-2. SCHEMATIC DIAGRAM OF THE LIC POLLUTION ABATEMENT SYSTEM

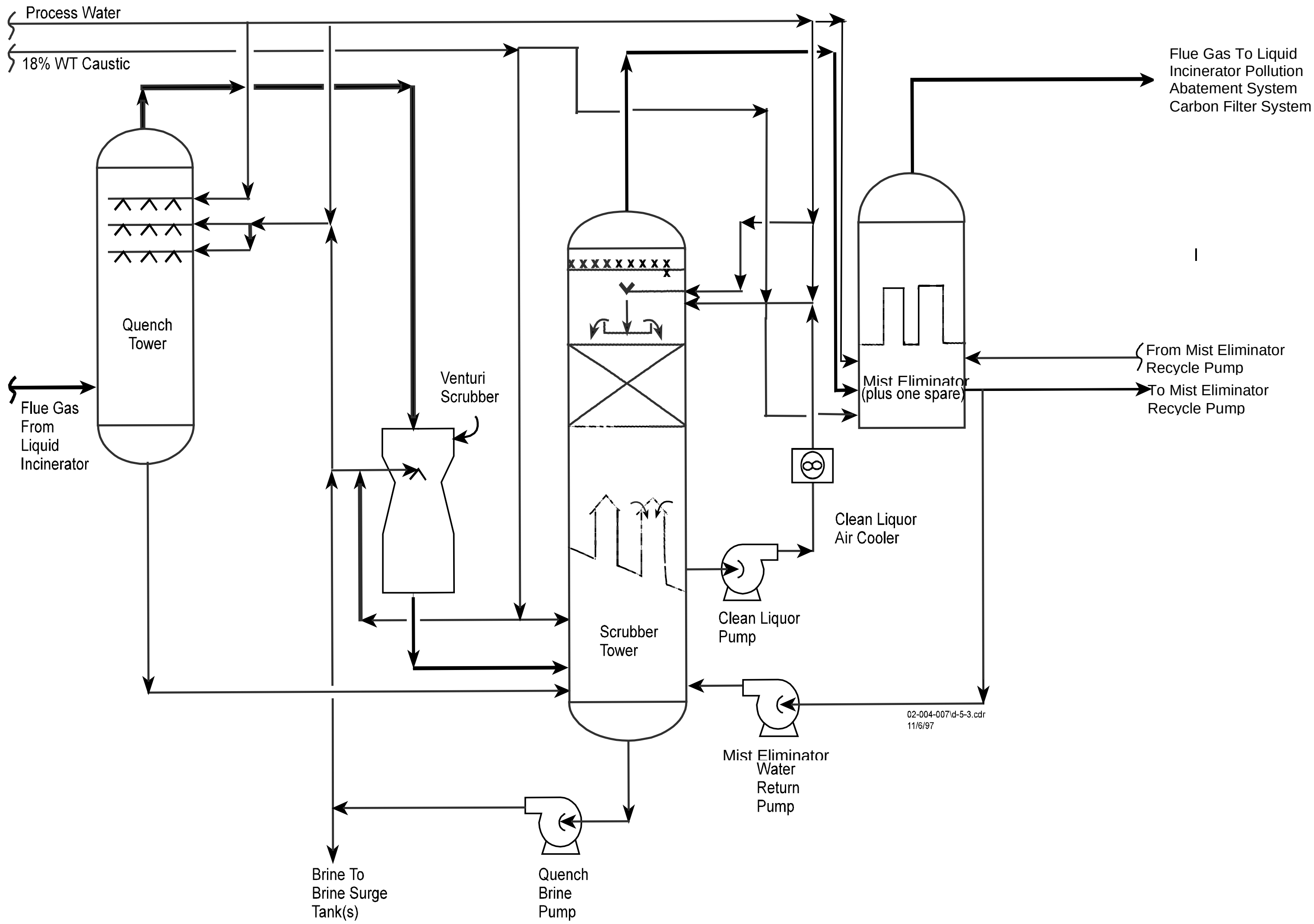


FIGURE 2-3. PROCESS FLOW DIAGRAM OF A PAS CARBON FILTER SYSTEM

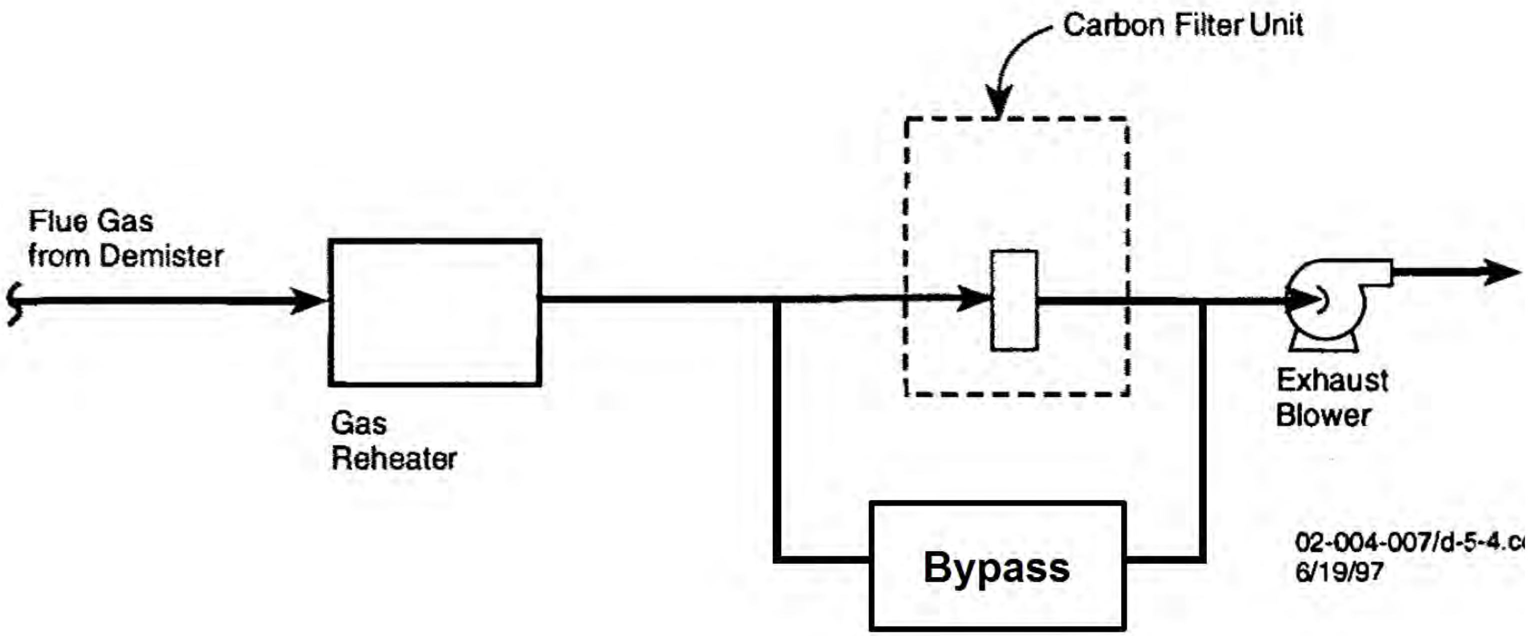
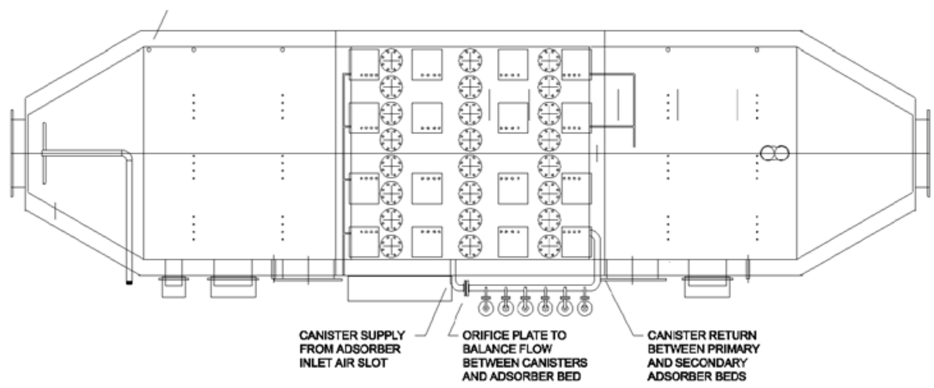


FIGURE 2-4. CONFIGURATION OF A PAS CARBON FILTER UNIT



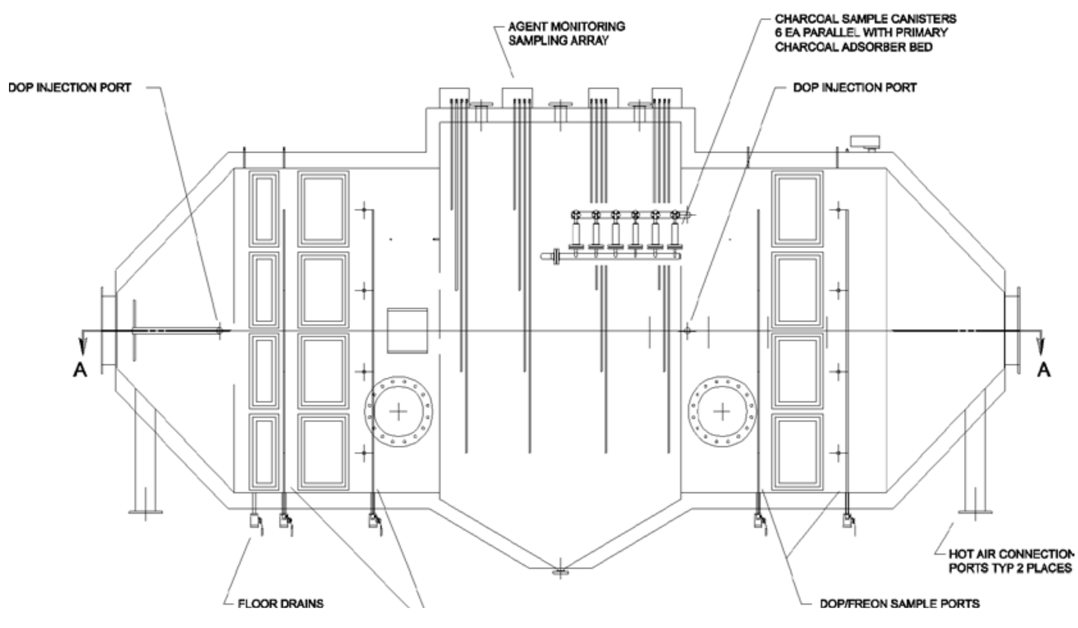
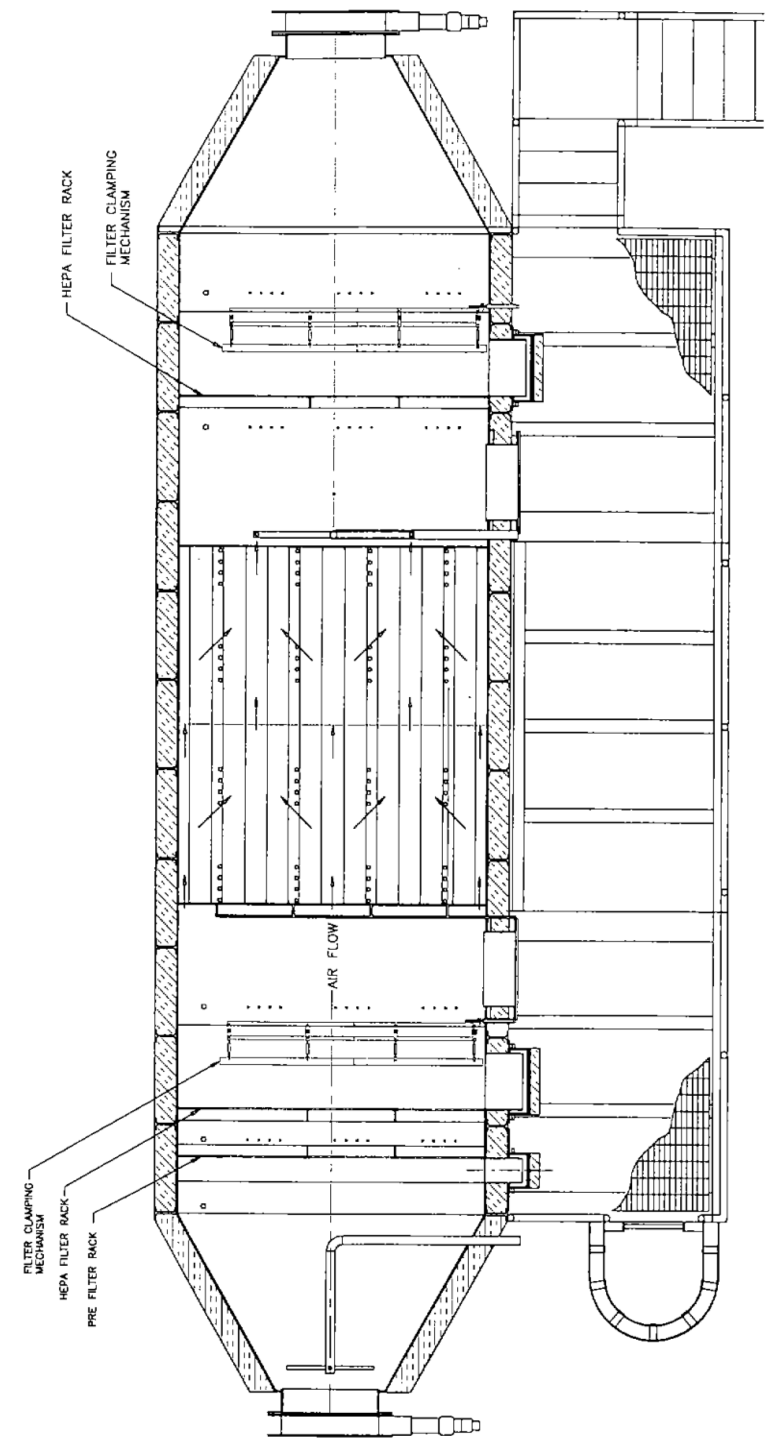


FIGURE 2-5. FLUE GAS FLOW THROUGH A CARBON FILTER UNIT



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SECTION 3.0 APPLICABLE PERFORMANCE STANDARDS

3.1. PERFORMANCE AND EMISSION STANDARDS

3.1.1. HWC MACT Performance and Emission Standards

Under 40 CFR §63.1219(a), existing HWC MACT sources must not discharge or cause combustion gases to be emitted into the atmosphere that contain the following (all corrected to 7% oxygen except DRE):

1. Dioxins and furans in excess of 0.40 nanograms toxicity equivalence per dry standard cubic meter
2. Mercury in excess of 130 micrograms per dry standard cubic meter
3. Lead and cadmium in excess of 230 micrograms per dry standard cubic meter
4. Arsenic, beryllium, and chromium in excess of 92 micrograms per dry standard cubic meter, combined emissions
5. Carbon monoxide in excess of 100 ppmv, over a rolling one-hour average (ROHA) (monitored continuously with a CEMS), dry basis and total hydrocarbons, not to exceed 10 ppmv, over a ROHA (monitored continuously with a CEMS), dry basis, and reported as propane
6. Hydrochloric acid and chlorine gas (total chlorine) in excess of 32 ppmv, combined emissions, expressed as a chloride equivalent, dry basis;
7. Particulate matter in excess of 0.013 grains per dry standard cubic foot

The standards listed above are the existing source replacement standards that became effective October 14, 2008.

3.1.2. UMCDF Hazardous Waste Permit Performance and Emission Standards

Performance and emission standards specified in the operating requirements of the UMCDF Hazardous Waste Permit (Condition VI.B.1) that must be maintained for the LICs include:

- A DRE of 99.9999% for HD which is a one time only demonstration and was demonstrated during the HD ATB/CPT. All HD air monitoring is on line during the EDT.
- A particulate emission limit of 34.3 milligrams per dry standard cubic meter (0.015 grains per dry standard cubic foot) corrected to 7% oxygen.
- Hydrochloric acid emissions not to exceed 1.91E-02 grams per second and less than 4 pounds per hour.
- A carbon monoxide emission limit, corrected to 7% oxygen, not to exceed 100 ppmv, dry basis, over a ROHA.
- An HD emission limit not to exceed 0.03 mg/m^3.
- Additional analyte emissions, identified in the UMCDF Hazardous Waste Permit, not to exceed the limits in Table 3-1. (Note that as discussed in the QAPjP [Appendix A], for several compounds, the UMCDF does not expect to be able to demonstrate compliance with the permitted emission rates as the detection limit required to demonstrate compliance is below the analytical method capability.)

3.2. EXHAUST GAS CONCENTRATIONS

The UMCDF demonstrated DRE during the HD ATB/CPT. DRE is a one time demonstration. On line ACAMS and DAAMS instrumentation will measure the HD agent emissions during the HD rinsate emissions demonstration test.

3.3. AUDIT SAMPLES

The UMCDF will use audit samples for dioxin/furan, semivolatile organics, volatile organics, metals, and chloride. Each audit sample will consist of a concentrate, full-volume, or other suitable material containing known concentrations of target analyte(s) provided by a commercial supplier of such materials. Control limits for the audit samples will be those established by the supplier.

3.4. SAMPLING FOR SULFUR DIOXIDE AND NITROGEN OXIDES

The UMCDF will sample the exhaust gas for sulfur dioxide and oxides of nitrogen to confirm emission factors. Sampling for sulfur dioxide and oxides of nitrogen will be in compliance with EPA Methods 6C and 7E, respectively.

TABLE 3-1. UMCDF HAZARDOUS WASTE PERMIT MAXIMUM ALLOWABLE EMISSION RATES FOR LIC

Constituent	CAS No.	LIC Allowable Emission Rates (grams/second)
ORGANICS		
TEQ 2,3,7,8-PCDFs [dioxin and furan congeners]	N/A	9.75E-10
1,1,2,2-Tetrachloroethane [a]	79-34-5	3.20E-06
1,1-Dichloroethane [a]	75-34-3	1.71E-06
2-Hexanone [a]	591-78-6	8.60E-06
Acetone	67-64-1	1.66E-01
Benzene	71-43-2	2.89E-04
Benzoic acid	65-85-0	5.40E-04
Benzyl alcohol	100-51-6	5.60E-03
Bis(2-ethylhexyl)phthalate	117-81-7	1.30E-03
Bromodichloromethane [a]	75-27-4	1.71E-06
Bromoform	75-22-2	1.59E-05
Carbon disulfide	75-15-0	3.25E-05
Carbon tetrachloride	56-23-5	1.10E-04
Chlorobenzene	106-90-7	8.35E-06
Chloroform	67-66-3	6.95E-05
Chloromethane	74-87-3	2.50E-03
m-Cresol	108-39-4	6.35E-04
o-Cresol	95-48-7	5.85E-04
p-Cresol	106-44-5	1.97E-04
Di(n)octyl phthalate	117-84-0	6.15E-05
Di-n-butyl phthalate	84-74-2	3.12E-05
Dibromochloromethane [a]	124-48-1	1.71E-06
(cis)1,3-Dichloropropene	542-75-6	8.10E-04
(trans)1,3-Dichloropropene [a]	542-75-6	1.71E-06
Diethyl phthalate	84-66-2	1.25E-04
Dimethyl phthalate	131-11-3	8.85E-04
Ethylbenzene	100-41-4	4.96E-06
Methyl chloroform	71-55-6	8.30E-05
Methyl ethyl ketone	78-93-3	5.90E-04
Methyl isobutyl ketone [a]	108-10-1	1.11E-05
Methylene chloride	75-09-2	1.88E-02
Naphthalene	91-20-3	3.12E-05
Propylene dichloride	78-87-5	9.40E-04
Styrene	100-42-5	2.82E-04
Tetrachloroethylene	127-18-4	5.75E-06
Toluene	106-88-3	1.06E-02
Vinyl acetate [a]	108-05-4	2.44E-06
Vinyl chloride	75-01-4	1.48E-05
Total xylene	1330-20-7	2.25E-05

TABLE 3-1. UMCDF HAZARDOUS WASTE PERMIT MAXIMUM ALLOWABLE EMISSION RATES FOR LIC

Constituent	CAS No.	LIC Allowable Emission Rates (grams/second)
METALS		
Antimony	7440-36-0	6.45E-05
Arsenic	7440-38-2	1.10E-04
Barium	7440-39-3	8.85E-05
Beryllium	7440-41-7	2.91E-05
Boron	7440-42-8	3.17E-03
Cadmium	7440-43-9	2.91E-05
Chromium	7440-47-3	2.91E-05
Cobalt	7440-48-4	3.64E-05
Copper	7440-50-8	3.64E-05
Lead	7439-2-1	1.52E-04
Manganese	7439-96-5	4.73E-03
Mercury	7440-97-6	3.10E-05
Nickel	7440-02-0	1.91E-04
Phosphorous	7440-14-0	2.05E-03
Selenium	7782-49-2	4.43E-05
Silver	7440-22-4	6.45E-05
Tin	7440-31-5	2.29E-04
Thallium	7440-28-0	2.91E-04
Vanadium	7440-62-2	4.43E-05
Zinc	7440-66-6	9.50E-04
ACID GASES		
Hydrogen chloride	7647-01-0	1.91E-02
Hydrogen fluoride	7664-39-3	5.25E-02
OTHER CONSTITUENTS		
Chlorine	7782-50-5	2.29E-02
Particulates	N/A	5.40E-02

Notes:

[a] Total train reporting limits may not be sufficiently low to demonstrate compliance with this permit limit considering the limitation on sample volume and analytical capabilities for the substantial target analyte list. To address this concern, the laboratory will report both the reporting limit and method detection limit. Method detection limit-derived emission limits may be reported for these analytes to provide the lowest possible emission limit.

Abbreviations:

CAS Chemical Abstracts Service
N/A not applicable

SECTION 4.0 DETAILED DESCRIPTION OF SAMPLING, ANALYSIS AND MONITORING PROCEDURES

Detailed explanations of EPA sampling methods, descriptions of pretest preparation, calibrations, sample collection, sample recovery, analysis, detailed method performance criteria, data reduction, validation, calculations, and quality control procedures are presented in the UMCDF HD Rinsate QAPjP (Appendix A).

4.1. EXHAUST GAS

The exhaust gas will be sampled in the flue gas duct between the LIC induced-draft fan and the common stack. Though the LICs, MPF, and DFS share a common stack, other furnaces may be operated during the LIC HD rinsate emissions demonstration test because the sampling location is under positive pressure in the exhaust duct, upstream of the common stack (where exhaust gases from the other incinerators are combined). The exhaust gases from the other furnace systems will have no effect on the LIC exhaust gas composition at the sampling locations selected. During the LIC HD rinsate emissions demonstration test, the ports shown in Figure A-1 and/or A-2 of the UMCDF HD rinsate emissions demonstration test QAPjP will be used for exhaust gas sampling. EPA Method 1 will be used to establish the required sampling points for the 12-point traverses. Only sampling locations that meet accepted standards for distance from flow disturbances will be used.

In addition to the normal setpoints, instrumentation, and data collection required to operate the incinerator and meet permit requirements, separate sampling and analysis of the exhaust gas will be performed to determine particulate matter, hydrochloric acid, chlorine, hydrogen fluoride, metals, dioxins and furans, PCBs, semivolatile and volatile PIC, total unspeciated organics, HD, total hydrocarbons as propane, sulfur dioxide, and nitrogen oxides.

Table A-1 of Appendix A shows the sampling trains and associated analytical parameters that will be collected during the LIC HD rinsate emissions demonstration test. Temporary reference CEMS will be on line for the duration of each run of the LIC HD rinsate emissions demonstration tests to determine total hydrocarbon, sulfur dioxide, and oxides of nitrogen emissions.

4.2. PROCESS SAMPLES

Samples of the HD rinsate feed to the primary chamber will be collected and analyzed for metals content prior to each run. Each sample will be collected from a designated RCS tank.

UMCDF standing operating procedure UM-0000-J-055 addresses collection of RCS tank samples. The metal method is discussed in the QAPjP describing that metals samples are prepared using SW-846 Method 3052 and analyzed using SW-846 Methods 6010B and 7470A.

Agent rinsate sample collection and analysis will be in accordance with facility procedures and are described in the QAPjP, Appendix A.

4.3. WASTES GENERATED DURING THE LIC HD RINSATE TESTS

Process waste generated during the LIC HD rinsate emissions demonstration test will be characterized in accordance with the UMCDF WAP. Brine samples are collected for each tank generated as well as monthly. A grab sample is collected from each brine tank and sampled for chemical agent. The sample is collected from a sample port located on the east side of each tank. Monthly, grab samples are collected and analyzed for total metals and Toxic Characteristic Leachate Procedure (TCLP) organics to support off-site disposal of the PAS brines. The sample is collected from the same sample port on the east side of each tank. The tank agitators are turned on at 70 inches. The brine tank is full at over 200 inches (212 inches). Thus, a sample is taken in accordance with UM-OP-019, “Request for Sample” on a tank that has been ”mixing” as 140 inches of brine are added to fill the tank.

4.4. TEST UPSET CRITERIA

The criteria for determining if a run is still valid if process or sampling interruptions occur is dependent on waste feed cutoff. If recovery from the waste feed cutoff can be done, and the amount of rinsate available is sufficient to resume waste processing, then testing will continue. All recorded data will be saved for historical purposes if a run is determined to be invalid.

SECTION 5.0 DEMONSTRATION TEST SCHEDULE

The execution of the LIC HD rinsate emissions demonstration test is contingent on completion of startup phases. With submission of this plan, the UMCDF currently plans to conduct the LIC HD rinsate emissions demonstration test in early 2011 for one LIC and approximately two months later for a second LIC.

Before each test, a daily test meeting will be scheduled to coordinate activities between the stack sampling personnel and Operations Department. The system will be brought to operating temperatures IAW UMCDF procedures and HD rinsate feed will be initiated. The feed rate will be increased until the planned feed rate is achieved and steady-state conditions are established (see Section 2.19). When the system is operating at steady state for at least 15 minutes, the stack sampling will begin. A daily post-test meeting may be held to review problems and plan the next day's activities.

5.1. SCHEDULE

The LIC HD rinsate emissions demonstration test will begin after the UMCDF has received the necessary approvals to construct the rinsate system, has successfully completed installation, and pretesting of the LIC system. In the submittal of the Rinsate PMR UMCDF-10-010-LIC(3) it was committed that the LIC HD rinsate emissions demonstration test plan would be submitted to the Department of Environmental Quality within 30 days. The final version of the HD rinsate emissions demonstration test plan will be issued prior to approval of the Rinsate PMR. Each LIC HD rinsate emissions demonstration test period will span approximately 10 days. This does not consider preparation days (up to 30 days) and cleanup days (three (3) days). Preparation may include the following activities:

- Review the daily schedule
- Discuss and resolve all outstanding issues with Operations Dept.
- Run blank sample trains
- Perform audits
- Conduct furnace preliminary runs
- Establish communications chain of command
- Prepare calibration packages
- Conduct oxygen and carbon monoxide relative accuracy test audit (RATA)

The anticipated daily sampling activity schedule is expected to commence about 0800 and conclude around 1400 hours. Sampling is expected to occur every other day to allow time to refill the RCS tanks and to sample the tanks. A daily pre-test meeting will be held to discuss the daily schedule, planned sampling activities, and any deviations to the EDT Plan that may be needed will be documented in the daily log and incorporated into the Final EDT Report.

The continuous operation of the MPF is required to supply the HD for the LIC HD rinsate emission testing. The MPF will operate under the operating parameter limits allowed by current permits.

The schedule, for example, for each LIC HD rinsate emission test is currently envisioned as follows:

- FSS to mobilize and set-up and conduct annual RATA
- Day 1 – Conduct preliminary measurements (EPA Methods 1 through 4, as required)
  Day 2 – Run 1
- Day 3 –RCS tank sampling and preparation
- Day 4 – Run 2

- Day 5 –RCS tank sampling and preparation
- Day 6 – Run 3
- Day 7 –RCS tank sampling and preparation
- Day 8 – Run 4
- Day 9 – Ship samples to the analytical laboratories and demobilize

Collection of samples from a fourth run is optional. Should four, or more, runs be sampled, it is expected that only three runs will be analyzed with the exception of certain samples that have short holding times between collection and analysis (e.g., field analysis of SW-846 Method 0040 bag samples, and SW-846 Method 0040 condensate samples). In the event more than three valid runs are collected, the determination as to which runs will be analyzed in their entirety will be made by the UMCDF trial burn manager/test director and Operations Manager. This determination will be made after considering: conformance of the run to the planned operating conditions, the number and length of any waste feed stoppages, sampling difficulties encountered, condition of the samples as received at the laboratory, and any nonconformances during sample preparation and/or analysis. These are not the only considerations and it is possible other factors may influence the determination as to which runs will be analyzed and reported.

5.2. DURATION

The LIC HD rinsate emissions demonstration test will consist of at least three valid runs. As the LIC HD rinsate emissions tests will be conducted using HD rinsate drained from ton containers to be processed in the MPF, the schedule is contingent upon successful draining operations. Each run will take approximately six (6) hours to complete. This includes four (4) hours of total sample collection time plus approximately two (2) hours for port changes and leak checks. It is expected that a total of nine (9) hours of LIC operation on HD rinsate feed will be required to complete each 6-hour run.

5.3. QUANTITY OF WASTE TO BE BURNED

The approximate quantity of HD rinsate required for each run is estimated to be 9,000 pounds, based on completing four (4) runs, nine (9) hours of LIC operation per run, a feed rate of about 1,000 pounds per hour, and a 25% contingency factor, the total rinsate needed for each LIC is 45,000 lbs.

SECTION 6.0 PROTOCOL FOR THE HD RINSATE EMISSIONS TEST

Each LIC has been designed for the unique service of incinerating agents. The test protocols are, therefore, structured to match the conditions that will occur during the incineration of the agents.

The EPA combustion strategy calls for a multi-end-point risk assessment using emissions measured at low temperature, while feeding real wastes representative of wastes normally burned at the UMCDF. The protocols for the various types of trial burns have been termed "parts" and are described below. Parts 1, 2, and 3 were previously completed during the LIC STBs, GB ATBs, and HD ATBs and are described below for reference. VX ATB testing has also been completed. The HD Rinsate Emissions Demonstration Test will not set any new OPLs; rather the LICs will operate from the OPLs established in the HD ATB/CPT.

Part 1. One of the STBs performed on each LIC was a LTT, designated Part 1, using a surrogate mixture fed into the PCC at low-temperature conditions to demonstrate that each furnace could achieve the required DRE. The LTT conditions were demonstrated in both the PCC and SCC for each LIC. The surrogate feed was a mixture of 1,2,4-trichlorobenzene and perchloroethylene. An ash agent, titanium dioxide, in an ethylene glycol solution, was also fed with the surrogate mixture.

The primary purpose of the LTT was to demonstrate the DRE capability for each LIC. Data was also collected to demonstrate compliance with performance standards for hydrochloric acid, particulate matter, and dioxin and furan emissions. The results of the STB LTT were used to establish certain operating limits for each LIC.

Part 2. One of the STBs performed on each LIC was a high-temperature test (HTT), designated as Part 2, using a surrogate mixture fed into the PCC at high-temperature conditions. The HTT conditions were demonstrated in both the PCC and SCC for each LIC. The permitted surrogate feed was a mixture of 1,2,4-trichlorobenzene and perchloroethylene. Metals and ash feed to the furnace was maximized by feeding a solution consisting of titanium dioxide, ethylene glycol, and metal oxides in addition to the surrogates.

The purpose of the STB HTT was to demonstrate the metal emission limitations for each LIC at HTT conditions. Data was also collected to demonstrate compliance with performance standards for hydrochloric acid, particulate matter, and dioxin and furan emissions at the high-temperature condition. DRE for the POHCs was not demonstrated during the STB HTT. The results of the STB HTT were used to establish certain operating limits for each LIC, including metals, chlorine, and particulate matter emissions rates in accordance with EPA guidance for establishing emission rates.

Part 3. The LIC GB ATBs were completed in July 2005 and May 2006, respectively. DRE capability was demonstrated and emissions data were captured for volatile and semivolatile compounds, particulate matter, metals, acid gases, dioxins/furans, and PCBs and were used in the post trial burn risk assessment. The LIC GB ATBs established certain specified operating parameters that were incorporated into the UMCDF Hazardous Waste Permit and HWC MACT NOC.

The LIC VX ATB was completed in January 2008 using a maximum agent feed rate of VX into the PCC at normal temperature conditions. 99.9999% DRE capability was demonstrated and emissions data were captured for dioxins/furans, metals, and total unspeciated volatile organics.

The results of the LIC VX ATB were used to establish feed rates for VX and confirm other operating limits.

The LIC HD ATBs were completed in May and June 2010. Emission sampling was completed for semivolatile and volatile organics, particulate matter, acid gases, metals, dioxins/furans, unspeciated total organic emissions, sulfur dioxide, nitrogen oxide, total hydrocarbons and PCB. All data was used in the HHRA to provide an update for HD processing. OPLs were established based on the HD ATB/CPT. The HD ATBs/CPTs for the LICs were required pursuant to 40 CFR 63.1200 to demonstrate compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Hazardous Waste Combustors (HWC) and the ATBs/CPTs also were required by the Hazardous Waste Permit, Module VI, to demonstrate that operations are protective of human health and the environment. The HD rinsate waste stream is under the HD campaign that was covered by the HD ATB/CPT. The rinsate feed limit is less than what was demonstrated for agent feed under the LIC HD ATB/CPT, and all other OPL will be in effect for this HD rinsate emissions demonstration test.

All parameters were established during the HD ATB/CPT. HD rinsate is not a new campaign, but rather a derivative of HD agent.

6.1. LIC HD RINSATE EMISSIONS DEMONSTRATION TEST

The LIC HD rinsate emissions demonstration test will involve flue gas emission sampling between the exhaust blower and common stack at the low end of the LIC operating temperatures with the maximum permitted feed rates obtainable. This will demonstrate compliance with the applicable performance standards.

The physical properties and feed rate of the HD rinsate to be incinerated during the LIC HD are described in the PMR, Tank Assessment section. Expected concentrations of metals found in the HD rinsate to be incinerated are within the permitted metal feed rates for each LIC. The UMCDF will sample the RCS tanks in accordance with the WAP and will have UMCDF-specific metal data that will be used to demonstrate compliance with the metal feed rates. The rinsate fed to the MPF during the HD ATB/CPT, Condition 2, is the same waste stream now being fed to the LICs. The metal feed rates and metal emissions from the MPF processing rinsate were within the permitted emission rates.

6.2. WASTE FEED METHODOLOGY

HD rinsate will be removed from ton containers by draining operations. The drained HD rinsate will be collected in the RCS tanks until enough is available to perform the LIC HD rinsate emission demonstration test run, or essentially two full RCS tanks.

6.3. AGENT RINSATE CHARACTERIZATION

The HD rinsate was characterized in the PMR UMCDF-10-010-LIC (3). The rinsate was also characterized on a ton container by ton container basis in the MPF HD ATB/CPT Final Report. Rinsate is also described in the Tank Assessment portion in this PMR.

SECTION 7.0 DESCRIPTION AND PLANNED OPERATING CONDITIONS FOR PROCESS CONTROL EQUIPMENT

Following the LIC STBs, GB ATBs, and/or the HD ATB/CPT the following parameters were established:

- Maximum combustion chamber temperature (PCC and SCC)
- Maximum density of clean liquor to the scrubber tower
- Maximum flue gas flow rate in SCC exhaust
- Maximum process water/SDS feed rate
- Maximum quench brine density
- Maximum surrogate feed rate
- Minimum brine pH
- Minimum combustion chamber temperature (PCC and SCC)
- Minimum differential pressure across the venturi scrubber
- Minimum flow rate of clean liquor to the scrubber tower
- Minimum flow rate of quench brine to the venturi scrubber
- Minimum oxygen concentration in the PFS exhaust gas
- Minimum pH of clean liquor to the scrubber tower

The information developed from the LIC STBs, GB ATB, VX ATB and HD ATB was used to calculate, establish, or otherwise confirm the limits for these parameters for normal operations of the LIC.

The facility also proved the following parameters using surrogate materials.

- Maximum ash feed rate
- Maximum chlorine feed rate
- Maximum metals feed rates
- Maximum total heat input
- Minimum POHC incinerability (Class 1).

7.1. KEY PROCESS AND POLLUTION ABATEMENT SYSTEM PARAMETERS

The key process and PAS parameters that will be monitored during the LIC HD rinsate emission test are identified in Tables 2-2 and 2-3. This table lists the instruments and associated setpoints that will activate the AWFCO system for LIC.

The exhaust gases entering the common stack from each LIC are continuously monitored and analyzed for carbon monoxide and oxygen by on-line instrumentation.

The process operating data will be recorded for the duration of each run. The PDAR system automatically records and saves the data. Alarm and interlock matrices identify the programmed actions that are taken when a specific alarm activates. All alarms are recorded by the PDAR system. The PDAR system is a critical device and is connected to the critical power system. The critical power system can supply full load for a minimum of 45 minutes. The critical power system draws from the substation power or, alternately, in case of substation failure, from the emergency generator. The measurements will be averaged for each run and the calculations will be performed on the average values. Plant operators continuously monitor the control systems and will notify the UMCDF test director if operating conditions are outside the acceptable limits. Determination whether a run will continue will depend upon a number of factors; operation out of acceptable limits does not constitute automatic cancellation of a run. The operators' initial response after notifying required personnel (e.g., CON Supervisor), is to attempt to rectify the situation (i.e., bring the parameter back into acceptable operating range). The situation will be reviewed regarding what the parameter is, how far and how long it was outside of original established limits, potential affect on future system operation, and potential affect on test objectives.

7.2. COMBUSTION TEMPERATURE RANGES

During the LIC HD rinsate emissions demonstration test, the PCC will be operated at a temperature that is not less than the permitted minimum temperature for each LIC and not greater than 2,761°F and 2,768°F for LIC1 and LIC2, respectively, and the SCC will be operated at a temperature that is not less than minimum temperature for each LIC and not greater than 2,002°F and 2,008°F for LIC1 and LIC2, respectively, in accordance with existing permit requirements.

7.3. COMBUSTION GAS VELOCITY

During the LIC HD rinsate emissions demonstration test, the total residence time in the PCC, the duct between the PCC, the SCC, and the duct into the quench tower is approximately 3.99 seconds, as shown in Table 2-6. During the LIC HD rinsate emission demonstration test, the combustion gas velocity will be continuously monitored and recorded.

SECTION 8.0 SHUTDOWN PROCEDURES

8.1. AUTOMATIC WASTE FEED CUT-OFF SYSTEM

The control systems for each LIC are designed to cut-off waste feed to the PCC and SCC in the event that operating conditions deviate from the normal limits. Setpoints which, when exceeded, activate the AWFCO system to control emissions in the event of a system malfunction are detailed in Tables 2-2 and 2-3. All HD rinsate emissions demonstration testing will be done within the existing permitted OPL.

In the event of a major equipment or system failure, it may be necessary to shut down the combustion chambers and PAS completely. A shutdown of this type will be performed in accordance with facility SOPs.

When there is a waste feed cut-off or an unplanned shutdown (e.g., caused by a power failure), stoppage of the hazardous waste feed is approximately one second. The manufacturer of the furnaces, T-Thermal, has determined that each LIC is sufficiently insulated and will maintain sufficient temperature to ensure complete combustion of residual materials in the affected unit. The same design has been proven effective at the TOCDF, Anniston Chemical Agent Disposal Facility, Pine Bluff Chemical Agent Disposal Facility, and Johnston Atoll Chemical Agent Disposal System.

A detailed description of the impacts and plans to recover sampling activities in the event of an unplanned interruption of system operations are provided in the QAPjP (Appendix A).

The proper procedures for shutting down waste feed, either LIC, and the associated PAS during the LIC HD rinsate emission demonstration test are provided in SOPs located in the operating record and the CON.

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SECTION 9.0 NEW INCINERATOR CONDITIONS

The UMCDF performed instrument debugging, instrument calibration, alarm and interlock testing, and related preliminary systems testing before startup on the auxiliary fuel and surrogate testing. Having successfully completed the LIC STBs, the LIC GB ATBs, the LIC1 and LIC2 VX ATB, and the LIC HD ATBs, the UMCDF has completed Parts 1, 2, and 3 of the trial burn program for the LICs.

Startup activities as described in Section 9.1 are complete. During the startup period, each system was thoroughly evaluated to verify that the entire system conforms to design requirements and performs in a safe, consistent, and predictable manner. Ramping of feed for the LIC HD rinsate emission test will be conducted as described in Section 9.2 and Table 9-1. Preliminary systems, startup, and ramp up testing will proceed in accordance with the established facility operating procedures. The UMCDF operating conditions will be maintained within the permitted operating conditions. These limits on operating conditions have been established based on demonstrated results from the LIC STBs and ATBs.

During the ramp up period, HD rinsate will not be fed to the system unless the conditions described above are satisfied. The flow of HD rinsate to the LIC will be stopped if operating conditions deviate from the established limits. An AWFCO system, described in Section 8.1 will be in operation at all times during the incineration of HD rinsate. AWFCO settings during the emission test for the LICs are those specified in Tables 2-2 and 2-3.

9.1. STARTUP

Prior to the LIC STBs, the startup phase for each incinerator was completed. The startup phase was used to test the subsystems of each LIC, as appropriate, without the introduction of actual hazardous wastes into the incineration systems. Startup was performed using natural gas. During the final startup test, the natural gas burners in each LIC furnace were fired to cure the refractory and check out the prime air mover and system instrumentation under actual temperatures and pressure. The UMCDF operated each incinerator for a period of time with simulant chemicals that are not regulated as hazardous wastes (e.g., ethylene glycol, diethylene glycol, and diethylene glycol dimethyl ether). This test period was used to tune the controllers and test the incinerator, the feed system, the safety shutdown systems, the process interlocks, and the AWFCO system.

LIC1 and LIC2 completed successful STBs in February 2003 and August 2004, respectively, with high chlorine, metal, and ash feed. LIC1 and LIC2 completed GB ATBs in July 2005 and June 2006, respectively. The LIC1 VX ATB was completed in January 2008. The LIC HD ATBs completed in June 2010. The LICs are prepared for continued testing through the LIC HD rinsate phase.

9.2. RAMP UP

Prior to feeding rinsate to LIC2, a test will be conducted of feeding process water (PRW) from the RCS tanks through to the LIC primary. The test will be conducted up to full feed rate in the primary chamber and full feed rate of SDS/PRW in the secondary chamber. A flow check will be conducted at the refractory venturi by the FSS using a manual sampling probe. This all water test will bound the rinsate feed vis-à-vis the residence time compared to the residence time of only HD in the HD ATB. After the initial startup and continued testing discussed in Section 9.1, the ramp up period that occurs prior to the LIC1 or LIC2 HD rinsate emissions demonstration test will consist of the installation, testing the system, and finally commence with the introduction of HD rinsate to the LICs. The commissioning period will commence with a slow ramp up of HD rinsate feed to a LIC, with the feed being increased over days to full rate. The ramp up will be done in accordance with UMCDF SOP for ensuring readiness of personnel and equipment, PL-097. Ramp up is used to identify any system differences that may result from the HD rinsate feed. During ramp up operations, sufficient latitude is available to identify these differences and take corrective actions to either correct the situation or find another approach to achieve the objectives of the LIC HD rinsate emissions demonstration test. Ramp up will also provide real-time information to verify the incineration system is capable of processing HD rinsate while maintaining the necessary levels of safety and protection of the environment.

The principal objective of the ramp up period is to prepare the incineration system to safely process the HD rinsate feed that will establish loading comparable to the HD campaign at the UMCDF. The HD emissions demonstration test will commence after the ramp up is complete and objective evidence exists that the HD rinsate emissions test can be completed at the design feed rate of approximately 1,000 lb/hr. Once the facility has maintained this feed rate on consecutive processing days, then the FSS will be notified to mobilize to conduct the testing.

To ensure that all four operation's shifts have had an opportunity to process rinsate, a three week period, minimum, is required for each LIC. The ramp up plan done in accordance with PL-097, requires a shift to begin initial processing at 25%, progress to 50%, then 75%, and finally 100%. A minimum of four hours of sustained operations on feed rates of 25% and 50% are required prior to that shift progressing to eight hour sustained operation at the 75% and 100% feed rates. It is anticipated that approximately 150,000 lbs of rinsate in each LIC will be processed during ramp up. A ramp up consuming 350 operational hours is expected.

9.3. LIC POST-HD RINSATE TEST OPERATIONS

The post-LIC HD rinsate operations are governed by the conditions listed in the UMCDF Hazardous Waste Permit and the HWC MACT standards for existing sources found in 40 CFR §63.1219(a). Upon completion of the LIC HD rinsate emissions demonstration test, each LIC remains subject to the conditions in Permit Module VI and the Title V Operating Permit requirements.

9.4. INCINERATOR PERFORMANCE

The results of the LIC STBs, the LIC GB ATBs, the LIC1/2 VX ATB, and the LIC HD ATB indicate the permitted emission limits for metals will not be exceeded, and control of each LIC by the CON operators and AWFCO systems is adequate.

9.5. LIC HD RINSATE EMISSION TEST RESULTS

All data collected from the HD Rinsate Emissions Demonstration Test will be compiled in tabular form, submitted to DEQ and entered into the operating record. A preliminary and Final EDT Report will be prepared using the HD ATB/CPT reports as a template.

9.6. FINAL OPERATING LIMITS

No changes in the existing operating limits identified in Table 2-2 and 2-3 will be made as a result of the HD rinsate emissions demonstration test.

TABLE 9-1. PRELIMINARY LIC1 AND/OR LIC2 HD RINSATE RAMP UP AND TEST SCHEDULE [a]

Day	1	2	3	4	5	6	7
Action	25% rate/shift	25% rate/shift	25% rate/shift	25% rate/shift	25% rate/shift	25% rate/shift	25% rate/shift
Day	**8**	**9**	**10**	**11-15**	**16**	**17**	**18**
Action	50% rate/shift	50% rate/shift	50% rate/shift	50% rate shift	75/90% rate/day	75/90% rate/day	75/90% rate/day
Day	**19-24**	**25-30**	**Test Period**	**Test Period**	**Test Period**	**Test Period**	**Test Period**
Action	75/90% rate/day	RATA window /100% rate/day	Methods 1-4 [b]	Run 1	Run 2	Run 3	Run 4

[a] The preliminary schedule is subject to change based on operational experience and facility requirements.

[b] EPA Methods are from 40 CFR §60, Appendix A.

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SECTION 10.0 QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

The UMCDF HD rinsate emissions demonstration test [QAPjP] documents the precision, accuracy, representativeness, completeness, and comparability objectives for the sampling and analysis conducted specifically to support this testing program. This QAPjP also describes the project organization and responsibilities, quality assurance objectives, sample custody requirements, calibration procedures, and other procedures and requirements specific to the performance of emissions testing.

The UMCDF QAPjP HD rinsate emission test has not been written to address the quality assurance and quality control requirements for facility activities that are not specific to the LIC HD rinsate emissions test. Operation and maintenance of the CMS (including the CEMS) are examples of such activities. The quality assurance and quality control requirements for the CMS are described in facility plans and procedures which are part of the operating record.

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