Pueblo Chemical Agent-Destruction Pilot Plant

PCAPP

PUEBLO CHEMICAL AGENT-DESTRUCTION PILOT PLANT PROJECT

24852-GPP-GYPM-00006
Revision 003

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Pilot Test Demonstration Plan, CDRL H002

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003	Modified per resolution of CDPHE comments defined in NOD.	

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ACRONYMS

1,2-DCA	1,2-dichloroethane
2-D	two-dimensional
3-D	three dimensional
ABCDF	Aberdeen Chemical Agent Disposal Facility
ACFM	Actual cubic feet per minute
ACGIH	American Conference of Industrial Hygienists
ACWA	Assembled Chemical Weapons Alternatives
AEL	Airborne Exposure Limit
AFA	Agent Filtration Area
AGV	Automated guided vehicle
ANR	Agent Neutralization Reactor
ANS	Agent Neutralization System
APB	Agent Processing Building
ATE	ACWA test equipment
Atm	Atmosphere
AWS	Agent/Water Separator
BC	Brine Concentrator
BNI	Bechtel National, Inc.
BOX	Bulk Oxidizer
BRS	Brine Reduction System
BTRA	*Bounding Transportation Risk Assessment*
BTS	Biotreatment System
C	Celsius
CAM	Cavity Access Machine
CAS	Chemical Abstracts Service
CASARM	Chemical Agent Standard Analytical Reference Material
CCR	Code of Colorado Regulations
CDPHE	Colorado Department of Public Health and the Environment
CDRL	Contract Data Requirements List
CMA	Chemical Materials Agency
CO	Colorado
CO_2	carbon dioxide
COD	chemical oxygen demand
COPC	chemicals of potential concern
DAAMS	Depot Area Air Monitoring System
DAP	diammonium phosphate
decon	decontamination
demo	demonstration
DMWS	Drained Munitions Weigh Station
DO	dissolved oxygen
DOD	Department of Defense
DOE	design of experiment
DP	differential pressure
DQO	data quality objective
DQR	data quality requirement

DRE	destruction and removal efficiency
DSCM	dry standard cubic meter
ECHIP®	(trade name, statistical software)
ECR	Explosion Containment Room
EDS	Explosive Destruction System
ERB	Enhanced Reconfiguration Building
FCS	Facility Control System
FLA	full load amperes
FOAK	first-of-a-kind
g	gram
GAC	granular activated carbon
gpm	gallons per minute
HD	distilled mustard, blister agent, bis(2-chloroethyl) sulfide
H	high
HH	high high
HPWW	high pressure washout water
HRA	health risk assessment
HRT	hydraulic residence time
HT	mustard T-mixture, mixture of 60% sulfur mustard (HD) and 40% T (bis[2-(2-chloroethylthio)ethyl] ether)
HVAC	heating, ventilation, and air conditioning
ICB™	Immobilized Cell Bioreactor
ID	identification
IFD	Integrated Facility Demonstration
IH	Industrial Hygiene
IHIP	Industrial Hygiene Implementation Plan
IMS	Integrated Master Schedule
inWC	inches water column
IOD	Integrated Operations Demonstration
in.	inch
JTG	Joint Test Group
kg	kilogram
L	liter
lb.	pound
LAMP	Laboratory Analysis and Monitoring Plan
LCO	limiting condition of operation
LIMS	Laboratory Information Management System
L	low
LL	low low
LMQAP	Laboratory and Monitoring Quality Assurance Plan
LPMD	Linear Projectile Mortar Disassembly system
LQAPP	Laboratory Quality Assurance Program Plan
LQCP	*Laboratory Quality Control Plan,* 24852-GPP-GGL-00003
LSAP	*Laboratory Sampling and Analysis Plan for Pilot Test Phase Operations*, 24852-GPP-GGL-00013
m	meter
MAV	Modified Ammunition Van

MBBE	Munitions Bodies Bin Enclosure
MCP	Monitoring Concept Plan
MDL	method detection limit
mg	milligram
MINICAMS®	Miniature Chemical Agent Monitoring System
MME	Munitions Monitoring Enclosure
MPHRA	Multiple Pathway Health Risk Assessment
MRR	Munitions Receiving Room
MSM	Munitions Service Magazine
MTU	Munitions Treatment Unit
MWS	Munitions Washout System
NRT	near-real-time
OMP	*Odor Monitoring Plan for Pilot Test Phase Operations*, 24852-GPP-GGG-V0018
OPP	overpack pallet
ORR	Operational Readiness Review
OSHA	Occupational Safety and Health Administration
OTS	Off-gas Treatment System
P&A	precision and accuracy
PCAPP	Pueblo Chemical Agent-Destruction Pilot Plant
PCD	Pueblo Chemical Depot
PDARS	Process Data Acquisition and Recording System
PEL	Permissible Exposure Level
PEO	Program Executive Office
PFD	process flow diagram
PLC	programmable logic controller
PM	Project Manager
PMD	projectile mortar disassembly system
PME	Parts Monitoring Enclosure
POHC	principal organic hazardous constituent
PPE	personal protective equipment
PRRS	Paint Residue Removal System
psig	pounds per square inch gauge
PSM	Plant Shift Manager
PSV	pressure safety valve
PTD	Pilot Test Demonstration
PTDP	Pilot Test Demonstration Plan
QA	quality assurance
QC	quality control
QMP	Quality Management Plan
RCRA	Resource Conservation and Recovery Act
RD&D	Research, Development, and Demonstration
RDT&E	research, development, test, and evaluation
RH	relative humidity
RHS	Residue Handling System
RICC	Rock Island Contracting Center
RO	reverse osmosis

RR	Reconfiguration Room
RTA	Receiving and Traveling Area
SC	Systems Contractor
SD	standard deviation
SDD	system design description
SDS	Spent Decontamination System
SDU	Supplemental Decontamination Unit
SG	specific gravity
SM	Safety and Health Manager
SME	subject matter expert
SOP	standing operating procedure
SVOC	semi-volatile organic compound
TAA	*Process Design Throughput and Availability Analysis*, 24852-RD-30V-000-B0001
TBD	to be determined
TCLP	toxicity characteristic leaching procedure
TCP	*Test Concept Plan for the Pueblo Chemical Agent Destruction Pilot Plant (PCAPP)*, Chron11-04221
TDG	thiodiglycol
THC	total hydrocarbon
TLV®	Threshold Limit Values
TMA	Toxic Maintenance Area
TOC	total organic carbon
TOCDF	Tooele Chemical Agent Disposal Facility
TPCS	Test Performance Control Sheet
TRR	technical risk reduction
TRRP	Technical Risk Reduction Program
TSDF	treatment, storage, and disposal facility
TSS	total suspended solids
USAE	U.S., Army Element
VC	vinyl chloride
VCR	Vapor Containment Room
VOC	volatile organic compound
VSL	Vapor Screening Level
WO	Work order
WPL	Worker Population Limit
WRS	Water Recovery System
VSS	volatile suspended solids
WWCT	Wash Water Collection Tank

1 INTRODUCTION

The Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) is an Assembled Chemical Weapons Alternatives (ACWA) chemical ordnance demilitarization plant constructed near Pueblo, Colorado (CO) for the destruction of the chemical munitions stockpile stored at the U.S. Army Pueblo Chemical Depot (PCD). This permitted treatment, storage and disposal facility (TSDF) uses conventional reverse assembly technology to remove energetics from munitions and access the agent, hydrolysis to neutralize the chemical agent, biotreatment of the resulting agent hydrolysate to mineralize degradation products, water recycling to minimize fresh water usage, and offsite disposition of decontaminated munitions bodies, energetics, miscellaneous parts and secondary waste.

Prior to operations, a set of interrelated plans must be submitted as Class 2 permit modifications as detailed in the Compliance Schedule, section I.J of the PCAPP Research, Development, and Demonstration (RD&D) Resource Conservation and Recovery Act (RCRA) Permit. One of these plans is the *Pilot Test Demonstration Plan* (PTDP, Contract Data Requirements List [CDRL] H002), which must be delivered at least 18 months prior to the start of operations. This permit condition is consistent with, and driven by 6 Code of Colorado Regulations (CCR) 1007-3 § 100.25, which applies to RD&D Permits. As specified in Condition I.J.2.a., the PTDP details the specific activities, the processing rates, the quantities of wastes to be treated and stored during pilot testing, and describes how PCAPP will satisfy permit requirements.

The PTDP also satisfies requirements defined in CDRL Element H002, the RCRA RD&D permit, and demonstrates the performance criteria specified in the *Test Concept Plan for the Pueblo Chemical Agent Destruction Pilot Plant (PCAPP)* (TCP), Chron11-04221.

The structure of the PTDP associates test activities to permit and performance requirements for each system and subsystem. The collection of data is designed to accommodate the timely assembly and distribution of interim reports to expedite the submittal of the final *Pilot Test Demonstration Report*.

Permit Modification 51 not only includes the PTDP, but also requires submission of the *Odor Monitoring Plan for Pilot Test Phase Operations* (OMP), 24852-GPP-GGG-V0018, and *Laboratory Sampling and Analysis Plan for Pilot Test Phase Operations* (LSAP), 24852-GPP-GGL-00013.

1.1 BACKGROUND

The use of novel and/or first-of-a-kind (FOAK) technologies as part of a pilot plant does not provide established operating parameters prior to the introduction of agent. PCAPP's RD&D RCRA permit allows development and testing of operating conditions during an initial pilot test phase for incorporation into the Part B permit. The pilot test phase demonstrates process facilities and equipment operate as designed, validates the Multiple Pathway Health Risk Assessment and establishes operating parameters for the Part B Permit. The PTDP incorporates testing designed to maximize operational flexibility by assessing the impact on site emissions of a wide range of operating conditions.

Compliance with permit performance standards includes demonstrating that cumulative site emissions from site stacks do not exceed the cumulative risk goals (e.g., carcinogenic risk of 1×10^{-6}) defined in the *Multiple Pathway Health Risk Assessment Report for the Pueblo Chemical Agent Destruction Pilot Plant with Explosive Destruction System (EDS) (MPHRA)*, 24852- 3RC-000-V0007 over the duration of the program. Pilot test demonstration of full-rate integrated processing and concurrent monitoring of emissions establishes operating conditions at which these risk goals are not exceeded and that will become the technical constraints applicable during full-rate permitted processing.

An MPHRA is a screening-level approach to evaluate the health risks associated with operations at the PCAPP facility and was performed to support the Colorado Department of Public Health and Environment (CDPHE) hazardous waste permitting process. Implementation of this MPHRA was conducted in accordance with a CDPHE-approved protocol that was developed specifically for PCAPP. The objectives of the MPHRA were to (1) evaluate how chemicals reasonably expected to be present in PCAPP air emissions can be transported through the environment and into the food chain, (2) assess how different people (human receptors) can directly or indirectly come into contact with these substances (exposure pathways), and (3) calculate the cumulative risks (carcinogenic effects) and hazards (noncarcinogenic effects) for each exposure scenario. The results of the MPHRA demonstrate that operations at PCAPP are expected to meet all acceptable risk benchmarks defined by CDPHE.

The MPHRA was performed using calculated emissions for Chemicals of Potential Concern (COPCs) identified using a process defined in Appendix A of the MPHRA. A total of 67 COPCs were identified as a result of this review, of which toxicity data are available for 56, and for which emissions estimates could be generated for 50. During pilot-scale operations, PCAPP will monitor actual emissions to corroborate the MPHRA inputs and resultant conclusions. In addition to COPCs, other constituents to be sampled in site emissions include dioxins/furans, metals, acid gases, and particulates. A list of constituents to be analyzed in emissions samples as part of pilot test demonstration (PTD) along with the justification for why this list is appropriate as compared to the 6 CCR 1007-3, Part 261, Appendix VIII list, are provided in the LSAP in accordance with permit condition I.J.2.d.vi.(A).

1.2 FACILITY AND PROCESS DESCRIPTION

The PCAPP is a state-of-the-art plant built to safely destroy the chemical weapons stockpile, consisting of 155-mm and 105-mm projectiles and 4.2-in mortars, currently in storage at the PCD near Pueblo, CO. The plant encompasses approximately 85 acres and is a government-owned, contractor-operated TSDF. As such, PCAPP complies with Federal and State Regulatory RCRA requirements with respect to design, construction and operation.

The PCAPP incorporates process equipment to safely disassemble munitions, and treat the mustard agent (HD) and a mustard agent mixture (HT) by neutralization and subsequent biotreatment. The PCAPP consists of two primary process buildings (the Enhanced Reconfiguration Building [ERB], equipped to reconfigure the munitions, and the Agent Processing Building [APB], equipped to process the munitions bodies and mustard agent), outdoor equipment and utilities, and various support buildings. The ERB and APB have engineered control features, such as Explosion Containment Rooms (ECR) and cascade ventilation systems, to protect workers, the public and the environment. Support facilities include electrical equipment, boilers for steam and hot water supply, air compressors, and other utility supplies; buildings used for storage and maintenance, buildings for access control, fuel storage tanks, and buildings for other support functions (e.g., locker rooms, break areas, control room, medical, and laboratory).

The PCAPP operates on a 24x7 schedule and processes the munitions stockpile in three campaigns beginning with the 155-mm HD campaign and ending with the 4.2-inch HD and HT mortar campaign. The following paragraphs explain munitions handling operations during the 155-mm projectile campaign. The PCAPP process flow diagram is included in Figure 1-1. Further information on the block designation shown in Figure 1-1 is provided in Section 4.

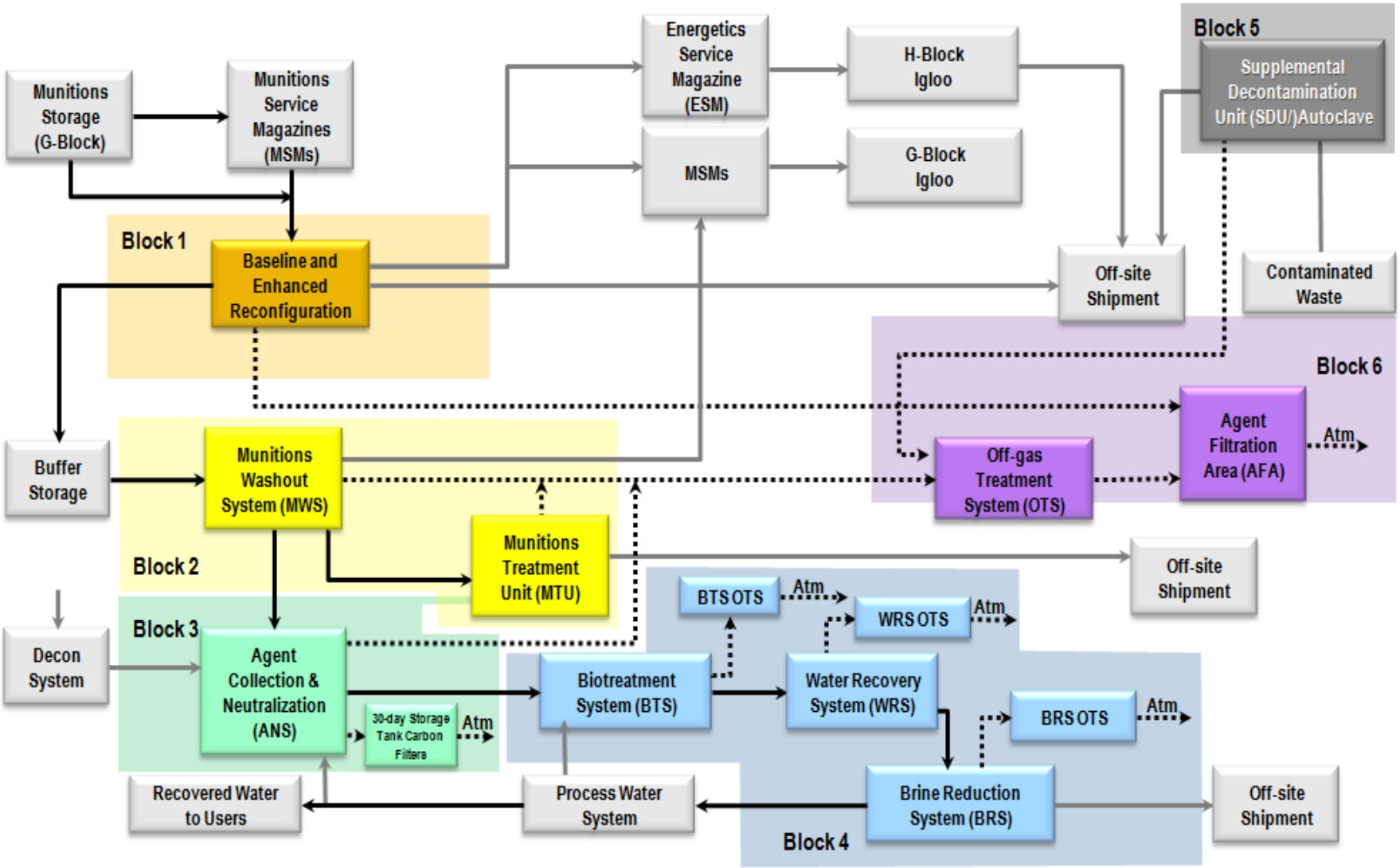

Figure 1-1. PCAPP Process Flow Diagram

Chemical agent munitions stored in PCD igloos are placed in overpack pallets (OPP) and loaded into Modified Ammunition Vans (MAV) for transport to the PCAPP ERB MAV unloading dock. At the MAV dock, each MAV is monitored for chemical agent before the vehicle is opened and OPPs are offloaded into one of three buffer storage Munitions Service Magazines (MSM) or directly to the ERB Receiving and Traveling Area (RTA). In the RTA, the OPPs are headspace-monitored before the OPP cover is removed and munitions are fed into the ECRs for enhanced reconfiguration by the Projectile Mortar Disassembly (PMD) system. Following enhanced reconfiguration, the deburstered munitions, energetics, and parts are monitored in the Munitions Monitoring Enclosures (MME) and the Parts Monitoring Enclosures (PME). The energetics and parts are packaged for final disposition. Deburstered munitions are repacked on slave pallets and delivered to the APB via Automated Guided Vehicles (AGV). Munitions determined to be leaking, or in-process rejects, are overpacked or palletized, respectively, and returned to PCD igloos.

Within the APB, the agent cavity of each munition is breached by the Cavity Access Machine (CAM) of the Munitions Washout System (MWS). The MWS delivers pressurized warm water to rinse the agent cavity. The agent and rinse water are sent to the Agent/Water Separator (AWS) while the munition bodies are thermally treated in the Munitions Treatment Unit (MTU). The AWS separates the agent and washwater for agent feed into the agent hydrolyzers (also called the Agent Neutralization Reactors [ANR]) per the reactor recipe. Following hydrolysis in the agent hydrolyzers, reactor hydrolysate batches are sent to a holding tank where the hydrolysate is recirculated, sampled, and analyzed for chemical agent to confirm destruction criteria have been met. When the hydrolysate is cleared to be non-detect for mustard in accordance with the *Laboratory Analysis and Monitoring Plan* (LAMP), 24852-GPP-GGL-00002, it is pumped into a 30-day storage tank. The hydrolysate is treated in Immobilized Cell Bioreactors (ICB™). The resulting bio-effluent is processed through the Water Recovery System (WRS) and the Brine Reduction System (BRS). Solids collected from the BRS, WRS, and secondary waste treatment systems are dispositioned in accordance with permit requirements.

Agent-contaminated secondary waste generated during agent operations and closure is treated onsite in a Supplemental Decontamination Unit (SDU) or an Autoclave or may be containerized for disposition offsite. Wastes that are not contaminated with mustard agent are dispositioned off site.

The off-gas from the various PCAPP process systems are treated prior to release to the environment. The APB Off-gas Treatment System (OTS), consisting of a Bulk Oxidizer (BOX) and scrubber, receives off-gas streams from the MWS, MTU, Agent Neutralization System (ANS), Spent Decontamination System (SDS), SDU, and Autoclave. Effluent from the OTS and the APB and ERB cascade ventilation system is processed through the Agent Filtration Area (AFA). The 30-day Hydrolysate Storage tanks, Biotreatment System (BTS), WRS, and BRS are also equipped with carbon adsorber OTSs.

1.3 PRECURSORS TO PILOT TESTING

Prior to commencement of pilot testing, risk reduction testing, systemization phase activities and an operational readiness review are completed. These are briefly described in the following paragraphs.

1.3.1 Risk Reduction Testing

Testing conducted to reduce the amount of technical risk for FOAK technologies and verify that equipment meets the project design requirements prior to acceptance into the plant. Testing was conducted in two phases: Technical Risk Reduction Program (TRRP) testing and FOAK equipment testing. TRRP testing was conducted on the PMD, MTU, MWS, ANRs, BTS, SDU, Autoclave, and OPP. FOAK testing was performed on systems that were identified through TRRP testing as having a higher technical risk (i.e., MWS, MTU, and PMD).

1.3.2 Systemization Phase Activities

Systemization is the phase following the turn-over of equipment from construction to startup in which components, systems and facilities are tested to ensure that the plant operates per the PCAPP design. Systemization is comprised of component testing, system demonstration testing and Integrated Operations Demonstration (IOD), as defined in the TCP. During systemization the functional performance of components, subsystems, systems, and integrated systems is tested without the introduction of agent into the facility using agent-free simulated rounds called ACWA test equipment (ATE). Systemization testing verifies that the equipment meets operational requirements (i.e., functionality, safety, reliability, throughput and maintainability).

Component testing includes tests performed by specialized startup teams to verify local and remote operation of individual plant components and subsystems. Testing also confirms that protective equipment and interlocks at the component, subsystem, and system interfaces are functioning properly. Systems demonstration testing is then conducted to verify that systems can function as designed. Individual system demonstrations are performed to confirm that the functionality, safety, reliability, throughput and maintainability of systems satisfy minimum acceptance criteria. Individual pieces of equipment and/or subsystems are tested together to ensure correct installation, delivery of power, and mechanical function. During systemization, final design data are validated and required ranges for operating parameters, alarm set points, and automatic interlocks are defined. Standing operating procedures (SOP) and limiting conditions of operations (LCO) are developed and confirmed during Systemization.

During the IOD the PCAPP demonstrates that processes, procedures and personnel proficiency meet the minimum acceptance criteria defined in the TCP. The IOD demonstrates integrated system operation and compliance with associated LCOs for the following major processes:

1. Receiving munitions
2. Transferring and processing munitions

3. Handling, transferring, and processing simulated agent-contaminated wastes
4. Identifying and handling leaking and contaminated munitions
5. Performing toxic area entries
6. Sampling of tanks
7. Performing laboratory analyses (e.g., agent, hydrolysate, brine, emissions)
8. Performing treaty sampling
9. Performing routine maintenance for critical process equipment
10. Responding to contingencies or equipment upset conditions

1.3.3 Operational Readiness Review

The ORR verifies personnel, procedures, plant and management oversight meet operational requirements. The review is a comprehensive assessment of the entire plant (including functional area interfaces) to demonstrate a state of readiness before agent operations may begin. The ORR consists of document reviews, field reviews, and personnel proficiency exercises (routine and contingency), to include the facility-wide IOD. The ORR confirms that the plant is ready from an equipment and procedural standpoint to accept materials containing chemical agent and explosives, in both normal and off-normal operations. Upon successful completion of the ORR the Systems Contractor (SC) will request of the Program Executive Office (PEO) ACWA authorization to start agent operations.

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2 SCOPE AND OBJECTIVES

2.1 SCOPE

The PTDP satisfies requirements included in the RCRA RD&D Permit, CDRL H002, and the TCP. As such, the PTDP identifies:

- Specific activities conducted during pilot testing
- Estimated processing rates for pilot testing
- Estimated quantities of wastes to be treated and stored during pilot testing
- Performance objectives and minimum acceptance criteria
- Reporting requirements during and after pilot testing

The PTDP estimates quantities of munitions, agent, hydrolysate, and BTS effluent; but does not provide an estimate of the quantities of secondary waste (e.g., personal protective equipment [PPE], filter cake, etc.) to be treated, stored and dispositioned during pilot testing.

The PTDP provides an overall plan for pilot testing. Specific details associated with direct implementation of this plan are contained in SOP 24852-SOP-PT-001, *Pilot Test Evolutions,* system procedures and the *Operations Plan* (Permit Modification 48). During development of procedures, the specific steps to be taken are reviewed and refined by operators, and risk assessments and/or activity hazard analyses are performed to facilitate safe execution.

The PTDP is developed specifically for the 155-mm projectile campaign. The 155-mm campaign corresponds to the largest quantity of agent per round, the maximum agent processing rate, the maximum total agent quantity, the maximum volume of hydrolysate generated and treated in the BTS, and the maximum metal parts processing rate (lbs/day). As such, the 155-mm campaign generates the maximum potential site emissions. Pilot testing for the 105-mm projectile and 4.2-in mortar campaigns will not be performed. Instead, unique campaign activities (e.g., 4.2-in mortar baseplate cutting) will be demonstrated during changeover testing using ATE and during a ramp-up phase using stockpile munitions.

Although this plan includes five test activities that deviate from normal process conditions (i.e., MTU heel test, loss of Paint Residue Removal Station [PRRS] MTU test, high agent loading in the ANR test, no agitator ANR test, and operation of the OTS without the BOX test; see Section 4 and Appendix A for additional details), it does not include simulated off-normal demonstration tests. Such demonstrations are performed during the systemization phase. Should unplanned off-normal events occur during pilot testing, the events will be addressed in accordance with established procedures and plans. Pilot testing will continue after re-establishing normal plant conditions as defined by governing plans and procedures.

Information contained in PTDP supporting documents is not duplicated in the PTDP. Odor monitoring is conducted during pilot testing in accordance with the OMP. Details on sampling and analysis methods for pilot testing are included in the LSAP and the

BRS Recovered Water Sampling and Analysis Plan, 24852-GPP-GGL-00011 (to be submitted in accordance with Condition I.J of the permit).

The Pilot Test Demonstration is the start of agent operations and commences with the loading of agent and munitions into OPPs at the PCD storage igloos and continues through the completion of the integrated facility demonstration (IFD) with collection of emissions data for the issuance of the Part B permit. Until the the Part B Permit is issued, operations will continue at a rate approved by CDPHE to sustain plant functionality based on periodic reviews during the pilot test phase.

2.2 OBJECTIVES

PCAPP used the Data Quality Objectives (DQO) Process, defined in the U.S. Environmental Protection Agency's *Systematic Planning Using the Data Quality Objectives Process*, to develop performance and acceptance criteria (or data quality objectives) for pilot testing. This process was used (in line with the Scope defined in Section 2.1), to define the appropriate type, quality, and quantity of data required to satisfy objectives. The results of this process are included in Table 2-1.

As shown in Table 2-1, objectives are defined by block (Figure 1-1) as further explained in Section 4.0. For each identified objective, the following information is provided:

- Classification as either originating from a TCP, Operations and/or RCRA permit requirement
- The Problem Statement
- Identification of the Goal
- Identification of information inputs
- Temporal and spatial boundaries
- Logical decision matrix/rules
- Specification of the performance or acceptance criteria
- General description of, or reference to, the plan for execution

Section 4 (Technical Approach) and Appendix A (Block Tests and IFD Plans) provide additional detail to satisfy each objective.

Table 2-1. Pilot Test Demonstration Data Quality Objectives

A1 Block 1, Munitions Receipt and Enhanced Reconfiguration											
A 1 Munitions Unpacking and Projectile/Mortar Disassembly											
	Objective	**Classification**			**Step 1 - State the Problem**	**Step 2 - Identify the Goal**	**Step 3 - Identify information inputs**	**Step 4 - Define the Boundaries**	**Step 5 - Develop a Logical Decision Matrix/Rule**	**Step 6 - Specify the Performance or Acceptance Criteria**	**Step 7 - Develop the Plan**
		TCP	**Opr**	**RCRA**							
1	Demonstrate energetics removal/ handling and disposition and demonstrate the PMD will support the operating schedule.	X	X	X	PMD separation of energetics and miscellaneous parts, no energetics transferred to APB Adequate monitoring of waste to meet TSDF requirement(s)* Throughput supports Operations duration	Removal of: nose closure, fuze cup assembly, booster, and burster achieved Shipment and disposal of waste at TSDF/EDS Process at a rate that supports 85.5 wks or less for the 155-mm campaign	Process Data Acquisition and Recording System (PDARS): • Munition processed (QI8000A-C) • Munitions reconfigured (QI8000A-A) • Munitions rejected (QI8000A-B) Monitoring data TSDF Acceptance criteria*	Spatial: B01 (Munitions Unpacking and Projectile Disassembly), J02 (near-real-time [NRT] monitoring/headspace screening) Temporal: PMD Ramp up Phase of PTD	If first day's processing results in rejects, then stop, evaluate and adjust PMD If rejects identified during ramp up >59, then pause and convene Joint Test Group (JTG) If leaker lot (agent and/or munitions) is identified, then pause and convene JTG If greater than TSDF acceptance monitoring criteria then disposition to EDS (energetics) or treat in SDU (misc parts). Shipment as required per Chemical Materials Agency (CMA) *Bounding Transportation Risk Assessment* (BTRA)	PMD set-up verified and stations performing intended function ≤ 59 rejects during ramp up MME/PME MINICAMS < 0.7 Vapor Screening Level (VSL) Process at a rate that supports 85.5 wks	Appendix A1 24852-SOP-PT-001, *Pilot Test Evolutions* LAMP, 24852-GPP-GGL-00002 24852-GPP-GGL-0301, *Mustard Agent (HD) in Air by MINICAMS®* At commencement of pilot test phase operations, the PMD is operated for limited periods. A single PMD is used during initial processing to minimize potential contamination of the remaining lines should equipment modifications be required as a result of lessons-learned. The PMD is ramped to full operations with data collection continuously.
2	Collect and assess data to validate and/or define critical operating parameters		X	X	Parameters for effective treatment need to be validated	Define PMD critical operating parameters	PDARS (see above) MME/PME MINICAMS	Spatial: B01 (PMD) Temporal: PMD Ramp up Phase of PTD	If operating parameter data impacts minimum acceptable performance, then critical If operating parameter data does not impact minimum acceptable performance, then not critical	≤ 59 rejects during ramp up ≤ 0.01% leaker rate d	Appendix A1 24852-SOP-PT-001, *Pilot Test Evolutions*

* TSDF performance and acceptance criteria will be determined following selection of an appropriate TSDF.

A1 Block 1, Munitions Receipt and Enhanced Reconfiguration

A 1 Munitions Unpacking and Projectile/Mortar Disassembly

	Objective	Classification			Step 1 - State the Problem	Step 2 - Identify the Goal	Step 3 - Identify information inputs	Step 4 - Define the Boundaries	Step 5 - Develop a Logical Decision Matrix/Rule	Step 6 - Specify the Performance or Acceptance Criteria	Step 7 - Develop the Plan
		TCP	Opr	RCRA							
3	Certify monitoring protocol for disposition of dunnage (OPP) relative to agent contamination (K901/K902)†	X		X	Adequate monitoring of waste to meet TSDF requirement(s)*	Treatment in SDU/Autoclave and/or shipment and disposal of waste at TSDF	Monitoring Data Visual Inspection	Spatial: J02 (OPP), B01 (OPP) Temporal: PMD Ramp up Phase of PTD	If no visual evidence and < release level then ship If visual evidence and/or ≥ release level then decontaminate and/or ship to TSDF in accordance with requirements of the BTRA	≥ 0.7 VSL Visible staining and/or liquid	Appendix A1 24852-SOP-PT-001, *Pilot Test Evolutions* *Laboratory Quality Control Plan* (LQCP), 24852-GPP-GGL-00003 LAMP, 24852-GPP-GGL-00002 24852-GPP-GGL-0301, *Mustard Agent (HD) in Air by MINICAMS®* During PMD operations, monitoring protocols are validated in accordance with the LAMP. Precision and Accuracy (P&A) studies and baselines performed during systemization are continued.

A2 Block 2, Munitions Bodies Treatment

A2A Munitions Washout System

	Objective	Classification			Step 1 - State the Problem	Step 2 - Identify the Goal	Step 3 - Identify information inputs	Step 4 - Define the Boundaries	Step 5 - Develop a Logical Decision Matrix/Rule	Step 6 - Specify the Performance or Acceptance Criteria	Step 7 - Develop the Plan
		TCP	Opr	RCRA							
1	Establish ranges and set points to achieve cleanliness of munitions bodies to the extent reasonably possible	X		X	Characteristics of the munition do not allow simple quantification of remaining agent/heel (gravimetric, volumetric, visual)	Minimize agent/heel loading in the MTU	MWS parameters (parameters defined in Appendix A2A) Drained Munitions Weigh Station (DMWS) weight following CAM process MTU parameters (parameters defined in Appendix A2B) MTU exit conveyor MINICAMS Scale variability‡	Spatial: B02 (MWS) thru B03 (MTU) Set points/Alarms for parameters in Appendix A2A and A2B per 24852-SOP-PT-001, Pilot Test Evolutions. Temporal: Steady state (continuous) operational data, throughout pilot test duration	MWS Decision: If operating parameters are not met then stop feed and evaluate. If met, then continue feed DMWS Decision: If DMWS delta weight after wash and weigh cycles is ≤ scale variability‡, feed to MTU If DMWS delta weight after wash and weigh cycles is > scale variability‡, stop and evaluate MWS MTU Decision: If an alarm value is reached on MTU, then stop feed and evaluate If no alarm value is reached on MTU, then continue feed	MWS operations, alarms and interlocks verified DMWS delta weight ≤ scale variability‡ MTU exit conveyor MINICAMS alarm (≥ 0.2 VSL) confirmed MTU alarms for parameters in Appendix A2B per 24852-SOP-PT-001, Pilot Test Evolutions.	Appendix A2A 24852-SOP-PT-001, *Pilot Test Evolutions* Start with MWS design parameters (pressure, time, flow, etc as specified in Appendix A2A). For first 59 munitions, perform wash, weigh at DMWS, rewash for 280 sec, and reweigh to assess delta weight to confirm appropriate wash parameters. In accordance with decision tree, proceed to ramp-up. Rewash any DMWS rejects for 280 s and check delta weight to confirm munitions cleaned to maximum extent possible. Collect data on throughput and availability under established set points and collect parameter data down stream to establish performance baseline (see Appendix A2A and A2B).

† Characterization for other applicable waste codes to be conducted in accordance with the *Wooden Dunnage Sampling and Analysis Plan*, 24852-GPP-GGL-00015.
‡ Scale variability will be established during the systemization phase and incorporated into 24852-SOP-PT-001, *Pilot Test Evolutions*.

A2 Block 2, Munitions Bodies Treatment											
A2A Munitions Washout System											
Objective		**Classification**			**Step 1 - State the Problem**	**Step 2 - Identify the Goal**	**Step 3 - Identify information inputs**	**Step 4 - Define the Boundaries**	**Step 5 - Develop a Logical Decision Matrix/Rule**	**Step 6 - Specify the Performance or Acceptance Criteria**	**Step 7 - Develop the Plan**
		TCP	**Opr**	**RCRA**							
1a	Establish optimal operating ranges and set points	X	X		Optimize MWS operating parameters while maintaining reasonable cleanliness.	Identify the independent and dependent variables and define optimum (sustainable and operable) settings for dependent variables which achieve reasonably clean munitions at a rate that supports an operation duration of 85.5 weeks or less for the 155 Campaign	Design of Experiment (DOE) Throughput (munitions) and availability MWS parameters (parameters defined by DOE in Appendix A2A) DMWS (weight following CAM process) MTU parameters (parameters defined in Appendix A2B) Scale variability‡	Spatial: B02-MWS through B03 - MTU Set points/Alarms for parameters in Appendix A2A and A2B per 24852-SOP-PT-001, Pilot Test Evolutions. Temporal: After establishing ranges/set points demonstrating cleanliness and MTU heel test and before IFD	If DMWS delta weight after double wash and weigh cycles is ≤ scale variability‡, wash parameters were successful If DMWS delta weight after double wash and weigh cycles is > scale variability‡, wash parameters were not successful If munitions throughput for optimized set points supports 85.5 wks or less for the 155-mm campaign, then revise set points/alarms for remainder of Pilot Testing and proceed with normal operations If munitions throughput for optimized set points does not supports 85.5 wks or less for the 155-mm campaign, evaluate limiting conditions, consult CDPHE regarding Permit Reuirements, and take corrective actions	Dependent and independent variables defined Optimum set points for dependent variables provide a sustainable processing rate that supports 85.5 wks or less for the 155mm campaign DMWS delta weights ≤ scale variability‡ MTU alarms for parameters in Appendix A2B per 24852-SOP-PT-001, Pilot Test Evolutions.	Appendix A2A 24852-SOP-PT-001, *Pilot Test Evolutions* After ranges and set points that achieve cleanliness of munitions bodies to the extent reasonably possible are demonstrated, perform a DOE to define the dependent and independent variables impacting system throughput and resulting munitions cleanliness. The experimental design developed using ECHIP® Design of Experiments Software includes pressure, time and agent lot. After testing, ECHIP® or other statistical and mathematical software will develop two- and three-dimensional (2-D, 3-D) response surfaces showing the impact of these variables on measured results (delta weight). Optimum set points for dependent variables that achieve optimal overall cycle time (i.e., sustained processing with lower downtime) while maintaining reasonable cleanliness will be established. An additional 59 rounds will be processed under optimized parameters to verify reasonable cleanliness by assessing the observed change in weight following double washes. A demonstration period of 4 hours is performed to verify throughput objectives are met, including < 1% incompletely washed rounds and < 1% False Rejects..
1b	Collect and assess data to validate and/or define critical operating parameters for the MWS		X	X	See objectives "Establish ranges and set points to achieve cleanliness of munitions bodies to the extent reasonably possible" and "Establish optimal operating ranges and set points"						

A2 Block 2, Munitions Bodies Treatment												
A2A Munitions Washout System												
Objective		**Classification**			**Step 1 - State the Problem**	**Step 2 - Identify the Goal**	**Step 3 - Identify information inputs**	**Step 4 - Define the Boundaries**	**Step 5 - Develop a Logical Decision Matrix/Rule**	**Step 6 - Specify the Performance or Acceptance Criteria**	**Step 7 - Develop the Plan**
		TCP	**Opr**	**RCRA**							
2	Confirm maximum munitions' body weight limit at DMWS (within the MTU system) is sufficient to allow confirmation of a breached munition	X	X	X	An improper set point, because of the variation in munition's characteristics, may result in excessive false rejects	Minimize false rejects	DMWS weight Munitions lot Munitions type MWS linear stroke (confirmation of munitions breach) MTU parameters (parameters defined in Appendix A2B)	Spatial: B02 (MWS) and B03 (MTU) Temporal: First cumulative 384 munitions used to validate or reset the set point. Set point re-evaluated or reset at 8,000 munitions processed. Continue evaluation every 8,000 rounds through IFD	During first 59 rounds, if any incompletely washed rounds are observed or if ≥ 2 false rejects are identified, convene JTG to evaluate data and develop path forward. If ≥ 1% incompletely washed rounds are observed during first 384 rounds or after 8000 rounds, convene JTG to evaluate data and develop path forward; if not proceed. If the false reject rate for first 384 rounds is ≥ 1% , then reset the DMWS set point. If the false reject rate is < 1% accept the value and re-evaluate at 8,000 rounds If the false reject rate for first 8000 rounds is ≥ 0.1%, then reset the DMWS set point value and continue to collect data If the false reject rate is < 0.1% accept the set point value and proceed to routine operations If an alarm value is reached on MTU, then stop feed and evaluate; If not, continue feed If SD > 1.5 lbs observed, convene JTG to review data and determine path forward.	False reject rate < 1% at 384 munitions and < 0.1% at 8,000 munitions and beyond Incompete wash rate < 1% at 384 munitions and at 8,000 munitions and beyond.	Appendix A2A 24852-SOP-PT-001, *Pilot Test Evolutions* First 59 munitions processed will be washed, weighed, rewashed for 280 sec and weighed (see "Establish ranges and set points to achieve cleanliness of munitions bodies to the extent reasonably possible"). If no incompletely washed rounds and < 2 false rejects are observed continue processing munitions while collecting weight data and false reject rate. If not, convene JTG. After a cumulative of 384 munitions are processed, evaluate data. If ≥ 1% incompletely washed rounds are observed convene JTG to evaluate data and develop path forward. If the false reject rate is ≥ 1%, reset the DMWS set point to the mean + 3 standard deviation (SD) (unless SD ≥ 1.5 lbs) and continue to collect data. If not, maintain set point and continue to collect data. After 8000 munitions, reassess set point. If ≥ 1% incompletely washed rounds are observed convene JTG to evaluate data and develop path forward. If the false reject rate is ≥ 0.1%, reset the DMWS set point to the mean + 3SD (unless SD ≥ 1.5 lbs) and continue to collect data. If false reject rate is < 0.1% proceed with normal operations. If after an additional 8000 munitions the false reject rate is ≥ 0.1%, convene JTG to evaluate data and develop path forward. If not, proceed with normal operations and reevaluate false reject and incompletely washed rate every 8000 rounds through the IFD. Monitor MTU parameters to ensure reasonable cleanliness.

A2 Block 2, Munitions Bodies Treatment											
A2B Munitions Treatment Unit											
	Objective	**Classification**			**Step 1 – State the Problem**	**Step 2 – Identify the Goal**	**Step 3 – Identify information inputs**	**Step 4 – Define the Boundaries**	**Step 5 – Develop a Logical Decision Matrix/Rule**	**Step 6 – Specify the Performance or Acceptance Criteria**	**Step 7 – Develop the Plan**
		TCP	**Opr**	**RCRA**							
1	Evaluate stack emissions under MWS process upset condition in which munitions bodies known to contain residual agent are fed to the MTU			X	Currently, there is an unquantified impact to emissions that may impact the MPHRA risk analysis during MWS process upset conditions (agent/heel)	Assess or quantify the impact of agent/heel MWS process upset conditions to the PCAPP MPHRA thresholds§ and CDPHE MPHRA benchmark* Identify which of the following test parameters best correlates w/ process upset conditions • Current to heated zones (power input) • Zone temperatures • Offgas vent flow • Offgas vent temperature • MTU exhaust carbon dioxide (CO_2)	Agent/heel processed in MTU (number unwashed rounds processed through MTU) An estimated processing time, developed prior to conducting the heel tests, that will allow collection of valid emissions data (estimated xx hours for unwashed round period at specified throughput) AFA sampling for agent; stack emissions sampling for COPCs, metals, acid gases, particulates, and dioxins/furans PCAPP Emissions calculation Baseline MTU parameter data (established during completion of A2A objective 1, "Establish ranges and set points to achieve cleanliness of munitions bodies to the extent reasonably possible") Post-MTU bin munitions weight for 100% loading test Paint loss of 0.15 lb/rnd**	Spatial: B02 (MWS) through M07 (AFA) Temporal: After MTU steady state is achieved and processing time determined by emissions requirements. Evaluation of heel levels and OTS demo completed prior to test execution.	If system performance not verified and/or agent readings observed, pause and convene JTG to review data and make recommendation for a path forward. If system performance verified and agent readings not observed, then proceed.	Data quality requirements (DQR) per LSAP and LQCP Sustained feed rate for duration of the run ≤1.6 tons/yr SO_2 ≤ 30 ppmv HCl ≤ 13 ppmv Cl_2 ≤ 23 mg/dscm particulates†† ≤ 13 ng/dscm dioxin/furans†† < MPHRA thresholds§ ≤ CDPHE MPHRA benchmark *	Appendix A2B and A6 24852-SOP-PT-001, Pilot Test Evolutions LSAP, 24852-GPP-GGL-00013 MTU Heel Test – Evaluation of potential MWS upset conditions on site emissions by processing a calculated and controlled number of unwashed rounds (the heel test). Once MTU steady state is achieved with drained and rinsed munitions, commence feeding drained/washed and drained/unwashed rounds at a frequency required for the specific test. Three processing periods will be performed which gradually ramp the calculated heel feed rate to the maximum calculated feed rate of 23.4 lbs/hr (i.e., 25%, 50%, 100% of 23.4 lbs/hr). Processing rate will be as established during completion of A2A objective 1, "Establish ranges and set points to achieve cleanliness of munitions bodies to the extent reasonably possible" Weigh munitions bodies bin during final run incorporating maximum number of unwashed rounds/hr and compare cumulative weight with feed weight after consideration for paint losses during processing.
2	Recycle munitions bodies		X	X	If munitions bodies fail scrap metal exemption, they are a listed hazardous waste	Achieve scrap metal exemption	MINICAMS Bin Sampling and analysis result	Spatial: Munitions Body Bin Temporal: Cool down time to reach 120°F Number of samples: 3 bins plus confirmation during heel test (2 bins per heel test)	If headspace successfully sampled and analyzed < 0.00002 mg/m^3, then scrap metal exemption requested If headspace not successfully sampled and analyzed (i.e., results ≥ 0.00002 mg/m^3), then convene JTG to evaluate data and develop path forward.	Data quality per LSAP/LQCP < 0.00002 mg/m^3	Appendix A2B 24852-SOP-PT-001, *Pilot Test Evolutions* LSAP, 24852-GPP-GGL-00013 Collect munitions in bin, allow munitions to cool down to 120°F, sample and analyze headspace.

§ Evaluation of emissions against MPHRA thresholds is discussed within *Summary Plan for Evaluating Pilot Test Data against MPHRA*, 24852-30H-000-L0003.
* "CDPHE MPHRA benchmark" is a maximum estimated lifetime cancer risk to any human receptor of a risk level of 1 in a million (i.e., 1.0 E-06), a maximum estimated combined Hazard Index (HI) to any human receptor of 0.25, or a total acute HI for any receptor of 1.0.
** Value per *Process Flow Diagram, Munitions Treatment Unit Material Balance – 155mm Munitions*, 24852-RD-M5-B03-B0003 considering loss of organics and paint chips.
†† These standards are adjusted for oxygen and may be revised in consultation with CDPHE.

A2 Block 2, Munitions Bodies Treatment											
A2B Munitions Treatment Unit											
Objective		**Classification**			**Step 1 – State the Problem**	**Step 2 – Identify the Goal**	**Step 3 – Identify information inputs**	**Step 4 – Define the Boundaries**	**Step 5 – Develop a Logical Decision Matrix/Rule**	**Step 6 – Specify the Performance or Acceptance Criteria**	**Step 7 – Develop the Plan**
		TCP	**Opr**	**RCRA**							
3	Control paint chips, ash, dust and COPCs			X	Release of paint chips, ash, dust and COPCs to the environment and/or resulting in a health hazard	No gross accumulation of paint chips, ash or dust in areas open to the environment; COPCs, total dust, and heavy metals below the Airborne Exposure Limits (AEL)‡‡	Sampling and analysis data: - MTU room sampling for total dust and metal - Bin sampling for COPCs - Administrative controls (i.e., housekeeping inspections) Visual Inspections	Spatial: B03 (MTU) through Munitions Body Bin Enclosure (MBBE) apron and cooling area Total Dust and Metals within the MTU Room, Visual observation of residue accumulation within MBBE and apron Temporal: Total dust and metals sampling during a minimum of 3 sample periods during full-rate MTU operations and during MTU Heel Test Visual inspections: Daily Bin samples: First 3 bins filledplus confirmation during heel test (2 bins/ramp test for total of 6 bins)	If no build-up of residues is observed and sample results < AELs‡‡, continue testing. If build-up is observed or sample results are ≥ AELs‡‡, pause and convene JTG to evaluate data and path forward.	Sampling/Analysis Data Quality Requirements met per standard methods No build-up of residues Sample results < AELs‡‡	Appendix A2B 24852-SOP-PT-001, *Pilot Test Evolutions* Workspace total dust and metals air samples are collected within I MTU room) in accordance with *PCAPP Industrial Hygiene Implementation Plan* (IHIP), 24852-30G-GHX-00034 during periods of full MTU throughput. If results ≥ AELs, the JTG is convened to determine the path forward. The MBBE and MBBE apron are inspected daily to confirm absence of residue accumulation. If residue build-up is observed, the JTG is convened to develop path forward. Bins are allowed to cool and sampled for COPCs and dioxins/furans per LSAP, 24852-GPP-GGL-00013. If COPC results ≥ AELs, the JTG is convened to determine path forward.
4	Demonstrate loss of PRRS does not result in unacceptable emissions during clearing of munitions bodies in the MTU		X	X	Release of paint chips, ash and dust to the environment and/or resulting in a health hazard	No gross accumulation of paint chips, ash or dust in areas open to the environment; total dust and heavy metals below the AELs‡‡	Sampling and analysis data Administrative controls (i.e., housekeeping inspections) Visual Inspections	Spatial: B03 (MTU) through MBBE apron Total Dust and Metals within the MTU Room, Visual observation of residue accumulation within MBBE and apron Temporal: After completing initial confirmation that dust/COPCs are not being released from MTU process; Continuous run without PRRS operations	If no build-up of residues is observed and sample results < AELs‡‡, evaluate need for continuous PRRS operations. If build-up is observed or sample results are ≥ AELs‡‡, PRRS operations is required during normal MTU operations.	Sampling/Analysis Data Quality Requirements met per standard methods No build-up of residues Sample results < AELs‡‡	Appendix A2B 24852-SOP-PT-001, *Pilot Test Evolutions* IHIP, 24852-30G-GHX-00034 During continuous run without PRRS operating collect workspace total dust and metals air samples at locations conducted during normal MTU operations.

‡‡ AELs is used here to include American Conference of Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs®) and Occupational Safety and Health Administration (OSHA) Permissible Exposure Levels (PEL). In a few select instances (e.g., specific metals), OSHA PELs are lower than ACGIH TLV. The lower of the two values, as determined by Certified Industrial Hygienist is used.

A2 Block 2, Munitions Bodies Treatment

A2B Munitions Treatment Unit

	Objective	Classification			Step–1 - State the Problem	Step–2 - Identify the Goal	Step–3 - Identify information inputs	Step–4 - Define the Boundaries	Step–5 - Develop a Logical Decision Matrix/Rule	Step–6 - Specify the Performance or Acceptance Criteria	Step–7 - Develop the Plan
		TCP	Opr	RCRA							
5	Collect and assess data to validate and/or define critical operating parameters for the MWS/MTU		X	X	See objectiv“s "Establish ranges and set points to achieve cleanliness of munitions bodies to the extent reasonably possi”le" a“d "Establish optimal operating ranges and set poi”ts"						
6	Demonstrate MTU throughput supports the duration of the operations phase	X			MTU availability and throughput are limiting factors for plant operations	Process at a rate that supports an operation schedule duration of 85.5 weeks or less for the 155 Campaign	Throughput (munitions) and availability	Spatial: B03 (MTU) lines 1 & 2 Temporal: Duration of pilot testing	If munitions throughput does not support 85.5 wks or less for the 155-mm campaign, then evaluate limiting conditions, consult with CDPHE regarding Permit requirements, and take correction actions If met, continue to monitor throughput	Processing rate supports 85.5 wks or less for the 155-mm campaign	Appendix A2B 24852-SOP-PT-001, *Pilot Test Evolutions* Demonstrate operation of MTU for the collection of data necessary to confirm throughput and availability

A3 Block 3, Agent Collection and Neutralization

A3A Agent/Water Separator

	Objective	Classification			Step–1 - State the Problem	Step–2 - Identify the Goal	Step–3 - Identify information inputs	Step–4 - Define the Boundaries	Step–5 - Develop a Logical Decision Matrix/Rule	Step–6 - Specify the Performance or Acceptance Criteria	Step–7 - Develop the Plan
		TCP	Opr	RCRA							
1	Control the concentration of agent in the Agent Neutralization Reactor		X		PC’PP's agent recipe is dependent upon the agent water separation	Achieve separation to ensure washwater specific gravity is ≤ 1.02 and agent concentrate specific gravity is ≥ 1.25	AWS Agent Concentrate Coriolis Flow Meter (FIT-0976AA/AB/BA/BB) AWS Agent Concentrate Coriolis Density Meter (DIT-0976AA/AB/BA/BB) AWS Washwater Coriolis Meter Flow Meter (FIT-0981) AWS Washwater Coriolis Meter Density Meter (DIT-0981) Separation time as determined by MWS/ANR throughputs	Spatial: B04/B05 Systems Set points/Alarms for parameters in Appendix A3A per 24852-SOP-PT-001, Pilot Test Evolutions. Temporal: Initial verification during ramp followed by OTS Demonstration (integrated APB operations)	If separation achieved with slow ramp-up, then proceed with AWS Demo (integrated APB operations); if not, convene JTG to evaluate data and develop path forward If during AWS Demonstrati2-9oriolislis readings are in-line with set points proceed with routine operations; if not, convene JTG to evaluate data and develop path forward	AWS washwater specific gravity ≤ 1.02 AWS agent concentrate specific gravity ≥ 1.25	Appendix A3A 24852-SOP-PT-001, *Pilot Test Evolutions* Ramp-up: Validate set points at high separation times (i.e., slow ramp-up of MWS and ANR) and demonstrate set points as separation times approach design separation times (approximately 100 minutes). If separation is not achieved during continuous flow operations, convene JTG to evaluate data and develop path forward.
2	Collect and assess data to validate and/or define critical operating parameters for the AWS		X	X	See objectiv“s "Control the concentration of agent in the Agent Neutralization Reac”or" a“d "Demonstrate agent destruction with agent loadings up to 15 wt% agent concentr”te"						

A3B Agent Hydrolyzers and Hydrolysate Hold Tank											
Objective		**Classification**			**Step–1 - State the Problem**	**Step–2 - Identify the Goal**	**Step–3 - Identify information inputs**	**Step–4 - Define the Boundaries**	**Step–5 - Develop a Logical Decision Matrix/Rule**	**Step–6 - Specify the Performance or Acceptance Criteria**	**Step–7 - Develop the Plan**
		TCP	**Opr**	**RCRA**							
1	Demonstrate agent destruction with agent loadings up to 15 wt% agent concentrate	X		X	Validate scale-up of ABCDF ANRs for agent loadings from 0 to 15 wt% agent concentrate	Demonstrate agent neutralization with variable agent loading	pH (AI-7108A/B) Glovebox sample AWS Agent Concentrate Coriolis Flow Meter (FIT-0976AA/AB/BA/BB) AWS Agent Concentrate Coriolis Flow Density Meter (DIT-0976AA/AB/BA/BB) ANR Agent Concentrate Flow Totalizer (FQIS-0976AA/(BA)/AB/(BB) Washwater flow to ANR (FIT-7062) Spent Decon flow to ANR (FIT-7042)	Spatial: B04 (Agent Collection and Neutralization)-B05 (Toxic Storage and Spent Decon) (excludes steady state systems e.g., Caustic Feed Tank, boilers, etc) Set points/Alarms for parameters in Appendix A3A and A3B per 24852-SOP-PT-001, Pilot Test Evolutions. Tempor–l - Pilot Test Demonstration through completion of high agent loading batches	If any batch is not successful, reprocess in agent hydrolyzers; if successful transfer to 30-day storage tanks If 8.6 wt% batch successful perform ANR OTS Demo; if not, convene JTG to evaluate data and path forward If OTS demonstration successful, perform 2 ea 15 wt% batches; if not successful, perform 2 ea 12 wt% batches If high agent loading successful, repeat for total of 6 high-agent-loading batches; if not, convene JTG	Glovebox samp–e - no visually observable organic phase, non-detect for HD, pH≥ 10	Appendix A3B 24852-SOP-PT-001, *Pilot Test Evolutions* 24852-GPP-GGL-0204, *Mustard Agent in HD/HT Water Hydrolysate* LSAP, 24852-GPP-GGL-00013 Testing builds upon the operational experience from the Aberdeen Chemical Agent Disposal Facility (ABCDF). After successfully demonstrating agent neutralization with batches up to 8.6 wt% agent concentrate loading (initial batches will be washwater only batches), commence high-agent-loading testing with two batches at 15 wt% agent concentrate. If successful, additional batches at 15 wt% agent concentrate are performed. If not successful, 12 wt% agent concentrate batches are performed. Up to six high-agent-loading batches are performed.
2	Demonstrate agent destruction with no agitator		X		Validate lessons-learned from ABCDF to account for no agitator operations	Demonstrate agent destruction without agitator	PDARS (key parameters in Appendix A3A and A3B) LIMS	Spatial: B04 (Agent Collection and Neutralization)-B05 (Toxic Storage and Spent Decon) (excludes steady state systems e.g., Caustic Feed Tank, boilers, etc) Set points/Alarms for parameters in Appendix A3A and A3B per 24852-SOP-PT-001, Pilot Test Evolutions. Temporal – Eight batches performed following high agent loading batches and before integrated facility demonstration.	If any batch is not successful, reprocess in agent hydrolyzers; if successful transfer to 30-day storage tanks. If reprocess is not successful, reprocess with agitator.	Glovebox sampe - no visually observable organic phase, non-detect for HD, pH≥ 10	Appendix A3B 24852-SOP-PT-001, *Pilot Test Evolutions* 24852-GPP-GGL-0204, *Mustard Agent in HD/HT Water Hydrolysate* LSAP, 24852-GPP-GGL-00013 Testing builds upon the operational experience from the ABCDF. 1After successfully demonstrating agent neutralization at 8.6 wt%, four batches will be performed at 8.6 wt% without the reactor agitator. After successfully demonstrating high agent loading batches, and, if 8.6 wt% batches without agitator are successful, an additional four batches will be performed at the highest successful agent loading demonstrated without the agitator.

A3B Agent Hydrolyzers and Hydrolysate Hold Tank											
Objective		**Classification**			**Step 1 - State the Problem**	**Step 2 - Identify the Goal**	**Step 3 - Identify information inputs**	**Step 4 - Define the Boundaries**	**Step 5 - Develop a Logical Decision Matrix/Rule**	**Step 6 - Specify the Performance or Acceptance Criteria**	**Step 7 - Develop the Plan**
		TCP	**Opr**	**RCRA**							
3	Demonstrate throughput can support the project schedule.	X	X		ANR throughput supports 85.5 weeks or less for the 155 mm campaign	Batch cycle time of ≤ 10 hrs (3.5 hrs process time per batch and 6.5 hrs hold for sample collection/analysis)	PDARS (key parameters in Appendix A3A and A3B) LIMS	Spatial: B04 (ANS), Laboratory Temporal: OTS-ANR Demonstration	If reactor batch time ≤ 3.5 hrs and sample collection and analysis is ≤ 6.5 hrs, then criteria met; if not, convene JTG to evaluate data and path forward	Reactor batch time ≤ 3.5 hrs and sample collection and analysis is ≤ 6.5 hrs	Appendix A3B 24852-SOP-PT-001, *Pilot Test Evolutions* 24852-GPP-GGL-0204, *Mustard Agent in HD/HT Water Hydrolysate* LSAP, 24852-GPP-GGL-00013 Collect cycle time data during execution of OTS-ANR demonstration to demonstrate Agent Hydrolyzer and Hydrolysate Hold Tank batch sequence times support the operations schedule.
4	Collect and assess data to validate and/or define critical operating parameters for the ANR		X	X	See objectives "Control the concentration of agent in the Agent Neutralization Reactor", "Demonstrate agent destruction with agent loadings up to 15 wt% agent concentrate", and “Demonstrate agent destruction with no agitator”						

A4 Block 4, Hydrolysate Treatment and Water Recovery											
A4A Biotreatment System											
	Objective	**Classification**			**Step 1 - State the Problem**	**Step 2 - Identify the Goal**	**Step 3 - Identify information inputs**	**Step 4 - Define the Boundaries**	**Step 5 - Develop a Logical Decision Matrix/Rule**	**Step 6 - Specify the Performance or Acceptance Criteria**	**Step 7 - Develop the Plan**
		TCP	**Opr**	**RCRA**							
1	Demonstrate removal of thiodiglycol (TDG) from hydrolysate waste stream.	X	X	X	BTS operations have not been demonstrated at full-scale. As such, TDG removal at design flow rates has not been demonstrated.	BTS throughput supports APB hydrolysate generation while optimizing TDG removal	Flowrate / hydraulic residence time (HRT) TDG, and dissolved organic carbon (DOC) concentrations in feed and effluent Process Parameters: pH Temperature Dissolved oxygen (DO) nutrient feed	Spatial: B04 (30 Day Storage Tanks); B09 (BioTreatment System) Set points/Alarms for parameters in Appendix A4A per 24852-SOP-PT-001, Pilot Test Evolutions. Temporal: BTS Start-up (2 HRT) and BTS Demonstration (2 HRT)	If BTS Start-up demonstrates ≥ 86%§§ TDG removal, feed rate supports operating schedule, and BRS distillate meets water recovery criteria, then perform BTS Demo. If BTS Start-up does not demonstrate ≥ 86%§§ TDG removal and/or feed rate does not support operating schedule, then pause and convene JTG to evaluate data and path forward. If BTS Demo demonstrates ≥ 86%§§ TDG removal, feed rate supports operating schedule, and BRS distillate meets water recovery criteria, then perform IFD. If BTS Demo demonstrates ≥ 86%§§ TDG removal and/or feed rate does not support operating schedule, then pause and convene JTG to evaluate data and path forward.	2 HRTs with ≥ 86%§§ TDG removal at 5,981 lbs hydrolysate/hour (or equivalent Process Design Throughput and Availability Analysis [TAA], 24852-RD-30V-000-B0001, quantity) and BRS distillate meets water recovery criteria for BTS effluent 2 HRTs with ≥ 86%§§ TDG removal at equivalent of 5,981 lbs hydrolysate/hour (or equivalent TAA quantity) and BRS distillate meets water recovery criteria for BTS effluent	Appendix A4A 24852-SOP-PT-001, Pilot Test Evolutions LSAP, 24852-GPP-GGL-00013 BTS will be started up until required modules are processing at the feed rate required to support 155 mm schedule and changeover for a minimum of 2 HRT at ≥ 95% TDG removal. If > 95% TDG removal is not achieved, but > 86% TDG removal is achieved, the resulting BRS effluent satisfies permit requirements for recycle, and the JTG determines operational enhancements are not available to improve performance, the BTS will enter the demonstration phase. Demonstration involves operation for 2 HRTs at the feed rate required to support 155 mm schedule and changeover to demonstrate TDG removal satisfies pilot test objectives. During start-up and demonstration, operating parameters to demonstrate acceptable TDG removal at the required facility feed rates will be refined and/or validated for continued operations.

§§ 86% is linked to an effluent concentration of ≤ 0.1 wt% TDG at a TDG feed concentration of 7,000 mg/L. PCAPP intends to operate the modules with consistent TDG removal of ≥ 95% as defined in SOP 24852-SOP-B09-W00001, *Biotreatment and Off-gas Treatment*. However, if the system is demonstrating stable operations with consistent TDG removal resulting in maximum effluent concentrations of 0.1 wt% (corresponding to ≥ 86% removal at a feed rate of 7000 mg/L) BRS effluent satisfies permit requirements for recycle, and the JTG determines operational enhancements are not available to improve performance, pilot testing will proceed.

A4 Block 4, Hydrolysate Treatment and Water Recovery											
A4A Biotreatment System											
Objective		**Classification**			**Step 1 - State the Problem**	**Step 2 - Identify the Goal**	**Step 3 - Identify information inputs**	**Step 4 - Define the Boundaries**	**Step 5 - Develop a Logical Decision Matrix/Rule**	**Step 6 - Specify the Performance or Acceptance Criteria**	**Step 7 - Develop the Plan**
		TCP	**Opr**	**RCRA**							
2	Control COPC and odor emissions in air			X	COPC emissions in excess of MPHRA thresholds, CDPHE MPHRA benchmark*, and/or ineffective odor control	Validate design maintains COPC emissions below MPHRA thresholds*** or, if not, the CDPHE MPHRA benchmark*, and provides effective odor odor control	B11 Carbon Baseline B11 Carbon Periodic Sampling per vendor procedure B11 Stack, Pre-Filter Units and between filter unit COPCs Odor monitoring in accordance with OMP BTS OTS parameters (parameters defined in Appendix A4A)	Spatial: B11 (OTS) COPCs and predictive bed life sampling of lead filter unit; site to installation fenceline Set points/Alarms for parameters in Appendix A4A per 24852-SOP-PT-001, Pilot Test Evolutions. Temporal: BTS Start-up, BRS Ramp-up, and IFD	If pre-filter COPC ≥ MPHRA thresholds and post-filter COPC < MPHRA thresholds continue to evaluate correlation of COPC data with carbon activity. If post-filter COPC < MPHRA thresholds, continue to next phase of testing and confirm findings during IFD. If post-filter COPC > MPHRA thresholds, conduct MPHRA update. If MPHRA update is below the CDPHE MPHRA benchmark*, continue to next phase of testing and confirm findings during IFD. If the IFD MPHRA update (pre-filter) is below CDPHE MPHRA benchmark*, evauate whether the JTG will recommend to CDPHE that carbon change out be based only on Agent. If the IFD MPHRA update, based on pre-filter data is greater than the CDPHE MPHRA benchmark*, rerun MPHRA with postfilter data. If any MPHRA update indicates an overall risk greater than the CDPHE MPHRA benchmark*, suspend testing, contact CDPHE, and convene JTG.	Odor detection per OMP < CDPHE MPHRA benchmark* < MPHRA thresholds***	Appendix A4A 24852-SOP-PT-001, *Pilot Test Evolutions* LSAP, 24852-GPP-GGL-00013 OMP, 24852-GPP-GGG-V0018 *Carbon Sampling Strategy,* 24852-30H-000-W0004 Perform COPC and carbon sampling when BTS module 1 is at full flow of hydrolysate or in response to odor detections per OMP. If pre-carbon COPCs are less than MPHRA thresholds, confirm findings during IFD. If the IFD MPHRA update (precarbon) is below CDPHE MPHRA benchmark*, evauate whether the JTG will recommend to CDPHE that carbon change out be based only on Agent. If the IFD MPHRA update (precarbon) is greater than the CDPHE MPHRA benchmark*, then evaluate correlation between carbon sampler data and COPC emission rates to determine if carbon changeout strategy can be developed to ensure continued reduction in COPC emissions. If change in carbon butane activity is observed that correlates with increased COPC emissions, perform carbon changeout based on butane activity. If IFD MPHRA indicates an overall risk greater than the CDPHE MPHRA benchmark*, suspend testing, contact CDPHE, and convene JTG, CDPHE will work with PCAPP to determine the potential use of a site specific risk assessment. If, after revision, the IFD MPHRA update (postcarbon) continues to indicate an overall risk greater than the CDPHE MPHRA benchmark*, suspend testing, contact CDPHE, and convene JTG.
3	Collect and assess data to validate and/or define critical operating parameters for the BTS		X	X	See objectives "Demonstrate removal of TDG and other organics from hydrolysate waste stream." and "Control fugitive COPC emissions "						

* "CDPHE MPHRA benchmark" is a maximum estimated lifetime cancer risk to any human receptor of a risk level of 1 in a million (i.e., 1.0 E-06), a maximum estimated combined Hazard Index (HI) to any human receptor of 0.25, or a total acute HI for any receptor of 1.0.

*** Evaluation of emissions against MPHRA thresholds is discussed within *Summary Plan for Evaluating Pilot Test Data against MPHRA*, 24852-30H-000-L0003.

A4B Brine Reduction System											
Objective		**Classification**			**Step 1 - State the Problem**	**Step 2 - Identify the Goal**	**Step 3 - Identify information inputs**	**Step 4 - Define the Boundaries**	**Step 5 - Develop a Logical Decision Matrix/Rule**	**Step 6 - Specify the Performance or Acceptance Criteria**	**Step 7 - Develop the Plan**
		TCP	**Opr**	**RCRA**							
1	Validate BRS operating ranges and set points required to produce a distillate acceptable for reuse in the facility at a throughput that supports Operations schedule.	X	X	X	Full-scale demonstration of BRS ability to treat ICB effluent to standards allowing reuse of distillate water has not been previously performed. Inability to recycle BRS effluent will require off-site disposal of a hazardous waste	Recycle BRS effluent to the Plant	Sampling and analysis of BRS effluent PDARS (key parameters in Appendix A3B) Sampling upstream, between and downstream of Distillate Carbon Process Data (TSS) Free Liquids Test of filtercake Throughput Analytical methods' defined tolerance, precision and bias	Spatial: B14 (WRS), B12 (BRS) and M16 (Process Water Tank) Set points/Alarms for parameters in Appendix A4B per 24852-SOP-PT-001, Pilot Test Evolutions. Temporal: BRS Ramp-up	If the analytical data complies with BRS SAP criteria, then recycle water and proceed to the IFD using established operating ranges and process parameters If the analytical data does not comply with BRS SAP criteria, pause and convene the JTG to evaluate the data and determine path forward. If throughput supports the Operations schedule, then proceed to IFD using established operating ranges and process parameters. If throughput does not support the Operations schedule, then convene the JTG to review data and determine the path forward.	BRS SAP criteria Throughput supports 155 mm schedule and changeover	Appendix A4B 24852-SOP-PT-001, *Pilot Test Evolutions* *BRS Recovered Water Sampling and Analysis Plan* (BRS SAP), 24852-GPP-GGL-00011 After BTS start-up is sufficient to support continued BRS operations, start-up BRS. Monitor BRS process control indicators. Validate process parameters (to include distillate carbon changeout criteria) provide distillate that satisfies BRS SAP criteria for reuse in the facility. Collect samples upstream, between, and downstream of distillate carbon filters to define the changeout schedule for carbon filters.

A4B Brine Reduction System											
Objective		**Classification**			**Step 1 - State the Problem**	**Step 2 - Identify the Goal**	**Step 3 - Identify information inputs**	**Step 4 - Define the Boundaries**	**Step 5 - Develop a Logical Decision Matrix/Rule**	**Step 6 - Specify the Performance or Acceptance Criteria**	**Step 7 - Develop the Plan**
		TCP	**Opr**	**RCRA**							
2	Control COPC and odor emissions in air			X	COPC emissions in excess of MPHRA thresholds, CDPHE MPHRA benchmark*, and/or ineffective odor control	Validate design maintains COPC emissions below MPHRA thresholds††† or risk/hazard below CDPHE MPHRA benchmark*, and provides effective odor control	B12 Carbon Baseline B12 Carbon Periodic Sampling per vendor procedure B12 Stack, Pre Filter Units, and between filter units COPCs sampling Odor monitoring in accordance with OMP BRS/WRS OTS parameters (parameters defined in Appendix A4B)	Spatial: B14 (WRS), B12 (OTS) COPCs and predictive bed life sampling of lead filter unit; site to installation fenceline Temporal: BTS Start-up, BRS Ramp-up and IFD	If odor detected, conduct pre-filter/stackCOPC sampling. If pre-filter COPC ≥ MPHRA thresholds and post-filter COPC < MPHRA thresholds evaluate correlation of COPC data with carbon activity. If post-filter COPC > MPHRA thresholds, conduct MPHRA update. If MPHRA update is below the CDPHE MPHRA benchmark*, continue to next phase of testing and confirm findings during IFD. If the IFD MPHRA update, based on pre-filter data is greater than the CDPHE MPHRA benchmark*, rerun MPHRA with postfilter data. If any MPHRA update indicates an overall risk greater than the CDPHE MPHRA benchmark*, suspend testing, contact CDPHE, and convene JTG.	odor detection per OMP < CDPHE MPHRA benchmark* < MPHRA thresholds†††	Appendix A4B 24852-SOP-PT-001, *Pilot Test Evolutions* LSAP, 24852-GPP-GGL-00013 OMP, 24852-GPP-GGG-V0018 *Carbon Sampling Strategy,* 24852-30H-000-W0004
3	Collect and assess data to validate and/or define critical operating parameters for the BRS		X	X	See objectives "Validate BRS operating ranges and set points and assess throughput to support Operations schedule." and "Control fugitive COPC emissions "						

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††† Evaluation of emissions against MPHRA thresholds is discussed within *Summary Plan for Evaluating Pilot Test Data against MPHRA*, 24852-30H-000-L0003.

A5 Block 5, Supplemental Decontamination											
A5A Supplemental Decontamination Unit											
Objective		**Classification**			**Step 1 - State the Problem**	**Step 2 - Identify the Goal**	**Step 3 - Identify information inputs**	**Step 4 - Define the Boundaries**	**Step 5 - Develop a Logical Decision Matrix/Rule**	**Step 6 - Specify the Performance or Acceptance Criteria**	**Step 7 - Develop the Plan**
		TCP	**Opr**	**RCRA**							
1	Demonstrate decontamination operations and waste handling and disposition	X	X		Accumulation of secondary waste requiring decontamination prior to shipment impacting schedule	Minimize waste generation and accumulation and demonstrate SDU ability to treat secondary waste to acceptable level for shipment to TSDF	Generator knowledge Monitoring data (MINICAMS distal sample ID AE-9438) Time, temperature, flow, visual inspection for liquids	Spatial: B24 (SDU) and J02 (monitoring) Wastes generated in ERB, APB and AFA Set points/Alarms for parameters in Appendix A5A per 24852-SOP-PT-001, Pilot Test Evolutions. Temporal: Processing of three batches	If < release level, package for off-site shipment in accordance with the WAP. If ≥ release level, reprocess or package for off-site shipment in accordance with the WAP and BTRA	< 1.0 VSL < 117 VSL per BTRA	Appendix A5A 24852-SOP-PT-001, *Pilot Test Evolutions* SDU testing involves the demonstration of operational procedures compliance and collection of data during processing of a minimum of three batches, consisting of diverse waste expected to be processed during agent operations.
2	Certify the monitoring protocol for waste disposal in accordance with the Laboratory Quality Control Plan (LQCP), 24852-GPP-GGL-00003 to meet TSDF performance and acceptance criteria.	X	X		Adequate monitoring of waste to meet TSDF requirement(s)	Treatment in SDU and disposal of waste at TSDF	Monitoring Data (MINICAMS distal sample ID AE-9438) Visual Inspection	Spatial: B24 (SDU) and J02 (Monitoring) Wastes generated in ERB, APB and AFA Set points/Alarms for parameters in Appendix A5A per 24852-SOP-PT-001, Pilot Test Evolutions. Temporal: Processing of three batches	If < release level then ship in accordance with the WAP If ≥ release level, then reprocess and/or ship to approved TSDF in accordance with the WAP and BTRA	<1.0 VSL < 117 VSL per BTRA TSDF Acceptance Criteria (to be determined [TBD‡‡‡])	Appendix A5A 24852-SOP-PT-001, *Pilot Test Evolutions* Monitoring protocols are certified in accordance with the LQCP. P&A studies and baselines performed during systemization are continued. Any additional TSDF acceptance criteria will be also be demonstrated.
3	Collect and assess data to validate and/or define critical operating parameters for the SDU				N/A (This objective is not applicable for SDU pilot testing. The SDU will be operated as per design operating ranges and set points and each batch generated will be evaluated against performance criteria specified in above objectives to develop appropriate waste transportation and disposition.)						

‡‡‡ TSDF performance and acceptance criteria will be determined following selection of an appropriate TSDF.

A5 Block 5, Supplemental Decontamination											
A5B Autoclave											
Objective		**Classification**			**Step 1 - State the Problem**	**Step 2 - Identify the Goal**	**Step 3 - Identify information inputs**	**Step 4 - Define the Boundaries**	**Step 5 - Develop a Logical Decision Matrix/Rule**	**Step 6 - Specify the Performance or Acceptance Criteria**	**Step 7 - Develop the Plan**
		TCP	**Opr**	**RCRA**							
1	Demonstrate decontamination operations and waste handling and disposition.	X	X		Accumulation of secondary waste requiring decontamination prior to shipment impacting schedule	Minimize waste generation and accumulation and demonstrate Autoclave ability to treat secondary waste to acceptable level for shipment to TSDF	Generator knowledge Monitoring Data (MINICAMS distal sample ID AE-9439) Time, temperature, pressure, visual Inspection for liquids	Spatial: B24 (Autoclave) and J02 (monitoring) Wastes generated in ERB, APB and AFA Set points/Alarms for parameters in Appendix A5B per 24852-SOP-PT-001, Pilot Test Evolutions. Temporal: Processing of three batches	If < release level, package for off-site shipment in accordance with the WAP. If ≥ release level, reprocess or package for off-site shipment in accordance with the WAP and BTRA	< 1.0 VSL < 117 VSL per BTRA	Appendix A5B 24852-SOP-PT-001, *Pilot Test Evolutions* Autoclave Testing - A minimum of three batches, consisting of diverse waste expected to be processed during agent operations, is prepared to the extent waste materials are available and processed in accordance with operating procedures and to validate monitoring protocols.
2	Certify the monitoring protocol for waste disposal in accordance with the LQCP, 24852-GPP-GGL-00003 to meet TSDF performance and acceptance criteria§§§.	X	X		Adequate monitoring of waste to meet TSDF requirement(s)§§§	Treatment in Autoclave and disposal of waste at TSDF	Monitoring Data (MINICAMS distal sample ID AE-9439) Visual Inspection	Spatial: B24 (Autoclave) and J02 (Monitoring) Wastes generated in ERB, APB and AFA Set points/Alarms for parameters in Appendix A5B per 24852-SOP-PT-001, Pilot Test Evolutions. Temporal: Processing of three batches	If < release level, then ship in accordance with the WAP If ≥ release level, then reprocess and/or ship to approved TSDF in accordance with the WAP and BTRA	< 1.0 VSL < 117 VSL per BTRA TSDF Acceptance Criteria (TBD§§§)	Appendix A5B 24852-SOP-PT-001, *Pilot Test Evolutions* Monitoring protocols are certified in accordance with the LQCP. P&A studies and baselines performed during systemization are continued. Any additional TSDF acceptance criteria will also be demonstrated.
3	Collect and assess data to validate and/or define critical operating parameters for the Autoclave				N/A (This objective is not applicable for Autoclave pilot testing. The Autoclave will be operated as per design operating ranges and set points and each batch generated will be evaluated against performance criteria specified in above objectives to develop appropriate waste transportation and disposition.)						

§§§ TSDF performance and acceptance criteria will be determined following selection of an appropriate TSDF.

A6 Block 6, Off-gas Treatment											
A6 Off-gas Treatment System and Agent Filtration Area											
Objective		**Classification**			**Step 1 - State the Problem**	**Step 2 - Identify the Goal**	**Step 3 - Identify information inputs**	**Step 4 - Define the Boundaries**	**Step 5 - Develop a Logical Decision Matrix/Rule**	**Step 6 - Specify the Performance or Acceptance Criteria**	**Step 7 - Develop the Plan**
		TCP	**Opr**	**RCRA**							
1	Evaluate contributions of individual systems on emissions.		X		Emissions calculations for MWS/MTU and ANR have not been validated	Quantify MWS/MTU w/ SDU operated and ANR w/ SDU operated emission contributions	COPCs – post B20 (OTS) but pre-AFA and at stack mercury – AFA and stack metals – stack Dioxins & furans - stack and scrubber liquid Agent -pre and post B20 (OTS), stack and scrubber liquid OTS/AFA parameters (defined in Appendix A6) Processing time to collect valid emissions data	Spatial: B02/B03 (MWS/MTU); B04 (ANR); B20 (OTS); M07 (AFA); B24 (SDU) Temporal: MWS/MTU demo & ANR demo processing time determined by emissions requirements	If MWS/MTU demo satisfies DQR, proceed with ANR demo; if not, convene JTG to evaluate results and path forward. If ANR demo satisfies DQR, proceed with integrated APB demo; if not, convene JTG to evaluate results and determine path forward. If emissions are greater than predicted in PCAPP emissions calculation, contact CDPHE and convene JTG to evaluate results and determine path forward	DQR per LSAP/LQCP Results within the emissions calculations for the individual systems < MPHRA thresholds**** < CDPHE MPHRA benchmark*	Appendix A6 24852-SOP-PT-001, Pilot Test Evolutions LSAP, 24852-GPP-GGL-00013 Collect data on process emissions during demonstration of each agent processing system (i.e., MWS/MTU and Agent Hydrolyzers)
2	Demonstrate OTS and AFA performance with respect to agent destruction and removal efficiency (DRE) (i.e., 97% destruction and removal at the OTS and 99.9999% destruction and removal at the stack), and evaluate performance with respect to acid gases, particulates, and COPCs.	X		X	DREs for OTS and AFA have not been validated; nor has OTS/AFA performance with respect to acid gases, particulates and COPCs and evaluation for presence of metals and dioxins/furans	Confirm DRE meets permit requirement and establish performance with respect to acid gases, particulates and COPCs.	Acid gases and particulates - stack COPCs – post B20 (OTS) but pre-AFA and at stack metals - stack Mercury – stack and between carbon banks 5 and 6 Dioxins & furans - stack and scrubber liquid Agent -pre and post B20 (OTS), stack and scrubber liquid OTS/AFA parameters (defined in Appendix A6) Processing time to collect valid emissions data	Spatial: B02/B03 (MWS/MTU); B04 (ANR); B20 (OTS); M07 (AFA); B24 (SDU) Temporal: OTS/AFA Demo (2 demonstration periods with processing time determined by emissions requirements)	If dioxins/furans detected at levels of concern, pause and convene JTG. If Agent DRE met, proceed with pilot testing If not met, convene JTG to evaluate data and path forward	DQR per LSAP/LQCP ≥ 97% Agent Destruction and Removal Efficiency (DRE) at OTS and ≥ 99.9999% Agent DRE at stack. ≤1.6 tons/yr SO_2 ≤ 30 ppmv HCl ≤ 13 ppmv Cl_2 ≤ 23 mg/dscm particulates†††† ≤ 13 ng/dscm dioxin/furans†††† < MPHRA threshold**** < CDPHE MPHRA benchmark*	Appendix A6 24852-SOP-PT-001, Pilot Test Evolutions LSAP, 24852-GPP-GGL-00013 OTS/AFA Demo consists of periods of integrated APB operations of sufficient duration to collect valid emissions samples. Agent monitoring data at the OTS and at the stack is used to demonstrate a mustard DRE of 97% across the OTS (full loading) and validate the DRE of 99.9999% for the complete plant at the AFA stack. These requirements must be met prior to proceeding with the MTU Heel test or OTS without operation of the BOX test. The ability to demonstrate Agent DREs requires sufficient processing rates and agent levels passing to the OTS. Pre-filter data for COPCs is used to assess need for continued COPC analysis. Stack sampling for acid gases and particulates is used to assess performance.

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**** Evaluation of emissions against MPHRA thresholds is discussed within *Summary Plan for Evaluating Pilot Test Data against MPHRA*, 24852-30H-000-L0003.

†††† These standard are adjusted for oxygen and may be revised in consultation with CDPHE.

A6 Block 6, Off-gas Treatment											
A6 Off-gas Treatment System and Agent Filtration Area											
Objective		**Classification**			**Step 1 - State the Problem**	**Step 2 - Identify the Goal**	**Step 3 - Identify information inputs**	**Step 4 - Define the Boundaries**	**Step 5 - Develop a Logical Decision Matrix/Rule**	**Step 6 - Specify the Performance or Acceptance Criteria**	**Step 7 - Develop the Plan**
		TCP	**Opr**	**RCRA**							
3	Evaluate the role of B20 (OTS) in controlling emissions		X		PCAPP's emissions calculation does not credit the BOX for destruction of non-Agent COPCs; therefore, its contributions are unknown.	Quantify the benefits (agent destruction/removal) of the BOX.	COPCs – post B20 (OTS)but pre-AFA and stack Dioxins & furans - scrubber liquid Agent -pre and post B20 (OTS), stack and scrubber liquid Processing time to collect valid emissions data	Spatial: APB B02/B03 (MWS/MTU); B04 (ANR); B20 (OTS) (minus BOX); M07 (AFA); B24 (SDU) Temporal: OTS without operation of the BOX test processing time determined by emissions requirements	If COPCs and dioxin/furan concentrations with No BOX contributions are within MPHRA thresholds or below CDPHE MPHRA benchmark*, and agent DRE are satisfied, then pause and evaluate with JTG as to whether to recommend to CDPHE normal operations without the BOX If COPCs and dioxin/furan concentrations with No BOX contributions are not below CDPHE MPHRA benchmark*, or agent DRE are not satisfied, then normal operations include BOX.	DQR per LSAP/LQCP ≥ 97% Agent DRE at OTS and ≥ 99.9999% Agent DRE at stack. < MPHRA thresholds‡‡‡‡ < CDPHE MPHRA benchmark* ≤1.6 tons/yr SO2 ≤ 30 ppmv HCl ≤ 13 ppmv Cl2 ≤ 23 mg/dscm particulates§§§§ ≤ 13 ng/dscm dioxin/furans§§§§	Appendix A6 24852-SOP-PT-001, Pilot Test Evolutions LSAP, 24852-GPP-GGL-00013 OTS without operation of the BOX testing involves sampling during integrated APB demonstration periods without operation of the preheater and BOX. The ability to demonstrate Agent DREs requires sufficient processing rates and agent levels passing to the OTS.

* "CDPHE MPHRA benchmark" is a maximum estimated lifetime cancer risk to any human receptor of a risk level of 1 in a million (i.e., 1.0 E-06), a maximum estimated combined Hazard Index (HI) to any human receptor of 0.25, or a total acute HI for any receptor of 1.0.

‡‡‡‡ Evaluation of emissions against MPHRA thresholds is discussed within *Summary Plan for Evaluating Pilot Test Data against MPHRA*, 24852-30H-000-L0003.

§§§§ These standard are adjusted for oxygen and may be revised in consultation with CDPHE.

A6 Block 6, Off-gas Treatment												
A6 Off-gas Treatment System and Agent Filtration Area												
Objective		**Classification**			**Step 1 - State the Problem**	**Step 2 - Identify the Goal**	**Step 3 - Identify information inputs**	**Step 4 - Define the Boundaries**	**Step 5 - Develop a Logical Decision Matrix/Rule**	**Step 6 - Specify the Performance or Acceptance Criteria**	**Step 7 - Develop the Plan**	
		TCP	**Opr**	**RCRA**								
4	Control COPC emissions			X	Ensuring COPC emissions remain within MPHRA thresholds or, if not, risk/hazard remain below the CDPHE MPHRA benchmark* during normal and off-normal operations	Define and demonstrate a strategy to ensure COPC emissions remain within MPHRA thresholds or, if not, risk/hazard remain below the CDPHE MPHRA benchmark*	AFA Carbon Baseline established prior to start of hazardous waste operations AFA Carbon Periodic Sampling (Bank 3 and Bank 6) (4 sampling events to coincide with COPC sampling) COPC –Pre-carbon and stack (16 sampling events) THC, VC, 1,2-DCA monitoring before and between carbon (continuous) OTS/AFA parameters (defined in Appendix A6) Processing time to collect valid emissions data PDARS data (key parameters identified in Appendix A1, A2A, A2B, A3A, A3B, A5A, A5B, A6)	Spatial: B02/B03 (MWS/MTU); B04 (ANR); B24 (SDU); B20 (OTS) Exhaust through M07 (AFA) Carbon sampling of bed 3 and bed 6 for each AFU for butane activity THC monitoring before and between carbon in two AFUs Pre-carbon COPC sampling in 3 on-line AFUs and at stack Temporal: Pilot Test Demonstration test iterations defined in Appendix A6 processing time determined by emissions sampling requirements	If pre-filter COPC ≥ MPHRA thresholds and post-filter COPC < MPHRA thresholds continue to evaluate correlation of COPC data with carbon activity. If post-filter COPC < MPHRA thresholds, continue to next phase of testing and confirm findings during IFD. If post-filter COPC > MPHRA thresholds, conduct MPHRA update. If MPHRA update is below the CDPHE MPHRA benchmark confirm findings during IFD If the IFD MPHRA update (pre-carbon) is less than the CDPHE MPHRA benchmark*, then evauate whether the JTG will recommend to CDPHE that carbon change out be based only on Agent. If the IFD MPHRA update (pre-carbon) data, is greater than the CDPHE MPHRA benchmark*, rerun MPHRA with post carbon data. If any MPHRA update indicates an overall risk greater than the CDPHE MPHRA benchmark*, suspend testing, contact CDPHE, and convene JTG.	Pre-carbon COPCs < MPHRA thresholds*****, or if not, risk/hazard remain below the CDPHE MPHRA benchmark* Correlation between THC monitoring and butane activity. A correlation is defined by a correlation factor > 0.7.	Appendix A6 *Carbon Sampling Strategy,* 24852-30H-000-W0004 If the IFD MPHRA update (pre-carbon) is less than the CDPHE MPHRA benchmark*, then evauate whether the JTG will recommend to CDPHE that carbon change out be based only on Agent. If the IFD MPHRA update (pre-carbon) data, is greater than the CDPHE MPHRA benchmark*, rerun MPHRA with post carbon data. If any MPHRA update indicates an overall risk/hazard greater than the CDPHE MPHRA benchmark*, suspend testing, contact CDPHE, and convene JTG. <u>The site will evaluate (1) whether the key contributors to risk/hazard have an affinity for carbon, and if so, (2) the strategy for assessing carbon performance in controlling emissions.</u> <u>If PCAPP determines that the key contributors to risk/hazard do not have an affinity for carbon, the JTG will be convened to determine appropriate actions (e.g., temporary pause in facility ramp-up pending evaluation of process or design changes to reduce emissions to acceptable levels).</u> <u>In support of evaluating the strategy for assessing carbon, PCAPP will perform carbon sampling and THC monitoring. Carbon samples are collected per *Carbon Sampling Strategy* (4 sampling events immediately following COPC sampling). Differences between THC analyzers within the same AFU (THC, VC, 1,2-DCA) are compared with change in carbon activity defined by butane activity testing.</u>	

* "CDPHE MPHRA benchmark" is a maximum estimated lifetime cancer risk to any human receptor of a risk level of 1 in a million (i.e., 1.0 E-06), a maximum estimated combined Hazard Index (HI) to any human receptor of 0.25, or a total acute HI for any receptor of 1.0.

***** Evaluation of emissions against MPHRA thresholds is discussed within *Summary Plan for Evaluating Pilot Test Data against MPHRA*, 24852-30H-000-L0003.

A6 Block 6, Off-gas Treatment											
A6 Off-gas Treatment System and Agent Filtration Area											
Objective		**Classification**			**Step 1 - State the Problem**	**Step 2 - Identify the Goal**	**Step 3 - Identify information inputs**	**Step 4 - Define the Boundaries**	**Step 5 - Develop a Logical Decision Matrix/Rule**	**Step 6 - Specify the Performance or Acceptance Criteria**	**Step 7 - Develop the Plan**
		TCP	**Opr**	**RCRA**							
5	Establish baseline and standard deviation for 1,2-dichloroethane (1,2-DCA) in the filter units.			X	Full-scale data for carbon removal of 1,2-DCA is not available	Satisfy Permit Condition Table IV.D.5.	1,2-DCA –Pre-AFA, between AFA carbon banks 5 and 6, and Post AFA Butane activity per *Carbon Sampling Strategy*, 24852-30H-000-W0004 OTS/AFA parameters (defined in Appendix A6)	Spatial: B02/B03 (MWS/MTU); B04 (ANR); B24 (SDU); B20 (OTS) Exhaust through M07 (AFA) same M07 filters maintained on-line throughout 9-day evaluation Temporal: 9 days at full munitions processing rate	If pre-AFA 1,2-DCA concentration is less than MPHRA thresholds, then pause and evaluate with JTG whether to recommend cessation of 1,2-DCA sampling to CDPHE. If pre-AFA 1,2-DCA concentration = concentration between Bank 5 and 6 1,2-DCA concentration, pause and evaluate with JTG whether to recommend to CDPHE cessation of 1,2-DCA sampling. If not, establish mean and standard deviation.	DQR per LSAP/LQCP < MPHRA thresholds†††††	Appendix A6 24852-SOP-PT-001, Pilot Test Evolutions LSAP, 24852-GPP-GGL-00013 After full munitions processing rate is achieved, perform 9 days of operations while maintaining same filter units on-line and collect 1,2-DCA data upstream and within the AFA and at the filter stack.. The full munitions processing rate will be established by the JTG after review of ramp-up data.
6	Collect and assess data to validate and/or define critical operating parameters for the OTS/AFA		X	X	Parameters for effective treatment need to be validated	Define OTS critical operating parameters	PDARS (key parameters in Appendix A6)	Spatial: B02/B03 (MWS/MTU); B04 (ANR); B24 (SDU); B20 (OTS) through M07 (AFA) Set points/Alarms for parameters in Appendix A6 per 24852-SOP-PT-001, Pilot Test Evolutions. Temporal: Pilot Test up to IFD processing time determined by emissions requirements	If operating parameter data impacts minimum acceptable performance and acceptable emissions, then critical If operating parameter data does not impact minimum acceptable performance and/or does not impact acceptable emissions, then not critical	DQR per LSAP/LQCP ≥ 97% Agent DRE at OTS‡‡‡‡‡ and ≥ 99.9999% Agent DRE at stack. ≤1.6 tons/yr SO2 ≤ 30 ppmv HCl ≤ 13 ppmv Cl2 ≤ 23 mg/dscm particulates§§§§§ ≤ 13 ng/dscm dioxin/furans §§§§§ < MPHRA thresholds††††††, or risk/hazard remain below the CDPHE MPHRA benchmark*	Appendix A6 24852-SOP-PT-001, Pilot Test Evolutions LSAP, 24852-GPP-GGL-00013 Apply ramp-up and test data to demonstrate OTS performance and establish critical operating parameters for continued operations. The ability to demonstrate Agent DREs requires sufficient processing rates and agent levels passing to the OTS. PCAPP requested modifications to operating parameters will be considered after the IFD MPHRA update.

* "CDPHE MPHRA benchmark" is a maximum estimated lifetime cancer risk to any human receptor of a risk level of 1 in a million (i.e., 1.0 E-06), a maximum estimated combined Hazard Index (HI) to any human receptor of 0.25, or a total acute HI for any receptor of 1.0.

††††† Evaluation of emissions against MPHRA thresholds is discussed within *Summary Plan for Evaluating Pilot Test Data against MPHRA*, 24852-30H-000-L0003.

‡‡‡‡‡ Due to elevated agent levels, sampling will not be performed at the OTS during the MTU heel test and therefore the criteria for > 97% DRE will not be demonstrated.

§§§§§ These standard are adjusted for oxygen and may be revised in consultation with CDPHE.

A6 Block 6, Off-gas Treatment											
A6 Off-gas Treatment System and Agent Filtration Area											
Objective		**Classification**			**Step 1 - State the Problem**	**Step 2 - Identify the Goal**	**Step 3 - Identify information inputs**	**Step 4 - Define the Boundaries**	**Step 5 - Develop a Logical Decision Matrix/Rule**	**Step 6 - Specify the Performance or Acceptance Criteria**	**Step 7 - Develop the Plan**
		TCP	**Opr**	**RCRA**							
7	Determine relationship of THC monitoring to emissions			X	COPC sampling is a discrete process which may be unable to capture increased emissions during unplanned off-normal process conditions	Determine if THC monitoring can provide valuable continuous data reflective of plant emissions	THC background (THC, VC and 1,2-DCA) THC monitoring between HEPA and carbon bank 1 (THC, VC, 1,2-DCA) COPC background COPC pre-carbon sampling PDARS data (key parameters identified in Appendix A1, A2A, A2B, A3A, A3B, A5A, A5B, A6)	Spatial: B02/B03 (MWS/MTU); B04 (ANR); B24 (SDU); B20 (OTS) Exhaust through M07 (AFA) Temporal: Pilot Test Demonstration	If THC data (THC, 1,2-DCA, VC) correlates with COPC sampling data during routine operations, THC monitoring may serve as a continuous indicator of process emissions. If a correlation does not exist, it cannot be used as an indicator during routine operations. If THC data (THC, 1,2-DCA, VC) correlates with COPC sampling data during process upset conditions (e.g., MTU heel test, without BOX test), THC monitoring may be useful as an indicator of process upsets. If no correlation exists, it cannot be used as an indicator. If THC readings for 1,2-DCA and/or VC indicate levels at or above those that could independently result in exceeding the CDPHE MPHRA benchmark* (i.e., 3,640 ppbv for 1,2-DCA or 1,470 ppbv for VC) collect pre-carbon COPC samples to confirm readings. If confirmed, convene JTG to develop path forward.	Positive correlation (> 0.7) between THC and COPC sampling data.	Develop control charts for continuous THC monitoring (THC, 1,2-DCA, VC). Compare THC data against pre-operational background and processing activities to determine if there is a change to the baseline or peaks attributable to plant activities. During pilot test activities, collect COPC data and compare results with THC monitoring data to determine potential correlation. Work with CDPHE to develop operational Part B Permit requirements to monitor THC, 1,2-DCA, and VC data to confirm emissions remain consistently below levels that could result in exceeding the CDPHE MPHRA benchmark.*

* "CDPHE MPHRA benchmark" is a maximum estimated lifetime cancer risk to any human receptor of a risk level of 1 in a million (i.e., 1.0 E-06), a maximum estimated combined Hazard Index (HI) to any human receptor of 0.25, or a total acute HI for any receptor of 1.0.

A7 Integrated Facility Demonstration											
	Objective	**Classification**			**Step 1 - State the Problem**	**Step 2 - Identify the Goal**	**Step 3 - Identify information inputs**	**Step 4 - Define the Boundaries**	**Step 5 - Develop a Logical Decision Matrix/Rule**	**Step 6 - Specify the Performance or Acceptance Criteria**	**Step 7 - Develop the Plan**
		TCP	**Opr**	**RCRA**							
1	Demonstrate integrated facility operations at the maximum achievable rate, while remaining compliant with governing plans, procedures, permits and other requirements.	X	X			Demonstrate integrated operations with agent and energetics				TCP Appendix D - Minimum Acceptance Criteria for Pilot Testing: • Throughput supports 85.5 weeks for 155 mm campaign • No safety, surety, security, or environmental noncompliance • Emissions within MPHRA thresholds or risk/hazard is below CDPHE MPHRA Benchmark*.	Appendix A7 Operate PCAPP in accordance with controlled SOPs 24852-SOP-PT-001, Pilot Test Evolutions The IFD consists of three demonstration periods of sufficient duration to collect valid emissions samples.
2	Generate and collect site-wide emissions data at the maximum achievable rate to support development of the RCRA Part B permit conditions.			X	Operating rate and/or design changes required to comply with MPHRA thresholds.	PCAPP COPC (agent included) emissions within MPHRA thresholds.	Emissions sample data: AFA Stack - 3rd Party Other Stacks (e.g., BTS, BRS, tanks, etc) - PCAPP Throughput PDARS (key parameters in Appendix A7) Laboratory Information Monitoring System (LIMS)	Spatial: PCAPP: Conducted only after sufficient inventories of process streams necessary to support the duration of the IFD. Temporal: IFD. Conducted during a time with no planned facility shutdowns. Three demonstration periods of sufficient duration to collect valid emissions samples (expected to be 4 hours). Conducted after all process systems are operating at full rates, under validated operating conditions	If PCAPP COPC (agent included) emissions within CDPHE MPHRA benchmark, then complete PTDP Final Report. If PCAPP COPC (agent included) emissions are not within CDPHE MPHRA tbenchmark, then pause and convene JTG to assess data and determine path forward.	< MPHRA thresholds****** or, if not, risk/hazard is below CDPHE MPHRA Benchmark* < MPHRA thresholds****** or, if not, risk/hazard is below CDPHE MPHRA Benchmark*	Appendix A7 24852-SOP-PT-001, Pilot Test Evolutions LSAP, 24852-GPP-GGL-00013 The IFD incorporates PCAPP munitions processing and support operations. Process systems are operated in an integrated manner at the maximum achievable rate. This rate will be established by the JTG after review of ramp-up data. . The IFD consists of three demonstration periods of sufficient duration to collect valid emissions samples (expected to be 4 hours).

* "CDPHE MPHRA benchmark" is a maximum estimated lifetime cancer risk to any human receptor of a risk level of 1 in a million (i.e., 1.0 E-06), a maximum estimated combined Hazard Index (HI) to any human receptor of 0.25, or a total acute HI for any receptor of 1.0.

****** Evaluation of emissions against MPHRA thresholds is discussed within *Summary Plan for Evaluating Pilot Test Data against MPHRA*, 24852-30H-000-L0003.

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3 ROLES AND RESPONSIBILITIES

Figure 3-1 provides an overview of the project test organization. Only positions with direct roles and responsibilities in pilot testing are shown. These roles and responsibilities are defined in the sections that follow.

3.1 JOINT TEST GROUP

The JTG is a committee comprised of PCAPP Management personnel and serves as a senior review team for plant documents and operations. During PTD, the JTG is convened as defined in Table 2-1 to evaluate data and develop a path forward for continued operations. The PTDP and Pilot Test Demonstration Report are approved by the JTG. The JTG is comprised of representation per its charter and may incorporate ad hoc members on an as needed basis. For additional details, see *Joint Test Group*, 24852-PLT-GAP-W0003.

3.2 PROJECT MANAGER

Along with general management, the Project Manager (PM) has the responsibility for coordinating safety, security, environmental, quality, and plant management for the pilot test phase. In this manner, the PM is responsible for the overall execution of pilot testing in accordance with the PTDP. The PM also provides management support for integration of the test team with plant personnel.

3.3 DEPUTY PROJECT MANAGERS

The Deputy Project Managers report to the PM. In addition to fulfilling the PM's responsibilities during absences, the Deputy Project Managers oversee selected departments as officially delegated by the PM.

3.4 PLANT MANAGER

The Plant Manager reports to a Deputy Project Manager and has responsibility for the operational implementation of the PTDP. This includes communicating test requirements to plant management and integrating Operations, Laboratory, Waste Management, Emergency Preparedness, Support Services, Plant Technical Specialists, and Training during execution of pilot testing. The Plant Manager coordinates plant operations and sets the expectations for conduct of operations in a safe, environmentally-sound, effective, and consistent manner in accordance with project operating procedures, work orders, and applicable permit and regulatory requirements. The Plant Manager coordinates test requirements with facility resources and, with the Test Coordinator, satisfies requirements of the PTDP. The Plant Manager is responsible for approving minor test plan changes and for coordinating significant test plan changes through the JTG, as defined in Section 4.5.

3.5 CHIEF SCIENTIST

The Chief Scientist is responsible for selecting the Test Coordinator and assists in the selection and training of the remainder of the test team. The Chief Scientist is responsible for development of the PTDP and for the preparation and finalization of pilot test reports.

3.6 PILOT TEST TEAM

A test team is assembled during systemization and continues through pilot testing to:

1. Assist in development of data collection forms in coordination with PCAPP Plant Operations
2. Assist with identifying test-specific materials and equipment in coordination with PCAPP Plant Operations
3. Review and comply with SOPs and work orders (WO) for implementation of pilot testing
4. Oversee pilot test activities
5. Collect, analyze, and compile pilot test data
6. Evaluate and document results to demonstrate test objectives are satisfied
7. Prepare pilot test reports (Section 4.6)

The test team is present during the IOD of the ORR and consists of the following key members:

- Test Coordinator – The Test Coordinator reports to the Chief Scientist and is responsible for selecting, training, and directing the test team. The Test Coordinator works with Plant Management to schedule test operations and oversees testing, data collection, data analyses, and reporting. The Test Coordinator determines when test criteria objectives are satisfied or when test plan changes are required to satisfy test objectives. The Test Coordinator is responsible for coordinating minor PTDP changes in accordance with Section 4.5.
- Systems Subject Matter Experts (SME) – Expert(s) in one or more aspects of testing, SMEs guide the testing and provide technical assistance to the Test Coordinator.
- Senior Test Engineers – The senior test engineers provide leadership for specific test Blocks and lead report(s) preparation.
- Test Engineers – The test engineers review SOPs, work orders, and test data sheets developed for implementation of the PTDP. The test engineers provide oversight of the sub-tests, submit weekly report input, perform data collection and analysis, and support development of data reports.
- Test Team Support – Non-site resources execute specific PTDP activities that cannot be executed by site personnel (e.g., independent stack testing firm).

Test personnel follow quality, safety, environmental and Surety policies for the facility and are trained in accordance with individual responsibilities.

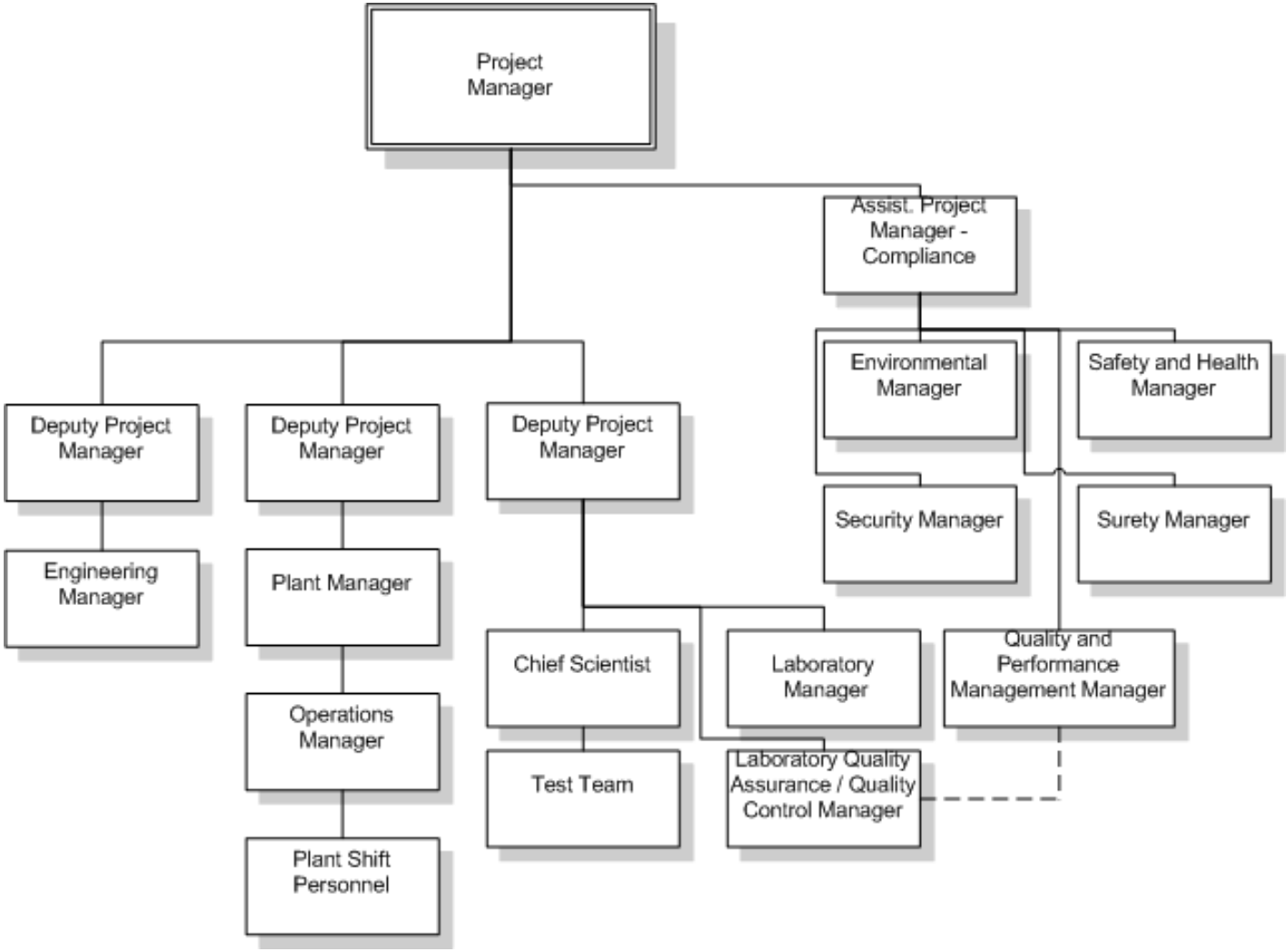

Figure 3-1. Project Test Organization

3.7 ENVIRONMENTAL MANAGER

The Environmental Manager is responsible for the development and administration of PCAPP's environmental programs and the implementation of environmental plans and procedures. The Environmental Manager is responsible for submitting the CDPHE-required PTDP reports to the state in compliance with permit requirements. The Environmental Manager is responsible for performing assessments during pilot testing to monitor compliance with established permit requirements and to direct and lead development of a Part B permit application for subsequent plant operations.

3.8 QUALITY AND PERFORMANCE MANAGEMENT MANAGER

The PCAPP Quality and Performance Management Manager is responsible for establishing and implementing a quality program that satisfies prime contract quality requirements. The quality department conducts audits and surveillances of select PCAPP processes to verify implementation of test procedures and compliance with test plan objectives and criteria. Quality Control will execute, witness, and/or hold points to verify compliance with established acceptance criteria.

3.9 LABORATORY QUALITY ASSURANCE / QUALITY CONTROL MANAGER

The PCAPP Laboratory Quality Assurance / Quality Control (QA/QC) functionally reports to the Quality & Performance Management Manager and has the responsibility to:

- Review, audit, and perform surveillances on analytical and air monitoring operations to ensure they meet the quality objectives established by the Laboratory Quality Control Plan (LQCP), 24852-GPP-GGL-00003
- Conduct audits of subcontractor laboratories
- Review a representative sample set of subcontractor laboratory data before final release of data to ensure completeness, accuracy, and traceability

3.10 SAFETY AND HEALTH MANAGER

The Safety and Health Manager (SM) is responsible for ensuring safe execution of pilot test activities for the PCAPP. The Safety and Health Manager ensures performance of IH monitoring (as required) during pilot testing to ensure any potential worker exposure conditions are identified, tested, and quantified to establish PPE or stay time requirements for continued operations. The Safety and Health Manager is also responsible for performing any required risk assessments and developing hazard analyses for execution of pilot testing activities.

3.11 SURETY MANAGER

The Surety Manager is responsible for implementing the PCAPP Chemical Surety Program, a carefully established system of reliability, safety, and security control measures designed to protect the local population, workers, and the environment by ensuring that only personnel who meet the highest standards of trustworthiness and reliability will conduct chemical agent-demilitarization operations. Throughout pilot

testing, the Surety Manager will support the pilot test team in addressing Surety issues that may arise.

3.12 SECURITY MANAGER

The Security Manager is responsible for implementing the PCAPP Security Program established to ensure chemical agents are securely stored and handled in a manner that precludes loss, sabotage, and theft. Throughout pilot testing, the Security Manager will support the pilot test team in addressing security issues that may arise.

3.13 ENGINEERING MANAGER

The Engineering Manager is the leader of the project engineering team and has overall responsibility for process equipment design, facilities design, and the cognizant systems engineering team. Project engineers assigned by the Engineering Manager lead groups of engineering specialists and technical specialists who are responsible for engineering design work performed for the project. The cognizant systems engineers will be responsible for providing operational support of system specific engineering issues.

3.14 OPERATIONS MANAGER

The Operations Manager reports to the Plant Manager and is responsible for coordinating plant operations and ensuring they are conducted in a safe, environmentally-sound, effective, and consistent manner in accordance with plant operating procedures and applicable permit and regulatory requirements. The Operations Manager is responsible for defining the necessary resources required to achieve pilot test objectives and executing pilot test evolutions.

3.15 LABORATORY MANAGER

The Laboratory Manager is responsible for management of the laboratory. The Laboratory provides chemical agent monitoring and laboratory analysis during operations to protect workers, the public, and the environment by ensuring compliance with workplace standards, and to assess plant performance. The Laboratory provides resources for MINICAMS operation, DAAMS and sample analyses, emissions monitoring, and other sampling as required. The Laboratory communicates results of analyses to the Control Room in a timely fashion to ensure appropriate responses are completed.

3.16 PLANT SHIFT PERSONNEL

Plant Shift Personnel receive direction from Plant Management regarding goals and objectives for the shift-to-shift operation of the plant. They are responsible for conducting operations safely and in accordance with approved SOPs and WOs, including the requirements of the LCOs. Personnel will have qualifications and certifications consistent with responsibilities.

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4 TECHNICAL APPROACH

4.1 OVERVIEW

PTD includes four activities: ramp-up, testing, demonstration (demo) and IFD to define and/or validate final operating conditions for incorporation into the operations (Part B) permit. The PTDP is organized into the following blocks in accordance with the process flow for munitions and agent processing shown in Figure 1-1.

Block 1: **Munitions Receipt and Enhanced Reconfiguration,** incorporating Munitions Unpacking and PMD.

Block 2 **Munitions Body Treatment,** incorporating the MWS and MTU.

Block 3 **Agent Collection and Neutralization**, incorporating the AWS and Agent Hydrolyzers and Agent Hydrolysate Hold Tanks.

Block 4 **Hydrolysate Treatment and Water Recovery**, incorporating the BTS and BRS.

Block 5 **Supplemental Decontamination**, incorporating the SDU and Autoclave.

Block 6 **Off-gas Treatment**, incorporating the OTS and AFA.

The level of testing for each block and sub-block was determined through the DQO process (Table 2-1). Figure 4-1 depicts the sub-block testing approach. Detailed descriptions of PTD activities for each sub-block are provided in Appendix A. The following paragraphs provide a general overview. The sequence for test activities is discussed in Section 4.2.

4.1.1 Ramp-up

In ramp-up, process variables are assessed during increasing durations of continuous operation to define and/or validate critical operating parameters to support testing, demo and/or IFD. The interrelationship of processing systems requires careful coordination of activities to control buffer capacity and to ensure test objectives are satisfied. Throughout ramp-up, PCAPP collects data needed to establish operating conditions, support the permitting process, and demonstrate the capability of the facility to destroy the stockpile. As shown in Figure 4-1, Blocks 1, 2, 3, 4, and 6 incorporate ramp-up testing.

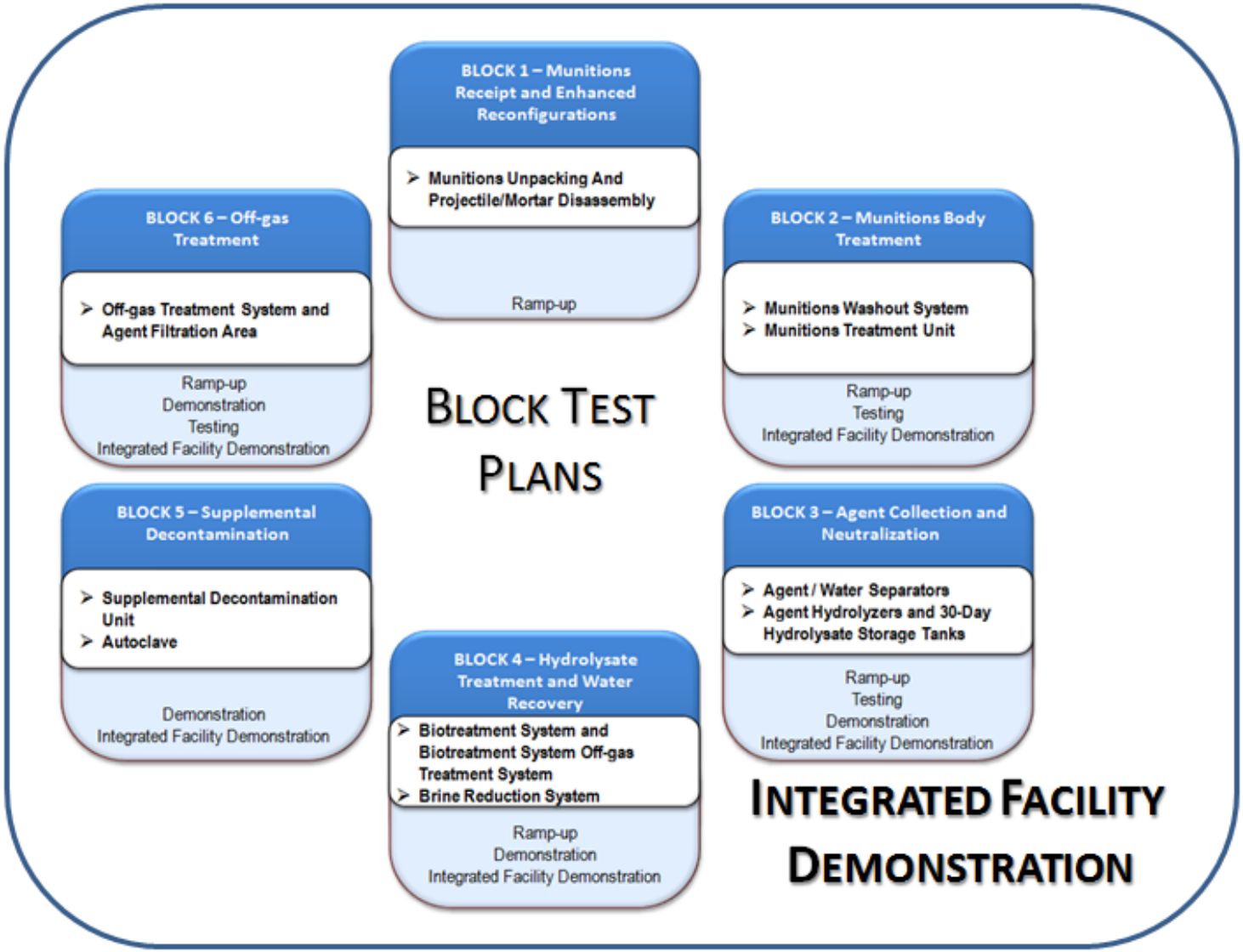


Figure 4-1. PTDP Testing Approach

4.1.2 Testing

Testing defines the impact of key process variables on system throughput, safe operations, and/or emissions. Testing is conducted in Block 2 (both MWS and MTU), Block 3 (ANR only), and Block 6 (OTS/AFA). Testing activities include the following:

- MWS Optimization Testing. Testing is performed to define the optimal (sustainable and operable) operating parameters which achieve reasonably clean munitions while satisfying the operating schedule (see Appendix A2A).
- MTU Loss of PRRS Testing. Testing is performed to assess the impact on dust control from periods of operations without the PRRS operating (see Appendix A2B).
- MTU heel test. Testing is performed to assess the impact of MWS process upset conditions on stack emissions. This testing is also considered an activity under OTS/AFA testing (see Appendix A2B and A6).
- ANR High-Agent-Loading Testing. Testing is performed to demonstrate agent destruction at agent loadings up to 15 wt% agent concentrate. This testing is also considered an activity under OTS/AFA testing (see Appendix A3B and A6).
- ANR No Agitator Testing. Testing is performed to demonstrate agent destruction without operation of the agitator. Testing is performed at both 8.6 wt% agent loading and at the highest agent loading successfully demonstrated during high agent loading testing (see Appendix A3B).
- OTS without operation of the BOX test. Testing is performed to provide information on the impact of the BOX on agent, COPC, and dioxin/furan emissions (see Appendix A6).
- 1,2-DCA baseline test. This test is performed to establish average and standard deviation for 1,2-DCA in the AFA filter units (see Appendix A6).

4.1.3 Demonstration

Demonstration is used to validate operations meet system performance criteria before execution of the IFD. During demonstration, the sub-block or block is operated continuously for a period sufficient to satisfy performance criteria. If performance criteria are not met, further ramp-up or testing activities may be required (determined by the JTG) to establish appropriate operating parameters before execution of the IFD. Demonstration testing is performed in Block 3 (AWS only), Block 5 (SDU and Autoclave), Block 4 (BTS only), and Block 6 (OTS/AFA).

4.1.4 Integrated Facility Demonstration

Pilot testing culminates with the IFD in which process systems are operated under the conditions defined and/or validated through testing, ramp-up, and demonstration at the maximum achievable rate for evaluation of site emissions relative to the health-based risk levels defined in the MPHRA (see Appendix A7). The maximum achievable rate will be established by the JTG after review of ramp-up data.

4.1.5 Production Operations

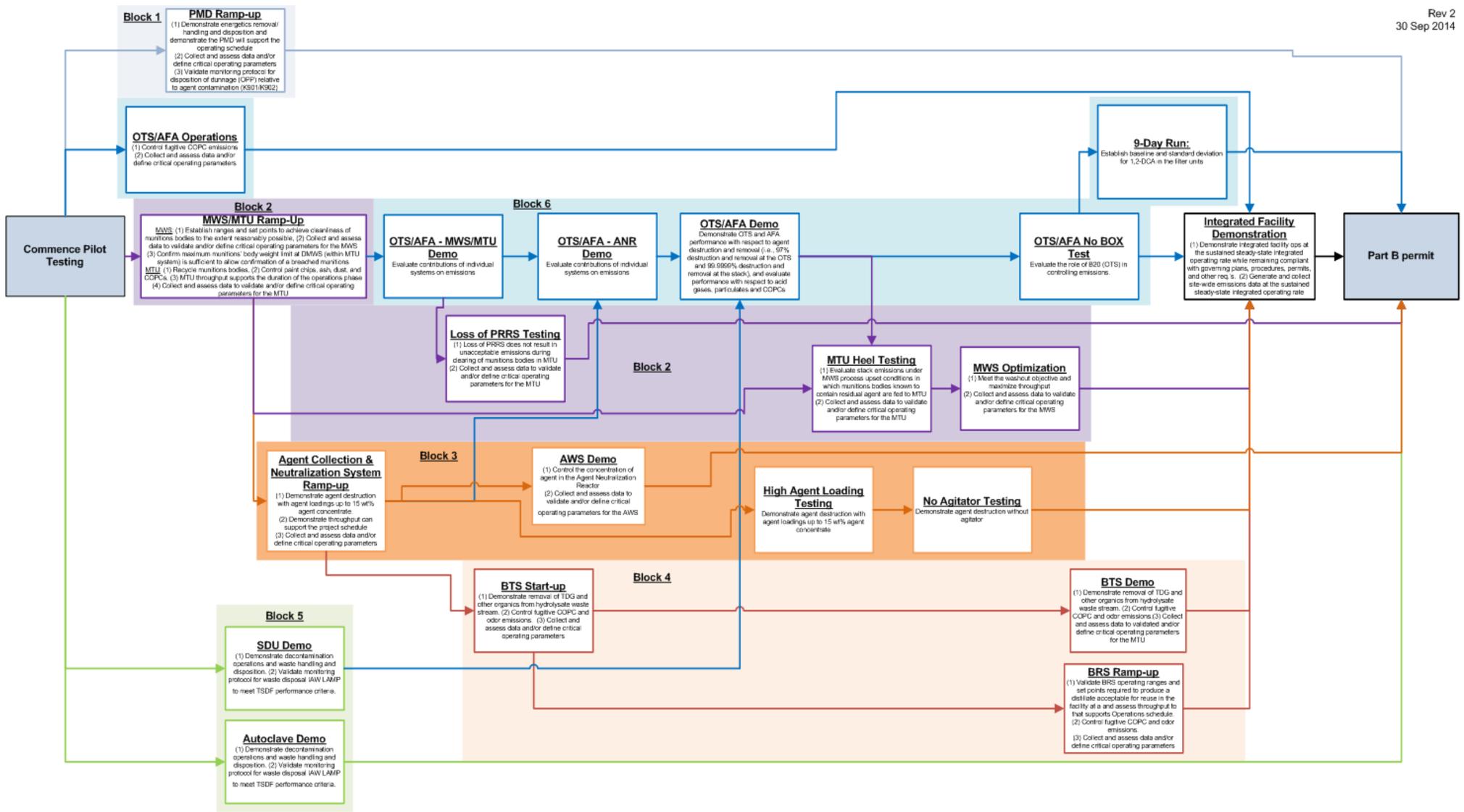
Pilot testing is complete after completion of the IFD. Within two weeks of submission of the test report on MWS optimization testing (see Appendix A2A), post pilot test operational throughput will be established in consultation with CDPHE, to allow continued operations prior to the award of the Part B Permit.

4.2 PILOT TEST DEMONSTRATION SEQUENCE

Figure 4-2 defines the sequence for the various PTD activities described in Appendix A. Two activities are not individually identified in this sequence as they occur continuously throughout PTD. These include Odor Monitoring in accordance with the OMP and carbon sampling in accordance with the *Carbon Sampling Strategy,* 24852-30H-000-W0004.

The PTD activities are sequenced methodically as follows:

- PMD ramp-up commences with the start of PTD. It supplies munitions bodies for MWS/MTU ramp-up activities and is largely independent of the remaining PTD activities (see Appendix A1).
- MWS/MTU ramp-up provides agent for ramp-up of the Agent Collection and Neutralization System (ANS) and supports OTS/AFA ramp-up. Ramp-up of the MWS/MTU provides agent-contaminated secondary waste and equipment for initiation of decontamination activities in the SDU and autoclave. MWS/MTU ramp-up establishes baseline conditions used in subsequent testing activities (i.e., Loss of PRRS Testing, MTU Heel testing, and MWS optimization testing) (see Appendix A2A and A2B).
- SDU and Autoclave demonstrations are performed independently of other PTD activities except as relates to the availability of secondary waste and reusable equipment for decontamination (see Appendix A5A and A5B). Following demonstrations, the SDU/Autoclave are operated as required to treat waste. The SDU is operated during execution of the OTS/AFA Demonstration, the OTS without Operation of the BOX test and the IFD.
- ANS ramp-up is controlled by the rate of agent supply from the MWS/MTU ramp-up. It proceeds with execution of appropriate pilot test objectives while supplying hydrolysate for BTS start-up operations and supporting OTS/AFA ramp-up.
- OTS/AFA operations commence with the start of PMD ramp-up. OTS/AFA ramp-up incorporates the MWS/MTU and ANR Demonstration activities which establish a baseline for the relative contribution of these systems to AFA emissions that can be used in subsequent evaluations. Execution of these activities is conducted after MWS/MTU and ANR operations have independently achieved sustained continuous processing for a period sufficient to obtain valid emissions samples. Such sustained and stable operations are required for execution of the AWS and OTS/AFA demos, which require integrated continuous operations of the MWS/MTU and ANRs for a period sufficient to verify separation times (AWS) or obtain valid emissions samples (OTS/AFA), and the various test activities identified in the sequence.



Schedule	Day 1	Day 22	Day 32	Day 44	Day 86	Day 108	Day 110
Munitions processed							
Maximum:	0	2,700	5,800	11,900	50,400	77,300	80,390
Expected:	0	691	1,843	3,744	18,288	27,792	29,520

Figure 4-2. PCAPP Pilot Test Demonstration Sequence of Activities with Objectives

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- The OTS/AFA Demonstration represents initial integrated APB operations with collection of valid emissions samples and demonstration of OTS/AFA performance criteria. The data collected during the OTS/AFA demo provide a baseline against which test data collected during subsequent testing activities (i.e., MTU heel test, high agent loading test, OTS without operation of the BOX test) are compared (see Appendix A6). Subsequent testing activities cannot be completed unless the OTS/AFA demo is completed successfully.
- MTU heel testing can only be conducted after OTS/AFA performance is verified and must be conducted prior to MWS optimization testing. MTU heel testing defines indicators of residual heel processing that can be used during MWS optimization testing to ensure the MWS continues to achieve cleanliness of munitions bodies to the extent reasonably possible.
- BTS and BRS ramp-up activities proceed largely independently of APB operations except as determined by hydrolysate generation rates and available buffer capacity.
- All activities defined in the sequence must be complete before initiation of the IFD so that system performance is verified and operating parameters established to support collection of representative samples of site emissions (see Appendix A7).

4.3 SCHEDULE

Pilot testing is conservatively estimated to require a minimum of 16 weeks. The detailed schedule for execution shall be maintained in the PCAPP Integrated Master Schedule (IMS). An initial snapshot of the timing of test activities is included in Figure 4.2 (maximum and expected). Assumptions and basis for the maximum processing rates shown in Figure 4-2 are provided in Appendix B (*Estimation of Time Phase Maximum Hazardous Waste Processing Rates for PCAPP Pilot Testing*) along with the corresponding quantity of munitions to be processed and the respective waste generation rates. An expected maximum total of approximately 80,000 155-mm projectiles are processed as part of the PTD.

4.4 DATA COLLECTION

Data collection includes data collection forms (e.g., Test Performance Control Sheets [TPCS]), process data collected from the PDARS, and data packages from sampling and analysis activities which will be maintained in the Operating Record for PCAPP. Data forms are used to collect data generated by direct observation of test activities and verify test activities were completed and required data were collected in accordance with the requirements in this test plan. After a data form is complete, it is signed by the originator and collected PDARS and/or analytical data are appended either in hard copy or electronic format. The compiled package then undergoes a peer review to ensure it is complete and correct. This review typically occurs within two business days of package completion.

Appendix A includes example TPCS forms that document the information to be collected. Final forms are included in SOP 24852-SOP-PT-001, *Pilot Test Evolutions*.

4.5 TEST PLAN CHANGE PROCEDURES

The PTDP is expected to be an attachment to, or incorporated by reference into the RCRA RD&D Permit. For this reason, changes to the PTDP require coordination between PCAPP, ACWA, and the State of Colorado.

The following types of changes to the PTDP can be recommended by the Test Coordinator and approved by the Plant Manager:

- Typographical corrections
- Revisions to the procedures to collect additional data
- Test reordering
- Suspension of PTD activities during unplanned operating conditions
- Schedule changes

CDPHE and ACWA are provided electronic notification of these changes after the necessary internal approvals are received.

Changes other than those described above are submitted to the JTG for review and approval. The PEO ACWA Deputy Site Project Manager is responsible for coordination of changes related to activities associated with TCP or operational objectives (see Table 2-1) and PCAPP provides CDPHE written notification of such approvals. CDPHE is notified of all other changes prior to implementation. If CDPHE indicates that the change requires CDPHE approval before implementation, PCAPP will adjust implementation plans accordingly. A permit modification to the RCRA RD&D Permit may not be required. However, CDPHE and PCAPP will assess the change so that it is properly reflected in the Part B Permit.

Throughout pilot testing, operational changes are governed by SOP-approved field changes. CDPHE is provided electronic notification of these changes.

If PTDP objectives cannot be achieved or completed, the Chief Scientist will review the data and make a recommendation to the JTG to either repeat the test or pursue other alternatives. The JTG will review the recommendation and present to the PM. The PM has the ultimate authority to determine if a test must be repeated, to accept the results, or pursue alternatives.

If during conduct of test, an interruption occurs, the Test Coordinator can either extend the sampling period or repeat the test.

4.6 TEST REPORTING

Reporting is accomplished in accordance with the requirements of CDRL H003, *Pilot Test Demonstration Report*. This reporting includes weekly reporting, and draft and final reports. Interim letter reports are also prepared as defined in Appendix A. Reports are submitted for retention in the site project document control center in accordance with project specific procedures.

4.6.1 Weekly Progress Report

A weekly progress report will be prepared by the Test Team with operations input and provided to the Chief Scientist by close of business every Friday of each week. This report will include the weekly accomplishments against those scheduled items, items scheduled to be accomplished the following week, and problem areas and recommended resolutions. The Chief Scientist will summarize, expand, or otherwise enhance these reports prior to transmittal to ACWA by close of business the following business day.

4.6.2 Letter Report

A letter data report will be compiled by the Test Team with Plant Operations and Laboratory input for the Chief Scientist, typically within two weeks after completion of each sub-Block test or unique activity identified in Appendix A (e.g., distillate recycling). Letter reports will be generated using the draft data collected during the test and available at time of letter report preparation. Any data that is modified or corrected during final data quality reviews will be transmitted by an amendment to the letter report that summarizes the changes and their impact on the conclusions of the original letter report. The report will undergo an independent and Test Coordinator (or designee) review. The test report will then be submitted to the Chief Scientist who will summarize, expand, or otherwise enhance these reports prior to transmittal to ACWA and CDPHE within one week.

4.6.3 Test Final Report

A test final report will be generated by the test team after the IFD is completed. This report may be used by CDPHE to develop permit conditions for the RCRA Operating Permit. This report will include the following:

- Executive Summary
- Introduction
- Results
- Discussion of Results
- Conclusions

The letter reports will be provided as an Appendix to the report. The Final Test Plan with appropriate change management documentation will also be included as a report appendix.

The Draft Report will be coordinated through the JTG and submitted to PEO ACWA and CDPHE within 30 days after completion of the IFD. The Final Report will be submitted to PEO ACWA and CDPHE 30 days subsequent to resolution of comments received.

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5 QUALITY

Pilot testing will comply with the *Quality Management Plan* (QMP), 24852-GQP-GAQ-00001 and the LQCP, 24852-GPP-GGL-00003. The PCAPP Quality Program through the QMP meets the requirements of the Department of Defense (DOD) Regulation 5000.2R, C5.2.3.4.3, Quality, and US Army Engineering Support Center, Huntsville, Specification 01421, *Contractor Quality Control*, using the BNI Quality Program as a resource.

5.1 DATA QUALITY

At a minimum, data collection forms (e.g., TPCS) will be provided for peer review and an independent reviewer in accordance with *Completing Quality Records*, 24852-GPP-GAM-00016 quality (see Section 4.4). These reviews are targeted to provide assurance that required data have been collected in accordance with this test plan. In addition, analytical data generated in support of pilot testing (generated both at PCAPP or at subcontracted laboratories) will be reviewed by the Laboratory QA/QC branch to verify that the data are complete, accurate, traceable, and generated in accordance with *Completing Quality Records,* 24852-GPP-GAM-00016, and established procedures or standard methods.

In cases where conflicting or spurious results are obtained, possible outliers will be identified and investigated. Outlier data with an assignable cause may be repeated, as practical, with documentation as to why the data point(s) was repeated. Outlier data for which an assignable cause is not identified will be retained within the data record, but the Test Coordinator may choose to repeat the data collection to increase understanding of potential process variability.

5.2 QUALITY RECORDS

Records generated by this PTDP will be managed in accordance with *Completing Quality Records*, 24852-GPP-GAM-00016, and *Records Retention and Turnover*, 24852-K10B- 00296.

5.3 METHODS CERTIFICATION

Any analytical methods to be employed during testing will have been certified prior to the start of pilot testing. Should unexpected matrix effects be observed in the data, initial pilot testing will be used to provide additional certification prior to final data collection for test demonstration.

5.4 CALIBRATION

Instruments and equipment used during testing will be calibrated in accordance with project procedures. During pilot testing, the Test Coordinator may require calibration frequencies beyond those specified in project plans and procedures. Such requirements will be documented in the 24852-SOP-PT-001, *Pilot Test Evolutions*. Requirements to provide calibration data with test data or results will likewise be specified in 24852-SOP-PT-001, *Pilot Test Evolutions*.

5.5 CHAIN OF CUSTODY

Samples collected during pilot testing will be handled in accordance with established project chain of custody practices and procedures as defined in the LQCP. Such samples will include requests for analysis.

5.6 AUDITS AND SURVEILLANCES

The PCAPP Quality Department and Laboratory QA/QC Branch will perform audits and surveillances throughout pilot testing in accordance with frequencies established for agent operations. Specific test activities will require additional quality oversight. The Laboratory QA/QC branch will audit subcontractor laboratories prior to those laboratories receiving samples for analysis. Results of audits and surveillances will be retained in the permanent record.

6 COMPLIANCE

During pilot-testing, facility plans and procedures will remain in effect. These plans and procedures are developed to protect human health and the environment. Before pilot testing begins, operators and test personnel will be trained in accordance with individual responsibilities. Throughout testing, project personnel will be empowered to stop work should an unexpected situation occur that could jeopardize either personal or plant safety. Safety and environmental compliance take precedence over operational throughput.

6.1 SAFETY

Testing activities will follow PCAPP safety protocols. Procedures will be approved for activities unique to the test as well as routine plant operations. Safety oversight during pilot testing will be provided by the PCAPP Safety Team.

6.2 SURETY

Testing and demonstration of systems requiring the use of munitions and/or drained agent will be conducted as Surety operations following the PCAPP approved Surety plans. Tests identified in this test plan will not begin until successful completion of an ORR and approval to begin toxic operations has been granted by the Army. Surety operations include those being tested/demonstrated in the ERB and APB exclusion areas. Once agent has been hydrolyzed and the hydrolysate is cleared to be non-detect for mustard in accordance with the LAMP, the treated hydrolysate is transferred to the 30-day storage tanks. These tanks and downstream operations are non-Surety operations.

The PCAPP laboratory is being operated as a research, development, test and evaluation (RDTE) facility with agents below the levels requiring Surety clearances. Any samples taken from within the facility exclusion areas with a potential to exceed Surety levels will be diluted below Surety levels prior to transfer to the PCAPP laboratory. Any samples required to be sent offsite for analysis with the potential to be agent-contaminated will be screened for agent by the PCAPP laboratory prior to being sent offsite.

6.3 ENVIRONMENTAL

Environmental and Waste Management activities are overseen at PCAPP by the Environmental Department. RCRA inspections, data submissions, regulatory interactions, and waste determinations and shipments are directed by project procedures and overseen by the Environmental Compliance department. Plant personnel receive training in Environmental requirements and waste practices based on their job functions.

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7 REFERENCES

7.1 DOCUMENTS CITED

PCAPP, *Design Criteria for Plant Process*, Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) Project, CDRL A003, 24852-RD-3DR-000-B0001.

PCAPP, *Multiple Pathway Health Risk Assessment Report for Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) with Explosive Destruction System (EDS)*, 24852-RD-3RC-000-V0007.

PCAPP, *Multiple Pathway Health Risk Assessment Protocol for Pueblo Chemical Agent Destruction Pilot Plant Project with Explosive Destruction Systems*, 24852-3RC-000-V0006.

PCAPP, *Chemical Surety Management Plan CDRL D022*, 24852-G81-GAZ-00002

PCAPP *Physical Security Plan Volume 1- CDRL D023*, 24852-G81-GAZ-00001

PCAPP, *System Safety Program Plan for the Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) Program*, 24852-RD-30G GHX-00001.

PCAPP, *Environmental Compliance Plan Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP)*, 24852-HKY-000-V0001.

PCAPP, *Waste Management Plan,* 24852-G01-GAM-00001

PCAPP, *Industrial Hygiene Implementation Plan*, 24852-30G-GHX-00034.

PCAPP, *Odor Monitoring Plan*, Pueblo Chemical Agent Destruction Pilot Plant Project (PCAPP), 24852-GPP-GGG-V0018.

PCAPP, *Pueblo Chemical Agent-Destruction Pilot Plant Project (PCAPP) RD&D RCRA Permit (Modification #6), Attachment D – Waste Analysis Plan,* PCAPP Document Number 24852-30L-H01-000017 Volume 2.

PCAPP, *Configuration Management Plan, CDRL B011, Pueblo Chemical Agent-Destruction Pilot Plant Project (PCAPP),* PCAPP Document Number 24852-RD-G01-000-T0002.

PCAPP, *Laboratory Analysis and Monitoring Plan, CDRL D007, Pueblo Chemical Agent-Destruction Pilot Plant Project (PCAPP),* PCAPP Document Number 24852-GPP-GGL-00002.

PCAPP, *Laboratory Quality Control Plan, CDRL D006, Pueblo Chemical Agent-Destruction Pilot Plant Project (PCAPP),* PCAPP Document Number 24852-GPP-GGL-00003.

PCAPP, *Laboratory Sampling and Analysis Plan for Pilot Test Phase Operations [LSAP]*, 24852-GPP-GGL-00013

PCAPP, *BRS Recovered Water Sampling and Analysis Plan*, 24852-GPP-GGL-00011

PCAPP, *PCAPP Quality Management Plan, CDRL B010*, 24852-GQP-GAQ-00001.

PCAPP, PCAPP *Carbon Sampling Strategy*, 24852-30H-000-W0004.

PCAPP, *White Paper on Total Hydrocarbon Monitoring During Pilot Test Demonstration*, 24852-30H-000-V0003.

PCAPP, *White Paper on Carbon Dioxide Monitoring During Pilot Test Demonstration*, 24852-30H-000-V0004.

PCAPP, *Summary Plan for Evaluating Pilot Test Data against MPHRA*, 24852-30H-000-L0003.

PCAPP, *Records Retention and Turnover*, 24852-K10B- 00296

PCAPP, *Process Design Throughput and Availability Analysis, Pueblo Chemical Agent-Destruction Pilot Plant Project (PCAPP),* PCAPP Document Number 24852-RD-30V-000-B0001.

PCAPP, *System Design Description (SDD) for Munitions Unpacking and Projectile/Mortar Disassembly System No. B01,* 24852-RD-3YD-B01-W0001.

PCAPP, *SDD for Munitions Washout System (MWS), System No. B02,* 24852-RD-3YD-B02-R0001.

PCAPP, *SDD Munitions Treatment Unit, System No. B03*, 24852-RD-3YD-B03-B0001

PCAPP, *SDD for Agent Collection & Neutralization, System No. B04*, 24852-RD-3YD-B04-B0001

PCAPP, *SDD for Biotreatment, System No. B09*, 24852-RD-3YD-B09-B0001.

PCAPP, *SDD for Bioreactor Off-gas Treatment System, System No. B11*, 24852-RD-3YD-B11-B0001

PCAPP, *SDD for Brine Reduction System (BRS), System No. B12*, 24852-RD-3YD-B12-B0001

PCAPP, *SDD for Water Recovery System (WRS), System No. B14*, 24852-RD-3YD-B14-B0001

PCAPP, *SDD for Residue Handling, System No. B15*, 24852-RD-3YD-B15-B0001

PCAPP, November 2012, *SDD for Off-gas Treatment System, System No. B20*, 24852-RD-3YD-B20-B0001.

PCAPP, *SDD for Munitions Transport and Storage, System No. B23*, 24852-RD-3YD-B23-W0001.

PCAPP, *SDD for Supplemental Decontamination Unit (SDU), System No. B24*, 24852-RD-3YD-B24-B0001.

PCAPP, *SDD for Autoclave, System No. B24*, 24852-RD-3YD-B24-B0002.

PCAPP, *Joint Test Group*, 24852-PLT-GAP-W0003.

PCAPP, *Wooden Dunnage Sampling and Analysis Plan*, 24852-GPP-GGL-00015

PCAPP, *Operations Plan, Permit Modification 48*

PCAPP. Calculation 24852-RD-M5C-B04-B0002, *Agent-Water Separator Design*

PCAPP, Calculation 24852-RD-M5C-000-B0004, *PCAPP Emissions Estimate.*

PCD, *Munitions Assessment and Characterization Report, Pueblo Chemical Depot*

PEO ACWA*, Chemical Agent Laboratory and Monitoring Quality Assurance Plan* (LMQAP).

PEO ACWA*, Chemical Agent Monitoring Concept Plan* (MCP).

USAE ACWA, *Test Concept Plan for the Pueblo Chemical Agent Destruction Pilot Plant (PCAPP)*

U.S. EPA, *Systematic Planning Using the Data Quality Objectives Process*, EPA QA/G-4

7.2 CODES, STANDARDS, REGULATIONS, AND PROCEDURES

PCAPP, *Administrative Services Procedures Manual*

PCAPP, PCAPP Laboratory Operating Procedure (LOP) 24852-GPP-GGL-0204, *Mustard Agent in HD/HT Water Hydrolysate*.

PCAPP, LOP 24852-GPP-GGL-0301, *Mustard Agent (HD) in Air by MINICAMS®*

PCAPP*,* PCAPP QA Procedure 24852-GPP-GAM-00016, *Completing Quality Records.*

PCAPP, Project Procedure 24852-PLT-GAP-W0003, *Joint Test Group (JTG)*

PCAPP, SOP 24852-SOP-PT-001, *Pilot Test Evolutions*

PCAPP, SOP 24852-SOP-B15-W0001, *Residue Handling (B15)*.

PCAPP, SOP 24852-SOP-B24-W0001, *Supplemental Decontamination Unit*.

PCAPP, SOP 24852-SOP-B24-W0002, *Autoclave System*.

PCAPP, SOP 24852-SOP-B20-W0001, *Off-Gas Treatment*.

PCAPP, SOP 24852-SOP-B04-W0001, *Agent Collection System*.

PCAPP, SOP 24852-SOP-B03-W0001, *Munitions Treatment Unit*.

PCAPP, SOP 24852-SOP-B02-W0001, *Munitions Washout System*.

PCAPP, SOP 24852-SOP-B01-W0001, *Projectile/Mortar Disassembly*.

PCAPP, SOP 24852-SOP-M07-W0001, *Cascade Ventilation.*

PCAPP, SOP 24852-SOP-B12-W0001, *Water Recovery and Brine Reduction.*

PCAPP, SOP 24852-SOP-B09-W0001, *Biotreatment and Off-Gas Treatment*.

PCAPP, SOP 24852-OPS-OAP-W0006, *Limiting Condition of Operations (LCO) (CDRL D003).*

PCAPP, SOP 24852-OPS-OAP-W0009, *Chemical Munitions Accountability.*

PCAPP, SOP 24852-OPS-OAP-W0012, *Desktop Instruction Request for Sample.*

PCAPP, SOP 24852-SOP-B00-W0002, *Toxic Area Entries.*

PCAPP, SOP 24852-SOP-B23-W0001, *Munitions Transport & Storage.*

Department of the Army, Army Regulation 50-6, *Nuclear and Chemical Weapons Materiel, Chemical Surety.*

Department of the Army, Pamphlet 385-61, *Toxic Chemical Agent Safety Standards.*

State of Colorado Research, Development, and Demonstration Permit for the Pueblo Chemical Agent-Destruction Pilot Plant, EPA I.D. NO.: CO8213820725, 24852-30L-H01-00017v01.

7.3 DRAWINGS

PCAPP, *Process Flow Diagram, Munitions Treatment Unit Material Balance – 155mm Munitions*, 24852-RD-M5-B03-B0003

7.4 SOFTWARE

ECHIP® Design of Experiments Software

APPENDIX A. Block Test Plans

A1 Block 1, Munitions Receipt and Enhanced Reconfiguration

A1 Munitions Unpacking and Projectile/Mortar Disassembly

A2 Block 2, Munitions Bodies Treatment

A2A Munitions Washout System
A2B Munitions Treatment Unit

A3 Block 3, Agent Collection and Neutralization

A3A Agent/Water Separator
A3B Agent Hydrolyzers and Hydrolysate Hold Tank

A4 Block 4, Hydrolysate Treatment and Water Recovery

A4A Biotreatment System
A4B Brine Reduction System

A5 Block 5, Supplemental Decontamination

A5A Supplemental Decontamination Unit
A5B Autoclave

A6 Block 6, Off-gas Treatment

A6 Off-gas Treatment System and Agent Filtration Area

A7 Integrated Facility Demonstration

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APPENDIX B. Estimation of Time-Phased Maximum Hazardous Waste Processing Rates for PCAPP Pilot Testing

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