BECHTEL PARSONS BLUE GRASS
A Joint Venture of Bechtel National, Inc. and Parsons Government Services Inc.

Blue Grass Chemical Agent-Destruction Pilot Plant (BGCAPP)

SDC 1200 Document

SDC 1200 Closure Verification Sampling and Analysis Quality Assurance Project Plan

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prepared for
Program Executive Office –
Assembled Chemical Weapons Alternatives (PEO ACWA)

This document has been reviewed for CUI/OPSEC and CUI/OPSEC sensitive information has been removed.

This document has been reviewed for ITAR/EAR and ITAR/EAR sensitive information has been removed.

Approval

Joint Test Group (JTG) Meeting Minutes

Technical Publications
21 MAY 2025 1500 hours
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Chair: Mike Noyes

JTG Chair concurrence represents all JTG members in attendance provided quorum is achieved and all JTG Review tasks are closed. One concurrence task will be assigned to the Chair for each document. Meeting minutes will show attendance, issues, and approval for each document. Document approval page will show Chair task completed, and screen snip of minutes/attendance. This change is IAW GEN-5PR-00-00001, Joint Test Group Procedure.

Attendees:

The following JTG members are in attendance for JTG quorum, have reviewed the documents presented for approval, and concur with the recommendations of the Chair.

- MP Operations – Christy Houston
- MP Eng – Paul Chapman
- SDC Operations – Scott Holladay, Rusty Davis
- SDC Eng – Rob Wood
- Plant Management – Bill Nieminen
- System Safety – Grant Fondaw
- Environmental – Amber Lewis
- Quality – Dave Patten
- GFO – Tammy Gray

Other Attendees:

Tech Pubs / Other – Teresa Beck, Jared Rose, Asa Brackett, Richard Yukawa, Jim Wangards , Mike Kester, George Lucier

POC/Presenting – Clara Galbis-Reig

JTG Review Concurrence has completed on CL-SPL-70-00001.

JTG Review Concurrence on CL-SPL-70-00001 has successfully completed. All participants have completed their tasks.

JTG Review Concurrence started by Rose, Jared on 5/21/2025 3:15 PM
Comment:

Completed by Noyes, Michael (Amentum) on 5/22/2025 8:54 AM
Comment:

Record of Revision

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List of Changes

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Table of Contents

1.0 Purpose 9
2.0 Scope 9
3.0 Definitions 11
4.0 Project/Task Organization 17
4.1 Project Team 18
4.1.1 Closure Manager 18
4.1.2 Plant Management 18
4.1.3 Safety and Health Manager 19
4.1.4 Project Quality Manager 19
4.1.5 Laboratory Quality Manager 19
4.1.6 Environmental Manager 19
4.1.7 Closure Chief Scientist 19
4.1.8 Training Manager 19
4.1.9 Waste Manager 20
4.1.10 Closure Sampling Manager 20
4.1.11 Field Sampling Team 20
4.1.12 BGCAPP Laboratory 21
4.1.13 Off-site Battelle Laboratory 21
4.1.14 Commercial Laboratory 21
4.2 Communication Pathways 21
4.3 Personnel Responsibilities and Qualifications 21
5.0 Problem Definition 22
5.1 Project Background 22
5.1.1 Environmental Setting 22
5.1.2 Site History 23
5.1.3 Site Description 24
5.2 Clean Closure 31
5.2.1 ESM 31
5.2.2 EEB 32
5.2.3 OTS Structure 33
5.2.4 OTS Storage Area 2 34
6.0 Quality Objectives 35
6.1 Closure Target Levels 35
6.1.1 Rinsate Sample Action Levels 35
6.1.2 Wipe Sample Action Levels 36
6.2 Measurement Performance Criteria 36
6.2.1 Sensitivity 37

6.2.2 Precision 37
6.2.3 Accuracy/Bias 38
6.2.4 Completeness 38
6.2.5 Comparability and Representativeness 38

7.0 Project/Task Description 39
7.1 Pre-Sampling Activities 39
7.2 Field Sampling 40
7.3 Post-Sampling Activities 40

8.0 Sampling Tasks 40
8.1 Rinsate Sampling 40
8.2 Wipe Sampling 42
8.3 Instrument Performance Verification 42
8.4 Field Health and Safety Procedures 42
8.5 Decontamination Procedures 42
8.6 Investigated Derived Waste 43
8.7 Field Documentation 43
8.7.1 Field Logs 43
8.7.2 Photographs 44

9.0 Analytical Tasks 44
9.1 Analytical Methods 44
9.1.1 Agent and Agent Degradation Products 44
9.1.2 Volatile Organic Compounds 44
9.1.3 Semivolatile Organic Compounds 45
9.1.4 Explosives 45
9.1.5 Metals 45
9.2 Instrument Performance Verification 45

10.0 Sample Handling and Custody 46
10.1 Sample Containers, Holding Times, and Preservation 46
10.2 Sample Numbering System 46
10.3 Sample Labels 46
10.4 Chain of Custody 47
10.5 Sample Packaging and Shipping Requirements 48

11.0 Quality Control Requirements 48
11.1 Quality Control Samples 48
11.1.1 Field Quality Control Samples 48
11.1.2 Laboratory Quality Control Samples 50
11.2 Quality Control Surveillance 50
11.3 Corrective Actions and Assessment 51

11.4 Procurement of Items and Services 51

12.0 Data Management and Software Control 52
12.1 Field Data Management 52
12.2 Laboratory Data Management 53
12.2.1 Data Package Format 53
12.2.2 Electronic Data Deliverable Format 53

13.0 Data Verification, Validation, and Useability 54
13.1 Data Verification 54
13.1.1 Field Data Verification 54
13.1.2 Laboratory Data Verification 54
13.2 Data Validation 54
13.3 Data Useability Assessment 55
13.3.1 Data Reduction 55
13.3.2 Data Useability and DQO Reconciliation 55

14.0 Documentation and Records 55
14.1 Document Control 56
14.2 Records 56
14.3 Closure Verification Reports 57

15.0 References 57
15.1 BGCAPP Permits, Reports and Technical Memoranda 57
15.2 Supporting Reports 58
15.3 Regulations 59
15.4 Templates 59
Table 1 – Crosswalk with Uniform Federal Policy (UFP)-QAPP Manual Requirements 60
Figure 1 – Project Organization. 61
Table 2 – Closure Verification Sampling Communication Pathways (Worksheet #6) 62
Figure 2 – Facility Location with Mustard Campaign Configuration. 64
Figure 3 – Facility Location with VX Campaign Configuration. 65
Figure 4 – Mustard Campaign Process Flow 66
Figure 5 – VX Campaign Process Flow. 67
Figure 6 – Hazardous Waste Storage Areas. 68
Figure 7 – EEB Layout. 69
Table 3 – Permitted Container Storage Areas, Tank Systems, and Treatment Units and Associated Waste Codes 70
Table 4 – Chemicals of Potential Concern 72
Figure 8 – General Closure Sampling Process. 73
Table 5 – Analytes by Hazardous Waste Management Unit 74
Table 6 – Action Levels for Wipe Samples 75
Table 7 – Summary of CVS Data Quality Objectives 76
Table 8 – Analytical Methods 79

Table 9 – Field QC Summary (Worksheet #20) 80
Table 10 – Measurement Performance Criteria (QAPP Worksheet #12) 81
Table 11 – Analyte-Specific Measurement Performance Criteria 83
Table 12 – Project Action Limits and Laboratory-Specific Quantitation Limits for Rinsate (QAPP Worksheet#15) 84
Table 13 – Project Tasks and Schedule (QAPP Worksheet #14) 85
Table 14 – Rinsate Sample Containers, Hold Times, and Preservation Methods 87
Table 15 – Data Verification and Validation Inputs (Worksheet # 34) 88
Table 16 – Data Validation QC Elements 89

1.0 PURPOSE

This Closure Verification Sampling and Analysis Quality Assurance Project Plan (CVQAPP) defines the methodology and quality requirements for execution of closure verification sampling in support of final closure of the Blue Grass Chemical Agent-Destruction Pilot Plant (BGCAPP) Static Detonation Chamber (SDC) 1200 (SDC 1200). Closure verification sampling (CVS) will demonstrate SDC 1200 hazardous waste management units (HWMUs) have been decontaminated to below risk-based closure performance standards defined in 24915-70-G01-GGPT-00001, *Attachment I – SDC 1200 Closure Plan (CDRL A010)*. This CVQAPP presents the policies, organization, functions, field sampling design and Quality Assurance/Quality Control (QA/QC) requirements designed to achieve the data quality goals associated with field and laboratory operations for SDC 1200 CVS.

2.0 SCOPE

The SDC 1200, with the SDC 2000, augment operations at the BGCAPP Main Plant. The three facilities operate under separate Resource Conservation and Recovery Act (RCRA) Permits and will be closed under separate closure plans. Each Closure Plan will have an associated CVQAPP to support verification that the BGCAPP HWMUs have been effectively decontaminated for their intended end-state. This plan is limited to the SDC 1200 and is a key component of 24915-70-G01-GGPT-00001, *Attachment I – SDC 1200 Closure Plan*, a part of the SDC 1200 RCRA permit. Groundwater sampling relevant to the three BGCAPP facilities will be performed in accordance with 24915-GEN-5PL-00-00018, *Quality Assurance Project Plan for Closure Verification Groundwater Sampling*, and is not addressed further in this plan.

The objectives of closure are to clean close the facility in a manner that is protective of human health and the environment and to eliminate the possibility of any future releases. There are two major components to be addressed for industrial clean closure of the SDC 1200 facility: (1) closure performance standards and (2) closure verification. The closure performance standards identify the requirements or conditions that must be satisfied to close the facility in a manner that is protective of human health and the environment and are addressed in 24915-70-G01-GGPT-00001. Achieving industrial clean closure will require decontamination and removal of hazardous waste or hazardous constituents at concentrations that may be harmful to human health and/or the environment. This CVQAPP defines the methodology and quality requirements for execution of CVS which provides confirmation industrial clean closure criteria have been met.

Notably, though agent monitoring is a key component of Closure operations, it is not part of CVS and is therefore outside the scope of this plan. Areas determined to be potentially VX agent-contaminated in 24915-CL-5PL-70-00003, *SDC 1200 Health-Based Risk Assessment* (pending), will undergo unventilated monitoring in accordance with 24915-CL-5PL-70-00002, *SDC 1200 Unventilated Monitoring Test Plan* (pending). As discussed in Section 5.1.2, unventilated monitoring of H-contaminated areas (defined in 24915-GEN-5PL-70-00019, *Health-Based Risk Assessment for Explosive Destruction Technology Changeover from Mustard Agent to VX Agent*), was successfully performed in accordance with 24915-GEN-5PL-70-00021, *Decontamination Verification Plan for Explosive Destruction Technology Changeover from Mustard Agent to VX Agent,* and additional H monitoring is not required.

Although permitted to receive Polychlorinated Biphenyl (PCB) waste, the SDC 1200 has not received or treated PCB waste and will therefore not require closure under the Toxic Substance Control Act (TSCA). In accordance with 24915-70-G01-GGPT-00001, *Attachment I – SDC 1200 Closure Plan*, an administrative closure evaluation will be performed stating no further actions are required for completing TSCA closure. No associated closure verification is required.

Based upon the operating history of the facility to date, there is no reason to expect the surrounding environment (e.g., soil, groundwater, and surface water) has been contaminated by SDC 1200 operations, and the facility is expected to achieve industrial clean closure after operations are complete. This CVQAPP identifies contaminants of potential concern (COPCs), closure target levels, and provides a sampling design based on the history of operations at the SDC 1200 as of August 2024. Following completion of operations, the complete operating record will be reviewed to ensure there is no substantial impact to this plan. At the time of final SDC 1200 closure, a comprehensive review of spill history and operations will be performed. Following this review or during progression of closure, it is possible an area having a probable release of a hazardous waste or hazardous constituents resulting from SDC 1200 operations (i.e., an Area of Concern [AOC]) that needs to be investigated is identified. In such an event, a remediation plan will be developed for Kentucky Department for Environmental Protection (KDEP) approval which will address sampling and analysis for the investigation and remediation of the AOC. The remediation plan will draw upon the COPC lists, Closure Target Levels, and general sampling and analysis methodology contained in this CVQAPP, but the plan will be prepared and submitted for approval independent of the CVQAPP.

The CVQAPP describes the sampling and analysis procedures/methods required to verify environmental media meet the closure performance standards. The CVQAPP addresses confirmation sampling and does not address waste characterization sampling or sampling associated with decommissioning of equipment and buildings. Sampling related to waste characterization is addressed in the *Waste Analysis Plan* (WAP; RCRA Part B Permit Attachment C).

The SDC 1200 CVQAPP is a project-specific Quality Assurance Project Plan (QAPP) to be considered the Sampling and Analysis Plan (SAP) or work plan for the project. The CVQAPP combines elements of a QAPP and a Field Sampling Plan (FSP). This CVQAPP is written in accordance with guidance and requirements outlined in the United States (U.S.) Uniform Federal Policy for Quality Assurance Project Plans (EPA-505-B-04-900A, DTIC ADA 427785). Table 1 provides a crosswalk of requirements. Relevant forms from UFP guidance have been adopted and are referenced throughout this document as “Worksheet X".

3.0 DEFINITIONS

Accuracy	A quantitative data quality indicator (DQI) defining the degree of agreement of a measurement with a known or true value. Accuracy includes a combination of the random error (precision) and the system error (bias components of both sampling and analytical operations). To determine accuracy, a laboratory or field value is compared to a known or true concentration using matrix spikes, surrogate spikes, laboratory control samples (blank spikes), and/or performance samples. Accuracy is determined using percent recovery for each method as follows: $$\text{Recovery } (\%) = (X_s - X_u) / K$$ where: X_s= measured value for spiked sample X_u = measured value for unspiked sample K = known value of the spike in the sample
Area of Concern (AOC)	Any area having evidence of a release or a probable release of a hazardous waste or hazardous waste constituent which is not from an SWMU and is determined by the Permittee to pose a current or potential threat to human health or the environment. Such AOCs may require investigations and remedial action to ensure adequate protection of human health or the environment.
BGCAPP Facility	Property, overseen by ACWA, that includes the BGCAPP Main Plant (MP), SDC 1200, SDC 2000, and permitted storage units operated by the Bechtel Parsons Blue Grass (BPBG) Joint Venture (JV).
Clean Closure	Decontamination and/or removal of all equipment, systems, and areas containing, or contaminated with, hazardous waste or hazardous constituents in a manner that is protective of human health and the environment and such that no post-closure care is required. Industrial clean closure is achieved by achieving clean closure standards applicable to industrial land uses.
Clean Closure Criteria	Quantitative concentrations or levels of contaminants that, if not exceeded, will ensure protection of human health and the environment. Criteria may consider reasonably expected future land use such that industrial exposure assumptions may be applied provided continued maintenance and use as industrial.
Closure Performance Standards	Requirements or conditions that must be satisfied to close the facility in a manner that is protective of human health and the environment; they are addressed in 24915-70-G01-GGPT-00001, *Attachment I – SDC 1200 Closure Plan* (Attachment I of RCRA Permit). The closure performance standards address RCRA, chemical agent, and TSCA closure performance standards, as well as the treatment standards for hazardous debris.

Closure Target Levels	Residual levels of hazardous waste constituents that are acceptable to remain on the BGAD footprint without need for further maintenance or controls (post-closure care).
Closure Verification	Confirmation that the industrial clean closure criteria have been satisfied through an approved sampling and analysis plan. Achieving industrial clean closure criteria will allow BGCAPP to close without the need for further maintenance or controls (post-closure care) for future industrial land use. Analytical results from closure verification sampling and analysis will be used to demonstrate that industrial clean closure criteria have been met as part of the closure certification process.
Container Accumulation Area (CAA)	Any onsite hazardous waste container accumulation area with hazardous waste accumulating in containers (less than 90-days) subject to the large quantity generator requirements of 401 Kentucky Administrative Regulations (KAR) 39:080 Section 1 (40 Code of Federal Regulations [CFR] 262.17) that meets the conditions for exemption from the storage facility requirements in 40 CFR 124, 264 through 268, and 270.
Contamination	The deposition, absorption, or adsorption of a hazardous substance on surfaces, equipment, structures, personal protective equipment, or personnel. Agent-contaminated items are those where agent is known or suspected to be on or contained within the matrix at a level of potential health concern such that safeguards are required.
Comparability	The qualitative DQI defining the degree to which one data set can be compared to another.
Completeness	The quantitative DQI defining the percent of valid usable data obtained compared to the amount that was expected. It is used to determine if sufficient data was generated to drive decision making and is calculated as follows: Completeness=(Number of Measurements Judged Valid)/(Total Number of Measurements)*100%
Data Validation	An analyte- and sample-specific process that extends the evaluation of data beyond method, procedural, or contractual compliance to determine the analytical quality of a specific data set.
Data Verification	The process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements. Data verification involves evaluation of performance against the requirements identified in the SAP or referenced documents and is performed during or immediately following completion of field or laboratory data collection.
Data Quality Indicator (DQI)	A parameter indicating the qualitative and quantitative degree of quality associated with measurement data.

Data Quality Objective (DQO)	Qualitative and quantitative statements derived from the DQO planning process that clarify the purpose of the study, define the most appropriate type of information to collect, determine the most appropriate conditions from which to collect that information, and specify tolerable levels of potential decision errors.
Decommissioning	Withdrawal of the facility or equipment from service, followed by decontamination and transition to required end-state configuration. Decommissioning ensures readiness for demolition or turnover.
Decontamination	The process of making safe any person, object, or area by absorbing, destroying, neutralizing, making harmless, or removing the hazardous substance (e.g., chemical agent) on that person, object, or area. Decontamination encompasses the physical or chemical means to remove, deactivate, or destroy hazardous substances (e.g., chemical agents) on the surface and in the matrix of protective clothing, objects, or equipment.
Decontamination and Decommissioning Package (DDP)	Defines the prerequisites, boundaries, and scope of field work to be performed to close a system, room, area, or building to prepare the facility for demolition and disposal or for turnover to other tenants.
Demolition	Dismantling, destruction, or wrecking of facilities or equipment for scrap recovery followed by off-site disposition and/or disposal. Precision, or targeted, demolition is a labor-intensive and detailed approach to dismantle and size-reduce items into manageable or salvageable components for scrap recovery, further use, or disposal offsite. Mass demolition is large-scale wrecking and destruction of equipment and structures utilizing conventional mechanical equipment to reduce manual labor and facilitate scrap recovery and off-site disposal.
Disposal	Under RCRA, the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters (40 CFR 262.10). Under TSCA, disposal means intentionally or accidentally to discard, throw away, or otherwise complete or terminate the useful life of polychlorinated biphenyls (PCBs) and PCB items. Disposal includes spills, leaks, and other uncontrolled discharges of PCBs as well as actions related to containing, transporting, destroying, degrading, decontaminating, or confining PCBs and PCB items. (40 CFR 761.3).
Engineering Controls	The device, room, or structure immediately surrounding the agent source, which provides the primary protection to the workers from the chemical agent hazard and is under negative pressure relative to the location of unprotected workers. Examples of engineering controls are hoods, gloveboxes, or rooms under negative pressure relative to the adjacent vestibule, corridor, or room.

Equipment Blank	Field quality sample collected by passing source water over decontaminated, non-dedicated sampling equipment and collecting the water into a sample container, which is handled in the same manner as other samples. Equipment Blanks are blind samples (i.e., identified on chain of custody documentation by sample ID and not by location) to ensure unbiased analysis. Equipment blanks are used to verify that samples were not contaminated by the equipment. Equipment Blanks are also known as rinsate blanks and are collected daily during sampling.
Facility	All contiguous land, structures, other appurtenances, and improvements on the land used for treating, storing, or disposing of hazardous waste.
Field Blank	A sample subjected to similar sample collection, field-processing preservation, transportation, and laboratory handling as an environmental sample; used to identify errors or contamination in sample collection and analysis. Field Blanks are blind samples (i.e., identified on chain of custody documentation by sample ID and not by location) to ensure unbiased analysis. For rinsate sampling, a field blank is a sample of the source water used for decontamination of sampling equipment and rinsate sampling, which is collected in sample containers and handled in the same manner as other samples. For wipe sampling, a field blank involves taking a prepared wipe sample container to the field, removing the cap from container for the estimated time of normal wipe, closing the cap, and submitting the sample for analysis. The field blank provides information on potential contamination in the wipe or in the air of the sample location.
Field Duplicate	One of two samples collected at a sampling location during a sampling event; used to check the precision and accuracy of the sampling technique. Field duplicate samples are collected in a manner identical to that of routine samples and are analyzed for the same parameters. Field duplicates are blind samples (i.e., identified on chain of custody documentation by sample ID and not by location) to ensure unbiased analysis. For rinsate sampling, a field duplicate involves repeating the rinsate collection and sampling procedure in its entirety and is collected at a frequency of 1 per 10 primary rinsate samples. For wipe sampling, a field duplicate is collected at a position immediately adjacent to the primary sample location.
Final Closure	Closure of all HWMUs at the facility in accordance with all applicable closure requirements so that hazardous waste management activities under 40 CFR parts 264 and 265 of this chapter are no longer conducted at the facility unless subject to the provisions in 40 CFR 262 for hazardous waste generators. Closure verification will be performed as part of final closure.

Field Replicate	One of two samples collected at a single sampling location; used to check the precision and accuracy of the sampling technique. Field replicates are blind samples (i.e., identified on chain of custody documentation by sample ID and not by location) to ensure unbiased analysis. For rinsate samples, a field replicate is also called a field split and involves collection of duplicate sample containers from the same sump or sample collection drum to assess precision and accuracy of subsampling techniques and is collected daily during sampling. For wipe sampling, a field replicate is collected by wiping the primary sampling area a second time to provide an assessment of extraction efficiency.
Hazardous Waste Control Limit (HWCL)	The concentration limit below which a hazardous constituent can be released from controls prohibiting its treatment or disposal at a permitted hazardous waste facility.
Hazardous Waste Management Unit (HWMU)	A contiguous area of land on or in which hazardous waste is placed, or the largest area in which there is significant likelihood of mixing hazardous waste constituents in the same area. Examples of HMWUs include a surface impoundment, a waste pile, a land treatment area, a landfill cell, an incinerator, a tank and its associated piping and underlying containment system, and a container storage area. A container alone does not constitute a unit; the unit includes containers and the land or pad upon which they are placed (refer to CFR Title 40 Part 260.10). A permitted unit does not become a HWMU until the initial receipt of hazardous waste.
Holding time	The maximum amount of time a sample may be stored before extraction and/or analysis.
Industrial Clean Closure	Decontamination and/or removal of all equipment, systems, and areas containing, or contaminated with, hazardous waste or hazardous constituents in a manner that is protective of human health and the environment which relies on industrial exposure assumptions to determine the level of decontamination necessary to satisfy the “remove or decontaminate” standard. Industrial clean closure requires continued maintenance of nonresidential land use and any necessary additional cleanup should land use change through institutional controls.
Investigative Derived Waste (IDW)	Waste resulting from investigative activities that are managed in accordance with environmental regulations.
Laboratory Blank	Also known as a method blank, this laboratory sample is a clean matrix processed through extraction and analysis in a manner identical to samples. Laboratory blanks verify that method interference caused by contaminants in solvents, reagents, glassware, and other sample processing hardware is known and minimized. The concentration of the target compounds in the laboratory blank sample must be less than or equal to the reporting limit.

Laboratory Control Sample (LCS)	Also known as a blank spike, an LCS is a clean matrix sample spiked in the laboratory and processed through the routine analytical method. An LCS and, as required an LCS Duplicate, are prepared to check the precision and accuracy of the analytical method in the absence of potential sample matrix interferences.
Matrix Spike Samples	Samples spiked with a standard solution and processed through the routine analytical method. Normally, two matrix spike (MS) samples are prepared to provide a matrix spike and Matrix Spike Duplicate (MSD) that are designed to check the precision and accuracy of the analytical methods in the sample matrix.
Non-Hazardous Waste Control Limit (NHWCL)	The concentration limit of a hazardous constituent, below which a waste material may be released for disposal at a non-RCRA disposal facility
Precision	A quantitative DQI defining the degree of agreement between or among independent measurements. Field precision is assessed by co-located samples, field duplicates, or field splits, and laboratory precision is assessed using laboratory duplicates, matrix spike duplicates, or laboratory control sample duplicates. It is usually estimated by calculating the relative percent difference (RPD) as follows: RPD (%)= (Regular-Duplicate)/((Regular+Duplicate)/ 2)*100%
Representativeness	A qualitative DQI defining the degree to which data accurately and precisely represent a characteristic of an environmental condition or a population.
Sampling design	Specifies the number, type, and location (spatial and/or temporal) of sampling units to be selected for measurement. Two main categories of sampling designs include probability-based and judgmental. Probability-based sampling designs involve random sampling, in which each unit of the population has a known probability of selection, such that statistical inferences may be made about the sampled population. Judgmental sampling designs involve selection of sampling units on the basis of expert knowledge and from which statistical inferences cannot be made.
SDC 1200	An explosive destruction technology system used to process HD-filled projectiles and Department of Transportation containers as well as drained and containerized VX rocket warheads. It includes a gas tight Detonation Chamber (DC), which uses indirect electrical heating to achieve temperatures sufficient to cause detonation, deflagration, or burn of the munition energetic material and destruction of the rounds.
Sensitivity	A quantitative DQI defining the ability of an analytical method to measure or quantify the analyte of interest. It is usually expressed as method detection limits (MDLs) or reporting limits (RLs) and measured against any relevant regulatory or action level.

Solid Waste Management Unit (SWMU)	Any discernable unit that has ever accumulated, treated, stored, or disposed of solid wastes, irrespective of whether the units were intended for waste management. SWMUs include areas that have been contaminated by routine and systematic releases of hazardous waste or hazardous constituents, excluding one-time spills that are immediately remediated and cannot be linked to solid waste management activities (e.g., product or process spills).
Source water	Water used for decontamination of sampling equipment (deionized, demineralized, or distilled water of known quality) and rinsate sampling.
SW-846	*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (U.S. EPA SW-846, Third Edition, and its first, second, third, and fourth updates) developed by EPA in support of RCRA. SW-846 includes test methods for the analysis of various environmental media.
Trip Blanks	A series of cleaned sample containers that are filled with analyte-free water and pre-certified by analysis at the laboratory as clean. These are used to verify that no contamination has occurred during sampling and shipping due to environmental conditions. Trip blanks are prepared for each sample cooler containing samples requiring volatile organic compound (VOC) analysis (i.e., method 8260).
Triple Rinse	A flushing process for removal of residual (waste) material Generally, triple rinsing should be performed by flushing three times with 10% or more capacity of a tank, pipe, pump, container, or other type of enclosed volume using a suitable solvent such that all potentially contaminated surfaces are contacted. Floors or other surface are considered triple rinsed when three successive rinses are performed. No strict requirements apply; however, factors such as waste properties, potential solvent options, container configuration and ability to manipulate, and waste minimization efforts all factor into the design of the triple rinse operation. 40 CFR § 261.7(b)(3) allows for an alternate method to be used when triple rinsing is determined to be inappropriate.

4.0 PROJECT/TASK ORGANIZATION

In accordance with guidance and requirements outlined in the United States (U.S.) Uniform Federal Policy for Quality Assurance Project Plans (EPA-505-B-04-900A, DTIC ADA 427785), this section identifies the individuals and organizations participating in the SDC 1200 closure verification sampling and discusses their specific roles and responsibilities. The lead organization for environmental data collection operations is Program Executive Office – Assembled Chemical Weapons Alternatives (PEO ACWA). PEO ACWA has designated responsibility to the Bechtel Parsons Blue Grass Team (BPBGT) for all phases of environmental data collection to include ensuring organization personnel, contractors, and subcontractors perform project work as prescribed in this CVQAPP. The principal data users and decision makers are BPBGT, PEO ACWA, and KDEP.

Figure 1 provides a concise organization chart showing the relationships among project participants. The individual roles and responsibilities of the Project Team members are discussed in Section 4.1. Section 4.2 defines the lines of communication to be used amongst project participants. Section 4.3 describes personnel responsibilities and qualifications for project team personnel executing sampling and analysis activities.

4.1 Project Team

The project team consists of technical personnel knowledgeable of SDC 1200 closure and sampling requirements. The Project Team is led by the Closure Manager but incorporates guidance and oversight by various other Department Managers which report directly to BPBGT Project Management. The following paragraphs describe the individuals responsible for project management, health and safety, sampling, sample analysis, quality oversight, data review, and reporting. Section 4.2 defines the lines of communication between these individuals.

4.1.1 Closure Manager

The Closure Manager is responsible for planning and executing the closure stages and will be supported by BGCAPP and subcontractor personnel necessary to execute closure safely, compliantly, and efficiently. Specific to CVS, the Closure Manager is responsible for the following:

- Directing or overseeing and coordinating CVS activities, including assembling a project team
- Developing and maintaining a schedule for CVS activities that aligns with closure activities and available resources and communicating the schedule to Environmental for coordination with stakeholders
- Coordinating development and approval of CVQAPP implementing plans, procedures, work orders and hazard analyses
- Facilitating communications between the Closure Sampling Manager and key project personnel
- Submitting the CVQAPP and CVQAPP revisions, amendments, and deviations to appropriate personnel for review and approval
- Pausing CVS activities in accordance with Closure Sampling Manager, Environmental Manager, or project management recommendations
- Ensuring technical issues identified during Quality Assurance (QA) review are satisfactorily addressed and documented prior to beginning the data collection activity
- Reviewing the CVQAPP triennially and documenting this review in a letter to the approval authority
- Submitting CVS reports to project management for review prior to delivery to stakeholders.

4.1.2 Plant Management

Plant Management is responsible for the following:

- Reviewing and concurring with the CVQAPP
- Reviewing and approving implementing plans, procedures, work orders, and hazard analyses
- Identifying plant resources to execute closure activities to include personnel to be trained as participants in the field sampling team

4.1.3 Safety and Health Manager

The Safety and Health (S&H) Manager is responsible for the following:

- Reviewing and concurring with the CVQAPP
- Supporting the review of implementing plans, procedures, work orders, and hazard analyses to verify compliance with safety standards
- Approving personal protective equipment (PPE) for use in CVS

4.1.4 Project Quality Manager

The Project Quality Manager is responsible for the following:

- Reviewing and concurring with the CVQAPP
- Reviewing and approving implementing plans, procedures, work orders, and hazard analyses

4.1.5 Laboratory Quality Manager

The Laboratory Quality Manager is responsible for the following:

- Auditing and oversight of CVS activities to ensure program activities and outputs conform to specified requirements
- Ensuring corrective action procedures are implemented when deviations from the CVQAPP are noted or whenever project personnel identify field sampling or analytical problems that could potentially affect data quality or usability

4.1.6 Environmental Manager

The Environmental Manager is responsible for the following:

- Reviewing and concurring with the CVQAPP
- Ensuring technical issues identified during QA review are communicated as required to key stakeholders to ensure regulatory compliance
- Reviewing planned operations, maintenance, and waste disposal activities for compliance with applicable waste characterization, disposal regulations, and permit conditions
- Coordinating communications with regulatory representatives, to include relaying sampling schedule and CVQAPP deviations as well as obtaining concurrence, as required.
- Coordinating with the Closure Manager to ensure CVS activities are paused until required permit modifications are obtained on relevant CVQAPP deviations

4.1.7 Closure Chief Scientist

The Closure Chief Scientist is responsible for the following:

- Assisting in development of the CVQAPP
- Supporting resolution of technical issues identified during planning, sampling, analysis, or QA review

4.1.8 Training Manager

The Training Manager is responsible for the following:

- Scheduling and ensuring personnel complete training, certification, or re-certification in support of Closure activities

- Maintaining documentation demonstrating project team members have read and understood the CVQAPP and/or associated implementing plans or procedures

4.1.9 Waste Manager

The Waste Manager is responsible for the following:

- Ensuring removal of all waste from waste management units to support final closure verification sampling
- Ensuring secondary waste contracts are in place to support disposal of closure waste and investigative derived waste (IDW) generated during CVS

4.1.10 Closure Sampling Manager

The Closure Sampling Manager is responsible for all aspects of field sampling and analysis. Specifically, the Closure Sampling Manager is responsible for the following:

- Developing and updating the CVQAPP as required
- Preparing and submitting CVQAPP deviations for approval
- Verifying field and laboratory personnel have read and understood requirements of this CVQAPP
- Reviewing CVQAPP implementing plans, desk-top instructions, procedures, work orders, and hazard analyses to confirm they comply with CVQAPP requirements
- Ensuring job hazard analyses and other site safety documentation are complete, available, and understood by field personnel
- Continuously assessing field conditions and, as required, pausing work and initiating deviations to the CVQAPP to support effective and safe field sampling
- Ensuring proper documenting of field sampling conditions and activities
- Coordinating laboratories and field personnel with respect to sample collection, shipment, and analysis. This will include submitting a Request for Sample Analysis (RFSA) to the BGCAPP laboratory for each specific CVS activity
- Ensuring data verification and validation are performed in accordance with CVQAPP requirements
- Assembling and preparing reports for submittal to the Closure Manager in accordance with Section 14.0

4.1.11 Field Sampling Team

The field sampling team is responsible for the following:

- Reading and confirming their understanding of the CVQAPP implementing work orders, procedures, desk-top instructions, and safety documentation
- Executing field sampling in accordance with work orders and site procedures prepared in accordance with this CVQAPP
- Documenting field activities in accordance with work order instructions
- Completing Chain of Custody (COC) documentation provided with sample containers and maintaining custody of samples until official transfer of custody

- Continuously assessing field conditions and, as required, pausing work and reporting conditions to the Closure Manager (or designee)

4.1.12 BGCAPP Laboratory

The on-site BGCAPP Laboratory is responsible for the following:

- Providing the sample team with sample kits which comply with the corresponding Request for Sample Analysis submitted for each CVS activity (i.e., to include sample labels with unique sample identification numbers, chain of custody form, clean sample containers, sample cooler, etc.)
- Performing Agent Monitoring and agent analyses required in support of Closure Activities and/or CVS
- Packaging and delivering samples for analysis at off-site Battelle laboratories or commercial subcontracted laboratories.
- Addressing sample receipt and laboratory quality control variances or corrective actions

4.1.13 Off-site Battelle Laboratory

The off-site Battelle laboratories are responsible for conducting sample analysis for agent degradation products and reporting results in accordance with Section 12.2. Each laboratory will have a designated project manager (PM) to coordinate directly with the Closure Sampling Manager (or designee), address sample receipt variances, and address laboratory quality control variances or analytical corrective actions.

4.1.14 Commercial Laboratory

The commercial laboratory is responsible for conducting sample analysis for non-agent related analyses and reporting results in accordance with Section 12.2. The commercial laboratory will have a designated PM to coordinate directly with the Closure Sampling Manager (or designee), address sample receipt variances, and address laboratory quality control variances or analytical corrective actions.

4.2 Communication Pathways

Communication pathways and modes of communication for communication drivers have been delineated and are documented in Table 2. Communication drivers are those activities that necessitate communication between different responsible entities (e.g., initiation, notification and approval of real time modifications to the CVQAPP, notification of delays or changes to field work). Table 2 defines the points of contact and procedures for resolving sampling and analysis problems that may arise. Modifications or deviations to the CVQAPP with appropriate notification of stakeholders will be conducted in accordance with Section 14.1.

4.3 Personnel Responsibilities and Qualifications

Project personnel with responsibilities under this CVQAPP are responsible for reading and understanding sampling guidance and work orders developed in accordance with this CVQAPP before beginning fieldwork. Project personnel are responsible for implementing the work orders as prescribed and, in the event compliance cannot be assured, pausing work and notifying the Closure Sampling Manager and/or Closure Manager of the condition.

Field sampling personnel will be knowledgeable of field sampling techniques and equipment. As required for the associated task, on-site personnel will receive training in accordance with 24915-00-G8L-GGG-00052, *Personnel Training Plan*, with documentation maintained within the Project record in accordance with 24915-00-G8P-GGG-00004, *Training Records Management*.

Laboratory personnel performing analyses will be trained in performance of the specific analytical method assigned. The laboratories will maintain training records to ensure personnel training and qualification requirements are satisfied in accordance with their established laboratory quality assurance plans. Training and personnel qualifications of Battelle or subcontracted laboratories will be confirmed in accordance with 24915-00-9PL-00-00002, *Laboratory Quality Control Plan*.

5.0 PROBLEM DEFINITION

This CVQAPP defines the methodology and quality requirements for execution of CVS in support of final closure of BGCAPP SDC 1200, which will demonstrate effective decontamination and removal of hazardous waste or hazardous constituents to below concentrations that may be harmful to human health or the environment from the SDC 1200. A summary of the overall BGCAPP background and site environmental conditions is provided in 24915-GEN-5PL-00-000014, *Main Plant Closure Verification Sampling and Analysis Quality Assurance Project Plan*. Section 5.1 provides additional background information specific to the SDC 1200 to establish the regulatory, programmatic, and historical context for the project. Section 5.2 addresses project planning with a special focus on how CVS will confirm industrial clean closure of the BGCAPP SDC 1200.

5.1 Project Background

This section provides a description of the environmental conditions at the SDC 1200 site (Section 5.1.1), a brief history of SDC 1200 operations (Section 5.1.2), and a description of the SDC 1200 site and relevant hazardous waste management units (Section 5.1.3).

5.1.1 Environmental Setting

Details on the environmental setting (i.e., climate, hydrology, geology, hydrogeology, and soils and vegetation) of the BGCAPP facility, which includes the SDC 1200 site, in addition to soil and groundwater investigations performed at BGAD and BGCAPP Main Plant, are provided in 24915-GEN-5PL-00-000014, *Main Plant Closure Verification Sampling and Analysis Quality Assurance Project Plan.*

Prior to construction of the EDT facility, background soil sampling was performed at the EDT site as reported in 24915-70-GRR-GGEN-00001, *Interim Report on Explosive Destruction Technology (EDT) Site Soil Sampling* (incorporated as Appendix C in 24915-000-GRR-GGEN-00007, *Background Soil and Water Investigation Report*). A total of 37 samples were collected from 8 soil borings at 2-foot intervals down to bedrock and analyzed by 13 analytical methods for 254 analytes. Sampling was performed prior to rough cut and fill activities. The sampling strategy included three judgmental sample locations located at the planned site of the EDT Service Magazine (ESM), the EDT Enclosure Building (EEB), and the EDT Off-gas Treatment System (OTS) with an additional 5 sample locations selected at random using a grid map of the area. There were detections of volatile organic compounds (VOC), semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH)-oil range organics (ORO), dioxins/furans, and metals. There were no detections for mustard, thiodiglycol (TDG), polychlorinated byphenyls

(PCBs), organochlorine (OC) pesticides, organophosphorus (OP) pesticides, herbicides, TPH-gasoline range organics (GRO), or TPH-diesel range organics (DRO). Background levels established from this sampling were comparable with those established for Main Plant background soil sampling.

5.1.2 Site History

Site history for BGAD and the Main Plant are provided in 24915-GEN-5PL-00-000014, *Main Plant Closure Verification Sampling and Analysis Quality Assurance Project Plan.* The following paragraphs provide specific information associated with the SDC 1200 facility.

In 2013 ACWA completed an environmental assessment regarding the possible use of explosive destruction technologies for the destruction of the deteriorating Levinstein mustard (H) -filled 155-mm projectiles in the BGAD stockpile. Following a conclusion of no significant environmental impact from installation and operation of an EDT, BPBGT began a competitive procurement process for selection of an EDT. BPBGT selected the SDC and, in 2014, BPBGT received approval from KDEP to begin initial construction activities. The SDC 1200 was assembled and installed in early 2016. In JUL 2017, pre-systemization activities of the SDC commenced. On 07 JUN 2019, BGCAPP commenced the destruction of mustard agent-filled munitions in the SDC. The SDC completed destruction of the 155-mm mustard stockpile and mustard-filled Department of Transportation (DOT) bottles on 04 SEP 2020.

In parallel with mustard operations, the BGCAPP main plant revised the rocket processing strategy to implement drain and containerization of rocket warheads. Accordingly, at completion of mustard operations the SDC 1200 transitioned into a changeover campaign to prepare for treatment of VX containerized rocket warheads (CRW) and potential reject/leaker rockets generated by the Main Plant. The SDC 1200 completed changeover in accordance with 24915-GEN-5PL-70-00020, *H Projectile to VX Containerized Rocket Warhead Changeover Plan.* Following systemization of the VX CRW process (see Section 5.1.3), the site commenced processing containerized VX rocket warheads on 25 October 2023. As no VX reject or leaker rockets were identified in Main Plant, the SDC 1200 processed only VX CRWs.

Upon completion of VX CRW processing, the SDC 1200 will be decommissioned, disassembled as necessary, and dispositioned in accordance with contract requirements, environmental permits, and other applicable regulatory requirements. Regulatory requirements include closure of the facility in accordance with RCRA regulations and permits. Real property consisting of facilities and other infrastructure constructed or acquired by PEO ACWA will be removed and dispositioned or retained in accordance with BGAD requirements and instructions. Personal property (e.g., tools, supplies, equipment, items, and materials) is owned by PEO ACWA and will be dispositioned in accordance with applicable Federal Acquisition Regulations (FAR) governing the disposition of Federal government property.

The SDC 1200 was designed and constructed to ensure containment of hazardous constituents and prevent release to the environment. The storage areas have design features specific to the type and quantity of waste permitted for storage (see Section 5.1.3). Throughout operations, inspections were performed in accordance with the Inspection Plan (RCRA Part B Permit Attachment F) and 24915-GEN-5PR-70-00003, *Static Detonation Chamber (SDC) 1200 Environmental Inspection*. These inspections have not identified a failure of containment. Spills of hazardous materials were reported in accordance with 24915-OPS-5PR-00-00044, *Event Notification* and 24915-00-GPP-GGEN-00012, *Spill Reporting and Notification.*

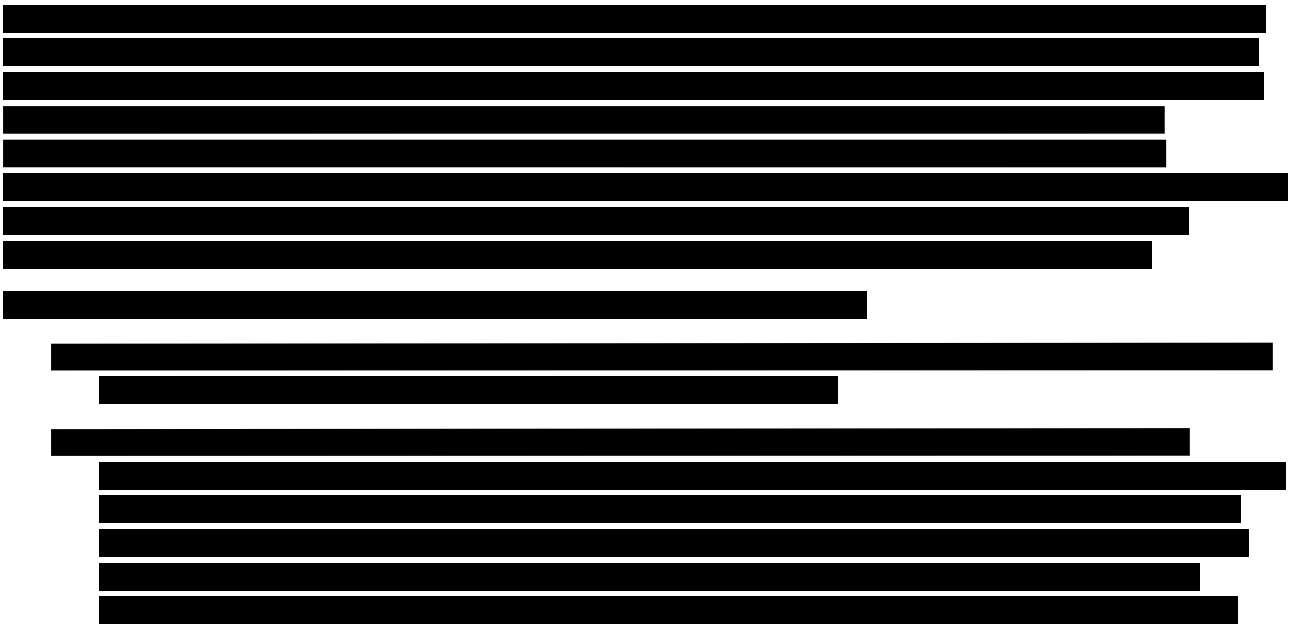
No agent contamination has occurred outside of engineering controls to date and there is no reason to expect the surrounding environment (e.g., soil, groundwater, and surface water) has been contaminated by SDC 1200 operations. In support of changeover from H projectile and DOT bottle processing to VX CRW processing, BGCAPP prepared 24915-GEN-5PL-70-00018, *Explosive Destruction Technology Mustard (H) Contamination History*, which summarized data on potential liquid agent and/or agent vapor contamination events. Information within this document was applied within 24915-GEN-5PL-70-00019, *Health-Based Risk Assessment for Explosive Destruction Technology Changeover from Mustard Agent to VX Agent*, which associated each EDT area with a Category of Agent Contamination to establish the decontamination and decontamination verification release criteria for equipment and areas following H operations. Decontamination Verification Criteria for EDT were defined within 24915-GEN-5PL-70-00021, *Decontamination Verification Plan for Explosive Destruction Technology Changeover from Mustard Agent to VX Agent*. Similar documents will be prepared following completion of VX operations to support final closure and will consider decontamination verification activities performed to eliminate residual H contamination.

5.1.3 Site Description

The SDC 1200 facility, previously called the Explosive Destruction Technology (EDT) facility, is located on the southwest side of the BGCAPP site (see Figure 2 and Figure 3). The SDC 1200 site is approximately 2.6 km from the BGAD northern boundary. The facility is a government-owned contractor-operated treatment, storage, and disposal facility (TSDF) and therefore complies with Federal and Commonwealth of Kentucky RCRA regulatory requirements with respect to design, construction, and operation.

The SDC 1200 consists of one primary process building and supporting buildings and areas (see Figure 2 and Figure 3). Sections 5.1.3.1 through 5.1.3.3 provide a description of the SDC 1200 process as operated during the mustard and VX campaigns. Section 5.1.3.4 provides a description of the HWMUs addressed in this plan.

5.1.3.1 SDC 1200 Process Description



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5.1.3.2 Mustard Campaign OTS

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5.1.3.3 VX Campaign OTS

[redacted]

[redacted]

5.1.3.4 HWMU Facility Descriptions

As indicated in Figure 3 and Figure 6, SDC 1200 HWMUs are contained within three buildings with associated filtration systems, and one outdoor container storage area:

- The ESM received and stored the mustard projectiles and DOT Containers and VX CRWs prior to treatment in the EEB.
- The EEB housed the various miscellaneous treatment units that made up the SDC and associated EDT OTS as well as permitted container storage areas for process and secondary wastes in two areas of the building – the SDC area and the OTS area.
- The OTS Structure houses the VX campaign OTS and contains both a RCRA-permitted tank storage system as well as permitted container storage.
- The OTS Storage Area 2 is a permitted container storage unit that is equipped with two (2) 5,000-gallon portable containers for the storage of liquid OTS waste prior to loading into tankers for offsite disposal.

The following sections provide detailed information on each HWMU addressed in this CVQAPP.

5.1.3.4.1 EDT Service Magazine (ESM) Description

The ESM is a non-standard storage structure designed and constructed in accordance with Army Regulation 190-59 for the storage of chemical weapons and compliant with requirements of 40 CFR 264.1201(b)(2) for aboveground magazines. The ESM received and stored mustard projectiles and VX CRWs prior to treatment in the EEB. The ESM corresponds to a permitted container storage area and complies with secondary containment requirements for storing containers with free liquids.

The floor of the ESM is sloped inward and coated with a chemical-resistant coating to prevent discharge of spills to the surrounding environment. The ESM containment is inspected weekly to identify signs of spills and defects that require repair, and the documented results of the inspections are maintained in the operating record.

Additionally, the ESM is equipped with an IONEX 1K filter unit that continuously filters air from the ESM to prevent releases of agent vapor to the environment in the event of an agent leak. The IONEX 1K filter includes five filtering banks: a prefilter, a high-efficiency particulate air (HEPA) filter, two banks of activated carbon filters, and a final HEPA filter bank. The space between the two banks of carbon filters and the exhaust from the filter are continuously monitored by the Agent Monitoring System (AMS) to identify agent breakthrough. Differential pressure indicators located across the prefilter bank, each HEPA filter bank, and the entire filter system are monitored to identify potential flow restrictions. An induced draft fan provides the motive force for air through the filters from the ESM. The fan is equipped with a variable frequency drive to allow fan operation at the desired speed. An electric duct heater and a temperature indicator are provided for humidity control.

5.1.3.4.2 EDT Enclosure Building (EEB) Description

The EEB consists of three observation corridors (Rooms 101, 102, and 103), a Personnel Vestibule (Room 100), the SDC room (Room 104), the OTS Room (Room 105), and an electrical room (Room 106). The SDC room contains the Subpart X Miscellaneous Unit comprising the SDC system (i.e., the loading system, detonation chamber, buffer tank, scrap conveyor, PVS and original THO used during the mustard campaign) as well as container storage areas. The OTS Room contains the remainder of the OTS system used during the mustard campaign as well as container storage areas (see Figure 7). The remaining rooms are support areas that do not contain HWMUs or hazardous waste. The SDC and OTS room floors consist of polyurea-coated concrete, and the walls are finished with gypsum wall board.

The EEB is equipped with a cascade ventilation system which provides containment of agent vapors that may escape the SDC. Specifically, the DC and BT enclosures provide category B areas surrounding the key process equipment through the action of the PVS. The SDC room is a Ventilation Category C area with a minimum of six air changes per hour and a minimum differential pressure of negative 0.25 in. w.c. (relative to atmosphere). It is maintained at negative pressure by the IONEX 16K filter. Two air handling units (AHUs), rated for 7600 cubic feet per minute (CFM) each, supply conditioned air to the Category C SDC room. The room is accessed through the SDC vestibule (Room 100) which is a ventilation class “D” or “C” room depending on door configuration. Remaining areas of the EEB are Category D areas.

Air from the SDC room and PVS is drawn through exhaust ductwork to the IONEX 16K filter Unit. A backflow prevention damper is located prior to the junction between the PVS exhaust duct work and the HVAC exhaust duct to prevent agent contamination from flowing back into the SDC room. The IONEX 16K consists of 5 filtering banks: a pre-filter, a HEPA filter, two banks of activated carbon filters, and a final HEPA filter bank. The air in the space between the two banks of activated carbon filters is monitored by the lab to give early warning of agent breakthrough. Agent vapor or organic compounds present in this space are captured and retained in the activated carbon filters. The exhaust air from the 16K unit is monitored by the AMS. The IONEX 16K ID fan pulls a draft through the IONEX 16K filter to the fan, discharges the filtered vapor, and maintains the negative pressure in the SDC room by modulating the fan speed with a variable frequency drive (VFD).

5.1.3.4.3 OTS Structure

The OTS Structure, also known as the Pre-Engineered Manufactured Building (PEMB), was designed and constructed to house the new OTS for the VX CRW processing campaign. The OTS Structure includes a C/D Vestibule, a THO Room, a Mechanical Equipment Room, an OTS room, and an Electrical Room (see Figure 6). The THO room and C/D Vestibule are maintained under cascade ventilation control by the PEMB 16K IONEX carbon bed filter unit (70-MK-EDT-ION0022) to control for potential releases upstream of THO. The THO room is a category C area with a minimum of six air changes per hour and a minimum differential pressure of negative 0.25 in. w.c. (relative to atmosphere). Remaining areas are Category D areas.

The OTS structure contains both a RCRA-permitted tank storage system (BWT) as well as permitted container storage. The THO and OTS room floors consist of polyurea-coated concrete.

5.2 Clean Closure

Clean closure of the BGCAPP SDC 1200 will involve decontamination and/or removal of equipment, systems, and areas containing, or contaminated with, hazardous waste or hazardous constituents in a manner that is protective of human health and the environment such that post-closure care is not required. Closure will be conducted in accordance with 24915-70-G01-GGPT-00001, *Attachment I – SDC 1200 Closure Plan*. The general process flow applied to each HWMU is provided in Figure 8. As required by operational history, clean closure will be demonstrated by inspection, unventilated monitoring, and/or analysis of wipe or rinsate samples for chemicals of potential concern (COPCs) identified based on the wastes stored in the HWMU (Table 3) and generator knowledge. Chemicals of Potential Concern for the site are defined in Table 4 by analyte class. Notably, the agents (VX and H) are excluded because clean closure for these compounds is more effectively demonstrated through unventilated monitoring which is outside the scope of this plan (see Section 2.0). The following paragraphs provide a conceptual site model for each HWMU to conclude on the closure requirements for each. Table 5 provides a summary of the resulting sampling requirements and analytes specific to each HWMU based on the site model. Quality objectives, to include Closure Target Levels, are provided in Section 6.0.

5.2.1 ESM

As described in Section 5.1.3.4, hazardous waste activities in the ESM were limited to storage and transfer. The ESM was designed to capture potential contaminants released from primary containment systems (projectiles, RWCS pallets), and the potential for residual contamination is remote. There have been no known releases outside containment areas and only a single incidence of hazardous waste exposure of the containment surface (mustard spill documented in 24915-GEN-5PL-70-00019, *Health-Based Risk Assessment for Explosive Destruction Technology Changeover from Mustard Agent to VX Agent*). A record review will be conducted at completion of agent operations and documented in 2915-CL-5PL-70-00003, *SDC 1200 Health-Based Risk Assessment* (pending) to confirm spill history.

Decontamination, decommissioning, and demolition activities will be conducted in accordance with 24915-70-G01-GGPT-00001, *Attachment I – SDC 1200 Closure Plan*, and site plans and procedures defined to minimize potential release to the environment. Current expectation is that the ESM and IONEX 1K filtration system and components within will be demolished and shipped off site for disposal or resource recovery. Based on this end state, the following activities will be completed as part of clean closure in accordance with Section 8.6.1 of 24915-70-G01-GGPT-00001:

- Hazardous waste will be removed
- The ESM will be mechanically cleaned
- A visual inspection of containment surfaces will be performed to identify cracks or damage that could have allowed hazardous waste or hazardous constituents to reach the underlying soils if liquids had been present during the operating life of the facility.
- Containment surfaces will be decontaminated as required and verified to meet closure performance standards. The concrete containment elements that meet the closure performance standards in section 7.3.1 of 24915-70-G01-GGPT-00001, *Attachment I – SDC 1200 Closure Plan*, may be shipped off site for resource recovery or disposal in a Subtitle D landfill.
- A low-volume rinsate sample will be collected that has contacted the surface of the containment area. Walls and ceilings will not be included in the rinsate sample unless there is evidence at the time of sampling that hazardous waste contacted these surfaces.

5.2.2 EEB

As described in Section 5.1.3.4, hazardous waste activities within the EEB included waste storage, transfer, and treatment. Each area was designed to capture potential contaminants released from primary containment systems (tanks, containers), and the potential for residual contamination is remote. There have been no known releases outside containment areas. Decontamination, decommissioning, and demolition activities will be conducted in accordance with 24915-70-G01-GGPT-00001, *Attachment I – SDC 1200 Closure Plan,* and site plans and procedures defined to minimize potential release to the environment. Current expectation is that the EEB and components within will be demolished and shipped off site for disposal or resource recovery. Based on this end state, the following actions are necessary for clean closure verification prior to demolition:

- SDC Room and OTS Room Container Storage areas will be closed in accordance with Section 8.6.1 of 24915-70-G01-GGPT-00001 using the same general steps as applied to the ESM (see Section 5.2.1). If review of operations indicates no potential contact of hazardous waste to containment surfaces, BGCAPP will document this finding and will not perform sampling.
- The Miscellaneous Treatment Units in the SDC Room will be closed in accordance with Section 8.6.3 of 24915-70-G01-GGPT-00001. Clean closure will be demonstrated through inspection, and as required by analysis of wipe samples or low-volume rinsate samples collected from surfaces. As indicated in Table 5, it is currently anticipated that wipe samples will be collected from LC1 and LC2 while a rinsate sample will be collected from the BT. Based on generator knowledge, the DC is clean of all COPCs excluding potential metals. Visual inspection of the DC will be used to confirm the DC is free of friable dust that could result in releases during final disposition.Similarly, this is also true for the scrap conveyor system and PVS (see Table 5). Alternatively, items may be dismantled and managed for offsite disposition in accordance with Project procedures (24915-OPS-5PR-00-00023, *Hazardous Waste Management and Hazardous Material Reporting Procedure [CDRL D012]*; 24915-OPS-5PR-00- 00030, *Waste Shipping*; and related documents).

- The OTS contained in the OTS room will be closed in accordance with Section 8.6.5 of 24915-70-G01-GGPT-00001. Clean closure will be demonstrated through inspections, and as required by analysis of wipe samples or low-volume rinsate samples collected from surfaces. The BHF captured particulate from the gas stream which was deposited on the surface of a filter "cake" additive adhering to the surface of the filter bags. The filter bags have been removed from the BHF and disposed in accordance with facility waste management processes and procedures. No further actions are required for closure of the BHF. As indicated in Table 5, it is currently anticipated that rinsate samples will be collected from within the SD, Quench and ASC, and NSC. Similar to the DC, generator knowledge verifies the internals of the THO cannot be contaminated with COPCs beyond metals. Following removal of potentially agent-contaminated piping and the refractory (as required), the THO will be inspected and confirmed to be free of friable material. Alternatively, items may be dismantled and managed for offsite disposition in accordance with Project procedures (24915-OPS-5PR-00-00023 and 24915-OPS-5PR-00- 00030).

5.2.3 OTS Structure

As described in Section 5.1.3.4, hazardous waste activities within the OTS Structure included waste storage and off-gas treatment. Each area was designed to capture potential contaminants released from primary containment systems (tanks, containers), and the potential for residual contamination is remote. There have been no known releases outside containment areas. Decontamination, decommissioning, and demolition activities will be conducted in accordance with 24915-70-G01-GGPT-00001, *Attachment I – SDC 1200 Closure Plan,* and site plans and procedures defined to minimize potential release to the environment. Current expectation is that specific components of the OTS and PEMB will be demolished and shipped off site for disposal or resource recovery; alternatively, items may be dismantled and managed for offsite disposition in accordance with Project procedures (24915-OPS-5PR-00-00023 and 24915-OPS-5PR-00- 00030). For demolition of building with subject items remaining, the following actions are necessary for clean closure verification for areas/equipment that remains for demolition:

- THO Room and OTS Room Container Storage areas will be closed in accordance with Section 8.6.1 of 24915-70-G01-GGPT-00001 using the same general steps as applied to the ESM (see Section 5.2.1). If review of operations indicates no potential contact of hazardous waste to containment surfaces, BGCAPP will document this finding and will not perform sampling.
- The BWT will be closed in accordance with Section 8.6.2 of 24915-70-G01-GGPT-00001. If the tank is to remain for demolition, a rinsate sample will be collected from surfaces within the BWT to demonstrate clean closure for relevant COPCs (see Table 5).
- The BWT Containment Area will be closed in accordance with Section 8.6.4 of 24915-70-G01-GGPT-00001. If review of operations indicates no potential contact of hazardous waste with containment surfaces, BGCAPP will document this finding and will not perform sampling. As required by review of spill history, a rinsate sample may be collected from surfaces within the BWT containment and analyzed for relevant COPCs (see Table 5) to demonstrate clean closure.

- The OTS contained in the THO and OTS room will be closed in accordance with Section 8.6.5 of 24915-70-G01-GGPT-00001. Clean closure will be demonstrated by analysis of wipe samples or low-volume rinsate samples collected from surfaces within the Quench and Neutral Scrubber for relevant COPCs (see Table 5). Following removal of potentially agent contaminated piping and the refractory (as required), the THO will be inspected and confirmed to be free of friable material. Similar actions will be performed for the Wet Electrostatic Precipitator.

5.2.4 OTS Storage Area 2

As described in Section 5.1.3.4, the OTS Storage Area 2 is a permitted Subpart I container storage unit equipped with two (2) 5,000-gallon portable containers for the storage of liquid OTS waste prior to loading into tankers for offsite disposal. The portable containers receive OTS wastewater from the BWT and they are provided with internal secondary containment that is designed to capture potential contaminants released from primary containment. The containers and tanker loading station are located within a bermed area which prevents runoff from the hazardous waste storage area to other areas of the facility or the environment, and the potential for residual contamination outside secondary containment or the bermed area is remote. A record review will be conducted during progression of closure to determine if any spills have occurred that could potentially contaminate the storage area. Decontamination, decommissioning, and demolition activities will be conducted in accordance with 24915-70-G01-GGPT-00001, *Attachment I – SDC 1200 Closure Plan*, and with site plans and procedures to minimize potential release to the environment. The two containers will be prepared for disposal or resource recovery. The following actions are necessary for clean closure verification prior to demolition:

- The OTS wastewater containers will be closed in accordance with Section 8.6.1.3 of 24915-70-G01-GGPT-00001. If the containers are to remain for demolition, a rinsate sample will be collected from surfaces to demonstrate clean closure for relevant COPCs (see Table 5).
- The surface within the bermed area of OTS Storage Area 2 will be mechanically cleaned and decontaminated as necessary
- A visual inspection will be performed of the bermed area around the storage containers and the tanker loading station to identify cracks or damage that could have allowed hazardous waste or hazardous constituents to reach the underlying soil if liquid wastes had been present during the operating life of the facility.
- Storage area surfaces will be decontaminated as required and verified to meet closure performance standards in section 7.3.1 of 24915-70-G01-GGPT-00001, *Attachment I – SDC 1200 Closure Plan*, and may be shipped off site for resource recovery of disposal in a Subtitle D landfill.

The bermed area of OTS Storage Area 2 is sufficiently impervious to contain leaks and spills until these are detected and removed. In accordance with Project requirements, spills or leaks are cleaned up in a timely manner to remove collected materials and prevent contamination of the containment. Since the potential for contamination is remote, no CVS is planned for OTS Storage Area 2.

6.0 QUALITY OBJECTIVES

The objective of BGCAPP closure is to ensure the permitted HWMUs are closed in a manner that minimizes the need for further maintenance, and minimizes, controls, or eliminates post-closure escapes of hazardous wastes or their constituents into the environment. The data quality objective (DQO) process, defined in the U.S. Environmental Protection Agency's *Systematic Planning Using the Data Quality Objectives Process*, was used to develop performance and acceptance criteria (or data quality objectives) for SDC 1200 Closure. This process was used to define the appropriate type, quality, and quantity of data required to satisfy objectives. The results of this process are summarized in Table 7. Closure criteria are tailored to the specific end-state for each HWMU.

6.1 Closure Target Levels

As described in Section 5.2, rinsate or wipe samples will be collected to verify clean closure has been achieved for HWMUs without sufficient generator knowledge to verify clean closure.

6.1.1 Rinsate Sample Action Levels

Rinsate sampling is a common method for assessing residual contamination remaining on surfaces. The rinsate sample, in combination with other clean closure criteria and visual inspection, is used to provide final confirmation that decontamination has been effective and waste residues have been removed from remaining surfaces. The study question for these units is whether contaminants in the rinsate exceed an acceptable level.

Action levels have been defined based on regulatory thresholds and risk-based concentrations to define residual levels of contamination that are considered protective of workers and eliminate or minimize the release of harmful constituents during reuse or demolition and disposition of HWMUs. Effective decontamination for volatile and semivolatile organic compounds and metals will be verified to meet land disposal restriction requirements of 40 CFR 268.45(b)(1). Due to their unique characteristics and consistent with EPA guidance, drinking water standards will be applied for explosives and Agent Degradation Products (ADPs). As explosives and ADPs do not have an established Maximum Contaminant Limit (MCL), the EPA generic Regional Screening Levels (RSL) for tap water for a target risk (TR) level of 1E-06 and hazard quotient of 0.1 will be applied as the acceptable closure standard. As applicable based on compound toxicity, the EPA RSL table lists both a carcinogenic and non-carcinogenic RSL. Except in the case where available method capabilities limit potential use (e.g., 2,4,6-trinitrotoluene), the lowest of the two available RSLs was selected as the project action level. Because an RSL is not defined for ethylmethyl phosphonic acid (EMPA), the RSL for the structurally similar compound, isopropyl methyl phosphonic acid (IMPA) was selected as the project action level.

The decision rule applicable to HWMU rinsate sampling is: if a rinsate sample collected from the HWMU containment surfaces is below the rinsate action levels take no further action, if above, decontaminate and repeat sampling. Unlike with statistical sampling, the effectiveness of rinsate sampling in demonstrating clean closure is based on quality controls in place during field sampling and analysis. Foremost, the total rinsate volume must be limited to no more than 10 times the volume required for analysis. The sampling design (Section 8.1) defines procedures to ensure minimal dilution of rinsate and reproducibility of results.

6.1.2 Wipe Sample Action Levels

For specific HWMUs, collection of a rinsate sample is not feasible. For these HWMUs, a wipe sample will be used. Wipe sampling is a common method for assessing residual contamination remaining on surfaces.

As indicated in Section 5.2 and Table 5 wipe samples will be performed for metals and explosives. ADPs are not relevant for areas requiring wipe sampling since ADPs are associated with hydrolysis reactions and not with thermal breakdown reactions related to the primary source of contamination in these areas. Notably, excluding lead (EPA limit of 10 µg/ft^2), surface limit concentrations are not defined for most COPCs. However, the American Conference of Governmental Industrial Hygienists (ACGIH®) has begun publishing surface limit threshold limit values (TLV®-SL) for specific chemicals. Though relevant COPCs do not currently have established TLV-SL, the ACGIH established a conservative process for establishing TLV-SLs from TLV-8hr values (ACGIH, Nov 2020). This process was applied to the relevant COPCs, to include lead, to establish TLV-SL values that can be used as risk-based Industrial Clean Closure Criteria (see Table 6).

Due to the limited use of wipe samples and the relative size of HWMUs requiring wipe sampling (Table 5), the sample design will rely on random sampling in grids to demonstrate clean closure. Specifically, sample locations will be identified as follows:

- The total area of potentially contaminated surfaces will be determined and divided into 1-m^2 sample grids.
- Within each 1-m^2 sample grid, a 10-cm by 10-cm (4-in by 4-in) wipe sample location will be identified by random number generation (e.g., applying Microsoft Excel™ RANDARRAY function to define a number between 1 and 100 for each grid).

The decision rule applicable to HWMU wipe sampling is: if all wipe samples collected from the HWMU containment surfaces are below the action level (Table 6) take no further action, else decontaminate and repeat sampling. If repeat sampling is required, a new location within each 1-m^2 sample grid will be randomly identified. Quality samples will be collected in accordance with Section 11.1 to demonstrate extraction efficiency, reproducibility, and accuracy, thereby providing confidence in the final assessment.

6.2 Measurement Performance Criteria

This section provides the measurement performance criteria for each matrix and analytical group relating to the data quality indicators (DQIs) of precision, accuracy/bias, representativeness, comparability, sensitivity (quantitation limits), and completeness. Measurement performance criteria are defined for both sampling and the analytical measurement systems to judge whether the project objectives have been met. Table 8 summarizes the analytical methods to be employed which are further discussed in Section 9.0. Field quality samples to be collected to support data quality are discussed in Section 8.0 and 11.1. Table 9 summarizes the field quality samples to be collected for evaluation of measurement performance. The measurement performance criteria established for this project are defined in the following paragraphs and summarized in Table 10 and Table 11. Section 11.1 provides additional context for the quality samples used to assess these DQIs.

Additional method-specific data quality indicators (surrogate recovery, internal standard requirements, instrument blanks, calibration verification standards) will be documented in individual laboratory standing operating procedures (SOPs). Prior to execution of analyses, the Closure Sampling Manager and/or other project personnel will review laboratory plans and procedures to ensure established DQIs satisfy project expectations and document any additional DQIs considered relevant to data analysis and interpretation.

6.2.1 Sensitivity

Sensitivity quantifies the ability of an analytical method to measure or quantify the analytes of interest. It is usually expressed as an MDL, Lower Limit of Quantification (LLOQ), or reporting limit (RL).

Achievable laboratory reporting limits are compared against desired project reporting limits, corresponding to 1/10th of the proposed action levels to account for potential dilutions required during sampling and analysis, in Table 12. As indicated, for most compounds, existing reporting limits meet project-desired limits. For several compounds, the laboratory achievable quantification limits are greater than the project desired reporting limits, and in a few instances, the action level. In most cases, reporting to the detection limit will address the discrepancy. If, following analysis, it is determined detection and quantitation limits exceed the action level for a specific constituent, reanalysis and/or resampling with alternative analytical methodology (if available) may be considered. If this option is not available and all other COPCs are below the corresponding action levels, BGCAPP will provide justification to KDEP on why clean closure should be considered based on an overall evaluation of sampling and analysis, analytical capabilities, and generator knowledge.

6.2.2 Precision

Precision is defined as the degree of mutual agreement among individual measurements made under prescribed conditions. Precision quantifies the repeatability of a given measurement. For CVS, precision is estimated by calculating the relative percent difference (RPD) of laboratory and field duplicates, as shown in Equation 1.

Equation 1

$$RPD\ (\%) = \left|\frac{(Regular - Duplicate)}{(Regular + Duplicate)/\ 2}\right| \times 100$$

Precision will only be evaluated for results exceeding the quantification limit (i.e., for estimated values between the detection limit and quantification limit, a RPD may be calculated but will not be evaluated against the DQI criteria). In the case where one duplicate has a quantified value and the other is either estimated or not detected, the RPD will be calculated using half of the quantification limit.

Table 10 define the precision DQIs established for CVS.

6.2.3 Accuracy/Bias

Accuracy is defined as the degree of agreement between a measurement and an accepted reference or true value. Bias is the systematic or persistent distortion of a measurement process that causes errors in one direction. For CVS, evaluation of accuracy and bias is performed by analyzing a sample to which a known amount of constituent has been added (spike sample). Accuracy will be expressed as a percent recovery (%R) and is method dependent. Analysis of a Laboratory Control Sample (LCS) will be assessed as a measure of accuracy of the method; matrix effects on accuracy will be assessed using matrix spike samples (MS/MSD). A combination of LCS and MS/MSD analyses will be used to evaluate the accuracy of most analysis methods. Percent recoveries for each method are estimated by Equation 2.

Equation 2

$$\text{Recovery (\%)} = \frac{\text{(Spiked Sample)} - \text{(Regular Sample)}}{\text{(Spike Added)}} \times 100$$

Table 10 and Table 11 define the accuracy/bias DQI established for CVS.

6.2.4 Completeness

Completeness represents the percentage of valid data collected from a measurement system as compared to the total amount expected to be obtained under optimal or normal conditions. Completeness is calculated as shown in Equation 3.

Equation 3

$$\text{Completeness (\%)} = \frac{\text{Number of Measurements Judged Valid}}{\text{Total Number of Measurements}} \times 100$$

The completeness DQI for CVS is 90%. The completeness DQI will be met if valid data (i.e., data not rejected during data verification or data validation as discussed in Section 13.0) are obtained for each sampling location for each COPC with no more than 10% rejected results. The impact of any data rejection will be assessed against the overall data quality objectives. If data rejection impacts the validity of the assumptions laid out in the sample design (Section 8.0), additional samples will be collected and analyzed.

6.2.5 Comparability and Representativeness

Comparability is the degree to which one data set can be compared to another. To ensure comparability, samples will be collected at specified intervals and in a similar manner, and will be analyzed within the required holding times by accepted methods. Data and units used in reporting this study will be consistent with accepted conventions for each matrix. This approach will ensure direct comparability between CVS results and project action levels.

Representativeness is the degree to which a sample or group of samples is indicative of the population being studied. Samples will be collected in a manner such that they are representative of both the chemical composition and the physical state of the sample at the time of sampling. Samples will be handled to minimize the contact between the soil and the atmosphere between sample collection and analysis.

Sample collection (Section 8.0) and sample handling (Section 10.0) protocols will be reviewed. Any deviations identified will be documented and considered within final data quality analysis (Section 13.0) to determine potential impacts on conclusions and the need to repeat sampling activities.

7.0 PROJECT/TASK DESCRIPTION

Closure of BGCAPP SDC 1200 involves various tasks to be completed at each HWMU in accordance with a sequence designed to ensure management of closure waste and attainment of Closure Standards. Details on closure activities are contained in 24915-70-G01-GGPT-00001, *Attachment I – SDC 1200 Closure Plan* and its supporting documents. Initial activities will focus on the elimination of residual agent contamination within the SDC 1200. In parallel with these activities, the EDT OTS will be sampled, allowing early opportunities for clean closure of these HWMUs. However, supporting HWMUs (e.g., container storage areas and SDC 1200 OTS) must remain available to support management of waste streams removed from the SDC during decontamination activities. With completion of SDC operations, decontamination, and sampling, clean closure of the SDC 1200 OTS and containment areas may proceed. Table 13 provides a general sequence for CVS with a tentative schedule that will be adjusted as closure activities progress.

Closure verification sampling for each HWMU will include a pre-sampling phase encompassing preparatory activities (Section 7.1); a field sampling phase that will include the collection of samples (Section 7.2); and a post-sampling phase that will include the assessment of the data, generation of reports, and final closure certification (Section 7.3). The sampling, analysis, and data verification and validation techniques to be used to support this effort are consistent with EPA methodologies and State of Kentucky regulations and are further discussed in subsequent sections.

7.1 Pre-Sampling Activities

During the pre-sampling portion of the program, project management and sampling details will be defined by HWMU. This will be accomplished through application of the general closure process provided in Figure 8. Responsibilities will be assigned to the respective qualified team members who will enhance and finalize the program to ensure successful sample collection efforts. Pre-sampling activities include, but are not limited to, the following:

- Review of operational history to finalize HWMUs requiring CVS under this plan.
- Procurement of equipment
- Development/revision of procedures, desk-top instructions, or non-standard test protocols (NSTP) (as appropriate) to support sampling
- Training of staff
- Verification selected laboratory meets DQIs established in CVQAPP
- Development of work orders (by HWMU) with associated documentation forms and safety reviews

7.2 Field Sampling

The field sampling phase will include the physical collection of environmental samples at each location. As shown in Table 13, CVS will be sequenced in accordance with decommissioning activities for each HWMU. Field sampling includes mobilization, sample collection, and demobilization as follows:

- Mobilization involves placement of required equipment and materials at the HWMU, verification of personnel training, completion of safety reviews, and verification the HWMU has been prepared for CVS sampling (e.g., bulk waste removal, debris/residues removed, containment inspections and repairs, surfaces cleaned and/or decontaminated in accordance with the Closure Plan).
- Sample collection involves the collection of required samples in accordance with Sections 8.0, 10.0, and 11.0 of this plan.
- Demobilization activities include shipment of samples, removal of IDW for proper management, decontamination and storage of reusable equipment, and proper management of sampling records (Sections 8.0, 10.0, 12.0, 14.0).

7.3 Post-Sampling Activities

Post-sampling activities include sample analysis and analytical report generation (Section 9.0), data verification, validation and data quality analysis (Section 13.0), and generation of a final report (Section 14.0). The results of sampling will be documented in a report that will be provided to the Professional Engineer (PE) to support closure certification of each HWMU.

8.0 SAMPLING TASKS

8.1 Rinsate Sampling

Rinsate sampling consists of a low-volume wash using deionized, distilled, or demineralized water that contacts potentially contaminated surfaces of the HWMU. Rinsate sampling aligns with programmatic and permitted clean closure methodology. Prior to sampling, waste will be removed from the HWMU and surfaces will be cleaned by mechanical means (e.g., sweeping, wiping, brushing, scraping, etc.). As required, any visible surface defects that could result in release of contaminants during decontamination and rinsate sampling will be repaired. Surfaces will then be decontaminated by any methods identified in Appendix A of 24915-70-G01-GGPT-00001. Thorough initial decontamination is required to minimize surface residues that will impact reporting limits and analytical performance.

Rinsate sampling must provide a representative sample of the HWMU surfaces that can be effectively analyzed for contaminants of interest. As such, it is essential the sampling team ensure rinse water contacts each surface. For the container storage areas with a history of potential release of hazardous waste, the complete surface consists of the concrete pad of each storage area. For the equipment, samples will be collected from the internal surface of each unit. Sampling of tank containment systems will be conducted, if required, based on review of historical releases. If a portion of an HWMU surface cannot be contacted by rinse water, a deviation will be prepared to document the nonconformance and the appropriate resolution (see Section 14.0).

To achieve adequate detection of contaminants while ensuring surface contact of the sampling area, the total volume of water for rinsing will be limited to no more than 10 times the water required to satisfy sample volumes (including associated quality samples per Section 11.1). Deionized, demineralized, or distilled water of known quality will be utilized. Dependent on observed conditions during sampling, two methods may be used for final rinsate collection in conjunction with impermeable berms and squeegees to direct and contain rinsate as necessary:

- Dependent on the properties of the individual HWMU, the sampling team will perform rinsate sampling using low-pressure washing followed by collection of the sample from a sump or low point. Material will be transferred to a collection container. The total volume of water will be measured, and samples will be extracted using a new disposable cup/beaker and transferred to the sample containers beginning with the VOC samples.
- For areas where a sump is not available or collection from the sump is impractical, an automatic floor cleaner may be utilized to ensure the rinse water contacts the surface while facilitating rinsate collection. The collection drum will be capped when not in use (i.e., adding volume or sampling) to minimize potential losses. After rinse water contacting all surfaces of the surface is collected in the collection drum, it will be gently stirred and transferred to sample containers beginning with the VOC samples.

The final method selected for each HWMU will be documented (Section 8.7 and 14.3). The final volume of rinsate collected before subsampling will be documented (Section 8.7 and 14.3). If the total volume measured exceeds 10 times the volume required to satisfy sampling requirements, the Closure Sampling Manager will notify Closure Management to discuss the path forward.

Field quality samples are discussed in Section 11.1.1. For rinsate sampling, both a field replicate (also known as a field split) and field duplicate will be collected. A field duplicate involves repeating the rinsate collection and sampling procedure in its entirety to provide information on the repeatability of the overall sampling method and efficacy of pre-washing activities and will be collected at a frequency of 1 per 10 primary rinsate samples. A field split involves collection of duplicate sample containers from the same sump or sample collection drum and is collected daily (when field duplicate is not collected) to provide information on sample handling variability. If either the sample (S1) or sample duplicate (S2) result is greater than the rinsate action level (Table 4), BGCAPP will decontaminate the HWMU and repeat sampling.

Non-dedicated sampling equipment will be decontaminated before use, and an equipment blank will be collected daily to confirm decontamination procedures are effective in preventing cross-contamination between sampling events. Outside the sampling area, plastic sheeting will be laid under any work areas to prevent potential spills of rinsate or decontamination water to the surrounding area.

8.2 Wipe Sampling

Wipe sampling will be performed in accordance with American Society of Testing and Materials (ASTM) Methods D6661-01 and D6966-08. Wipe samples will be systematically taken from pre-selected sample locations identified in the individual HWMU Sample Plan. Individual HWMU Sample Plans will be prepared for each area requiring wipe sampling (see Table 5) in accordance with the sampling strategy defined in Section 6.1.2. Specifically, each sample plan will define the contaminated surface area grids, selected sample locations, and required quality samples to provide individual sample maps. Sampling consists of passing a solvent-saturated wipe over the sampling area (100 cm^2) multiple times in a systematic manner to absorb potential contamination on the non-porous surface. The wipe is then placed in a sample container and transferred to the Laboratory for analysis. Sampling will involve quality samples identified in Section 11.1.1 to verify potential background impacts, extraction efficiency, matrix impacts, and sampling reproducibility. Specifically, sampling will include field blanks, field replicates, field duplicates, and matrix samples.

8.3 Instrument Performance Verification

The Closure Sampling Manager will follow an orderly program of positive action to prevent the failure of equipment during sample collection. This preventative maintenance helps to ensure sample collection without delays. Equipment that is scheduled for field use will be cleaned and checked prior to use. Once the equipment has been assembled, it will be checked to reduce problems in the field. An adequate supply of spare parts will be available in the field to minimize any downtime caused by equipment failure.

8.4 Field Health and Safety Procedures

Field operations will be conducted in accordance with 24915-00-2HY-H03-00012, *Accident Prevention Plan*, and supporting plans and procedures. The sampling team will exercise the authority to stop work due to health or safety concerns.

In the event of a stop work or safety incident, the Closure Sampling Manager will contact safety personnel and provide a complete summary of the event. Personnel will support subsequent safety reviews as required.

8.5 Decontamination Procedures

During rinsate sampling activities, equipment will be inspected visually for the presence of contamination or deterioration. Dedicated (i.e., disposable) sampling or sample preparation equipment will be used whenever possible to minimize potential cross contamination. Where dedicated (i.e., disposable) equipment cannot be used, equipment will be decontaminated after obtaining each sample on a constructed decontamination “pad” with demineralized, distilled or deionized water and/or a non-phosphate detergent (e.g., Alconox®) followed by a demineralized, distilled or deionized water rinse. Liquids from the decontamination process will be collected during the fieldwork and will be disposed per Section 8.6. Effective decontamination will be verified through collection of equipment rinsate blanks daily during sampling (see Section 11.1.1).

8.6 Investigated Derived Waste

The primary liquid wastes/residuals from sampling are anticipated to include wash-water, excess rinsate, and decontamination water. Solid wastes will include disposable sampling equipment, disposable gloves and booties, and plastic sheeting or bags. Wastes will be accumulated on site in appropriate containers and properly labeled. Consistent with 24915-OPS-5PR-00-00023, *Hazardous Waste Management and Hazardous Material Reporting Procedure*, the Field Sampling Team, as the waste generator, is responsible for proper management of waste generated until the waste is turned over to Waste Management for proper storage and disposal.

Prior to sampling, the Field Sampling Team will contact Waste Management personnel to obtain appropriate waste collection containers and to define appropriate labeling and turn-in procedures for each waste stream. Prior to use, the Field Sampling Team will visually inspect containers (including lids) to ensure containers have maintained their integrity and will discard any containers that are considered unacceptable. The Field Sampling Team will mix the liquid waste streams (i.e., wash-water, excess rinsate, and decontamination water) to minimize container usage. This activity will not be considered dilution.

The IDW will be characterized in accordance with the WAP for disposition in accordance with project plans and procedures.

8.7 Field Documentation

This section discusses field documentation but excludes sample documentation which is discussed in Section 10.0. Field documentation will be completed using waterproof ink. If an error is made on any field document, a correction will be made by drawing a single line through the error and entering the correct information. Corrections must be initialed and dated. Should a field document become damaged, lost, or destroyed, the disposition of the document must be recorded in the project files. Field documents that are voided must not be discarded; they must be maintained in the project files for accountability.

8.7.1 Field Logs

Field logs will be maintained by the field sampling team to document sampling activities. Field logs will be used to record the activities of the sampling team to be able to reconstruct any given sampling event and to record field observations and quantitative information associated with each physical sample taken. Field logs may be paper or electronic, may be contained within a bound field logbook, or consist of completed forms but will contain the information specified here.

Field logs will provide a record of the sampling team's activities. Specifically, the field logs will be signed and dated by sampling team members and will contain the following:

- An account of the sampling team's activities during sampling, including times and locations of specific events, and descriptions of any general problems encountered along with the corresponding resolution, as applicable.
- Information about each physical sample taken to include:
    - Sample identification (ID) number;
    - Relevant field observations, including problems encountered in collecting the sample or evidence of contamination of the sample; and
    - A description of deviations from established sampling procedures and justification for deviation.

These logs will constitute official records (Section 14.0) and will be submitted as part of the final report.

8.7.2 Photographs

BGAD prohibits non-depot employees from using photographic equipment on the depot without prior explicit approval (i.e., a camera pass). As determined appropriate or necessary, BPBGT will request a member of the sampling team to have a camera pass so that he or she may use photographic equipment. If permission is granted and as required to support appropriate reporting, the sampling team will take photographs of sampling activities and submit photographs for Operational Security (OPSEC) review and approval. Date, time, and content of any photographs taken will be recorded in field logs. If OPSEC approval is obtained, photographs will be included as part of the final report.

9.0 ANALYTICAL TASKS

This section describes the analytical procedures to be used to analyze the samples collected during CVS. Section 9.1 defines the analytical methods to be used. The QA procedures will follow the basic guidelines given in the methods (see Section 11.0). Should a failure in the analytical system occur, the laboratory will notify the Closure Sampling Manager immediately. Section 9.2 describes requirements for instrument performance verification.

9.1 Analytical Methods

Clean closure will be demonstrated by analysis of COPCs identified based on the wastes stored in each HWMU (Table 5). Chemicals of Potential Concern for the site are defined in Table 4 by analyte class. Analyses will be performed using validated methods for each constituent. For common environmental contaminants, standard methods defined in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (U.S. EPA SW-846, Third Edition, and its first, second, third, and fourth updates) will be used. For agent degradation products, validated methods developed by Battelle laboratories will be used. Table 8 defines the analytical methods to be used for each analyte class. The following paragraphs provide additional information on each method.

9.1.1 Agent and Agent Degradation Products

Battelle method BGCAPP BCO-700, *The Determination of Chemical Warfare Agents (CWA) and Agent Degradation Products (ADP) in Water Matrix by LC-MS-MS*, will be used for analysis of ADPs in rinsate samples. For the water samples, following filtration, the filtrate is analyzed by Liquid Chromatography-quadrupole Mass Spectrometry (LC-MS/MS). Quantitative results are determined by comparing peak areas to a series of calibration standards. Labelled surrogates of target compounds may be used to quantify using the “stable isotope dilution method” to address matrix effects and facilitate chromatographic interpretation.

9.1.2 Volatile Organic Compounds

Method 8260 is used for analysis of volatile organic compounds (VOC). For aqueous samples, an inert gas is bubbled through a portion of the aqueous sample at ambient temperature, and the volatile components are effectively transferred from the aqueous phase to the vapor phase (Method 5030). Just as with the fill samples, the vapor is swept through a sorbent trap where the purgeable organics are trapped. The trap is backflushed and heated to desorb the purgeable organics onto a GC equipped with a capillary column, where they are separated and then detected with a mass spectrometer.

9.1.3 Semivolatile Organic Compounds

Semivolatile organic compounds (SVOC) (also known as base/neutral and acid preserved samples) in water samples are analyzed using Method SW-8270. This technique determines quantitatively the concentration of a number of SVOCs. Samples are extracted by a method 3500 series extraction method designated by Method 8270. Samples are preserved and both base/neutral and acid-preserved samples are then concentrated through evaporation. Compounds of interest are separated and quantified using a capillary column GC/mass spectrometer.

9.1.4 Explosives

Method SW-8330 is intended for the trace analysis of explosive residues in and water samples by a high-performance liquid chromatograph (HPLC) using an ultraviolet (UV) detector. Water samples are extracted by a salting-out extraction procedure with acetonitrile and sodium chloride. Next, the extract is concentrated and diluted 1:1 with reagent grade water. An aliquot is separated on a C-18 reverse phase column, determined at 254 nm, and confirmed on a cyano (CN) reverse-phase column.

9.1.5 Metals

Samples are analyzed for trace elements or metals using method 6010 for water samples. Prior to analysis, samples must be solubilized or digested (Method 3050). Following digestion, the trace elements are determined simultaneously or sequentially using inductively coupled plasma-atomic emission spectrometry (ICP-AES).

Mercury analysis may be performed by Method 6010 or by Methods SW-7470 as determined by method performance relative to action levels. Method SW-7470 is a cold-vapor atomic absorption technique whereby the mercury is reduced to the elemental state and aerated from solution in a closed system. The mercury vapor passes through a cell positioned in the light path of an atomic absorption spectrophotometer. Absorbance is measured as a function of mercury concentration.

9.2 Instrument Performance Verification

The subcontractor laboratories will maintain their instrumentation in accordance with the instrument manufacturer’s specifications and appropriate methods. In addition, the laboratories will maintain a stock of replacement parts to minimize downtime resulting from foreseeable breakage or typical consumption.

10.0 SAMPLE HANDLING AND CUSTODY

Field samples are collected by procedures identified in Section 8.0 and managed in accordance with requirements in this section to ensure the authenticity of the information generated and facilitate the interpretation of the sampling and analysis results. Sample documentation will provide the means to individually identify, track, and monitor each sample from the point of collection through final data reporting. Samples will be preserved as necessary and packaged for shipment to either the off-site Battelle laboratory for ADP analysis or to the commercial laboratory for other environmental analyses per procedures described in Section 9.0. Section 10.1 describes the sample containers, required preservation techniques and the specified holding times for each analyte class. Both laboratories will hold samples in accordance with their SOP to maintain preservation and the integrity of the samples. Section 10.2 describes the sample number system to be used. Section 10.3 describes minimum sample labeling requirements. Section 10.4 describes the chain of custody process to be used. Section 10.5 describes packaging and shipping requirements to transfer samples to the laboratories.

10.1 Sample Containers, Holding Times, and Preservation

Table 14 presents sample container, holding time, and preservation requirements for the listed analytical parameters based on U.S. EPA SW-846 requirements for water. New, pre-cleaned sample containers supplied by the laboratory will be used. Where required, preservatives will be pre-added to containers by the laboratory. Certifications received with containers will be maintained in the project record.

10.2 Sample Numbering System

Sample ID numbers will be assigned to each physical sample collected in accordance with 24915-00-9SO-00-00005, *Sample Management*. The sample ID will be unique to distinguish the sample from other samples and be traceable throughout the process. If the Laboratory Information Management System is no longer available to automatically generate sample numbers, the same general process will be applied for sample numbering:

A sample ID number is assigned using the format:

YYMMDDPXX

where YY is the year, MM is the month, and DD is the day, P is the location from where the sample is generated (C for SDC 1200), and XX is the sequential number of samples for that date and location.

10.3 Sample Labels

Each sample container will have a sample label affixed to the outside of the container in an obvious location. Information will be recorded on the label with water-resistant ink. The sample label will specify the following:

- Sample identification number
- Date and time of sample
- Preservation used
- Analytical methods

- Sampling location
- Sampler's initials

10.4 Chain of Custody

Each sample container will be logged using a chain-of-custody (COC) form (24915-TEMPLATE-01191, *Chain of Custody Record* or LIMS-generated form BG-00-9SO-00-00004.01, *BGCAPP Laboratory Sampling Form*) at the time of sample collection. The COC form will be signed by the individual responsible for custody of the sample containers and will accompany the samples to the laboratory. Information to be recorded on the COC form shall include the following:

- Sample matrix
- Sample collector's name
- Dates/times of sample collection
- Sample identification numbers
- Number and type of containers for each sample aliquot
- Type of preservation
- Analysis method
- Special handling instructions
- Name, date, time, and signature of each individual releasing custody of samples

The laboratory will designate a sample custodian. This individual is responsible for inspecting and verifying the correctness of the COC records upon sample receipt. The sample custodian will accept the samples by signing the COC form and noting the condition of the samples, to include temperature for samples requiring preservation, and the condition of the custody seals in writing on the COC or other receipt form.

Samples received by the laboratory will be entered into a sample management system, which must include the following:

- Laboratory sample number
- Field sample designation
- Analytical batch numbers
- List of analyses requested for each sample container

Immediately after receipt, the samples will be stored in a secure storage area. The analytical laboratory will document the chronology of sample handling during analysis. This record will include the following:

- Copy of the incoming COC
- Copy of laboratory COC, when created for transfer of samples to an approved lower-tier subcontracted laboratory
- Instrument results
- Records identifying instruments or equipment used for sample analysis with calibration/inspection indicated
- Sample preparation blank analysis
- Duplicate sample analysis and associated precision

- Percent recoveries where appropriate
- Name or identifier of person(s) performing the analyses
- Out-of-control events and corrective action reports
- Records and results of QA audits

10.5 Sample Packaging and Shipping Requirements

Immediately after samples are collected, they will be labeled and bagged (as required). The samples will be packed in appropriate coolers with shock-absorbent materials, such as bubble wrap, to prevent movement or breakage of the sample containers during transport. The cooler will be filled with ice in order to meet the < 7°C preservative requirement.

The COC will accompany the samples and may be placed in a zip-lock bag and taped to the inside of each cooler (for commercial shipment). The cooler will be banded with packaging tape, and custody seals will be placed along the cooler lid in order to prevent or indicate tampering. The coolers will be transferred to the appropriate laboratory by courier or by an overnight delivery service such as FedEx®. If an overnight delivery service is used, the package must be scheduled for priority overnight service so that the temperature preservation and sample hold time requirements are met.

11.0 QUALITY CONTROL REQUIREMENTS

Quality assurance can be described as an integrated system of activities in the area of quality planning, assessment, and improvement to provide the project with measurable assurance that established standards of quality are met. Quality control checks, including both field and laboratory, are the specific operational techniques and activities used to fulfill the QA requirements. Field QC is accomplished through the use of field QC samples, field measurements checks, field data integrity checks, and field audits. Laboratory QC is addressed through the analysis of laboratory QC samples, documented internal and external laboratory QC practices, and laboratory audits. Quality control samples are discussed in Section 11.1. Quality control audits and surveillances are discussed in Section 11.2. Controlled procedures for procurement of items and services are discussed in Section 11.3.

11.1 Quality Control Samples

Quality samples are collected to provide a measure of sample and analysis error impacting results. Both field (Section 11.1.1) and laboratory (Section 11.1.2) quality control samples are collected and analyzed. The following sections describe the samples to be collected and minimum required frequency for collection. The minimum QC sample requirements are presented in Table 9.

11.1.1 Field Quality Control Samples

Field QC is accomplished through the use of field QC samples and field measurements checks. Five types of field QC samples will be used in this project: trip blanks (VOCs only), field duplicates, field replicates, field blanks, and equipment blanks. Definitions of each type of QC sample are below. Analytical results for these samples will become the quantitative focus of the field activities.

Trip blanks are used to verify contamination has not occurred during sampling and shipping due to environmental conditions. They consist of a series of cleaned sample containers filled with analyte-free water and pre-certified by analysis at the laboratory as clean. Trip blanks are prepared in sample containers identical to those used in field investigation. Trip blanks will be prepared for each sample cooler containing samples requiring VOC analysis. Trip blanks will be analyzed for VOCs only. Once trip blanks are submitted for analysis, they are subjected to the same holding times as environmental samples.

Field duplicates are used to evaluate sampling quality and to check the precision and accuracy of the sampling technique. Field duplicate samples are collected in a manner identical to that of routine samples and are analyzed for the same parameters. A rinsate field duplicate involves repeating the rinsate collection and sampling procedure in its entirety to provide information on the repeatability of the overall sampling method and efficacy of pre-washing activities (see Section 8.1). A field duplicate for wipe samples will be collected at a position immediately adjacent to the primary sample location. A field duplicate will be collected at a frequency of 1 per 10 primary samples. Field duplicates will be blind samples (i.e., identified by sample ID only and not location) to ensure unbiased analysis.

Field replicate samples are collected for both rinsate and wipe samples but provide very different quality information based on the sampling methodology. For rinsate sampling, a field replicate corresponds to a field split and involves collection of duplicate sample containers from the same sump or sample collection drum to provide information on sample handling variability. A rinsate field replicate is collected daily during sampling (when a field duplicate is not collected, see Section 8.1). For wipe sampling, a field replicate corresponds to a repeat wipe of the original sample location to assess extraction efficiency from the surface. A wipe sample field replicate is collected at a frequency of 1 per 10 primary samples.

Field blanks are used to assess potential field contamination. For rinsate sampling, field blanks verify that the water used for rinsate sampling and equipment decontamination is not contaminated. Rinsate sampling field blanks correspond to source water collected and transferred to a sample container and handled in the same manner as other samples. Field blanks will be collected for each unique source water used during sampling. For wipe sampling, field blanks verify that field conditions (i.e., background wipe concentrations or potential air concentrations) do not contribute to results. Wipe sampling field blanks involves taking a prepared sample container to the field, removing the cap from container for the estimated time of normal wipe, closing the container, and submitting the sample for analysis. A wipe sampling field blank is collected for each unique sampling event.

Equipment blanks are used to verify that rinsate samples were not contaminated by the sampling equipment. They will be prepared by passing source water through/over decontaminated, non-dedicated sampling equipment. The water is collected and transferred to a sample container and handled in the same manner as other samples. Equipment blanks will be collected once per day when non-dedicated sampling equipment is used.

11.1.2 Laboratory Quality Control Samples

Three types of laboratory QC samples will be used in this project: laboratory blank samples, MS/MSD samples, and laboratory control samples. Definitions of each type of laboratory QC sample are listed below. Analytical results for these samples will become the quantitative focus of laboratory data verification and validation activities. Additional method-specific quality samples may be used (instrument blanks, calibration verification standards, laboratory duplicates) as documented in individual laboratory SOPs and will be assessed in data verification and validation as applicable for each method.

Laboratory blank samples are designed to detect contamination of routine samples that occurs in the laboratory. Laboratory blanks verify that method interference caused by contaminants in solvents, reagents, glassware, and other sample processing hardware are known and minimized. Laboratory blanks are deionized water for water samples. A minimum of one laboratory blank will be analyzed each day that routine samples are analyzed. The concentration of the target compounds in the laboratory blank sample must be less than or equal to the reporting limit. If the blank is not under the specified limit, the source contamination is to be identified and corrective actions taken.

MS and MSD samples are designed to check the precision and accuracy of the analytical methods in the specific sample matrix through the analysis of a normal sample with a known amount of analyte added. Samples to be used for MS and MSD samples will be collected in the field by trebling the normal volume collected for a primary sample. During wipe sampling, the samples for matrix spike analysis will be collected from locations immediately adjacent to the primary sample. In the lab, two portions of the sample are spiked with a standard solution. MS and MSD samples are to be analyzed for the same parameters as the routine samples, and analytical results are to be compared to evaluate the precision and accuracy of the analytical method and effects of the sample matrix. The MS/MSD samples will be collected at a minimum of one each per 20 routine samples for each sample matrix.

Laboratory control samples include blank spikes and blank spike duplicates. Blank spike samples are designed to check the accuracy of the analytical method in the absence of potential matrix interference by measuring a known concentration of an analyte in the blank spike samples. Blank spike duplicate samples are designed to check the accuracy and precision of the analytical method by measuring a known concentration of an analyte in the blank spike duplicate sample. Blank spike and blank spike duplicate samples are prepared by the laboratory using clean laboratory matrices spiked with the same spiking compounds used for matrix spikes.

11.2 Quality Control Surveillance

The Closure Sampling Manager is responsible for ensuring field data integrity checks are performed at a frequency necessary to identify and correct deficiencies. Such field integrity checks will include the following:

- Verification the required samples and quality samples have been collected, documented, and packaged appropriately
- Verification field logs and chain of custody forms are completed in accordance with this plan

Site Quality or Environmental personnel may perform audits and surveillances during sample execution to confirm field data integrity. During field operations, these individuals will inspect sample collection techniques, field logs, sample handling, and QC sample document control to see that established protocols are being followed. Any deviations from the procedures of this plan will be documented. Adverse and noncompliant conditions will be addressed in accordance with 24915-00-GPP-GAM-00008, *Condition Reporting* and 24915-00-9PR-00-00003, *Laboratory Quality Assurance/Quality Control Nonconformance*, as applicable.

Laboratory QC is performed by the respective laboratory. Quality assurance is a function of established laboratory QC procedures using established laboratory QC practices and project audits. The laboratory will provide an internal Laboratory Quality Assurance Plan (LQAP) and SOPs which will be reviewed to ensure data quality requirements satisfy project expectations. The LQAP addresses laboratory QA policies and procedures. Laboratory audits will be conducted internally by laboratory QA staff and by BGCAPP Laboratory Quality (see Section 11.3).

11.3 Corrective Actions and Assessment

When deviations from the CVQAPP are noted or whenever project personnel identify field sampling or analytical problems that could potentially affect data quality or usability, a non-conformance report with be generated and submitted to the Closure Manager. If the Closure Manager determines the non-conformance represents a significant deviation from the CVQAPP, corrective action and reporting will follow the applicable procedure.

The need for corrective action will occur when a circumstance arises that adversely affects data quality. In most instances, personnel conducting field work and laboratory analysis are in the best position to recognize problems that will affect data quality. Awareness on their part can detect instrument changes, drifts, or malfunctions that would then be corrected, thus preventing a major system breakdown. Therefore, field sampling and laboratory analysis personnel have the prime responsibility for recognizing the need for a nonconformance report. However, the need for corrective action may also be identified by various oversight personnel during and following sampling in accordance with Sections 11.2 and 13.1. Personnel identifying or originating such a finding will document each nonconformance. For this purpose, a variance log, a testing procedure record, a notice of equipment calibration failure, results of laboratory analysis QC tests, an audit report, an internal memorandum, or a letter will be used, as appropriate. It will be the responsibility of the specific organization responsible for the deficiency to generate the non-conformance report, transmit the report to the Closure Sampling Manager, and implement corrective actions with associated documentation.

Corrective action documentation will be provided to the Closure Sampling Manager and maintained in a secure site repository (R-drive) accessible by project personnel until it is incorporated into the final report (Section 14.3) that will be uploaded into the site document repository in accordance with established project procedures.

11.4 Procurement of Items and Services

Procurement of materials and services for execution of CVS will comply with 24915-00-9PL-00-00002, *Laboratory Quality Control Plan*. Specifically, the field sampling team will use a procurement system for the acquisition of supplies and services and procurement activities that meets the requirements of the Federal Acquisitions Regulation (FAR). Subcontractors and independent organizations that will supply the sampling team with materials or services will be evaluated to ensure they are operating under a quality system.

To ensure specified requirements are being met prior to their release, designated personnel will review purchasing documents for supplies that directly affect quality. Personnel will check purchasing documents to ensure the following items are clearly identified:

- The title or other positive identification and applicable issue of specifications, process requirements, inspection requirements, and other relevant technical data
- The type, style, grade, or other precise identification

Where outside services are used to assist sampling (e.g., the commercial laboratory), the Closure Sampling Manager, with assistance from the BGCAPP Laboratory Quality Department, will ensure the service organization complies with the requirements of the LQCP, and applicable environmental regulations. To ensure requirements are enforced, contracts/purchase orders will identify the QC requirements and will satisfy the procurement and validation requirements.

For evaluation of laboratory services, laboratory practices will be compared to the LQAP for any significant variances. If significant variances are found during an audit, the laboratory coordinator will be requested to submit a response in writing. Additional audits will be conducted if significant variances are found.

12.0 DATA MANAGEMENT AND SOFTWARE CONTROL

Execution of sampling will generate field and laboratory data and documentation referenced in Sections 8.0, 9.0, and 10.0. This section describes the data management process that will allow data to be traced from generation to final use or storage. Handling of field documentation is discussed in Section 12.1. Each laboratory will have established data management procedures which will support data tracking and reporting. Key aspects of the laboratory data management process are described in Section 12.2. Discussions on document control and reporting are provided in Section 14.0.

12.1 Field Data Management

Field data relevant to interpretation of the sampling and analysis results and to assessment of potential contamination problems include field logs (Section 8.7.1) and sample documentation (Section 10.4). Project team members will maintain original hardcopies in a secure location at a designated site location for retention in accordance with 24915-000-2KP-A03-00012, *Records Retention and Turnover*. Project team members may scan field documents. Scanned files will be maintained in a secure site repository (R-drive) accessible by project personnel until they are incorporated into reports (Section 14.3) that will be uploaded into the site document repository in accordance with established project procedures. Should a field document become damaged, lost, or destroyed, the disposition of the document must be recorded in the project files. Field documents that are voided must not be discarded; they must be maintained in the project files for accountability.

12.2 Laboratory Data Management

Each laboratory shall have established procedures for data collection, evaluations, calculations, and reporting to ensure maintenance of COC and defensibility of reported results. Prior to execution of sampling, laboratory procedures will be reviewed and assessed in accordance with Section 11.0 to ensure procedures meet the requirements of this CVQAPP. Data will be submitted to the Closure Sampling Manager as both a complete Contract Laboratory Program (CLP) Level IV data package and an electronic data deliverable (EDD). Requirements for each are described in the following paragraphs.

12.2.1 Data Package Format

The data package format shall conform to U.S. EPA CLP (CERCLA analysis) forms (or appropriate equivalent for non-CLP methods) and consist of the case narrative followed in sequence by the sample results, QA/QC summary forms, and raw data. Data packages shall provide the full data validation package. Deliverable requirements for methods not specified should emulate those for the most closely related analysis type. Data forms for non-CLP methods (e.g., SW-846) should be equivalent to the specified EPA forms for CLP deliverables.

- At a minimum, reporting will include the following:
  - Configuration-controlled analytical method employed to include type of instrumentation used if not specified by the method
  - Identification number (or name) of instrument used in analysis with date of most recent calibration
  - Date and time of sample preparation for each preparatory procedure
  - Date and time of analysis for each analyte or grouping of analyses
  - Copy of completed COC with cross-reference to laboratory sample identification numbers as assigned
  - Results of sample-specific QC data with associated samples from the analytical batch (e.g., matrix spikes, duplicates, preparation blanks, laboratory control samples (as appropriate), and surrogate recoveries)
- QC data and associated sample data will be qualified using "flags" defined by the laboratory and consistent with U.S. EPA CLP statements of work (SOWs) for organics and inorganics
- Data will, in each case, be reported as a numerical value or an indication of "not detected" at the appropriate detection limit. If presence of a substance is detectable but cannot be quantified, it will be reported as estimated and the quantification limit reported
- In cases, where sample results exceed calibration ranges and a dilution is required, both the original analysis and the dilution analysis will be reported

Data shall be available for review in raw form. Measured values will be reported in units consistent with the methodology used. Original output (e.g., chromatograms, instrument printouts) will be submitted as part of a data package.

12.2.2 Electronic Data Deliverable Format

The laboratory will provide an electronic data deliverable which provides a summary of sample results (to include quality samples) in a Comma Separated Values (CSV) format with the following minimum column headers: Analysis Lot ID, Sample Number, Client ID, Date Collected, Date Received, Date Prepared, Date Analyzed, Method, Analyte, CAS #, Result, Spiked, Footnote/Qualifier, Units, Reporting Limit, Method Detection Limit, QC Lot, QC Run, Dilution.

13.0 DATA VERIFICATION, VALIDATION, AND USEABILITY

Data verification is the process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements. Data validation is an analyte- and sample-specific process that extends the evaluation of data beyond method, procedural, or contractual compliance to determine the analytical quality of a specific data set. Each is discussed further in the following sections. Table 15 list the inputs that will be used during data verification and validation.

13.1 Data Verification

Data verification involves the evaluation of performance against the requirements identified in this CVQAPP or referenced documents (e.g., SOPs). Data verification is performed during or immediately following completion of field or laboratory data collection. The goal of data verification is to ensure the reported results reflect what was done. Data verification is performed by each person involved in the data generation and reporting process (i.e., each person is responsible for verifying their work complies with appropriate work plans or procedures) as well as individuals within the data transfer process (e.g., sample custodian, laboratory project manager) and by responsible project team members (e.g., Closure Sampling Manager, quality personnel).

13.1.1 Field Data Verification

During field operations, the Closure Sampling Manager and assigned project personnel (e.g., Site and/or Laboratory Quality Control personnel, Environmental personnel) will inspect sample collection techniques, field logs, sample handling, and QC sample document control to verify established protocols are followed. Deviations from the requirements of this plan will be documented (see Section 11.0).

13.1.2 Laboratory Data Verification

Laboratory data verification is performed by the respective laboratory as well as by project team members to confirm the required data has been collected and correctly reported. Data verification is conducted against established laboratory procedures using established laboratory QC practices.

13.2 Data Validation

The data generated will be submitted for independent data review and validation. The data validation strategy is 10% Level IV and 90% Level III.

The Level III data validation is performed on the summary (i.e., no raw data) data reports. The Level IV data validation is performed on the summary and raw data packages, which include data required for a full review and assessment of compound selection, integration, interference assessment, and re-quantification (e.g., spectra and chromatograms). Supporting records are also included in this package (e.g., calibration standards, instrument sequence files, and dilution factors). Level IV data validation includes re-quantification of reported QC and field sample values using the raw data files. In addition, instrument performance, calibration methods, and calibration standards are reviewed to ensure that the detection limits and data values are accurate and appropriate. The QC Elements reviewed for each are summarized in Table 16.

13.3 Data Useability Assessment

Using the outputs from data verification and data validation, a data useability assessment will be performed to qualitatively and quantitatively determine if the data are of the right type, quality, and quantity to support the decision that the areas are free of residual contamination and can be clean-closed. The following specific steps will be taken as part of this process:

1. Review the Project's objectives and sampling design to provide context for interpreting the data
2. Perform data reduction (see Section 13.3.1) to summarize the data (e.g., using graphs, tables) and look for patterns or trends
3. Document data useability and conclusions

13.3.1 Data Reduction

Data, to include findings from data verification and validation, will be reduced from the raw format to a formal report using specifically defined intermediate steps. Each step in the reduction process will incorporate methods for identification of erroneous information and transcription errors. Data provided in Electronic Data Deliverables will be used to generate Microsoft Excel® spreadsheets for data evaluation. In addition to a one-over-one review, spot-checks will be performed by quality personnel. Corrective action will be taken when appropriate.

The data will be compiled using Microsoft Excel® or similar software to generate tables, plots, figures and for performing and facilitating calculations required to determine completeness and data distribution.

Specific QC measures will be used to ensure the generation of reliable data from sampling and analysis activities. Sampling data will be reviewed on a daily basis by the Closure Sampling Manager and summarized in tables. Errors or discrepancies will be identified and corrected per procedures defined in Section 11.3. The Closure Sampling Manager has the authority to institute corrective actions in the field. At a minimum, the Closure Sampling Manager and the Closure Manager will be apprised of deviations from standard protocols.

13.3.2 Data Useability and DQO Reconciliation

After considering the potential implications of deviations, corrective actions and results for data quality indicators, the project team will determine if the data can be used as intended and define potential limitations on data use. A data useability assessment will summarize the outputs of the six-step process and provide a final conclusion.

14.0 DOCUMENTATION AND RECORDS

This section describes the process for ensuring project personnel have the most current approved version of the CVQAPP and associated planning documents (Section 14.1) and discusses the records to be generated by this sampling effort, appropriate control procedures (Section 14.2), and reporting requirements (Section 14.3).

14.1 Document Control

The CVQAPP is the guiding document used to develop implementing work orders and sampling protocols to be used by the sampling and analysis team. It will be the responsibility of the Closure Sampling Manager to ensure that implementing work orders and sampling protocols fully comply with the most current version of the CVQAPP prior to execution of work.

The CVQAPP will be updated and maintained in accordance with 24915-00-2KP-A03-50000, *Development, Review, and Control of Documents*.

Deviations required either prior to, during, or following sampling will be documented using 24915-TEMPLATE-01519, *CVQAPP Change/Deviation Form* and must be approved by the Closure Manager. The Closure Manager will submit deviations to the Environmental Manager. All deviations will be submitted to KDEP for information at the time of generation and project approval. If the deviation includes the following, the deviation will be submitted as a Class 1 modification requiring approval prior to implementation:

- Changes to analytes
- Change of project action level
- Analytical capabilities do not support quantification at the project action level
- More than 5% of the sample area cannot be adequately sampled

The Closure Sampling Manager will be responsible for maintaining approved deviations with the CVQAPP for project personnel review and for including deviations within the final report (Section 14.3).

14.2 Records

The following records will be generated as part of this sampling effort:

- CVQAPP Deviation Forms (24915-TEMPLATE-01519, *CVQAPP Change/Deviation Form*)
- Field Logs (Section 8.7)
- Chain of Custody Forms (24915-TEMPLATE-01191, *Chain of Custody Record* or LIMS-generated form BG-00-9SO-00-00004.01, *BGCAPP Laboratory Sampling Form*)
- Sample Analysis Data Packages (Section 12.2)
- Corrective Action Reports (see Section 11.3)
- Data verification and validation summaries (Section 13.0)
- Final Reports (Section 14.3)

Field records will be maintained in accordance with Section 12.1. Field records and laboratory data will be maintained in a secure site repository (R-drive) accessible by project personnel until they are incorporated into the final report that will be uploaded into the site document repository for retention in accordance with 24915-000-2KP-A03-00012, *Records Retention and Turnover*. Original hardcopies of field logs will be maintained in a secure site location (e.g., Work Control Office, Laboratory Quality Control Trailer or Environmental Department) until they are turned over for retention in accordance with 24915-000-2KP-A03-00012.

14.3 Closure Verification Reports

A CVS Report will be prepared for each HWMU and submitted to ACWA and KDEP following project approval. The report will evaluate the CVS results with respect to the project action levels. Each CVS Report will contain:

- A summary of sampling and analytical methods used and any deviations from referenced methods
- Analyses results for field samples and QC samples
- A compilation and evaluation of analytical and QA/QC data, with a summary of problems encountered and the solutions implemented. The report will include complete data packages and a QA/QC evaluation which will include the following: 1) estimates of data precision, accuracy, and completeness, 2) reports of performance and system audits, 3) any quality problems found, and 4) any corrective actions taken

Upon acceptance, the final report is submitted for retention in the site project document control center in accordance with project specific procedures.

15.0 REFERENCES

15.1 BGCAPP Permits, Reports and Technical Memoranda

- 24915-000-2KP-A03-00012, *Records Retention and Turnover*
- 224915-70-GRR-GGEN-00001, *Interim Report on Explosive Destruction Technology (EDT) Site Soil Sampling*
- 24915-000-GRR-GGEN-00007, *Background Soil and Groundwater Report*
- 24915-00-2HY-H03-00012, *Accident Prevention Plan*
- 24915-00-2KP-A03-50000, *Development, Review, and Control of Documents*
- 24915-00-30H-G01-00156, White Paper 180, *Markers for Closure Verification at BGCAPP*.
- 24915-00-9PL-00-00002, *Laboratory Quality Control Plan*
- 24915-00-9PR-00-00003, *Laboratory Quality Assurance/Quality Control Nonconformance*
- 24915-00-9SO-00-00005, *Sample Management*
- 24915-00-G01-GGEN-00012, *Spill Prevention, Control, and Countermeasures (SPCC) Plan*
- 24915-00-G8L-GGG-00052, *Personnel Training Plan*
- 24915-00-G8P-GGG-00002, *Required Reading*
- 24915-00-G8P-GGG-00004, *Training Records Management*
- 24915-00-GPE-GGPT-00394, Waste Analysis Plan
- 24915-00-GPP-GAM-00008, *Condition Reporting*
- 24915-00-GPP-GGEN-00012, *Spill Reporting and Notification*
- 24915-00-GPP-GHX-00421, *Pre-Job Safety Planning*
- 24915-00-G01-GGPT-00007*, Attachment I - Closure Plan*
- 24915-70-G01-GGPT-00001, *Attachment I – SDC 1200 Closure Plan*
- 24915-70-GPE-GGPT-00019, *Final Decision for Class 3 Permit Modification, Additional Storage in the Explosive Destruction Technology (EDT) Enclosure Building (EEB)*

- 24915-70-GPE-GGPT-00021, *Hazardous Waste Management Facility Permit, Static Detonation Chamber 1200 Containers, Tanks, and Miscellaneous Units*
- 24915-CL-5PL-70-00002, *SDC 1200 Unventilated Monitoring Plan* (pending)
- 24915-CL-5PL-70-00003, *SDC 1200 Health-Based Risk Assessment* (pending)
- 24915-GEN-5PL-00-000014, *Main Plant Closure Verification Sampling and Analysis Quality Assurance Project Plan*
- 24915-GEN-5PL-00-00018, *Quality Assurance Project Plan for Closure Verification Groundwater Sampling*
- 24915-GEN-5PL-70-00018, *Explosive Destruction Technology Mustard (H) Contamination History*
- 24915-GEN-5PL-70-00019, *Health-Based Risk Assessment for Explosive Destruction Technology Changeover from Mustard Agent to VX Agent*
- 24915-GEN-5PL-70-00020, *H Projectile to VX Containerized Rocket Warhead Changeover Plan*
- 24915-GEN-5PL-70-00021, *Decontamination Verification Plan for Explosive Destruction Technology Changeover from Mustard Agent to VX Agent*
- 24915-OPS-5PR-00-00023, *Hazardous Waste Management and Hazardous Material Reporting Procedure* (CDRL D012)
- 24915-OPS-5PR-00- 00030, *Waste Shipping*
- 24915-OPS-5PR-00-00040, *Chemical Agent Spill Tracking*
- 24915-OPS-5PR-00-00044, *Event Notification*
- 24915-GEN-5PR-70-00003, *Static Detonation Chamber (SDC) 1200 Environmental Inspection*
- BGCAPP BCO-700[00], *The Determination of Chemical Warfare Agents (CWA) and Agent Degradation Products (ADP) in Water Matrix by LC-MS-MS*

15.2 Supporting Reports

- ACGIH, 7 NOV 2020, *Operations Manual, Threshold Limit Values (TLV®) for Chemical Substances Committee*
- ASTM, 2008, D6966-08, *Standard Practice for Collection of Settled Dust Samples Using Wipe Sampling Methods for Subsequent Determination of Metals*
- ASTM, 2001, D6661-01, *Standard Practice for Field Collection of Organic Compounds from Surfaces Using Wipe Sampling*
- USA., *United States (U.S.) Uniform Federal Policy for Quality Assurance Project Plans*, EPA-505-B-04-900A, DTIC ADA 427785.
- U.S. EPA, 2000, *Guidance for Data Quality Assessment: Practical Methods for Data Analysis*, QA/G-9
- U.S. EPA, 2006, *Data Quality Assessment: A Reviewer's Guide* (QA/G-9R)
- U.S. EPA, November 2023, *Regional Screening Level (RSL) – Generic Tables*, https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables
- U.S. EPA, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846), The SW-846 Compendium | US EPA.

- U.S. EPA. 2006a. *Guidance on Systematic Planning Using the Data Quality Objectives Process.* EPA QA/G-4, EPA/240/B-06/001, U.S. Environmental Protection Agency, Office of Environmental Information, Washington DC.
- U.S. EPA, February 2006, Data Quality Assessment: *Statistical Methods for Practitioners,* EPA QA/G-9S. Washington DC: Office of Environmental Information

15.3 Regulations

- 40 CFR, *Protection of the Environment*
- 401 KAR 39:080, *Hazardous Waste Handlers*

15.4 Templates

- 24915-TEMPLATE-01191, *Chain of Custody Record*
- 24915-TEMPLATE-01519, *CVQAPP Change/Deviation Form*
- BG-00-9SO-00-00004.01, *BGCAPP Laboratory Sampling Form*

Table 1 – Crosswalk with Uniform Federal Policy (UFP)-QAPP Manual Requirements

CVQAPP Outline	UFP-QAPP Required Element
Title Page Approval Page	2.1 Title and Approval Page 2.3 Distribution list and Project Personnel Sign-Off Sheet[a]
Table of Contents	2.2 Document Format and Table of Contents
1.0 Purpose 2.0 Scope 3.0 Definitions	2.5 Problem Definition/Background 2.5.1 Project Planning 2.5.2 Problem Definition, Site History and Background
4.0 Project/Task Organization	2.4 Project Organization
5.0 Problem Definition	2.5 Problem Definition/Background
6.0 Quality Objectives	2.6 Project Quality Objectives and Measurements Performance Criteria 2.7 Secondary Data Evaluation
7.0 Project/Task Description	2.8 Project Overview and Schedule
8.0 Sampling Tasks	3.1 Sampling Tasks 3.1.1 Sampling Process Design and Rationale 3.1.2 Sampling Procedures and Requirements
9.0 Analytical Tasks	3.2 Analytical Tasks
10.0 Sample Handling and Custody	3.3 Sample Collection Documentation, Handling, Tracking, and Custody Procedures
11.0 Quality Control Requirements	3.4 Quality Control Samples 4.1 Assessments and Response Actions 4.2 QA Management Report
12.0 Data Management	3.5 Data Management Tasks
13.0 Data Reduction, Verification, and Validation	5.1 Overview 5.2 Data Review Steps 5.3 Streamlining Data Review
14.0 Documentation and Records	4.3 Final Project Report
21.0 References	Not Applicable

[a] A Distribution List is not provided in this Quality Assurance Project Plan as distribution will be in accordance with BGCAPP policies and procedures.

Figure 1 – Project Organization.

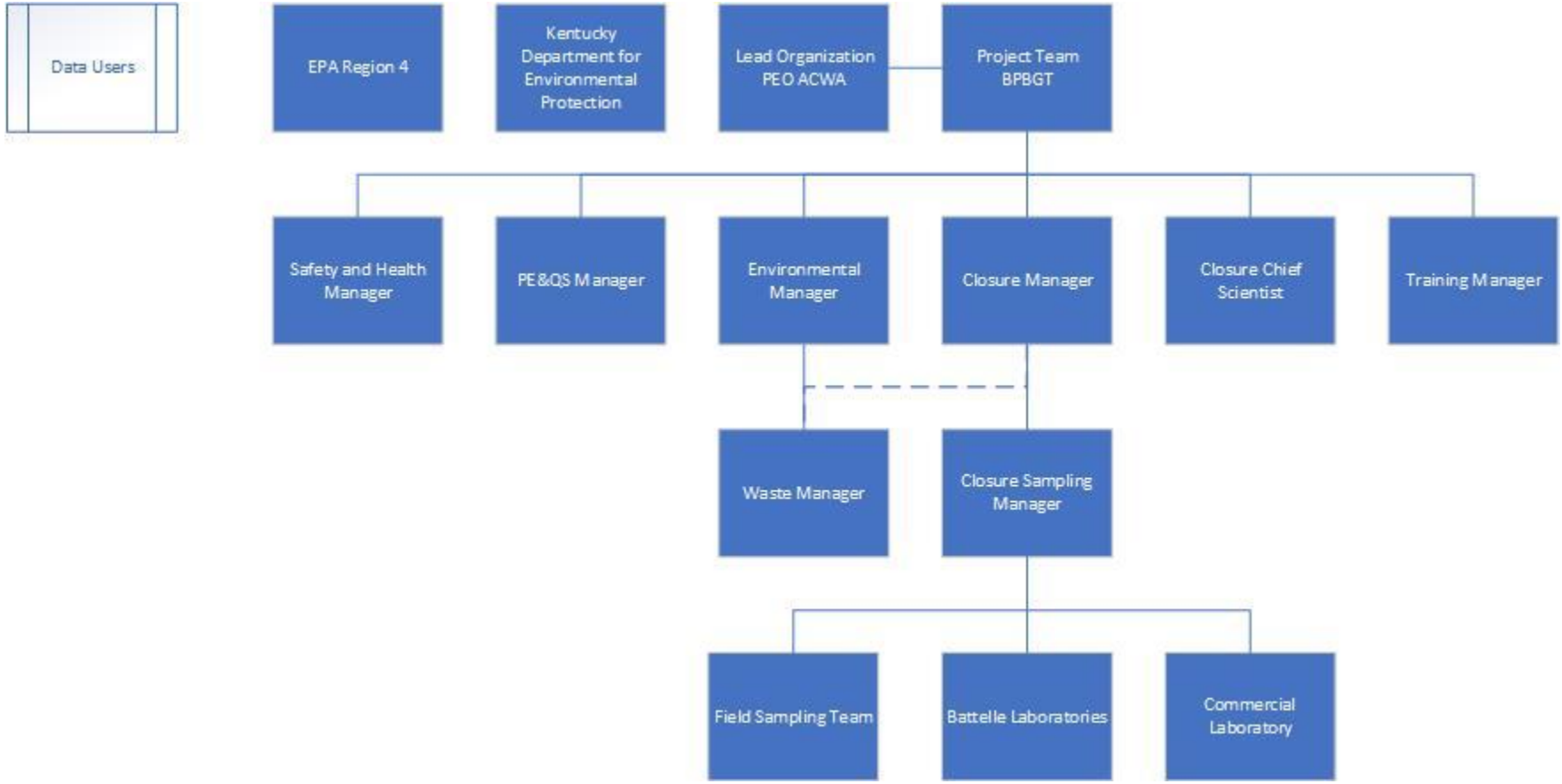


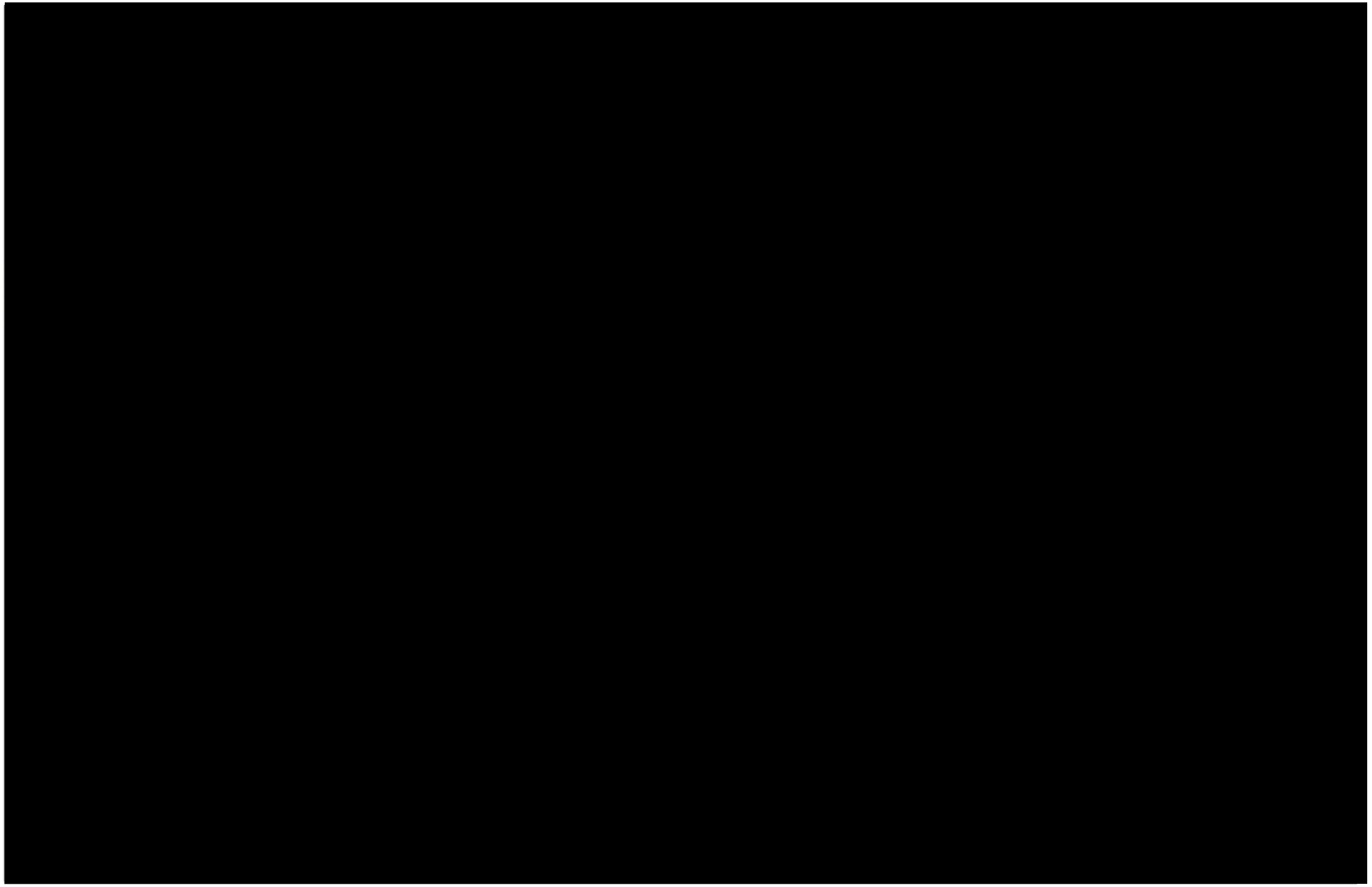
Table 2 – Closure Verification Sampling Communication Pathways (Worksheet #6)

Communication Driver	Responsible	Procedure (e.g., timing, pathway, documentation)
Regulatory Agency Interface	Environmental Manager	The Environmental Manager (or designee) will conduct all interface with regulatory agencies. The Closure Manager will provide the Environmental Manager with revisions to the QAPP, deviations to the QAPP, CVS schedule, and CVS progress reports and final reports for transmittal.
Field Progress Reports	Closure Sampling Manager	The Closure Sampling Manager will provide weekly progress reports to the Closure Manager electronically prior to and following execution of CVS. During CVS, the Closure Sampling Manager will provide daily progress updates.
Stop Work due to Safety or Quality Issues	Closure Sampling Manager	Field personnel will immediately notify the Closure Sampling Manager (phone or in-person) if any activity is deemed unsafe or if sampling cannot be executed in accordance with the QAPP. The Closure Sampling Manager will immediately notify the Closure Manager by phone and ensure the work site is left in an acceptable manner. The Closure Sampling Manager will work with the Closure Manager to develop the plan to allow restart of work. This may include discussions with Health and Safety Personnel or preparation of a deviation to the QAPP. The Closure Manager will relay information to supporting project personnel for notification of stakeholders.
QAPP Changes Prior to Field Work	Closure Manager	The Field Sampling Team, Laboratory, or Project personnel may identify the need for changes to the QAPP prior to execution of work. Such changes will be transmitted electronically to the Closure Sampling Manager. The Closure Sampling Manager will make necessary modifications to the QAPP or develop a deviation, as appropriate. The Closure Manager will ensure the revision/deviation receives appropriate project review and is transmitted to stakeholders.
QAPP Changes During Project Execution	Closure Sampling Manager	Changes identified during CVS will be immediately reported to the Closure Sampling Manager (by phone or in-person) who will determine the extent of impact relative to QAPP requirements. Based on this assessment, the Closure Sampling Manager will either stop work or continue work under a deviation. The Closure Sampling Manager will provide the Closure Manager with the deviation electronically and the Closure Manager will be responsible for ensuring the deviation receives appropriate project review and is transmitted to stakeholders.

Communication Driver	Responsible	Procedure (e.g., timing, pathway, documentation)
Field Corrective Actions	Closure Sampling Manager	In response to self-identified or quality identified errors in the field, the Closure Sampling Manager will be responsible for implementing corrective actions in the field. If the deficiency is significant, the Closure Sampling Manager will be responsible for stopping work and submitting a Condition Report. For lesser deficiencies, the Closure Sampling Manager will document the event and the associated corrective actions in the daily progress report and submit it to the Closure Manager.
Sample Receipt Variances	Laboratory PM	The Laboratory PM is responsible for identifying and reporting within 24 hours of discovery to the Closure Sampling Manager any sample receipt inconsistencies or variances. Such variances include, but are not limited to, the following: damaged custody seal, damaged or broken sample container, inadequate temperature control for samples, missing chain of custody, and incorrect sample identification numbers. The Laboratory PM and Closure Sampling Manager will assess the impact of the variance and determine a path forward. The Closure Sampling Manager will document the variance and impact on data quality to the Closure Manager with the proposed corrective action.
Laboratory Quality Control Variances and Analytical Corrective Actions	Laboratory PM	The Laboratory PM is responsible for reporting to the Closure Sampling Manager within 24 hours of identification of any laboratory quality control variances impacting data quality indicators. For significant deviations, the laboratory quality assurance team will determine the extent of the problem and required corrective actions. The Laboratory PM and Closure Sampling Manager will assess the impact of the variance and determine a path forward. The Closure Sampling Manager will document the variance and impact on data quality to the Closure Manager with the proposed corrective action.
Data Verification and Validation Issues and Corrective Actions	Closure Sampling Manager	The Closure Sampling Manager will coordinate issues identified during data verification and validation. The Closure Sampling Manager will request corrections/revisions to laboratory reports as required and assess the overall impact on project quality. The Closure Sampling Manager will communicate such issues to the Closure Manager.

Figure 2 – Facility Location with Mustard Campaign Configuration.

Figure 3 – Facility Location with VX Campaign Configuration.



EDT = Exposive Destruction Technology; EEB = EDT Enclosure Building; ESB = EDT Support Building; ESM = EDT Service Magazine; MER = Mechanical Equipment Room; OTS = Offgas Treatment System; SA2 = Storage Area 2; THO = Thermal Oxidizer

Figure 4 – Mustard Campaign Process Flow.

Figure 5 – VX Campaign Process Flow.

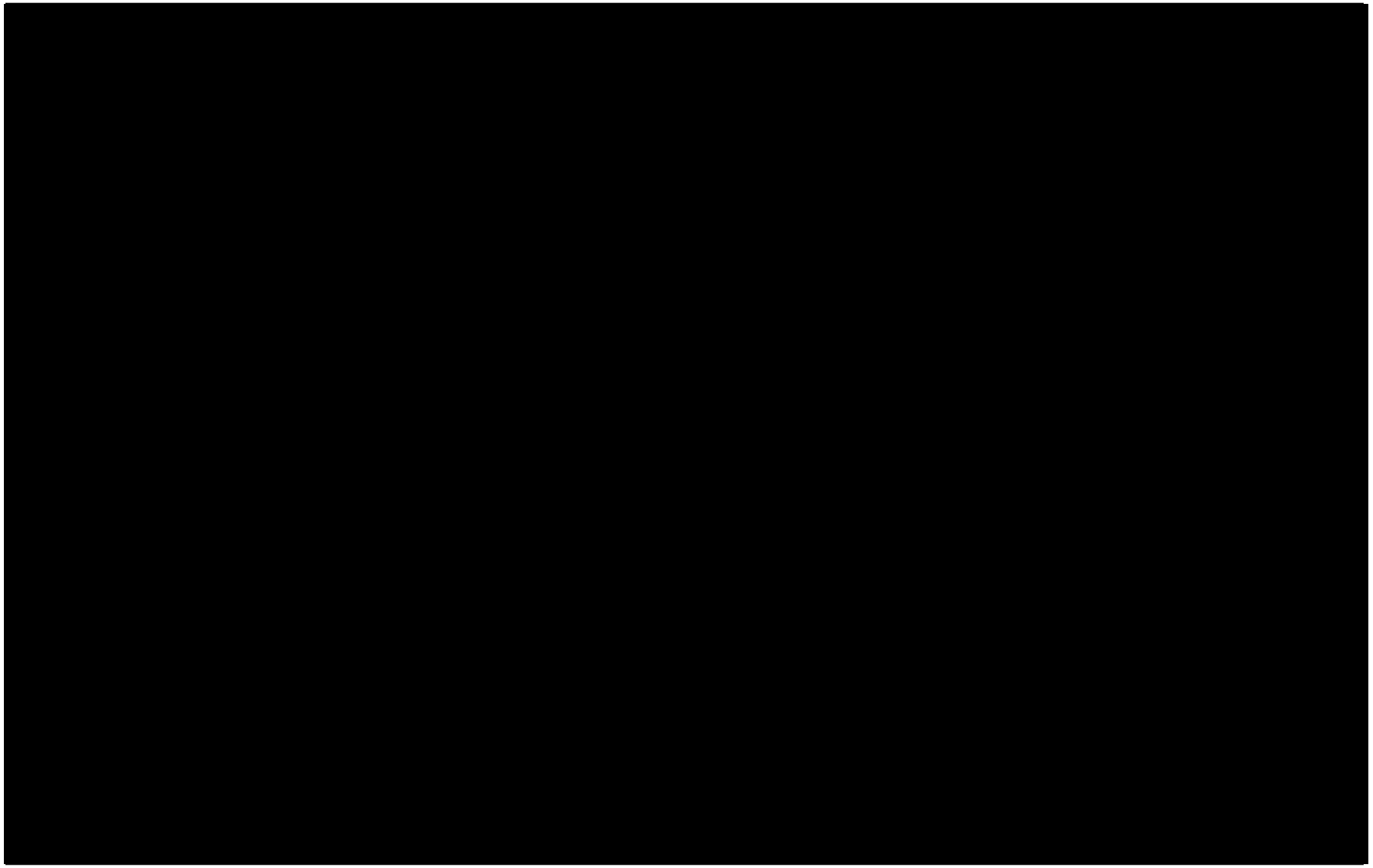
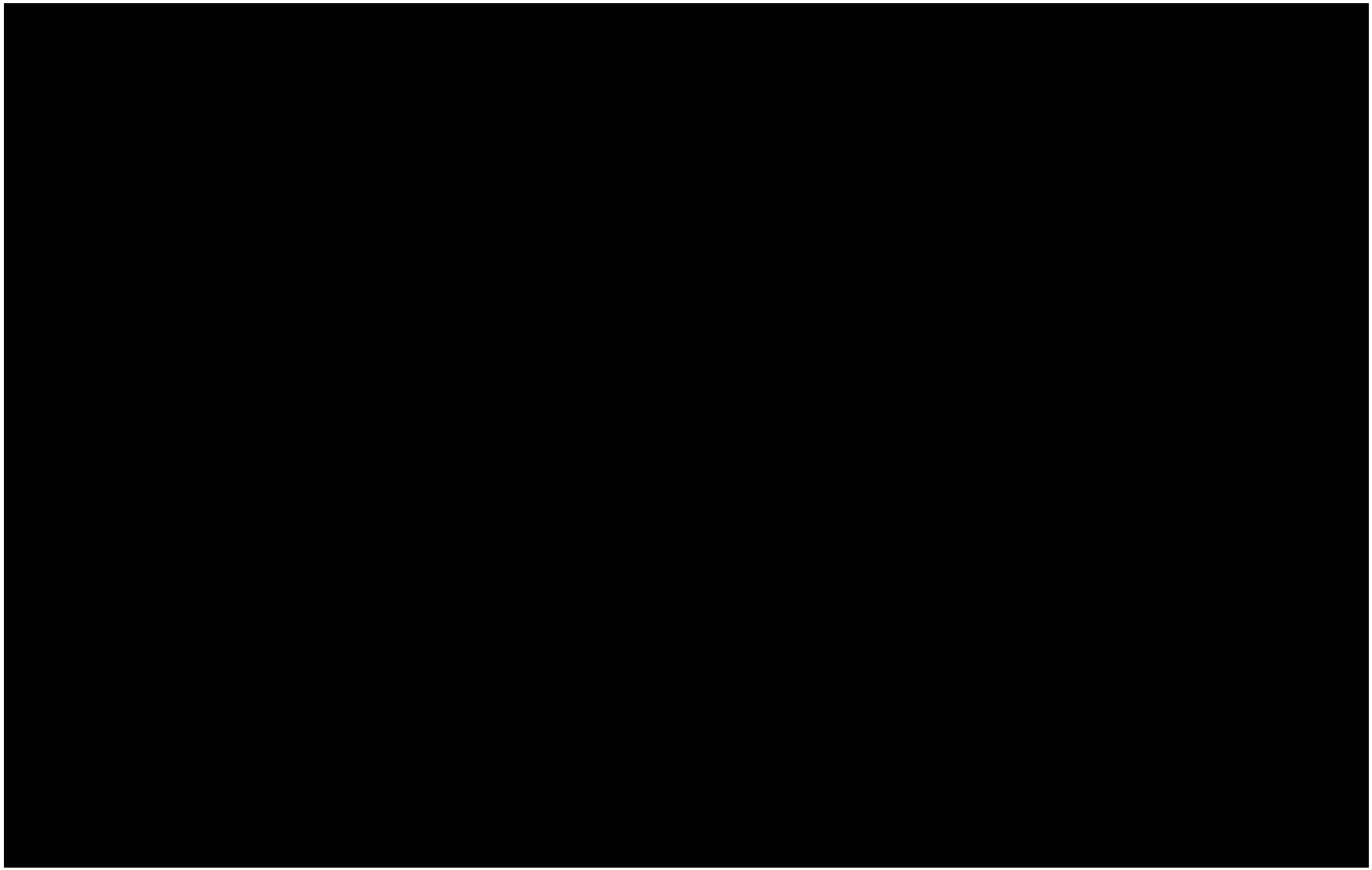


Figure 6 – Hazardous Waste Storage Areas.



Note – OTS Storage Area 2 is outside the area shown here but is shown in Figure 3.

Figure 7 – EEB Layout.

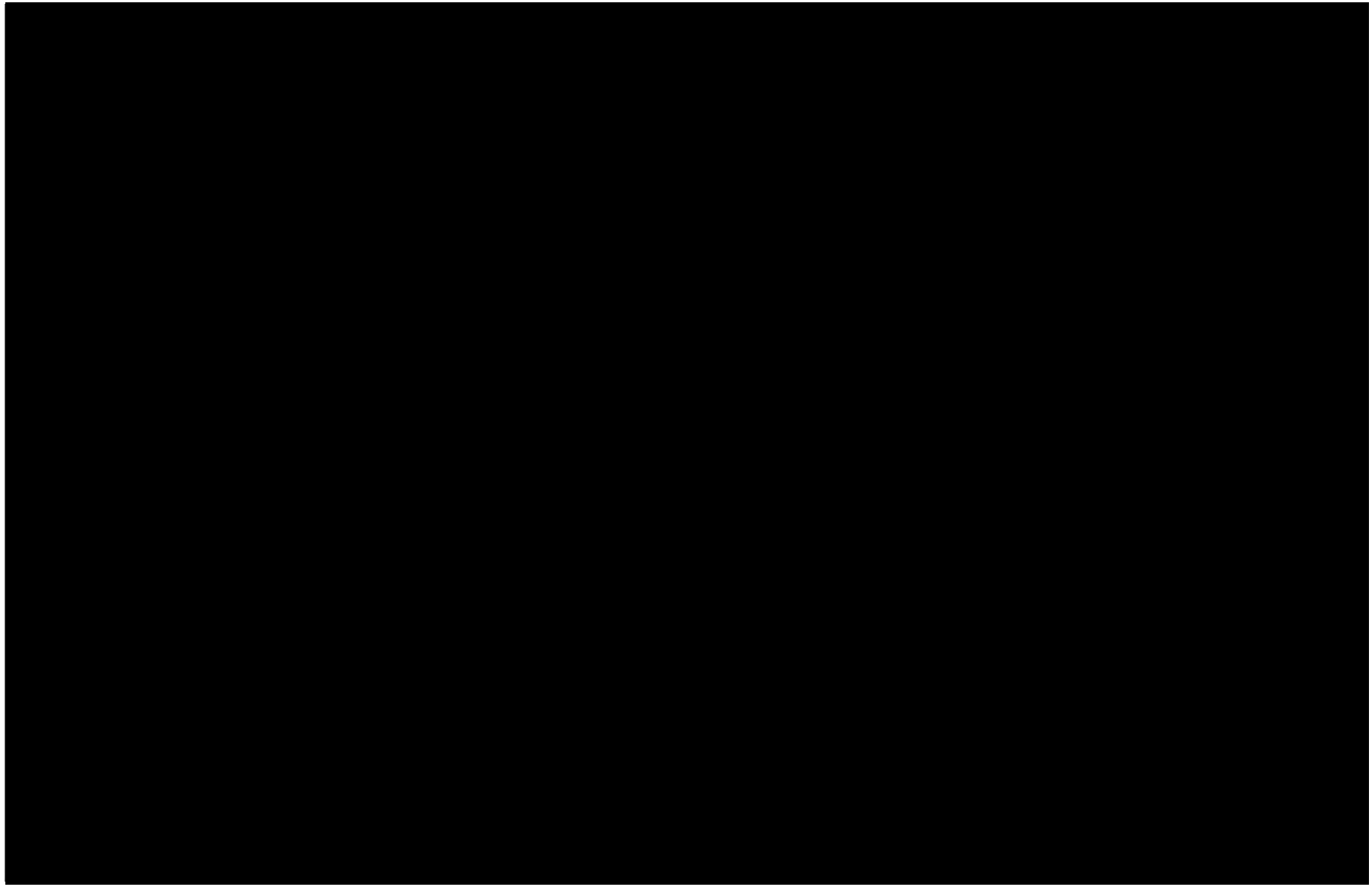


Table 3 – Permitted Container Storage Areas, Tank Systems, and Treatment Units and Associated Waste Codes

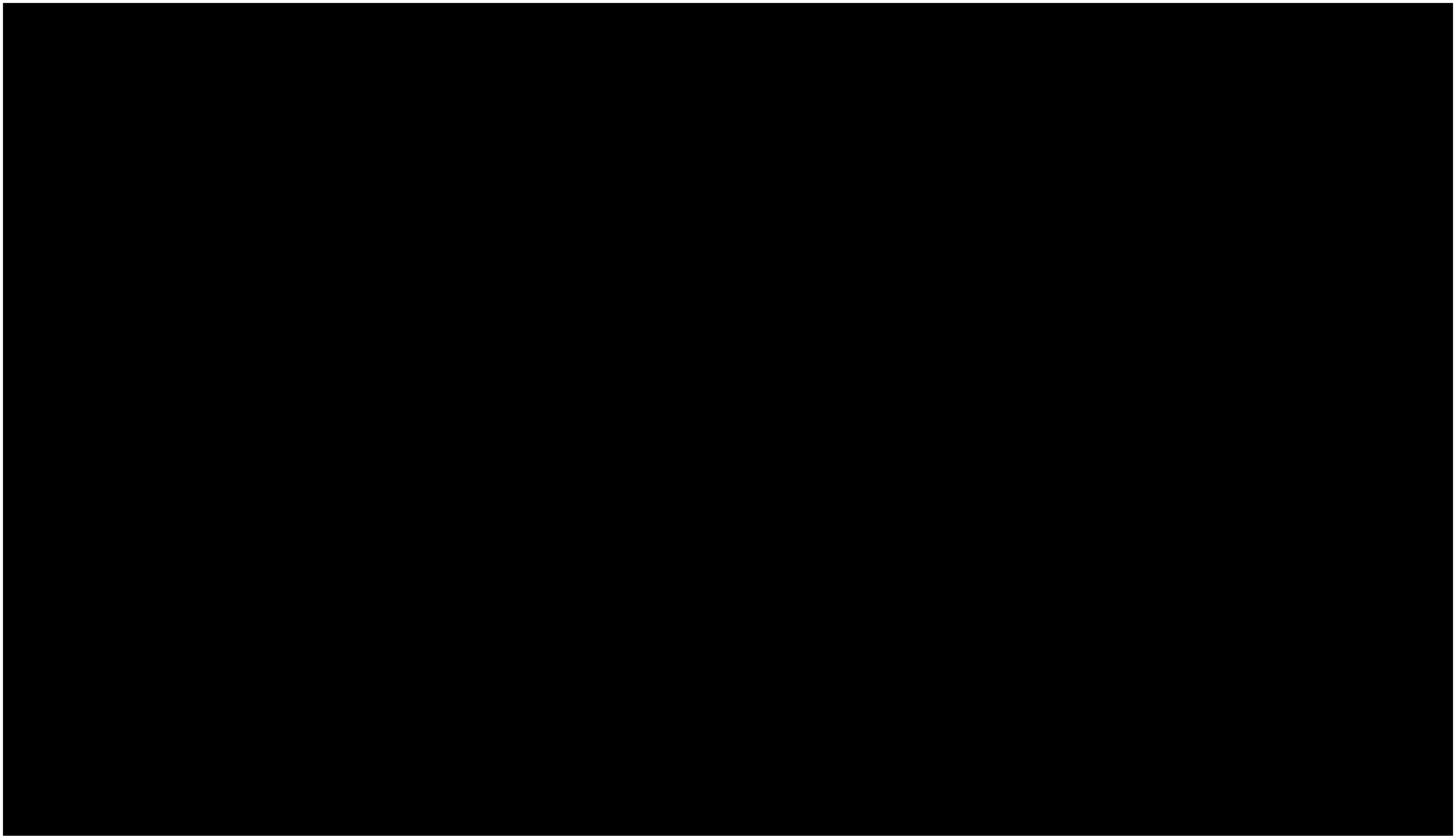


Table 4 – Chemicals of Potential Concern

Chemicals of Potential Concern (COPC)[a]	CAS No.	Project Action Level for Rinsate[b], µg/L	Source
Agent Degradation Products (ADP)			
ethyl methylphosphonic acid (EMPA)[c]	1832-53-7	2.00E+02[c]	USEPA, Nov 2024
methylphosphonic acid (MPA)	993-13-5	1.20E+02	USEPA, Nov 2024
Thiodiglycol (TDG)	111-48-8	1.40E+02	USEPA, Nov 2024
Metals			
arsenic	7440-38-2	1.40E+03	40 CFR 268.45(b)(1)
barium	7440-39-3	1.20E+03	40 CFR 268.45(b)(1)
cadmium	7440-43-9	6.90E+02	40 CFR 268.45(b)(1)
chromium	7440-47-3	2.77E+03	40 CFR 268.45(b)(1)
lead	7439-92-1	6.90E+02	40 CFR 268.45(b)(1)
mercury	7439-97-6	1.50E+02	40 CFR 268.45(b)(1)
selenium	7782-49-2	8.20E+02	40 CFR 268.45(b)(1)
silver	7440-22-4	4.30E+02	40 CFR 268.45(b)(1)
Volatile Organic Compounds (VOC)			
1,1-dichloroethylene	75-35-4	2.50E+01	40 CFR 268.45(b)(1)
1,2-dichloroethane	107-06-2	2.10E+02	40 CFR 268.45(b)(1)
chloroform	67-66-3	4.60E+01	40 CFR 268.45(b)(1)
tetrachloroethylene	127-18-4	5.60E+01	40 CFR 268.45(b)(1)
trichloroethylene	79-01-6	5.40E+01	40 CFR 268.45(b)(1)
Semivolatile Organic Compounds (SVOC)			
1,4-dichlorobenzene	106-46-7	9.00E+01	40 CFR 268.45(b)(1)
2,4-dinitrotoluene	121-14-2	3.20E+02	40 CFR 268.45(b)(1)
pentachlorophenol	87-86-5	8.90E+01	40 CFR 268.45(b)(1)
Explosives			
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	8.00E+00	USEPA, Nov 2024
Trinitrotoluene, 2,4,6	118-96-7	2.50E+00	USEPA, Nov 2024
Tetryl (trinitrophenylmethylnitramine)	479-45-8	3.90E+00	USEPA, Nov 2024

CAS = Chemical Abstract Service; No. = number

References:

1. US EPA Regional Screening Level (RSL) Resident Tapwater Table (TR=1E-06, HQ=0.1), November 2024

[a] The list of COPCs applicable to each HWMU are defined in Table 5.

[b] Action levels are specific to rinsate samples collected as required by the closure process summarized in Figure 8. Action levels for wipe samples are provided in Table 6.

[c] An RSL for EMPA has not been established. Based on compound similarities, the RSL for isopropylmethyl phosphonic acid (IMPA) is applied as the action level for EMPA.

Figure 8 – General Closure Sampling Process.

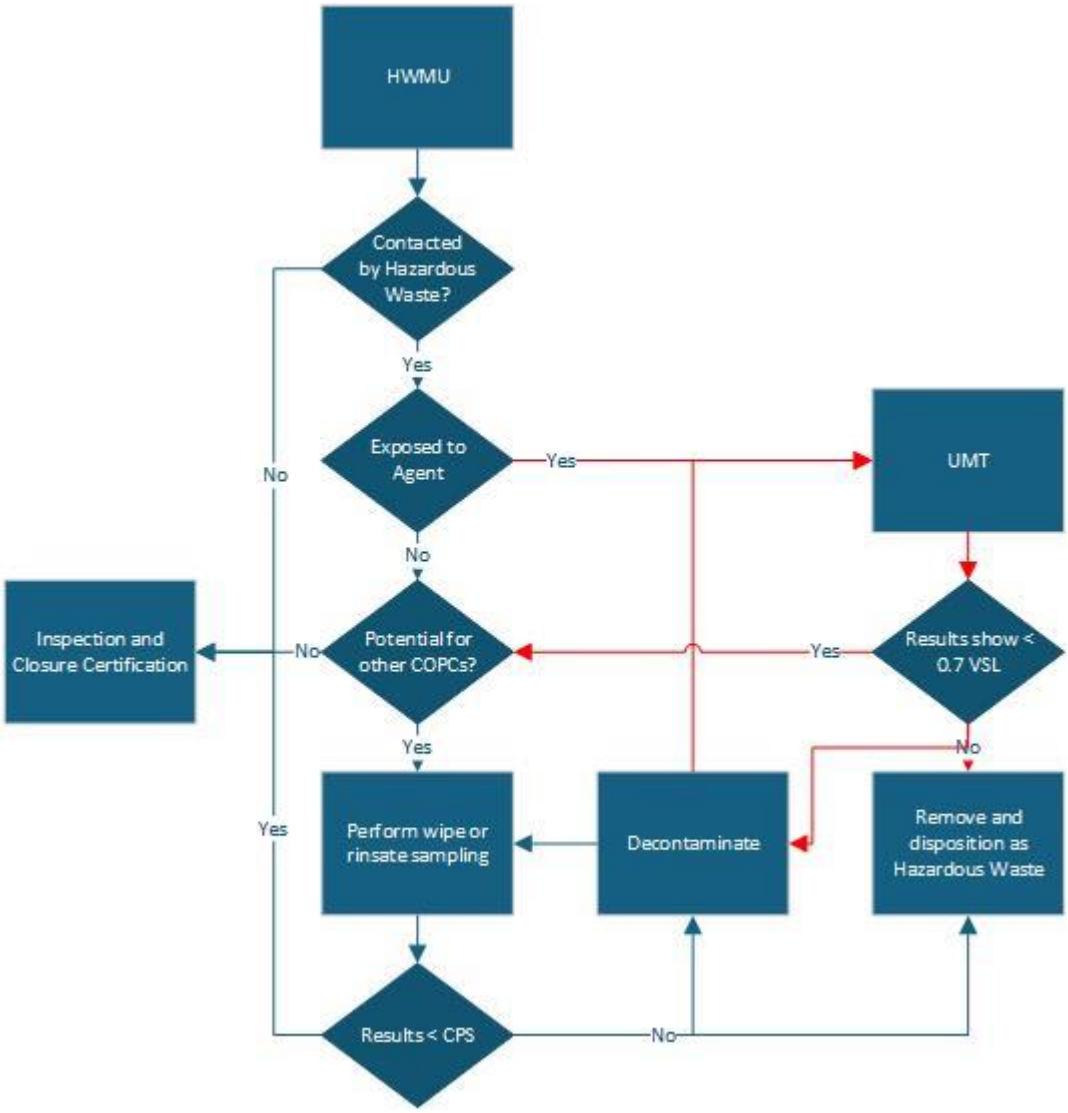


Table 5 – Analytes by Hazardous Waste Management Unit

HWMU	Type of Waste Permitted	Analytes	Sampling Method[a]
ESM	D003, N002, N003	ADP (EMPA, MPA, TDG), Explosives	Rinsate
EEB – SDC Room Container Storage Areas	D001-D011, D022, D027-D030, D037, D039, D040, F001-F005, N002, N003, N202, N203, N902	Metals, VOC, SVOC	Rinsate
EEB SDC Room Process Units			
DC	D003, N002, N003	Generator Knowledge	NA
LC1, LC2		Explosives	Wipe
BT		Metals, Explosives	Wipe/Rinsate
Scrap Conveyor		Generator Knowledge	NA
PVS		Generator Knowledge	NA
THO	N002, N003, N202, N203, N802, N902, N1002	Generator Knowledge	NA
EEB – OTS Room Container Storage Areas	D001-D011, D022, D026-D030, D037, D039, D040, F001-F005, N002, N003, N202, N203, N802, N902, N1002	Metals, VOC, SVOC	Rinsate
EEB – OTS Room Process Units			
Spray Dryer	N202, N203, N802, N902, N1002	Metals	Rinsate
Quench			Rinsate
Acid Scrubber			Rinsate
Neutral Scrubber			Rinsate
OTS Structure – THO Room Container Storage Areas	D002, D004- D008, D011, N802	Metals, VOC, SVOC	Rinsate
OTS Structure – OTS Room Container Storage Areas	D001-D011, D022, D026- D030, D037, D039, D040, F001-F005, N002, N202, N802, N902, N1002	Metals, VOC, SVOC	Rinsate
OTS Structure - BWT	N802	Metals	Rinsate
OTS Structure Process Units			
THO	N002, N202, N802, N902, N1002	Generator Knowledge	NA
Quench	N802, N902, N1002	metals	Rinsate
Neutral Scrubber			Rinsate
WEP		Generator Knowledge	NA

ADP = Agent Degradation Products; BT = Buffer Tank; BWT = Bleed Water Tank; DC = Detonation Chamber; EEB = EDT Enclosure Building; EMPA = Ethylmethyl phosphonic acid; ESM = EDT Service magazine; LC = Loading Chamber; MPA = methylphosphonic acid; NA = not applicable as sampling is not planned; OTS = Offgas Treatment System; PVS = Process Ventilation System; SDC = Static Detonation Chamber; SVOC = semivolatile organic compound; TDG = thiodiglycol; THO = Thermal Oxidizer; VOC = volatile organic compound; WEP = Wet Electrostatic Precipitator

[a] As per Section 5.2 and Figure 8, clean closure will be demonstrated by inspection, unventilated monitoring, and/or analysis of wipe or rinsate samples for chemicals of potential concern (COPCs) identified based on the wastes stored in the HWMU (Table 3) and generator knowledge. This table provides a summary of sampling requirements and analytes specific to each HWMU based on the site model. Designation of areas as not requiring rinsate or wipe sampling does not indicate the HWMU will not be subject to unventilated monitoring. As per Section 2.0, agent monitoring is outside the scope of this plan. Areas determined to be potentially VX agent-contaminated in 24915-CL-5PL-70-00003, *SDC 1200 Health-Based Risk Assessment* (pending), will undergo unventilated monitoring in accordance with 24915-CL-5PL-70-00002, *SDC 1200 Unventilated Monitoring Plan* (pending).

Table 6 – Action Levels for Wipe Samples

Chemical of Potential Concern	CAS No.	TLV, mg/m^3	Ref	TLV-SL[a], mg/100 cm^2
Metals				
arsenic	7440-38-2	0.01	ACGIH, 2025	0.1
barium	7440-39-3	0.5	ACGIH, 2025	5
cadmium	7440-43-9	0.01	ACGIH, 2025	0.1
chromium	7440-47-3	0.5	ACGIH, 2025	5
lead	7439-92-1	0.05	ACGIH, 2025	0.5
mercury	7439-97-6	0.025	ACGIH, 2025	0.25
selenium	7782-49-2	0.2	ACGIH, 2025	2
silver	7440-22-4	0.01	OSHA, 2024	0.1
Explosives				
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	0.5	OSHA, 2024	5
Trinitrotoluene, 2,4,6	118-96-7	0.1	OSHA, 2024	1
Tetryl (trinitrophenylmethylnitramine)	479-45-8	1.5	ACGIH, 2025	15

ACGIH = American Conference of Governmental Industrial Hygienists; OSHA = Occupational Safety and Health Administration; TLV = Threshold Limit Value; TLV-SL = surface limit threshold limit values

References:

1. ACGIH, 2025, https://www.acgih.org/
2. OSHA, 2024, https://www.osha.gov/
3. ACGIH, 7 Nov 2020, *Operations Manual, Threshold Limit Values for Chemical Substances (TLV®-CS) Committee*

[a] TLV-SLs were calculated using the conservative process defined by ACGIH in Reference 3.

Table 7 – Summary of CVS Data Quality Objectives

State the Problem	Identify the Goals of the Study	Identify Information Inputs	Define Boundaries of the Study	Develop the Analytical Approach	Specific Performance or Acceptance Criteria	Develop Plan for Obtaining Data
Primary Problem: How to demonstrate operations and decontamination of the **ESM** will ensure there is no potential for future release of contaminants to the environment. *Planning Team:* Section 4.0 *Conceptual Model:* Section 5.0	*Principal Study Question:* Does the concentration of contaminants in rinsate exceed acceptable levels? *Alternative Actions:* - Take no action - Repeat decon and sampling.	Rinsate measures residual contamination. Acceptable levels per Section 6.1.1 and 0 Operational history defines COPCs (Table 5). Standard methods for analysis of COPCs.	Floor surfaces are the only surfaces with potential contamination. Total volume per sample (excluding quality samples) is 2.25 L. Potential dilution minimized (maximum volume of rinsate < 10 times minimum sample volume).	*Action Level (AL):* Table 4 *Theoretical Decision Rule:* *If* rinsate sample collected from **ESM** floors is below the rinsate ALs, *then* take no further action, *else* decontaminate and repeat sampling	False acceptance decision results in unnecessary decon/sampling. False rejection decision could leave residual contamination. The sampling procedures (Section 8.0) ensure minimal dilution and reproducibility of results.	Sample collection in accordance with Section 8.0.
Primary Problem: How to demonstrate operations and decontamination of the **SDC Room Container Storage Areas** will ensure there is no potential for future release of contaminants to the environment. *Planning Team:* Section 4.0 *Conceptual Model:* Section 5.0	*Principal Study Question:* If contacted by hazardous waste, does the concentration of contaminants in rinsate exceed acceptable levels? *Alternative Actions:* - Take no action - Repeat decon and sampling.	Rinsate measures residual contamination. Acceptable levels per Section 6.1.1 and Table 4 Operational history defines COPCs (Table 5). Standard methods for analysis of COPCs.	Floors surfaces are the only surfaces with potential contamination. Total volume per sample (excluding quality samples) is 1.37 L. Potential dilution minimized (maximum volume of rinsate < 10 times minimum sample volume).	*Action Level (AL):* Table 4 *Theoretical Decision Rule:* *If* rinsate sample collected from **SDC Room Container Storage Area** floors is below the rinsate AL, *then* take no further action, *else* decontaminate and repeat sampling	False acceptance decision results in unnecessary decon/sampling. False rejection decision could leave residual contamination. The sampling procedures (Section 8.0) ensure minimal dilution and reproducibility of results.	Sample collection in accordance with Section 8.0.
Primary Problem: Demonstrate operations, decontamination, and decommissioning of the **EEB Miscellaneous Subpart X treatment units** will ensure there is no potential for future release of contaminants to the environment *Planning Team:* Section 4.0	*Principal Study Question:* Does the concentration of contaminants in rinsate or on surfaces of the units exceed acceptable levels? *Alternative Actions:* - Take no action - Repeat decon and sampling.	Rinsate or wipe samples measure residual contamination. Acceptable levels per Section 6.1, Table 4, and Table 6 Operational history defines COPCs (Table 5). Standard methods for analysis of COPCs.	Internal unit surfaces are the only surfaces with potential contamination. One wipe sample from each 1 m^2 of Surface Area (Section 6.1.2). Rinsate volume per sample (excluding quality samples) is 1.25 L. Potential dilution minimized (maximum volume	*Action Level (AL):* Table 4 or Table 6 *Theoretical Decision Rule:* *If* rinsate or wipe sample collected from **LC1, LC2, and BT** is below the rinsate AL, *then* take no further action, *else* decontaminate and repeat sampling. If repeat wipe samples are required, a new location	False acceptance decision results in unnecessary decon/sampling. False rejection decision could leave residual contamination. The sampling procedures (Section 8.0) ensure minimal dilution and reproducibility of results.	Sample collection in accordance with Section 8.0.

State the Problem	Identify the Goals of the Study	Identify Information Inputs	Define Boundaries of the Study	Develop the Analytical Approach	Specific Performance or Acceptance Criteria	Develop Plan for Obtaining Data
Conceptual Model: Section 5.0			of rinsate < 10 times minimum sample volume).	within each 1-m^2 sample grid will be identified.		
Primary Problem: How to demonstrate operations and decontamination of the **EEB-OTS Room Container Storage Areas** will ensure there is no potential for future release of contaminants to the environment. *Planning Team:* Section 4.0 *Conceptual Model:* Section 5.0	*Principal Study Question:* If contacted by hazardous waste, does the concentration of contaminants in rinsate exceed acceptable levels? *Alternative Actions:* - Take no action - Repeat decon and sampling.	Rinsate measures residual contamination. Acceptable levels per Section 6.1.1 and Table 4 Operational history defines COPCs (Table 5). Standard methods for analysis of COPCs.	Floor surfaces are the only surfaces with potential contamination. Total volume per sample (excluding quality samples) is 1.37 L. Potential dilution minimized (maximum volume of rinsate < 10 times minimum sample volume).	*Action Level (AL):* Table 4 *Theoretical Decision Rule:* *If* rinsate sample collected from **EEB-OTS Room Container Storage Area** floors is below the rinsate AL, *then* take no further action, *else* decontaminate and repeat sampling	False acceptance decision results in unnecessary decon/sampling. False rejection decision could leave residual contamination. The sampling procedures (Section 8.0) ensure minimal dilution and reproducibility of results.	Sample collection in accordance with Section 8.0.
Primary Problem: Demonstrate operations, decontamination, and decommissioning of the **EEB OTS units** will ensure there is no potential for future release of contaminants to the environment *Planning Team:* Section 4.0 *Conceptual Model:* Section 5.0	*Principal Study Question:* Does the concentration of contaminants on surfaces of the units exceed acceptable levels? *Alternative Actions:* - Take no action - Repeat decon and sampling.	Rinsate measures residual contamination. Acceptable levels per Section 6.1.1 and Table 4 Operational history defines COPCs (Table 5). Standard methods for analysis of COPCs.	Internal unit surfaces are the only surfaces with potential contamination. Total volume per sample (excluding quality samples) is 0.25 L. Potential dilution minimized (maximum volume of rinsate < 10 times minimum sample volume).	*Action Level (AL):* Table 4 *Theoretical Decision Rule:* *If* rinsate sample collected from **THO, SD, QUE, ASC and NSC** is below the rinsate AL, *then* take no further action, *else* decontaminate and repeat sampling	False acceptance decision results in unnecessary decon/sampling. False rejection decision could leave residual contamination. The sampling procedures (Section 8.0) ensure minimal dilution and reproducibility of results.	Sample collection in accordance with Section 8.0.
Primary Problem: How to demonstrate operations and decontamination of the **THO Room Container Storage Areas** will ensure there is no potential for future release of contaminants to the environment. *Planning Team:* Section 4.0 *Conceptual Model:* Section 5.0	*Principal Study Question:* If contacted by hazardous waste, does the concentration of contaminants in rinsate exceed acceptable levels? *Alternative Actions:* - Take no action - Repeat decon and sampling.	Rinsate measures residual contamination. Acceptable levels per Section 6.1.1 and Table 4 Operational history defines COPCs (Table 5). Standard methods for analysis of COPCs.	Floor surfaces are the only surfaces with potential contamination. Total volume per sample (excluding quality samples) is 1.37 L. Potential dilution minimized (maximum volume of rinsate < 10 times minimum sample volume).	*Action Level (AL):* Table 4 *Theoretical Decision Rule:* *If* rinsate sample collected from **THO Room Container Storage Area** floors is below the rinsate AL, *then* take no further action, *else* decontaminate and repeat sampling	False acceptance decision results in unnecessary decon/sampling. False rejection decision could leave residual contamination. The sampling procedures (Section 8.0) ensure minimal dilution and reproducibility of results.	Sample collection in accordance with Section 8.0.

State the Problem	Identify the Goals of the Study	Identify Information Inputs	Define Boundaries of the Study	Develop the Analytical Approach	Specific Performance or Acceptance Criteria	Develop Plan for Obtaining Data
Primary Problem: How to demonstrate operations and decontamination of the **PEMB-OTS Room Container Storage Areas** will ensure there is no potential for future release of contaminants to the environment. *Planning Team:* Section 4.0 *Conceptual Model:* Section 5.0	*Principal Study Question:* If contacted by hazardous waste, does the concentration of contaminants in rinsate exceed acceptable levels? *Alternative Actions:* - Take no action - Repeat decon and sampling.	Rinsate measures residual contamination. Acceptable levels per Section 6.1.1 and Table 4 Operational history defines COPCs (Table 5). Standard methods for analysis of COPCs.	Floors surfaces are the only surfaces with potential contamination. Total volume per sample (excluding quality samples) is 1.37 L. Potential dilution minimized (maximum volume of rinsate < 10 times minimum sample volume).	*Action Level:* Table 4 *Theoretical Decision Rule:* *If* rinsate sample collected from **PEMB-OTS Room Container Storage Area** floors is below the rinsate AL, *then* take no further action, *else* decontaminate and repeat sampling	False acceptance decision results in unnecessary decon/sampling. False rejection decision could leave residual contamination. The sampling procedures (Section 8.0) ensure minimal dilution and reproducibility of results.	Sample collection in accordance with Section 8.0.
Primary Problem: Demonstrate operations, decontamination, and decommissioning of the **BWT** will ensure there is no potential for future release of contaminants to the environment *Planning Team:* Section 4.0 *Conceptual Model:* Section 5.0	*Principal Study Question:* Does the concentration of contaminants on surfaces of the units exceed acceptable levels? *Alternative Actions:* - Take no action - Repeat decon and sampling.	Rinsate measures residual contamination. Acceptable levels per Section 6.1.1 and Table 4 Operational history defines COPCs (Table 5). Standard methods for analysis of COPCs.	Internal unit surfaces are the only surfaces with potential contamination. Total volume per sample (excluding quality samples) is 0.25 L. Potential dilution minimized (maximum volume of rinsate < 10 times minimum sample volume).	*Action Level:* Table 4 *Theoretical Decision Rule:* *If* rinsate sample collected from the **BWT** is below the rinsate AL, *then* take no further action, *else* decontaminate and repeat sampling	False acceptance decision results in unnecessary decon/sampling. False rejection decision could leave residual contamination. The sampling procedures (Section 8.0) ensure minimal dilution and reproducibility of results.	Sample collection in accordance with Section 8.0. Sampling of containment area to be performed based on operating history
Primary Problem: Demonstrate operations, decontamination, and decommissioning of the **OTS units** will ensure there is no potential for future release of contaminants to the environment *Planning Team:* Section 4.0 *Conceptual Model:* Section 5.0	*Principal Study Question:* Does the concentration of contaminants on surfaces of the units exceed acceptable levels? *Alternative Actions:* - Take no action - Repeat decon and sampling.	Rinsate measures residual contamination. Acceptable levels per Section 6.1.1 and Table 4 Operational history defines COPCs (Table 5). Standard methods for analysis of COPCs.	Internal unit surfaces are the only surfaces with potential contamination. Total volume per sample (excluding quality samples) is 0.25 L. Potential dilution minimized (maximum volume of rinsate < 10 times minimum sample volume).	*Action Level:* Table 4 *Theoretical Decision Rule:* *If* rinsate sample collected from **THO, QUE, NSC and WEP** is below the rinsate AL, *then* take no further action, *else* decontaminate and repeat sampling	False acceptance decision results in unnecessary decon/sampling. False rejection decision could leave residual contamination. The sampling procedures (Section 8.0) ensure minimal dilution and reproducibility of results.	Sample collection in accordance with Section 8.0.

Table 8 – Analytical Methods

Compounds	Analytical Method
Agent Degradation Products	Battelle SOPs (BCO-700-02)
Volatile Organics	EPA SW-846 8260
Semivolatile organics	EPA SW-846 8270
Explosives	EPA SW-846 8330
Metals	EPA SW-846 6010/7470

Table 9 – Field QC Summary (Worksheet #20)

Sample Location	Analyte Group	Matrix	Field Samples	Field Duplicates[1]	Field Splits	Matrix Spikes	Field Blanks	Equipment Blanks	Trip Blanks	Total
ESM	ADP	Aqueous	1	1	0	2	1	1	0	6
	Explosives	Aqueous	1	1	0	2	1	1	0	6
SDC Room	ADP	Aqueous	1	1	0	2	1	1	1	7
	Metals	Aqueous	1	1	0	2	1	1	1	7
	VOC	Aqueous	1	1	0	2	1	1	1	7
	SVOC	Aqueous	1	1	0	2	1	1	1	7
EEB-OTS Room	ADP	Aqueous	1	1	0	2	1	1	1	7
	Metals	Aqueous	1	1	0	2	1	1	1	7
	VOC	Aqueous	1	1	0	2	1	1	1	7
	SVOC	Aqueous	1	1	0	2	1	1	1	7
EEB-OTS Equip	Metals	Aqueous	5	1	4	2	1	1	0	14
THO Room	ADP	Aqueous	1	1	0	2	1	1	1	7
	Metals	Aqueous	1	1	0	2	1	1	1	7
	VOC	Aqueous	1	1	0	2	1	1	1	7
	SVOC	Aqueous	1	1	0	2	1	1	1	7
PEMB-OTS Room	ADP	Aqueous	1	1	0	2	1	1	1	7
	Metals	Aqueous	1	1	0	2	1	1	1	7
	VOC	Aqueous	1	1	0	2	1	1	1	7
	SVOC	Aqueous	1	1	0	2	1	1	1	7
BWT	Metals	Aqueous	1	1	0	2	1	1	0	6
OTS Equip	Metals	Aqueous	4	1	1	2	1	1	0	10

Note – Individual sample plans will be developed for EEB equipment in support of wipe samples and therefore these sample areas are excluded from this table.
[1] For rinsate sampling, a field split is collected daily if a field duplicate is not collected; a field duplicate is collected once per 10 primary samples and locations may vary.

Table 10 – Measurement Performance Criteria (QAPP Worksheet #12)

Analytical Method	Data Quality Indicator	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
VOC, SVOC, ADP, Explosives, Metals	Overall Precision	Field Duplicates	RPD ≤ 50% when COPCs are detected in both samples and concentration is greater than sample-specific lower limit of quantification (LLOQ)
ADP	Analytical Accuracy/Bias (Laboratory)	LCS	± 40%
	Analytical Precision (Laboratory)	LCS Duplicates	RPD ≤ 35%
	Analytical Accuracy/Bias (Matrix interference)	Matrix Spike Recovery	± 40%
	Analytical Precision (Matrix interference)	MS Duplicates	RPD ≤ 35%
	Sensitivity	LLOQ Verification Sample (spiked at LLOQ)	Analyte-Specific (see Table 11)
Metals	Analytical Accuracy/Bias (Laboratory)	LCS	Percent recovery of 80-120%
	Analytical Precision (Laboratory)	LCS Duplicates	RPD ≤ 20%
	Analytical Accuracy/Bias (Matrix interference)	Matrix Spike Recovery	Percent recovery of 75-125%
	Analytical Precision (Matrix interference)	MS Duplicates	RPD ≤ 20%
	Sensitivity	LLOQ Verification Sample (or Low-Level Calibration Check)	± 20%
VOC	Analytical Accuracy/Bias (Laboratory)	LCS	Analyte-Specific (see Table 11)
	Analytical Precision (Laboratory)	LCS Duplicates	RPD ≤ 30%
	Analytical Accuracy/Bias (Matrix interference)	Matrix Spike Recovery	Analyte-Specific (see Table 11)
	Analytical Precision (Matrix interference)	MS Duplicates	RPD ≤ 30%
	Sensitivity	LLOQ Verification Sample (spiked at LLOQ)	Analyte-Specific (see Table 11)

Analytical Method	Data Quality Indicator	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
SVOC	Analytical Accuracy/Bias (Laboratory)	LCS	Analyte-Specific (see Table 11)
	Analytical Precision (Laboratory)	LCS Duplicates	RPD ≤ 30%
	Analytical Accuracy/Bias (Matrix interference)	Matrix Spike Recovery	Analyte-Specific (see Table 11)
	Analytical Precision (Matrix interference)	MS Duplicates	RPD ≤ 30%
	Sensitivity	LLOQ Verification Sample (spiked at LLOQ)	Analyte-Specific (see Table 11)
Explosives	Analytical Accuracy/Bias (Laboratory)	LCS	Analyte-Specific (see Table 11)
	Analytical Precision (Laboratory)	LCS Duplicates	RPD ≤ 30%
	Analytical Accuracy/Bias (Matrix interference)	Matrix Spike Recovery	Analyte-Specific (see Table 11)
	Analytical Precision (Matrix interference)	MS Duplicates	RPD ≤ 30%
	Sensitivity	LLOQ Verification Sample (or Maximum Residue Limit (MRL) sample)	Analyte-Specific (see Table 11)

Note – Limits shown here are specific to aqueous analysis. Limits for wipe samples are pending final laboratory assessment.

Table 11 – Analyte-Specific Measurement Performance Criteria

Chemicals of Potential Concern	CAS No.	LCS Recovery, %	MS Recovery, %	LLOQ Sample, %
Agent Degradation Products				
ethyl methylphosphonic acid (EMPA)	1832-53-7	60-140	60-140	30-220
methylphosphonic acid (MPA)	993-13-5	60-140	60-140	30-220
thiodiglycol (TDG)	111-48-8	60-140	60-140	15-187
Metals				
arsenic	7440-38-2	80-120	75-125	80-120
barium	7440-39-3	80-120	75-125	80-120
cadmium	7440-43-9	80-120	75-125	80-120
chromium	7440-47-3	80-120	75-125	80-120
lead	7439-92-1	80-120	75-125	80-120
mercury	7439-97-6	80-120	75-125	80-120
selenium	7782-49-2	80-120	75-125	80-120
silver	7440-22-4	80-120	75-125	80-120
Volatile Organic Compounds				
1,1-dichloroethylene	75-35-4	70-130	70-130	TBD
1,2-dichloroethane	107-06-2	70-135	70-135	TBD
chloroform	67-66-3	70-125	65-135	TBD
tetrachloroethylene	127-18-4	65-140	45-150	TBD
trichloroethylene	79-01-6	75-125	70-125	TBD
Semivolatile Organic Compounds				
1,4-dichlorobenzene	106-46-7	45-95	45-95	TBD
2,4-dinitrotoluene	121-14-2	50-115	50-115	TBD
pentachlorophenol	87-86-5	25-125	25-125	TBD
Explosives				
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	50-160	50-160	0-200
Trinitrotoluene, 2,4,6	118-96-7	40-145	40-145	0-200
Tetryl (trinitrophenylmethylnitramine)	479-45-8	20-175	20-175	0-200

Note – Limits shown here are specific to aqueous analysis. Limits for wipe samples are pending final laboratory assessment.
TBD - to be determined. Data quality indicators will be defined in associated SOPs and will be submitted to the Closure Sampling Manager for approval prior to sample analysis.

Table 12 – Project Action Limits and Laboratory-Specific Quantitation Limits for Rinsate (QAPP Worksheet#15)

Chemicals of Potential Concern	CAS No.	Project Action Limit, µg/L	Desired Project Quantitation Limit, µg/L	Achievable Laboratory Quantitation Limit, µg/L
Agent Degradation Products				
ethyl methylphosphonic acid (EMPA)	1832-53-7	2.00E+02	2.00E+01	5.00E-01
methylphosphonic acid (MPA)	993-13-5	1.20E+02	**1.20E+01**	**2.50E+01**
thiodiglycol (TDG)	111-48-8	1.40E+02	1.40E+01	5.00E-01
Metals				
arsenic	7440-38-2	1.40E+03	1.40E+02	2.00E+01
barium	7440-39-3	1.20E+03	1.20E+02	1.00E+01
cadmium	7440-43-9	6.90E+02	6.90E+01	2.00E-00
chromium	7440-47-3	2.77E+03	2.77E+02	5.00E+00
lead	7439-92-1	6.90E+02	6.90E+01	2.00E+01
mercury	7439-97-6	1.50E+02	1.50E+01	2.00E-01
selenium	7782-49-2	8.20E+02	8.20E+01	3.50E+01
silver	7440-22-4	4.30E+02	4.30E+01	1.00E+01
Volatile Organic Compounds				
1,1-dichloroethylene	75-35-4	2.50E+01	**2.50E+00**	**5.00E+00**
1,2-dichloroethane	107-06-2	2.10E+02	2.10E+01	5.00E+00
chloroform	67-66-3	4.60E+01	4.60E+00	5.00E+00
tetrachloroethylene	127-18-4	5.60E+01	5.60E+00	5.00E+00
trichloroethylene	79-01-6	5.40E+01	5.40E+00	5.00E+00
Semivolatile Organic Compounds				
1,4-dichlorobenzene	106-46-7	9.00E+01	**9.00E+00**	**9.90E+00**
2,4-dinitrotoluene	121-14-2	3.20E+02	3.20E+01	9.90E+00
pentachlorophenol	87-86-5	8.90E+01	**8.90E+00**	**5.00E+01**
Explosives				
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	8.00E+00	**8.00E-01**	**1.00E+00**
Trinitrotoluene, 2,4,6	118-96-7	2.50E+00	**2.50E-01**	**1.00E+00**
Tetryl (trinitrophenylmethylnitramine)	479-45-8	3.90E+00	**3.90E-01**	**1.00E+00**

Notes:

1. Limits shown here are specific to aqueous analysis. Limits for wipe samples are pending final laboratory assessment.
2. Desired project quantitation limits incorporate a 10-fold dilution factor that may be required should matrix interferences be observed during sample analysis. Failure to meet desired project quantitation limits (identified in bold) does not indicate an inability for the method to be used for CVS as detection limits will be applied if quantitation fails. If, following analysis, it is determined detection and quantitation limits exceed the action level for a specific constituent, reanalysis and/or resampling with alternative analytical methodology (if available) may be considered. If all other COPCs are below the corresponding action levels, BGCAPP will provide justification to KDEP why clean closure should be considered based on an overall evaluation of sampling and analysis, analytical capabilities, and generator knowledge.

Table 13 – Project Tasks and Schedule (QAPP Worksheet #14)

Activity	Responsible Party	Planned Start Date	Planned Completion Date	Deliverables	Deliverable Due Date
Finalization of Planning Documents	Closure Sampling Manager	March 2023	August 2025	Sampling procedures, work orders	August 2025
EEB OTS Sample Mobilization, Collection, Demobilization	FST	September 2025	December 2025	Field Logs	December 2025
EEB OTS Sample Analysis, Data Verification/Validation and Reporting	FST	December 2025	March 2026	PE Certified Closure Report	March 2026
EEB Equipment Sample Mobilization, Collection, Demobilization	FST	October 2025	November 2025	Field Logs	November 2025
EEB Equipment Sample Analysis, Data Verification/Validation and Reporting	FST	November 2025	February 2026	PE Certified Closure Report	February 2026
EEB OTS Room Sample Mobilization, Collection, Demobilization	FST	December 2025	December 2025	Field Logs	December 2025
EEB OTS Room Sample Analysis, Data Verification/Validation and Reporting	FST	December 2025	March 2026	PE Certified Closure Report	March 2026
OTS Equipment Sample Mobilization, Collection, Demobilization	FST	December 2025	December 2025	Field Logs	December 2025
OTS Equipment Sample Analysis, Data Verification/Validation and Reporting	FST	December 2025	March 2026	PE Certified Closure Report	March 2026
BWT Sample Mobilization, Collection, Demobilization	FST	December 2025	December 2025	Field Logs	December 2025
BWT Sample Analysis, Data Verification/Validation and Reporting	FST	December 2025	March 2026	PE Certified Closure Report	March 2026
THO Room Sample Mobilization, Collection, Demobilization	FST	December 2025	December 2025	Field Logs	December 2025
THO Room Sample Analysis, Data Verification/Validation and Reporting	FST	December 2025	March 2026	PE Certified Closure Report	March 2026
THO Room Sample Mobilization, Collection, Demobilization	FST	December 2025	December 2025	Field Logs	December 2025
THO Room Sample Analysis, Data Verification/Validation and Reporting	FST	December 2025	March 2026	PE Certified Closure Report	March 2026
PEMB-OTS Room Sample Mobilization, Collection, Demobilization	FST	December 2025	December 2025	Field Logs	December 2025

Activity	Responsible Party	Planned Start Date	Planned Completion Date	Deliverables	Deliverable Due Date
PEMB-OTS Room Sample Analysis, Data Verification/Validation and Reporting	FST	December 2025	March 2026	PE Certified Closure Report	March 2026
SDC Room Sample Mobilization, Collection, Demobilization	FST	December 2025	December 2025	Field Logs	December 2025
SDC Room Sample Analysis, Data Verification/Validation and Reporting	FST	December 2025	March 2026	PE Certified Closure Report	March 2026

FST = Field Sampling Team; PE = Professional Engineer

Table 14 – Rinsate Sample Containers, Hold Times, and Preservation Methods

Analyte Type	Method	Sample Container[a]	Preservation	Holding Time
ADP	Battelle SOP	1 x 250-mL amber glass	Cool to < 7°C	7 days until preparation/ analyzed within 14 days following preparation
VOCs	Method 8260	3 x 40mL vials	Cool to < 7°C; pH < 2 with HCl	7 Days
SVOCs	Method 8270	2 x 1-L amber glass*	Cool to < 7°C	7 days until extraction/analyzed within 40 days after extraction
Metals	Method 6010C/7470A	1 x 250-mL HDPE	Cool to < 7°C; pH < 2 with HNO_3	6 months except mercury which is 28 days
Explosives	Method 8330A	2 x 1-L amber glass	Cool to < 7°C	7 days until extraction/analyzed within 40 days after extraction

[a] Sample containers shown are specific to rinsate samples and standard commercial practice. Specific laboratories selected to complete analyses may be able to perform analyses using smaller sample volumes. Wipe samples will comply with ASTM D6966-08 and D666-01.

Table 15 – Data Verification and Validation Inputs (Worksheet # 34)

Item	Description	Verification (Completeness)	Validation (Conformance to Specification)
	Planning Documents/Records		
1	Approved QAPP	X	
2	Subcontract for Commercial Laboratory	X	
3	-- Not Used --		
4	Field SOPs/WO	X	
5	Laboratory LQAP and SOPs	X	
	Field Records		
6	Field Logs	X	X
7	Equipment Calibration Records		
8	Chain of Custody Forms	X	X
9	Sampling Diagrams/Survey Maps	X	X
10	Boring Logs		
11	Geophysics Reports		
12	Relevant correspondence		
13	Change Orders/Deviations	X	X
14	Field Audit/Surveillance Report	X	X
15	Field Corrective Action Report	X	X
	Analytical Data Package		
16/17	Cover Sheet and Case Narrative	X	X
18/19	Sample Receipt Records and Internal Laboratory Chain of Custody	X	X
20	Sample Chronology (date/time of receipt, preparation, and analysis)	X	X
21/22	Communication Records/ Project-Specific PT Sample results		
23	LOD/LOQ establishment/verification	X	X
24	Standards traceability		
25	Instrument Calibration Records	X	X
26	Definition of Laboratory Qualifiers	X	X
27	Sample Results	X	X
28	QC Sample Results	X	X
29	Corrective Action Reports	X	X
30	Raw Data		X
31	Electronic Data Deliverable		X

Table 16 – Data Validation QC Elements

	Level III Data Validation	Level IV Data Validation
Organic Analyses	• Holding times • Initial calibration • Continuing calibration • Blanks • Surrogate recovery • Matrix spike and matrix spike duplicate recovery • Laboratory control sample recovery • Internal standard performance • Field duplicate sample analysis RPD • Reporting limits • Overall assessment of data in the SDG	• Holding times • Initial calibration • Continuing calibration • Blanks • Surrogate recovery • Matrix spike and matrix spike duplicate recovery • Laboratory control sample recovery • Internal standard performance • Field duplicate sample analysis RPD • Compound identification • Compound quantitation and detection limits • Tentatively identified compound verification (GC/MS) • System performance • Overall assessment of data in the SDG
Inorganic Analyses	• Holding times • Initial calibration • Continuing calibration • Blanks • Surrogate recovery • Matrix spike recovery • Duplicate sample RPD • Laboratory control sample recovery • ICP interference check • MSA and serial dilution checks • Field duplicate sample analysis RPD • Reporting limits • Overall assessment of data in the SDG	• Holding times • Initial calibration • Continuing calibration • Blanks • Surrogate recovery • Matrix spike recovery • Duplicate sample RPD • Laboratory control sample recovery • ICP interference check • MSA and serial dilution checks • Field duplicate sample analysis RPD • Analyte identification • Analyte quantitation and detection limits • System performance • Overall assessment of data in the SDG

NOTE: ICP = inductively coupled plasma; MSA = Method of Standard Additions; SDG = Sample Delivery Group