ATTACHMENT 2- WASTE ANALYSIS PLAN

2.1 Introduction

The procedures and methodologies used to characterize Explosive Destruction System (EDS) operation wastes shall ensure proper treatment of wastes; safe handling and storage of treatment residues; and safe handling, treatment, or disposal of wastes shipped offsite.

Liquid and solid waste sample analysis for chemical agent shall be performed by Edgewood Chemical Biological Center (ECBC) personnel using an onsite mobile laboratory. At a minimum, air monitoring systems and operations will meet the certification and validation requirements outlined in the Quality Assurance Project Plan (QAPjP), Attachment 3 and the *Chemical Materials Agency Laboratory and Monitoring Quality Assurance Plan (LMQAP).*

A contracted laboratory certified by Utah for the specific analysis shall analyze liquid and solid waste samples for Resource Conservation and Recovery Act (RCRA) hazardous waste constituents and characteristics in accordance with *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* SW-846. The laboratory selected shall follow the Utah certification program for procedures in the QAPjP, Attachment 3 and for sample analyses as identified in Utah Rule R444-14, Rule for the Certification of Environmental Laboratories.

2.2 Purpose

The primary purpose of the waste analysis plan is to ensure that wastes are properly characterized in compliance with the Solid and Hazardous Waste Act requirements for general waste analysis [Utah Administrative Code R315-8-2.4]. Waste characterization also is performed to ensure the safe management of wastes being treated, proper disposition of treatment residues, and proper characterization of waste for shipment to a permitted hazardous waste treatment, storage, and disposal facility.

This plan establishes the requirements that shall be followed to ensure waste characterization objectives are met, that all data obtained are technically sound, statistically valid, and properly documented. This plan also identifies the tools that shall be used to measure the degree of certainty that all objectives have been met.

2.3 Responsibilities and Authority

The RCMD Site Manager shall be responsible for ensuring that appropriate data are provided to the state and federal regulatory agencies, as stipulated by this RCRA permit. External audits and surveillances, either announced or unannounced, shall be conducted as required in the QAPjP. Additional external audits or surveillances may be conducted by other qualified organizations as requested by the RCMD. All documents and data produced by the onsite mobile laboratory and offsite Utah-certified contract laboratory will be placed in the operating record. The environmental regulatory agencies may review these data to ensure that the EDS operations personnel are complying with permit requirements as they pertain to waste characterization and treatment operations.

Sampling and analysis to determine that treatment and vapor screening levels (as applicable) are met shall be performed by ECBC personnel. Sampling for RCRA waste characterization purposes shall be performed by ECBC personnel or the RCMD hazardous waste contractor.

The Quality Assurance (QA) Manager noted in Figure 17 provides QA/QC reports directly to the RCMD Site Manager. These reports shall include the daily Monitoring Results Summary and the Operations Order. These shall be reviewed and signed by the QA Manager prior to submission to the Site Manager. All data related to treatment shall be reviewed and verified by the QA Manager and personnel reporting the results prior to issuance of the treatment verification approval.

2.4 Health and Safety Protocols

During all sampling and analysis activities, strict compliance with industrial hygiene and safety standards will be mandatory. All personnel involved in sampling and analysis activities shall be trained in the applicable safety procedures; the use of all cleaning, decontamination, and sampling equipment; and proper cleaning and decontamination techniques per Standard Operating Procedures. Sampling and analysis personnel must have received Occupational Safety and Health Administration health and safety training for hazardous waste operations prior to beginning work at TEADS EDS site. Sampling personnel are required to wear eye, skin, and respiratory protection gear, as dictated by the Site Safety and Health Officer. If personnel accidentally contact waste material, decontamination procedures shall be performed as directed by safety personnel.

Every container of solid waste generated during EDS chemical agent treatment processes will be agent screened using a MINICAMS or DAAMS as specified in this Permit and must meet the vapor screening levels identified in Table 3 before the wastes can be shipped offsite to a permitted treatment, storage, and disposal facility for further treatment and/or disposal based on the RCRA characterization.

RCRA characterization sampling and analysis shall be conducted as specified in Table 8.

2.5 Sample Equipment, Containers, Preservation, Handling, and Management

Sample container selection, preservation, handling, and management are critical to sample quality. Considering waste compatibility, durability, volume, and analytical sensitivities, the permitted containers are listed in Tables 9, 10 and 11. The contract laboratory will provide sample containers, labels, and preservatives for RCRA analysis.

Immediately after collection, filled sample containers will be preserved at 4 degrees C in durable coolers or comparable receptacles for transport to the laboratory or samples may immediately be placed in a refrigerator pending shipment to a laboratory for analysis. RCRA analyses will be conducted at an Utah-certified laboratory within the allowable holding times for sample analysis. Coolers or comparable receptacles will be tightly sealed before sample shipment occurs. Samples will be screened for chemical agent prior to being released off-site. Samples then will be transported to ensure delivery within the allowable holding times for sample analysis. All sample collection, preparation, packaging, transportation, and analysis will conform to the requirements of SW-846.

Sampling procedures that will be used at the EDS are designed to ensure that each sample is accounted for at all times. The primary objectives of the sample control procedures are as follows:

- Samples are protected from loss, damage, or tampering.
- Any alteration of samples during collection or shipping (e.g., preservation, breakage) is documented.
- A record of sample custody and integrity is established.
- The correct samples are analyzed and are traceable to the applicable data records (e.g., chain-of-custody, field records, request for analysis, laboratory ledgers).

As part of sample management procedures, personnel collecting the samples shall maintain a permanent record of sampling activities. This record shall include: the purpose of sampling; date and time of collection; sample number; sampling location, sampling methodology, container description, waste description (metal fragments, rinsewater, etc.); description of process originating the waste; name and address of field contact; number and volume of samples; field observations; destination and transporter; and signature of collector.

Samples shall be transported in accordance with DOT, EPA, and Army requirements. Hazardous waste samples shall be properly packaged, marked, and labeled. Shipping papers shall be prepared as required by DOT regulations, EPA requirements, and Army regulations and guidelines.

All equipment used to sample waste materials shall be pre-cleaned and disposable or designed for easy decontamination. Contaminated disposable equipment shall be managed as hazardous waste, as appropriate. Cleanable equipment shall be thoroughly decontaminated prior to reuse. Decontamination solutions shall be managed as hazardous waste.

Sample container labels and chain of custody forms shall contain a minimum of the following information:

- Unique Sample Identification,
- Sampler Name,
- Collection time and date
- Preservative (thermal or chemical)
- Type of sample
- Matrix
- Requested methods

The Permittee shall custody-seal all sample containers and place samples in a durable ice-filled cooler or comparable receptacle for transport to the laboratory or immediately place in a refrigerator for storage pending shipment to the laboratory for analysis. Protective material may be placed around the sample containers prior to placement in the cooler or comparable receptacle as necessary.

The Permittee shall complete the chain-of-custody and laboratory method request-forms.

The Permittee shall review all paperwork and enclose the forms in a leak-tight, polyethylene bag taped to the underside of the cooler lid or comparable receptacle.

The Permittee shall seal the coolers or comparable receptacle with tape and mark in accordance with Department of Transportation (DOT) and Army requirements, as applicable.

The Permittee shall transport coolers to the analytical laboratory.

2.6 General Waste Analyses Conditions

All wastes destined to be treated in the EDS must be characterized by the MARB before being moved into the environmental enclosure.

In this section of the Permit, agent analysis refers to the use of US Army methods for determining if treatment levels of certain chemical agents have been achieved. RCRA waste characterization refers to using an off-site Utah-certified laboratory to determine if the waste possesses RCRA characteristics such as TC metals, TC organics, pH, and ignitibility and to provide analysis for LDR notifications.

After treating waste in the EDS, agent analysis shall be conducted on each batch of neutralent wastes to ensure agent treatment standards are met before wastes are discharged from the EDS containment vessel into waste containers.

Agent and RCRA sampling and analysis shall be conducted as specified in Table 8.

All waste characterization samples must pass a screening for chemical agent by methods in this Permit before the samples can be sent to a Utah-certified laboratory for RCRA hazardous waste characterization.

The Permittee shall determine LDR applicability and compliance with LDR treatment standards, concentration limits, identification of underlying hazardous constituents, and/or notification and certification requirements for all wastes.

The Permittee shall provide LDR notification to treatment, storage, and disposal facilities at the time of shipment of wastes.

The Permittee may use process knowledge to identify and complete LDR notifications for lab packs generated at the EDS site prior to shipment offsite for treatment and/or disposal.

The Permittee shall keep notices, certifications, demonstrations, analyses, and other documentation produced to support the determination for all regulated waste to be treated onsite, or generated and treated onsite or offsite. These will be kept for a period of three years in the operating record.

For all LDR wastes that will be sent off the EDS site for further management (treatment and/or disposal), notices and certifications, as applicable, will be made in writing and forwarded with the waste shipment to the receiving facility in accordance with the requirements of R315-13-1 and40 CFR 268.7(d).

For each first shipment of a waste stream, the Permittee shall include a written notification and certification to the TSDF that the waste either meets or does not meet applicable treatment standards.

The Permittee shall keep determinations of restricted wastes and documentation on where a restricted waste was treated, stored, and/or disposed of in the operating record.

As applicable, a one-time notice shall be placed in the EDS site operating files detailing: (1) the basis for any waste excluded from the requirements of R315-13-1 and 40 CFR 268.7(d), (2) the generation process, and (3) the basis for exclusion and disposition of the waste.

The Permittee shall determine if free liquids are present by using process knowledge or by performing the paint filter liquids test.

The Permittee may not treat waste using dilution. However, neutralent, spent decontamination solution, and other liquid wastes may be aggregated in DOT approved containers for shipment to a permitted treatment, storage, and disposal facility as long as no other condition of this Permit is violated by doing so.

The Permittee shall maintain specified strength of the reagents during treatment in the EDS. For sodium hydroxide the concentration must be at least 20 percent NaOH (by weight) solution and for MEA the concentration must be at least 45 percent MEA (by volume) in water using a 10:1 volume to volume (v/v) decontamination ratio.

2.7 Test Methods

Anytime the Permittee wishes to use process knowledge to characterize its waste as listed in Table 7 below, it must be initially supported by laboratory chemical analysis on that waste stream. The laboratory must be a Utah-certified laboratory for that analysis. The results of that analysis must be in the operating record.

Table 7 lists the approved analytical methods for individual parameters used to characterize a specific waste stream.

Table 7 – Selected Parameters, Test Methods and Rationale for Process Wastes

Waste Stream	Parameter/Analysis	Test Methods[a,b,c]	Analysis Rationale
Mustard Neutralents (HD/H/HT)[d]	H	U.S. Army-approved IOP method	Verify treatment level is met. Ensure safe handling, storage, and treatment; compliance with applicable regulations; ensure that all physical and chemical characteristics are known prior to disposition; determine further waste management needs.
	TC Metals	3010A or 3020A/6010C or 6020A; 7470A	
	TC SVOCs	3510C or 3520C/8270D	
	TC VOCs	5030B/8260B	
	pH	9040C	
	Ignitability	Documented process knowledge or 1010A or 1020B	
Nitrogen Mustard (HN-3) neutralent	HN-3	US Army approved IOP method	Verify treatment level is met. Ensure safe handling, storage, and treatment; compliance

Waste Stream	Parameter/Analysis	Test Methods[a,b,c]	Analysis Rationale
	TC Metals	3010A or 3020A/6010C or 6020A; 7470A	with applicable regulations; ensure that all physical and chemical characteristics are known prior to disposition; determine further waste management needs.
	TC SVOCs	3510C or 3520C/8270D	
	TC VOCs	5030B/8260B	
	pH	9040C	
	Ignitability	Documented process knowledge or 1010A or 1020B	
GA/GB Neutralents[e]	GA or GB	U.S. Army-approved IOP method	Verify treatment level is met. Ensure safe handling, storage, and treatment; compliance with applicable regulations; ensure that all physical and chemical characteristics are known prior to disposition; determine further waste management needs.
	TC Metals	3010A or 3020A/6010C or 6020A; 7470A	
	TC SVOCs	3510C or 3520C/8270D	
	TC VOCs	5030B/8260B	
	Cyanide	9016	
	pH	9040C	
	Ignitability	Documented process knowledge	

Waste Stream	Parameter/Analysis	Test Methods[a,b,c]	Analysis Rationale
		or 1010A or 1020B	
FM and FS Smoke Neutralents	pH[f]	9041A/9040C[f]	Verify treatment level is met. Ensure safe handling, storage, and treatment; compliance with applicable regulations; ensure that all physical and chemical characteristics are known prior to disposition; determine further waste management needs.
	TC Metals	3010A or 3020A/6010C or 6020A; 7470A	
	TC SVOCs	3510C or 3520C/8270D	
	TC VOCs	5030B/8260B	
	Ignitability	Documented process knowledge or 1010A or 1020B	
Rinsewaters[e]	H[d], HN-3, GA, or GB (as applicable)	U.S. Army-approved IOP method	Ensure safe handling, storage, and treatment; compliance with applicable regulations; ensure that all physical and chemical characteristics are known prior to disposition; determine further waste management needs.
	TC Metals	3010A or 3020A/6010C or 6020A; 7470A	
	TC SVOCs	3510C or 3520C/8270D	
	TC VOCs	5030B/8260B	
	pH	9040C	
	Cyanide	9016	
	Ignitability	Documented process knowledge or 1010A or 1020B	
Used Decontamination Solution	H[d], HN-3, GA, or GB (as applicable)	U.S. Army-approved IOP method	Ensure safe handling, storage, and treatment; compliance with applicable regulations; ensure that all physical and chemical characteristics are known prior to disposition;

Waste Stream	Parameter/Analysis	Test Methods[a,b,c]	Analysis Rationale
	TC Metals	3010A or 3020A/6010C or 6020A; 7470A	determine further waste management needs.
	TC SVOCs	3510C or 3520C/8270D	
	TC VOCs	5030B/8260B	
	pH	9040C	
	Cyanide	9016	
	Ignitability	Documented process knowledge or 1010A or 1020B	
Spent Carbon (from EDS Drum Filter, Environmental Enclosure Carbon Filtration System)	H[d], HN-3, GA, or GB (as applicable) TC Metals TC SVOCs TC VOCs	Spent carbon shall be F999 and any other applicable codes from wastes treated.	Ensure safe handling, storage, treatment; compliance with applicable regulations; determine further waste management needs.
Potentially Contaminated PPE[g]	H[d], HN-3, GA, or GB (as applicable)	U.S. Army-approved air monitoring IOP method	Ensure safe handling, storage, and treatment; compliance with applicable regulations; determine further waste management needs and container management practices.
	TC SVOCs	Documented process knowledge	

Waste Stream	Parameter/Analysis	Test Methods[a,b,c]	Analysis Rationale
	TC VOCs	Documented process knowledge	
Unexploded Energetic or Propellant Compounds (if generated)	H[d], HN-3, GA, or GB (as applicable)	U.S. Army-approved air monitoring IOP method	Ensure safe handling, storage, and treatment; compliance with applicable regulations; determine further waste management needs and container management practices.
Solid Laboratory Waste (Including Labware, Sampling Equipment, Plastic Bags, Stainless Steel Sample Bottle Assemblies, and Packing Material)[g]	H[d], HN-3, GA, or GB (as applicable)	U.S. Army-approved air monitoring IOP method	Ensure safe handling, storage, and treatment; compliance with applicable regulations; determine further waste management needs and container management practices.
	TC Metals	Documented process knowledge	
	TC Organics	Documented process knowledge	
	Cyanide	Documented process knowledge	

Notes:

[a] Methods are from *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, unless otherwise specified. The most current version of the methods will be used during EDS operations.

[b] U.S. Army-approved methods: For liquid chemical agent mustard analysis, use Edgewood Chemical Biological Center (ECBC) Internal Operating Procedure (IOP) MT-60. GB, GA, and HN-3 liquid chemical agent analysis will be performed using MT-08. For solid waste chemical agent screening, use ECBC IOP's. MT-02 or ECBC IOP MT-11 followed by ECBC IOP MT-13. All Depot Area Air Monitoring System (DAAMS) analysis will be conducted in accordance with IOP MT-13and will follow the Quality Assurance Project Plan, Attachment 3 of this permit. All IOP's shall be the current revision.

[c] Documented process knowledge may be used for certain RCRA waste characterization as provided in this Permit.

[d] H, HD and HT shall be monitored as HD.

[e] TC metals and TC organics G-series samples cannot be acidified.

[f] Method 9041A (pH paper method) will be used as a field screen to determine if treatment level has been met for FS and FM neutralents. Method 9040C will be used for RCRA waste characterization conducted at the contract laboratory.

[g] Using process knowledge for waste characterization on non-liquid wastes shall be defined as applying all waste codes from wastes that the item came in contact with or were possibly associated with the item during its use. The Permittee must maintain adequate documentation.

EDS = Explosive Destruction System

FM smoke = titanium tetrachloride

FS smoke = sulfur trioxide and chlorosulfonic acid

GA = tabun

GB = sarin

H = Levinstein mustard

HD = distilled sulfur mustard

HN-3 = nitrogen mustard

HT = mustard-T mixture

PPE = personal protective equipment

RCRA = Resource Conservation and Recovery Act

SVOC = semivolatile organic compound

TC = toxicity characteristic

VOC = volatile organic compound

2.8 Sample Type, Sampling Equipment, Methods, and Frequency

Table 8 lists the approved type of equipment, frequency and sampling methods, where appropriate, that will be used to obtain a representative sample of each waste type.

Table 8 – Sampling Requirements

Media and Waste Stream	Sample Type[a]	Method and Equipment[b]	Frequency[c]
Vapor			
Air Monitoring for GA/GB, H/HD/HT, and HN-3	Grab	Collect headspace sample in sample bag from Containment Vessel per EDS SOP and analyze before opening door.	Each chemical agent treatment operation.
Air Monitoring of Solids: Metal Parts and Fragments Spent Carbon Filters Laboratory Waste Personal Protective Equipment Grayloc® seals and O-rings Unexploded Energetic Components (if generated) Unpacking materials	Grab	Waste material will be bagged inside a waste container and the bagged contents shall be headspaced monitored (Bagged 4 hours >70°F) for minimum of 2 complete MINICAMS cycles or 2, 1-hour DAAMS tubes to meet the 0.5 VSL in accordance with the SAP and IOP.	Every container of solid waste generated from an EDS chemical agent treatment process.
Solids			

Media and Waste Stream	Sample Type[a]	Method and Equipment[b]	Frequency[c]
Spent Carbon Filters	No sample	Spent carbon filters are declared listed hazardous waste F999 and any other applicable waste codes from wastes treated in Section 4.3 of this Permit.	Each Filter
Metal Parts and Fragments, Laboratory Solid Waste, Personal Protective Equipment, Grayloc® seals and O-rings, Unexploded Energetic Components (if generated), and Unpacking materials[d]	Documented Generator Knowledge	Documented Generator Knowledge	Documented Generator Knowledge
Liquid			
Neutralent (for agent analysis, process monitoring, and RCRA waste characterization)	Grab	Chemical Agent from EDS Containment Vessel sample valve assembly per EDS SOP.	Sample each treatment batch.
	Grab	For pH analysis (FS and FM smoke neutralent), collect sample from Valve 28 of the Containment Vessel effluent discharge line per EDS SOP.	Sample each treatment batch.

Media and Waste Stream	Sample Type[a]	Method and Equipment[b]	Frequency[c]
	Composite	For RCRA waste characterization sampling, collect sample from waste container using a COLIWASA or drum thief per EDS SOP or ASTM D5495-03.	Sample all drums associated with each treatment batch. Composite sample may not be more than 5 individual drums.
	Grab	For chemical agent samples, collect liquid sample in a stainless steel bottle.	Sample each treatment batch
Rinsewater	Grab	For chemical agent samples, collect liquid sample in a stainless steel bottle or glass bottle/jar.	Sample each rinsate waste container for agent analysis.
	Composite	RCRA waste characterization sampling, collect sample from waste container using a COLIWASA per EDS SOP or ASTM D5495-03.	For RCRA waste characterization, sample all drums associated with each treatment batch. Composite sample may not be more than 5 individual drums.
Spent Decontamination Solutions and Containment Pan/Sump Liquids/PDS Liquid Waste (for Agent Analysis and RCRA Waste Characterization), Laboratory Wastes	Grab	Collect liquid samples from waste container using a COLIWASA per EDS SOP or ASTM D5495-03.	For Chemical Agent and RCRA waste characterization, collect one sample from each container (drum) generated.

Notes:

[a] For each waste stream sampled, appropriate QA/QC samples will be collected as shown in Table 9 and described in Attachment 3.

[b] As applicable, equipment used to sample waste materials will be disposable or designed for easy decontamination. Contaminated disposable equipment will be managed as hazardous waste, as appropriate. Cleanable equipment will be thoroughly decontaminated prior to reuse. Spent decontamination solutions will be managed as hazardous waste as appropriate.

[c] A neutralent batch is defined as the volume of treatment reagent and chemical fill contained in the EDS Containment Vessel after the chemical fill from an explosively opened munition or other container (for example, a cylinder) has been treated. A rinsewater batch is the volume of liquid contained in the EDS Containment Vessel that is used to rinse the vessel after the neutralent has been drained.

[d] Using process knowledge for waste characterization on non-liquid wastes shall be defined as applying all waste codes from wastes that the items came in contact with or were possibly associated with the item during its use. The Permittee must maintain adequate documentation.

COLIWASA = composite liquid waste sampler

DAAMS = Depot Area Air Monitoring System

EDS = Explosive Destruction System

FM smoke = titanium tetrachloride

FS smoke = sulfur trioxide and chlorosulfonic acid

GA = tabun

GB = sarin

H = Levinstein mustard

HD = distilled sulfur mustard

HN-3 = nitrogen mustard

HT = mustard-T mixture

PDS = Personnel Decontamination Station

RCRA = Resource Conservation and Recovery Act

SOP = Standing Operating Procedure

2.9 Sample Quantities and Sample Containers

Table 9 lists the approved sample quantities and sample containers for specific samples that shall be collected for a particular waste stream.

Table 9 – Sample Quantity Requirements for EDS Waste Streams

Waste Stream	Parameter/Analysis	Sample[a]	Field Duplicate Sample	Trip Blank[b]
Mustard Neutralents (HD, H, HT and HN-3)	HorHN-3	(1) – 25 mL Stainless steel bottle or (1) – 125 mL Glass bottle w/PTFE-lined lid	(1) – 25 mL Stainless steel bottle or (1) – 125 mL Glass bottle w/PTFE-lined lid	
	TC Metals	(1) – 1 L HDPE bottle (1) – 500 mL HDPE bottle	(1) – 1 L HDPE bottle (1) – 500 mL HDPE bottle	

Waste Stream	Parameter/Analysis	Sample[a]	Field Duplicate Sample	Trip Blank[b]
	TC SVOCs	(2) – 1 L Amber glass bottles w/PTFE-lined cap	(2) – 1 L Amber glass bottles w/PTFE-lined cap	
	TC VOCs	(3) – 40 mL Amber glass VOA vials	(3) – 40 mL Amber glass VOA vials	(1) – 40 mL Amber glass VOA vial (deionized water)
	pH	(1) – 250 mL HDPE bottle	(1) – 250 mL HDPE bottle	
	Ignitability	(1) – 500 mL Glass bottle	(1) – 500 mL Glass bottle	
GA/GB Neutralents	GA or GB	(1) – 25 mL Stainless steel bottle or (1) – 125 mL Glass bottle w/PTFE-lined lid	(1) – 25 mL Stainless steel bottle or (1) – 125 mL Glass bottle w/PTFE-lined lid	
	TC Metals	(1) – 1 L HDPE bottle (1) – 500 mL HDPE bottle	(1) – 1 L HDPE bottle (1) – 500 mL HDPE bottle	
	TC SVOCs	(2) – 1 L Amber glass bottles w/PTFE-lined cap	(2) – 1 L Amber glass bottles w/PTFE-lined cap	
	TC VOCs	(3) – 40 mL Amber glass VOA vials	(3) – 40 mL Amber glass VOA vials	(1) – 40 mL Amber glass VOA vial (deionized water)

Waste Stream	Parameter/Analysis	Sample[a]	Field Duplicate Sample	Trip Blank[b]
	Cyanide	(2) – 500 mL HDPE bottles wrapped in aluminum foil	(2) – 500 mL HDPE bottles wrapped in aluminum foil	
	pH	(1) – 250 mL HDPE bottle	(1) – 250 mL HDPE bottle	
	Ignitability	(1) – 500 mL Glass bottle	(1) – 500 mL Glass bottle	
FM and FS Smoke Neutralents	pH	(1) – 250 mL HDPE bottle	(1) – 250 mL HDPE bottle	
	TC Metals	(1) – 1 L HDPE bottle (1) – 500 mL HDPE bottle	(1) – 1 L HDPE bottle (1) – 500 mL HDPE bottle	
	TC SVOCs	(2) – 1 L Amber glass bottles w/PTFE-lined cap	(2) – 1 L Amber glass bottles w/PTFE-lined cap	
	TC VOCs	(3) – 40 mL Amber glass VOA vials	(3) – 40 mL Amber glass VOA Vials	(1) – 40 mL Amber glass VOA vial (deionized water)
	Ignitability	(1) – 500 mL Glass bottle	(1) – 500 mL Glass bottle	
Rinsewaters	H[c], HN-3, GA, or GB (as applicable)	(1) –25 mL Stainless steel bottle or (1) – 125 mL Glass bottle w/PTFE-lined lid	(1) –25 mL Stainless steel bottle or (1) – 125 mL Glass bottle w/PTFE-lined lid	

Waste Stream	Parameter/Analysis	Sample[a]	Field Duplicate Sample	Trip Blank[b]
	TC Metals	(1) – 1 L HDPE bottle (1) – 500 mL HDPE bottle	(1) – 1 L HDPE bottle (1) – 500 mL HDPE bottle	
	TC SVOCs	(2) – 1 L Amber glass bottles w/PTFE-lined cap	(2) – 1 L Amber glass bottles w/PTFE-lined cap	
	TC VOCs	(3) – 40 mL Amber glass VOA vials	(3) – 40 mL Amber glass VOA vials	(1) – 40 mL Amber glass VOA vial (deionized water)
	pH	(1) – 250 mL HDPE bottle	(1) – 250 mL HDPE bottle	
	Cyanide	(2) – 500 mL HDPE bottles wrapped in aluminum foil	(2) – 500 mL HDPE bottles wrapped in aluminum foil	
	Ignitability	(1) – 500 mL Glass bottle	(1) – 500 mL Glass bottle	
Used Decontamination Solution	H[c], HN-3, GA, or GB (as applicable)	(1) –25 mL Stainless steel bottle or (1) – 125 mL Glass bottle w/PTFE-lined lid	(1) –25 mL Stainless steel bottle or (1) – 125 mL Glass bottle w/PTFE-lined lid	
	TC Metals	(1) – 1 L HDPE bottle (1) – 500 mL HDPE bottle	(1) – 1 L HDPE bottle (1) – 500 mL HDPE bottle	

Waste Stream	Parameter/Analysis	Sample[a]	Field Duplicate Sample	Trip Blank[b]
	TC SVOCs	(2) – 1 L Amber glass bottles w/PTFE-lined cap	(2) – 1 L Amber glass bottles w/PTFE-lined cap	
	TC VOCs	(3) – 40 mL Amber glass VOA vials	(3) – 40 mL Amber glass VOA vials	(1) – 40 mL Amber glass VOA vial (deionized water)
	pH	(1) – 250 mL HDPE bottle	(1) – 250 mL HDPE bottle	
	Cyanide	(2) – 500 mL HDPE bottles wrapped in aluminum foil	(2) – 500 mL HDPE bottles wrapped in aluminum foil	
	Ignitability	(1) – 500 mL Glass bottle	(1) – 500 mL Glass bottle	

Notes:

[a] All sample containers should be filled completely.

[b] One trip blank per cooler containing VOC samples.

[c] H, HD and HT shall be monitored as HD

HDPE = high-density polyethylene

L = liter

mL = milliliter

PTFE = polytetrafluoroethylene (Teflon®)

SVOC = semivolatile organic compound

TC = toxicity characteristic

VOA = volatile organic analysis

VOC = volatile organic compound

Table 10 lists the required sample container, preservation, volume and management requirements for liquid samples.

Table 10- Requirements for Sampling Liquids

Parameter	Holding Time[a]	Bottle Type	Preservative[b]	Standard Volume	Minimum Volume
Chemical Agent	3 days	Stainless steel or glass bottle with PTFE-lined cap	4°C	25 ml (if stainless steel bottle used); 125 mL if glass bottle used	2 ml
Corrosivity/pH	Analyze immediately	HDPE plastic	4°C	250 ml	50 ml
Ignitability	NS	Glass	None	500 ml	100 ml
Cyanide	14 days	HDPE plastic Wrap in aluminum foil	4°C, pH>12, NaOH	2 × 500 ml	500 ml
TC Metals	180 days 7 day holding time G-agents	HDPE plastic	HNO_3, 4°C, pH<2 None for G-agents	1 L	100 ml
TC Mercury	28 days 24-hour holding time G-agents	HDPE plastic	2% HNO_3, 4°C, pH<2 and $AuCl_3$ (1ppm)	500 ml	100 ml

TC Volatile Organics (D-List)	14 days, 7-day holding time G-agents	Amber glass 40-mL vial with PTFE-lined septum cap	HCl, 4°C, pH<2	2 x 500 ml	500 ml
TC Semivolatile Organics (D-List)	14 days to extract; 7 days to analyze	Amber glass with PTFE-lined cap	4°C	2 × 1 L per analysis	1 L per analysis

Notes:

[a] Holding times are from the date of collection as referred to in the Federal Register, Vol. 49, No. 209, October 26, 1984, as applicable.

[b] TC metals and TC organics G-series samples cannot be acidified; therefore, TC volatile organics must be analyzed within 7 days.

HCl = hydrogen chloride

HDPE = high-density polyethylene

L = liter

mL = milliliter

NaOH = sodium hydroxide

NS = none specified

PTFE = polytetrafluoroethylene (Teflon®)

TC = toxicity characteristic

ZHE = zero headspace extraction

Reference: *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, current edition*

Table 11 lists the required sample container, preservation, volume and management requirements for solid matrix samples.

Table 11- Requirements for Sampling Solids

Parameter	Holding Time[a]	Bottle Type	Preservative	Standard Amount	Minimum Amount
Chemical Agent	3 days	Glass	4°C	50 g	20 g
Ignitability	7 days	Glass	None	100 g	30 g
Cyanide	14 days	HDPE plastic Wrap in aluminum foil	4°C	50 g	5 g
TC Metals	TCLP extract and analysis 180 days	HDPE plastic	4°C	100 g	25 g
TC Mercury	TCLP extract and analysis 28 days	HDPE plastic	4°C	100 g	25 g
TC Volatile Organics (D-list)	TCLP extract within 14 days; 14 days to analyze	Amber glass	4°C	100 g	25 g
TC Semivolatile Organics (D-list)	TCLP extract within 14 days; preparative extract within 7 days; 14 days to analyze	Amber glass	4°C	100 g	50 g

Notes:

[a] Holding times are from the date of collection as referred to in the Federal Register, Vol. 49, No. 209, October 26, 1984, as applicable

g = gram

HDPE = high-density polyethylene

TC = toxicity characteristic

TCLP = Toxicity Characteristic Leaching Procedure

2.10 Field QC Samples for RCRA Waste Sampling Analysis

The goal of the RCRA waste sampling and analysis effort is to provide representative information regarding the characteristics of wastes generated during EDS operations. The laboratory chosen for this RCRA analysis must be Utah-certified, have significant capacity and quality to meet analytical demand, provide timely and complete data packages, and provide technical support in the form of sample kits and shipping supplies. Laboratory blanks and supplies for field blanks will be prepared by the laboratory. For each waste stream sampled, appropriate QC samples will be collected, as shown in Table 13 and described below.

Field QC samples may include trip blanks, rinse blanks, and/or duplicate samples. Trip blanks are used to verify that field procedures do not contaminate containers or samplers. They shall be prepared using analyte-free water when samples are to be analyzed for volatile organic compounds (VOCs). At least one trip blank must be prepared and analyzed for each cooler used for storing and transporting VOC samples.

Rinse blanks are used to detect cross-contamination resulting from the use of non-dedicated (re-used) sampling equipment. It is anticipated that disposable, one-time use sampling equipment will be used. However, if sampling equipment is re-used, at least one rinse blank will be collected for every 20 samples per parameter group and matrix. This blank will be prepared in the field by rinsing the cleaned sampling equipment with analyte-free water and collecting the rinsate. There will be a minimum of one rinse blank per lab set. There will a minimum of one rinse blank per 20 samples.

Duplicates are samples collected at the same time from the same source and are used to measure sample homogeneity and analytical precision. Duplicates shall be collected as described in Table 13 and/or at the request of the waste generator or a representative of UDEQ). There shall be a minimum of one duplicate collected per sampling event.

2.11 Sampling Handling and Chain-of-Custody

A chain-of-custody record will accompany samples at all times. An example of a chain-of-custody form is included as Figure 19. The personnel performing the sampling will be responsible for initiating the chain-of-custody procedures at the time samples are collected. A chain-of-custody record form will be used to document sample collection activities, including sampling site, sample identification, number of samples, and date and time of collection. The form also will document the names of responsible individuals and dates and times of custody transfers.

Samples will be screened for agent prior to being shipped off-site. An agent screen release document for samples will be provided with the chain of custody form to the off-site laboratory.

Samples will be received at the laboratory by a designated sample custodian. This individual will carefully review received samples and documentation for compliance with applicable sampling and documentation requirements such as type and condition of container, sample preservation, collection date, and chain-of-custody records. After verifying that all samples submitted are listed and that the required information is listed on the form, the sample custodian will sign and date the chain-of-custody form. The sample custodian will then store and secure the samples appropriately (e.g., in locked refrigerator).

Chain-of-custody documentation for samples will continue throughout the analytical process. After logging in and storing the samples, the sample custodian will distribute sample-receiving logs, which will list sample numbers and analyses to be performed, to designated laboratory personnel. Upon completion of analyses, results will be submitted to the laboratory data management section along with QA/QC information. Much of the analytical results will be used to characterize wastes prior to the wastes being sent to a permitted hazardous waste treatment, storage, and disposal facility. All data sheets and laboratory records will be retained as part of the permanent record.

2.12 Reserved

2.13 Data Quality Assessment

Data quality assessments will evaluate whether the data generated by the laboratories is consistent with the established DQOs.

For the RCRA waste characterization, the laboratory shall furnish a QA Manual (or QA Program Plan) that defines the quality procedures and policies specific to that facility. In addition, the laboratories shall be provided a copy of the quality assurance project plan to incorporate project specific requirements. An Environmental Scientist, Laboratory Manager, or QA Coordinator will be responsible for reviewing the reports from that facility to ensure consistency with RCRA limits and with the project specific requirements. An audit of the analytical laboratory may be performed by an Environmental Scientist or assignee at any time during the EDS operations.

Table 12 defines the analytical quality control limits.

Table 12 - Analytical QC Limits[a]

Analytical Parameter	Surrogate Recovery Limits	MS/MSD Recovery Limits (every batch)	LCS/LCSD Recovery Limits	RPD Limits
Volatiles, 8260B	±20%	±20% rinsewater, decon solutions (etc) ±30% neutralent	±20%	±20% rinsewater, decon solutions (etc) ±30% neutralent
Semivolatile-8270D	±30%	±20%rinsewater, decon solutions (etc) ±30% neutralent	±20%	±20%
Metals-6010C or 6020A	N/A	±20%	±20%	±20%
pH	N/A	N/A	N/A	0.05 pH units
Ignitibility	N/A	N/A	N/A	N/A
Cyanide	N/A	±30% (every 10 samples)	N/A	±20%

Notes:

[a] Procedures should be in place for establishing and updating control limits for analysis. Control limits are established to evaluate laboratory precision and bias based on the analysis of control samples. Typically, control limits for bias are based on the historical mean recovery plus or minus three standard deviation units, and control limits for precision range from zero (no difference between duplicate control samples) to the historical mean relative percent difference plus three standard deviation units. At a minimum, the laboratory shall meet these limits.

LCS = laboratory control sample
LCSD = laboratory control sample duplicate
MS = matrix spike
MSD = matrix spike duplicate
N/A = not applicable

RPD = relative percent difference

Data Quality RCRA Characterization Deliverables. For the RCRA analysis, data packages will consist of complete data packages (Level IV) with raw data. A request for electronic deliverables may be made by the DWMRC as appropriate. Summary reports for the RCRA characterization will include but not be limited to:

- Chain-of-custody, Field Sampling Logs, any associated correspondence
- Name and address of laboratory (on letterhead)
- EPA or other approved method used (with title and method number)
- Client delivery order (or job) number
- Sample identification, client, and laboratory number
- Date and time sampled
- Date and time sample received by laboratory
- Date and time sample was extracted/digested
- Dilution factor
- Sample matrix
- Date and time sample was analyzed
- Parameters tested
- Units reported
- Concentration of each parameter found
- Reporting limit or other similar limit for each parameter [practical quantitation limit (PQL)]
- Report date
- Case narrative for each sample batch and any anomalies encountered with samples
- Signature of laboratory supervisor or laboratory director (or assignee).

2.14 Quality Control Deliverables for RCRA Characterization and Chemical Agent

The contract laboratory will provide the following type of information in the case narratives and other written text:

Metals – Toxicity Characteristic Leaching Procedure extraction logs (EPA 1311), method blank results, lab control sample and lab control sample duplicate (% recoveries with calculated relative percent difference (RPD)), matrix spike and matrix spike duplicate (% recoveries with calculated RPD), original sample (OS), and original sample duplicate (OSD) with calculated RPD.

Organics – extraction logs, method blank results, lab control sample, (% recovery), and matrix spike (% recovery), and surrogates (% recovery).

Wet Chemistry – extraction preparation logs, method blank results, lab control sample and lab control sample duplicate (% recoveries with calculated RPD), matrix spike and matrix spike duplicate (% recoveries with calculated RPD), OS, and OSD with calculated RPD.

Other – For methods in which no spikes can be performed (for example, specific gravity) an original sample and sample duplicate analysis must be performed and reported (OS/OSD with calculated RPD %).

Chemical Agent analysis will follow the procedures specific in this QAPjP. Full data package deliverables will be provided with each treatment batch.

2.15 Reserved

2.16 Reserved

2.17 QA Reports to Management

QA reports will be generated by the laboratory to document the analytical results and organizational performance. These reports will contain, at a minimum, reports of system or performance audits; reports of required corrective actions implemented; assessment of the generated data precision, accuracy, and comparability; and resolution of previously reported problems. The content, frequency, and recipient of these reports will be established in the laboratory's QA Plan.

2.18 Recordkeeping

Both the onsite mobile chemical agent laboratory and offsite contract laboratory performing RCRA analyses will maintain a record system that will include the documentation of all samples received, analyzed, analyses conducted, preparations, QC challenges, maintenance of laboratory equipment, and reports prepared. The TEADS-EDS site operations will maintain documentation on samples collected, chain-of-custody, results, and reports received. All information will become part of the operating record and will be maintained by Tooele Army Depot South until closure.