UMATILLA CHEMICAL AGENT DISPOSAL FACILITY WASTE ANALYSIS PLAN

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

APPENDICES

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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.

Normally Processed TC HD Agent Sampling

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.

Upset Condition TC HD Agent Sampling

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.

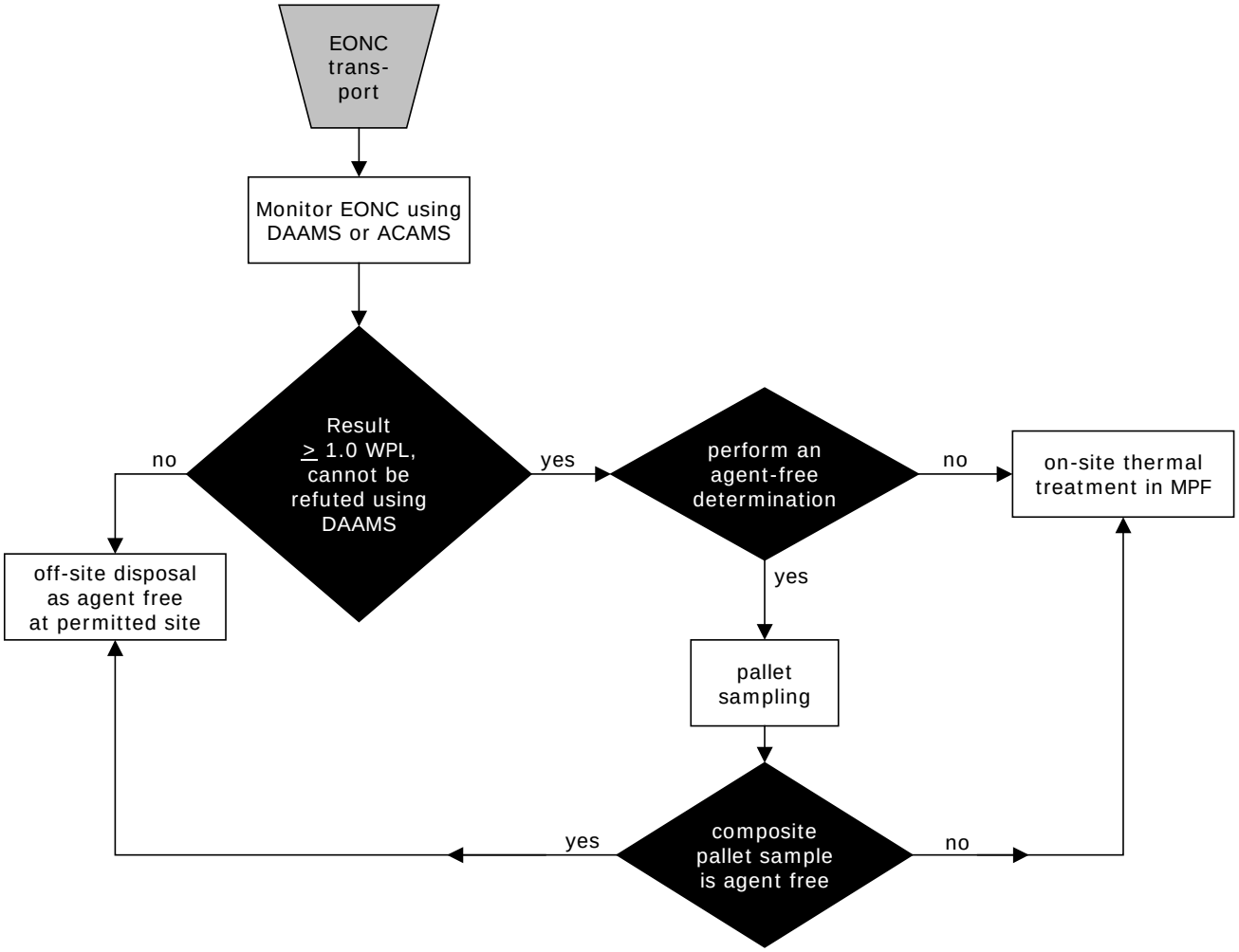

Figure 2-1 UMCDF Nonleaker Igloo Wood Pallet Characterization Process

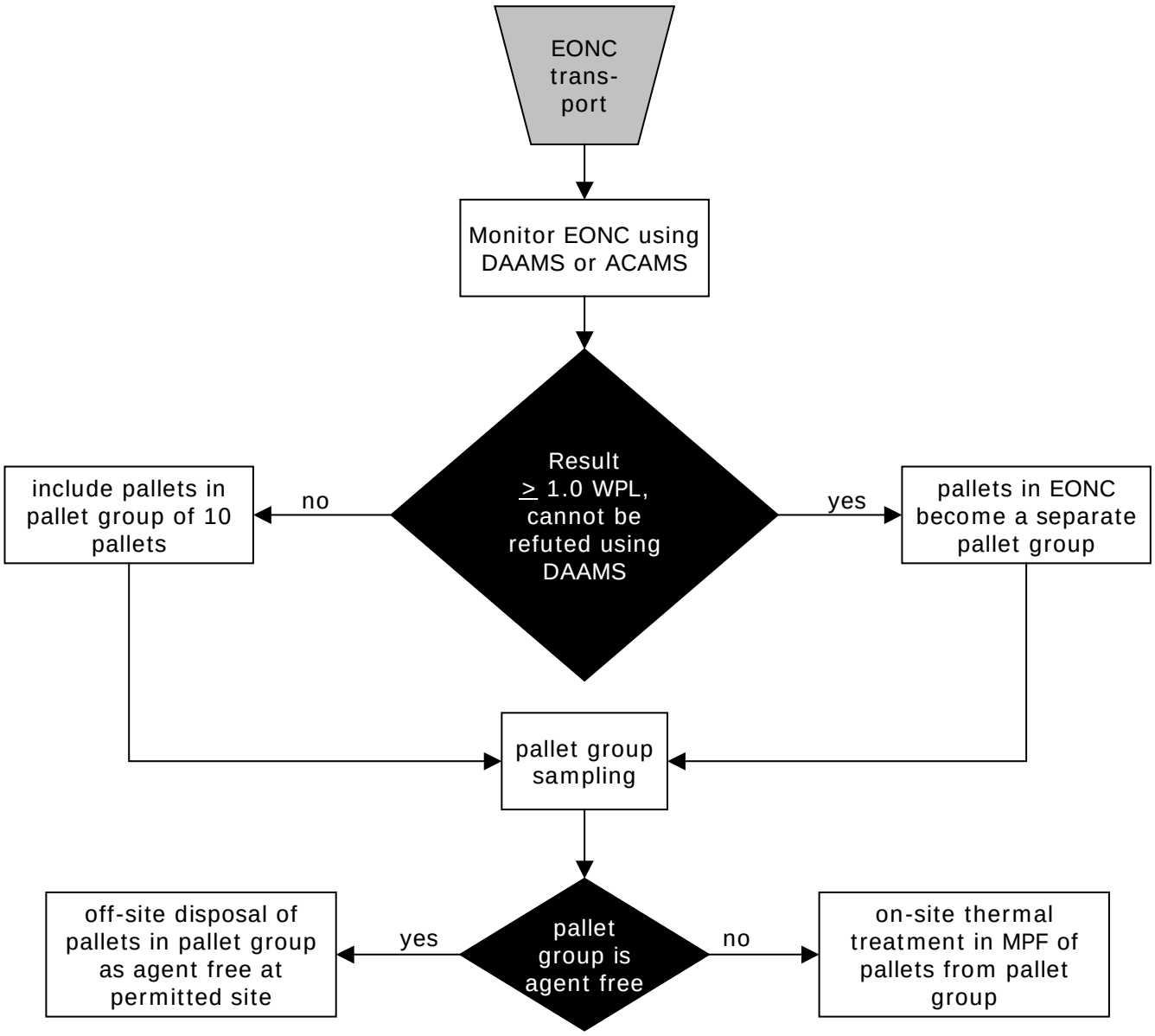

Figure 2-2. UMCDF Leaker Igloo Wood Pallet Initial Characterization

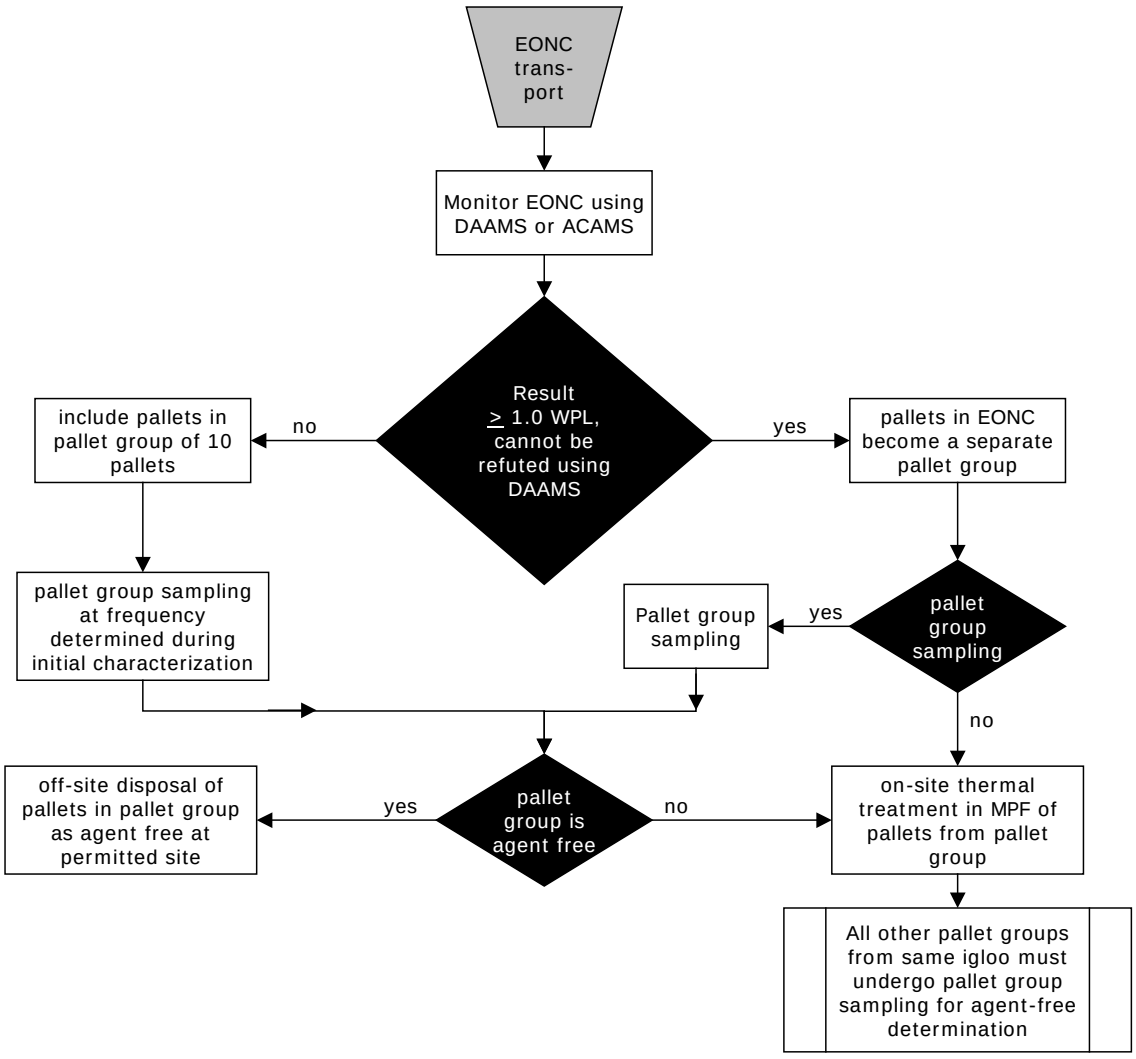

Figure 2-3. UMCDF Leaker Igloo Wood Pallet Confirmation Sampling

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).

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

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 ≥ 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 ≥ 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

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		

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)**		**General Population Limit (GPL)**
		(8-hour)	(12-Hour)[1]	
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

RTAP Detection and Confirmation

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).

	Column		
Equipment	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