DEPARTMENT OF THE ARMY
U.S. ARMY CHEMICAL MATERIALS ACTIVITY
PUEBLO CHEMICAL DEPOT, BUILDING 1
45825 HIGHWAY 96 EAST
PUEBLO, COLORADO 81006-9330

Chron23-00727

Environmental Management Office

SUBJECT: Class 2 PCD Permit Modification Request S015, *Overpacks Processing*, submittal, Permit No. CO-13-12-23-01, Pueblo Chemical Depot (PCD), Pueblo, CO

CONTROL #: EMO-23-015

Mr. Kevin Mackey
Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Dear Mr. Mackey:

The Permittees at the Pueblo Chemical Depot (PCD) are submitting the enclosed Class 2 PCD Permit Modification Request (PMR) S015, *Overpacks Processing* to the PCD Hazardous Waste Permit No. CO-13-12-23-01. This request requires prior Colorado Department of Public Health and Environment (CDPHE) approval.

The PMR proposes the processing of overpacks (Single Round Containers--SRCs and Propelling Charge Containers--PCCs) at the Static Detonation Chamber (SDC) Complex. Overpacks contain Leakers, Rejects and separately packed Energetics from the 155mm, 105mm and the 4.2-inch campaigns, that could not be processed at the Pueblo Chemical Agent Destruction Pilot Plant (PCAPP) Main Plant.

A request for Temporary Authorization (TA) to implement proposed modifications and to process overpacks is being transmitted in accordance with 6 CCR 1007-3 §100.63(e) in a separate letter (Chron23-00728). This PMR contains enclosures that are Export Controlled Information (ECI) and Controlled Unclassified Information (CUI). An ECI/CUI version of this PMR is being transmitted separately via Chron23-00729.

For all technical matters, please contact Dr. Patrick Sullivan with the Assembled Chemical Weapons Alternatives staff at (719) 549-4523. For all other matters related to the request, please contact Mr. Jamal Albaiz, PCD Environmental Management Office, at (719) 549-4252.

Sincerely,

LACROIX.JASON.ANGELO.1012266304 Digitally signed by LACROIX.JASON.ANGELO.1012266304 Date: 2023.02.13 10:29:50 -07'00'

Jason A. Lacroix * Date
Colonel, U.S. Army
Commanding

Ailes, Todd Digitally signed by: Ailes, Todd DN: CN = Ailes, Todd C = US O = Bechtel Global Corporation Date: 2023.02.08 09:26:03 -07'00'

Todd Ailes * Date
Project Manager
Bechtel Pueblo Team

LEVI.WALTON.WAYNE.1231431558 Digitally signed by LEVI.WALTON.WAYNE.1231431558 Date: 2023.02.10 09:30:45 -07'00'

Walton W. Levi * Date
Site Project Manager
Pueblo Chemical Agent-Destruction Pilot Plant

Enclosures

CC:
Ms. Carmen Howard, Pueblo County Planning/Development, 229 West 12th Street, Pueblo, CO 81003-2810
Mr. Jesse Newland, US EPA Region 8, 1595 Wynkoop Street, Denver, CO 80202-1129
Mr. Walton W. Levi, PCAPP, 45825 Highway 96 East, Pueblo, CO 81006-9330
Mr. Michael Saupe, PCAPP Environmental Manager, 45825 Highway 96 East, Pueblo, CO 81006-9330
Mr. Trevor Klotz, Sentinel, 650 South Cherry Street, Ste 1140, Denver, CO 80246
PCAPP Document Control Center, 45825 Highway 96 East, Pueblo, CO 81006-9330
PCD Document Control Center, 45825 Highway 96 East, Pueblo, CO 81006-9330

*In accordance with 6 CCR 1007-3 Sections 100.12 and 100.42(k), I certify under penalty of law that, except as specifically noted, this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person(s) who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

PCD Permit Modification Request

PCD Permit Number: CO-13-12-23-01

Permit Modification Request: *Overpacks Processing* (Modification S015)

Classification: Class 2 Permit Modification Request

Description of Changes:

The Permittees seek approval of this Class 2 Permit Modification Request (PMR) to allow processing of overpacks (Single Round Containers--SRCs and Propelling Charge Containers--PCCs) at the Static Detonation Chamber (SDC) Complex. Overpacks contain Leakers, Rejects and separately packed Energetics from the 155mm, 105mm and the 4.2-inch campaigns, that could not be processed at the Pueblo Chemical Agent Destruction Pilot Plant (PCAPP) Main Plant.

Processing of Overpacks at SDCs

Approximately 425 (94 -155mm, 170 - 105mm, 70 – 4.2-inch in fiber tubes and 90 energetics/parts) overpacks containing Leakers, Rejects or agent contaminated Energetics require treatment. The quantity of 4.2-inch mortar overpacks is subject to change as the 4.2-inch campaign progresses. The current permit allows treatment/processing of mustard agent filled 4.2-inch mortars only, per the conditions of the trial burns as described in Attachment 3 and 13 and associated appendices and parts. The overpacks and fiber tubes have no other treatment capacity available other than the SDCs. Therefore, the Permittees, seek approval to process these overpacks and fiber tubes at the SDC units. Permittees also seek an exemption to trial burns for these waste streams by providing data-in-lieu in accordance with Colorado Code of Regulations, 6 CCR 1007-3 Part §100.41(b)(5)(v).

Changes to transportation and storage practices

Overpacks will be transported from PCD storage igloos in Modified Ammunition Vehicles (MAVs) to Igloo H1102. Overpacks are packaged into a crate of up to six (6) overpacks per crate and the crates will be set atop secondary containment pallets. See Enclosures 2 and 3 for updates to Standing Operating Procedures (SOPs) related to transportation and storage of overpacks. Once at Igloo H1102, overpacks will be off loaded from the MAVs for storage and will be accessible for processing. For processing, one (1) overpack crate will be transported to SDC Room on the flatbed truck, which is used to move munition crates. While in transport on the flatbed truck, the crate will be shrouded with a plastic cover.

A maximum of 18 overpack crates along with 100 overpack pallets (OPPs) of 4.2-inch mortars may be stored in Igloo H1102.A maximum of 2 overpack crates may be stored in the SDC Room. These limits are derived from maximum allowable Net Explosive Weight (NEW) for a worst case individual SRC. See Enclosures 2 and 4 for updated NEW values. Overpack crates will be single stacked with spill containment while in storage. Enclosure 5, 6 and 7 provide updates to storage quantities, layout, and inspection requirements.

Leaker and Reject Handling

Once in the SDC Room, the overpack crates will be segregated by leaker or reject. A leaker is identified by either its inventoried status (i.e., overpacked as a leaker) or by monitoring for Vapor Screening Limit (VSL). All overpacks without a known (inventoried) status, will be assumed leakers until proven otherwise via monitoring to less than or equal to 0.2 VSL (≤0.2 VSL). Monitoring will sample either the interior of an SRC for one MINICAM® cycle or by monitoring the headspace and by inserting the distal end of a MINICAMS® sampling line. If the monitoring indicates ≤0.2 VSL, the munitions are removed from the overpacks and are treated as rejects. If monitoring results are greater than 0.2 VSL, the overpack along with munition is identified as leaker and the SDC room will be upgraded to a Toxic Level B area, until the overpack along with the munition is processed through the SDCs. See Enclosure 8 for procedures to handle leakers and rejects.

Overpacks and Fiber tubes Handling

Overpacks are structurally held together with metal bolts. Permittees propose modifications to these bolts by replacing them with Aluminum or Nylon bolts (fusible bolts). A breach in the overpack body is required for visual inspection of deflagrated munitions after processing. Additionally, a very small number of larger overpacks will require transferring their contents into a smaller overpack to be able to feed the overpacks into the detonation chamber. Further details are provided in the justification section below. The number of overpacks that require transferring of contents is minimal and will follow predetermined procedures with appropriate level of PPE, for replacing bolts or for transferring contents to a smaller overpack. See Enclosure 8 for detailed procedure for replacing metal bolts with fusible bolts.

Fiber tubes associated with thirty-four (34) 4.2-inch HD mortars, were characterized as hazardous waste during baseline reconfiguration. Fiber tubes are hazardous for the presence of lead up to 50 ppm (see Enclosure 9 and 10 for waste profiles). Fiber tubes' transportation and handling are similar to overpacks handling but will not require any replacement of bolts or transfer of contents.

Overpack Feed Rate

The overpack feed rate will be limited to 1 overpack per every 2.5 hrs. (i.e., 0.4 overpacks/hr.), 1 reject munition per hour, and/or, 1 reject munition in fiber tube per hr. These feed rates are less than or equal to 13% of demonstrated feed rates during the trial burns. See justification section below. Also see Enclosure 4 for a foot note to Table 7 explaining the feed rate.

A request for Temporary Authorization (TA) to implement proposed modifications and to operate the modified system is being transmitted in accordance with 6 CCR 1007-3 §100.63(e) in a separate letter (Chron23-00728). This PMR contains enclosures that are Export Controlled Information (ECI) and Controlled Unclassified Information (CUI). An ECI/CUI version of this PMR is being transmitted separately via Chron23-00729 and a non-ECI/CUI version of the PMR is being submitted via Chron23-00727.

Description of Permit Changes:
This PMR is submitted to request modifications to the PCD Hazardous Waste Permit CO-13-12-23-01. Specific changes include:

- Updates to **24852-SOP-SDC-W0005**, *SDC Munition Transfers and Storage* (Enclosure 2)
    - Added language throughout the document to include SRC crates and SRC transfers.
    - Added requirements to install plastic shroud over crates before transporting from H1102 to SDC Room.
    - Added requirements to sample SRC crates within Operation 5 to monitor, identify and segregate leakers.
    - Added NEW and quantity of SRCs that can be stored in H1102.
- Updates to **24852-SOP-B23-W0001**, *Munitions Transport and Storage Operations* (Enclosure 3)
    - Added language throughout the document to include SRC crates and SRC transfers.
    - Modified unloading of MAVs to include handling of SRC crates.
- Updates to **Annex 3 Attachment 15**, *SDC Operations Plan* (Enclosure 4)
    - Update language throughout the plan to include ability to process overpacked munitions from 155mm, 105mm and overpacked energetics
    - Update 50 percent fill counts and language to include overpacked munitions
    - Update Table 1: *SDC Primary Process Waste Streams* to include overpacks for SDC Room.
    - Update Table 2: *Leaking 4.2-inch Munition Processing* to expand leaker handling for all campaigns.
    - Updated Table 4: *H1102 Service Magazine NEW (Maximum)* to show NEW calculation after including SRCs along with footnotes.
    - Updated Table 6: *SDC Enclosures 1,2, and 3 Process Area NEWs (Maximum*) for SRCs along with footnotes.
- Updates to **Annex 3 Attachment 7**, *SDC Munitions and Container Storage* (Enclosure 5)
    - Update Figure 7-5 to show SRC storage arrangement for Igloo H1102.
    - Update Table 7-1: Storage Unit Summary and Characteristics,
    - Update Waste Description with Overpack waste streams in Igloos G101, G102, G103 and H1102.
    - Update Maximum Storage Capacity for overpacks storage in Igloos G101, G102, G103 and H1102.
    - Update Storage Configuration and Aisle Space for Igloos G101, G102, G103 and H1102.
    - Update Table 7-3: Overpack/Container Types
    - Add details regarding type and dimensions of Overpacks.
- Updates to **Annex 3 Attachment 2 Appendix 2-5**, *Hazard Preparedness and Prevention Plan* (Enclosure 6)
    - Appendix A. Storage Capacities and Requirements
    - Update Maximum NEWs for SDC Enclosure, Hazard Division 1.1 and Hazard Division 1.3 from "0" lbs. to "150" lbs.
- Updates to **Annex 3 Attachment 2**, SDC Procedures to Prevent Hazards (Enclosure 7)
    - Table 2-2: Storage Igloo G101, G102, G103, and H1102 Inspection Schedule
    - Add inspections requirements for overpack crates in H1102.

- Updates to **24852-SOP-B28-W0001,** *SDC and Off-gas Treatment System (OTS)* (Enclosure 8)
    - Updated procedure to receive SRC crates in Operation 10 of the SOP. Added steps to procedure to replace SRC bolts with fusible bolts.
    - Added steps, within Operation 10, to ensure MINICAMS® readings are less than 0.2 VSL before proceeding with treatment verification.
    - Updated Appendix 5 of the SOP, to include NEW and quantity limits for 155mm, 105mm and SRCs within SDC Room.
    - Made other administrative and non-permit impacting changes.
- Updates to**, Introduction** (Enclosure 11)
    - Hazardous Waste Tanks and Treatment Units
        - Minor language modifications to allow treatment of overpacks containing 155mm and 105mm projectiles and agent contaminated energetics.
- Updates to **Part VI**, *Tank Systems* (Enclosure 12)
    - Section VI.A SDC Units and Tank Systems Description
        - Minor language modifications to allow treatment of overpacks containing 155mm and 105mm projectiles and agent contaminated energetics.
- Updates to **Part VIII**, *Storage and Treatment in Containment Buildings* (Enclosure 13)
    - Section VIII.A.1.a Static Detonation Chamber (SDC) Process Description
        - Update 50 percent fill counts and language to include overpacked munitions
- Updates to **Annex 3 Attachment 3**, *SDC Waste Characteristics and Waste Analysis Plan (WAP)* (Enclosure 14)
    - Minor language modifications throughout the WAP, to expand applicability to overpacked 155mm, 105mm projectiles and agent contaminated energetics.
    - Section 3-3
        - Modify language to allow removal of munitions overpacked rejects from overpacks
    - Updates to Table 3-1: RCRA Hazardous Waste Designation, Rationale, and Disposition, to expand applicability to overpacked, 155mm,105mm projectiles and agent contaminated energetics.
- Updates to **Annex 3 Attachment 8**, *SDC Process Description* (Enclosure 15)
    - Section 8-2a and 8-3a(1)
        - Modify language to allow removal of munitions overpacked rejects from overpacks
    - Section 8-3a(5) Remove Solid Wastes
        - Update 50 percent fill counts and language to include overpacked munitions
- Updates to **Part II**, *General Facility Conditions* (Enclosure 19)
    - Permit Condition II.H.4.a.iv
        - Added language to include storage capacity for overpacks in Igloo H1102.
- Updates to **Part III**, *Storage in Containers* (Enclosure 20)
    - Permit Condition III.A.12 – Storage Igloo H1102
        - Added language to specify storage capacity for overpacks in Igloo H1102.
    - Permit Condition II.E.2.c – Igloo H1102
        - Added language to clarify that overpacks are not to be placed on racks.
    - Updates to **Annex 3 Attachment 8 Appendix 8-3**, *SDC Complex Support Equipment and Structures* (Enclosure 21)

- Modified Table 8-3-2, SDC Enclosure Containment Building Design and Operating Standards
    - Modified compliance method for Regulatory Citation 264.1101(b), by deleting the restriction to not unpack overpacked items for processing.

Justification for Changes:

Justification for data-in-lieu of trial burns

The quantity of overpacks represents a limited scope for agent processing at the SDCs. Demonstration of ability to treat using data-in-lieu is better than trail burns, due to the limited availability of overpacks to conduct a full-blown trial burn. Data in lieu presented is based on the Trial Burn results for the 4.2-inch campaign that were previously approved by the Division. Information satisfying regulatory requirements at 6 CCR 1007-3§100.41(b)(5)(v)(A) through (H), is provided in Enclosure 16. Trial Burns, however, do not include performance data for propellent and so, performance data from SDC units from Anniston Chemical Agent Disposal Facility in Alabama is used. As required by 6 CCR 1007-3§100.28, design and operating information for SDC units from Anniston Chemical Agent Disposal Facility are provided in Enclosure 17. Few operating parameters differ from SDC parameters and are highlighted in Enclosure 18; however, these differences do not directly impact the destruction efficiency. Overall, the total agent by mass in the overpacks, is equivalent to approximately 350 HD mortars processed during the 4.2-inch mortar campaign, which equates to about 1-2 days of processing at SDCs.

Justification for processing rejects outside of overpacks

For rejects (confirmed by a ≤0.2 VSL), not having to feed the overpack body into the detonation chamber has considerable impacts on detonation chamber fill limits and the number of scrap dumps that are required when overpacks enter the detonation chamber. Additionally, rejects do not require any special handling more than regular munitions. Rejects were identified as such, at the PCAPP main plant where processing could not achieve desired outcomes for the munition. Within the SDC process, rejects are similar to regular munitions and their feed sequence is similar. By removing rejects out of the overpacks, efforts required to replace fusible bolts is minimized in addition to decreasing the introduction of fusible bolt material into SDC process regardless of the negligible emissions that fusible bolts are expected to cause.

Justification for Overpack and reject feed rates

All overpacks are metal built, although the structure and build differ between SRCs and PCCs. Regardless of the build, these waste streams vary mainly with the type of munition and/or energetics that are located inside the overpacks. Proposed overpack feed rates are significantly less than feed rates demonstrated in the trial burns. A comparison of waste feed constituents based on demonstrated 4.2-inch mortar feed and proposed overpack feeds are shown in Table 3-3 of (Enclosure 16). A worst-case scenario feed rate for overpacks is the 155mm munitions which, in comparison, is only 13% of the demonstrated Trial Burn feed rate. The feed rate for overpacks is based on system design and Mass & Energy Balances located in Attachment 13 Appendix 3-2 of the SDC permit. The feed rate for rejects is based on maximum expected energetics and is within the bounds of what has been demonstrated through SDC trail burns. Processing rates and corresponding emissions measurements from trial burns, demonstrated emission to be within that estimated/captured in the 2022 Multi Pathway Health Risk Assessment (MPHRA).

Justification to transfer contents from larger overpacks to smaller overpacks
Larger overpacks (total of 18: twelve (12) 9"x41" and six (6) 12"x56") are dimensionally suitable to fit into the SDCs, however the lids for some of the larger overpacks are greater than the overpack dimensions and therefore will not feed into the detonation chamber. To ensure that overpacks are fed without any issues, transfer of contents from these larger overpacks into smaller overpacks is necessary when the overpacks are leakers; for rejects, the overpacks will follow procedures in Operation 10 of Enclosure 8. Only 18 overpacks need this transfer of contents.

Justification for replacing Overpack bolts with fusible bolts
Replacing the SRC lid bolts with fusible bolts facilitates treatment verification of deflagrated munitions. Fusible bolts melt better within the detonation chamber thereby opening the overpack and exposing the munitions body for deflagration. Opening up of overpack within the detonation chamber during treatment is the safest way to open overpacks as opposed to attempting to open them before or after treatment. The amount of aluminum or nylon in fusible bolts is negligible compared to demonstrated energetics feed rate Anniston SDCs and is addressed in Table 4-2 of Enclosure 16.

Justification for ability to process Fiber Tubes
Fiber tubes are hazardous for presence of lead at a maximum of 50 ppm. Trace amounts of lead were part of Trial Burn operations due to Lead Azide in the fuzes. Estimate of 0.00139 pounds of lead is expected per fiber tube which is less than 0.00209 pounds of lead during Trial Burns. As such, the lead feed rate from fiber tubes is less than that which has been demonstrated during Trial Burns. See section 3.3.1 of Enclosure 16 for details.

Justification for Energetics processing
Section 4 of Enclosure 16 describes the basis for processing of energetics at SDCs on the basis of M67 propellant that was processed at similar incineration units at Anniston, Alabama. Permittees present data from Anniston for M67 propellant based feed and provide design and operating information as required by 6CCR §100.28 in Enclosures 17 and 18.

Justification for addition of overpack specific Detonation Chamber (DC) fill limits
The proposed overpack-specific fill counts determine the required frequency of the DC being emptied during the processing of each type of overpack. The volumes of each overpack container type were used, factoring in the random alignment of the overpacks within the DC, to determine fill counts that ensures the DC is emptied prior to exceeding 50 percent full.

Justification for Classification:

- Changes to the permit to process overpacks in the SDC units are categorized as Class 2 per 6 CCR 1007-3 Part 100, Appendix I, L.6.b: *If the waste does not contain a POHC that is more difficult to burn than authorized by the permit and if burning of the waste does not require compliance with different regulatory performance standards than specified in the permit.*
- *Other classifications that apply to this PMR:*
    - Class 1 for 6 CCR 1007-3 Part 100, Appendix I, A.1: *Administrative and Informational Changes*.
    - Class 1 for 6 CCR 1007-3 Part 100, Appendix I, A.2: *Correction of Typographical Changes*.

Proposed changes do not substantially alter the permit conditions, nor do they reduce the capacity of the facility to protect human health and the environment.

Enclosures:

Enclosure 1: Permit Change Page(s): Permit Modification History

Enclosure 2: SOP: *SDC Munitions Transfers and Storage*, 24852-SOP-SDC-W0005, Rev. 008

Enclosure 3: SOP: *Munitions Transport and Storage Operations, 24852-SOP-B23-W0001, Rev. 018*

Enclosure 4: Permit Change Page(s): Annex 3 Attachment 15, *SDC Operations Plan* (REDACTED)

Enclosure 5: Permit Change Page(s): Annex 3 Attachment 7, *SDC Munitions and Container Storage*

Enclosure 6: Permit Change Page(s): Annex 3 Attachment 2 Appendix 2-5, *SDC Hazard Preparedness and Prevention Plan*

Enclosure 7: Permit Change Page(s): Annex 3 Attachment 2, *SDC Procedures to Prevent Hazards* (CUI)

Enclosure 8: SOP: *SDC and Off-Gas Treatment System (OTS)*, 24852-SOP-B28-W0001, Rev. 011 (ECI / CUI)

Enclosure 9: PCAPP Hazardous Waste Determination Form: *4.2-inch Munition Fiber Tubes*

Enclosure 10: Clean Harbors Waste Material Profile Sheet: *4.2 inch Munition Tube and Tape*

Enclosure 11: Permit Change Page(s): Introduction

Enclosure 12: Permit Change Page(s): Part VI, *Tank Systems*

Enclosure 13: Permit Change Page(s): Part VII, *Storage and Treatment in Containment Buildings*

Enclosure 14: Permit Change Page(s): Annex 3 Attachment 3, *SDC Waste Characteristics and Waste Analysis Plan*

Enclosure 15: Permit Change Page(s): Annex 3 Attachment 8, *SDC Process Description*

Enclosure 16: White Paper on *Submittal of Data in Lieu of Additional Trial Burns for Overpacked Munitions at the PCAPP Static Detonation Chambers, 24852-30H-SDC-L0002, Rev. 001*

Enclosure 17: AECOM: *Static Detonation Chamber Final Condition 2 Emissions Test Report , Rev. 0* - Design and Operating information for Anniston SDCs

Enclosure 18: Differences in operating parameters between Anniston and PCD Static Detonation Chambers (SDCs)

Enclosure 19: Permit Change Page(s): Part II, *General Facility Conditions*

Enclosure 20: Permit Change Page(s): Part III, *Storage in Containers*

Enclosure 21: Permit Change Page(s): Annex 3 Attachment 8 Appendix 8-3, *SDC Complex Support Equipment and Structures*

Enclosure 1

Permit Change Page(s): Permit Modification History

PERMIT MODIFICATION HISTORY

Mod	Class	Approval Date	Section	Page(s)	Modification
S025 (22-214)	1	11/23/2022	Annex 3 – Attachment 8, Appendix 8-4	Appendix 8-4	This modification incorporates previous approvals from PMR S007 and makes changes to Table 1 for Internal Visual Inspection Frequencies.
SW022 (23-003) ECI (23-004)	1WOA	12/20/2022	Annex 3 Attachment 8, Appendix 8-4	SDC CMP pages: cover page and pages 2,6 and 7	This modification updates Appendix 8-4 (*SDC Complex Corrosion Monitoring Plan)* to make permanent the requirement to capture digital photographs during visual inspection. Additional administrative updates include adding the ECI designation to two pages and the '*RCRA Permit-Affecting Document-CDPHE Approval'* stamp on the cover page.
SW021 (23-007)	1woa	1/17/2023	Annex 3 – Attachment 9	Attachment 9-1	Modified Annex 3 Attachment 9 by updating the revision number and issue date of four (4) procedures.
S015 (23-015) TA (23-016) ECI (23-017)	2	TBD	Annex 3 – Introduction Annex 3-Part II Annex 3-Part III Annex 3 – Part VI Annex 3 – Part VIII Annex 3 – Attachment 2 Annex 3 – Attachment 2, Appendix 2-5 Annex 3 – Attachment 3 Annex 3 – Attachment 7 Annex 3 – Attachment 8 Annex 3- Attachment 8 Appendix 8-3 Annex 3 – Attachment 15	Introduction-Page iv Condition II.H.4.a.iv-Page II-9 Condition III.A.12- Page III-5 and Condition III.E.2.c- Page III-12 Part VI-1 Part VIII-3 Attachment 2-Table 2-2 Attachment 2, Appendix 2-5-Appendix A Attachment 3-1, 4, 10, 11, 15, 16, 18 and Table 3-1 Attachment 7-Figure 7-5, Table 7-1 and Table7-3 Attachment 8-13 Table 8-3-2, Appendix 8-3-13 Attachment 15-12, 14, 17, 21, 26, 30, 31, 32, 34, 37, 38, 44-46, 51, 52, 78, 79, Table-1, 3, 4, 6, 11, 12, 13, 14, 15 and 16	This modification allows processing of overpacks at the SDC Complex. Changes add inspection requirements for overpacks stored in Igloo H1102, update NEWs for the SDC complex where needed, expand the applicability of the WAP to overpacks and update Operations processes to include the transport and processing of overpacks.

Enclosure 2

SOP: *SDC Munitions Transfers and Storage,*

24852-SOP-SDC-W0005, Rev. 008

PUEBLO CHEMICAL AGENT-DESTRUCTION PILOT PLANT (PCAPP)

24852-SOP-SDC-W0005

ENV SDC MUNITION TRANSFERS AND STORAGE

REVISION	TOTAL PAGE COUNT	ANNUAL REVIEW DUE
008	66	07 MAY 2023

APPROVALS: (N/A FOR PCN)

REQUIRED	PRINT AND SIGN	DATE
CHRIS SHRONTZ OPSEC REVIEW COMPLETE		
MICHAEL SAUPE ENVIRONMENTAL MANAGER		MOD# (REQUIRED) PMR S015
MARK PROCTOR PROCEDURE OWNER		
TROY WORTHEN DEPARTMENT MANAGER		

ENV This SOP in its entirety is incorporated into the RCRA Permit. Any changes made to this SOP will require a permit modification. Notification and identification of the proposed changes must be made to CDPHE through the Environmental Department.

7-6-2022 Operation 5 Validation.pdf

Table of Contents

Remarks:

SAF This SOP contains identified Safety Critical Items. Safety department must approve changes to **SAF** tagged items.

PPE This SOP contains specific PPE requirements as a hazard mitigation measure associated with a specific task in an operation. Safety department must approve changes to **PPE** tagged items.

TRE This SOP contains identified Treaty Critical Items. Treaty Compliance Representative must approve changes to **TRE** tagged items.

This SOP provides instructions for loading, transporting, and monitoring Static Detonation Chamber (SDC) Overpack Pallets (OPPs) containing munitions.

This SOP is applicable to all SDC Personnel involved with loading, transporting, and monitoring munitions from SDC service magazines to the SDC sites. The SOP is applicable during the Operations phase of the project.

OPERATION 1 – GENERAL REQUIREMENTS

1.0 PREREQUISITES

1.1 None

2.0 SPECIAL REQUIREMENTS

2.1 IF any "VERIFY" step cannot be completed, **NOTIFY** Operations Superintendent.

2.2 Personnel and Explosive Limits for service magazines are listed in *Personnel and Explosive Limits for Routine Operations,* Appendix 05.

3.0 EQUIPMENT, TOOLS, AND SUPPLIES

ITEM	QUANTITY REQUIRED
None	N/A

4.0 PROCEDURE

SDC Plant Personnel

4.1 **INSPECT** G-Block service magazines in accordance with this SOP.

4.1.1 Apron inspection will be performed prior to opening the service magazine when adding or removing munitions.

4.1.2 Interior inspection will be performed once per week if accessing the service magazine, or once per quarter, whichever occurs first.

NOTE

Unless adding or removing munitions, the *Storage Igloo Per-Use Operations Daily RCRA Inspection*, PCAPP Form OPS-SDC-FD05 is not required to be completed.

4.1.3 IF adding or removing munitions, **INSPECT** service magazine in accordance with *Storage Igloo Per-Use Operations Daily RCRA Inspection*, PCAPP Form OPS-SDC-FD05 and Environmental Inspections, 24852-OPS-OAP-W0043.

4.2 **ENSURE** the necessary emergency response equipment to address hazards located in the areas (e.g., portable fire extinguishers, absorbent material storage) is available when required.

4.3 **ENSURE** service magazine door remains unlocked and open during operations inside service magazine. **LOCK** service magazine door when personnel are NOT present inside service magazine.

4.4 **VERIFY** concrete floors are free of cracks and gaps exceeding ½ inch wide.

4.5 **ANNOTATE** service magazine entry and exit times in the SDC Service Magazine Logbook.

4.6 **ENSURE** signage is displayed at or near eye level, in plain view, and facing the primary point of entry at each service magazine area with the following:

4.6.1 Identification number

4.6.2 Danger – Unauthorized Personnel Keep Out

4.6.3 No Smoking

4.6.4 Emergency contact information

4.6.5 Explosive Placard

4.7 Temporary Exclusion Area MUST be established and identified prior to opening any service magazine.

4.8 **ENSURE** the Two-person rule is followed in all exclusion areas in accordance with *Physical Security Plan Volume III, CDRL D023*, 24852-GPP-GAZ-00010.

4.9 Prior to G-Block operations requiring service magazine access, **ENSURE** a 1000 CFM Mobile Filtering Unit, Portable Generator, and G-Block Supply Trailer is available. In the event that an agent hazard is detected in a G-Block service magazine, **PROVIDE** filter, generator, and monitoring as necessary to establish active filtration, in accordance with *Mobile Air Filtration Operation*, *G-Block Secondary Waste Storage and Shipment*, 24852-SOP-B00-W0048.

4.9.1 Filter will be mobilized from a staging location.

4.9.2 Portable generator will be mobilized from a staging location.

4.9.3 G-Block Supply Trailer will be mobilized from a staging location. The G-Block Supply Trailer will be a fully enclosed storage trailer and contain related equipment to connect the mobile filter unit to the effected service magazine stack.

4.10 **RESPOND** to Miniature Continuous Air-Monitoring System (MINICAMS) alarms, identifying, isolating, overpacking, and decontaminating, as necessary through the Work Control process (a Work Order will be submitted).

4.11 PCD Fire will respond to all incidents outside service magazines.

4.12 PCD Fire will respond to any fire inside or outside the structure.

4.13 PCAPP Personnel will be responsible for all response actions inside service magazines.

4.14 Service Magazine H1102 has NRT monitoring available and will not require RTAP support for entering the service magazine.

4.15 Service Magazines G101, G102, and G103 do not have NRT monitoring, and will require RTAP support for entering the service magazine.

4.16 **VERIFY** SDC Flatbed Truck has “H” and correct explosive placard.

4.17 **PPE 1** When approaching an unmonitored service magazine (G101, G102, or G103), personnel must mask within 15 feet of approach.

4.18 Chemical Munition Accountability will be performed in accordance with *SDC Chemical Munitions Accountability, 24852*-OPS-OAP-W0062.

END OF OPERATION

OPERATION 2 – PRE-OPERATIONAL CONDITIONS

1.0 PREREQUISITES

1.1 None

2.0 SPECIAL REQUIREMENTS

2.1 IF any “VERIFY” step cannot be completed, **NOTIFY** Operations Superintendent.

2.2 SDC Plant Personnel refers to Plant Operators, Ordnance Technicians, and Maintenance Technicians who work at the SDC.

3.0 EQUIPMENT, TOOLS, AND SUPPLIES

ITEM	QUANTITY REQUIRED
SDC Flatbed Truck	1
PIT, National Fire Protection Agency (NFPA) type EE	2
Radio	1 available
Temporary Barricades	3
Cut resistance level 4 and puncture resistance level 3 gloves	1 pair

4.0 PROCEDURE

Operations Superintendent

4.1 **IDENTIFY** transfer route, designated Service Magazines, and delivery schedule for munitions transfers.

4.2 **VERIFY** RTAP support for G101, G102, or G103 is available when required.

SDC Plant Personnel

NOTE

Steps 4.3.2 through 4.4, SDC Plant Personnel shall continuously wear the identified PPE, unless recording information.

4.3 **PREPARE** SDC equipment for daily operation as follows:

4.3.1 PPE 3 **DON** cut resistance level 4 and puncture resistance level 3 gloves.

4.3.2 **COMPLETE** *PCAPP Vehicle Mileage Log*, PCAPP Form GPP-GPX-00109-F005.

4.3.3 **COMPLETE** *Taylor-Dunn Cart Daily Inspection Checklist,* PCAPP Form SAF-SAP-W0026-F005.

4.3.4 **COMPLETE** *Electric PIT Daily Inspection Checklist*, PCAPP Form SAF-SAP-W0026-F002, for each electric PIT.

4.4 Using barricades, **SETUP** Temporary Exclusion Area at service magazine.

4.4.1 **ENSURE** door guards are present at service magazine apron.

4.5 **COMPLETE** communications check with the following radios/ personnel:

4.5.1 SDC Flatbed Truck Radio to SDC CON (SCON)

4.5.2 SDC Flatbed Truck to Operations Superintendent

4.5.3 SDC Flatbed Truck Radio to MINICAMS Technician.

CRO

4.6 **VERIFY** SDC Limiting Conditions of Operations (LCOs) are complete**.**

4.7 **VERIFY** communications checks are complete.

4.8 **VERIFY** Temporary Exclusion Area barricades are in place.

4.9 **ENSURE** RTAPS are ready to support G-Block transfer operations.

4.10 **DISPATCH** SDC Flatbed Truck to H1102, G101, G102, or G103.

END OF OPERATION

OPERATION 3 – G-BLOCK HEADWALL/ FIRST ENTRY MONITORING

5.0 PREREQUISITES

Operations Superintendent

5.1 **ENSURE** review of Operation 1 is complete.

5.2 **VERIFY** Operation 2 is complete.

Monitoring Personnel

5.3 **ENSURE** Real Time Analytical Platform (RTAP) is ready to support monitoring of G101, G102, or G103.

6.0 SPECIAL REQUIREMENTS

6.1 IF any “VERIFY” step cannot be completed, **NOTIFY** Operations Superintendent.

6.2 SDC Plant Personnel refers to Plant Operators, Ordnance Technicians, and Maintenance Technicians who work at the SDC.

6.3 **SAF 4** RTAP vehicle(s) is kept 25 feet away from igloo, on a level surface and away from vegetation or other combustible material.

6.4 **SAF 4** **PPE 4** M40 mask is donned prior to connecting RTAP to G-Block storage igloos.

6.5 In the event a G-Block service magazine has readings GREATER THAN or EQUAL TO 0.2 VSL, the service magazine will need to be placed under engineering controls in accordance with *Mobile Air Filtration Operation*, *G-Block Secondary Waste Storage and Shipment*, 24852-SOP-B00-W0048.

6.6 Headwall/ First Entry monitoring is not required for H1102. This service magazine has a continuous air filtration unit on it all times, along with continuous monitoring.

6.7 **ENV** Headwall/ First Entry monitoring will be performed under the following conditions:

6.7.1 At a minimum, ONCE each week for permit conditions.

6.7.2 Prior to entry into G-Block service magazine.

7.0 EQUIPMENT, TOOLS AND SUPPLIES

ITEM	QUANTITY REQUIRED
RTAP	1
1000 CFM Mobile Filtering Unit	As needed
Cut resistance level 4 and puncture resistance level 3 gloves	As determined by task

8.0 PROCEDURE

NOTE

IF Headwall or First Entry Monitoring MINICAM sample is confirmed at GREATER THAN 0.2 VSL the igloo passive filtration system will require a VSL monitoring work order.

Operations Superintendent

8.1 **ENSURE** Lab Monitoring Personnel are in place to support service magazine operations.

Monitoring Personnel

8.2 SAF 4 **SET** RTAP on level surface, approximately 25 feet from the service magazine and away from vegetation and other combustible material.

8.3 Prior to connecting the RTAP sample lines to G-Block Service Magazine,

8.3.1 SAF 4 PPE 4 **DON** M40 Mask at RTAP.

8.3.2 PPE 4 **DON** cut resistance level 4 and puncture resistance level 3 gloves.

8.3.3 **CONNECT** the RTAP sample line to G-Block service magazine.

8.3.4 **RETURN** to RTAP.

8.3.5 **DOFF** M40 Mask.

8.4 **PERFORM** headwall/ first entry monitoring (three cycles).

8.4.1 IF MINICAMS sample is LESS THAN 0.2 VSL, THEN **GO TO** step 8.5.

8.4.2 IF MINICAMS sample is GREATER THAN or EQUAL 0.2 VSL, THEN **STOP** and **NOTIFY** CRO.

SCON

8.4.2.1 **GO TO** *Mobile Air Filtration Operation*, *G-Block Secondary Waste Storage and Shipment*, 24852-SOP-B00-W0048.

SDC Plant Personnel

8.5 ENV **ANNOTATE** monitoring results on the following applicable *RCRA Inspection:*

8.5.1 *Storage Igloo G101 Weekly RCRA Inspection*, PCAPP Form OPS-SDC-FW01

8.5.2 *Storage Igloo G102 Weekly RCRA Inspection*, PCAPP Form OPS-SDC-FW02

8.5.3 *Storage Igloo G103 Weekly RCRA Inspection*, PCAPP Form OPS-SDC-FW03

8.5.4 *Storage Igloo H1102 Weekly RCRA Inspection*, PCAPP Form OPS-SDC-FW04.

8.6 **PROVIDE** *Storage Igloo Weekly RCRA Inspection(s)* to Operations Superintendent.

Operations Superintendent

8.7 **PROVIDE** *Storage Igloo Weekly RCRA Inspection(s)* to SDC Operations Shift Clerk.

SDC Plant Personnel

8.8 **GO TO** *Service Magazine Entry,* Operation 4.

SDC Operations Shift Clerk

8.9 **ENV** **SUBMIT** completed form to PCAPP DCC to be processed in accordance with *Records and Information Management*, 24852-K10B-00150.

END OF OPERATION

OPERATION 4 – SERVICE MAGAZINE ENTRY

1.0 PREREQUISITES

Operations Superintendent

1.1 **VERIFY** previous operations are reviewed and/or complete.

1.2 **VERIFY** headwall/ first entry monitoring results are LESS THAN 0.2 VSL.

1.3 **VERIFY** that a 1000 CFM Mobile Filtering Unit is available for G-Block Service Magazines.

1.4 **VERIFY** G-Block Supply Trailer is available for G-Block Service Magazine.

1.5 **VERIFY** portable generator is available.

2.0 SPECIAL REQUIREMENTS

2.1 IF any "VERIFY" step cannot be completed, **NOTIFY** Operations Superintendent.

2.2 SDC Plant Personnel refers to Plant Operators, Ordnance Technicians, and Maintenance Technicians who work at the SDC.

2.3 Prior to entry into service magazine, **NOTIFY** SCON.

2.4 **SAF 6** IF leaks or liquid are identified, or MINICAMS readings are GREATER THAN or EQUAL to 0.2 VSL, THEN IMMEDIATELY **MASK, EGRESS** service magazine, **NOTIFY** SCON, and **CLOSE** service magazine door.

2.4.1 In the event a G-Block service magazine has readings GREATER THAN or EQUAL TO 0.2 VSL, the service magazine will need to be placed under engineering controls in accordance with *Mobile Air Filtration Operation*, *G-Block Secondary Waste Storage and Shipment*, 24852-SOP-B00-W0048.

2.5 **SAF 6** **ENV** RTAP is used for first entry monitoring to allow entry into the service magazine.

2.5.1 H1102 has NRT monitoring and does not require RTAP support.

2.6 **SAF 6** **ENV** Continuous monitoring will be performed while personnel are in the service magazine.

2.7 Inspection will consist of a minimum of two Plant Operators/ Ordnance Technicians.

2.8 **SAF 5** PITs travel no faster than walking speed.

2.9 **SAF 5** Operators are certified in transportation, PIT/pallet jack operations.

2.10 Spotters will wear approved high visibility apparel meeting ANSI 107-2015, Class II, Standard for High-Visibility Public Safety Vests (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016).

2.11 **SAF 5** Spotters are used during PIT movement.

2.12 SAF 5 Spotters maintain visual contact with PIT/ transport vehicle operator at all times.

2.13 SAF 5 Utilizing the PIT, **POSITION** forks correctly at all times during operation.

2.14 **ANNOTATE** service magazine entry and exit times in the SDC Service Magazine Logbook.

2.15 **ENSURE** the Two-person rule is followed in all exclusion areas, or Temporary Exclusion Areas, in accordance with *Physical Security Plan Volume III, CDRL D023*, 24852-GPP-GAZ-00010.

3.0 EQUIPMENT, TOOLS AND SUPPLIES

ITEM	QUANTITY REQUIRED
Service Magazine Stick	1 ea.
Surety Keys	1 ea.
Flashlight	2
RTAP	As needed
1000 CFM Mobile Filtering Unit	As needed
G-Block Supply Trailer	As needed
SDC Service Magazine Logbook	1 per service magazine
PIT	2
High visibility vest	One per spotter
Cut resistance level 4 and puncture resistance level 3 gloves	As determined by task

4.0 PROCEDURE

SDC Plant Personnel

NOTE

Throughout Operation 4, Spotter shall continuously wear the identified PPE.

4.1 PPE 5 **DON** high visibility vest when performing spotter activities.

4.2 **PERFORM** the following for accessing Service Magazines:

Operations Superintendent / Designee

4.2.1 **ENSURE** Lab Monitoring Personnel are ready and monitoring is in place to support service magazine operations.

SDC Plant Personnel/ Surety Key User/ Door Guard

4.2.2 **REQUEST** Access to Service Magazine from the SCON 3.

CRO

4.2.3 **PROVIDE** VSL reading and time confirmation.

4.2.4 **NOTIFY** IDS that service magazine door is going to be UNLOCKED.

4.2.5 **NOTIFY** SDC Plant Personnel service magazine door is in ACCESS.

SDC Plant Personnel

4.3 PPE 5 **DON** cut resistant level 4 puncture resistant level 3 gloves.

4.3.1 Using a PIT**, REMOVE** king tut block and **SET** aside.

4.3.2 **UNLOCK** and **OPEN** door as follows:

4.3.2.1 **REMOVE** surety locks from service magazine door and **SECURE** surety locks to door bracket.

4.3.2.2 For G101-G103, **VERIFY** air bypass damper is CLOSED by **TURNING** the wingnut CLOCKWISE.

4.3.2.3 Use the service magazine stick, **APPLY** enough tension to RELEASE door pins.

4.3.2.4 **REMOVE** door pins from door swing arms.

4.3.2.5 **MOVE** door swing arms away from door, and out of the way of Personnel.

4.3.2.6 **OPEN** service magazine door fully.

4.4 **PERFORM** service magazine inspections as follows:

NOTE

When performing an initial inspection (H1102 only), one operator will inspect the inside rack while the second operator inspects the outside rack.

4.4.1 Using a flashlight, VISUALLY **INSPECT** the service magazine for the following:

4.4.1.1 Unknown liquid in the Service Magazine.

a. SAF 6 IF leaks or liquid are identified, THEN IMMEDIATELY **DON** M40 (if not already on) and **EGRESS** service magazine.

b. **CLOSE** service magazine door.

c. **NOTIFY** SCON 3 and Operations Superintendent.

4.4.1.2 Damage to racks (H1102 only).

a. IF rack damage is found, THEN **NOTIFY** SCON 3 and **DOCUMENT** location of damage.

b. **NOTIFY** Operation Superintendent**.**

4.4.1.3 **ENSURE** the Hazardous Waste Label for each OPP cover or SRC Crate is visible from the aisle.

~~4.4.1.3~~4.4.1.4 **EXIT** service magazine.

a. IF inspection discrepancies are noted, THEN **NOTIFY** SCON 3.

4.4.2 **PERFORM** RCRA Inspections in accordance with *Environmental Inspections*, 24852-OPS-OAP-W0043.

4.4.2.1 **DOCUMENT** any Service Requests/ Work Order Numbers generated from inspection sheet and any additional comments.

4.4.2.2 **PROVIDE** completed inspection forms to Operations Superintendent.

Operations Superintendent

4.4.2.3 **REVIEW** inspection forms and **INITIAL**.

4.4.2.4 **PROVIDE** completed RCRA inspection package to SDC Operations Shift Clerk.

SDC Operations Shift Clerk

4.4.2.5 ENV **SUBMIT** completed form to PCAPP DCC to be processed in accordance with *Records and Information Management*, 24852-K10B-00150.

SDC Plant Personnel

4.5 IF transferring munitions, THEN **PROCEED** to Operation 5.

NOTE

Steps 4.6.2 through 4.6.5, SDC Plant Personnel/ Surety Key Holder/ Door Guard shall continuously wear the identified PPE.

SDC Plant Personnel/ Surety Key User/ Door Guard

4.6 WHEN service magazine activities are complete, **SECURE** door as follows:

4.6.1 PPE 7 **DON** cut resistance level 4 and puncture resistance level 3 gloves.

4.6.2 **CLOSE** door COMPLETELY.

4.6.3 **SECURE** door swing arms to door.

4.6.4 **USE** the service magazine stick, **APPLY** enough tension to **INSTALL** door pins.

4.6.5 **REMOVE** surety locks from security hasp and **SECURE** surety locks on service magazine door.

4.6.6 **NOTIFY** SCON 3 that service magazine door is Locked and request a time for SECURING service Magazine.

4.6.7 **PLACE** king tut block in FRONT of service magazine door.

CRO

4.6.8 **NOTIFY** IDS service magazine door is SECURED.

4.6.9 **PROVIDE** secure time for service magazine to SDC Plant Personnel.

END OF OPERATION

OPERATION 5 – TRANSPORTING MUNITIONS

1.0 PREREQUISITES

SDC Plant Personnel

1.1 **VERIFY** previous Operations 1 and 2 are complete.

1.2 **DRIVE** the empty SDC Flatbed Truck to the designated Temporary Exclusion Area (TEA) at identified service magazine.

1.2.1 **SAF 13** **PLACE** Transmission in NEUTRAL.

1.2.2 **SAF 13** **SET** Parking brake.

1.2.3 **SAF 13** **TURN** SDC Flatbed Truck ignition OFF.

1.2.4 **SAF 13** **PLACE** wheel chocks.

2.0 SPECIAL REQUIREMENTS

2.1 IF any “VERIFY” step cannot be completed, **NOTIFY** Operations Superintendent.

2.2 SDC Plant Personnel refers to Plant Operators, Ordnance Technicians, and Maintenance Technicians who work at the SDC.

2.3 Spotters will wear approved high visibility apparel meeting ANSI 107-2015, Class II, Standard for High-Visibility Public Safety Vests (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016).

2.4 **SAF 15** Spotter is to maintain visual contact with PIT operator at all times.

2.5 **SAF 15, 17, 20** Spotters are required during Powered Industrial Truck (PIT) movement and OPP placement.

2.6 **SAF 15** Operators are certified in transportation, PIT/pallet jack operations and SDC Flatbed Truck.

2.7 **SAF 10, 15, 17, 20** A spotter is required when using the SDC Flatbed Truck to move OPPs with munitions, or when the SDC Flatbed Truck is backing or maneuvering in tight areas.

2.8 **SAF 15, 20** PITs travel no faster than walking speed.

2.9 **ENSURE** the Two-person rule is followed in all exclusion areas, or Temporary Exclusion Areas, in accordance with *Physical Security Plan Volume III, CDRL D023*, 24852-GPP-GAZ-00010.

2.10 **ENSURE** OPP or SRC Crate cover remains on ~~the OPP~~ until MINICAMS monitoring is complete.

2.11 **ENSURE** hazard label on the OPP or SRC Crate cover is VISIBLE from the aisle.

2.12 **SAF 15** IF liquid is found on munitions or SRC Crate or in area during inspection or normal munition handling, THEN **MASK**, **EXIT** area, and **NOTIFY** Operations Superintendent and SCON.

2.12.1 In the event a G-Block service magazine has readings GREATER THAN or EQUAL TO 0.2 VSL, the service magazine will need to be placed under engineering controls in accordance with *Mobile Air Filtration Operation*, *G-Block Secondary Waste Storage and Shipment*, 24852-SOP-B00-W0048.

2.13 All munition accountability will be performed in accordance with *SDC Chemical Munitions Accountability,* 24852-OPS-OAP-W0062.

2.14 TRE NOTIFY the receiving SCON if a treaty round is being transferred. SCON will have to **NOTIFY** Treaty before the round can be removed from the service magazine.

2.15 SAF 17 Flatbed trucks will NOT exceed 5 mph at any time when carrying munitions**.**

2.16 SAF 8 SCON has advance warning of approaching lightning storms.

2.17 SAF 8 Explosives/ energetics/ propellants are not handled during lightning events.

2.18 SAF 8 Service magazines are equipped with approved Lightning Protection System.

3.0 EQUIPMENT, TOOLS AND SUPPLIES

ITEM	QUANTITY REQUIRED
SDC Flatbed Truck	As determined by task
Temporary Barricades	As determined by task
OPP (as required)	As determined by task
Wheel Chocks	1 set per vehicle
PIT, NFPA type EE	2 (minimum)
MHE	As determined by task
TAP Boots	1 set per PIT Operator and Spotter
TAP Gloves	1 set per PIT Operator and Spotter
Apron	1 per PIT Operator and Spotter
Large tarp cover	1 per SDC Flatbed Truck
SDC Service Magazine Logbook	1 per service magazine
PIT Ramps (G-Block Only)	As needed

ITEM	QUANTITY REQUIRED
High visibility vest	One per spotter
Cut resistance level 4 and puncture resistance level 3 gloves	1 pair
Blunt Punch ~~ITEM~~	As determined by task ~~QUANTITY REQUIRED~~
H1102 Munitions Accountability Logbook	1 per service magazine

4.0 TRANSPORTING MUNITIONS OR SRC CRATE FROM H1102 TO SDC ENCLOSURE

CRO

4.1 **NOTIFY** PCD Post 8 and Operations Center (OC) for overwatch of munition delivery from H-1102 to receiving SDC enclosure.

SDC Plant Personnel

4.2 **SET UP** the Temporary Exclusion Area at H1102 service magazine as follows:

4.2.1 **PPE 9** **DON** cut resistant level 4 puncture resistant level 3 gloves.

4.2.2 **USING** barricades, **SETUP** Temporary Exclusion Area at service magazine.

4.2.3 **UPGRADE** area to Temporary Exclusion Area.

CRO

4.2.4 **MAKE** PA announcement and **NOTIFY** all site personnel H1102 service magazine has been upgraded to a Temporary Exclusion Area.

SDC Plant Personnel

4.3 **PERFORM** the following for accessing H1102 Service Magazine:

Operations Superintendent / Designee

4.3.1 **ENSURE** Lab Monitoring Personnel are ready and monitoring is in place to support service magazine operations.

SDC Plant Personnel/ Surety Key User/ Door Guard

4.3.2 **REQUEST** Access to Service Magazine from the SCON 3.

CRO

4.3.3 **PROVIDE** VSL reading and time confirmation.

4.3.4 **NOTIFY** IDS that service magazine door is going to be UNLOCKED.

4.3.5 **NOTIFY** SDC Plant Personnel service magazine door is in ACCESS.

SDC Plant Personnel

4.4 PPE 11 **DON** cut resistant level 4 puncture resistant level 3 gloves.

4.4.1 Using a PIT**, REMOVE** king tut block and **SET** aside.

4.4.2 **UNLOCK** and **OPEN** door as follows:

4.4.2.1 **REMOVE** surety locks from service magazine door and **SECURE** surety locks to door bracket.

4.4.2.2 **USE** the service magazine stick, **APPLY** enough tension to RELEASE door pins.

4.4.2.3 **REMOVE** door pins from door swing arms.

4.4.2.4 **MOVE** door swing arms away from door, and out of the way of Personnel.

4.4.3 **OPEN** service magazine door fully.

SDC Plant Personnel

NOTE

Throughout Operation 5, SDC Plant Personnel shall continuously wear the identified PPE.

4.5 SAF 19,20 PPE 19,20 **DON** the following PPE:

4.5.1 TAP Boots

4.5.2 TAP Gloves

4.5.3 Tychem Apron

4.5.4 M40 Mask Slung

NOTE

Throughout Operation 5, Spotter shall continuously wear the identified PPE.

Spotter

4.6 PPE 10, 15, 17, 20 **DON** high visibility vest when performing spotter activities.

Operations Superintendent/ Designee

4.7 **COORDINATE** with SDC Plant Personnel to TRANSFER OPP(s) or SRC Crate from H1102 service magazine and identify which SDC Unit (SDC 1, SDC 2, or SDC 3) is to receive the OPP(s) or SRC Crate.

4.7.1 **NOTIFY** receiving SCON of munition quantities and type to be TRANSFERRED.

4.7.2 **NOTIFY** receiving SCON if a single round container (SRC) is being transferred with a leaker munition.

4.8 TRE IF OPP or SRC Crate contains munition tagged by Treaty,

4.8.1 **ANNOTATE** and **VERIFY** OPP or SRC Crate Number in the Remarks section of DA Form 4508.

Control Room Operator (CRO)

4.8.2 TRE **NOTIFY** Treaty Inspection Team that an OPP or SRC Crate with treaty tagged munition(s) will be transferred to SDC enclosure for monitoring and unpacking.

WARNING
TO PREVENT INJURY, ANY LIQUID FOUND ON MUNITIONS OR IN AREA DURING INSPECTIONS OR NORMAL MUNITION HANDLING IS CONSIDERED AGENT.

SDC Plant Personnel

~~4.9~~ For OPP's,

~~4.10~~4.9 **ENSURE** OPP cover is in good condition with no punctures, rips and tears. The cover shall NOT have tape repairs to punctures, rips and tears.

~~4.10.1~~4.9.1 IF OPP cover has punctures, rips and tears:

~~4.10.1.1~~4.9.1.1 DO NOT REMOVE OPP cover.

4.9.1.2 **INSTALL** second cover over the OPP.

4.10 For SRC Crate, **INSTALL** cover on SRC Crate.

SDC Plant Personnel

4.11 **LOAD** OPP or SRC Crate on to SDC Flatbed Truck by performing the following steps:

WARNING
PIT SPOTTER STAYS CLEAR OF AREA BETWEEN PIT AND ANY STATIONARY OBJECT TO PREVENT BEING CRUSHED OR INJURED DURING THIS OPERATION.

4.11.1 **SET** PIT ramps in place, if required.

4.11.1.1 PPE 14 **DON** cut resistance level 4 and puncture resistance level 3 gloves.

4.11.2 SAF 15 Using designated PIT/ MHE and spotter, **PROCEED** to designated OPP or SRC Crate.

4.11.2.1 Prior to moving, **ENSURE** Spotter is in visual contact with PIT Operator.

4.11.2.2 WHEN spotter is in position, **ENGAGE** OPP or SRC Crate and **REMOVE** with PIT/ MHE.

4.11.2.3 IF OPP or SRC Crate is on the top rack, **BACK** out and lower forks prior to travel to threshold.

4.11.3 **TRANSFER** OPP or SRC Crate and **STAGE** ~~OPP~~ at the H1102 service magazine threshold.

4.11.3.1 **VERIFY** OPP or SRC Crate number, Munition Type, Lot number, and number of munitions, and DA Form 4508 Number.

4.11.3.2 **RECORD** the DATE OUT~~–~~ and number of munitions removed or the SRC Crate removal on *SDC Service Magazine Log,* PCAPP Form OPS-OAP-W0062-F002, in accordance with *SDC Chemical Munitions Accountability,* OPS-OAP-W0062.

4.11.3.3 SAF 15 PRIOR to moving, **ENSURE** Spotter is in visual contact with PIT Operator.

4.11.3.4 **ENGAGE** the OPP or SRC Crate is placed on the threshold.

4.11.3.5 **LOAD** OPP or SRC Crate onto SDC Flatbed Truck.

4.11.3.6 **PLACE** all accessible hazard placards when first loaded OPP or SRC Crate has been placed on the SDC Flatbed Truck.

4.11.4 ENV **REPEAT** above steps until required quantity of OPPs are loaded or the SRC Crate is loaded, ~~,~~ maintaining 6” spacing between OPPs.

4.11.5 **UPDATE** *SDC Service Magazine Log*, 24852-OPS-OAP-W0062-F002.

4.11.6 PPE 16 **DON** cut resistance level 4 and puncture resistance level 3 gloves.

4.11.6.1 **SECURE** OPPs or SRC Crate with cargo straps.

4.11.6.2 **REMOVE** PIT ramps if installed.

SDC Enclosure Surety Key User/ Door Guard

4.11.7 **REQUEST** Access from receiving SCON to Open SDC Unit door.

CRO

4.11.8 **NOTIFY** IDS that the designated SDC door is going to be UNLOCKED.

4.11.9 **NOTIFY** Surety Key User/Door Guard designated SDC Unit is in ACCESS.

SDC Enclosure Surety Key User/ Door Guard

4.11.9.1 **REMOVE** surety locks from SDC Unit door.

4.11.9.2 **OPEN** SDC Unit doors.

SDC Plant Personnel

4.12 **TRANSFER** munitions or SRC Crate ~~-~~to designated SDC unit as follows:

4.12.1 **REMOVE** vehicle chocks.

4.12.2 **NOTIFY** SCON 3 that munitions or SRC Crate loading is complete and SDC Flatbed Truck is ready to proceed to the receiving SDC Unit.

4.12.2.1 **NOTIFY** receiving SCON the OPP or SRC Crate number~~(s)~~ and quantity of munitions being transferred.

4.12.3 **CONTACT** the receiving SDC Enclosure Door Guards to ensure SDC enclosure is ready to receive~~ the munitions~~.

4.12.4 Once Designated SDC Unit is ready to receive, **USE** predetermined/approved route, **DELIVER** munitions or SRC Crate to designated SDC Unit.

SDC Plant Personnel/ Surety Key User/ Door Guard

4.12.5 **PPE 10, 11** **DON** cut resistance level 4 and puncture resistance level 3 gloves.

4.12.6 **CLOSE** H1102 service magazine door COMPLETELY.

4.12.7 **SECURE** door swing arms to door.

4.12.8 **USE** the service magazine stick, **APPLY** enough tension to **INSTALL** door pins.

4.12.9 **PLACE** king tut block in front of service magazine door.

4.12.10 **REQUEST** SCON 3 to have the H1102 service magazine apron downgraded from a Temporary Exclusion Area to Normal Access.

4.12.11 **REMOVE** Temporary Exclusion Area around apron.

CRO

4.12.12 **MAKE** PA announcement to **DOWNGRADE** the H1102 service magazine apron from Temporary Exclusion Area to Normal Access.

SDC Plant personnel

CAUTION

Prior to moving, ENSURE Spotter is in visual contact with SDC Flatbed Truck Driver.

4.12.13 **DRIVE** Flatbed Truck in to receiving SDC Enclosure Vestibule and close outside door.

SDC Enclosure Surety Key User/ Door Guard

4.12.14 **NOTIFY** receiving SCON that the SDC Flatbed Truck has arrived.

SDC Plant Personnel

4.12.15 **OPEN** Inner Vestibule door and **DRIVE** SDC Flatbed Truck to conveyor 1 inside the designated SDC Unit for offloading.

4.12.15.1 **SAF 18** **PLACE** Transmission in NEUTRAL.

4.12.15.2 **SAF 18** **SET** Parking brake.

4.12.15.3 **SAF 18** **TURN** SDC Flatbed Truck ignition OFF.

4.12.15.4 **SAF 18** **PLACE** wheel chocks.

4.12.15.5 **RECORD** SRC Crate or munition lot number and count of munitions in the SDC Enclosure logbook.

WARNING

TO PREVENT INJURY, ANY LIQUID FOUND ON MUNITIONS OR IN AREA DURING INSPECTIONS OR NORMAL MUNITION HANDLING IS CONSIDERED AGENT.

NOTE

Steps 4.12.17 through 4.13.11, SDC Plant Personnel shall continuously wear the identified PPE.

SDC Plant Personnel

4.12.16 **SAF 19, 20** **PPE 19, 20** **DON** the following PPE:

4.12.16.1 TAP Boots

4.12.16.2 TAP Gloves

4.12.16.3 Tychem Apron

4.12.16.4 M40 Mask slung

4.12.17 **INSPECT** OPP or SRC Crate for signs of liquid.

4.12.17.1 IF no liquid is found, THEN **CONTINUE** to step 4.12.18.

4.12.17.2 IF liquid is found, THEN **MASK, EXIT** area, and **NOTIFY** Operations Superintendent and receiving SCON.

4.12.18 **PPE 16** **DON** cut resistance level 4 and puncture resistance level 3 gloves.

4.12.18.1 **RELEASE** and **STORE** cargo straps.

~~***ENSURE the OPP covers remain on the OPPs.***~~

SDC Plant Personnel

4.13 **SAF 19** **PPE 19** **PERFORM** MINICAMS monitoring of the OPP or SRC Crate as follows:

4.13.1 **COORDINATE** flow check of MINICAMS sample line with Lab Monitoring Personnel or SCON unless using mobile MINICAMS unit.

4.13.2 After satisfactory sample line flow check, **PERFORM** the following to monitor each OPP or SRC Crate.

4.13.1.14.13.2.1 **VERIFY** SRC Crate Cover had a hold time of 15-minute or greater prior to headspace monitoring.

4.13.1.24.13.2.2 **LOCATE** the sample grommet on the OPP cover or use a blunt punch to create a sampling hole on the SRC Crate Cover.

4.13.1.34.13.2.3 **INSERT** the sample line distal end through the grommet or SRC Crate Cover sampling hole.

4.13.1.44.13.2.4 **REQUEST** the SCON to start 15-minute MINICAMS test cycle on designated OPP or SRC Crate.

4.13.1.54.13.2.5 **RECORD** MINICAMS Start time and OPP Number or SRC Crate in the SDC Enclosure Logbook.

4.13.24.13.3 **MONITOR** OPP or SRC Crate for a minimum of two complete MINICAMS cycles or 15-minute sample time.

CRO

4.13.2.14.13.3.1 **START** the 15-minute Monitoring time for the OPP or SRC Crate.

4.13.2.24.13.3.2 **SAF 15** **NOTIFY** the SDC Plant Personnel when the monitoring time is complete and the VSL Reading.

SDC Plant Personnel

a. IF MINICAMS reading is 0.2 VSL or greater, THEN **MASK, EXIT**.

b. IF MINICAMS reading is less than 0.2 VSL, THEN **DISCONNECT** HSTL and **STORE.**

4.13.34.13.4 **RECORD** OPP or SRC Crate MINICAMS results in the SDC enclosure logbook.

4.13.44.13.5 **IF** there are additional OPPs, -**REPEAT** steps 4.13.2 to step 4.13.4.

4.13.54.13.6 **REMOVE** DA Form 4508 from the OPP sleeve or SRC Crate sleevesleeve.

4.13.64.13.7 **REMOVE** OPP cover.

4.13.74.13.8 **PLACE** DA Form 4508 on top of the pallet or SRC, **ENSURING** it stays with the correct pallet or SRC.

4.13.9 For OPP's, **FOLD** and **STORE** OPP cover.

4.13.84.13.10 For SRC Crates, **DISPOSE** of cover in accordance with *Waste Management Procedure*, 24852-SOP-B00-W0038.

4.13.94.13.11 WHEN OPPs or SRC Crates on the Transport truck are monitored **GO TO** step 4.144.13.

4.14 **LOAD** the SDC Feed Conveyor in accordance with *SDC Off-Gas Treatment System*, 24852-SOP-B28-W0001.

SDC Plant Personnel/ Surety Key User/ Door Guard

4.15 IF munition or SRC Crate movements are complete**,** THEN **SECURE** H1102 service magazine as follows:

4.15.1 PPE 10, 11 **DON** cut resistance level 4 and puncture resistance level 3 gloves.

4.15.2 **ENSURE** H1102 service magazine doors are COMPLETELY closed.

4.15.3 **ENSURE** door swing arms are secured to the door.

4.15.4 **ENSURE** door pins are installed.

4.15.5 **REMOVE** surety locks from security hasp and **SECURE** surety locks on service magazine door.

4.15.6 **NOTIFY** SCON 3 that service magazine door is locked and request a time for SECURING service Magazine.

4.15.7 **ENSURE** king tut block is in front of service magazine door.

CRO

4.15.8 **NOTIFY** Post 8 and OC that munition deliveries are COMPLETE and **REMOVE** security overwatch.

4.15.9 **NOTIFY** IDS service magazine door is SECURED.

4.15.10 **PROVIDE** secure time for service magazine to SDC Plant Personnel.

5.0 TRANSPORTING MUNITIONS FROM SDC ENCLOSURE TO SDC ENCLOSURE

NOTE

ENV Transporting munitions from SDC Enclosure to SDC Enclosure is not routine, a SDC Enclosure to SDC Enclosure transfer will occur only in a contingency event.

CRO

5.1 **NOTIFY** PCD Post 8 and Operations Center (OC) for overwatch of munition delivery from SDC enclosure to SDC enclosure.

SDC Plant Personnel

NOTE

Throughout Operation 5, SDC Plant Personnel shall continuously wear the identified PPE.

5.2 PPE 14,16 **DON** cut resistance level 4 and puncture resistance level 3 gloves.

5.3 **ENSURE** correct OPP and Dunnage are available.

5.4 **REMOVE** munition boxes from conveyor 1 and **PALLETIZE** munitions.

5.5 **PLACE** OPP cover on palletized munitions and **REPLACE** DA Form 4508 in cover sleeve.

5.6 **ENSURE** OPP cover is in good condition with no punctures, rips and tears. The cover shall NOT have tape repairs to punctures, rips and tears.

5.6.1 IF OPP cover has punctures, rips and tears:

5.6.1.1 DO NOT REMOVE OPP cover.

5.6.2 **INSTALL** second cover over the OPP.

5.7 **SECURE** OPPs with cargo straps.

5.8 **ENSURE** DA Form 4508 remains with the OPP during transfer**.**

CRO

5.9 WHEN Overwatch is in PLACE, **MAKE** a PA announcement that Munition transfer is taking place and avoid the area.

Operations Superintendent/ Designee

5.10 **TRE** IF OPP contains munition tagged by Treaty, **ANNOTATE** and **VERIFY** OPP number in the remarks section of DA Form 4508.

Control Room Operator (CRO)

5.11 **NOTIFY** Treaty Inspection Team that an OPP with treaty tagged munition(s) will be transferred to SDC enclosure.

SDC Enclosure Surety Key User/ Door Guard

5.11.1 **REQUEST** Access from receiving SCON to OPEN SDC Unit door.

CRO

5.11.2 **NOTIFY** IDS that the receiving SDC door is going to be UNLOCKED.

5.11.3 **NOTIFY** Surety Key User/Door Guard receiving SDC Unit is in ACCESS.

SDC Enclosure Surety Key User/ Door Guard

5.11.4 **REMOVE** surety locks from SDC Unit door.

5.11.5 **OPEN** SDC Unit doors.

SDC Plant Personnel

5.12 **TRANSFER** munitions to receiving SDC unit as follows:

5.12.1 **REMOVE** vehicle chocks.

5.12.2 **NOTIFY** receiving SCON that munition loading is COMPLETE and SDC Flatbed Truck is ready to proceed to the receiving SDC Unit.

5.12.3 **NOTIFY** receiving SCON the OPP number(s) and quantity of munitions being transferred.

5.12.4 **CONTACT** the receiving SDC Enclosure Door Guards to ensure enclosure is ready to receive.

5.12.5 ONCE receiving SDC Unit is ready to receive, **USE** predetermined/approved route.

SDC Plant personnel

CAUTION

Prior to moving, ENSURE Spotter is in visual contact with SDC Flatbed Truck Driver.

5.12.6 **DRIVE** SDC Flatbed Truck in to receiving SDC Enclosure Vestibule and close outside door.

SDC Enclosure Surety Key User/ Door Guard

5.12.7 **NOTIFY** receiving SCON that the SDC Flatbed Truck has arrived.

CRO

5.12.8 **NOTIFY** Post 8 and OC that munition deliveries are COMPLETE and **REMOVE** security overwatch.

SDC Plant Personnel

5.12.9 **OPEN** Inner Vestibule door and **DRIVE** SDC Flatbed Truck to conveyor 1 inside the designated SDC Unit for offloading.

5.12.9.1 SAF 18 **PLACE** Transmission in NEUTRAL.

5.12.9.2 SAF 18 **SET** Parking brake.

5.12.9.3 SAF 18 **TURN** SDC Flatbed Truck ignition OFF.

5.12.9.4 SAF 18 **PLACE** wheel chocks.

5.12.9.5 **RECORD** munition lot number and count of munitions in the SDC Enclosure logbook.

WARNING

TO PREVENT INJURY, ANY LIQUID FOUND ON MUNITIONS OR IN AREA DURING INSPECTIONS OR NORMAL MUNITION HANDLING IS CONSIDERED AGENT.

NOTE

Steps 5.12.10 through 5.14, SDC Plant Personnel shall continuously wear the identified PPE.

SDC Plant Personnel

5.12.10 SAF 19, 20 PPE 19, 20 **DON** the following PPE:

5.12.10.1 TAP Boots

5.12.10.2 TAP Gloves

5.12.10.3 Tychem Apron

5.12.10.4 M40 Mask slung

5.12.11 **INSPECT** OPP for signs of liquid.

5.12.11.1 IF no liquid is found, THEN **CONTINUE** to step 5.12.12~~5.11.11~~.

5.12.11.2 IF liquid is found, THEN **MASK, EXIT** area, and **NOTIFY** Operations Superintendent and receiving SCON.

5.12.12 **PPE 16** **DON** cut resistance level 4 and puncture resistance level 3 gloves.

5.12.12.1 **RELEASE** and **STORE** cargo straps.

5.12.13 **ENSURE** the OPP cover remains on.

SDC Plant Personnel

5.13 **SAF 19, 20** **PPE 19, 20** **PERFORM** MINICAMS monitoring of the OPP~~,~~ as follows:

5.13.1 **COORDINATE** flow check of MINICAMS sample line with Lab Monitoring Personnel or SCON unless using mobile MINICAMS unit.

5.13.2 AFTER satisfactory sample line flow check, **PERFORM** the following to monitor each OPP:

5.13.2.1 **LOCATE** the sample grommet on the OPP cover

5.13.2.2 **INSERT** the sample line distal end through the grommet.

5.13.2.3 **REQUEST** the SCON to start 15-minute MINICAMS test cycle on designated OPP

5.13.2.4 **RECORD** MINICAMS start time and OPP number in the SDC Enclosure Logbook.

5.13.3 **MONITOR** OPP for a minimum of two complete MINICAMS cycles or 15-minute sample time.

CRO

5.13.4 **START** the 15-minute Monitoring time for the OPP.

5.13.5 **SAF 15** **NOTIFY** the SDC Plant Personnel when the monitoring time is complete and the VSL Reading.

SDC Plant Personnel

5.13.5.1 IF MINICAMS reading is 0.2 VSL or greater, THEN **MASK, EXIT**.

5.13.5.2 IF MINICAMS reading is less than 0.2 VSL, THEN **DISCONNECT** HSTL and **STORE.**

5.13.6 **RECORD** OPP MINICAMS results in the SDC enclosure logbook.

5.13.7 IF there are additional OPPs, THEN **REPEAT** steps 5.12.11~~5.11.10~~ to step 5.13.6~~5.12.6~~.

5.13.8 **REMOVE** the DA Form 4508 from the OPP sleeve.

5.13.9 **REMOVE** cover.

5.13.10 **PLACE** the DA Form 4508 on top of the pallet, **ENSURING** it stays with the correct pallet.

5.13.11 **FOLD** and **STORE** OPP cover.

5.14 **LOAD** the SDC Feed Conveyor in accordance with *SDC Off-Gas Treatment System*, 24852-SOP-B28-W0001.

6.0 TRANSPORT MUNITIONS OR SRC CRATE FROM AN SDC ENCLOSURE TO H-1102

CRO

6.1 **NOTIFY** PCD Post 8 and Operations Center (OC) for overwatch of munition delivery from SDC enclosure to H1102.

SDC Plant Personnel

6.2 **SET UP** the Temporary Exclusion Area at H1102 service magazine as follows:

6.2.1 **PPE 9** **DON** cut resistant level 4 puncture resistant level 3 gloves.

6.2.2 **USING** barricades, **SETUP** Temporary Exclusion Area at service magazine.

6.2.3 **UPGRADE** area to Temporary Exclusion Area.

SDC Plant Personnel/ Surety Key User/ Door Guard

6.2.1 **REQUEST** Access to H1102 Service Magazine from the SCON 3.

CRO

6.3 **MAKE** PA announcement and **NOTIFY** all site personnel H1102 service magazine has been upgraded to a Temporary Exclusion Area.

SDC Plant Personnel

NOTE

Throughout Operation 5, SDC Plant Personnel shall continuously wear the identified PPE.

6.4 **PPE 14, 16** **DON** cut resistance level 4 and puncture resistance level 3 gloves.

6.5 **ENSURE** correct OPP/ SRC and Dunnage are available.

6.6 **REMOVE** munition boxes or SRCs from conveyor 1 and **PALLETIZE** ~~munitions~~.

~~6.6~~

6.7 **PLACE** ~~OPP~~ cover on palletized munitions or SRC Crate and **REPLACE** DA Form 4508 in cover sleeve.

6.8 For OPP, **ENSURE** OPP cover is in good condition with no punctures, rips and tears. The cover shall NOT have tape repairs to punctures, rips and tears.

6.8.1 IF OPP cover has punctures, rips and tears:

6.8.1.1 DO NOT REMOVE OPP cover.

6.8.1.2 **INSTALL** second cover over the OPP.

6.9 For SRC Crate, **INSTALL** -cover on SRC Crate.

~~6.9~~6.10 **SECURE** OPPs or SRC Crates with cargo straps.

~~6.10~~6.11 **ENSURE** DA Form 4508 remains with the OPP or SRC Crate during transfer.

CRO

~~6.11~~6.12 WHEN Overwatch is in PLACE, **MAKE** a PA announcement that Munition transfer is taking place and avoid the area.

Operations Superintendent/ Designee

~~6.12~~6.13 TRE IF OPP or SRC Crate contains munition tagged by Treaty, **ANNOTATE** and **VERIFY** OPP Number in the Remarks section of DA Form 4508.

Control Room Operator (CRO)

~~6.13~~6.14 **NOTIFY** Treaty Inspection Team that an OPP or SRC Crate with treaty tagged munition(s) will be transferred to H1102 service magazine.

SDC Plant Personnel

NOTE

Throughout Operation 5, Spotter shall continuously wear the identified PPE.

~~6.14~~6.15 PPE 10, 15, 17, 20 **DON** high visibility vest when performing spotter activities.

~~6.15~~6.16 **PERFORM** the following for accessing Service Magazines:

Operations Superintendent / Designee

~~6.15.1~~6.16.1 **ENSURE** Lab Monitoring Personnel are ready and monitoring is IN PLACE to support service magazine operations.

CRO

~~6.15.2~~6.16.2 **PROVIDE** VSL reading and time confirmation.

~~6.15.3~~6.16.3 **NOTIFY** IDS that H1102 service magazine door will be UNLOCKED.

~~6.15.4~~6.16.4 **NOTIFY** SDC Plant Personnel H1102 service magazine door is in ACCESS.

SDC Plant Personnel

~~6.15.5~~6.16.5 PPE 10 **DON** cut resistant level 4 puncture resistant level 3 gloves.

~~6.15.6~~6.16.6 **USING** a PIT**, REMOVE** king tut block and **SET** aside.

~~6.15.7~~6.16.7 **UNLOCK** and **OPEN** door as follows:

~~6.15.7.1~~6.16.7.1 **REMOVE** surety locks from service magazine door and **SECURE** surety locks to door bracket.

~~6.15.7.2~~6.16.7.2 **USE** the service magazine stick, **APPLY** enough tension to **RELEASE** door pins.

~~6.15.7.3~~6.16.7.3 **REMOVE** door pins from door swing arms.

~~6.15.7.4~~6.16.7.4 **MOVE** door swing arms away from door, and out of the way of Personnel.

~~6.15.7.5~~6.16.7.5 **OPEN** service magazine door fully.

SDC Plant Personnel

~~6.16~~6.17 **TRANFER** munitions or SRC Crate to H-1102 as follows:

~~6.16.1~~6.17.1 **REMOVE** vehicle chocks.

~~6.16.2~~6.17.2 **NOTIFY** SCON 3 that munitions or SRC Crate loading is COMPLETE and SDC Flatbed Truck is ready to PROCEED to H-1102.

~~6.16.2.1~~6.17.2.1 **NOTIFY** SCON 3 of the OPP or SRC Crate number(s) and quantity of munitions being transferred.

~~6.16.3~~6.17.3 **CONTACT** the H-1102 Door Guards to ENSURE enclosure is ready to receive ~~the munitions~~.

~~6.17~~6.18 Once H-1102 is ready to receive, **USE** predetermined/approved route.

~~6.18~~6.19 **SAF 10** PRIOR to unloading, **ENSURE** Spotter is in visual contact with PIT Operator.

~~6.19~~6.20 **UNLOAD** OPP or SRC Crate from SDC Flatbed Truck and **STAGE** ~~OPP~~ at the H1102 service magazine threshold.

~~6.20~~6.21 **RECORD** the DATE IN and number of munitions or SRC Crate on *SDC Service Magazine Log,* PCAPP Form OPS-OAP-W0062-F002, in accordance with *SDC Chemical Munitions Accountability,* OPS-OAP-W0062.

~~6.21~~6.22 **RECORD** OPP or SRC Crate ~~–~~and munitions on the H1102 munitions accumulation log**.**

~~6.22~~6.23 **SAF 10** **USING** PIT/ MHE and spotter, **PROCEED** to stage OPP or SRC Crate on storage rack as follows:

~~6.22.1~~6.23.1 **ENGAGE** the OPP or SRC Crate placed on the threshold.

~~6.22.2~~6.23.2 **LOAD** OPPs or SRC Crate ~~OPP~~ ~~i~~onto designated storage area.~~rack.~~

~~6.22.3~~6.23.3 **REPEAT** steps 6.19 to 6.23.2 as necessary to COMPLETE munitions or SRC Crate transfer to H1102.

~~6.23~~6.24 **REMOVE** all hazard placards on SDC Flatbed Truck.

CRO

~~6.24~~6.25 **NOTIFY** Post 8 and OC that munition or SRC Crate deliveries are COMPLETE and to **REMOVE** security overwatch.

END OF OPERATION

OPERATION 6 – STORAGE AND DELIVERY OF EMPTY OPPs TO PCD

1.0 PREREQUISITES

1.1 None

2.0 SPECIAL REQUIREMENTS

2.1 IF any "VERIFY" step cannot be completed, THEN NOTIFY Operations Superintendent.

2.2 SDC Plant Personnel refers to Plant Operators, Ordnance Technicians, and Maintenance Technicians who work at the SDC.

2.3 Three empty SDC OPPs may be transported on the SDC Flatbed Truck or four high (total of 12) on PCD's flatbed vehicle.

2.4 SDC OPP covers and straps may be delivered with the SDC OPPs.

2.5 Spotters will wear approved high visibility apparel meeting ANSI 107-2015, Class II, Standard for High-Visibility Public Safety Vests (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016).

2.6 **SAF 21, 25** The Spotter will maintain visual contact with PIT operator and ensure SDC OPPs remain secured and transported.

2.7 **SAF 21, 25** Spotters are required during Powered Industrial Truck (PIT) movement and OPP placement.

2.8 **SAF 21, 25** A spotter is required when using the SDC Flatbed Truck to move OPPs with munitions, or when the SDC Flatbed Truck is backing or maneuvering in tight areas.

2.9 **SAF 21, 25** PITs travel no faster than walking speed.

3.0 EQUIPMENT, TOOLS, AND SUPPLIES

ITEM	QUANTITY REQUIRED
SDC Flatbed Truck	1 available
PIT	1 available
OPP (as required)	As determined by task
Wheel Chocks	1 set per vehicle
OPP Covers	As determined by task
OPP Tie-down Straps	As determined by task
High visibility vest	One per spotter
Cut resistance level 4 and puncture resistance level 3 gloves	1 pair

4.0 PROCEDURE

NOTE

Throughout Operation 6, SDC Plant Personnel shall continuously wear the identified PPE.

SDC Plant Personnel

4.1 **PPE 21, 25, 26** **DON** high visibility vest when performing spotter activities.

4.2 **DELIVER** empty OPPs, OPP covers, and OPP straps to dedicated SDC Service Magazine.

4.2.1 **LOAD** SDC Flatbed with OPPs and equipment using a PIT.

4.2.2 **DRIVE** to and **PARK** at SDC Service Magazine.

4.2.3 **ENSURE** the following for the SDC Flatbed Truck:

4.2.3.1 **SAF 21** Transmission in NEUTRAL.

4.2.3.2 **SAF 21** Parking brake SET.

4.2.3.3 **SAF 21** Ignition OFF.

4.2.3.4 **SAF 21** Wheel chocks IN PLACE.

NOTE

Steps 4.2.5 through 4.2.7, SDC Plant Personnel shall continuously wear the identified PPE

4.2.4 **PPE 24** **DON** cut resistance level 4 and puncture resistance level 3 gloves.

4.2.5 **OPEN** SDC Service Magazine in accordance with *Operation 4 - Service Magazine Entry.*

4.2.6 **OFFLOAD** SDC Flatbed using a PIT.

4.2.7 **SECURE** dedicated SDC Service Magazine in accordance with *Operation 4 - Service Magazine Entry.*

END OF OPERATION

OPERATION 7 – PIT CHARGING

1.0 PREREQUISITES

1.1 None

2.0 SPECIAL REQUIREMENTS

2.1 IF any "VERIFY" step cannot be completed, **NOTIFY** Operations Superintendent.

2.2 SDC Plant Personnel refers to Plant Operators, Ordnance Technicians, and Maintenance Technicians who work at the SDC.

3.0 EQUIPMENT, TOOLS, AND SUPPLIES

ITEM	QUANTITY REQUIRED
PIT	1 available
Cut resistance level 4 and puncture resistance level 3 gloves	1 pair

4.0 PROCEDURE

NOTE

Throughout Operation 7, SDC Plant Personnel shall continuously wear the identified PPE.

SDC Plant Personnel

4.1 **PPE 26, 27** **DON** cut resistance level 4 and puncture resistance level 3 gloves.

4.2 **CHARGE** PIT, as follows:

4.2.1 **OPEN** clasp on PIT seat assembly.

4.2.2 **RAISE** PIT seat area to allow batteries to vent during charging.

4.2.3 **DISCONNECT** PIT battery wire harness assembly.

4.2.4 **VERIFY** PIT battery wire harness connection is free of debris and in good condition.

4.2.5 **VERIFY** battery charger wire harness connection is free of debris and in good condition.

4.2.6 **CONNECT** battery charger to wire harness assembly connection end which energizes PIT batteries.

4.2.7 **VERIFY** battery is charging on battery charger screen.

4.2.7.1 IF not charging, THEN **NOTIFY** Operations Superintendent.

NOTE

Battery charger will automatically begin charging PIT batteries and battery charger will turn off when PIT batteries are fully charged.

4.3 **SAF 28** **DISCONNECT** PIT charger by performing the following:

WARNING

DISCONNECTING PIT CHARGING CABLE FROM CHARGER PRIOR TO VERIFYING CHARGER OPERATION CAN RESULT IN ELECTRICAL SHOCK INJURY.

4.3.1 **VERIFY** PIT charger is NOT actively charging PIT battery.

4.3.1.1 IF still charging, THEN **TURN** charger OFF.

4.3.2 **DISCONNECT** battery charger wire harness assembly from PIT.

4.3.3 **STORE** battery charger wire harness.

4.3.4 **CONNECT** PIT battery wire harness assembly.

4.3.5 **LOWER** PIT seat.

4.3.6 **CLOSE** clasp on PIT seat assembly.

END OF OPERATION

APPENDIX 01 – RCRA INSPECTION – SDC SERVICE MAGAZINE DAILY INSPECTION FORM (DELETED IN REV 005)

DELETED IN REV 005

APPENDIX 02 – RCRA INSPECTION – SDC SERVICE MAGAZINE WEEKLY INSPECTION FORM (DELETED IN REV 005)

DELETED IN REV 005

APPENDIX 03 – RCRA INSPECTION – SDC SERVICE MAGAZINE MONTHLY INSPECTION FORM (DELETED IN REV 005)

DELETED IN REV 005

APPENDIX 04 – SDC MILVAN STORAGE LOG

DELETED in REV 006

APPENDIX 05 – PERSONNEL AND EXPLOSIVE LIMITS FOR ROUTINE OPERATIONS

Personnel and Explosive Limits for Routine Operations							
Location	Unit	Net Explosive Weight (NEW)		Unit Measurement	Unit Quantity	Personnel Limits	
						Operational	Transient
H1102	4.2 inch palletized	3.456	lbs	SDC OPP	100	14	4
H1102	SRC Crate	15.420	lbs	Each	64	14	4
G101 G102 G103	4.2 inch palletized	3.456	lbs	SDC OPP	60	14	4
G101 G102 G103	155mm projectiles	3.312	lbs	SDC OPP	60	14	4
G101 G102 G103	105mm with fuze	7.392	lbs	SDC OPP	60	14	4
G101 G102 G103	105mm w/o fuze	6.168	lbs	SDC OPP	60	14	4

*Maximum OPPs allowed in H1102 are 100, Maximum in G-101, 102, 103 is 60.

JOB HAZARD ANALYSIS

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

JHA Review Date: 31 JAN 2023

Revision Number: 008

Originator: Dan Sutherland

Print Sign

Checker:

Print Sign

RECOMMENDATION FOR ACCEPTANCE:

SSWG Chairperson,

Amy Shepherd N/A

Sign Date

APPROVALS:

PCAPP S&H Manager,

Bret Clausen

Sign Date

PCAPP Project Manager,

Todd Ailes N/A

Sign Date

ACWA Site Management,

Walton Levi N/A

Sign Date

HAT Meeting Date: 19 JUL 2022

Attendees: Mark Proctor, Larry Waddell, Rachelle Smart, Damon Trumps, Carolina Pena, Dave Matula, Brad Robbins, Eric Bedwell, Victor Gustafson, Yetta Jones.

SOP SCOPING NOTE:

This JHA identifies the hazards and controls associated with munitions movement and storage between SDC complex, individual SDC sites, and the munition igloo.

ANALYSIS SUMMARY:

All items identified by a **SAF** tag are safety critical controls and cannot be modified or removed from the SOP unless approved by Safety and Health.

All items identified by a **PPE** tag are used to indicate specific PPE requirements identified as a hazard mitigation measure associated with a specific task in an SOP Operation. PPE tags cannot be modified or removed from the SOP unless approved by Safety and Health.

ATTACHMENT A: Procedures Affecting the SOP

F = Probability/Frequency C = Consequence/Severity R = RAC

PCAPP FORM SAF-SAP-W0034-F002 Rev. 13 Page 1 of 26 01 Sep 2022

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 1 – General Requirements											
Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
1	Inspecting and Working around SDC magazines	Walking and working areas-injuries attributed to slips, trips, and falls (same level) Uneven surfaces resulting in Slip, Trips, or Falls Environmental conditions resulting in Slips, Trips, or falls Physiological and/or psychological induced errors resulting in injury due to heat/cold stress conditions Personnel injury resulting from wildlife/insect bites or stings Inclement Weather Lightning	Materials on floor Improperly maintained surfaces Poorly managed work area. Environmental heat/cold conditions Potential wildlife/insects in and around the working areas Potential Lighting Strikes	Personnel injury	D	IV	4	• Walking and working surfaces are maintained (24852-SAF-SAP-W0021) • Walking and working surfaces subject to inclement weather are evaluated by the area owner prior to use and all operations are managed accordingly (24852-SAF-SAP-W0021) • Personnel recognize heat and cold stress conditions (24852-SAF-SAP-W0008) • PCAPP ambient temperature conditions are monitored to determine appropriate safeguards • Personnel notify the proper organization should wildlife/insects be observed (24852-OPS-OAP-W0021) • Personnel thoroughly inspect areas before accessing or reaching into spaces • PPE Personnel mask when approaching with 15 feet of an unmonitored service magazine (G101, G102, G103) • Personnel stop or pause work when wildlife presents a hazard to any employee (24852-OPS-OAP-W0021) • SDC Munition operations are notified if lighting is approaching the 10-mile limit • Operators unload SDC Flatbed truck if notified of an approaching lightning storm • If unable to unload prior to lightning danger of 10 miles SDC Flatbed	E	IV	4

F = Probability/Frequency C = Consequence/Severity R = RAC

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 1 – General Requirements

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
								Trucks are moved to a protected location at the SDC			

Operation 2 – Pre-Operational Conditions

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
2	Working around SDC Flatbed Trucks	SDC Flatbed Trucks are exposed to environmental conditions resulting in slips, trips, or falls	Inadequate control of debris, snow, rain, ice on the SDC Flatbed	Personnel injury	C	IV	4	• Walking and working surfaces are maintained (24852-SAF-SAP-W0021) • Walking and working surfaces subject to inclement weather are evaluated by the area owner prior to use and all operations are managed accordingly (24852-SAF-SAP-W0021)	D	IV	4
3	Inspecting the SDC Flatbed truck and PIT	Pinch Points Strains, Sprains, Cuts, Lacerations	Improper hand and body placement Inexperienced or untrained operator Sharp edges	Personnel injury	C	IV	4	• PPE Personnel wear cut resistance level 4 and puncture resistance level 3 gloves (24852-SAF-SAP-W0022) • PIT and transport vehicles inspected per shift and checklist completed before operations • Personnel apply proper lifting techniques, proper hand and body positioning techniques and manage repetitive tasks (24852-SAF-SAP-W0005)	E	IV	4

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Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 3 – G-Block Headwall/First Entry Monitoring

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
4	RTAP Setup	Pinch points Potential agent exposure Walking/working surface injuries attributed to slips, trips, and falls Hot surfaces	Improper hand and body placement Not complying to PCD direction of Best Management Practice for potential agent exposure Materials on floor Improperly maintained surfaces Heat from vehicle engine	Personnel injury	D	IV	3	• SAF RTAP vehicle(s) is kept on level surface and 25 feet away from igloo and away from vegetation or other combustible materials • SAF PPE M40 mask is donned prior to connecting RTAP to G-Block Storage Igloos • PPE Personnel wear cut resistance level 4 and puncture resistance level 3 gloves (24852-SAF-SAP-W0022) • G-Block service magazines are placed under engineering controls when agent readings are equal to or greater than 0.2 VSL (24852-SOP-B00-W0048) • Walking/working surfaces are maintained in a clean/orderly condition (24852-SAF-SAP-W0021) • Walking and working surfaces subject to inclement weather are evaluated by the area owner prior to use and all operations are managed accordingly (24852-SAF-SAP-W0021) • Personnel apply proper lifting techniques, proper hand and body positioning techniques and manage repetitive tasks (24852-SAF-SAP-W0005)	E	IV	4

F = Probability/Frequency C = Consequence/Severity R = RAC

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 4 – Service Magazine Entry

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC F	Uncontrolled RAC C	Uncontrolled RAC R	Control Measures	Controlled RAC F	Controlled RAC C	Controlled RAC R
5	Opening Service Magazine Door and Removing King Tut Block Using PIT	PIT/pallet jack or load strikes an employee Employee is caught between, resulting in injury Pinch points Strains, Sprains, Cuts, Lacerations	Excessive speed Spotters not used Inexperienced or untrained PIT/pallet jack operator Malfunctioning PIT/pallet jack Unsecured load Inadequate visibility Unauthorized personnel in vicinity of operations Improper hand and body placement Unrecognized weights and repetitive tasks	Personnel injury	D	III	3	• Personnel use their "STOP/PAUSE WORK" authority whenever adverse or unsatisfactory conditions are observed (24852-GPP-GAM-00007) • Discrepancies noted by personnel are immediately brought to the attention of supervision • PPE Spotters wear high visibility vest ANSI 107-2015 (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016) • PPE Personnel wear cut resistance level 4 and puncture resistance level 3 gloves (24852-SAF-SAP-W0022) • Forklift operators are authorized and certified • Unauthorized personnel are restricted from entering the area • Speed limits are obeyed • SAF PITs travel no faster than walking speed • PIT and transport vehicles inspected per shift and checklist completed before operations • SAF Transporters are certified in transportation, PIT/pallet jack operations (24852-SAF-SAP-W0016) • SAF Spotters used during PIT movement • SAF Spotters maintain visual contact with PIT/ transport vehicle operator at all times	E	IV	4

F = Probability/Frequency C = Consequence/Severity R = RAC

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Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 4 – Service Magazine Entry

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
								• SAF Utilizing the PIT, POSITION forks correctly at all times during operation			
6	Entry into the service magazine Service magazine inspections	Exposure to agent Poor lighting Walking/working surface injuries attributed to slips, trips, and falls (same level)	Leaking munition Liquid on floor Not Complying to PCD direction of Best Management Practice for potential agent exposure Poor Visibility Due to lack of light and being in TAP gear	Personnel Injury Agent release	D	II	2	• SAF RTAP is used for first entry monitoring to allow entry (G101, G102 and G103) • SAF Continuous monitoring will be performed while personnel are in igloo • SAF Personnel should DON M40 mask, egress igloo and notify SCON when leaks or liquid are identified • Service magazine are placed under engineering controls when agent readings in G-Block service magazine are equal to or greater than 0.2 VSL (24852-SOP-B00-W0048) • Personnel apply industry best practices when handling materials (24852-SAF-SAP-W0021) • Proper lifting techniques are employed at all times • Lifts greater than 50 lbs require a two-person lift (24852-SAF-SAP-W0005) • Lifts greater than 100 lbs require mechanical assistance (24852-SAF-SAP-W0005) • Service magazine stick is available for use • Flashlight used during inspection process in low light conditions	E	IV	4

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Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 4 – Service Magazine Entry											
Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
								• Walking/working surfaces are maintained in a clean/orderly condition (24852-SAF-SAP-W0021) • Walking and working surfaces subject to inclement weather are evaluated by the area owner prior to use and all operations are managed accordingly (24852-SAF-SAP-W0021)			
7	Closing and securing the service magazine	Struck by Pinch points Strains, Sprains, Cuts, Lacerations	Improper hand and body placement Unrecognized weight and repetitive tasks	Personnel Injury	D	III	3	• PPE Personnel wear cut resistance level 4 and puncture resistance level 3 gloves (24852-SAF-SAP-W0022) • Personnel apply proper lifting techniques, proper hand and body positioning techniques and manage repetitive tasks (24852-SAF-SAP-W0005) • Unauthorized personnel are restricted from entering the area • Personnel apply industry best practices when handling materials (24852-SAF-SAP-W0021) • Proper lifting techniques are employed at all times • Lifts greater than 50 lbs require a two-person lift (24852-SAF-SAP-W0005) • Lifts greater than 100 lbs require mechanical assistance (24852-SAF-SAP-W0005) • Service magazine stick is available for door closure	E	IV	4

F = Probability/Frequency C = Consequence/Severity R = RAC

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC F	Uncontrolled RAC C	Uncontrolled RAC R	Control Measures	Controlled RAC F	Controlled RAC C	Controlled RAC R
Operation 5 – Transporting Munitions											
8	Pre-Transportation Conditions	Lightning storm results in static discharge causing fire or explosion	Lightning strike	Personnel Injury	D	II	2	• **SAF** Inspection is interrupted when lightning is detected within 10 miles • **SAF** Explosives/ energetics/ propellant are not handled during lightning events • **SAF** Igloos are equipped with an approved Lightning Protection System	E	IV	4
9	Setting up Temporary Exclusion Area at service magazine	Pinch points, strains, sprains, cuts and lacerations Struck by	Improper hand and body placement Inexperienced or untrained operator	Personnel injury	D	III	3	• Personnel use their "STOP/PAUSE WORK" authority whenever adverse or unsatisfactory conditions are observed (24852-GPP-GAM-00007) • Unauthorized personnel are restricted from entering the area • Personnel apply proper lifting techniques, proper hand and body positioning techniques and manage repetitive tasks (24852-SAF-SAP-W0005) • **PPE** Personnel wear cut resistance level 4 and puncture resistance level 3 gloves (24852-SAF-SAP-W0022)	E	IV	4
10	Opening / Closing Service Magazine Door and Removing King Tut Block Using PIT	PIT/pallet jack or load strikes an employee Employee is caught between, resulting in injury	Excessive speed Spotters not used Inexperienced or untrained PIT/pallet jack operator	Personnel injury	D	III	3	• Personnel use their "STOP/PAUSE WORK" authority whenever adverse or unsatisfactory conditions are observed (24852-GPP-GAM-00007)	E	IV	4

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Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC F	Uncontrolled RAC C	Uncontrolled RAC R	Control Measures	Controlled RAC F	Controlled RAC C	Controlled RAC R
Operation 5 – Transporting Munitions											
		Pinch points Strains, Sprains, Cuts, Lacerations	Malfunctioning PIT/pallet jack Unsecured load Inadequate visibility Unauthorized personnel in vicinity of operations Improper hand and body placement Unrecognized weights and repetitive tasks					• Discrepancies noted by personnel are immediately brought to the attention of supervision • PPE Spotters wear high visibility vest ANSI 107-2015 (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016) • PPE Personnel wear cut resistance level 4 and puncture resistance level 3 gloves (24852-SAF-SAP-W0022) • Forklift operators are authorized and certified • Unauthorized personnel are restricted from entering the area • Speed limits are obeyed • SAF PITs travel no faster than walking speed • PIT and transport vehicles inspected per shift and checklist completed before operations • SAF Transporters are certified in transportation, PIT/pallet jack operations (24852-SAF-SAP-W0016) • SAF Spotters used during PIT movement • SAF Spotters maintain visual contact with PIT/ transport vehicle operator at all times • SAF Utilizing the PIT, POSITION forks correctly at all times during operation			

F = Probability/Frequency C = Consequence/Severity R = RAC

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 5 – Transporting Munitions

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
11	Closing and securing the service magazine	Struck by Pinch points Strains, Sprains, Cuts, Lacerations	Improper hand and body placement Unrecognized weight and repetitive tasks	Personnel Injury	D	III	3	• **PPE** Personnel wear cut resistance level 4 and puncture resistance level 3 gloves (24852-SAF-SAP-W0022) • Personnel apply proper lifting techniques, proper hand and body positioning techniques and manage repetitive tasks (24852-SAF-SAP-W0005) • Unauthorized personnel are restricted from entering the area • Personnel apply industry best practices when handling materials (24852-SAF-SAP-W0021) • Proper lifting techniques are employed at all times • Lifts greater than 50 lbs require a two-person lift (24852-SAF-SAP-W0005) • Lifts greater than 100 lbs require mechanical assistance (24852-SAF-SAP-W0005) • Service magazine stick is available for door closure	E	IV	4
12	Operating SDC Flatbed Truck	SDC Flatbed Truck accident results in injury	Excessive speed, losing control Inexperienced or untrained operator Inadequate visibility Equipment malfunction	Personnel injury System loss	D	III	3	• Personnel use their "STOP/PAUSE WORK" authority whenever adverse or unsatisfactory conditions are observed (24852-GPP-GAM-00007) • Discrepancies noted by personnel are immediately brought to the attention of supervision	E	IV	4

F = Probability/Frequency C = Consequence/Severity R = RAC

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 5 – Transporting Munitions

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC F	Uncontrolled RAC C	Uncontrolled RAC R	Control Measures	Controlled RAC F	Controlled RAC C	Controlled RAC R
								• Unauthorized personnel are restricted from entering the area • Speed limits are obeyed • Transport vehicles inspected per shift and checklist completed before operations • SAF Transporters are authorized and certified in transportation operations (24852-SAF-SAP-W0016)			
13	Parking and Working around SDC Flatbed Truck	Inadvertent movement of the SDC Flatbed Truck results in striking personnel	Improper or inadequately staging the SDC Flatbed Truck for loading and unloading	Personnel injury	D	III	3	• SAF Transmission in Neutral • SAF Transport vehicle parking brake will be set, ignition turned off, and rear wheels chocked	E	IV	4
14	Installing the PIT ramps	Pinch points, strains, sprains, cuts and lacerations	Inexperienced or untrained operator Improper installation of PIT ramps Improper hand and body placement Unrecognized weight and repetitive tasks	Personnel injury	D	IV	4	• PPE Personnel wear cut resistance level 4 and puncture resistance level 3 gloves (24852-SAF-SAP-W0022) • Personnel apply proper lifting techniques, proper hand and body positioning techniques and manage repetitive tasks (24852-SAF-SAP-W0005) • Unauthorized personnel are restricted from entering the area • Personnel apply industry best practices when handling materials (24852-SAF-SAP-W0021) • Proper lifting techniques are employed at all times	E	IV	4

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Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC F	Uncontrolled RAC C	Uncontrolled RAC R	Control Measures	Controlled RAC F	Controlled RAC C	Controlled RAC R
Operation 5 – Transporting Munitions											
								• Lifts greater than 50 lbs require a two-person lift • Lifts greater than 100 lbs require mechanical assistance (24852-SAF-SAP-W0005) • Spotter stays clear of area between pit and stationary object to prevent being crushed or injured • Warning in SOP			
15	Loading the SDC Flatbed Truck with PIT Equipment	PIT strikes employee PIT drops OPP pallet or SRC Crate OPP pallet or SRC Crate strikes employee Agent exposure Overloading SDC Flatbed Truck (3000 lbs.) Pinch points, strains, sprains, cuts and lacerations	Excessive speed losing control Spotters not used Inexperienced or untrained operator Inadequate visibility Unsecured load Malfunctioning PIT Contact object while transporting Unauthorized personnel in area Exceeding load capacity of SDC Flatbed Truck (3,000 lbs.) Not Complying to PCD direction of	Personnel injury System loss Agent release	D	II	2	• Personnel use their "STOP/PAUSE WORK" authority whenever adverse or unsatisfactory conditions are observed (24852-GPP-GAM-00007) • Discrepancies noted by personnel are immediately brought to the attention of supervision • PPE Spotters wear high visibility vest ANSI 107-2015 (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016) • SAF Utilizing the PIT, POSITION forks correctly at all times during operation. • SAF If at any time MINICAM readings are GREATER THAN or EQUAL to 0.2 VSL, mask, exit area, and notify the SCON • SAF If leaks or liquid are identified, DON M40 egress service magazine and notify SCON	E	IV	4

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Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 5 – Transporting Munitions											
Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
			Best Management Practice for potential agent exposure					• Follow Warning provided in the SOP • Forklift operators are authorized and certified • Unauthorized personnel are restricted from entering the area • Speed limits are obeyed • SAF PITs travel no faster than walking speed • PIT and transport vehicles inspected per shift and checklist completed before operations • SAF Transporters are authorized and certified in transportation, PIT/pallet jack operations (24852-SAF-SAP-W0016) • SAF Spotters used during PIT movement • SAF Spotters maintain visual contact with PIT/ transport vehicle operator at all times • SAF Utilizing the PIT, POSITION forks correctly at all times during operation. • Follow Hazard warning provided in the SOP • Limit the amount of OPP pallets to only Two • Limit SRC Crate to only one • OPP Pallet Is fully covered by OPP Flame Retardant Cover • Preventive and corrective maintenance program maintain			

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Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
Operation 5 – Transporting Munitions											
					F	C	R		F	C	R
								SDC Flatbed Truck railing in operational condition			
16	Secure loaded OPP pallets or SRC Crate onto SDC Flatbed Truck using Straps Removing PIT ramps Un-securing Straps	Struck by Pinch points Strains, sprains, cuts and lacerations	Inexperienced or untrained operator Inadequate visibility Improper hand and body placement Unsecured load	Personnel injury	D	IV	4	• PPE Personnel wear cut resistance level 4 and puncture resistance level 3 gloves (24852-SAF-SAP-W0022) • Area surrounding load shall be verified clear of all personnel prior to the securing device being "tossed" over the load • Personnel apply proper lifting techniques, proper hand and body positioning techniques and manage repetitive tasks (24852-SAF-SAP-W0005) • Personnel use industrial best practices for transportation operations (24852-SAF-SAP-W0016)	E	IV	4
17	Transporting to/Backing up; SDC Flatbed Truck into SDC Unit staging area	SDC Flatbed Truck accident results in injury SDC Flatbed Truck incident drops OPP pallet or SRC Crate Agent release	Excessive speed, losing control Inexperienced or unqualified operator Inadequate visibility Unsecured load	Personnel injury System loss Agent Release	D	II	2	• Personnel use their "STOP/PAUSE WORK" authority whenever adverse or unsatisfactory conditions are observed (24852-GPP-GAM-00007) • Discrepancies noted by personnel are immediately brought to the attention of supervision • PPE Spotters wear high visibility vest ANSI 107-2015 (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016) • Unauthorized personnel are restricted from entering the area	E	IV	4

F = Probability/Frequency C = Consequence/Severity R = RAC

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 5 – Transporting Munitions

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
								• Speed limits are obeyed • SAF Flatbed trucks are limited to 5 mph when carrying munitions • SAF PIT travels no faster than walking speed • Transport vehicles inspected per shift and checklist completed before operations • SAF Transporters are authorized and certified in transportation operations (24852-SAF-SAP-W0016) • SAF Spotters used during operations • SAF Spotters maintain visual contact with transport vehicle operator at all times • Follow Caution provided in the SOP			
18	Parking and Working around SDC Flatbed Truck in the SDC Area	Inadvertent movement of the SDC Flatbed Truck results in striking personnel	Improper or inadequately staging the SDC Flatbed Truck for loading and unloading	Personnel injury	D	III	3	• SAF Transmission in Neutral • SAF Transport vehicle parking brake will be set, ignition turned off, and rear wheels chocked	E	IV	4
19	MINICAM Sampling of OPP's or SRC Crate in igloos	Agent present in the OPP or SRC Crate resulting in exposure to personnel during SDC	Improper MINICAMS sample if sample line not connected properly	Personnel Injury Agent Release	D	III	3	• Personnel use their "STOP/PAUSE WORK" authority whenever adverse or unsatisfactory conditions are observed (24852-GPP-GAM-00007)	E	IV	4

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Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 5 – Transporting Munitions											
Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
		Flatbed Truck unloading operations Personnel exposure to chemical agent contamination on munitions	Low temperature of the area restricts volatility Uncertified worker Liquid undetected visually and by monitoring equipment Agent exposure					• Discrepancies noted by personnel are immediately brought to the attention of supervision • SAF PPE Personnel wear TAP boot, TAP gloves, apron and M40 mask slung, prior to MINICAM operations • SAF Personnel egress igloo and notify SCON when leaks or liquid are identified • SAF If MINICAMS analysis is 0.2 VSL or greater personnel mask, evacuate the area, and notify SCON • Personnel are certified in agent safety (Toxic Area Training) and the identification of and safeguards/actions associated with mustard chemical agent • Follow Warning provided in the SOP			
20	Transport vehicle movement into SDC vestibule; OPP or SRC Crate monitoring/inspection	PIT or load strikes an employee, or an employee is caught between, resulting in injury Transport or PIT accident resulting in OPP pallet or	Excessive speed losing control Inexperienced or unauthorized operator Inadequate visibility Unsecured load Malfunctioning PIT	Personnel injury agent release	D	III	3	• Personnel use their "STOP/PAUSE WORK" authority whenever adverse or unsatisfactory conditions are observed (24852-GPP-GAM-00007) • Discrepancies noted by personnel are immediately brought to the attention of supervision • SAF PPE Personnel wear TAP boot, TAP gloves, apron and M40 mask slung, prior to MINICAM operations	E	IV	4

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Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 5 – Transporting Munitions											
Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
		SRC Crate drop Struck by pinch points Releasing agent	Contact object while transporting Not Complying to PCD direction of Best Management Practice for potential agent exposure Unsecure OPP pallets or SRC Crate					• SAF Personnel should DON M40 mask, egress igloo and notify SCON when leaks or liquid are identified • SAF If MINICAMS analysis is greater than action level, personnel mask, evacuate the area • PPE Spotters wear high visibility vest ANSI 107-2015 (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016) • Personnel are certified in agent safety (Toxic Area Training) and the identification of and safeguards/actions associated with mustard chemical agent • Forklift operators are authorized and certified • Unauthorized personnel are restricted from entering the area • Speed limits are obeyed • SAF PITs travel no faster than walking speed • PIT is inspected per shift and checklist completed before operations • SAF Transporters are authorized and certified in PIT/pallet jack operations (24852-SAF-SAP-W0016) • SAF Spotters used during PIT movement			

F = Probability/Frequency C = Consequence/Severity R = RAC

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 5 – Transporting Munitions

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
								• SAF Spotters maintain visual contact with PIT/ transport vehicle operator at all times • SAF Utilizing the PIT, POSITION forks correctly at all times during operation. • Follow Warning provided in the SOP • Personnel apply proper lifting techniques, proper hand and body positioning techniques and manage repetitive tasks (24852-SAF-SAP-W0005) • Preventive and corrective maintenance program maintain SDC Flatbed Truck railing in operational condition			

Operation 6 – Storage and Delivery of Empty OPPs to PCD

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
21	Operating SDC Flatbed Trucks and PIT equipment: in tight places in normal operations	SDC Flatbed Truck accident results in injury PIT or load strikes an employee, or an employee is caught between,	Excessive speed, losing control Inexperienced or uncertified operator Inadequate visibility	Personnel injury	D	III	3	• Personnel use their "STOP/PAUSE WORK" authority whenever adverse or unsatisfactory conditions are observed (24852-GPP-GAM-00007) • Discrepancies noted by personnel are immediately brought to the attention of supervision	E	IV	4

F = Probability/Frequency C = Consequence/Severity R = RAC

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC F	Uncontrolled RAC C	Uncontrolled RAC R	Control Measures	Controlled RAC F	Controlled RAC C	Controlled RAC R
Operation 6 – Storage and Delivery of Empty OPPs to PCD											
	While Loading	resulting in injury Transport or PIT accident resulting in OPP pallet drop Struck by pinch points	Unsecured load					• PPE Spotters wear high visibility vest ANSI 107-2015 (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016) • Operators are authorized and certified • Unauthorized personnel are restricted from entering the area • Speed limits are obeyed • SAF Travel no faster than walking speed • Transport vehicles inspected per shift and checklist completed before operations • SAF Transporters are certified in transportation, PIT/pallet jack operations (24852-SAF-SAP-W0016) • SAF Spotters are used during movements • SAF Spotters maintain visual contact with transport vehicle operator at all times			
22	Operating SDC Flatbed Truck	SDC Flatbed Truck accident results in injury	Excessive speed, losing control Inexperienced or untrained operator Inadequate visibility Equipment malfunction	Personnel injury	D	III	3	• Personnel use their "STOP/PAUSE WORK" authority whenever adverse or unsatisfactory conditions are observed (24852-GPP-GAM-00007) • Discrepancies noted by personnel are immediately brought to the attention of supervision • Unauthorized personnel are restricted from entering the area • Speed limits are obeyed	E	IV	4

F = Probability/Frequency C = Consequence/Severity R = RAC

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 6 – Storage and Delivery of Empty OPPs to PCD											
Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
								• Transport vehicles inspected per shift and checklist completed before operations • Transporters are authorized in transportation operations (24852-SAF-SAP-W0016)			
23	Parking and Working around SDC Flatbed Truck	Inadvertent movement of the SDC Flatbed Truck results in striking personnel	Improper or inadequately staging the SDC Flatbed Truck for loading and unloading	Personnel injury	D	III	3	• SAF Transmission in Neutral • SAF Transport vehicle parking brake will be set, ignition turned off, and rear wheels chocked	E	IV	4
24	Opening, Closing SDC storage Igloo	Opening and closing door results in pinch points, strains, or sprains	Improper gloves Closing and opening doors improperly Overexertion from difficult-to-open doors Worn hinges	Personnel injury	D	IV	4	• PPE Personnel wear cut resistance level 4 and puncture resistance level 3 gloves (24852-SAF-SAP-W0022) • Personnel apply proper lifting techniques, proper hand and body positioning techniques and manage repetitive tasks (24852-SAF-SAP-W0005) • Uncertified or unauthorized personnel not allowed in area • Personnel apply industry best practices when handling materials (24852-SAF-SAP-W0021) • Proper lifting techniques are employed at all times • Lifts greater than 50 lbs require a two-person lift • Lifts greater than 100 lbs require mechanical assistance (24852-SAF-SAP-W0005)	E	IV	4

F = Probability/Frequency C = Consequence/Severity R = RAC

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
Operation 6 – Storage and Delivery of Empty OPPs to PCD											
					F	C	R		F	C	R
25	Offloading the SDC Flatbed Truck with empty OPP's, OPP covers and Straps using PIT	PIT strikes employee PIT drops OPP pallet OPP pallet strikes employee Pinch points, strains, sprains, cuts and lacerations	Excessive speed losing control Inexperienced or untrained operator Inadequate visibility Unsecured load Malfunctioning PIT Contact object while transporting Unauthorized personnel in area	Personnel injury System loss	D	II	2	• Personnel use their "STOP/PAUSE WORK" authority whenever adverse or unsatisfactory conditions are observed (24852-GPP-GAM-00007) • Discrepancies noted by personnel are immediately brought to the attention of supervision • PPE Spotters wear high visibility vest ANSI 107-2015 (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016) • Operators are authorized and certified • Unauthorized personnel are restricted from entering the area • Speed limits are obeyed • SAF PITs travel no faster than walking speed • PIT and transport vehicles inspected per shift and checklist completed before operations • SAF Transporters are authorized and certified in transportation, PIT/pallet jack operations (24852-SAF-SAP-W0016) • SAF Spotters used during PIT movement • SAF Spotters maintain visual contact with PIT/ transport vehicle operator at all times • Warning provided in the procedure • Personnel use industrial best practices for transportation operations (24852-SAF-SAP-W0016)	E	IV	4

F = Probability/Frequency C = Consequence/Severity R = RAC

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 6 – Storage and Delivery of Empty OPPs to PCD											
Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
26	Loading SDC Flatbed Truck	PIT or load strikes an employee, or an employee is caught between, resulting in injury Transport or PIT accident resulting in OPP pallet drop Struck by pinch points Strains, sprains, cuts and lacerations	Excessive speed losing control Inexperienced or untrained operator Inadequate visibility Unsecured load Malfunctioning PIT Contact object while transporting Unsecure OPP pallets	Personnel injury agent release	D	III	3	• Personnel use their "STOP/PAUSE WORK" authority whenever adverse or unsatisfactory conditions are observed (24852-GPP-GAM-00007) • Discrepancies noted by personnel are immediately brought to the attention of supervision • PPE Spotters wear high visibility vest ANSI 107-2015 (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016) • Spotters are used during transport movement, and maintain visual contact with vehicle driver at all times • Operators are authorized and certified • Unauthorized personnel are restricted from entering the area • Speed limits are obeyed • SAF PITs travel no faster than walking speed • PIT and transport vehicles inspected per shift and checklist completed before operations • SAF Transporters are authorized and certified in transportation, PIT/pallet jack operations (24852-SAF-SAP-W0016) • SAF Spotters used during PIT movement • SAF Spotters maintain visual contact with PIT/ transport vehicle operator at all times	E	IV	4

F = Probability/Frequency C = Consequence/Severity R = RAC

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 6 – Storage and Delivery of Empty OPPs to PCD											
Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
								• SAF Utilizing the PIT, POSITION forks correctly at all times during operation. • Warning provided in the procedure • Area surrounding load shall be verified clear of all personnel prior to the securing device being "tossed" over the load • Repetitive tasks and proper lifting techniques are managed (24852-SAF-SAP-W0005) • Personnel apply proper hand and body positioning techniques (24852-SAF-SAP-W0005) • Personnel use industrial best practices for transportation operations (24852-SAF-SAP-W0016) • Preventive and corrective maintenance program maintain SDC Flatbed Truck railing in operational condition			
27	Working around SDC storage igloo	exposure to environmental conditions resulting in slips, trips, or falls	Inadequate control of debris, snow, rain, ice on the SDC Flatbed	Personal Injury	D	IV	4	• Walking and working surfaces are maintained (24852-SAF-SAP-W0021) • Walking and working surfaces subject to inclement weather are evaluated by the area owner prior to use and all operations are managed accordingly (24852-SAF-SAP-W0021)	E	IV	4

F = Probability/Frequency C = Consequence/Severity R = RAC

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Operation 7 – PIT Charging

Item	Step	Hazardous Condition	Cause	Effect	Uncontrolled RAC			Control Measures	Controlled RAC		
					F	C	R		F	C	R
28	Accessing PIT battery	Struck by pinch points strains, sprains, cuts and lacerations	Improper hand and body placement	Personnel injury	D	IV	4	• PPE Personnel wear cut resistance level 4 and puncture resistance level 3 gloves (24852-SAF-SAP-W0022) • Repetitive tasks and proper lifting techniques are managed (24852-SAF-SAP-W0005) • Personnel apply proper hand and body positioning techniques (24852-SAF-SAP-W0005)	E	IV	4
29	Connect/disconnect PIT from charger	Exposure to battery acid	Opening battery cover during charge cycle Over charging unit	Personnel injury	D	III	3	• PPE Personnel wear cut resistance level 4 and puncture resistance level 3 gloves (24852-SAF-SAP-W0022) • Personnel are trained in hazard controls for battery acid • Cable designed to prevent misalignment during charging operations • Cable connections are electrically shielded to prevent inadvertent contact during charging operations • Electrical components are inspected for damage prior to use • SAF Personnel do not disconnect the PIT charging cable prior to verifying charger operation • Warning is provided in the SOP	E	IV	4

F = Probability/Frequency C = Consequence/Severity R = RAC

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

Attachment A: PROCEDURES AFFECTING THE SOP

24852-SAF-SAP-W0021, *General Safe Work Practices*	24852-GPP-GGG-*V0004, Managing Environmental Deficiencies*
24852-SAF-SAP-W0004, *Hazard Communication Program*	24852-SAF-SAP-W0026-F001, *PIT/EWP Daily Checklist*
24852-SAF-SAP-W0022, *Personal Protective Equipment*	24852-SAF-SAP-W0018, *Fall Protection*
24852-SAF-SAP-W0001, *Electrical Safety*	24852-SAF-SAP-W0026, *Powered Industrial Trucks and Elevated Work Platforms*
24852-B00-W0039, *Exclusion Area Waste Management*	24852-SOP-B00-W0038, *Waste Management Procedure*
24852-SAF-SAP-W0016, *Transportation Safety*	24852-SOP-B00-W0048, *Mobile Air Filtration Operation, G-Block Secondary Waste Storage and Shipment*
24852-SOP-SDC-W0005-F004, *SDC Flatbed Truck Inspection Checklist*	24852-GPP-GGL-00301, *Mustard Agent (HD) In Air By MINICAMS*
24852-SAF-SAP-W0011, *Toxic Chemical Agent Safety Program*	24852-OPS-OAP-W0009, *Chemical Munitions Availability*
24852-SOP-B23- W0026-F002, *Electric PIT Daily Inspection checklist*	24852-SAF-SAP-W0034, *Job Hazard Analysis*

F = Probability/Frequency C = Consequence/Severity R = RAC

Munitions Transport and Storage Operations

JOB HAZARD ANALYSIS (JHA) – 24852-SOP-SDC-W0005

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F = Probability/Frequency C = Consequence/Severity R = RAC

PCAPP

PLANT PROCEDURE REVISION/PCN FORM

REQUESTOR: MARK PROCTOR	**PHONE:** 719-553-0833	**REQUEST DATE:** 11-15-2022
DOC NO.: 24852-SOP-SDC-W0005	**TITLE:** SDC MUNITIONS TRANSFERS AND STORAGE	

NEW REVISION NO.: 008 — **TYPE:** ☐ NEW ☐ EDITORIAL ☒ TECHNICAL ☐ CANCEL ☐ SUSPENSION ☐ ANNUAL REVIEW ☐ PCN 24852-PCN-022-

ASSOCIATED CRS: ☐ YES ☒ NO IF YES, LIST: — **VALIDATION REQUIRED?** ☐ YES ☒ NO — **HAZARD EVALUATION?** ☒ JHA ☐SR ☐N/A — **ASSOCIATED PCP:** ☐ YES ☒ NO IF YES, LIST:

TYPE OF VALIDATION: ☐ TABLE TOP ☐ PERFORM ☐ SIMULATION ☒ N/A

EXPEDITED ☒ **NO** ☐ **YES** **REASON:**

MARK PROCTOR
PROCEDURE OWNER (PRINT AND SIGN) — DATE

REVISION DESCRIPTION (PAGE NO., SUMMARY OF CHANGES, ETC.)

OPERATION 4

ADDED STEP: 4.4.1.3 **ENSURE** the Hazardous Waste Label for each OPP cover is visible from the aisle.

OPERATION 5

STEP 2.10 NOW READS: **ENSURE** OPP cover remains on the OPP until MINICAMS monitoring is complete (OPP covers are not required for SRC's).

UPDATED STEP NUMBERING FOR STEPS 2.16, 2.17 AND 2.18.

ADDED STEP 4.9: IF transferring SRC's **GO TO** step 4.11.

ADDED STEP 4.13: IF transferring SRC's **GO TO** step 4.15.9.

MOVED STEP 4.15.9 TO 4.15.8: **FOLD** and **STORE** OPP cover.

ADDED STEP 6.7: IF transferring SRC's **GO TO** step 6.10.

PCAPP FORM PLT-GAP-W0009-F001 R013 — 1 of 1 — 29 Mar 2022

Enclosure 3

SOP: *Munitions Transport and Storage Operations,*

24852-SOP-B23-W0001, Rev. 018

PUEBLO CHEMICAL AGENT-DESTRUCTION PILOT PLANT (PCAPP)

24852-SOP-B23-W0001		
ENV MUNITIONS TRANSPORT AND STORAGE OPERATIONS		
REVISION	**TOTAL PAGE COUNT**	**ANNUAL REVIEW DUE**
018	**5681**	**05 OCT 2023**
APPROVALS: (N/A FOR PCN)		
REQUIRED	PRINT AND SIGN	DATE
CHRIS SHRONTZ		
OPSEC REVIEW COMPLETE		
MICHAEL SAUPE		
ENVIRONMENTAL MANAGER		MOD# (REQUIRED)
RALPH MAESTAS		
PROCEDURE OWNER		
MARK DULING		
OPERATIONS SUPPORT MANAGER		

Commented [CN(1]: S015?

SAF This SOP contains identified Safety Critical Items. Safety department must approve changes to **SAF** tagged items.

PPE This SOP contains specific PPE requirements as a hazard mitigation measure associated with a specific task in an operation. Safety department must approve changes to **PPE** tagged items.

ENV This SOP in its entirety is incorporated into the RCRA Permit. Any changes made to this SOP will require a permit modification. Notification and identification of the proposed changes must be made to CDPHE through the Environmental Department.

TRE This SOP contains identified Treaty Critical Items. Treaty Compliance Representative must approve changes to **TRE** tagged items.

Table of Contents

Remarks:

This SOP provides instructions for receiving, transporting, monitoring, and storing Overpack Pallets (OPPs) containing munitions received from Pueblo Chemical Depot (PCD).

This SOP is applicable to all Operation Support Personnel transporting munitions from PCD to Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) within the Munitions Service Magazine (MSM) area.

This SOP is also applicable to all Operation Support Personnel transporting munitions from PCD to the Static Detonation Chamber (SDC) Complex (Annex 3 of the PCD RCRA Permit), which includes the SDC Service Magazines (G101, G102, G103, and H1102) and three SDC Sites.

This SOP is applicable during the Operations phase of the project.

The following Documentation generated from this procedure are quality records and are completed and transmitted to DCC in accordance with *Records and Information Management*, 24852-K10B-00150.

- *MAV Inspection Report,* PCAPP Form SOP-B23-W0001-F001 (Appendix 01)
- *MAV Movement Log,* PCAPP Form SOP-B23-W0001-F003 (Appendix 02)
- *MAV Sampling Report,* PCAPP Form SOP-B23-W0001-F002 (Appendix 03)

OPERATION 1 – GENERAL REQUIREMENTS

1.0 PREREQUISITES

1.1 None

2.0 SPECIAL REQUIREMENTS

2.1 IF any "VERIFY" step cannot be completed, THEN **NOTIFY** Transportation Supervisor.

2.2 SAF 2, 5, 9 Spotters used during PIT or MAV movement and OPP placement. Spotters maintain visual contact with PIT operator and ensure OPPs remain secured and transported.

2.3 Spotters will wear approved high visibility apparel meeting ANSI 107-2015, Class II, Standard for High-Visibility Public Safety Vests (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016).

2.4 The steps in this operation apply to all Operations in this procedure.

3.0 EQUIPMENT, TOOLS, AND SUPPLIES

ITEM	QUANTITY REQUIRED
Broom (as required)	As determined by task
Shovel (as required)	As determined by task
Ice Melt (as required)	As determined by task
Powered Industrial Truck (PIT) (as required)	As determined by task
Temporary Barricades (as required)	As determined by task
6-inch C-Clamps	2
½ Ton Come-a-Long Chain Retrieval System	1
6500-lb Rated Tow Straps (20 ft. and 25 ft.)	2
Modified Ammunitions Vehicle (MAV) Conveyer Roller Pin Crossover Walk Platform	1
Cut resistant level 4 Puncture resistant level 3 gloves	As determined by task
70-inch Tow Strap Guide Rod	1
High visibility vest	As determined by task

4.0 PROCEDURE

General Guidelines

4.1 **ENSURE** the Two-Person rule is followed in all exclusion areas in accordance with *Physical Security Plan Volume III, CDRL D023*, 24852-GPP-GAZ-00010.

4.2 **POSITION** Door Guards at MAV dock when doors 100, 100B, or 100D are UNLOCKED and OPEN.

4.3 For SDC Service Magazine Operations, **POSITION** Door Guards at G101, G102, G103, or H1102 when accessed and OPEN.

4.4 Prior to accessing doors 100, 100B, or 100D, **VERIFY** the sliding hasp lock on door 101G is in the LOCKED position.

4.5 During receipt and return of munitions, Single Round Containers (SRCs), or Prop Charge Cans (PCCs):

4.5.1 **REMOVE** MAVs NOT being used for deliveries for the day from the MAV dock prior to the start of deliveries.

4.5.2 IF a MAV is unable to be moved due to mechanical issues, THEN **ASSIGN** two personnel to provide the 360-degree coverage required.

4.6 **SECURE** the MAV dock gate WHEN there are no deliveries scheduled for the day.

NOTE

The MAV fence line is an extension of the MSM Exclusion Area when the MAV dock is upgraded to a Temporary Exclusion Area.

4.7 **POSITION** Door Guards at the MAV gate entrance WHEN MAV dock is upgraded to a Temporary Exclusion Area to control access to the area.

4.8 **PLACE** Temporary barricades on H Street and 6th Street prior to the MAV dock being upgraded to a Temporary Exclusion Area.

4.9 **PLACE** Identification placards in the OPP cover sleeve to identify OPPs as follows:

4.9.1 Yellow placard - Light Load

4.9.2 Red placard - Treaty Round

4.9.3 Brown placard - Rodent Urine or Tainted Munitions

4.9.4 Blue placard - OPP loaded during in inclement weather (Rain or Snow)

4.9.5 Orange placard - Mixed Lots

4.10 OPP covers are NOT required during training evolutions.

4.11 **DISPOSE** of unserviceable OPP covers and straps in accordance with *Waste Management Procedure*, 24852-SOP-B00-W0038.

4.12 **INSPECT** OPP covers:

4.12.1 ENV **ENSURE** OPP cover is in good condition with no punctures, rips, and tears.

4.12.2 **DISPOSE** of OPP covers that have punctures, rips, or tears and unserviceable straps in accordance with *Waste Management Procedure*, 24852-SOP-B00-W0038.

4.13 At least weekly, **USE** a broom to sweep and clean MAV dock to mitigate safety hazards.

ENV Inclement Weather

4.14 SAF 3 IF munitions transport operations are notified of lightning approaching the 15-mile limit, THEN **UNLOAD** munitions, SRCs, or PCCs from MAVs at the MAV dock or SDC Service Magazine H1102, G101, G102 or G103, or SDC Sites.

4.14.1 **DO NOT LOAD** any additional munitions into MAVs until lightning hazard has passed.

4.15 SAF 3 IF MAVs loaded with munitions cannot be offloaded prior to lightning danger of 15 miles, THEN **MANEUVER** MAVs loaded with munitions, SRCs, or PCCs to MAV dock with back of MAV at least 13 feet west of outer I-beam columns until lightning hazard has passed.

4.16 IF MAVs at the SDC Complex are loaded with munitions and cannot be offloaded prior to lightning danger of 15 Miles, THEN **MOVE** loaded MAVs between any two SDC structures until lightning hazard has passed. If other hazards exist such as icy roads, snow, or high wind conditions, transport operations may be suspended. Suspension of operations notification will be made from CON to Operations Support.

4.16.1 The driver and assistant driver will remain in the MAV during lightning hazard.

4.17 IF weather is forecasted to be below freezing, THEN **PLUG** MAVs block heater into 110V outlet

4.17.1 **UNPLUG** MAVs bock heater **PRIOR** to starting engine.

4.18 **USE** shovel and ice melt where necessary to keep MAV dock free of snow and ice.

4.19 **REMOVE** ice and snow from MAV before use.

MAV General Guidelines

4.20 WHEN MAV fuel tank is at ½ mark, THEN **FILL** tank.

4.21 MAVs will NOT exceed 10 mph when carrying munitions and posted speed limit when munitions are NOT present.

4.22 For PCAPP three OPPs (loaded with munitions, SRCs, or PCCs) are maximum capacity for each MAV.

4.22.1 IF MAV shipment is less than three loaded OPPs, THEN **LOAD** empty OPPs first to make up a load of three to ensure adequate blocking and bracing of load.

4.23 For the SDC Complex, six SDC OPPs (loaded with munitions) are maximum capacity for each MAV.

4.23.1 IF MAV shipment is less than six SDC OPPs, THEN add adequate SDC OPPs for blocking and bracing.

4.24 IF access is needed into cargo area of MAV, THEN personnel will use MAV access stairs and assemble by performing the following:

4.24.1 PPE 10 **DON** cut resistant level 4 puncture resistant level 3 gloves.

4.24.2 **OPEN** MAV cargo doors and **SECURE**.

WARNING

AVOID PINCH POINTS AND PROTECT HANDS BY WEARING APPROPRIATE GLOVES WHEN STORING OR ASSEMBLING ACCESS STAIRS FROM UNDER MAV DECK.

4.24.3 **PULL** access steps out fully from under MAV deck by depressing lever under landing plate and **INSPECT** stairs for safe use.

4.24.4 **PULL** stairs down from under landing plate and **INSPECT** stairs for safe use.

4.24.5 **REMOVE** handrail from storage area and **CONNECT** pigtail to MAV door.

4.24.6 **INSERT** rail base into hole in landing plate.

4.25 IF access stairs were assembled and no further access into cargo area is needed, THEN **STORE** access stairs by performing the following:

WARNING

AVOID PINCH POINTS AND PROTECT HANDS BY WEARING APPROPRIATE GLOVES WHEN STORING OR ASSEMBLING ACCESS STAIRS FROM UNDER MAV DECK.

4.25.1 **REMOVE** rail base from landing plate hole.

4.25.2 **REMOVE** pigtail from MAV door and **STORE** handrail in storage area.

4.25.3 **SECURE** MAV door.

4.25.4 **PUSH** steps up under landing plate.

4.25.4.1 **STORE** access stairs by pushing landing plate/ stair assembly under MAV deck.

4.25.4.2 **ENSURE** stair assembly latching mechanism engaged.

MAV Conveyor Troubleshooting

4.26 IF conveyor does NOT operate, THEN **PERFORM** the following:

4.26.1 **VERIFY** front and rear sensors are NOT BLOCKED.

4.26.2 **TURN** conveyor key from LOCKED to OPERATE position.

4.26.3 **REMOVE** remote controller.

4.26.4 **ENSURE** emergency stops on panel and remote are OFF by turning knob.

4.27 **PRESS** E-STOP RESET button.

4.28 IF conveyor does NOT operate, THEN **NOTIFY** Transportation Supervisor.

NOTE

The following steps should only be performed in the event of conveyor motor or conveyor gearbox failure.

Munitions Transporter

4.29 **ENSURE** MAV truck is on level ground and conveyor is level.

4.29.1 IF necessary, to level MAV/ Conveyor, THEN **DROP** airbags or **REDUCE** tire pressure to level.

4.30 Using the PIT, **REMOVE** the first OPP and **PLACE** in designated area.

Maintenance Operators

4.31 **INSPECT** all equipment prior to use.

4.32 **PRESS** the E-STOP on the control panel and pendant. **VERIFY** no power to the rollers.

4.33 **PLACE** the mobile ladder on the left-hand side of the MAV cargo box and **LOCK** into place with one person holding the ladder.

4.34 **STEP** into the MAV cargo box.

4.35 **REMOVE** ladder and **SET** aside.

4.36 **PLACE** MAV Conveyer Roller Pin Crossover Walk Platform onto conveyor to cross the conveyor.

4.37 SAF 6 **DISCONNECT** power on motor for conveyor by unplugging the motor power connection.

4.38 **REMOVE** chain guard cover.

4.39 **REMOVE** master link from chain, **REMOVE** chain and **SET** aside.

4.40 **PLACE** the tow strap through the PIT opening on the OPP utilizing tow strap guide rod to push strap through openings and extend strap to end of conveyor.

4.41 **REMOVE** MAV Conveyer Roller Pin Crossover Walk Platform and **STOW**.

4.42 Utilizing two Maintenance Operators or two Munitions Transporters, **PULL** on tow strap to move OPP to the end of the conveyor and **REMOVE** the strap.

4.42.1 IF unable to PULL the OPP to the end of the conveyor, THEN **STOW** access stairs, then **GO TO** the next step.

NOTE

Each C-clamp is installed one at a time while the other maintenance operator is holding the opposite end of the channel beam in place.

4.43 **PLACE** channel beam onto the end of the conveyor and **PLACE** C-clamps on each end of the channel beam.

4.44 **HOOK** come-a-long to eyebolt on channel beam and **HOOK** the chain to the end of the tow strap.

Munitions Transporter/ Maintenance Operator

4.45 Utilizing the come-a-long, **MOVE** the handle back and forth to pull OPP to location to allow PIT to remove OPP from conveyor. OPP will be approximately 19 inches from the end of conveyor.

4.46 **REMOVE** MAV Conveyer Roller Pin Crossover Walk Platform.

Maintenance Operator

4.47 **DISCONNECT** chain from the tow strap.

4.48 **REMOVE** tow strap and **UNHOOK** come-a-long from eyebolt and **SET** aside.

4.49 **REMOVE** C-clamps from channel beam and **SET** channel beam and C-clamps aside.

Munitions Transporter

WARNING

PIT SPOTTER STAYS CLEAR OF AREA BETWEEN PIT AND ANY STATIONARY OBJECT TO PREVENT BEING CRUSHED OR INJURED DURING THIS OPERATION.

NOTE

Steps 4.51 through 4.55, Spotter shall continuously wear the identified PPE.

4.50 PPE 2, 5, 9 **DON** high visibility vest when performing spotter activities.

4.51 Utilizing the PIT, **POSITION** forks into OPP pallet.

4.52 **APPLY** minimal lift to OPP pallet with forks without lifting and **PULL** to end of conveyor if needed.

4.53 **REMOVE** OPP from conveyor.

4.54 If needed, **REPEAT** steps 4.40 through 4.53 until all OPPs are removed from MAV.

4.55 IF adjustments were made in 4.29.1, THEN **RESTORE** airbags or tire pressure to normal conditions.

PIT Charging

4.56 **CHARGE** PIT, as follows

4.56.1 **OPEN** clasp on PIT seat assembly.

4.56.2 **RAISE** PIT seat area to allow batteries to vent during charging.

4.56.3 **CONNECT** safety hook.

4.56.4 Visually **INSPECT** the PIT battery.

4.56.4.1 IF battery acid is present, THEN STOP and **NOTIFY** Supervisor.

4.56.5 **DISCONNECT** PIT battery wire harness assembly.

4.56.6 **VERIFY** PIT battery wire harness connection is free of debris and in good condition.

4.56.7 **VERIFY** battery charger wire harness connection is free of debris and in good condition.

4.56.8 **CONNECT** battery charger to wire harness assembly connection end which energizes PIT batteries.

4.56.9 **VERIFY** battery is charging on battery charger screen.

4.56.9.1 IF NOT charging, THEN **NOTIFY** Supervisor.

NOTE

Battery charger will automatically begin charging PIT batteries and battery charger will turn off when PIT batteries are fully charged.

4.57 **DISCONNECT** PIT charger by performing the following:

WARNING

DISCONNECTING PIT CHARGING CABLE FROM CHARGER PRIOR TO VERIFYING CHARGER OPERATION CAN RESULT IN ELECTRICAL SHOCK INJURY.

4.57.1 **SAF 13,14** **VERIFY** PIT charger is NOT actively charging PIT battery.

4.57.1.1 IF still charging, THEN **TURN** charger OFF.

4.57.2 **VERIFY** battery acid is not present.

4.57.2.1 IF battery acid is present, THEN STOP and **NOTIFY** Supervisor

4.57.3 **DISCONNECT** battery charger wire harness assembly from PIT.

4.57.4 **STORE** battery charger wire harness.

4.57.5 **DISCONNECT** safety hook.

4.57.6 **ENSURE** Charging Harness is free of pinch points.

4.57.7 **LOWER** PIT seat.

4.57.8 **CLOSE** clasp on PIT seat assembly.

MAV Auxiliary Battery Charging

4.58 To charge auxiliary batteries which operate MAV conveyor system, **ATTACH** cord to 110V outlet.

4.58.1 **DISCONNECT** cord from 110V outlet.

END OF OPERATION

OPERATION 2 – PRE-OPERATIONAL CONDITIONS

1.0 PREREQUISITES

1.1 Personnel have read and understand Operation 1 of this procedure.

2.0 SPECIAL REQUIREMENTS

2.1 IF any "VERIFY" step cannot be completed, THEN **NOTIFY** Transportation Supervisor.

3.0 EQUIPMENT, TOOLS, AND SUPPLIES

ITEM	QUANTITY REQUIRED
MAV	1
PIT, National Fire Protection Agency (NFPA) type EE	2
Jack Stands	As determined by task
Temporary Barricades	3
Cut resistant level 4 Puncture resistant level 3 gloves	As determined by task

4.0 PROCEDURE

Transportation Superintendent

4.1 **ENSURE** coordination with PCD for the following:

4.1.1 IF required, THEN **UPDATE** G-Block Entry Control Access Roster.

4.1.2 IF required, THEN **UPDATE** Surety Custodian Roster.

4.2 **IDENTIFY** transfer route, designated igloos, and delivery schedule for munitions transfers.

Munitions Transporter

4.3 **PREPARE** MAV for daily operation as follows:

4.3.1 **COMPLETE** *PCAPP Vehicle Mileage/ Dispatch Log*, GPP-GPX-00109-F005.

4.3.2 **COMPLETE** *Daily Vehicle Inspection List*, GPP-GPX-00109-F004.

4.3.3 **COMPLETE** *MAV Inspection Report,* PCAPP Form SOP-B23-W0001-F001 (Appendix 01) (Equivalent to DD Form 626).

4.4 **COMPLETE** *Electric PIT Daily Inspection Checklist*, PCAPP Form SAF-SAP-W0026-F002, for electric PIT.

5.0 PCAPP MAV DOCK OPERATIONS

5.1 **COMPLETE** communications check with the following radios/ personnel.

5.1.1 MAV Radio to CON

5.1.2 MAV Radio to Igloo Supervisor

5.1.3 MAV Radio to MAV Dock Supervisor

5.1.4 MAV Radio to MAV Dispatch

5.1.5 MAV Radio to MINICAMS Technician

5.2 PPE 17 **ERECT** temporary exclusion area barricades.

Transportation Supervisor

5.3 **VERIFY** communications checks are complete.

5.4 **VERIFY** temporary exclusion area barricades are in place.

5.5 **ENSURE** jack stands are in place to support MINICAMS sample line.

5.6 ENV **ENSURE** MINICAMS have been verified through the CON using MINICAMS line number as operational in accordance with Laboratory Procedure *Mustard Agent (HD) In Air by MINICAMS*, 24852-GPP-GGL-00301, and are ready to support operations at MAV dock.

5.7 **VERIFY** plant is operating within Limiting Conditions of Operations (LCOs).

5.8 **VERIFY** the sliding hasp lock on door 101G is in the locked position to prevent access during MAV operations.

5.9 **VERIFY** PCD/ Operations Center (OC) is ready to receive MAV.

5.10 **REQUEST** the CON to upgrade the MAV dock to a Temporary Exclusion Area

5.11 **VERIFY** Surety unlocks door in access 100B, 100D, 100.

5.12 **VERIFY** Door Guards move from 100B to the guard shack at the entrance of Temporary Exclusion Area.

5.13 **NOTIFY** Munitions Transport Dispatch to start dispatching and controlling MAV movement for the day.

6.0 SDC COMPLEX MAV OPERATIONS

6.1 **COMPLETE** communications check with the following radios/ personnel.

6.1.1 MAV Radio to SCON #3

6.1.2 MAV Radio to Igloo Supervisor

6.1.3 MAV Radio to MAV Dock Supervisor

6.1.4 MAV Radio to MAV Dispatch

6.1.5 MAV Radio to MINICAMS Technician

Transportation Supervisor

6.2 **VERIFY** communications checks are complete.

6.3 **VERIFY** temporary exclusion area barricades are in place.

6.4 ENV **ENSURE** MINICAMS have been verified through the SCON #3 using MINICAMS line number as operational in accordance with Laboratory Procedure *Mustard Agent (HD) In Air by MINICAMS*, 24852-GPP-GGL-00301, and are ready to support operations at H1102, G101, G102 or G103.

6.5 **VERIFY** plant is operating within Limiting Conditions of Operations (LCOs).

6.6 **VERIFY** PCD/ Operations Center (OC) is ready to receive MAV.

6.7 **REQUEST** the SCON #3 to upgrade H1102, G101, G102 or G103 to a Temporary Exclusion Area.

6.8 **VERIFY** Door Guards move from SDC Service Magazine door to the entrance of Temporary Exclusion Area.

6.9 **NOTIFY** Munitions Transport Dispatch to start dispatching and controlling MAV movement for the day.

Munitions Transport Dispatch

6.10 **DISPATCH** MAV from MAV dock to designated igloo.

6.11 **UPDATE** *MAV Movement Log*, PCAPP Form SOP-B23-W0001-F003 (Appendix 02).

END OF OPERATION

OPERATION 3 – DELIVER EMPTY OPP TO PCD

1.0 PREREQUISITES

Transportation Supervisor

1.1 **VERIFY** Operation 2 of this SOP is complete.

2.0 SPECIAL REQUIREMENTS

2.1 IF any "VERIFY" step cannot be completed, THEN **NOTIFY** Transportation Supervisor.

2.2 Empty OPP may be transported three high (total of nine) in cargo area of MAV or four high (total of 12) on flatbed vehicle.

2.3 OPP covers and straps may be delivered with the OPPs.

2.4 **SAF 20, 22** Spotters used during PIT or MAV movement and OPP placement. Spotters maintain visual contact with PIT operator and ensure OPPs remain secured and transported.

2.5 Spotters will wear approved high visibility apparel meeting ANSI 107-2015, Class II, Standard for High-Visibility Public Safety Vests (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016).

3.0 EQUIPMENT, TOOLS, AND SUPPLIES

ITEM	QUANTITY REQUIRED
MAV or Flatbed Vehicle	1 available
PIT	1 available
OPP (as required)	As determined by task
Wheel Chocks	1 set per vehicle
OPP Covers (as required)	As determined by task
OPP Tie-down Straps (as required)	As determined by task
High visibility vest	As determined by task
Cut resistant level 4 Puncture resistant level 3 gloves	As determined by task

4.0 PROCEDURE

NOTE

Throughout Operation 3, Spotter shall continuously wear the identified PPE.

Spotter

4.1 PPE 20, 22 **DON** high visibility vest when performing spotter activities.

Munitions Transporter

4.2 To deliver OPPs using MAV, **PERFORM** the following:

4.2.1 **ENSURE** the following on MAV:

4.2.1.1 SAF 18 Transmission in NEUTRAL.

4.2.1.2 SAF 18 Parking brake SET.

4.2.1.3 SAF 18 Ignition OFF.

4.2.1.4 SAF 18 Wheel chocks IN PLACE.

4.2.2 PPE 19 **OPEN** MAV loading door and **SECURE** OPEN.

4.2.2.1 IF additional light is needed, THEN **TURN** lights ON in cargo area.

4.2.3 **PERFORM** the following to ready conveyor for use:

4.2.3.1 **OPEN** and **SECURE** conveyor control access door.

4.2.3.2 **TURN** conveyor key from LOCKED to OPERATE position.

4.2.3.3 **REMOVE** remote controller and **MOVE** into safe operating position.

4.2.3.4 **ENSURE** emergency stops on panel and remote are OFF by turning knob.

4.2.3.5 **PRESS** E-STOP RESET button.

4.2.4 **VERIFY** conveyor is clear of all obstacles and ready to accept OPPs.

WARNING

PIT SPOTTER STAYS CLEAR OF AREA BETWEEN PIT AND ANY STATIONARY OBJECT TO PREVENT BEING CRUSHED OR INJURED DURING THIS OPERATION.

Munitions Transporter

4.2.5 PPE 20 **ENGAGE** empty OPP with PIT.

4.2.6 **LOAD** empty OPP into MAV.

4.2.7 **OPERATE** conveyor to safely load OPPs as follows:

4.2.7.1 **MOVE** OPP into position to allow room for next OPP.

4.2.7.2 **REPEAT** until required quantity of OPPs are loaded into MAV.

4.2.7.3 **ENSURE** that straps and covers are delivered with OPPs.

4.2.8 **STORE** conveyor remote.

4.2.9 **TURN** conveyor key from OPERATE to LOCKED position.

4.2.10 **CLOSE** and **SECURE** conveyer control access door.

4.2.11 IF additional lights were needed, THEN **TURN** lights OFF in cargo area.

NOTE

It is permissible to move MAV away from MAV loading area to avoid obstructions to close cargo doors.

4.2.12 **CLOSE** and **SECURE** MAV doors.

4.2.13 **REMOVE** vehicle chocks.

4.2.14 **REQUEST** permission from the Munitions Transport Dispatch to proceed to PCD G-Block.

4.2.15 **DRIVE** MAV to PCD PCAPP or PCD SDC limited area dividing zone 6/ 7 gates.

4.2.16 **PROCEED** along designated route to igloo.

4.2.17 **NOTIFY** the MAV Dispatch of arrival at designated igloo.

4.2.18 **POSITION** MAV at designated igloo.

4.2.19 **ENSURE** the following:

4.2.19.1 **SAF 18** Transmission in NEUTRAL.

4.2.19.2 **SAF 18** Parking brake SET.

4.2.19.3 **SAF 18** MAV Ignition OFF.

4.2.19.4 **SAF 18** Wheel chocks IN PLACE.

4.2.20 **OPEN** MAV loading doors and **SECURE**.

4.2.20.1 IF additional light is needed, THEN **TURN** lights ON in cargo area.

4.2.21 **PERFORM** the following to ready conveyor for use:

4.2.21.1 **OPEN** and **SECURE** conveyor control access door.

4.2.21.2 **TURN** conveyor key from LOCKED to OPERATE position.

4.2.21.3 **REMOVE** conveyer remote.

4.2.21.4 **ENSURE** emergency stops on panel and remote are OFF by turning knob.

4.2.21.5 **PRESS** E-STOP RESET button.

4.2.22 **OPERATE** conveyor to safely offload OPPs as follows:

4.2.22.1 **OBSERVE** first OPP being removed by PCD with forklift.

4.2.22.2 IF additional OPPs need to be removed, THEN **MOVE** OPP into position by operating conveyor.

4.2.22.3 **REPEAT** until required quantity of OPPs are removed from MAV.

4.2.23 WHEN all OPPs are delivered, **STORE** conveyor remote.

4.2.24 **TURN** conveyor key from OPERATE to LOCKED position.

4.2.25 **CLOSE** and **SECURE** conveyor control access door.

4.2.26 **CLOSE** and **SECURE** MAV cargo doors.

4.2.27 **NOTIFY** Munitions Transport Dispatch that OPP unloading is complete and MAV is ready to proceed to MAV dock.

4.3 To deliver empty OPPs using flatbed vehicle, **PERFORM** the following:

4.3.1 **ENSURE** the following on flatbed vehicle:

4.3.1.1 **SAF 18** Transmission in PARK.

4.3.1.2 **SAF 18** Parking brake SET.

4.3.1.3 **SAF 18** Ignition OFF.

4.3.1.4 **SAF 18** Wheel chocks IN PLACE.

WARNING

PIT SPOTTER STAYS CLEAR OF AREA BETWEEN PIT AND ANY STATIONARY OBJECT TO PREVENT BEING CRUSHED OR INJURED DURING THIS OPERATION.

Munitions Transporter

4.3.2 **ENGAGE** empty OPP with PIT.

4.3.3 **LOAD** empty OPP(s) onto flatbed.

4.3.4 **SECURE** empty OPP(s) with cargo straps.

4.3.5 **REMOVE** vehicle chocks.

4.3.6 **DRIVE** MAV to PCD PCAPP or PCD SDC limited area dividing zone 6/ 7 gate.

4.3.7 **PROCEED** along designated route to G-Block igloo.

4.3.8 **PARK** vehicle at designated G-Block igloo.

4.3.8.1 **ENSURE** the following:

a. **SAF 18** Transmission in PARK.

a. **SAF 18** Parking brake SET.

b. **SAF 18** Ignition OFF.

c. **SAF 18** Wheel chocks IN PLACE.

4.3.9 **NOTIFY** the MAV Dispatch of arrival at designated igloo.

4.3.10 **RELEASE** cargo straps.

4.3.11 **STORE** cargo straps.

4.3.12 **OBSERVE** OPPs being removed by PCD with forklift.

4.3.13 **NOTIFY** Munitions Transport Dispatch that flatbed vehicle unloading is complete and is ready to proceed to MAV dock.

END OF OPERATION

OPERATION 4 – LOADING MUNITIONS ON OPP AND DELIVERY TO PCAPP

1.0 PREREQUISITES

1.1 **VERIFY** Operation 2 of this SOP is complete.

2.0 SPECIAL REQUIREMENTS

2.1 IF any "VERIFY" step cannot be completed, THEN **NOTIFY** Transportation Supervisor.

2.2 **SAF 26** Spotters used during PIT or MAV movement and OPP placement. Spotters maintain visual contact with PIT operator and ensure OPPs remain secured and transported.Spotters will wear approved high visibility apparel meeting ANSI 107-2015, Class II, Standard for High-Visibility Public Safety Vests (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016).

2.3 Munitions accountability is in accordance with *Chemical Munitions Accountability*, 24852-OPS-OAP-W0009.

2.4 **ENSURE** the Two-person rule is followed in all exclusion areas in accordance with *Physical Security Plan Volume III, CDRL D023*, 24852-GPP-GAZ-00010.

3.0 EQUIPMENT, TOOLS, AND SUPPLIES

ITEM	QUANTITY REQUIRED
MAV	1
OPP (as required)	As determined by task
Hazardous Waste Label (as required)	As determined by task
Wheel Chocks	1 set per vehicle
High visibility vest	As determined by task
Treaty Label	As needed
Cut resistant level 4 Puncture resistant level 3 gloves	As determined by task

4.0 PROCEDURE

NOTE

Throughout Operation 4, Spotter shall continuously wear the identified PPE.

Spotter

4.1 **PPE 26** **DON** high visibility vest when performing spotter activities.

Munitions Transporter

4.2 IF NOT previously accomplished, THEN **PERFORM** the following:

4.2.1 **REQUEST** permission from the Munitions Transport Dispatch to proceed to PCD G-Block.

4.2.2 **DRIVE** MAV to PCD PCAPP Limited Area through B gate.

4.2.3 **PROCEED** along designated route to G-Block igloo.

4.2.4 **STOP** MAV short of designated Igloo and **NOTIFY** the MAV Dispatch of arrival at designated igloo.

4.2.5 **RECEIVE** safety brief from PCD, all **DIRECTION** will be given by PCD Lead.

4.2.6 **PARK** MAV at designated G-Block igloo.

4.2.6.1 **ENSURE** the following:

a. **SAF 23** Transmission in NEUTRAL.

b. **SAF 23** Parking brake SET.

c. **SAF 23** Ignition OFF.

d. **SURRENDER** badge to PCD.

e. **SAF 23** Wheel chocks IN PLACE.

4.2.7 **OPEN** MAV loading doors and **SECURE**.

4.2.7.1 IF additional light is needed, THEN **TURN** lights ON in cargo area.

4.2.8 **PERFORM** the following to ready conveyor for use:

4.2.8.1 **OPEN** and **SECURE** conveyor control access door.

4.2.8.2 **TURN** conveyor key from LOCKED to OPERATE position.

4.2.8.3 **REMOVE** conveyer remote.

4.2.8.4 **ENSURE** emergency stops on panel and remote are OFF by turning knob.

4.2.8.5 **PRESS** E-STOP RESET button.

4.2.8.6 **VERIFY** conveyor is CLEAR of all obstructions and READY to receive OPPs.

Transportation Supervisor or Designee

4.3 **OBSERVE** loading of munitions pallets or SRC crate onto OPP.

4.4 **ENV** **RECEIVE** DA Form 4508 from PCD Representative.

4.5 **ENV** **VERIFY** accuracy of DA Form 4508, as follows:
4.5.1 Nomenclature
4.5.2 Lot Number/ Serial Number
4.5.3 Number of Munitions, SRCs, or PCCs (quantity)

4.6 ENV **ANNOTATE** OPP Identification Number and MAV Number in Remarks section.

4.6.1 IF an OPP contains a marking of RU (Rodent Urine) on the munition, THEN **ANNOTATE** in the remarks section of the 4508 the quantity munitions marked.

4.6.2 IF an OPP contains identified mixed lots, THEN **ANNOTATE** in the remarks section of the 4508.

4.6.3 IF there are discrepancies with DA Form 4508, THEN **REJECT** form until corrected. Pen and ink corrections are acceptable on the spot.

4.6.4 IF DA Form 4508 information is correct, THEN **PRINT, SIGN,** and **DATE** DA Form 4508.

4.7 ENV **RETAIN** two copies of DA Form 4508.

4.7.1 IF OPP contains SRCs or PCCs **GO TO** step 4.13.

4.8 **OBSERVE** OPP cover being placed on OPP base where the documents will be facing the driver's side of the MAV.

4.9 **VERIFY** OPP cover is secure.

4.9.1 **REJECT** OPP cover if it has tears, rips or is determined unserviceable in accordance with Operation 1.

4.10 ENV **VERIFY** DA Form 4508 is placed in the OPP cover sleeve.

NOTE

ENV Hazardous waste label is NOT required for munitions being transported to PCAPP for baseline reconfiguration.

4.11 ENV **ENSURE** date and type of munition is placed on hazardous waste label.

4.12 ENV **VERIFY** placement of hazardous waste label on OPP cover sleeve(s).

4.13 TRE IF OPP contains munition tagged by Treaty, THEN **PERFORM** the following:

4.13.1 **VERIFY** treaty label is placed in the OPP cover sleeve.

4.13.2 **NOTIFY** CON with the following:

4.13.2.1 MAV Number

4.13.2.2 OPP number

4.13.2.3 Treaty identification number on munition

4.14 ENV **DELIVER** all retained copies of DA Form 4508 to Munitions Transporter MAV Operator(s).

Munitions Transporter

4.15 **OBSERVE** loading of OPP into MAV and **OPERATE** conveyor to safely load OPP by performing the following steps:

4.15.1 **OBSERVE** first OPP being placed onto conveyor rollers by forklift.

4.15.2 **ROTATE** all accessible hazard placards on MAV.

4.15.3 **MOVE** OPP into position to allow room for next OPP.

4.15.4 **REPEAT** above steps until required number of OPPs have been loaded.

4.15.5 IF additional lights were needed, THEN **TURN** lights OFF in cargo area.

4.15.6 **PPE 24, 25** **CLOSE** and **SECURE** MAV loading doors.

4.15.6.1 IF inaccessible placards were NOT rotated, THEN **ROTATE** placards.

4.15.7 **STORE** conveyor remote.

4.15.8 **TURN** conveyor key from OPERATE to LOCKED position.

4.15.9 **CLOSE** and **SECURE** conveyor control access door.

4.15.10 **REMOVE** vehicle chocks.

4.15.11 VISUALLY **INSPECT** under and around MAV for any flammable debris (tumbleweeds, etc.) trapped beneath vehicle and **REMOVE** as needed.

4.15.12 **RETRIEVE** badge from PCD.

4.15.13 **NOTIFY** Munitions Transport Dispatch that Munition loading is complete and **REQUEST** permission to return to the MAV dock.

Transportation Supervisor (MAV Dock)

4.16 IF first transport of day, THEN **NOTIFY** CON that MAV is ready to transport to MAV dock.

Munitions Transport Dispatch

4.17 **NOTIFY** MAV driver of permission to proceed to the MAV dock.

4.18 **UPDATE** *MAV Movement Log*, PCAPP Form SOP-B23-W0001-F003 (Appendix 02).

Munitions Transporter

4.19 **TRANSPORT** munitions, SRCs, or PCCs to MAV dock.

END OF OPERATION

OPERATION 5 – PCAPP MAV SAMPLING

1.0 PREREQUISITES

MINICAMS Technician

1.1 **VERIFY** with Operations Support Supervisor that Operation 4 of this SOP is complete.

2.0 SPECIAL REQUIREMENTS

2.1 IF any "VERIFY" step cannot be completed, THEN **NOTIFY** Transportation Supervisor.

2.2 This operation is specific to MAV Sampling at the MAV Dock located at PCAPP.

2.3 **SAF 30** Spotters used during PIT or MAV movement and OPP placement. Spotters maintain visual contact with PIT operator and ensure OPPs remain secured and transported.

2.4 Spotters will wear approved high visibility apparel meeting ANSI 107-2015, Class II, Standard for High-Visibility Public Safety Vests (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016).

2.5 **ENSURE** the Two-person rule is followed in all exclusion areas in accordance with *Physical Security Plan Volume III, CDRL D023*, 24852-GPP-GAZ-00010.

3.0 EQUIPMENT, TOOLS, AND SUPPLIES

ITEM	QUANTITY REQUIRED
MAV (as required)	1
Wheel Chocks	1 set per vehicle
High visibility vest	As determined by task
Sample line quick disconnect	1
Cut resistant level 4 Puncture resistant level 3 gloves	As determined by task

4.0 PROCEDURE

NOTE

Throughout Operation 5, Spotter shall continuously wear the identified PPE.

Spotter

4.1 **PPE 30** **DON** high visibility vest when performing spotter activities.

Munitions Transporter

4.2 **DRIVE** MAV to MAV dock as follows:

4.2.1 SAF 30 **ENSURE** spotter is in visual contact with MAV driver.

4.2.2 **PARK** MAV at MAV dock.

4.2.3 **ENSURE** the following:

4.2.3.1 SAF 27 Transmission in NEUTRAL.

4.2.3.2 SAF 27 Parking brake SET.

4.2.3.3 SAF 27 MAV ignition OFF.

4.2.3.4 SAF 27 Wheel chocks IN PLACE.

NOTE

MINICAMS flow check will only be performed on each MINICAMS line (AE 3240/ 3241) prior to the start of the MAV Sampling Operations. No additional flow check will need to be performed if there is continuous operation.

Munitions Transporter

4.3 ENV **PERFORM** MINICAMS flow check as follows.

4.3.1 **ENSURE** inlet sample line is attached to sampling port.

4.3.2 **ENSURE** quick disconnect on sampling port is free from debris and **INSPECT** MINICAMS distal end for wear and fraying.

4.3.3 **NOTIFY** MINICAMS Technician that flow check is ready to be PERFORMED and **PROVIDE** the line being used (AE 3240/ 3241).

MINICAMS Technician

4.3.4 **INSTRUCT** Munitions Transporter to PLACE the quick disconnect on the sample line.

4.3.5 **INSTRUCT** Munitions Transporter to REMOVE the quick disconnect from the sample line.

Munitions Transporter

4.3.6 **WAIT** for MINICAMS Technician to VERIFY that the flow check was good.

NOTE

MINICAMS Technician will provide START and STOP times for each sampling cycle to Munitions Transporter.

4.4 ENV **ENSURE** inlet sample line is attached to sampling port as follows:

4.4.1 **ENSURE** quick disconnect on sampling port is free from debris and **INSPECT** distal end for wear and fraying.

4.4.2 **NOTIFY** MINICAMS Technician when ready to connect sampling line to truck.

4.4.3 **PULL** back slightly on locking ring of quick disconnect at end of heated sample line.

4.4.4 **PLACE** sample line quick disconnect over mated sampling port on MAV.

4.4.5 **RELEASE** locking ring and **VERIFY** quick disconnect assembly is seated.

4.4.6 **NOTIFY** MINICAMS Technician ready for sampling to begin.

4.4.7 **ANNOTATE** MAV sampling start time on MAV sampling report.

4.4.8 **WAIT** for results/ readings from MINICAMS Technician and **ANNOTATE** on MAV sampling report.

4.4.9 **ANNOTATE** end sample time on MAV sampling report.

NOTE

If MINICAMS sample line is NOT connected during purge period, a full sample will NOT be obtained by MINICAMS on that cycle. The Operator must wait for next cycle and use that cycle's results to obtain accurate MINICAMS reading for MAV.

4.5 ENV During sampling period, with information provided on DA Form 4508, **COMPLETE** *MAV Sampling Report,* PCAPP Form SOP-B23-W0001-F002 (Appendix 03).

4.6 ENV **MONITOR** MAV MINICAMS for a minimum of two complete cycles.

4.6.1 **RECORD** results of MINICAMS cycle times on *MAV Sampling Report*.

4.6.1.1 IF MINICAMS result are LESS THAN 0.2 VSL, THEN **GO TO** step 4.8.

4.6.1.2 IF MINICAMS result are EQUAL TO or GREATER THAN 0.2 VSL, THEN **STOP** and **GO TO** step 4.7.

4.7 SAF 28 ENV IF MINICAMS analysis is EQUAL TO or GREATER THAN action level, THEN **PERFORM** the following:

4.7.1 **MASK** all personnel at MAV dock.

4.7.1.1 **NOTIFY** CON.

4.7.2 **NOTIFY** Transportation Dock Supervisor.

4.7.3 **DISCONNECT** MINICAMS sampling line from MAV sampling port.

4.7.3.1 **STORE** MINICAMS sampling equipment.

4.7.4 **REMOVE** wheel chock blocks.

4.7.5 VISUALLY **INSPECT** under and around MAV for any flammable debris (tumbleweeds, etc.) trapped beneath vehicle and **REMOVE** as needed.

4.7.6 **REFER TO** *Leaker and Reject Management*, 24852-SOP-B00-W0001, to set up vestibule for leaker operations.

4.7.7 **VERIFY** with CON that door 118 is secured with barrel bolt.

4.7.8 **REQUEST** permission to **ACCESS** door ERB 118A/ B.

4.7.9 SAF 30 Using spotter, **DRIVE** MAV to Truck Vestibule ERB-118 and **BACK** into vestibule.

4.7.9.1 **ENSURE** the following:

a. SAF 27 Transmission in NEUTRAL.

b. SAF 27 Parking brake SET.

c. SAF 27 MAV ignition OFF.

d. SAF 27 Wheel chocks IN PLACE.

4.7.10 **REPORT** to supervisor for further direction.

4.8 ENV IF MINICAMS monitoring is LESS THAN action level,

4.8.1 **DISCONNECT** MINICAMS sample line from MAV sampling port.

4.8.1.1 **STORE** MINICAMS sampling equipment.

4.8.2 PPE 31 **OPEN** MAV cargo doors.

4.8.3 IF necessary, THEN **BACK** MAV up to concrete.

4.8.4 **REMOVE** OPPs and **TRANSFER** to MSM in accordance with Operation 6 – MAV Unloading.

4.8.5 **DELIVER** DA Form 4508 to Transportation Dock Supervisor or designee.

END OF OPERATION

OPERATION 6 – MAV UNLOADING

1.0 PREREQUISITES

1.1 **ENSURE** Operation 5 of this SOP is complete.

2.0 SPECIAL REQUIREMENTS

2.1 IF any "VERIFY" step cannot be completed, THEN **NOTIFY** Transportation Supervisor.

2.2 **VERIFY** *Personnel and Explosive Limits for Routine Operations* (Appendix 04).

2.3 **SAF 33, 34** Spotters used during PIT or MAV movement and OPP placement. Spotters maintain visual contact with PIT operator and ensure OPPs remain secured and transported.

2.4 Spotters will wear approved high visibility apparel meeting ANSI 107-2015, Class II, Standard for High-Visibility Public Safety Vests (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016).

2.5 **ENSURE** the Two-person rule is followed in all exclusion areas in accordance with *Physical Security Plan Volume III, CDRL D023*, 24852-GPP-GAZ-00010.

3.0 EQUIPMENT, TOOLS, AND SUPPLIES

ITEM	QUANTITY REQUIRED
MAV (as required)	As determined by task
OPP (as required)	As determined by task
PIT, NFPA type EE	2 (minimum)
High visibility vest	As determined by task
Cut resistant level 4 Puncture resistant level 3 gloves	As determined by task

4.0 PROCEDURE

NOTE

Throughout Operation 6, Spotter shall continuously wear the identified PPE.

Spotter

4.1 **PPE 33, 34** **DON** high visibility vest when performing spotter activities.

Munitions Transporter

4.2 **VERIFY** door 100, 100B, 100D is in ACCESS.

4.3 **READY** conveyor system by performing the following:

4.3.1 PPE 32 **OPEN** and **SECURE** conveyor control access door.

4.3.2 **TURN** conveyor key from LOCKED to OPERATE position.

4.3.3 **REMOVE** conveyer remote.

4.3.4 **VERIFY** emergency stops on panel and remote are OFF by turning knob.

4.3.5 **PRESS** E-STOP RESET button.

4.3.6 **MOVE** into safe operating position.

4.4 **UNLOAD** MAV as follows:

4.4.1 IF additional light is needed, THEN **TURN** lights ON in cargo area.

WARNING

SPOTTER MUST STAY CLEAR OF AREA BETWEEN PIT AND ANY STATIONARY OBJECT TO PREVENT BEING CRUSHED OR INJURED DURING THIS OPERATION.

4.4.2 SAF 33, 34 Prior to moving, **ENSURE** Spotter is in visual contact with PIT operator.

CAUTION

When using the 72-inch PIT, inserting tines past the yellow marker may damage the previously loaded OPP.

4.4.3 Using PIT, **REMOVE** OPP from MAV.

4.4.3.1 Prior to moving the munitions through the corridor, **MOVE** any loose OPP cover material from the OPP number to provide visibility of the OPP number to the CCTV cameras.

4.4.3.2 **MOVE** OPP to MSM corridor and **PLACE** on floor.

4.4.4 To move OPPs to rear of MAV, **PRESS** button on conveyor remote to move OPP into position.

4.4.5 **REPEAT** steps to operate conveyor to remove OPPs from MAV as necessary.

4.4.6 IF operations request **TRANSFER** of the OPPs for direct shipment to the RTA, THEN **PERFORM** in accordance with *Munitions Unpacking,* 24852-SOP-B01-W0001. THEN **GO TO** step 4.8.

4.5 Using a 42-inch PIT, **MOVE** OPP to designated rack as follows:

4.5.1 WHEN loading OPPs on designated rack, **ENSURE** the following:

4.5.1.1 TRE ENV **PLACE** OPP on rack and **ENSURE** hazardous waste placard and treaty information placard are visible to support RCRA inspections and treaty requirements.

Transportation Supervisor or Designee

4.5.1.2 IF OPP contains treaty tagged munitions, THEN **NOTIFY** CON with MSM number and rack number.

4.6 ENV **DELIVER** DA Form 4508 to Ordnance Technician, Process Supervisor, or designee at the end of munitions delivery operations.

4.7 ENV **RECORD** the DATE of Receipt (in), OPP number, SRC or PCC number (If applicable), Munition Type, Lot number, 4508 number (xxxx-xxxx) and number of projectiles (+) received on the applicable MSM log for MSM-1, MSM-2, or MSM-3 that munitions are being placed.

4.7.1 IF OPP contains mixed lots, **RECORD** lot number and annotate "MIXED LOT" below.

Munitions Transporter

4.8 WHEN last OPP is unloaded, **PERFORM** the following:

4.8.1 **ROTATE** hazard placards, personal protective equipment (PPE) placards and chemical hazard placards on MAV.

4.8.2 IF additional light was needed, THEN **TURN** lights OFF in cargo area.

4.8.3 **STORE** conveyor remote.

4.8.4 **TURN** conveyor key from OPERATE to LOCKED position.

4.8.5 PPE 32 **CLOSE** and **SECURE** conveyor control access door.

NOTE

It is permissible to move MAV forward to close doors.

4.8.6 PPE 32 **CLOSE** and **SECURE** MAV cargo doors.

4.8.7 **ROTATE** placards on MAV cargo doors.

4.8.7.1 IF inaccessible placards were NOT rotated, THEN **ROTATE** placards.

Transportation Supervisor

4.9 WHEN last transport of day is complete, **NOTIFY** CON that all transportation activities are complete and **REQUEST** to have the MAV dock downgraded from a Temporary Exclusion Area to normal access.

Munitions Transporter

4.10 Upon completion of all deliveries, **SUBMIT** *MAV Sampling Report*, PCAPP Form SOP-B23-W0001-F002 (Appendix 03), to Transportation Dock Supervisor.

END OF OPERATION

OPERATION 7 – TRANSPORTING MUNITIONS

1.0 PREREQUISITES

1.1 **ENSURE** Operation 2 of this SOP is complete.

2.0 SPECIAL REQUIREMENTS

2.1 IF any "VERIFY" step cannot be completed, THEN **NOTIFY** Transportation Supervisor.

2.2 **VERIFY** *Personnel and Explosive Limits for Routine Operations* (Appendix 04).

2.3 **SAF 37,38,39, 42** Spotters used during PIT or MAV movement and OPP placement. Spotters maintain visual contact with PIT operator and ensure OPPs remain secured and transported.Spotters will wear approved high visibility apparel meeting ANSI 107-2015, Class II, Standard for High-Visibility Public Safety Vests (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016).

2.4 **ENSURE** the Two-person rule is followed in all exclusion areas in accordance with *Physical Security Plan Volume III, CDRL D023*, 24852-GPP-GAZ-00010.

3.0 EQUIPMENT, TOOLS, AND SUPPLIES

ITEM	QUANTITY REQUIRED
MAV (as required)	As determined by task
OPP (as required)	As determined by task
Wheel Chocks	1 set per vehicle
PIT, NFPA type EE	2 (minimum)
TAP Boots	1 set per PIT Operator and Spotter
TAP Gloves	1 set per PIT Operator and Spotter
Tychem F Apron	1 per PIT Operator and Spotter
High Visibility Vest	As determined by task
Cut resistant level 4 Puncture resistant level 3 gloves	As determined by task

4.0 PROCEDURE

NOTE

Throughout Operation 7, Spotter shall continuously wear the identified PPE.

Spotter

4.1 PPE 37, 38, 39, 42 **DON** high visibility vest when performing spotter activities.

Operations

4.2 **NOTIFY** PCD of munition quantities and type to be returned to G-Block/ SDC Complex.

4.3 **NOTIFY** PCD if a single round container (SRC) is being returned to G-Block/ SDC Complex with a leaker/reject munition.

4.4 ENV **REQUEST** DA Form 4508 from PCD.

Munitions Transporter

4.5 IF NOT previously accomplished, THEN **ENSURE** the following:

4.5.1 SAF 35 Transmission in NEUTRAL.

4.5.2 SAF 35 Parking brake SET.

4.5.3 SAF 35 Ignition OFF.

4.5.4 SAF 35 Wheel chocks IN PLACE.

4.6 **OPEN** and **SECURE** MAV loading doors.

4.6.1 IF necessary, THEN **BACK** MAV up to concrete.

4.6.2 IF additional light is needed, THEN **TURN** lights ON in cargo area.

4.7 **PERFORM** the following to ready conveyor for use:

4.7.1 **OPEN** and **SECURE** conveyor control access door.

4.7.2 **TURN** conveyor key from LOCKED to OPERATE position.

4.7.3 **REMOVE** conveyer remote.

4.7.4 **ENSURE** emergency stops on panel and remote are OFF by turning knob.

4.7.5 **PRESS** E-STOP RESET button.

Operations Supervisor

4.8 IF NOT already performed, THEN **OBSERVE** loading of munitions pallets onto an OPP, or SRC containing a leaker munition is loaded into the SRC egg crate, loaded onto OPP, and placed on a designated OPP rack.

4.9 ENV **VERIFY** accuracy of DA Form 4508 as follows:

4.9.1 Control Number

4.9.2 Nomenclature

4.9.3 Lot Number

4.9.4 Number of Munitions (quantity)

4.10 IF DA Form 4508 information is correct, THEN **SIGN** DA Form 4508.

4.11 IF there are any discrepancies with DA Form 4508, THEN **REJECT** form until corrected. Pen and ink corrections are acceptable on the spot.

4.12 **ANNOTATE** OPP Identification Number in Remarks section.

4.13 ENV **DELIVER** DA Form 4508 to Transportation Supervisor.

Transportation Supervisor or Designee

4.14 TRE IF OPP contains munition tagged by Treaty,

4.14.1 **ANNOTATE** MAV number and **VERIFY** OPP Number in the Remarks section of DA Form 4508.

4.14.2 **NOTIFY** CON/SCON #3 with the following:

4.14.2.1 MAV Number

4.14.2.2 OPP number

4.14.2.3 Treaty identification number on munition

4.15 ENV **DELIVER** DA Form 4508 to Munitions Transporter MAV Operator(s).

Munitions Transporter

NOTE

Steps 4.17 through 4.18, Munitions Transporter shall continuously wear the identified PPE.

4.16 PPE 37 **DON** the following PPE:
4.16.1 TAP boots
4.16.2 TAP gloves
4.16.3 Tychem F Apron

4.17 **LOAD** OPP into MAV and **OPERATE** conveyor to safely load OPP by performing the following steps:

WARNING

PIT SPOTTER STAYS CLEAR OF AREA BETWEEN PIT AND ANY STATIONARY OBJECT TO PREVENT BEING CRUSHED OR INJURED DURING THIS OPERATION.

4.17.1 SAF 37, 38, 39 Prior to moving, **ENSURE** Spotter is in visual contact with PIT Operator.

4.17.2 IF operations request **TRANSFER** of the OPPs for direct shipment from the RTA to PCD, THEN **PERFORM** in accordance with 24852-SOP-B01-W0001*, Munitions Unpacking,* THEN **GO TO** step 4.17.8.

4.17.3 Using a 42-inch PIT, **REMOVE** OPP from OPP rack assembly.

4.17.4 IF OPP is on the top rack prior to leaving the MSM, THEN **LOWER** the OPP to lowest traveling configuration.

4.17.5 For SDC Service Magazine, **MOVE** OPP to the entrance of G101, G102, G103, or H1102 and place on the floor of the Door.

4.17.6 **MOVE** OPP down MSM corridor to MSM rollup door 100D and **PLACE** on the floor inside the corridor.

Transportation Supervisor or designee

4.17.7 **VERIFY** OPP number, Munition Type, Lot number, and number of projectiles received on the applicable MSM Log for MSM-1, MSM-2, MSM-3 or SDC storage magazine where munitions are being removed.

4.17.7.1 **RECORD** the DATE OUT and number of projectiles (-) removed on the applicable MSM Log for MSM-1, MSM-2, or MSM-3 or SDC storage magazine where munitions are being removed.

CAUTION

When using the 72-inch PIT, inserting tines past the yellow marker may damage the previously loaded OPP.

Munitions Transporter

4.17.8 **SAF 37, 38, 39** Prior to moving, **ENSURE** Spotter is in visual contact with PIT Operator.

4.17.9 Using a 72-inch PIT outside Door 100D, **ENGAGE** the OPP placed on the floor.

4.17.10 **LOAD** first OPP onto conveyor rollers using PIT.

4.17.11 **ROTATE** all accessible hazard placards when first loaded OPP has been placed in MAV.

4.17.12 **MOVE** OPP into position to allow room for next OPP.

4.17.13 **REPEAT** above steps until required quantity of OPPs are loaded.

4.17.13.1 IF additional lights were needed, THEN **TURN** lights OFF in cargo area.

4.18 **CLOSE** and **SECURE** MAV loading doors.

4.18.1 IF inaccessible placards were NOT rotated, THEN **ROTATE** placards.

4.19 **STORE** conveyor remote.

4.20 **TURN** conveyor key from OPERATE to LOCKED position.

4.21 **CLOSE** and **SECURE** conveyor control access door.

4.22 **REMOVE** vehicle chocks.

4.23 **NOTIFY** Munitions Transport Dispatch that munitions loading is complete, and MAV is ready to proceed to its designated igloo.

Transportation Supervisor (MAV Dock)

4.24 IF first transport of the day, THEN **NOTIFY** CON/SCON #3 that MAV is ready to transport to G-Block/SDC Service Magazine.

MAV Dispatch

4.25 **PROVIDE** authorization to proceed to the Igloo.

Munitions Transporter

4.26 Using predetermined/ approved route, **DELIVER** munitions to identified G-Block/SDC Service Magazine.

4.27 **DRIVE** MAV to designated igloo.

4.28 **NOTIFY** Munitions Transport Dispatch that the MAV has arrived at its designated igloo (use igloo number during communication).

4.28.1 IF first return of the day, THEN **RECEIVE** safety brief from PCD.

4.28.2 SAF 35 **PLACE** Transmission in NEUTRAL.

4.28.3 SAF 35 **SET** Parking brake.

4.28.4 SAF 35 **TURN** MAV ignition OFF.

4.28.5 **EXIT** and **SURRENDER** badge to PCD.

4.28.6 SAF 35 **PLACE** wheel chocks.

4.28.7 **RECEIVE** safety brief from PCD if first return of the day.

PCD Real Time Analytical Platform (RTAP) Operator

4.29 **MONITOR** MAV.

4.29.1 IF result is LESS THAN 0.25 VSL, THEN **CONTINUE** with step 4.31.

4.29.2 SAF 40 IF result is EQUAL TO or GREATER THAN 0.25 VSL, THEN **PERFORM** the following:

4.29.2.1 **MASK** all personnel at igloo.

Munitions Transporter

4.29.2.2 **NOTIFY** CON.

4.29.2.3 **NOTIFY** Operations Support Supervisor.

PCD RTAP Operator

4.29.2.4 **DISCONNECT** MINICAMS sampling line from MAV sampling port.

Munitions Transporter

4.30 SAF 40 **MOVE** MAV to MAV vestibule as follows:

4.30.1 **RETRIEVE** badge from PCD.

4.30.2 **REMOVE** wheel chocks.

4.30.3 SAF 42 Using spotter, **DRIVE** MAV to Truck Vestibule ERB-118 and **BACK** into vestibule.

4.30.4 **ENSURE** the following:

4.30.4.1 SAF 35 Transmission in NEUTRAL.

4.30.4.2 SAF 35 Parking brake SET.

4.30.4.3 SAF 35 MAV ignition OFF.

4.30.4.4 SAF 35 Wheel chocks IN PLACE.

4.30.5 PPE 41 VISUALLY **INSPECT** under and around MAV for any flammable debris (tumbleweeds, etc.) trapped beneath vehicle and **REMOVE** as needed.

4.30.6 **REPORT** to supervisor for further direction.

Munitions Transporter

4.31 **PERFORM** the following to ready conveyor for use.

4.31.1 **VERIFY** PCD Inventory personnel are listed on DA Form 1687 (*Receipt for Supplies*).

4.31.2 ENV **DELIVER** DA Form 4508 to Operations Support Supervisor or PCD Inventory.

4.31.3 PPE 36 **OPEN** and **SECURE** MAV loading doors.

4.31.4 **OPEN** and **SECURE** conveyor control access door.

4.31.5 **TURN** conveyor key from LOCKED to OPERATE position.

4.31.6 **REMOVE** conveyer remote.

4.31.7 **ENSURE** emergency stops on panel and remote are OFF by turning knob.

4.31.8 **PRESS** E-STOP RESET button.

4.31.9 **OBSERVE** first OPP being removed by PCD/ PCAPP with forklift.

4.31.9.1 IF additional OPPs are needed to be removed, THEN **MOVE** OPP into position by operating conveyor.

4.31.10 **REPEAT** until required quantity of OPPs are removed from MAV.

4.31.11 **VERIFY** PCD RTAP Operator disconnects MINICAMS sampling line from MAV sampling port.

PCD Inventory

4.32 ENV **VERIFY** accuracy of DA Form 4508 as follows:

4.32.1 Control Number

4.32.2 Nomenclature

4.32.3 Lot Number

4.32.4 Number of Munitions (quantity)

4.32.5 SRC or PCC number (If applicable)

4.33 IF DA Form 4508 information is correct, THEN **SIGN** DA Form 4508.

4.34 IF there are any discrepancies with DA Form 4508, THEN **REJECT** form.

NOTE

Steps 4.36 through 4.41, Munitions Transporter shall continuously wear the identified PPE.

Munitions Transporter

4.35 PPE 36 **DON** cut resistant level 4 puncture resistant level 3 gloves

4.36 WHEN all loaded OPPs have been delivered, **ROTATE** placards to identify MAV is empty.

4.37 **STORE** conveyor remote.

4.38 **TURN** conveyor key from OPERATE to LOCKED position.

4.39 **CLOSE** and **SECURE** conveyor control access door.

4.40 **CLOSE** and **SECURE** MAV cargo doors.

4.41 **REMOVE** wheel chocks.

4.42 **RETRIEVE** badge from PCD.

4.43 **NOTIFY** Munitions Transport Dispatch that munitions unloading is complete, and MAV is ready to proceed to MAV dock.

Munitions Transport Dispatch

4.44 **NOTIFY** the MAV driver that it has permission to proceed to the MAV dock.

4.45 **UPDATE** *MAV Movement Log*, PCAPP Form SOP-B23-W0001-F003 (Appendix 02).

Transportation Supervisor

4.46 WHEN last transport of the day is complete, **NOTIFY** CON/SCON #3 that all transportation activities are complete and **REQUEST** to have the MAV dock/SDC Service Magazine downgraded from a temporary exclusion area to normal access.

END OF OPERATION

OPERATION 8 – SDC MUNITIONS DELIVERY

1.0 PREREQUISITES

1.1 **VERIFY** Operation 2 of this SOP is COMPLETE.

1.2 **VERIFY** with SDC Complex Operations that the following are complete, or in process for completion, in accordance with *SDC Munitions Transfers and Storage*, 24852-SOP-SDC-W0005:

1.2.1 Temporary Exclusion Area established at receiving service magazine.

1.2.2 Headwall/ First Entry Monitoring performed for receiving G-Block service magazine.

1.2.2.1 H1102 is exempt from headwall monitoring. **VERIFY** H1102 is LESS THAN 0.2 VSL.

2.0 SPECIAL REQUIREMENTS

2.1 IF any "VERIFY" step cannot be completed, THEN **NOTIFY** Transportation Supervisor.

2.2 **SAF 46** Spotters used during PIT or MAV movement and OPP placement. Spotters maintain visual contact with PIT operator and ensure OPPs remain secured and transported.

2.3 Spotters will wear approved high visibility apparel meeting ANSI 107-2015, Class II, Standard for High-Visibility Public Safety Vests (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016).

2.4 The G-Block Service Magazines dedicated to the SDC Complex are G101, G102, and G103.

2.4.1 These service magazines will not have fixed monitoring capabilities.

2.5 The H-Block Service Magazine that is dedicated to the SDC Complex is H1102.

2.5.1 H1102 will have fixed monitoring capabilities.

2.6 Munitions accountability is in accordance with *SDC Chemical Munitions Accountability*, 24852-OPS-OAP-W0062.

2.7 **ENSURE** the Two-person rule is followed in all exclusion areas in accordance with *Physical Security Plan Volume III, CDRL D023*, 24852-GPP-GAZ-00010.

2.8 Door guards are required when service magazine doors are open.

3.0 EQUIPMENT, TOOLS, AND SUPPLIES

ITEM	QUANTITY REQUIRED
MAV	1
SDC OPP (as required)	As determined by task

ITEM	QUANTITY REQUIRED
SRC OPP	As determined by task
Hazardous Waste Label (as required)	As determined by task
Wheel Chocks	1 set per vehicle
High visibility vest	As determined by task
Treaty label	As needed
Cut resistant level 4 Puncture resistant level 3 gloves	As determined by task

4.0 PROCEDURE

NOTE

Throughout Operation 8, Spotter shall continuously wear the identified PPE.

Spotter

4.1 PPE 46 **DON** high visibility vest when performing spotter activities.

Munitions Transporter

4.2 IF NOT previously accomplished, THEN **PERFORM** the following:

4.2.1 **REQUEST** permission from the Munitions Transport Dispatch to proceed to PCD G-Block.

4.2.2 **DRIVE** MAV to PCD PCAPP Limited Area dividing gate.

4.2.3 **PROCEED** along designated route to G-Block igloo.

4.2.4 **STOP** MAV short of designated igloo and **NOTIFY** the MAV Dispatch of arrival at designated igloo.

4.2.5 **RECEIVE** safety brief from PCD, all **DIRECTION** will be given by PCD Lead.

4.2.6 **PARK** MAV at designated G-Block igloo and **ENSURE** the following:

4.2.6.1 SAF 43 Transmission in NEUTRAL.

4.2.6.2 SAF 43 Parking brake SET.

4.2.6.3 SAF 43 Ignition OFF.

4.2.6.4 SAF 43 Wheel chocks IN PLACE.

4.2.7 **SURRENDER** badge to PCD.

4.2.8 PPE 44 **OPEN** MAV loading doors and **SECURE**.

4.2.8.1 IF additional light is needed, THEN **TURN** lights ON in cargo area.

4.2.9 **PERFORM** the following to ready conveyor for use:

4.2.9.1 PPE 44 **OPEN** and **SECURE** conveyor control access door.

4.2.9.2 **TURN** conveyor key from LOCKED to OPERATE position.

4.2.9.3 **REMOVE** conveyer remote.

4.2.9.4 **ENSURE** emergency stops on panel and remote are OFF by turning knob.

4.2.9.5 **PRESS** E-STOP RESET button.

4.2.9.6 **VERIFY** conveyor is CLEAR of all obstructions and READY to receive SDC OPPs/ SRC OPPs.

Transportation Supervisor or Designee

4.3 **OBSERVE** loading of munitions pallets onto SDC OPP or SRC crate onto SRC OPP.

4.4 ENV **RECEIVE** DA Form 4508 from PCD Representative.

4.5 ENV **VERIFY** accuracy of DA Form 4508, as follows:

4.5.1 Nomenclature

4.5.2 Lot Number

4.5.3 Number of Munitions (quantity)

4.6 **ANNOTATE** SDC OPP/ SRC OPP Identification Number and MAV Number in Remarks section.

4.6.1 IF an SDC OPP/ SRC OPP contains a marking of RU (Rodent Urine) on the munition, THEN **ANNOTATE** in the remarks section of the 4508.

4.6.2 IF an SDC OPP/ SRC OPP contains identified mixed lots, THEN **ANNOTATE** in the remarks section of the 4508.

4.6.3 IF there are discrepancies with DA Form 4508, THEN **REJECT** form until corrected. Pen and ink corrections are acceptable on the spot.

4.6.4 IF DA Form 4508 information is correct, THEN **PRINT, SIGN,** and **DATE** DA Form 4508.

4.7 ENV **RETAIN** two copies of DA Form 4508.

~~4.7~~4.8 IF transporting SRCs **GOTO** step 4.11.

~~4.8~~4.9 **OBSERVE** SDC OPP cover being placed on SDC OPP base where the documents will be facing the driver's side of the MAV.

~~4.9~~4.10 **VERIFY** SDC OPP cover is secure.

~~4.9.1~~4.10.1 **REJECT** SDC OPP cover if it has tears, rips and is determined unserviceable in accordance with Operation 1.

4.11 ENV **VERIFY** DA Form 4508 is placed in the SDC OPP cover sleeve or secure sleeve containing DA Form 4508 to crate if transporting SRCs.

~~4.10~~4.12 ENV **ENSURE** date and type of munition is placed on hazardous waste label.

~~4.11~~4.13 ENV **VERIFY** placement of hazardous waste label on SDC OPP cover sleeve(s).

~~4.12~~4.14 TRE IF SDC OPP contains munition tagged by Treaty, THEN **PERFORM** the following:

~~4.12.1~~4.14.1 **VERIFY** treaty label is placed in the SDC OPP cover sleeve.

~~4.12.2~~4.14.2 **NOTIFY** SDC Control Room (SCON) with the following:

~~4.12.2.1~~4.14.2.1 MAV Number

~~4.12.2.2~~4.14.2.2 SDC OPP number

~~4.12.2.3~~4.14.2.3 Treaty identification number on munition

~~4.13~~4.15 ENV **DELIVER** all retained copies of DA Form 4508 to Munitions Transporter MAV Operator(s).

Munitions Transporter

~~4.14~~4.16 **OBSERVE** loading of SDC OPP/ SRC OPP into MAV and **OPERATE** conveyor to safely load SDC OPP by performing the following steps:

~~4.14.1~~4.16.1 **OBSERVE** first SDC OPP/ SRC OPP being placed onto conveyor rollers by forklift.

~~4.14.2~~4.16.2 **ROTATE** all accessible hazard placards on MAV.

~~4.14.3~~4.16.3 **MOVE** SDC OPP/ SRC OPP into position to allow room for next SDC OPP.

~~4.14.4~~4.16.4 **REPEAT** above steps until required number of SDC OPPs/ SRC OPPs have been loaded.

~~4.14.5~~4.16.5 IF additional lights were needed, THEN **TURN** lights OFF in cargo area.

~~4.14.6~~4.16.6 **CLOSE** and **SECURE** MAV loading doors.

~~4.14.7~~4.16.7 IF inaccessible placards were NOT rotated, THEN **ROTATE** placards.

~~4.14.8~~4.16.8 **STORE** conveyor remote.

~~4.14.9~~4.16.9 **TURN** conveyor key from OPERATE to LOCKED position.

~~4.14.10~~4.16.10 **CLOSE** and **SECURE** conveyor control access door.

~~4.14.11~~4.16.11 **REMOVE** vehicle chocks.

~~4.14.12~~4.16.12 PPE 45 VISUALLY **INSPECT** under and around MAV for any flammable debris (tumbleweeds, etc.) trapped beneath vehicle and **REMOVE** as needed.

~~4.15~~4.17 **RETRIEVE** badge from PCD.

~~4.16~~4.18 **NOTIFY** Munitions Transport Dispatch that Munition loading is complete and **REQUEST** permission to proceed to the SDC Complex or specific SDC Service Magazine.

Transportation Supervisor (SDC)

~~4.17~~4.19 IF first transport of day, THEN **NOTIFY** SCON that MAV is ready to transport to the SDC Complex or specific SDC Service Magazine.

Munitions Transport Dispatch

~~4.18~~4.20 **NOTIFY** MAV driver of permission to proceed to the SDC Service Magazine.

~~4.19~~4.21 **UPDATE** *MAV Movement Log*, PCAPP Form SOP-B23-W0001-F003 (Appendix 02).

Munitions Transporter

~~4.20~~4.22 **TRANSPORT** to G101, G102, G103 or H1102.

~~4.20.1~~4.22.1 **PARK** MAV at designated location.

~~4.20.2~~4.22.2 **ENSURE** the following:

~~4.20.2.1~~4.22.2.1 **SAF 43** Transmission in NEUTRAL.

~~4.20.2.2~~4.22.2.2 **SAF 43** Parking brake SET.

~~4.20.2.3~~4.22.2.3 **SAF 43** MAV ignition OFF.

~~4.20.2.4~~4.22.2.4 **SAF 43** Wheel chocks IN PLACE.

~~4.20.3~~4.22.3 **PROCEED** to Operation 9.

END OF OPERATION

OPERATION 9 – SDC MAV SAMPLING

1.0 PREREQUISITES

MINICAMS Technician

1.1 **VERIFY** with Operations Support Supervisor that Operation 8 of this SOP is complete.

2.0 SPECIAL REQUIREMENTS

2.1 IF any "VERIFY" step cannot be completed, THEN **NOTIFY** Transportation Supervisor.

2.2 This operation is specific to MAV Sampling at the SDC Complex.

2.3 **SAF 50** Spotters used during PIT or MAV movement and OPP placement. Spotters maintain visual contact with PIT operator and ensure OPPs remain secured and transported.

2.4 Spotters will wear approved high visibility apparel meeting ANSI 107-2015, Class II, Standard for High-Visibility Public Safety Vests (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016).

2.5 IF MAV sampling is at service magazine G101, G102, G103, THEN monitoring will be performed with a Real Time Analytical Platform (RTAP).

2.6 IF MAV sampling is at H1102, THEN the Monitoring Technician will operate the MINICAMs while Munitions Transporters sample the MAV.

2.7 **REQUEST** monitoring to start DAAMS sampling on H-1102 Temporary Exclusion Area apron.

2.8 **ENSURE** the Two-person rule is followed in all exclusion areas in accordance with *Physical Security Plan Volume III, CDRL D023*, 24852-GPP-GAZ-00010.

2.9 Door guards are required when service magazine doors are open.

3.0 EQUIPMENT, TOOLS, AND SUPPLIES

ITEM	QUANTITY REQUIRED
MAV (as required)	1
Wheel Chocks	1 set per vehicle
RTAP	As needed
High visibility vest	As determined by task
Sample line quick disconnect	1
Cut resistant level 4 Puncture resistant level 3 gloves	As determined by task

4.0 PROCEDURE

Munitions Transporter

NOTE

MINICAMS flow check will only be performed on each MINICAMS line prior to the start of MAV Sampling Operations. No additional flow checks will need to be performed if there is continuous operation.

If at G101, G102, or G103, monitoring will be performed with a Real Time Analytical Platform (RTAP).

4.1 ENV **PERFORM** MINICAMS flow check as follows:

4.1.1 **ENSURE** inlet sample line is attached to sampling port.

4.1.2 **ENSURE** quick disconnect on sampling port is free from debris and inspect MINICAMs distal end for wear and fraying.

4.1.3 **NOTIFY** MINICAMs Technician that flow check is ready to be PERFORMED.

MINICAMS Technician

4.1.4 **INSTRUCT** Munitions Transporter to PLACE the quick disconnect on the sample line.

4.1.5 **INSTRUCT** Munitions Transporter to REMOVE the quick disconnect from the sample line.

Munitions Transporter

4.1.6 **WAIT** for MINICAMS Technician to VERIFY that the flow check was good.

NOTE

MINICAMS Technician will provide START and STOP times for each sampling cycle to Munitions Transporter.

4.2 ENV **ENSURE** inlet sample line is attached to sampling port as follows:

4.2.1 **ENSURE** quick disconnect on sampling port is free from debris and **INSPECT** distal end for wear and fraying.

4.2.2 **NOTIFY** MINICAMS Technician when ready to connect sampling line to truck.

4.2.3 **PULL** back slightly on locking ring of quick disconnect at end of heated sample line.

4.2.4 **PLACE** sample line quick disconnect over mated sampling port on MAV.

4.2.5 **RELEASE** locking ring and **VERIFY** quick disconnect assembly is seated.

NOTE

If MINICAMS sample line is NOT connected during purge period, a full sample will NOT be obtained by MINICAMS on that cycle. The Operator must wait for next cycle and use that cycle's results to obtain accurate MINICAMS reading for MAV.

4.3 ENV **MONITOR** MAV for a minimum of two complete cycles

4.3.1 During sampling period, with information provided on DA Form 4508, **COMPLETE** *MAV Sampling Report,* PCAPP Form SOP-B23-W0001-F002 (Appendix 03).

4.3.2 **RECORD** results of each MINICAMS cycle time on *MAV Sampling Report,* PCAPP Form SOP-B23-W0001-F002 (Appendix 03).

4.3.2.1 IF MINICAMS result is LESS THAN 0.2 VSL, THEN **GO TO** step 4.5.

4.3.2.2 IF MINICAMS result are EQUAL TO or GREATER THAN 0.2 VSL, THEN **STOP** and **GO TO** step 4.4.

SDC Control Room (SCON)

4.4 SAF 48 ENV IF MINICAMS analysis is EQUAL TO or GREATER THAN action level, THEN **PERFORM** the following:

4.4.1 **MASK** all personnel at G101, G102, G103, or H1102.

4.4.2 **NOTIFY** Main Plant Control Room.

Munitions Transporters

4.4.3 **NOTIFY** Transportation Dock Supervisor.

4.4.4 **DISCONNECT** MINICAMS sampling line from MAV sampling port.

4.4.5 **STORE** MINICAMS sampling equipment.

4.4.5.1 **REMOVE** wheel chock blocks.

4.4.5.2 PPE 49 VISUALLY **INSPECT** under and around MAV for any flammable debris (tumbleweeds, etc.) trapped beneath vehicle and **REMOVE** as needed.

Transportation Dock Supervisor

4.4.6 **REFER TO** *Leaker and Reject Management*, 24852-SOP-B00-W0001, to set up vestibule for leaker operations.

4.4.7 **VERIFY** with Main Plant CON that door 118 is secured with barrel bolt.

Munitions Transporter

4.4.8 **REQUEST** permission to **ACCESS** door ERB 118A/ B.

Spotter

4.4.9 PPE 50 **DON** high visibility vest when performing spotter activities.

Munitions Transporter

4.4.10 Using spotter, **DRIVE** MAV to Truck Vestibule ERB-118 and **BACK** into vestibule.

4.4.11 **ENSURE** the following:

4.4.11.1 SAF 47 Transmission in NEUTRAL.

4.4.11.2 SAF 47 Parking brake SET.

4.4.11.3 SAF 47 MAV ignition OFF.

4.4.11.4 SAF 47 Wheel chocks IN PLACE.

4.4.12 **REPORT** to supervisor for further direction.

Munitions Transporter

4.5 ENV IF MINICAMS monitoring is LESS THAN action level:

4.5.1 **DISCONNECT** MINICAMS sample line from MAV sampling port.

4.5.2 **STORE** MINICAMS sampling equipment.

4.5.3 PPE 51 **OPEN** and **SECURE** MAV cargo doors.

4.5.4 **REMOVE** SDC OPPs/ SRC OPPs and **TRANSFER** to G101, G102, G103, or to H1102 in accordance with Operation 10 – SDC MAV Unloading.

4.5.5 **DELIVER** DA Form 4508 to Transportation Dock Supervisor or designee.

END OF OPERATION

OPERATION 10 – SDC MAV UNLOADING

1.0 PREREQUISITES

1.1 **ENSURE** Operation 9 of this SOP is complete.

2.0 SPECIAL REQUIREMENTS

2.1 IF any "VERIFY" step cannot be completed, THEN **NOTIFY** Transportation Supervisor.

2.2 **VERIFY** *Personnel and Explosive Limits for Routine Operations* (Appendix 04).

2.3 **SAF 53, 54** Spotters used during PIT or MAV movement and OPP placement. Spotters maintain visual contact with PIT operator and ensure OPPs remain secured and transported.

2.4 Spotters will wear approved high visibility apparel meeting ANSI 107-2015, Class II, Standard for High-Visibility Public Safety Vests (24852-SAF-SAP-W0022, 24852-SAF-SAP-W0016).

2.5 The Service Magazines that are dedicated to the SDC Complex are G101, G102, G103, and H1102.

2.6 **ENSURE** the Two-person rule is followed in all exclusion areas in accordance with *Physical Security Plan Volume III, CDRL D023*, 24852-GPP-GAZ-00010.

2.7 Door guards are required when service magazine doors are open.

3.0 EQUIPMENT, TOOLS, AND SUPPLIES

ITEM	QUANTITY REQUIRED
MAV (as required)	As determined by task
SDC OPP (as required)	As determined by task
SRC OPP	As determined by task
Wheel Chocks	1 set per vehicle
PIT, NFPA Type EE	2 (minimum)
High visibility vest	As determined by task
Cut resistant level 4 Puncture resistant level 3 gloves	As determined by task
TAP Boots	As determined by task
TAP Gloves	As determined by task
Tychem Apron	As determined by task

4.0 PROCEDURE

NOTE

If transporting SRCs Munition Transports ~~Throughout Operation 10, Spotter~~ shall continuously wear the identified PPE throughout Operation 10.

~~Spotter~~Munition Transporter

4.1 PPE XX IF transporting SRCs **DON** the following PPE:

4.1.1 TAP boots

4.1.2 Nitrile gloves

4.1.3 TAP gloves

4.1.4 Tychem F apron

NOTE

Throughout Operation 10, Spotter shall continuously wear the identified PPE

Spotter

~~4.1~~4.2 PPE 53, 54 **DON** high visibility vest when performing spotter activities.

Munitions Transporter

~~4.2~~4.3 **READY** conveyor system by performing the following:

~~4.2.1~~4.3.1 PPE 52 **OPEN** and **SECURE** conveyor control access door.

~~4.2.2~~4.3.2 **TURN** conveyor key from LOCKED to OPERATE position.

~~4.2.3~~4.3.3 **REMOVE** conveyer remote.

~~4.2.4~~4.3.4 **VERIFY** emergency stops on panel and remote are OFF by turning knob.

~~4.2.5~~4.3.5 **PRESS** E-STOP RESET button.

~~4.2.6~~4.3.6 **MOVE** into safe operating position.

~~4.3~~4.4 **UNLOAD** MAV as follows:

~~4.3.1~~4.4.1 IF additional light is needed, THEN **TURN** lights ON in cargo area.

WARNING

SPOTTER MUST STAY CLEAR OF AREA BETWEEN PIT AND ANY STATIONARY OBJECT TO PREVENT BEING CRUSHED OR INJURED DURING THIS OPERATION.

~~4.3.2~~4.4.2 Prior to moving, **ENSURE** Spotter is in visual contact with PIT operator.

CAUTION

When using the PIT, inserting tines past the yellow marker may damage the previously loaded SDC OPP.

~~4.3.3~~4.4.3 Using PIT, **REMOVE** SDC OPP/ SRC OPP from MAV.

4.3.3.14.4.3.1 **MOVE** any loose SDC OPP cover material from the SDC OPP number to provide visibility of the SDC OPP number to the CCTV cameras.

4.3.3.24.4.3.2 **MOVE** SDC OPP/ SRC OPP to service magazine and **PLACE** at magazine threshold.on floor.

4.3.44.4.4 To move SDC OPPs/ SRC OPPs from rear of MAV, **PRESS** button on conveyor remote to move SDC OPP/ SRC OPP into position.

4.3.54.4.5 **REPEAT** steps to operate conveyor to remove SDC OPPs from MAV as necessary.

4.44.5 IF transporting palletized munitions **CONTINUE** to next step, IF transporting SRCs **GOTO** step 4.6.24.6.24.5.2.

4.54.6 Using a PIT, **MOVE** SDC OPP to service magazine as follows:

4.5.14.6.1 TRE ENV **PLACE** SDC OPP on space number and **ENSURE** hazardous waste placard and treaty information placard are visible to support RCRA inspections and treaty requirements.

Transportation Supervisor or Designee

4.6.1.1 IF SDC OPP contains treaty tagged munitions, THEN **NOTIFY** SCON with storage space number.

4.6.2 Using PIT **STAGE** SRC OPP in front of service magazine.

4.6.3 **REMOVE** cargo straps from SRC OPP.

4.6.4 Using inside PIT, **REMOVE** SRC crate from SRC OPP and place in designated spot within service magazine.

4.6.5 **STAGE** empty SRC OPP.

4.5.24.6.6 **PLACE** empty SRC OPPs on MAV when unloading is complete.

4.64.7 ENV **DELIVER** DA Form 4508 to Ordnance Technician, Operations Superintendent, or designee at the end of munitions delivery operations.

4.74.8 ENV **RECORD** the DATE of Receipt (in), SDC OPP/ SRC OPP number, Munition Type, Lot number, 4508 number (xxxx-xxxx) and number of projectiles (+) received on the G-Block Service Magazine G-101, G-102, G-103 log, or H1102 Service Magazine log, in accordance with *SDC Chemical Munitions Accountability,* 24852-OPS-OAP-W0062.

4.7.14.8.1 IF OPP contains mixed lots, **RECORD** lot number and annotate "MIXED LOT" below.

Munitions Transporter

4.84.9 WHEN last SDC OPP/ SRC OPP is unloaded, **PERFORM** the following:

4.8.14.9.1 **ROTATE** hazard placards, personal protective equipment (PPE) placards and chemical hazard placards on MAV.

4.8.24.9.2 IF additional light was needed, THEN **TURN** lights OFF in cargo area.

4.8.34.9.3 **STORE** conveyor remote.

4.8.44.9.4 **TURN** conveyor key from OPERATE to LOCKED position.

4.8.54.9.5 **CLOSE** and **SECURE** conveyor control access door.

NOTE

It is permissible to move MAV forward to close doors.

4.8.64.9.6 PPE 52 **CLOSE** and **SECURE** MAV cargo doors.

4.8.74.9.7 **ROTATE** placards on MAV cargo doors.

4.8.7.14.9.7.1 IF inaccessible placards were NOT rotated, **ROTATE** placards.

4.8.84.9.8 **REMOVE** wheel chocks and **STORE**.

4.8.94.9.9 **CONTACT** dispatch for further instructions.

Transportation Supervisor

4.94.10 WHEN last transport of day is complete, **NOTIFY** SCON that all transportation activities are complete and **REQUEST** to have G101, G102, G103, or H1102 downgraded from a Temporary Exclusion Area to normal access.

Munitions Transporter

4.104.11 Upon completion of all deliveries, **SUBMIT** *MAV Sampling Report*, PCAPP Form SOP-B23-W0001-F002 (Appendix 03), to Transportation Dock Supervisor.

END OF OPERATION

APPENDIX 01 – ENV MAV INSPECTION REPORT

Total page count: 2

Inspect MAV by placing an X or √ to indicate a satisfactory or unsatisfactory condition. All unsatisfactory conditions must be detailed in Remarks section. Vehicle may not be operated with an unsatisfactory condition without Supervisory approval.

CATEGORY	SAT	UNSAT	CATEGORY	SAT	UNSAT
Cargo Compartment			**General**		
Conveyor System			Grill		
Cargo Lights/ Lenses			Fuel Tank/ Cap/ Mount		
Truck Cab			Steps/ Handles		
Radio			Doors		
Fire Extinguishers			Auxiliary Batteries		
Emergency Equipment			Vent System		
Lights			Placards		
Windshield			Monitoring Port		
Windshield Wipers			Air Tank Valve		
Mirrors			U-Bolts		
Windows			Mud Flaps		
Instrument Gauges			Shock Absorbers		
Seat Belts			Leaf Springs		
AC/ Heater/ Defrost			Frame		
Horn			Tires/ Rims/ Lug Nuts		
Air Brakes			Drain Valve		
Engine Compartment			Exhaust System		
All Fluid Levels*			Drive Shaft		
Air Cleaner			Axle		
Air Compressor			Battery		
Steering Assembly			Vehicle Body		
Alternator			**Lights and Reflectors**		
Belts/ Hoses			Headlights		
Radiator/ Cap			Clearance Lights		
Fan/ Shroud			Turn Signals		
Wires			Brake/ Reverse		
U-Bolts			Emergency		
Hub Oil Seal					
REMARKS					

Printed Name/ Signature of Certified Munitions Transporter Date

Printed Name/ Signature of Independent Reviewer Date

Cargo Compartment Inspection

- Check overall condition no visible damage, cleanliness
- Cargo lights, functional check
- Conveyor system, functional check to include conveyor sensors

Truck Cab

- Fire extinguisher inspected, charged
- Emergency Equipment, MAV book contains emergency procedures
- Interior lights functional
- Windshield not cracked or broken
- Windows not cracked or broken
- Windshield wipers functional
- Mirrors not cracked broken or missing
- Instrument gauges not cracked, gauge needles in proper positions, no warning lights illuminated
- Seat belts not torn, missing, frayed
- Air Conditioner functional check
- Heater functional check
- Defrost functional check
- Horn functional check
- Radio functional check
- Air Brakes – Air pressure is 120 psi

Engine Compartment

Check the following fluid levels

- Power steering –a full drop should be coming off the dip stick (NO fluid leaking)
- Coolant – above add line and under full line (NO fluid leaking)
- Motor oil – above add line and under full line (NO fluid leaking)
- Windshield wiper fluid – full

- Visually inspect the following:
  - Air cleaner cover is in place and secure
  - Hoses and belts not frayed, no cracks or holes, not missing
  - Wires not loose, not frayed, plastic connection not missing
  - Air Compressor not loose
  - Alternator not loose from mount, no loose wires
  - Front U-Bolts not missing or loose
  - Front hub oil seal not leaking
  - Fan and shroud not cracked or broken
  - Radiator is not leaking, and cap is fastened
  - Steering assembly no bolts missing, not loose, no leaks
  - No fluids leaking

General Inspection

- Fuel tank mounted securely, and cap fastened
- Steps and handles secured to vehicle and are operational
- All passenger and cargo doors latch, lock, and function properly
- Placards not missing or faded
- Monitoring port functional check
- Mud flaps are secured to vehicle, not torn or missing
- Shock absorbers not leaking, not loose, no bolts missing (visual only)
- Leaf springs not cracked or rusty
- Tires and rims display no abrasion, bubbles or cuts, no retreads, no dents, cracks no missing loose or cracked lug nuts, no non-factory welds (visual only)
- Rear U-Bolts not missing or loose
- Drain valve in closed position
- Exhaust system displays no obvious damage and is functional (visual only)
- Drive shaft not damaged (visual only)
- Axle not damaged or leaking (visual only)
- Battery not loose from mount
- Auxiliary battery not loose from mount
- Vent system not damaged
- Vehicle body (including grill) no dents, missing rivets, cracked or rusty
- Air tank bleeder valve (Pull on cord for front tank until no moisture is escaping, turn valve on rear tank until no moisture is escaping)

Lights and Reflectors

- Headlights functional check
- Running lights functional check (front, back, sides)
- Turn Signals functional check (front, back)
- Brake/ Reverse functional check
- Emergency functional check

APPENDIX 02 – MAV MOVEMENT LOG

Total page count: 1

DATE: ________________

MAV NUMBER	DRIVER/ BADGE #	A- DRIVER/ BADGE #	LEAVE MAV DOCK	ARRIVE AT IGLOO	LEAVE IGLOO	ARRIVE AT SDC or MAV DOCK	VERIFY BADGE

THIS FORM IS A QUALITY RECORD

APPENDIX 03 – ENV MAV SAMPLING REPORT

Total page count: 1

ENV *This form contains Environmental Critical Items. Environmental Department must concur with changes to this form.*

MAV Number	Control Number	Munition Transporter	MINICAMS #	Start Time	End Time	Reading (VSL)

Printed Name/ Signature of Independent Reviewer Date

APPENDIX 04 – PERSONNEL AND EXPLOSIVE LIMITS FOR ROUTINE OPERATIONS

Personnel and Explosive Limits for Routine Operations						
Location	Unit	Net Explosive Weight (NEW)	Unit Measurement	Unit Quantity	Personnel Limits	
					Operational	Transient
MAV Loading Dock	4.2 inch pallet	6.912 lbs	OPP	9	18	6
Munitions Service Magazine (MSM) Corridor*	4.2 inch pallet	6.912 lbs	OPP Reconfigured projo	2		
Munitions Service Magazine*	4.2 inch pallet	6.912 lbs	OPP	1	4	4

Notes:
*One (1) full OPP may only be placed in the MSM Corridor in the event of equipment breakdown, but NOT for longer than 1 hour.
*Maximum OPPS allowed in MSM is 52

JOB HAZARD ANALYSIS

PCAPP

PLANT PROCEDURE REVISION/PCN FORM

REQUESTOR: RALPH MAESTAS	PHONE: 549-5601	REQUEST DATE: 1/17/2023
DOC NO.: 24852-SOP-B23-W0001	TITLE: MUNITION TRANSPORT AND STORAGE OPERATIONS	

NEW REVISION NO.: 018 | TYPE: ☐ NEW ☐ SUSPENSION ☐ EDITORIAL ☐ ANNUAL REVIEW ☒ TECHNICAL ☐ PCN ☐ CANCEL 24852-PCN-023-

ASSOCIATED CRs: ☐ YES ☒ NO IF YES, LIST: | VALIDATION REQUIRED? ☐ YES ☒ NO | HAZARD EVALUATION? ☒ JHA ☐SR ☐N/A | ASSOCIATED PCP: ☐ YES☒ NO IF YES, LIST:

TYPE OF VALIDATION: ☐ TABLE TOP ☐ PERFORM ☐ SIMULATION ☒ N/A

EXPEDITED ☒ NO ☐ YES REASON:

RALPH MAESTAS
PROCEDURE OWNER (PRINT AND SIGN) DATE

REVISION DESCRIPTION (PAGE NO., SUMMARY OF CHANGES, ETC.)

GLOBAL CHANGE

SDC OPP **Changed to** SDC OPP/ SRC OPP

OPERATION 8

3.0 ADDED SRC OPP

STEP 4.3 NOW READS: OBSERVE loading of munitions pallets onto SDC OPP or SRC crate onto SRC OPP.

ADDED STEP 4.8: **I**F transporting SRCs **GOTO** step 4.11.

STEP 4.11 NOW READS: **VERIFY** DA Form 4508 is placed in the SDC OPP cover sleeve or secure sleeve containing DA Form 4508 to crate if transporting SRCs.

OPERATION 10

3.0 ADDED SRC OPP

NOTE ABOVE 4.1 NOW READS: If transporting SRCs Munition Transports shall continuously wear the identified PPE throughout Operation 10.

ADDED NEW 4.1: IF transporting SRCs DON the following PPE:
4.1.1 TAP boots
4.1.2 Nitrile gloves
4.1.3 TAP gloves
4.1.4 Tychem F apron

STEP 4.4.3.2 NOW READS: **MOVE** SDC OPP/ SRC OPP to service magazine and **PLACE** at magazine threshold.

ADDED STEPS
4.6.2 Using PIT STAGE SRC OPP in front of service magazine.
4.6.3 REMOVE cargo straps from SRC OPP.
4.6.4 Using inside PIT, REMOVE SRC crate from SRC OPP and place in designated spot within service magazine.
4.6.5 STAGE empty SRC OPP.
4.6.6 PLACE empty SRC OPPs on MAV when unloading is complete

PCAPP FORM PLT-GAP-W0009-F001 R014 1 of 1 10 Jan 2023

Enclosure 4

Permit Change Page(s): Annex 3 Attachment 15,

SDC Operations Plan

(REDACTED)

Introduction

This Static Detonation Chamber (SDC) Operations Plan is organized with system and process descriptions in the body of the document and compliance tables organized at the end. The format and information provided in this plan is intended to allow for a more effective quick-reference aid for operators. This first regulatory submittal of this document represents the design and anticipated operating conditions/setpoints for the systems. Final setpoints will be established during the systemization and shakedown phase and will be finalized following the successful conduct of Agent Trial Burn testing as defined by the Trial Burn plans (**Annex 3 Attachment 13A and 13B**).

ENV This Plan in its entirety is incorporated into the Hazardous Waste Permit (Annex 3 Attachment 15). Any changes made to this Plan will require a permit modification. Notification and identification of the proposed changes must be made to CDPHE through the Environmental Department.

15-1A PROCESS AND OPERATIONS OVERVIEW

Three SDCs will be permitted to treat/destroy intact, non-leaking, palletized 4.2-inch rounds; and overpacked ~~4.2-inch rounds~~agent contaminated ~~(i.e.,~~ leakers, rejects, recovered munitions and energetics ~~and recovered munitions)~~ currently stored at Pueblo Chemical Depot (PCD) or Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) that contain mustard agents (HD/HT). Each SDC and associated Off-gas Treatment System (OTS) unit is housed inside a pre-engineered Sprung™ structure (SDC Enclosure) placed on top of a reinforced concrete pad that has a chemical-resistant coating. Each SDC (and associated OTS) operates independently from the other SDCs and is controlled and operated from its own Control Room. Figure 1 shows the SDC Complex at PCD that comprises SDC Sites 1, 2, and 3 (where the SDC Enclosures and ancillary structures are located); storage igloos G101, G102, G103 and H1102; and the SDC Waste Laydown Yard. Storage igloos, storage magazines and service magazine terms in this plan are interchangeable and have the same meaning.

Munitions and/or overpacked energetics or munitions to be treated are brought into the SDC Enclosure by a munitions transport truck and left on transport truck and/or placed on the munitions staging area floor in accordance with **Munitions Transport and Storage Operations, 24852-SOP-B23-W0001** and **SDC Munitions Transfers and Storage, 24852-SOP-SDC-W0005**. In the staging area, the overpack pallets (OPPs) and/or overpack crates are monitored for absence of agent and the OPP -covers (not applicable to crates) are removed. The items are placed in feed containers (cardboard boxes for munitions and rejects and overpacks for leakers, hereafter known as "feed boxes") on the loading conveyor. Once the feed conveyor is filled with feed boxes, control room operators place the conveyor in automatic and begin the feed sequence. The control system then conveys feed boxes, one at a time to the top of the SDC vessel platform. When the feed box is placed into the electrically heated SDC vessel, the munitions are detonated/deflagrated by the high heat inside the vessel, and the chemical agent and energetics are destroyed by thermal decomposition. Heated air sweeps the vessel to carry the contaminated gasses to the OTS. The OTS, which includes a thermal oxidizer, spray dryer, bag house filter, venturi scrubber, acid scrubber, neutral scrubber, demister, chilled water heat exchanger, reheater, and a series of HEPA and carbon filters to remove particulates and potential air pollutants. When the SDC vessel is approximately 50% filled (96 ea. 4.2-inch, 144 ea. 105mm, 48 ea. 155mm) with munitions or overpacked munitions (12 ea. 5.4" x 36" SRC, 9 ea. 7" x 27" SRC, 6 ea. Propelling Charge Can PA92) as determined by tracking the number of munitions fed since the last emptying, a clean burn timer starts to determine when the vessel can be emptied. Metal parts/fragments are emptied onto a scrap conveyor where they can cool before being conveyed, inspected and placed into an SDC scrap bin. Once collected, the scrap bin is transferred to SDC Vestibule where the lid is placed on, then transferred to SDC Waste Laydown Yard. The processed munition bodies and metal parts are recycled as scrap metal. More detailed process descriptions of each SDC system are provided in Section 7.

Figure 2 and Figure 3 are generalized process flow diagrams for the SDC and OTS, respectively, and Figure 4 shows a simplified block flow diagram for the SDC and OTS process. **Annex 3 Attachment 8, SDC Process Description**, provides detailed process descriptions. **Annex 3 Attachment 3, *SDC Waste Characteristics and Waste Analysis Plan*,** describes the wastes generated from the SDC process, waste characterization sampling and analysis, and disposition. Section 7 of this Operations Plan describes the SDC systems/equipment and addresses details such as parameters, performance, operation, and decontamination for each system.

15-1B SCOPE OF THE OPERATIONS PLAN

The Operations Plan describes SDC operations including transport and storage of munitions and overpacked munitions, staging ~~munitions~~ inside the SDC Enclosure, processing munitions and overpacked munitions, and managing the wastes generated from the processes. The Operations Plan is focused on normal start-up, operation and shut-down and is limited to addressing off-normal operations to the responses identified in the compliance tables.[1] Normal system operation including start-up and shut-down are contained in **SDC and Off-Gas Treatment System (OTS), 24852-SOP-B28-W0001**. Compliance tables for the permitted operations are provided in Section 9. Response to off-normal or emergency conditions is addressed in **Annex 3 Attachment 2** and **Annex 3 Attachment 4**.

15-1C USE OF THE OPERATIONS PLAN RELATIVE TO TRIAL BURN TEST

This Operations Plan describes the expected operation of the PCAPP permitted waste handling systems, air pollution control systems, and monitoring and control systems. This plan describes how the SDC/OTS will be operated at the start of the trial burn test. During the test, operating data will be gathered and analyzed with the objective of optimizing plant performance. It is expected that during the trial burn testing, the normal operating ranges for the parameters may be further defined. The Operations Plan will evolve and be revised to describe normal plant operation based upon the trial burn test results.

In addition to identifying key operating parameters and establishing normal operating ranges for the parameters, trial burn testing will be used to establish processing rates, establish minimum acceptance criteria, and conduct emissions sampling to determine if SDC emissions are below incremental risk as hazard thresholds (determined by a Multiple Pathway Health Risk Assessment). The data quality objectives for each test are defined in **Table 3** of **Annex 3 Attachment 13 Appendix 13-1**.

Specific details associated with implementation of the Trial Burn are provided in **Annex 3 Attachment 13A and 13B**.

15-1D ORGANIZATION AND RESPONSIBILITIES

Figure 5 illustrates the SDC organizational structure. Roles and responsibilities are defined in the sections that follow, but position titles are subject to change.

SDC personnel complete qualification, certification, and recertification activities certifying that they have the necessary proficiency to perform the duties assigned according to job title and responsibilities. Copies of all SDC personnel training, qualifications, and certifications are maintained onsite. SDC project training requirements are defined in the

[1] Other off-normal operations will be covered on a case-by-case basis, will be documented, and will be reported to CDPHE

15-1D(14) PCAPP ENVIRONMENTAL MANAGER

The PCAPP Environmental Manager is responsible for the development and administration of PCAPP's environmental programs and the implementation of environmental plans and procedures at the PCAPP and SDC facilities.

15-1D(15) PCAPP SURETY/SECURITY MANAGER

The PCAPP Surety/Security Manager is responsible for the development and administration of PCAPP and SDC surety and security programs and the implementation of surety and security plans and procedures at these facilities.

15-1D(16) PCAPP QUALITY ASSURANCE MANAGER

The PCAPP Quality Assurance Manager is responsible for establishing and implementing a quality program that satisfies prime contract quality requirements. The Quality group conducts audits and surveillances of select SDC processes to verify implementation of and compliance with procedures. QC personnel execute, witness, and/or enforce hold points to verify compliance with established acceptance criteria.

15-2 AGENT MONITORING

Agent monitoring is conducted throughout the PCAPP SDC operations to detect and confirm any unexpected release of mustard agent and to ensure worker protection. MINICAMS® near real-time monitors analyze room and process stack air to provide initial detection results. Depot Area Air Monitoring System (DAAMS) units are typically co-located with the near real-time monitors and serve to confirm or refute the near real-time results, as necessary. DAAMS monitoring also provides historical monitoring and typically provide continuous sampling to evaluate the worker population limit or general population limit time-weighted average concentrations. Relevant operating information and levels for the agent monitoring activities are in **Table 13**. Details regarding this monitoring—including responses to agent concentrations above 0.2 vapor screening level (VSL)—are included in the Site Specific Monitoring Plan (see **Annex 3 Attachment 10**) and are generally not repeated herein. The areas monitored for the PCAPP SDC Complex are:

- SDC Vestibule,
- SDC equipment,
- ~~Ionex~~ IONEX 16000 and 4000 mid-bed filters and stacks,
- Modified Ammunition Vehicles (MAVs),
- OPPs,
- H1102, G101, G102, and G103
- SDC Room

15-3C DESCRIPTION OF AUTOMATIC WASTE FEED CUT OFF (AWFCO) SYSTEMS

The AWFCO system stops the waste feed into the detonation chamber (DC). The AWFCO system instrumentation monitors process conditions, providing data to ensure compliance with permit requirements and meet process response and control needs. It also provides operational flexibility, safety interlocking, and shutdown features. Any waste that is in the DC at the time of cutoff continues to be processed to completion. The AWFCO system is used to prevent the feeding of munitions if operating conditions are outside a) the manufacturer's recommendations or b) operational limits demonstrated during the PTM exhaust gas sampling tests. A list of AWFCO criteria is provided in **Table 16**.

Shutdown of the SDC systems is independent of waste feed cut-off, and is addressed in the **SDC and OTS, 24852-SOP-B28-W0001** procedure.

15-4 WASTE MANAGEMENT

This section provides a description of the primary waste streams anticipated from processing munitions; the contents of **Table 1** are not limits on waste generation. Other waste generated from support activities are addressed in **Annex 3 Attachment 3** to the PCD permit, the **SDC Waste Analysis Plan (WAP)**. Waste will be managed in accordance with **Waste Management Procedure, 24852-SOP-B00-W0038** and **Exclusion Area Waste Management, 24852-SOP-B00-W0039**.

Table 1: SDC Primary Process Waste Streams

Area	Description	Packaging	Forecast Volume/Month per SDC ~~[4.2-inch Campaign]~~	Basis
SDC Room	Scrap Munitions Bodies or overpacks	Bins (MTU)	~25 Tons	~3200 munition bodies/month[1] @ 18 lb each
SDC Room	Dunnage from Munitions	Rolloff bin	2	~4500 lb/ rolloff (70 lb/pallet)
SDC Room	Buffer Tank Dust	55 Gallon steel drums	< 1	Based on BGCAPP actuals
SDC Room	< VSL Waste	55 Gallon poly drum	~5	Based on BGCAPP actuals
SDC Room	> VSL Waste	55 Gallon poly drum	< 5	Based on BGCAPP actuals
OTS Room	Spray Dryer Dust	55 Gallon steel drums	~10	Based on BGCAPP actuals
OTS Room	Baghouse Filter Dust	55 Gallon steel drums	~90 drums	The 4.2 in HD mortar M&EB is provided in Attachment 13

				as Appendix 13-2
OTS Room	Bleed Water Tank Sludge	55 Gallon poly drum	~6 drums	Dynasafe Mass & Energy Balance (@~3200 munitions/month)

1. 3200 munitions/month per SDC is the forecast average processing rate, though peak rates may exceed this rate, depending on Trial Burn results.

15-5 LEAKER AND REJECT MANAGEMENT

The SDC mission includes demilitarization of 4.2-inch mortars, that are currently being stored in PCD G-block igloos. When stored munitions are scheduled for demilitarization, the PCD will transfer custody of the munitions to PCAPP/SDC personnel and the munitions will then be transferred from the G-block igloo to the SDC storage magazines G101, G102, G103, and H1102, in accordance with this *SDC Operations Plan* (Annex 3 Attachment 15) and the SOPs below.

Storage and transfer operations to SDC magazines follow **Munitions Transport and Storage Operations, 28452-SOP-B23-W0001.** SDC munitions transfers between SDC magazines and SDC Sites 1, 2, and 3 and storage follow **SDC Munitions Transfers and Storage, 24852-SOP-SDC-W0005.**

A munition confirmed to have released either liquid agent or exhibiting a vapor concentration above 0.2 VSL is considered a leaker. A potential exists for a munition in PCAPP custody to leak mustard agent between the time that custody is transferred from a PCD G-block storage igloo and the time that the munition is destroyed during SDC processing. Leakers may be identified in the MAVs; H1102 service magazine; G101, G102, or G103 storage magazines; or the SDC Room inside the SDC Enclosure. **Table 2** provides high-level direction for processing a leaking munition, following custody transfer. Rejected and overpacked munitions will be processed through the SDCs separately from regular munitions processing.

Table 2: Leaking ~~4.2- inch~~ Munition Processing

Leaker Location	Handling Process (Separate Campaign)
SDC Room	Process per 24852-SOP-B28-W0001~~Overpack and process when allowed under permit conditions~~
H1102, G101, G102, G103	Overpack and transfer to SDC for processing ~~when allowed under permit conditions~~
MAV	Overpack and transfer to SDC for processing ~~when allowed under permit conditions~~

15-7B(3) DECONTAMINATION INFORMATION

The MAV and other items contaminated as the result of a leaker will be decontaminated as determined in the pre-job planning and will follow the process outlined in **Leaker and Reject Management**, **24852-SOP-B00-W0001** and **SDC Site Emergency Actions (Annex 3 Attachment 4)**.

Secondary waste from decontamination activities will include, but not be limited to, contaminated personal protective equipment, demilitarization protective ensemble suits, TAP gear, and items used for cleanups.

Equipment and parts that no longer meet operating requirements may become hazardous waste generated from maintenance activities. The ≥ 0.7 VSL wastes may be decontaminated as an integral part of the waste generation process, and may be treated at PCAPP Main Plant in accordance with the PCAPP Part B Operations RCRA Permit (24852-30L-H01-00057). Alternatively, the waste may be packaged and shipped offsite for treatment and/or disposal. The treated waste will be classified in accordance with the **WAP (Annex 3 Attachment 3)**.

Stationary equipment, structural elements, piping, conduit, and other fixed items that become contaminated with agent will be decontaminated by operators performing entries. Decontamination will be performed following **Equipment and Building Decontamination, 24852-SOP-B00-W0037**.

An agent-containing waste stream could be generated from the munitions transport and storage (B23) system following a leaker event. This represents an off-normal condition and will be addressed in compliance with the WAP and **SDC Site Emergency Actions (Annex 3 Attachment 4)**.

15-7C STATIC DETONATION CHAMBER (B27)

15-7C(1) SYSTEM DESCRIPTION

15-7c(1)(a) General Description

The three SDC units will treat/deflagrate intact, non-leaking, palletized 4.2-inch rounds; overpacked energetics and overpacked 155mm, 105mm and 4.2-inch rounds (i.e., leakers, rejects, or recovered munitions) currently stored at Pueblo Chemical Depot (PCD) or PCAPP that contain mustard agents (HD/HT).

15-7c(1)(b) Process Overview

The waste treatment process follows **SDC and Off-gas Treatment System (OTS), 24852-SOP-B28-W0001** procedure and begins when items for treatment are transferred from storage to the SDC Room. Munitions are placed into a cardboard feed box on a conveyor for the SDC Feeding and Loading System.

The feed boxes are conveyed individually to the munitions lift, which brings them to the top of the SDC system. From the munitions lift, the feed box is pushed into loading chamber 1. The gate for loading chamber 1 is closed, pressure equalization is accomplished, loading gate 2 is opened, and the feed box is then pushed into the cradle in loading chamber 2. Loading gate 2 is closed and loading chamber 2 rotated to drop the container into the hot DC.

Inside the DC, the items detonate and/or deflagrate from the heat of the DC. Gases flow to a buffer (equalization) tank that smooths out pressure pulses caused by detonation within the DC, followed by an orifice plate that also helps to smooth the flow going to downstream components of the system. The entire tank and all piping are maintained at temperature using electric heaters and insulation.

Gases generated are further treated in the OTS. The process steps are detailed in the following subsections.

The remaining solid residue from the treated items (scrap metal from shells, cartridges, fuzes, etc.) remains in the DC and accumulates as additional items are fed. This process continues until the DC is approximately 50 percent full. Before the processed munitions are emptied, the DC is placed into a clean burn time cycle of 30 minutes. The clean burn timer ensures the munitions in the DC have deflagrated or detonated and are exposed to a temperature > 1,000°F for > 30 minutes. At the completion of the clean burn time, the DC is opened and the metal scrap from the munition bodies is discharged into a scrap funnel.

Scrap from the scrap funnel is fed onto a scrap conveyer to cool for safe handling. The scrap passes through a scrap inspection area where operators perform a visual check to verify munitions have been properly treated. The inspected scrap is conveyed to a scrap bin. Once the scrap bin is full, scrap metal bins are transferred to the SDC Waste Laydown Yard.

15-7C(2) COMPLIANCE TABLE

The following information can be found in Section 9.

Table 7 provides process and compliance information for SDC operation.

15-7C(3) DECONTAMINATION INFORMATION

The potential exists to generate agent contaminated waste from within this system. Decontamination will be performed following **Equipment and Building Decontamination, 24852-SOP-B00-W0037**.

15-7D OFF-GAS TREATMENT SYSTEM (OTS) (B28)

15-7D(1) SYSTEM DESCRIPTION

15-7d(1)(a) General Description

Gases are generated from the detonation or deflagration of munitions inside the DC. These gases require treatment through the OTS before they are acceptable for release to the atmosphere. The OTS consists of a thermal oxidizer, spray dryer, bag house filter, quench venturi, acid and neutral scrubbers, condensing heat exchanger, reheater, induced draft fans (IDFs), and safeguard filters (~~Ionex~~ IONEX 4000). The process off-gas is emitted through an elevated stack that meets the requirements of the ACGIH® industrial ventilation manual.

15-7d(1)(b) Process Overview

Gases are generated from the detonation or deflagration of items inside the DC. These gases require further treatment and are treated by the OTS before they are acceptable for release to the environment.

After the buffer tank and orifice plate, the OTS (B28 system) begins. The gas is combusted for at least 2 seconds in the thermal oxidizer, cooled by a spray dryer, and then sent through a dry bag filter and a quench. The thermal oxidizer uses natural gas as a fuel to generate the temperatures needed to ensure treatment. Gas flow and combustion air flow are controllable by an automatic temperature control function and by manual setpoint adjustment. The thermal oxidizer design is based on a retention time of 2 seconds or more at > 1,500°F (actual operating temperature may be slightly greater and final value will be based on Trial Burn data) for the peak load expected from the upstream SDC. An additional flow of secondary air is automatically added to ensure an oxidizing environment. The gases to be treated are fed tangentially via a ring system to ensure complete treatment of the contaminated gases.

In the spray dryer, hot flue gas from the thermal oxidizer is introduced at the top and flows downward to the exhaust pipe. The spray water is injected by a dual fluid spray gun (process water and atomizing air) with a high-pressure pump and plant air. The spray dryer uses spent scrubber liquids for the water feed. The spray dryer exit gas temperature is controlled by modulating the water flow through automatic control. Additives, sodium bicarbonate or sodium bicarbonate with activated carbon, is injected into the gas stream between the spray dryer and the bag house filter. An emergency water tank is installed to maintain a water supply to the spray dryer in event of power failure, loss of instrument air, or process water pump failures; the emergency water tank provides enough water for 8 hours of flow to the spray dryer (only), or 2 hours to the quench. Combined operation would allow flow for approximately 45 minutes if power cannot be restored. Combined operation is mandatory, if both the spray dryer and quench operations are impacted by the event.

gas enters the induction fans.

The final step is a multistage exhaust carbon filtration system (~~Ionex~~ IONEX 4000), which acts as a safeguard backing up the OTS before the off-gas is released to the atmosphere.

15-7d(1)(c) OTS Support Processes

OTS support processes include the OTS wet scrubbing system and moisture removal system, the SDC chilled water system, and the NaOH dosing station.

Wet Scrubbing System and Moisture Removal System

The Wet Scrubbing System and the Moisture Removal System create wastewater in the OTS. In the Wet Scrubbing System, constant removal of pollutants leads to saturation of pollutants in the water. The wastewater from the scrubber mainly contains acids (HCl, H_2SO_4), salts of chlorine and sulfur, and dissolved/undissolved heavy metals. The wastewater from the scrubbers, called bleed, is first treated in the bleed water tank where neutralization of the acids is carried out. The neutralized wastewater is transferred to the process water tank, where it is utilized in the spray dryer for cooling the off-gas. The condensate is used as refill water in the scrubbers. The remaining condensate water is used as refill water in the process water tank. The condensate water quantity is generally lower than the refill quantities required in the scrubbers and process water tank; therefore, the wastewater from the scrubbers and Moisture Removal System is completely utilized within the OTS, making the OTS free of wastewater generation.

SDC Chilled Water System

In the heat exchanger, off-gas comes in contact with cold-water tubes where the water is circulated. The air-cooled chiller ensures removal of the heat from the water and recycles the chilled water back to the heat exchanger at a preferred lower temperature.

NaOH Dosing Station

The scrubbers capture a significant portion of acidic gases. As a result, the scrubber liquid becomes acidic. The scrubber's operation is optimized by regulating the pH through the addition of NaOH to the acid scrubber, neutral scrubber, and bleed water tank using separate dosing pumps. The quantity added by the NaOH dosing station is determined by pH monitoring in the acid scrubber, neutral scrubber, and bleed water tank.

15-7D(2) COMPLIANCE TABLE

The following information can be found in Section 9.

Table 8 provides process and compliance information for operation of the OTS.

15-7D(3) SDC HAZARDOUS WASTE TANK SYSTEMS

The SDC Enclosure Ventilation and Filtration System consists of supply and exhaust filtration systems that serve Category B, C, and D process areas in the SDC Enclosure in a cascade arrangement. Both the process ventilation and the HVAC systems exhaust to the ~~Ionex~~ IONEX 16000 which is also maintained at a negative pressure by the IONEX 16000 exhaust fan. The operating setpoints for the cascade are provided in **Table 11**.

The Supply Air System consists of three air handling units to supply conditioned air to the building. One hundred percent outside air is drawn through an elevated outside air intake duct and passes through a prefilter and is preheated, if required. Each air handling unit has heating and cooling for conditioned supply air to the OTS Room. The air handling units are located outside the enclosure.

The SDC and OTS Rooms are further cooled by split air conditioning units. There are also electric unit heaters: in the SDC Room, in the OTS Vestibule, and in the SDC Vestibules.

The supply air distribution ductwork supplies conditioned air to the OTS Room. Using negative pressurization differential between rooms, air is drawn via transfer ducts from the OTS Room to the SDC Room.

15-7e(1)(b) Major Components

There are three main air supply air handling units. Each air handling unit has the following components:

- Inlet and outlet isolation dampers
- DX cooling coil
- High-efficiency filter
- Supply fan
- Natural gas heat
- Condensing unit

Each split air conditioning unit has the following components:

- Condensing unit
- Air filter
- DX cooling coil
- Supply fan

The major components of the SDC Filtration HVAC Exhaust System are filter units (one per SDC). Each filter unit has the following components:

- Pre-filters: One bank of 90- 95 percent efficiency filters
- HEPA filters: Two banks of 99.97% efficiency filters
- Charcoal adsorbers: Two banks
- Exhaust fan
- Inlet and discharge isolation dampers

15-7e(1)(c) System Operation

During normal operation of the SDC Enclosure Ventilation System, the outside air is brought in by the air handling units to supply conditioned air to the OTS Room. The adjustable speed drives for the air handling units supply fans are controlled by the supply air header air flow control loop.

15-7E(2) COMPLIANCE TABLE

The following information can be found in Section 9.

Table 11 presents process and compliance information for operation of the SDC Enclosure Ventilation System

15-7E(3) DECONTAMINATION INFORMATION

Contamination of this system is not anticipated during normal operations. If contamination occurs, decontamination will be performed following the process outlined in **Equipment and Building Decontamination, 24852-SOP-B00-W0037.**

15-7F SDC OTS FILTRATION SYSTEM (M18)

15-7F(1) SYSTEM DESCRIPTION

15-7f(1)(a) General Description

The SDC OTS Filtration System consists of one filter unit used to remove agent vapor and fine particulates from the off-gas system before the off-gas is discharged to the atmosphere. The ~~Ionex~~ IONEX 4000 contains nine separate filtering banks.

The exhaust duct from the SDC OTS Filtration System is equipped with a flow- measuring device. All gases exiting the OTS are discharged directly into the ~~Ionex~~ IONEX 4000, which acts as a final safeguard filter.

15-7f(1)(b) Major Components

The major components of the SDC OTS Filtration System are filter units (one unit per SDC). Each filter unit has the following components:

- Pre-filters: One bank
- HEPA filters: Two banks
- Granulated Activated Carbon (GAC) Filters: 4 banks
- Sulfur Impregnated Carbon (SIC) Filters: 2 banks
- Exhaust fan
- Inlet and discharge isolation dampers

15-7f(1)(c) System Operation

The SDC OTS Filtration System is designed to ensure the off-gas from the SDC is clean and agent free when it exhausts to atmosphere. The off-gas flows through, one of two ID fans and the ~~Ionex~~ IONEX 4000 to ensure a negative draw through the OTS.

The differential -pressure -indicating transmitters (one at each pre-filter and HEPA filter) are monitored for pressure drops across the filters due to filter loading. Filter pressure drops are monitored both locally and at the operator workstation. The filters need to be replaced when the high differential pressure alarm is activated.

The ~~Ionex~~ IONEX 4000 filter configuration includes 9 banks – one prefilter, one HEPA inlet, four GAC filters, two SIC filters and one HEPA outlet. The prefilter and the HEPA filters will be monitored for particulate loading via pressure drop and will be replaced when it exceeds the operational upper limit. Agent (HD) is monitored between the GAC banks 3 and 4 and will be replaced when agent break through is detected. The second principal organic hazardous constituent (POHC), 1, 2-DCA, will be used to indicate GAC loading of non-agent organics. The GAC beds will be replaced when breakthrough is detected between banks 3 and 4. The SIC banks (5 and 6) are used to control mercury emissions. While the SIC banks have sufficient mercury adsorption capacity to meet the expected number of munitions to be processed, the SIC bank performance will be monitored using the mercury CEMS and if break through is detected the banks will be replaced. Alternatively, periodic monitoring may be performed between banks 5 and 6; if break through is detected bank 5 will be replaced.

During the Trial Burn Period, volatile organic compounds (VOCs) will be monitored after the HEPA filter and between GAC banks 3 and 4. Analysis of the data will be used to determine the need for a carbon changeout strategy for secondary POHCs and VOCs.

15-7F(2) COMPLIANCE TABLE

The following information can be found in Section 9.

15-7h(1)(b) Major Components

NRTM System (MINICAMS®)

Each NRTM cycle is composed of a sample period and an analysis period. Each cycle (sampling and analysis) takes approximately 15 minutes (minimum requirement). This process is conducted continuously. NRTM provides the detection and alarm of chemical agent release above setpoints determined to be protective of human health. Workers conducting operations in areas with mustard agent must have continuous, low-level NRTM, with the alarm level set at a chemical agent concentration equal to or less than the level determined appropriate for the level of personal protective equipment being used.

Primary NRTM functions are:

- Alert, through audio and visual alarms, of the detection of chemical agent above the alarm setpoint
- Alert Control Room personnel of the release of chemical agent
- Support the documentation of chemical agent releases
- Provide support documentation of agent screening of secondary waste

The Agent Monitoring System design utilizes MINICAMS® units to provide monitoring throughout the SDC complex. The MINICAMS® may consist of a gas chromatograph, pre-concentrator tube, low-volume sampler, stream selector, selective sampler, halogen specific detector, process control and data processing computer interface, HSTLs, Dilution Air Flow Controllers (DAFC), and sample pump.

MINICAMS® are located in cabinets designed to protect the monitors and supporting equipment. They are positioned at locations around the complex with attached HSTLs used to collect vapor samples in designated monitoring locations.

The MINICAMS® provides monitoring 24 hours a day, 7 days a week at the VSL (0.003 mg/m³) for monitoring locations inside the SDC Enclosure, in the ~~Ionex~~ IONEX 16000, ~~Ionex~~ IONEX 4000 stack, and at Igloo H1102. Igloos G101, G102, and G103 will be monitoring on an as required basis using a real-time analytical platform via mobile monitoring procedures.

The ~~Ionex~~ IONEX 16000 and OTS ~~Ionex~~ IONEX 4000 stacks alarm at 0.7 VSL (high-high alarm) and 0.2 VSL (high) to monitor for agent breakthrough.

Table 4: H1102 Service Magazine NEW (Maximum)

Facility	Description	Hazard Division 1.1	Hazard Division 1.2.1	Hazard Division 1.2.2	Hazard Division 1.3	Hazard Division 1.4
H1102	Service Magazine	1,000 lb	0 lb	34,356 lb	68,989 lb	Mission Essential Quantities (MEQs)[a]
TYPICAL OPERATING CONFIGURATIONS FOR H1102[b]						
i) 100 OPPs of 155mm projectiles = 100 pallets = 800 155mm projectiles w/M6 burster = 331.2 lb NEW = Hazard Division 1.2.2 One pallet = 8 each 155mm projectiles One M6 burster = 0.414 lb NEW						
ii) 100 OPPs of 105mm projectiles w/fuze = 100 pallets = 2,400 105mm projectiles w/M5 burster and M51A5 or M57 fuze = 739.2 lb NEW – Hazard Division 1.2.2 One pallet = 24 each 105mm projectiles One M5 burster and one M51A5 or M57 fuze = 0.308 lb NEW						
iii) 100 OPPs of 105mm projectiles w/o fuze = 100 pallets = 2,400 105mm projectiles w/M5 burster = 616.8 lb NEW – Hazard Division 1.2.2 One pallet = 24 each 105mm projectiles, One M5 burster = 0.257 lb NEW						
iv) 100 OPPs of 4.2-inch mortars = 100 pallets = 2,400 4.2-inch mortars w/M14 burster and M8 fuze = 345.6 lb NEW – Hazard Division 1.2.2 One pallet = 24 each 4.2-inch mortars One M14 burster and one M8 fuze = 0.144 lb NEW v) 64 SRC crates of maximum NEW= 384 SRC in multiple explosive configurations = 986.888 lb NEW- Hazard Division 1.1 One maximum NEW SRC = 10 M5 bursters One M5 burster = 0.257 lb NEW One maximum NEW SRC= 2.57 lb NEW vi) 100 OPPS of 4.2-inch mortars Plus 18 maximum NEW SRC crate = 100 pallets +18 SRC crate = 2,376 4.2-inch mortars w/M14 burster and M8 fuze + 108 SRCs w/ 10 M5 bursters = 345.6 lb NEW (1.2.2) + 277.56 lb NEW (1.1) =623.16 lb NEW – Hazard Division 1.1						

NOTES

a. MEQs for HD 1.4 (as needed) shall be limited to 1,000 lb by PCAPP in operations.

b. The combinations of energetics in this table are based on typical routine operations and do not include all possible combinations. In the event that a combination of energetics is introduced that is not in this table, a review will be conducted and limits established for maximum number of containers that can be stored in H1102 based on maintaining the NEW below allowable maximums and any required physical configuration limitations.

c. The combination of 1.2.2 hazard classified material with 1.1 hazard classified material will always result in a 1.1 hazard classification as per DESR 6055.9 and DAPAM 385-64 “when HD 1.1 is mixed with any other HD, treat the mixture as HD 1.1”

d. 1.3 Material will be processed individually of any other hazard classification.

Table 6: SDC Enclosures 1, 2, and 3 Process Area NEWs (Maximum)

Facility	Description	Hazard Division 1.1	Hazard Division 1.2.1	Hazard Division 1.2.2	Hazard Division 1.3	Hazard Division 1.4
SDC Enclosures 1, 2, and 3	Three SDC 1200C Units	0 lb	0 lb	150 lb[a]	0 lb	0 lb
TYPICAL OPERATING CONFIGURATIONS FOR EACH SDC ENCLOSURE[b,c]						
i) 3 OPPs of 4.2-inch mortars = 3 pallets = 120 4.2-inch mortars w/M14 burster and M8 fuze = 10.4 lb NEW – HD 1.2.2 One pallet = 24 each 4.2-inch mortars One M14 burster and one M8 fuze = 0.144 lb NEW						
ii) 2 SRC Crates of maximum NEW = 2 crates = 12 SRC of maximum NEW w/ 10 M5 bursters = 30.84 lb NEW – HD 1.1 One SRC crate = 6 SRC of maximum NEW = 15.42 lb NEW One SRC of maximum NEW = 2.57 lb NEW						

NOTES

a. All three SDC Enclosures (the PCAPP SDC Complex) are sited as one Potential Explosion Site, so the maximum quantity is represented as being present in any one or combination of the three enclosures.

b. The combinations of energetics in this table are based on typical routine operations and do not include all possible combinations. In the event that a combination of energetics is introduced that is not in this table, a review will be conducted and limits established for maximum number of containers that can be stored in each SDC Enclosure based on maintaining the NEW below allowable maximums and any required physical configuration limitations.

c. Typical configurations do not include boxes that may be in process within the SDC (loading chamber 1, loading chamber 2, or detonation chamber).

d. Table 8-2 from DAPAM 385-64 will be followed, for explosive material compatibility of hazard classification

e. 1.3 Material will be processed individually of any other hazard classification

Restricted Information

NOTES

a. PLC Tag is not unit specific. The code is standard for all 3 units; unit number will be identified on reports.

b. Compliance Requirement values in this table are based on design information. Information gathered during Site Acceptance Testing (SAT) and Trial Burns will be the basis for a Permit Modification to finalize operating limits and alarm levels.

c. Restricted Information

Table 11: SDC Enclosure Ventilation System (M17 and M08) Compliance Table

Equipment Number and Description	Operating Parameter	Instrument Tag Number	PLC Tag	Compliance Requirement[a, b,c]	Response Level
MA-M08-1001A/B/C MK-M08-2001A/B/C MA-M08-3001A/B/C Air handling Unit (AHU)	Differential pressure between OTS Room and atmosphere	M08-PDIT-1013-04 M08-PDIT-2013-04 M08-PDIT-3013-04	PDIT1013 PDIT2013 PDIT3013	-0.35 to -0.1 in wc	1
MK-M17-1001/-2001/-3001 SDC HVAC Exhaust Air Filter Unit	Differential pressure between SDC Room and atmosphere	M17-PDIT-1000--- M17-PDIT-2000--- M17-PDIT-3000---	PDIT1000 PDIT2000 PDIT3000	-0.50 to -0.40 in wc	2
MK-M17-1001/-2001/-3001 SDC HVAC Exhaust Air Filter Unit	Differential pressure between inlet to ~~Ionex~~ IONEX 16000 and atmosphere	M17-PDIT-1007--- M17-PDIT-2007--- M17-PDIT-3007---	PDIT1007A PDIT2007A PDIT3007A	> -3.8 in wc	2
MK-M17-1001/-2001/-3001 SDC HVAC Exhaust Air Filter Unit	~~Ionex~~ IONEX 16000 Inlet Temperature	M17-TIT-1005A-- M17-TIT-2005A-- M17-TIT-3005A--	TIT1005A TIT2005A TIT3005A	< 158 °F	1
MK-M17-1001/-2001/-3001 SDC HVAC Exhaust Air Filter Unit	~~Ionex~~ IONEX 16000 Overall Differential Pressure	M17-PDIT-1010A M17-PDIT-2010A M17-PDIT-3010A	PDIT1010A PDIT2010A PDIT3010A	< 12.35 in wc	1

NOTES:

a. Compliance Requirement values in this table are based on design information. Information gathered during Site Acceptance Testing, Pre-Trial Burn Phase, and Trial Burn will be basis for finalizing operating limits and alarm levels through a Permit Modification.

b. Need for delay will be determined in the Trial Burn and documented in the form of a permit modification, as wind or other factors may trigger threshold

c. The operating pressures cited are for the condition that the doors are closed. The pressures may temporarily vary from the listed value during transient events such as doors being opened.

Limitations on transient events will be determined during Trial Burn and documented in the form of a permit modification.

Table 12: SDC OTS Filtration Exhaust System (M18) Compliance Table

Equipment Number and Description	Operating Parameter	Instrument Tag Number	PLC Tag[a]	Compliance Requirement[b]	Response Level
MK-M18-1001/-2001/-3001 SDC OTS Air Filter Unit	Exhaust duct pressure relative to atmosphere	M18-PDIT-1007A-- M18-PDIT-2007A-- M18-PDIT-3007A--	PDIT1007A-- PDIT2007A-- PDIT3007A--	< 0.00 in wc	2
MK-M18-1001/-2001/-3001 SDC OTS Air Filter Unit	~~Ionex~~ IONEX 4000 Inlet Temperature	M18-TIT-1005A-- M18-TIT-2005A-- M18-TIT-3005A--	TIT1005A TIT2005A TIT3005A	< 152 °F	3
MK-M18-1001/-2001/-3001 SDC OTS Air Filter Unit	~~Ionex~~ IONEX 4000 outlet Temperature	M18-TI-1017A-- M18-TI-2017A-- M18-TI-3017A--	TIT1017A TIT2017A TIT3017A	< 152 °F	3

NOTES:

a. PLC Tag is not unit specific. The code is standard for all 3 units; unit number will be identified on reports.
b. Compliance Requirement values in this table are based on design information. Information gathered during Site Acceptance Testing, Pre-Trial Burn Phase, and Trial Burn will be basis for finalizing operating limits and alarm levels through a permit modification.

Table 13: Agent Monitoring System (J12) Compliance Table

Item	HSTL Sampling Location or Equipment Number and Description	Operating Parameter	Instrument Tag Number	PLC Tag	Compliance Requirement[a]	Frequency of Monitoring	Response Level
1	MK-M17-1001/-2001/-3001 SDC-OTS HVAC Exhaust Air Filter Unit – ~~Ionex~~ IONEX 16000 Midbed	Agent Concentration – High-High	J12-ASHH- 1007 J12-ASHH- 2007 J12-ASHH- 3007	AIT1007 AIT2007 AIT3007	1.0 VSL 0.003 mg/m^3	Continuous	3
2	MK-M17-1001/-2001/-3001 SDC-OTS HVAC Exhaust Air Filter Unit – ~~Ionex~~ IONEX 16000 Stack	Agent Concentration – High-High Emissions	J12-ASHH- 1008 J12-ASHH- 2008 J12-ASHH- 3008	AIT1008 AIT2008 AIT3008	1.0 VSL 0.003 mg/m^3	Continuous	3
3	MK-M18-1001/-2001/-3001 SDC OTS Exhaust Air Filter Unit - Stack A	Agent Concentration – High-High Emissions	J12-ASHH- 1009 J12-ASHH- 2009 J12-ASHH- 3009	AIT1009 AIT2009 AIT3009	1.0 VSL 0.003 mg/m^3	Continuous	3
4	MK-M18-1001/-2001/-3001 SDC OTS Exhaust Air Filter Unit – Stack A	Agent Concentration - High Emissions	J12-AIT-1009 J12-AIT-2009 J12-AIT-3009	AIT1009 AIT2009 AIT3009	<0.2 VSL	Continuous	3
5	MK-M18-1001/-2001/-3001 SDC OTS Exhaust Air Filter Unit - Stack B	Agent Concentration – High-High Emissions	J12-ASHH- 1010 J12-ASHH- 2010 J12-ASHH- 3010	AIT1010 AIT2010 AIT3010	1.0 VSL 0.003 mg/m^3	Continuous	3
6	MK-M18-1001/-2001/-3001 SDC OTS Exhaust Air Filter Unit – Stack B	Agent Concentration High Emissions	J12-AIT-1010 J12-AIT-2010 J12-AIT-3010	AIT1010 AIT2010 AIT3010	<0.2 VSL	Continuous	3

7	MA-M17-1001/-2001/-3001 SDC OTS HVAC Exhaust Air Filter Unit – ~~Ionex~~ IONEX 16000 Stack B	Agent Concentration - High- High Emissions	J12-AIT-1008 J12-AIT-2008 J12-AIT-3008	AIT1008 AIT2008 AIT3008	<0.2 VSL	Continuous	3
8	Scrap Monitoring	Agent Concentration - High	J12-AIT- 1012B J12-AIT- 2012B J12-AIT- 3012B	AIT1012B AIT2012B AIT3012B	<0.2 VSL	Continuous	3
9	Scrap Monitoring	Agent Concentration – High-High	J12-ASHH- 1012B J12-ASHH- 2012B J12-ASHH- 3012B	AIT1012B AIT2012B AIT3012B	1.0 VSL 0.003 mg/m^3	Continuous	3

NOTES:

a. The compliance requirement is defined as equivalent to the Short-Term Exposure Limit (STEL) concentration for HD. Agent monitoring systems are programmed to alarm/take action at values below this compliance threshold as defined in the Site-Specific Monitoring Plan Annex 3 Attachment 10

Table 14: CEMS (J13) Compliance Table

Equipment Number and Description	Operating Parameter	Instrument Tag Number		PLC Tag	Compliance Requirement[a]	Frequency of Monitoring	Response Level
MK-M18-1001/-2001/-3001 SDC OTS Exhaust Air Filter Unit - Stack	CO[b]	J13-AIT- 1001A-A J13-AIT -1001B-A J13-AIT -2001A-A J13-AIT -2001B-A J13-AIT -3001A-A J13-AIT -3001B-A	J13-AIT-1001A-B J13-AIT -1001B-B J13-AIT -2001A-B J13-AIT -2001B-B J13-AIT -3001A-B J13-AIT -3001B-B	J13-AI 1001--A J13-AI 2001--A J13-AI 3001--A	< 100 ppm	ROHA	3
MK-M18-1001/-2001/-3001 SDC OTS Exhaust Air Filter Unit - Stack	Total Hydrocarbons	J13-AIT 1003A-A J13-AIT -1003B-A J13-AIT -2003A-A J13-AIT -2003B-A J13-AIT -3003A-A J13-AIT -3003B-A	J13-AIT -1003A-B J13-AIT -1003B-B J13-AIT -2003A-B J13-AIT -2003B-B J13-AIT -3003A-B J13-AIT -3003B-B	J13-AI 1003--A J13-AI 2003--A J13-AI 3003--A	< 10 ppmv	ROHA	3
MK-M18-1001/-2001/-3001 SDC HVAC Exhaust Air Filter Unit - Stack	Particulate	J13-AIT -1004A-- J13-AIT -2004A-- J13-AIT -3004A--	J13-AIT-1004B-- J13-AIT -2004B-- J13-AIT -3004B--	J13-AI 1004--- J13-AI 2004--- J13-AI 3004---	<13,000 counts, (Equivalent to < 23 mg/dscm)	Continuous	2

NOTES:

a. Compliance Requirement values in this table are based on design ~~information~~performance. Information gathered during Site Acceptance Testing, Pre-Trial Burn Phase, and Trial Burn will be the basis for finalizing operating limits and alarm levels through a permit modification.

b. The CO ROHA value will be evaluated during Trial Burn, Phase II Continued operations during exceedances of the CO rolling hourly average (ROHA) limit may occur during Trial Burn Phase II stack sample (using PTM methods) collection, in accordance with the Agent (Phase 2) Trial Burn Plan in (Annex 3 Attachment 13B).

Table 15: Transport Compliance Table

Equipment Number and Description	Munition Type	OPP Qty	Munitions per OPP	Agent Monitoring
Modified Ammunition Vehicle (MAV)	4.2- inch mortar ~~105mm projectile~~ Overpacked munitions	6	24 – 4.2 inch ~~24 – 105mm~~ 1 - Overpack	< 0.2 VSL monitored MAV prior to transfer
SDC Flatbed Truck	4.2- inch mortar ~~105mm projectile~~ Overpacked munitions	3	24 – 4.2 inch ~~24 – 105mm~~ 1 - Overpack	< 0.2 VSL monitored in SDC Room

Table 16: Automatic Waste Feed Cutoff (AWFCO) Limits

Item No.	Instrument Tag	Process Data Description	Parameter	Criteria	Units
SDC-AWFCO-01	B27-PI-112007, B27-PI-212007, B27-PI-312007	Detonation chamber	Pressure	≥ 218 [a]	psi
SDC-AWFCO-02	B27-TIC-112021, B27-TIC-212021, B27-TIC-312021, B27-TIC-112054, 212054, 312054	Detonation chamber	Temperature	< 1,000	°F
SDC-AWFCO-03	B28-PIC-1310, B28-PIC-2310, B28-PIC-3310	Thermal oxidizer[c]	Pressure	> 0 [a]	psi
SDC-AWFCO-04	B28-TIC-1310, B28-TIC-2310, B28-TIC-3310	Thermal oxidizer[c]	Temperature	< 1,500	°F
SDC-AWFCO-05	B28-TIC-1320AVG, B28-TIC-2320AVG, B28-TIC-3320AVG	Spray dryer[c]	Temperature	> 392	°F
SDC-AWFCO-06	B28-PDS-133001, B28-PDS-233001, B28-PDS-333001	Bag house	Differential pressure	> 0.30 [a]	psi
SDC-AWFCO-07	B28-TI-134003, B28-TI-234003, B28-TI-334003, B28-TI-134004, B28-TI-234004, B28-TI-334004	Quench	Temperature	> 190	°F
SDC-AWFCO-08	B28-FI-134232, B28-FI-234232, B28-FI-334232	Acid scrubber	Flow rate	< 20	gpm
SDC-AWFCO-09	J12-AIT-1008, J12-AIT-2008, J12-AIT-3008	~~Ionex~~ IONEX 16000 stack	Agent emissions	> 0.2	VSL
SDC-AWFCO-10	B28-TI-137001, B28-TI-237001, B28-TI-337001	Moisture separator	Temperature	> 119	°F
SDC-AWFCO-11	M18-TI-1017A, M18-TI-2017A, M18-TI-3017A	~~Ionex~~ IONEX 4000 outlet	Temperature	> 152	°F
SDC-AWFCO-12	J12-AIT-1009, J12-AIT-2009, J12-AIT-3009, J12-AIT-1010, J12-AIT-2010, J12-AIT-3010	OTS stack	Agent emissions	> 0.2	VSL (continuous)
SDC-AWFCO-13	J13-AI-1001A/B, J13-AI-2001A/B, J13-AI-3001A/B	OTS stack	CO concentration	> 100[d]	ppm (ROHA) [b]
SDC-AWFCO-14	J13-AI-1003A/B, J13-AI-2003A/B, J13-AI-3003A/B	OTS stack	THC concentration	> 10	ppm (ROHA) [b]

NOTES:

a. Delay timer tuning will be established during shakedown (Phase 1 and 2 Trial Burn testing described in **Annex 3 Attachments 13A and 13B.**
b. Corrected to 7 percent O2, dry gas basis, and ROHA computed from these instruments
c. Averaged values based on control system logic as shown on P&IDs
d. The CO ROHA value will be evaluated during Trial Burn, Phase II. Continued operations during exceedances of the CO rolling hourly average (ROHA) limit may occur during Trial Burn Phase II stack sample (using PTM methods) collection, in accordance with the Agent (Phase 2) Trial Burn Plan (Annex 3, Attachment 13B).

15-10 REFERENCES

- 6 CCR 1007-3 §264.193
- Equipment and Building Decontamination (24852-SOP-B00-W0037)
- Exclusion Area Waste Management (24852-SOP-B00-W0039)
- Federal Register, Volume 68, No. 140, Agents H, HD, and HT
- Leaker and Reject Management (24852-SOP-B00-W0001)
- Munitions Transport and Storage Operations (24852-SOP-B23-W0001)
- P&ID (24852-V11-M000-0011s01)
- P&ID (24852-V11-M000-0014s01)
- P&ID (24852-V11-M000-0016s01)
- P&ID (24852-V11-M000-0017s01)
- P&ID (24852-V11-M000-0134s01)
- P&ID (24852-V11-M000-0448s01)
- Pueblo Chemical Agent Destruction Pilot Plant (PCAPP) Part B Operations RCRA Permit (24852-30L-H01-00057)
- Pueblo Chemical Depot Hazardous Waste Permit, Permit No CO-13-12-23-01 Class 3 permit modification attachments (~~Submitted 1/31/2020~~Approved 10/7/2021)
    - Procedures to Prevent Hazards (Annex 3 Attachment 2)
    - SDC Waste Analysis Plan (WAP) (Annex 3 Attachment 3)
    - Site Emergency Actions (Annex 3 Attachment 4)
    - SDC Training Plan (Annex 3 Attachment 5)
    - SDC Munitions and Container Storage (Annex 3 Attachment 7)
    - SDC Process Descriptions (Annex 3 Attachment 8)
    - Site Specific Monitoring Plan (Annex 3 Attachment 10)

SDC Trial Burn Plan (Annex 3 Attachment 13A and 13B)

- Part VII: Incinerators to Permit CO-13-12-23-01

- Resource Conservation and Recovery Act (RCRA) Tank Assessment Report for Static Detonation Chamber (SDC) (24852-RD-30H-000-V0004)
- SDC and Off-Gas Treatment System (OTS) (24852-SOP-B28-W0001)
- SDC Limiting Conditions of Operations Plan (24852-OPS-OAP-W0061)
- SDC Munitions Transfers and Storage (24852-SOP-SDC-W0005)
- Static Detonation Chamber (SDC) Plot Plan (24852-RD-P1-000-P0002)
- Waste Management Procedure (24852-SOP-B00-W0038)

Enclosure 5

Permit Change Page(s): Annex 3 Attachment 7,

SDC Munitions and Container Storage

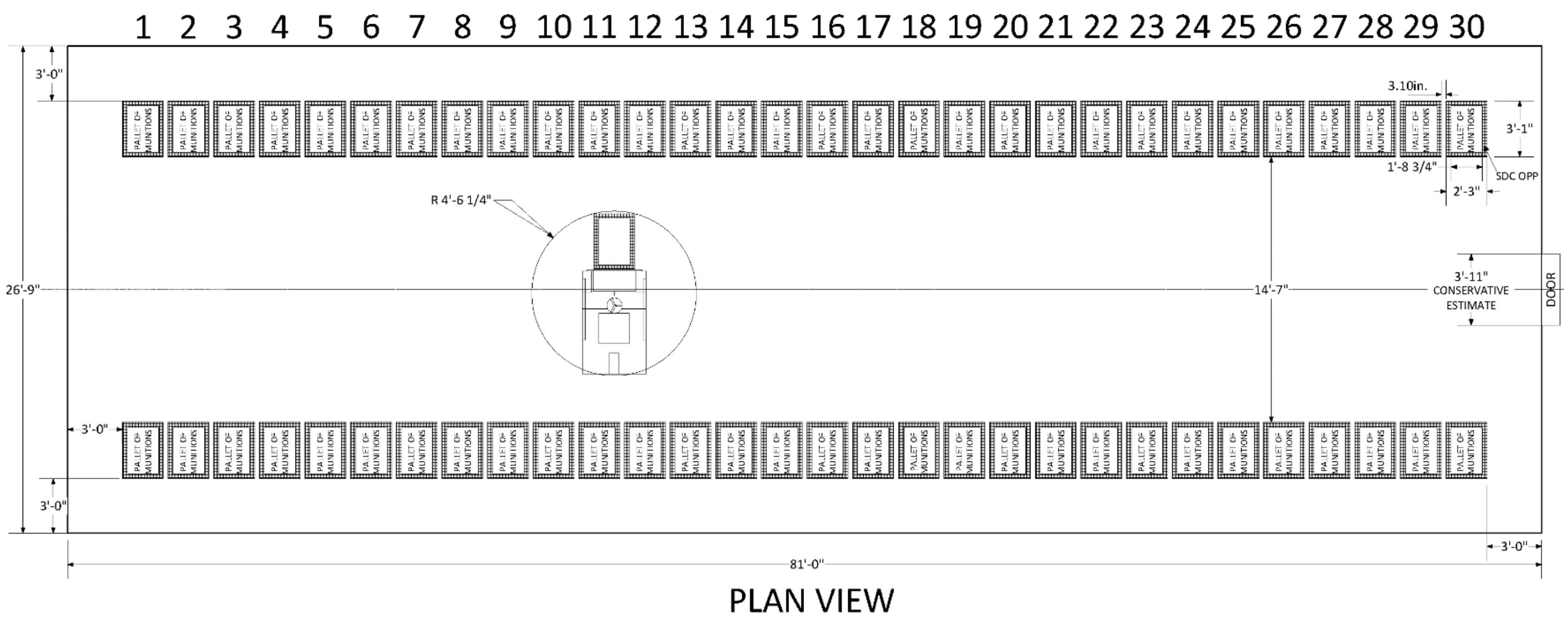

Figure 7-3. Example Interior Storage Arrangement for Igloos G101, G102, and G103

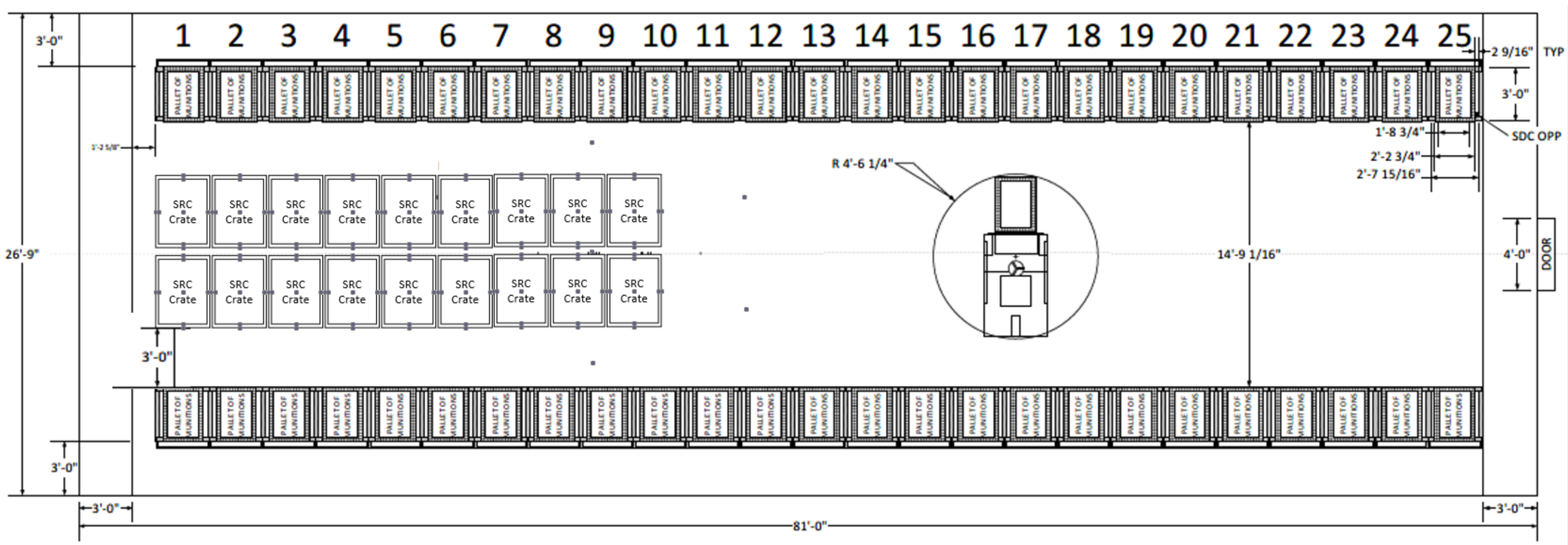

Figure 7-5. Example Interior Storage Arrangement for Igloo H1102

Note: All measurements are approximate.

Subject	Igloos G101, G102, and G103	Igloo H1102	SDC Waste Laydown Yard	Hazardous Waste Storage Area - SDC Room (3)
Waste Description	Stores intact, non-leaking, palletized rounds; overpacked rounds (leakers, rejects, and recovered munitions); and agent-contaminated energetics (ignition cartridges, propellant, bursters) prior to treatment in SDC units: • HD-filled 155mm projectiles • HD-filled PCAPP and PCD baseline reconfigured (palletized) 105mm projectiles • HD- and HT-filled PCAPP baseline reconfigured (palletized) 4.2-inch mortars	Stores intact, non-leaking, palletized rounds; overpacked rounds (leakers, rejects, and recovered munitions); and agent-contaminated energetics (ignition cartridges, propellant, bursters) prior to treatment in the SDC units: • HD-filled 155mm projectiles • HD-filled PCAPP and PCD baseline reconfigured (palletized) 105mm projectiles • HD- and HT-filled PCAPP baseline reconfigured (palletized) 4.2-inch mortars • Overpacked HD 155mm, HD 105mm, HD and HT 4.2-inch mortars, ignition cartridges, propellant, bursters in crates.	Will store the following wastes: • Scrap metal parts and fragments • Used decontamination solutions • Miscellaneous non-hazardous solid wastes • Wooden pallets and dunnage • Maintenance wastes • SDC liquid wastes (from maintenance activities or from spills/leaks) • Spent carbon, pre-, and HEPA filters • Cyclone separator dust, ash, and particulates • Salts, metals, and particulates from the spray dryer • Buffer tank dust, ash, and particulates • OTS process water and OTS bleed tank water • OTS condensate tank water • OTS bleed water tank sludge • OTS bag house filter residues (salts, metals, and particulates) • OTS brines and scrubber solutions • SDC water (reserve flush) tank water (<200 ppb mustard agent)	Will store the following wastes: • Agent-contaminated and potentially agent-contaminated liquid and solid phase hazardous wastes • Spent decontamination solutions, • Contaminated condensate, • Bleed water tank water and sludge, • Process water, and • Neutral or acid scrubber water • Water (Reserve Flush) Tank-generated liquids

Subject	Igloos G101, G102, and G103	Igloo H1102	SDC Waste Laydown Yard	Hazardous Waste Storage Area - SDC Room (3)
Maximum Storage Capacity	Each igloo has a storage capacity of 1,440 munitions in a single-stack arrangement, equivalent to 1,584 gallons.	Storage capacity of 2,400 munitions in a double-stack (rack) arrangement, equivalent to 2,640 gallons plus 108 overpacks in a single-stack arrangement, equivalent to 1,215 gallons for the largest overpack.	388 cubic yards, consisting of the following: • 9x40-cubic-yard roll-offs and 100x55-gallon drums • Or less than 9x40-cubic-yard roll-offs and other DOT containers (e.g., bulk bags or drums, elevated or on pallets) that together do not exceed 388 cubic yards • Or any combination of DOT-approved and weather-resistant containers that does not exceed the identified cubic yard capacity and remains at or below the maximum capacity of 388 cubic yards	Storage capacity not to exceed 818 gallons consisting of fourteen (14) DOT-approved ≤55-gallon drums and eight (8) DOT-approved ≤6-gallon containers, or seven (7) 95 gallon overpacks and eight (8) DOT-approved ≤6-gallon containers. Containers used for liquid hazardous waste will be UN Rated for liquid and made of polyethylene.

Subject	Igloos G101, G102, and G103	Igloo H1102	SDC Waste Laydown Yard	Hazardous Waste Storage Area - SDC Room (3)
Storage Configuration and Aisle Space	• Single stacked • Up to two rows of 15 secondary containment device, two munition pallets or two OPPs per secondary containment device; up to 48 rounds per secondary containment device • Stored atop secondary containment pallets • Two rows of 30 OPPs, one munition pallet per OPP, up to 24 rounds per OPP • Munition crates may be used • Intact, non-leaking, palletized rounds do not require overpack containers but must be stored inside enclosed OPPs • Minimum horizontal distance of 3 feet between waste containers and igloo structural walls	• Rack storage (double stack) for OPPs only. • Two rows of 25 OPPs, double-stacked, 50 per side total, up to 24 rounds per OPP • Two rows of 9 overpack crates, 18 total, all within a secondary containment device up to 6 overpacks per crate. • Intact, non-leaking, palletized rounds do not require overpack containers but must be stored inside enclosed OPPs • Minimum horizontal distance of 3 feet between OPPs and igloo structural walls on bottom rack • SRC crates will be stored single stacked with spill containment on the floor in the back center of the igloo between the palletized storage racks. There will be two rows with up to 9 crates per row for a maximum of 108 SRCs/PCCs. A minimum horizontal distance of 3 feet between the crates and the storage racks and the back wall. See Figure 7-5.	• Single stacked • Aisles between rows of containers (e.g., roll-offs, palletized drums, bulk bags) will be a minimum of 28 inches wide. • Aisles between containers or rows of containers and stationary equipment will be a minimum of 28 inches wide. Acceptable container types include up to 90-gallon drums, weather-resistant boxes (e.g., 5x5x4.7-foot metal boxes), cubic yard bulk bags, cubic yard containers, up to 40-cubic-yard roll offs, and other DOT-approved and weather-resistant containers.	See Figure 7-15 for a typical storage configuration and aisle space

Subject	Igloos G101, G102, and G103	Igloo H1102	SDC Waste Laydown Yard	Hazardous Waste Storage Area - SDC Room (3)
Containment	• Wastes are placed on top of secondary containment pallets/pans • Concrete floor is maintained free of cracks and gaps greater than 1/2-inch wide.	• Wastes are placed on top of OPPs or device that provide secondary containment. • Concrete floor is maintained free of cracks and gaps greater than 1/2-inch wide.	• Concrete pad is sloped in the direction of the grading to drain liquid that may accumulate on the concrete pad (see drawing 24852-RD-DB-SDC-S0009). • Waste containers are elevated and otherwise protected from contact with accumulated liquid. • Waste containers holding free liquids are placed on secondary containment sized to contain the volume of the largest container or 10 percent of the total volume—whichever is greater—plus accumulated precipitation per 6 CCR 1007-3 § 264.175(b)(3). All liquids will be removed from the secondary containment within 24 hours of detection or precipitation event (as applicable). Liquids will be characterized by process knowledge (including visual observation, inspection findings, and/or sampling and analysis). • Solid wastes are placed on wood or containment pallets or other elevating devices. Roll-off containers have elevated footings.	Primary containment of the hazardous waste storage area is provided by the DOT-approved containers in which the waste is stored. Secondary containment is comprised of concrete floors and curbs with a chemical-resistant impervious coating system. A third layer of protection is provided by using secondary containment pallets for agent-contaminated liquid waste. Water (Reserve Flush) Tank-generated liquids ≥200 ppb HD will have a DOT-approved 55-gallon drum placed inside a DOT-approved overpack (85-95 gallons) as secondary containment, and a spill pallet (See **Figure 7-13**) as tertiary containment. A fourth level of containment is comprised of concrete floors and curbs with a chemical-resistant impervious coating system.

Notes:

DOT	Department of Transportation
HD	distilled sulfur mustard
HEPA	high efficiency particulate air
HT	mustard-T mixture
OPP	overpack pallet

Table 7-2. NEW Limits for Storage Igloos G101, G102, G103, and H1102

Location	Net Explosive Weight (NEW) [a] Limits				
	1.1	1.2.1	1.2.2	1.3	1.4
H1102	1,000	0	34,356	68,989	Capacity
G101	0	0	3,000	0	0
G102	0	0	3,000	0	0
G103	0	0	3,000	0	0

Notes:

a NEW = The actual weight (in pounds) of explosive mixtures or compounds, including the trinitrotoluene (TNT) equivalent of energetic material that is used in determining explosive limits.

Reference: PCD Explosives Storage License, 10 October 2017

Table 7-3. Overpack/Container Types

Munition/Item	Overpack/Container
155mm Projectiles	9" x 41" SRC 12" x 56" SRC Propelling Charge Can PA92
105mm Projectiles	Retrofit M55 SRC, 5.4" x 36" SRC 7" x 27" SRC Propelling Charge Can PA92 12"x56"
4.2-inch Mortars	7" x 27" SRC Retrofit M55 SRC 5.4" x 36" SRC Propelling Charge Can PA92
Miscellaneous Items (for example, propellant, ignition cartridges, etc.)	M2A1 Ammunition Box 30-gallon drum 55-gallon drum Propelling Charge Can, PA92 5.4" x 36" SRC 7" x 27" SRC 9" x 41" SRC
Recovered Munitions and Components	9" x 41" SRC P/N ACV00655 7" x 27" SRC P/N S727001 5.4" x 36" Retrofit M55 SRC 7" x 27" SMRC 9" x 41" SMRC 12" x 56" SMRC Propelling Charge Can – PA92

Enclosure 6

Permit Change Page(s): Annex 3 Attachment 2 Appendix 2-5,

SDC Hazard Preparedness and Prevention Plan

ANNEX 3

ATTACHMENT 2

APPENDIX 2-5

SDC HAZARD PREPAREDNESS AND PREVENTION PLAN

Building Name	Room Number	Operating Parameter	Normal Operating Range	Method of Inspection	Frequency of Inspection
SDC enclosure	SDC room staging area near feed conveyor	Maximum amount of hazardous waste	Up to 120 4.2-inch munitions in a single-stack arrangement pending processing within 48 hrs. at any point in time, including overpacks	Visual inspection for amount of waste	Weekly
		NEW	<u>Maximum NEWs</u> Hazard Division 1.1: ~~0~~ <u>150</u> lb Hazard Division 1.2.1: 0 lb Hazard Division 1.2.2: 150 lb Hazard Division 1.3: ~~0~~ <u>150</u> lb Hazard Division 1.4: 0 lb	Visual inspection for number of projectiles	Daily
	Hazardous waste storage area	Maximum amount of hazardous waste	Up to a combined total of 818 gallons of agent contaminated liquid hazardous waste and other hazardous waste in containers	Visual inspection for amount of waste	Weekly, when in use
SDC Waste laydown yard	NA	Maximum amount of hazardous waste	388 cubic yards, consisting of the following: • 9x40-cubic-yard roll-offs and 100x55-gallon drums • Or < 9x40-cubic-yard roll-offs and other DOT containers (e.g., bulk bags or drums, elevated or on pallets) that together do not exceed 388 cubic yards • Or any combination of DOT-approved and weather-resistant containers that do not exceed the maximum capacity of 388 cubic yards (per Annex 3 Attachment 7 of the PCD Permit)	Visual inspection for amount of waste	Weekly
		Storage capacities and requirements	• Single stacked • Aisles between rows of containers (e.g., roll-offs, palletized drums, bulk bags) will be a minimum of 28 inches wide. • Aisles between containers or rows of containers and stationary equipment will be a minimum of 28 inches wide. Acceptable container types include up to 185-gallon drums, weather-resistant boxes (e.g., 4x8x4 metal boxes), cubic yard bulk bags, cubic yard containers, up to 40-cubic-yard roll offs, and other DOT-approved and weather-resistant containers (per Annex 3 Attachment 7 of the PCD Permit)	Visual inspection	Weekly

Enclosure 7

Permit Change Page(s): Annex 3 Attachment 2,

SDC Procedures to Prevent Hazards

Controlled Unclassified Information (CUI)

This enclosure (Enclosure 7) has been omitted because it contains information that is marked as Controlled Unclassified Information (CUI). This document is transmitted under a separate letter (Chron23-00729); which has been uploaded to the CDPHE SharePoint Site due to its CUI designation (CUI).

Enclosure 8

SOP: *SDC and Off-Gas Treatment System (OTS),*

24852-SOP-B28-W0001, Rev. 011

Export Controlled Information (ECI) / Controlled Unclassified Information (CUI)

This enclosure (Enclosure 8) has been omitted because it contains information that is marked as Export Controlled Information (ECI) / Controlled Unclassified Information (CUI). This document is transmitted under a separate letter (Chron23-00729); which has been uploaded to the CDPHE SharePoint Site due to its ECI / CUI designation (ECI) / (CUI).

Enclosure 9

PCAPP Hazardous Waste Determination Form:

4.2-inch Munition Fiber Tubes

HAZARDOUS WASTE DETERMINATION FORM

WASTE DESCRIPTION:

Description of waste (including chemical/physical description): 4.2 Munition Fiber Tubes

Profile Number: WPR180131-002

Process and location generating the waste: Removal of packaging from munition in the ERB

WASTE DETERMINATION:

☒ User knowledge (Process evaluation, SDSs, and interviews. Attach applicable.)
☒ Waste analysis (List all sampling ID numbers that are applicable and attach analytical results.)
☒ Waste Analysis Plan (WAP, Document Number 24852-G01-GBL-V0007) (Review the PCAPP WAP and attach applicable listed and characteristic hazardous waste codes.)

Note: Analytical data will be needed on a frequency determined by the Waste Analysis Plan or upon significant process change.

Quarterly Composite Sampling LIMS Request ID: 200507027

Is the waste "solid waste" (6 CCR 1007-3 §261.2)?	☒ Yes ☐ No
Is the solid waste excluded or exempted from regulation as a hazardous waste? (6 CCR 1007-3 §261.4) (6 CCR 1007-3 §266.210) *If yes, specify exclusion or exemption by regulatory citation and describe:*	☐ Yes ☒ No ☐ N/A

Is the waste a listed hazardous waste? ☐ Yes ☒ No
(If yes, check all boxes that apply): (6 CCR 1007-3...)

		Applicable Waste Codes:			
☐	F-listed per §261.31				
☐	K-listed per §261.32 / Appendix VII				
☐	P-listed per §261.33(e) / Appendix VII				
☐	U-listed per §261.33(f)				

WASTE CHARACTERISTICS. Is the waste a characteristic hazardous waste? ☒ Yes ☐ No

D001: (6 CCR 1007-3 §261.21) ☐ Yes ☒ No

Flashpoint: ☐ N/A
☐ <140°F ☐ >140° but <200°F
☐ >200°F ☐ Explosive
☐ Ignitable Gas ☐ Oxidizer
☐ Capable of spontaneous combustion

D002:(6 CCR 1007-3 §261.22) ☐ Yes ☒ No

pH: ☐ N/A
☐ ≤ 2
☐ > 2 but < 12.5
☐ ≥ 12.5
☐ Corrodes Steel >6.35 mm/year @ 55°C

D003: (6 CCR 1007-3 §261.23) ☐ Yes ☒ No

Reactive: ☐ N/A
☐ Unstable ☐ Water Reactive
☐ Toxic gasses w/water ☐ Cyanide/Sulfide
☐ Explosive ☐ 1.1, 1.2, 1.3

Physical State:
☒ Solid (including paste)
☐ Solid w/freestanding or absorbed liquid
☐ Liquid – indicate if liquid is:

HAZARDOUS WASTE DETERMINATION FORM

☐ Explodes/detonates @ standard temperature ☐ Detonates/ Explodes with strong initiating source	☐ Single-Layer ☐ Multi-Layer ☐ Contained Gas

D004-D043 (6 CCR 1007-3 §261.24) ☒ Yes ☐ No

Metals (mg/L)	Volatiles (mg/L)	Semi-Volatiles (mg/L)	Pesticides/Herbicides
☐ Arsenic (D004)	☐ Benzene (D018)	☐ o-Cresol (D023)	☐ Chlordane (D020)
☐ Barium (D005)	☐ Carbon Tetrachloride (D019)	☐ m-Cresol (D024)	☐ Endrin (D012)
☐ Cadmium (D006)	☐ Chlorobenzene (D021)	☐ p-Cresol (D025)	☐ Heptachlor+epoxide(D031)
☐ Chromium (D007)	☐ Chloroform (D022)	☐ Cresol (D026)	☐ Lindane (D013)
☒ Lead (D008)	☐ 1,2-Dichloroethane (D028)	☐ 1,4-Dichlorobenzene (D027)	☐ Methoxychlor (D014)
☐ Mercury (D009)	☐ 1,1-Dichloroethylene (D029)	☐ 2,4-Dinitrotoluene (D030)	☐ Toxaphene (D015)
☐ Selenium (D010)	☐ Methyl Ethyl Ketone (D035)	☐ Hexachlorobenzene(D032)	☐ 2,4-D(D016)
☐ Silver (D011)	☐ Tetrachloroethylene (D039)	☐ Hexachlorobutadiene (D033)	☐ 2,4,5-TP (Silvex) (D017)
	☐ Trichloroethylene (D040)	☐ Hexachloroethane (D034)	
	☐ Vinyl Chloride (D043)	☐ Nitrobenzene (D036)	
		☐ Pentachlorophenol (D037)	
		☐ Pyridine (D038)	
		☐ 2,4,5-Trichlorophenol (D041)	
		☐ 2,4,6-Trichlorophenol (D042)	

Is the waste PCB-contaminated? (6 CCR 1007-3 268.2(e) ☒ Yes ☐ No
If yes, verify RCRA status at §261.8. (TSCA regulations may apply.)

PCB Concentration: 9 ppm

WASTE DESIGNATION

☒ Hazardous Waste ☐ Non-Hazardous Waste ☐ Used Oil ☐ Universal Waste
☐ Exempt / Excluded because:

Is the waste prohibited from land disposal without further treatment per (6 CCR 1007-3 268.40/268.48)? *If yes, specify treatability group* ☐ Wastewater (6 CCR 1007-3 268.2(f)) ☒ Non-wastewater (6 CCR 1007-3 268.2(d))	☒ Yes ☐ No ☐ N/A
Are UHCs present above treatment standards? *[Only applicable to certain characteristically hazardous waste codes specified by regulation.]* If yes, specify UHCs:	☐ Yes ☒ No ☐ N/A

HAZARDOUS WASTE DETERMINATION FORM

REMARKS: (Attach all applicable documentation describing the waste.)
For example, process knowledge statement, SDS, sample analysis, or sample ID.

All constituents will be listed in HMMS.
Analytical Sampling Frequency:
Quarterly sampling will be performed unless changes are noted and analysis does not agree with initial study results. Sampling is conducted in accordance with 24852-GPP-GGL-00015, Rev. 2, Wooden Dunnage Sampling and Analysis plan.

The term "attached" herein refers to documents available in the HMMS database / RCRA Operating Record under the applicable waste profile.

Per 6 CCR 1007-3 §261.21, D001 does not attach. Material is not ignitable because it is a physical solid and is not capable of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.

Per 6 CCR 1007-3 §261.22, Material is not corrosive because it is a physical solid. D002 does not attach.

Per 6 CCR 1007-3 §261.23 Material is not reactive because it is not unstable and does not undergo violent change without detonating, does not react violently with water, does not form potentially explosive mixtures with water, does not generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment when exposed to water, is not a cyanide or sulfide bearing waste that can generate toxic gases vapors or fumes in a quantity sufficient to present a danger to human health or the environment when exposed to pH conditions between 2 and 12.5, is not capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement, is not readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure, is not a forbidden explosive as defined in 49 CFR 173.54, or is a Division 1.1, 1.2 or 1.3 explosive as defined in 49 CFR 173.50 and 173.53.

Levels of Lead have hisotrically exceeded the regulatory limit of 5.0 ppm, results range from 0-50 ppm.

Levels of PCB's in the body of the fiber tube and mostly the tape are averaging 9 ppm, below the TSCA regulatory limit of 50 ppm.

Per the PCAPP Waste Analysis Plan Table D-5-1, fiber tube dunnage is monitored to less than .2 VSL in accordance with 24852-GPP-GGL-00301 prior to completion of hazardous waste determination.

I have reviewed the process generating this waste and hereby certify that all information submitted in this and all attached documents is, to the best of my knowledge, an accurate representation. All known or suspected hazards have been disclosed. No changes have been made to materially affect the waste generated (e.g., require additional or elimination of codes). If this is not the case, then a new Hazardous Waste Determination Form must be completed.

Only those persons certified in waste determinations through the completion of DLA and RCRA trainings and receiving clearance from the PCD Commander to ship hazardous waste are authorized to make such determinations at PCAPP.

EMPLOYEE INFORMATION:		
Completed By (Print): Jaclyn Gomez	**Signature:** Gomez, Jaclyn (JNGOMEZ) Digitally signed by: Gomez, Jaclyn (JNGOMEZ) DN: CN = Gomez, Jaclyn(JNGOMEZ) C = US O = Bechtel Global Corporation Date: 2020.05.21 15:44:57 -07'00'	**Date:** 21 MAY 2020

HAZARDOUS WASTE DETERMINATION FORM		
Reviewed By (Print): Micah Hausch	**Signature:** Micah Hausch	**Date:** 21 MAY 2020

Enclosure 10

Clean Harbors Waste Material Profile Sheet:

4.2 inch Munition Tube and Tape

WASTE MATERIAL PROFILE SHEET

Clean Harbors Profile No. WPR180131-002

A. GENERAL INFORMATION

GENERATOR EPA ID #/REGISTRATION #: *CO8213820725*
GENERATOR NAME: *Pueblo Chemical Depot*
GENERATOR CODE (Assigned by Clean Harbors): *PU14100*
CITY: *Pueblo* STATE/PROVINCE: *CO* ZIP/POSTAL CODE: *81006*
ADDRESS: *45825 Highway 96 East Attn: PSB*
PHONE: **(719) 406-4149**
CUSTOMER CODE (Assigned by Clean Harbors): *BE3312*
CUSTOMER NAME: *Bechtel Pueblo Team*
ADDRESS: *45825 Highway 96 East Bldg*
CITY: *Pueblo* STATE/PROVINCE: *CO* ZIP/POSTAL CODE: *81006*

B. WASTE DESCRIPTION

WASTE DESCRIPTION: *4.2 MUNITION TUBE AND TAPE*

PROCESS GENERATING WASTE: **Tubes and tape from 4.2 munitions. Fiber tubes that have been coated with asphalt. Contains low levels of PCB's.**

IS THIS WASTE CONTAINED IN SMALL PACKAGING CONTAINED WITHIN A LARGER SHIPPING CONTAINER ? **No**

C. PHYSICAL PROPERTIES (at 25C or 77F)

PHYSICAL STATE
- [x] SOLID WITHOUT FREE LIQUID
- POWDER
- MONOLITHIC SOLID
- LIQUID WITH NO SOLIDS
- LIQUID/SOLID MIXTURE
- % FREE LIQUID
- % SETTLED SOLID
- % TOTAL SUSPENDED SOLID
- SLUDGE
- GAS/AEROSOL

NUMBER OF PHASES/LAYERS
1 2 3
% BY VOLUME (Approx.)
TOP *0.00*
MIDDLE *0.00*
BOTTOM *0.00*

VISCOSITY (If liquid present)
- 1 - 100 (e.g. Water)
- 101 - 500 (e.g. Motor Oil)
- 501 - 10,000 (e.g. Molasses)
- > 10,000

COLOR
Black/ red

ODOR
- [x] NONE
- MILD
- STRONG

Describe:

BOILING POINT °F (°C)
- <= 95 (<=35)
- 95 - 100 (35-38)
- 101 - 129 (38-54)
- >= 130 (>54)

MELTING POINT °F (°C)
- < 140 (<60)
- 140-200 (60-93)
- [x] > 200 (>93)

TOTAL ORGANIC CARBON
- <= 1%
- 1-9%
- [x] >= 10%

FLASH POINT °F (°C)
- < 73 (<23)
- 73 - 100 (23-38)
- 101 -140 (38-60)
- 141 -200 (60-93)
- > 200 (>93)

pH
- <= 2
- 2.1 - 6.9
- [x] 7 (Neutral)
- 7.1 - 12.4
- >= 12.5

SPECIFIC GRAVITY
- < 0.8 (e.g. Gasoline)
- 0.8-1.0 (e.g. Ethanol)
- [x] 1.0 (e.g. Water)
- 1.0-1.2 (e.g. Antifreeze)
- > 1.2 (e.g. Methylene Chloride)

ASH
- < 0.1
- 0.1 - 1.0
- 1.1 - 5.0
- 5.1 - 20.0
- > 20
- [x] Unknown

BTU/LB (MJ/kg)
- < 2,000 (<4.6)
- 2,000-5,000 (4.6-11.6)
- 5,000-10,000 (11.6-23.2)
- [x] > 10,000 (>23.2)

Actual:

D. COMPOSITION (List the complete composition of the waste, include any inert components and/or debris. Ranges for individual components are acceptable. If a trade name is used, please supply an MSDS. Please do not use abbreviations.)

CHEMICAL	MIN	--	MAX	UOM
ASBESTOS (NON-FRIABLE)	0.0000000	--	1.0000000	%
CYANIDE TOTAL	0.0000000	--	65.0000000	PPM
FIBER TUBES WITH ASPHALT	95.0000000	--	100.0000000	%
LEAD	0.0000000	--	29.0000000	PPM
PCBS	0.0000000	--	9.0000000	PPM
PPE (GLOVES, APRONS, MASK FILTERS)	0.0000000	--	5.0000000	%
TAPE	1.0000000	--	1.5000000	%

DOES THIS WASTE CONTAIN ANY HEAVY GAUGE METAL DEBRIS OR OTHER LARGE OBJECTS (EX., METAL PLATE OR PIPING >1/4" THICK OR >12" LONG, METAL REINFORCED HOSE >12" LONG, METAL WIRE >12" LONG, METAL VALVES, PIPE FITTINGS, CONCRETE REINFORCING BAR OR PIECES OF CONCRETE >3")? YES [x] NO

If yes, describe, including dimensions:

DOES THIS WASTE CONTAIN ANY METALS IN POWDERED OR OTHER FINELY DIVIDED FORM? YES [x] NO

DOES THIS WASTE CONTAIN OR HAS IT CONTACTED ANY OF THE FOLLOWING; ANIMAL WASTES, HUMAN BLOOD, BLOOD PRODUCTS, BODY FLUIDS, MICROBIOLOGICAL WASTE, PATHOLOGICAL WASTE, HUMAN OR ANIMAL DERIVED SERUMS OR PROTEINS OR ANY OTHER POTENTIALLY INFECTIOUS MATERIAL? YES [x] NO

I acknowledge that this waste material is neither infectious nor does it contain any organism known to be a threat to human health. This certification is based on my knowledge of the material. Select the answer below that applies:

The waste was never exposed to potentially infectious material. YES NO

Chemical disinfection or some other form of sterilization has been applied to the waste. YES NO

I ACKNOWLEDGE THAT THIS PROFILE MEETS THE CLEAN HARBORS BATTERY PACKAGING REQUIREMENTS. YES NO

I ACKNOWLEDGE THAT MY FRIABLE ASBESTOS WASTE IS DOUBLE BAGGED AND WETTED. YES [x] NO

SPECIFY THE SOURCE CODE ASSOCIATED WITH THE WASTE. *G11*

SPECIFY THE FORM CODE ASSOCIATED WITH THE WASTE. *W002*

E. CONSTITUENTS

Are these values based on testing or knowledge? ☑ Knowledge ☐ Testing

If based on knowledge, please describe in detail, the rationale applied to identify and characterize the waste material. Please include reference to Material Safety Data Sheets (MSDS) when applicable. Include the chemical or trade-name represented by the MSDS, and or detailed process or operating procedures which generate the waste.

Analytical will show values for PCBs, Total Cyanide, and Lead TCLP levels. The 0-1% non-friable asbestos is noted based on generator knowledge. Tubes were monitored at <0.2 VSL

Please indicate which constituents below apply. Concentrations must be entered when applicable to assist in accurate review and expedited approval of your waste profile. Please note that the total regulated metals and other constituents sections require answers.

RCRA	REGULATED METALS	REGULATORY LEVEL (mg/l)	TCLP mg/l	TOTAL	UOM	NOT APPLICABLE
D004	ARSENIC	5.0				☑
D005	BARIUM	100.0				☑
D006	CADMIUM	1.0				☑
D007	CHROMIUM	5.0				☑
D008	LEAD	5.0	*24.0000*	*29.0000000*	*PPM*	
D009	MERCURY	0.2				☑
D010	SELENIUM	1.0				☑
D011	SILVER	5.0				☑

VOLATILE COMPOUNDS

RCRA	COMPOUND	REGULATORY LEVEL (mg/l)
D018	BENZENE	0.5
D019	CARBON TETRACHLORIDE	0.5
D021	CHLOROBENZENE	100.0
D022	CHLOROFORM	6.0
D028	1,2-DICHLOROETHANE	0.5
D029	1,1-DICHLOROETHYLENE	0.7
D035	METHYL ETHYL KETONE	200.0
D039	TETRACHLOROETHYLENE	0.7
D040	TRICHLOROETHYLENE	0.5
D043	VINYL CHLORIDE	0.2

SEMI-VOLATILE COMPOUNDS

RCRA	COMPOUND	REGULATORY LEVEL (mg/l)
D023	o-CRESOL	200.0
D024	m-CRESOL	200.0
D025	p-CRESOL	200.0
D026	CRESOL (TOTAL)	200.0
D027	1,4-DICHLOROBENZENE	7.5
D030	2,4-DINITROTOLUENE	0.13
D032	HEXACHLOROBENZENE	0.13
D033	HEXACHLOROBUTADIENE	0.5
D034	HEXACHLOROETHANE	3.0
D036	NITROBENZENE	2.0
D037	PENTACHLOROPHENOL	100.0
D038	PYRIDINE	5.0
D041	2,4,5-TRICHLOROPHENOL	400.0
D042	2,4,6-TRICHLOROPHENOL	2.0

PESTICIDES AND HERBICIDES

RCRA	COMPOUND	REGULATORY LEVEL (mg/l)
D012	ENDRIN	0.02
D013	LINDANE	0.4
D014	METHOXYCHLOR	10.0
D015	TOXAPHENE	0.5
D016	2,4-D	10.0
D017	2,4,5-TP (SILVEX)	1.0
D020	CHLORDANE	0.03
D031	HEPTACHLOR (AND ITS EPOXIDE)	0.008

OTHER CONSTITUENTS	MAX	UOM	NOT APPLICABLE
BROMINE			☑
CHLORINE			☑
FLUORINE			☑
IODINE			☑
SULFUR			☑
POTASSIUM			☑
SODIUM			☑
AMMONIA			☑
CYANIDE AMENABLE			☑
CYANIDE REACTIVE			☑
CYANIDE TOTAL	*65.0000*	*PPM*	
SULFIDE REACTIVE			☑

HOCs

☐ NONE
☑ < 1000 PPM
☐ >= 1000 PPM

PCBs

☐ NONE
☑ < 50 PPM
☐ >=50 PPM

IF PCBS ARE PRESENT, IS THE WASTE REGULATED BY TSCA 40 CFR 761?

☐ YES ☑ NO

ADDITIONAL HAZARDS

DOES THIS WASTE HAVE ANY UNDISCLOSED HAZARDS OR PRIOR INCIDENTS ASSOCIATED WITH IT, WHICH COULD AFFECT THE WAY IT SHOULD BE HANDLED?

☐ YES ☑ NO (If yes, explain)

CHOOSE ALL THAT APPLY

☐ DEA REGULATED SUBSTANCES	☐ EXPLOSIVE	☐ FUMING	☐ OSHA REGULATED CARCINOGENS
☐ POLYMERIZABLE	☐ RADIOACTIVE	☐ REACTIVE MATERIAL	☑ NONE OF THE ABOVE

F. REGULATORY STATUS

☑ YES NO USEPA HAZARDOUS WASTE?

D008

YES ☑ NO DO ANY STATE WASTE CODES APPLY?

Texas Waste Code

YES ☑ NO DO ANY CANADIAN PROVINCIAL WASTE CODES APPLY?

☑ YES NO IS THIS WASTE PROHIBITED FROM LAND DISPOSAL WITHOUT FURTHER TREATMENT PER 40 CFR PART 268?

LDR CATEGORY: ***This is subject to LDR.***
VARIANCE INFO:

YES ☑ NO IS THIS A UNIVERSAL WASTE?

YES NO IS THE GENERATOR OF THE WASTE CLASSIFIED AS VERY SMALL QUANTITY GENERATOR (VSQG) OR A STATE EQUIVALENT DESIGNATION?

YES NO IS THIS MATERIAL GOING TO BE MANAGED AS A RCRA EXEMPT COMMERCIAL PRODUCT, WHICH IS FUEL (40 CFR 261.2 (C)(2)(II))?

YES ☑ NO DOES TREATMENT OF THIS WASTE GENERATE A F006 OR F019 SLUDGE?

YES ☑ NO IS THIS WASTE STREAM SUBJECT TO THE INORGANIC METAL BEARING WASTE PROHIBITION FOUND AT 40 CFR 268.3(C)?

YES ☑ NO DOES THIS WASTE CONTAIN VOC'S IN CONCENTRATIONS >=500 PPM?

YES ☑ NO DOES THE WASTE CONTAIN GREATER THAN 20% OF ORGANIC CONSTITUENTS WITH A VAPOR PRESSURE >= .3KPA (.044 PSIA)?

YES ☑ NO DOES THIS WASTE CONTAIN AN ORGANIC CONSTITUENT WHICH IN ITS PURE FORM HAS A VAPOR PRESSURE > 77 KPA (11.2 PSIA)?

YES ☑ NO IS THIS CERCLA REGULATED (SUPERFUND) WASTE ?

YES ☑ NO IS THE WASTE SUBJECT TO ONE OF THE FOLLOWING NESHAP RULES?

Hazardous Organic NESHAP (HON) rule (subpart G) Pharmaceuticals production (subpart GGG)

YES ☑ NO IF THIS IS A US EPA HAZARDOUS WASTE, DOES THIS WASTE STREAM CONTAIN BENZENE?

YES NO Does the waste stream come from a facility with one of the SIC codes listed under benzene NESHAP or is this waste regulated under the benzene NESHAP rules because the original source of the waste is from a chemical manufacturing, coke by-product recovery, or petroleum refinery process?

YES NO Is the generating source of this waste stream a facility with Total Annual Benzene (TAB) >10 Mg/year?

What is the TAB quantity for your facility? Megagram/year (1 Mg = 2,200 lbs)

The basis for this determination is: Knowledge of the Waste Or Test Data Knowledge Testing

Describe the knowledge :

G. DOT/TDG INFORMATION

DOT/TDG PROPER SHIPPING NAME:

UN3077, WASTE ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S., (LEAD), 9, PG III

H. TRANSPORTATION REQUIREMENTS

ESTIMATED SHIPMENT FREQUENCY ONE TIME WEEKLY ☑ MONTHLY QUARTERLY YEARLY OTHER

CONTAINERIZED

0-0 CONTAINERS/SHIPMENT

STORAGE CAPACITY:
CONTAINER TYPE:

PORTABLE TOTE TANK BOX|CARTON|CASE
CUBIC YARD BOX DRUM
OTHER:
DRUM SIZE:

BULK LIQUID

GALLONS/SHIPMENT: ***0 Min -0 Max*** GAL.

☑ **BULK SOLID**

SHIPMENT UOM: TON ☑ YARD

TONS/YARDS/SHIPMENT: ***24.00 Min - 24.00 Max***

I. SPECIAL REQUEST

COMMENTS OR REQUESTS:

The tubes are roughly 22 inches long and 4.5 inches in diameter.

GENERATOR'S CERTIFICATION

I certify that I am authorized to execute this document as an authorized agent. I hereby certify that all information submitted in this and attached documents is correct to the best of my knowledge.I also certify that any samples submitted are representative of the actual waste.If Clean Harbors discovers a discrepancy during the approval process, Generator grants Clean Harbors the authority to amend the profile, as Clean Harbors deems necessary, to reflect the discrepancy.

AUTHORIZED SIGNATURE	NAME (PRINT)	TITLE	DATE
jrbahr@bechtel.com			

This waste profile has been submitted using Clean Harbors' electronic signature system.

Enclosure 11

Permit Change Page(s): Introduction

Three Static Detonation Chamber (SDC) units, each located within an Environmental Enclosure, are permitted as incineration treatment units at PCD. The three SDC units are permitted for the treatment of 4.2-inch mortars; intact, non-leaking, palletized 4.2-inch rounds; overpacked agent contaminated energetics and overpacked 155mm, 105mm, 4.2-inch rounds (i.e., leakers, rejects, and recovered munitions) currently stored at PCD or PCAPP that contain mustard agent. Associated with each SDC unit are five permitted hazardous waste tanks. Two tanks per SDC unit, the water [reverse flush] tank and the bleed water tank, are permitted for hazardous waste treatment. The permitted treatment of the waste managed in these tanks is pH adjustment and precipitation of metals. Details about the SDC tanks can be found in Part VI and Annex 3 of the Permit. Details about the SDC incinerator units can be found in Part VII and Annex 3 of the Permit. Details about the SDC Environmental Enclosures, which are permitted containment buildings, can be found in Part VIII and Annex 3 of the Permit.

Enclosure 12

Permit Change Page(s): Part VI,

Tank Systems

PART VI: TANK SYSTEMS

VI.A. SDC UNITS AND TANK SYSTEMS DESCRIPTION

Each of the three identical Static Detonation Chamber (SDC) 1200c units is housed in a membrane-covered frame structure (Sprung™ structure). The SDC units will treat/destroy intact, non-leaking, 4.2-inch palletized rounds, ~~and~~ 155mm, 105mm & 4.2-inch overpacked rounds (i.e., leakers, rejects, recovered munitions) and overpacked agent contaminated energetics, currently stored at PCD or PCAPP that contain mustard agents [distilled mustard/mustard-T mixture (HD/HT)]. The SDC 1200c is depicted in P&IDs 24852-RD-M6-B27-M1002 and 24852-V11-M000-0070s01. The SDC and Off-gas Treatment System (OTS) process descriptions are presented in 24852-V11-M000-0205s01 and 24852-V11-M000-0206s01.

Each of the three SDC 1200c units has four identical RCRA tank systems. This section provides a detailed description of each SDC RCRA tank system. The tank systems are as follows:

1. Water (Reserve Flush) Tank System
2. Condensate Tank System
3. Bleed Water Tank System
4. Process Water Tank System

The Permittee is authorized to store hazardous wastes in the following storage tank systems: Water (Reserve Flush) Tank System, Condensate Tank System, and Process Water Tank System.

The Permittee is authorized to treat and store hazardous wastes in the following storage tank system: Bleed Water Tank System.

VI.A.1. Water (Reserve Flush) Tank System

The water (reserve flush) tank system is located indoors inside the SDC Room. The SDC Room is shown on the plot plan (24852-RD-P1-000-P0002). The reserve flush tank system consists of the water tank, water pump, and associated piping. The reserve flush tank system is depicted in P&ID 24852-RD-M6-B27-M1002, 24852-RD-M6-B27-M2002, and 24852-RD-M6-B27-M3002. This system is designed to contain water as a contingency measure to flush loading chamber (LC) 1 if mustard agent is detected during an off- normal condition. When the flush is completed, the liquid flows by gravity back to the water tank.

If the water flows back into the tank, it may contain mustard agent. The contents of the reserve flush tank system will be a K902 hazardous waste that may exhibit the RCRA characteristics in Table VI.B.2. The pH of the tank contents will vary depending on the volume of water used to flush LC 1 and the degree of mustard agent contamination. The pH could be lower than 2. If

Enclosure 13

Permit Change Page(s): Part VII,

Storage and Treatment in Containment Buildings ventilation system is captured by the cascade ventilation system of the SDC Enclosure. After emptying, the DC is returned to destruction operations while the scrap cools.

Scrap metal inside the DC is removed at regular intervals when 50 percent of the volume has been consumed, as determined by tracking the number of munitions or overpacks fed since the last emptying (96 for 4.2-inch mortars, 12 for 5.4" x 36" SRCs, nine (9) for 7" x 27" SRCs, six (6) for Propelling Charge Cans PA92). Additional munitions or overpacks will not be fed without emptying the chamber.

After emptying, the DC is returned to destruction operations. The scrap funnel feeds scrap metal from the treatment process to the scrap conveyor system to be cooled, monitored (in accordance with the SDC SSMP - Annex 3, Attachment 10), and inspected. After inspection, the scrap is conveyed to a scrap metal bin. The scrap metal bin is removed between each SDC detonation chamber empty cycle after the emptied munitions are transferred to the scrap bin. The scrap bin is transferred by forklift to the SDC Vestibule. At the vestibule, the inner roll up door is closed and the outer roll up door is opened. The waste handling forklift is used to place the lid on the bin, and the scrap metal bin is then transferred to the SDC Waste Laydown Yard.

The processing of the munitions/objects will generate gas, solids and dust that are hazardous wastes. The solids will remain in the DC, while the gas and most of the dust will escape through the exhaust pipe. The dust and gases enter the Buffer Tank, and some of the dust (larger and denser particles) will be separated in the Buffer Tank, which is configured as a large cyclone. The main purpose of the Buffer Tank, however, is to smooth pressure peaks coming from the DC caused by explosions before the gases are transferred to the downstream OTS system. The dust that accumulates in the Buffer Tank is emptied into a commercial off-the-shelf 55-gallon steel drum for disposal as a hazardous waste. The exhaust pipe, Buffer Tank, and associated piping are maintained at 300°C (572°F) to prevent condensation of agents or acid gasses, and they are enclosed within a secondary containment system to prevent gas escape in the unlikely event of a leak.

Outputs from the SDC unit are:

- Metal scrap from the Scrap Box;
- Off-gas to the OTS;

Table VIII-2 SDC Containment Building Waste Types and Design Capacities				
Containment Building/Room[a]	**Design Specifications**	**Waste Codes[b]**	**Primary Containment and Secondary Containment**	**Maximum Volume of Waste**
SDC Room				
Enclosure	Size: about 70 ft x 70 ft Volume: 153,100 ft^3 Basic Wind Speed: 90 mph and 1.15 inches (wc) Wind Exposure: Category C Ground Snow Load: 15 lb/ft^2 and 1.2 inches (wc) Occupancy Category: III Collateral Dead Load: 2.0 lb/ft^2 Negative Pressure: 1.0	K901, K902, D001, D002, D003, D004-D011, D022, D028, D029, D030, D034, D039, D040, D043, U037, U069, U105	Primary containment is provided by the Loading Chamber, DC, DC off-gas piping, Buffer Tank and Thermal Oxidizer. Parts of the SDC, including feed and secondary waste handling systems, are enclosed in negative pressure secondary containment enclosures, while the SDC Room must also be maintained at a negative pressure relative to atmosphere. This cascading air flow is to prevent releases to the environment and is exhausted through a Process Enclosure Exhaust Filter Unit (IONEX 16000) containing granulated activated carbon. Primary containment of the HWSA is provided by the DOT-approved containers in which the waste is stored. Secondary containment is comprised of concrete floors and curbs with a chemical-resistant	Up to 120 4.2-inch munitions or 12 overpacks in a single-stack arrangement, pending processing within 48 hours at any point in time[c]~~,~~ ~~including overpacks~~. Net Explosive Weight: 150 lbs[d] Combustible Loading Limits: 120 munitions A maximum of **one** drum of waste each for the Buffer Tank,

[a] Each SDC Enclosure and the associated rooms are identical; the requirements and limits in the table above apply equally for each of the three enclosures.
[b] Waste Codes are for reference only and storage limitations, disposition and characterization will be in accordance with Waste Analysis Plan (Annex 3 Attachment 3)
[c] Hazardous waste munitions, as described in Annex 3 Attachment 3 Section 3-3 (SDC Process Description), may be stored in the hazardous waste staging area, pending processing, for longer than 48 hours only in the event of an off-normal situation (e.g., equipment failure or malfunction, or mustard agent release resulting in response and decontamination activities that affect operations with a notification to the Division within 24 hours of exceeding the 48-hour storage time limit. The notification shall include a description of planned corrective actions and associated schedule if the off-normal situation has been resolved at the time of notification.
[d] All three SDC Enclosures (the PCD SDC Complex) are sited as one Potential Explosion Site, so the maximum quantity is represented as being present in any one or combination of the three enclosures

Enclosure 14

Permit Change Page(s): Annex 3 Attachment 3,

SDC Waste Characteristics and Waste Analysis Plan

ATTACHMENT 3
SDC WASTE CHARACTERISTICS AND WASTE ANALYSIS PLAN

3-1 PURPOSE

This Waste Analysis Plan (WAP) is for the Trial Burn period and the limited operation period of the Static Detonation Chambers (SDC) prior to starting full operations. During the Trial Burn period an analysis of all waste produced from the SDC Units will be completed. The analysis must be compliant with 6 CCR 1007-3 §262.11, 264.13, 264.341, 268, ~~A~~at the end of the Trial Burn period analytical testing results, generator process knowledge and agent monitoring data shall be collected and reviewed. The Permittee shall submit a permit modification request to update this WAP based on analytical results and generator process knowledge prior to the starting full Operations of the SDC Units. Generator process knowledge and analytical results and agent monitoring data must be maintained in the Operating Record

The Permittee is permitted to store and treat hazardous waste munitions containing mustard agent (HD/HT) from the Pueblo Chemical Depot ~~. Storage includes:~~comprising intact, non-leaking palletized 4.2 inch rounds; over packed munitions (that is, leakers, ~~and~~ rejects and recovered munitions) and overpacked agent contaminated energetics (for example ignition cartridges, propellant, bursters). The munitions are 4.2 inch mortars~~ and~~ ,105 mm projectiles and 155mm projectiles. The SDC Units treatment process is incineration. ~~Permitted treatment is limited to the 4.2-inch mortars; intact, non-leaking, palletized 4.2-inch rounds; and overpacked 4.2-inch rounds (i.e., leakers, rejects, and recovered munitions) currently stored at PCD or PCAPP that contain mustard agents (HD/HT)~~. Hazardous waste munitions containing Lewisite, contaminated personal protective equipment, tools, and soil are not permitted for treatment in the SDC.

The Permittee is also allowed to store agent-contaminated liquid hazardous waste and other hazardous waste in containers in the designated hazardous waste storage area (HWSA) inside each of the three (3) SDC Enclosures. Containerized liquid wastes with mustard agent concentration ≥200 parts per billion (ppb) HD/HT may be stored in this area and subsequently transferred to a PCAPP RCRA-lined sump at the Agent Processing Building (APB) in accordance with the PCAPP RCRA Permit. Other wastes that may be stored in this area include spent decontamination solutions, contaminated condensate from the condensate tanks, bleed water tank water and sludge, process water, and neutral or acid scrubber water. Liquid wastes that are <200 ppb HD/HT may be stored in the HWSA pending transfer to the SDC Waste munitions is emptied into a scrap metal bin. After the treatment process for the batch completes, a new feed destruction cycle begins.

Each SDC unit is equipped with an IONEX 16000 and an IONEX 4000 filter system. The SDC Enclosure is equipped with an IONEX 16000. The SDC process ventilation exhausts to the IONEX 16000. The OTS Room (housing the temporary condensate tank, condensate tank, bleed water tank, and process water tank—all of which, except for the bleed water tank, vent to the OTS Room) cascades to the SDC Room and then exhausts to the IONEX 16000. The IONEX 4000 provides positive backup capacity to the main OTS in the event of system malfunction. All treated process off-gases exiting the OTS are discharged directly into the IONEX 4000. It is designed and built in accordance with the requirements of the U.S. Army's Chemical Demilitarization Program.

The SDC process is described in the following paragraphs. Figure 3-1 illustrates the SDC process flow.[2] A more detailed description of the SDC process and equipment is provided in Annex 3 Attachment 8. Key operation information is provided in the SDC Operations Plan (Annex 3 Attachment 15). The SDC units will be operated in accordance with approved Standing Operating Procedure (SOP) 24852-SOP-B28-W0001 (Annex 3 Attachment 9).

Items to be treated are delivered to the SDC Enclosure and placed in a staging area. Waste delivery and movement are described in Annex 3 Attachments 1 and 8. In the loading area, munitions and/or other items are placed in feed containers that are already staged on the feed conveyor. ~~Overpacked~~ Overpacks with rejects~~4.2-inch mortars~~ ~~will not~~may be removed from overpacks for processing. Feed containers are conveyed individually to the munitions lift, which brings the container to the top of the SDC system. From the munitions lift, the feed container is pushed into loading chamber 1. The gate for loading chamber 1 is closed, loading gate 2 is opened, and the feed container is then pushed into the cradle in loading chamber 2. Loading gate 2 is closed and loading chamber 2 rotated to drop the container into the hot DC.

When the feed container drops into the DC, it lands on the hot scrap material at the bottom of the chamber (lower DC). In addition to the hot scrap, heat is generated and controlled by heating elements in the space between the chamber and the shell. The items are heated until they deflagrate or detonate and the explosives (if any) are destroyed.

2 All figures are located at the end of this attachment.

The agent Trial Burn testing will consist of 4.2-inch mortars containing mustard agent (HD/HT) fed into the DC in cardboard feed containers. 4.2-inch mortars that contain HD/HT will be fed as baseline-reconfigured rounds during trial burns (wooden boxes, fiber tubes, propellant wafers and ignition cartridges were removed during reconfiguration).

Trial burns will provide performance test method (PTM) exhaust gas emission results and system data for evaluation of SDC system performance against applicable RCRA emission and performance standards, as well as the estimated emission rates in the pre-trial burn Screening Multiple Pathway Health Risk Assessment Report (MPHRA) (Annex 3 Attachment 14). The outcome will be used to establish operating parameters, permitted waste streams, and automatic waste feed cutoff (AWFCO) limits.

3-4b Waste Feeds for SDC Operations

The SDC units will treat/destroy intact, non-leaking, palletized 4.2-inch rounds; and overpacked agent contaminated energetics, 155mm, 105mm and 4.2-inch rounds (i.e., leakers, rejects, and recovered munitions); currently stored at Pueblo Chemical Depot (PCD) or Pueblo Chemical Agent-Disposal Pilot Plant (PCAPP) that contain mustard agents (distilled sulfur mustard [HD]/mustard-T mixture [HT]). ~~Munitions will consist of 4.2-inch mortars related to the same stockpile munitions.~~ Lewisite munitions (including separated components) will not be treated in an SDC unit.

3-5 WASTE ACCEPTANCE, DESIGNATION, AND DETERMINATION

3-5a Waste Pre-Acceptance Review and Approval Process

The munitions transferred to the SDC Complex for treatment were previously stored in munition storage magazines or stored in the PCD storage igloos. Munition type and propellant sampling and stability have been documented in the PCD Operating Record. The Permittee will review and verify munition type and its stability prior to transfer. The transfer is preapproved based on munition type, tracked in accordance with U.S. Army and PCAPP protocols, and documented in the PCAPP Operating Record. This identification, approval, and tracking process allows the operator to verify that the stored munitions meet the waste acceptance criteria for munition type for the SDC-related containment buildings.

3-5b Waste Designation and Rationale

The designation and disposition of waste to be treated by and waste generated from the SDC will be based on generator process knowledge and analytical testing of the waste. Generator process knowledge and analytical testing will be documented in the Operating Record and the results of the analytical testing will be submitted in a data package to the Colorado Department of Public Health and Environment (CDPHE) for review upon request.

3-5c Hazardous Waste Determination

As required by 6 CCR 1007-3 §§ 262.11, 264.13, and 264.314 PCD will characterize the following:

- Waste to be treated, including waste used in Trial Burn tests
- Waste generated from Trial Burn tests
- Waste generated from the treatment of intact, non-leaking, palletized 4.2-inch rounds; overpacked energetics, ~~and overpacked~~ 155mm, 105mm and 4.2-inch rounds (i.e., leakers, rejects, and recovered munitions) currently stored at PCD or PCAPP that contain mustard agents (HD/HT).

Only intact, non-leaking, palletized 4.2-inch rounds; overpacked energetics and overpacked 155mm, 105mm and 4.2-inch rounds (i.e., leakers, rejects, and recovered munitions) shall be treated in an SDC. Wastes such as contaminated personal protective equipment, tools, and soil are not permitted for treatment in the SDC. As required by 6 CCR 1007-3 § 262.11, all waste generated from the treatment of intact, non-leaking, palletized 4.2-inch rounds; overpacked energetics and overpacked 155mm, 105mm and 4.2-inch rounds (i.e., leakers, rejects, and recovered munitions) currently stored at PCD or PCAPP that contain mustard agents (HD/HT) will be characterized.

Prior to treatment in the SDC, munitions containing HD/HT exhibit characteristics of hazardous waste, contain hazardous waste constituents and may contain P and U listed EPA hazardous wastes. 6 CCR 1007-3 § 268.40 defines which characteristic can be removed by combustion of the waste. Any characteristics not removed by combustion must meet the concentration-based universal treatment standards defined in 6 CCR 1007-3 § 268.48.

The concentrations and variability of the concentrations of hazardous waste constituents in the mustard agent (HD/HT) are generally not known. The hazardous waste codes for toxicity characteristic (TC) inorganic and organic waste constituents will be applied to mustard agent (HD/HT) munition-related waste, until demonstrated by process knowledge and analytical testing that the waste does not exhibit the characteristic(s). When process knowledge is used to exclude TC metals and/or TC organic hazardous waste codes from any wastes contaminated with mustard agent (HD/HT), the Operating Record will document specifically how such determinations were made.

hazardous waste, transferred to permitted PCAPP storage at Igloo G201, G202, G203, or G204 or if ≥200 ppb HD/HT transferred to the PCAPP APB for treatment by adding to one of the RCRA-lined sumps; managed in accordance with the PCAPP Permit; and/or, ultimately, shipped off site as greater than or equal to 0.7 VSL waste.

- Treated munition bodies will be managed as hazardous waste with the hazard waste code K902 unless they are cleared to the general population limit (GPL) for mustard agent (HD/HT) and recycled.

3-5c(5) Designation of Hazardous Waste Codes for Scrap Metal, Debris, Residue and Dust Waste Generated from SDC Treatment Operations

All listed waste codes (P, U, and K) applicable to intact, non-leaking, palletized 4.2-inch rounds; overpacked energetics and overpacked 155mm, 105mm and 4.2-inch rounds (i.e., leakers, rejects, and recovered munitions); and agent-contaminated energetics (ignition cartridges, propellant, busters) prior to treatment will apply to the scrap metal, solid debris, residue and dust waste after treatment in the SDC Units, except as described in the bullet below.

- The waste code P081 (nitroglycerine) may be removed from the scrap metal, debris, and dust waste generated from the treatment of 4.2-inch mortars containing propellant and ignition cartridges after treatment in the SDC Units. The treatment standard for nitroglycerine is combustion and there is no LDR standard concentration.

- The waste codes U069 dibutyl phthalate and U105 (2, 4-dintirotoulene) do not have a treatment standard technology code (§ 268.40). These waste codes have only a concentration standard. The D030 (2,4-dinitrotoluene) code can be removed from the waste if the concentration standards in §§ 268.40 and 268.48 are met. The U105 waste code applied to the unused propellant removed from the munitions and cannot be removed from the waste.

Characteristic waste codes applicable to intact, non-leaking, palletized 4.2-inch rounds; overpacked energetics and overpacked 155mm, 105mm, and 4.2-inch rounds (i.e., leakers, rejects, and recovered munitions); and agent-contaminated energetics (ignition cartridges, propellant, busters) prior to treatment will apply to the scrap metal, solid debris, residue and dust waste after treatment in the SDC Units if:

- incineration is not the treatment standard technology code listed (§ 268.40) for the characteristic waste code, and

- the treatment standard concentration (§§ 268.40 and 268.48) is not met.

Scrap metal, solid debris, residue and dust waste generated from the treatment of intact, non-leaking, palletized 4.2-inch rounds; overpacked 155mm, 105mm, and 4.2-inch rounds (i.e., leakers, rejects, and recovered munitions); and agent-contaminated energetics (ignition cartridges, propellant, bursters) may have characteristic waste code D003, §261.23(a)(4) and (a)(5), removed if the scrap metal, debris, residue and dust waste is monitored and determined to be less than 0.7 VSL for mustard agent (HD/HT). In addition, the residue and dust waste must meet the treatment standard technology (if a standard is listed) and the treatment concentration standards outlined in §268.40 and meet the universal treatment standard in accordance with §268.48 for all applicable characteristic waste codes and underlying hazardous waste constituents. During the Trial Burn the Permittee will conduct analytical testing on the residue and dust. Based on these analytical results the Permittee shall submit a permit modification request to update the characteristic waste codes and underlying hazardous waste constituents in this WAP.

- The U105 waste code shall apply to the scrap metal, debris, and dust waste generated from the treatment of 105mm projectiles that include 2,4-dintrotoluene in the propellant mixture, even if the D030 waste code is removed.

The waste code D003 (Reactivity) may be removed if the treatment standard is met by deactivation through incineration (SDC process), or the treatment standard concentrations in §§268.40 and 268.48 are met and verified by the analytical test methods required in in §§268.40 and 268.48.

Scrap metal will be: separated from the solid debris, residue and dust waste; and containerized and recycled in accordance with Section 3-8 of this WAP. The scrap metal (if not recycled), solid debris, residue, and dust wastes will be characterized in accordance with this WAP and 6 CCR 1007-3 §§ 262.11 and 268, given applicable waste codes, and shipped off-site to an approved TSDF.

3-5c(6) Designation of Hazardous Waste Codes for Wastes Generated from SDC Trial Burn Testing

Wastes generated from Trial Burn testing will be characterized in accordance with this WAP and 6 CCR 1007-3 §§ 262.11, 264.13, 264.341, and 268.40. A hazardous waste analysis that identifies and quantifies the concentration of any constituent identified in Appendix VIII of Part 261 that may reasonably be expected to be in the waste will be provided to CDPHE. These analyses will be used to provide all information required by 6 CCR 1007-3 §§ 100.41(b)(5) and 100.28(c).

- OTS brines and scrubber liquids
- Spent pre-, HEPA, and carbon filters (IONEX 4000)
- Munitions Bin Debris and Residue (i.e., fragments, dust and metal dust)

3-6 PERMITTED WASTE MANAGEMENT UNITS and OTHER TREATMENT IN TANKS IDENTIFICATION

Permitted waste management units located at the SDC Complex include the following:

- Igloos H1102, G101, G102, and G103, where wastes to be treated will be stored prior to processing
- SDC Waste Laydown Yard, where less than 0.7 VSL (HD/HT) agent-related wastes generated from SDC operations will be stored. Scrap metal bins with a monitoring result of greater than or equal to 0.2 VSL (HD/HT) must not be removed from the SDC Enclosure as the debris does not qualify for the scrap metal exemption and does not meet the required criteria for treatment verification.
- Three SDC units inside permitted containment buildings (i.e., Environmental Enclosures), used to treat intact, non-leaking, palletized 4.2-inch rounds; overpacked energetics and overpacked 155mm, 105mm and 4.2-inch rounds (i.e., leakers, rejects, and recovered munitions); currently stored at PCD or PCAPP that contain mustard agents (HD/HT).
- SDC tank systems, which include the following tanks: water [reserve flush] tank, condensate tank, temporary condensate tank, bleed water tank, and process water tank
- The bleed water tank is also a permitted treatment unit. The permitted treatment of the waste managed in this tank is pH adjustment using sodium hydroxide and/or addition of sodium sulfide to precipitate metals.

Note: Agent-related wastes generated during SDC operations that are monitored and determined to be greater than or equal to 0.7 VSL for mustard agent (HD/HT) will be containerized and transferred to permitted PCAPP storage at Igloo G201, G202, G203, or G204. These wastes will be managed in accordance with the PCAPP Permit, and, ultimately, shipped off-site as greater than or equal to 0.7 VSL (HD/HT) waste. These igloos are not included as part of the SDC Complex. Liquid wastes generated

Table 3-1. RCRA Hazardous Waste Designation, Rationale, and Disposition

<table>
<tr><th>Waste Material</th><th>Source</th><th>Applicable Waste Codes [a,b,c,f]</th><th>Basis for Designation</th><th>Disposition of Waste Material</th></tr>
<tr><td rowspan="4">Mustard Agent (HD/HT) Munitions
(intact, non-leaking palletized 4.2 inch, rounds, overpacked 155mm, 105mm and 4.2 inch rounds (leakers, rejects and recovered munitions)</td><td rowspan="4">PCD hazardous waste permitted storage igloos, PCD interim status igloos, or PCAPP</td><td>K901</td><td>6 CCR 1007-3 § 261.32</td><td rowspan="4">Will be processed in the SDC.</td></tr>
<tr><td>D001, D002, D003, D004-D011, D022, D028, D029, D034, D039, D040, D043</td><td>6 CCR 1007-3 §§ 261.21, 261.22, 261.23, and 261.24, and Section 3-5c(2) of this WAP</td></tr>
<tr><td>U105</td><td>105mm munitions containing propellant, Section 3-5c(3) of this WAP</td></tr>
<tr><td>P081</td><td>4.2-inch mortars containing propellant and ignition cartridge, Section 3-5c(3) of this WAP</td></tr>
<tr><td rowspan="5">Potentially Mustard Agent (HD/HT)-Contaminated Energetics in overpacks</td><td rowspan="5">PCD hazardous waste permitted storage igloos, PCD interim status igloos, or PCAPP</td><td>K901</td><td>6 CCR 1007-3 § 261.32</td><td rowspan="5">Will be containerized; transferred to permitted PCAPP storage at Igloo G201, G202, G203, or G204; managed in accordance with the PCAPP Permit;</td></tr>
<tr><td>D001, D003, D004-D011, D022, D028, D029, D034, D039, D040, D043</td><td>6 CCR 1007-3 §§ 261.21, 261.23, and 261.24, and Section 3-5c(2) of this WAP</td></tr>
<tr><td>U105</td><td>Section 3-5c(3) of this WAP</td></tr>
<tr><td>U069</td><td>Section 3-5c(3) of this WAP. 105mm separated energetics with dibutyl phthalate in propellant mixture.</td></tr>
<tr><td>D003</td><td>Section 3-5c(2) of this WAP. 4.2-inch mortars separated energetics with P081 waste code</td></tr>
<tr><td>Ethylene Glycol (with and without ATE)</td><td>Non-agent Trial Burn use (Annex 3 Attachment 13A)</td><td>N/A</td><td>N/A</td><td>Will be processed in SDC during non-agent Trial Burn.</td></tr>
</table>

Table 3-1. RCRA Hazardous Waste Designation, Rationale, and Disposition

Waste Material	Source	Applicable Waste Codes [a,b,c,f]	Basis for Designation	Disposition of Waste Material
Monochlorobenzene	Non-agent Trial Burn use (Annex 3 Attachment 13A)	D001	6 CCR 1007-3 § 261.21	Will be processed in SDC during non-agent Trial Burn.
		U037	6 CCR 1007-3 §261.33	
M306A1 Conventional Ammunition	Non-agent Trial Burn use (Annex 3 Attachment 13A)	D001, D003, D004-D011, U105	6 CCR 1007-3 §§ 261.21, 261.24 and 261.33	Will be processed in SDC during non-agent Trial Burn.
Used Decontamination Solutions Associated with Mustard Agents (HD/HT)	Generated from decontamination of SDC or components	K902	6 CCR 1007-3 § 261.32	Will be containerized and stored in the SDC Waste Laydown Yard or HWSA in the SDC Room , pending shipment off-site to an approved TSDF.
		D002, D004-D011, D022, D028, D029, D034, D039, D040, D043	6 CCR 1007-3 §§ 261.22 and 261.24, and Section 3-5c(4) of this WAP	
Solid Debris and Residue (i.e., scrap metal parts, fragments, and metal dust)	Generated from treatment of munitions and/or overpacks in SDC	K901	6 CCR 1007-3 § 261.32	Will be containerized and recycled. If not recycled, the wastes will be characterized, given a K901 waste code, and shipped off-site to an approved TSDF. Note: The P081 waste code applied to 4.2-inch mortars containing propellant and ignition cartridge is removed from the post-SDC treatment scrap metal and fragments waste stream because the SDC process (i.e., combustion) meets the treatment standard for P081.
		D004-D011	6 CCR 1007-3 § 261.24 and Section 3-5c(5) of this WAP	
		D030 if ≥ 0.13 mg/L	6 CCR 1007 3 § 261.24, and Section 3-5c(5) of this WAP	
		U069, U105	6 CCR 1007 3 §§ 268.40 and 261.48, and Section 3-5c(3) of this WAP	

Enclosure 15

Permit Change Page(s): Annex 3 Attachment 8,

SDC Process Description

8-2a SDC Process

The SDC System is designed to treat/destroy intact, non-leaking, palletized rounds; overpacked rounds (i.e., leakers, rejects, and recovered munitions); and agent-contaminated energetics (ignition cartridges, propellant, bursters) that contain mustard agents (HD/HT) by indirect/conductive heating. The solid scrap material remaining from the process is emptied into a scrap box. The off-gas generated is cleaned and filtered in the OTS.

Figure 8-6 provides an overview of the SDC process, and **Figure 8-7** depicts a simplified block flow diagram of the SDC treatment process. Section 8-3 details system components of the SDC. **Appendix 8-2** contains schematics, derived from piping and instrument diagrams (P&IDs), that show/identify the pieces of equipment within the SDC that will store, contain, convey, or treat hazardous wastes.

Each SDC unit operates independently and is controlled and operated from its own Control Room. One SDC being down for maintenance will not prevent the other two SDCs from operating.

Overpacked ~~agent-contaminated items~~rejects ~~will~~ may ~~not~~ be removed from overpacks for processing.

8-2b Containment Systems

8-2b(1) Secondary Containment

With the exception of the carbon filtration systems (IONEX 4000 for the OTS and IONEX 16000 for the enclosure), SDC process and support equipment is located within the SDC Enclosure. Secondary containment within the SDC Enclosure is concrete with an approved chemical-resistant impervious coating. The racks containing SDC equipment have steel base plates secured to embeds in the concrete floor. The concrete will be maintained free of cracks and gaps. The SDC and OTS Rooms of each enclosure have a 4-inch curb and the entrances are sloped ramps.

The following calculations show that adequate secondary containment for liquids is provided in the SDC and OTS Rooms:

- Volume displaced by installed equipment (including the HWSA) in the SDC Room was calculated using the projected area of the equipment plus the floor area of the HWSA The total volume displaced is 30 percent of the floor area.

in time. A 48-hour hazardous waste staging timeframe will be followed.[5] As shown in **Figure 8-8**, the munitions are staged on the floor and/or on the munitions transport truck (flatbed) on overpack pallets (OPPs). The pallets will not be stacked and a minimum 6-inch space will be maintained between the OPPs for inspection purposes. Overpacked ~~agent-contaminated items~~rejects ~~will not~~may be removed from overpacks for processing.

8-3a(2) Load Containers for SDC Feed

Munitions and/or other items are placed into cardboard feed containers that are already staged on the conveyor. The number/amount of items and/or waste in the containers is limited by either the physical size of the waste that can fit into the container or the NEW of the waste, and will vary depending on the nature of the items to be processed. The conveyor is designed to hold multiple feed containers prior to any conveyor movement. After the feed containers have been loaded, the process is controlled remotely from the Control Room.

Each feed container is advanced to the munitions lift and elevated to the level of loading chamber 1. From the lift, the container is conveyed to the apron of loading chamber 1. All movements from the conveyor to loading chamber 1 are automatic, but the Control Room operator can remotely stop or reverse the movements as required. The conveyor and lift are equipped with guides, interlocks, and sensors to prevent misalignment of containers or other problems and to halt movements automatically if problems arise.

8-3a(3) Feed Containers into SDC

Loading Chamber 1

At the apron of loading chamber 1, the loading system pauses until the SDC Control Room operator acknowledges that the feed container is ready to enter the chamber. Loading chamber 1 seals and isolates the container from both the outside atmosphere and the remainder of the SDC process (i.e., it serves as an airlock). The loading chamber 1 gate is equipped with an inflatable gasket seal that prevents leakage from the loading chamber. After the Control Room operator initiates the loading operation, the loading chamber 1 gate is opened to admit the feed container positioned on the apron. The container is pushed into loading chamber 1 by a ram equipped with sensors to detect misfeeds and other problems and to halt

[5] Should this 48-hour hazardous waste staging timeframe not be met, requirements provided in Part VIII.A.1, Table VIII-2 fn. c, and Section 7-1 in Annex 3 Attachment 7 of this permit must be followed.

which is in turn sandwiched between two pipe flanges. This plate is replaceable, if needed, and is maintained at temperature using electric heaters and insulation.

8-3a(5) Remove Solid Wastes

Scrap metal inside the DC is removed when the chamber is full; that is, when 50 percent of the volume has been consumed, as determined by tracking the number of munitions or overpacks fed since the last emptying (96 for 4.2-inch mortars, 12 for 5.4" x 36" SRCs, nine (9) for 7" x 27" SRCs, six (6) for Propelling Charge Cans PA92). Additional munitions or overpacks will not be fed without emptying the chamber. The DC is emptied by rotating the chamber and letting the scrap fall down into a scrap funnel and chute. As the scrap metal is discharged from the DC, dust from this operation is captured by the process ventilation system to prevent release. During the pre-Trial Burn (shake down), industrial hygiene testing will be conducted to assess airborne dust hazards and determine if additional removal measures are required. If necessary, sampling and analysis of dust and/or other residue will be performed, and the material will be characterized in accordance with 24852-GD1-GGWM-00002 (**Annex 3 Attachment 9**).

After emptying, the DC is returned to destruction operations. The scrap chute feeds scrap metal from the treatment process to the scrap conveyor system to be cooled and inspected. After inspection, the scrap is conveyed to a scrap metal bin. The scrap metal bin is removed between each SDC detonation chamber empty cycle after the emptied munitions are transferred to the scrap bin. The scrap bin is transferred by forklift to the SDC Vestibule. At the vestibule, the inner roll up door is closed and the outer roll up door is opened. The waste handling forklift is used to place the lid on the bin, and the scrap metal bin is then transferred to the SDC Waste Laydown Yard.

During the Trial Burn, a scrap metal bin test will be conducted to confirm adequate decontamination of the scrap metal. Additional information on monitoring the scrap metal is also provided in **Annex 3 Attachment 3**.

The equipment/systems associated with this process are detailed in the following subsections.

Locking and Sealing System

The upper and lower parts of the DC are locked to each other with a locking ring during destruction. The locking ring is maneuvered by two hydraulic cylinders. For the emptying procedure, the locking ring is turned to the open position and the lower part of the DC is lowered and turned. The connection between upper and lower part of the DC is sealed by three gaskets seals during destruction. Only one of the three seals is needed to maintain the DC as gastight.

Enclosure 16

White Paper on *Submittal of Data in Lieu of Additional Trial Burns for Overpacked Munitions at the PCAPP Static Detonation Chambers, 24852-30H-SDC-L0002, Rev. 001*

OPSEC Cleared 10/5/2022

WHITE PAPER ON

Submittal of Data in Lieu of Additional Trial Burns for Overpacked Munitions at the PCAPP Static Detonation Chambers

Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) Project

REV	DATE	REASON FOR REVISION	BY A. Shaffer	CHKD N. Chennubhotla	EGS	PEM	APPR J. Earley
001	2/7/2023	Updated for reject munitions processing	Shaffer, Andrew	Chennubhotla, Naveen (NKCHENNU)	NA	NA	Earley, James
000	1/12/2023	Issued for Use	NA	NA	NA	NA	NA

ORIGIN		JOB NO. 24852	
Bechtel Pueblo Team		DOCUMENT NO. 24852-30H-SDC-L0002	REV 001
		Sheet 1 of 19	

Table of Contents

ACRONYMS

CCR	Colorado Code of Regulations
ER	Emission Rate
HD	bis(2-chloroethyl) sulfide
HT	HD with 40 wt% agent T, bis[2(2-chloroethylthio)-ethyl] ether
PCAPP	Pueblo Chemical Agent-Destruction Pilot Plant (DoD Colorado)
PCD	Pueblo Chemical Depot
SDC	Static Detonation Chamber
SRC	Single Round Container

1 OBJECTIVE

The objective of this white paper is to document proposed feed rates and information needed to meet the Colorado Code of Regulation (CCR) governing the submittal of data in lieu of a trial burn to demonstrate conformance with6 CCR 1007-3 § 264.342 through 264.345 (trial burn performance standards) and § 100.28 (incinerator permitting requirements). This will be done by providing the information required by § 100.28 of these regulations from previous compliance testing of the device in conformance with § 265.140 of the CCR.

The Static Detonation Chambers (SDCs), operated as part of the Pueblo Chemical Agent Destruction Pilot Plant (PCAPP), are needed to process leakers and rejects in addition to the munitions stockpile of 4.2-inch HD and HT mortars stored at the Pueblo Chemical Depot (PCD). Limited quantities of agent contaminated energetics/materials are also stored and require treatment at the SDCs. Leakers, rejects and agent contaminated energetics/parts are all stored in overpacks. Trial Burns and emissions sampling have been conducted for processing 4.2-inch stockpile munitions, but other waste streams (rejects, leakers, agent contaminated energetics and parts) are currently prohibited from being treated in the SDCs. This memo demonstrates that existing emissions data is bounding of leakers, rejects and agent contaminated energetics/parts and that existing Colorado regulations provide a path-forward for permitting their treatment using this data in lieu of a trial burn.

A list of the types and quantities of munitions/waste in overpack containers are shown in Table 1-1 below.

Table 1-1. Description of Overpacked Munition and Waste Feed Types (as of 12/31/2022)

Overpack Waste Type	Waste Source
HD Projectile M104 155mm	munition
HD Projectile M110 155mm	munition
HD Cartridge M60 105mm	munition
Propellant M67 105mm	propellant
Burster M5	munition
repacked Burster M5	munition
Burster M6	munition
Repacked Burster M6	munition
HT Cartridge M2 4.2in Mortar	munition
HD Cartridge M2A1 4.2in Mortar	munition
HD Cartridge M2A1 4.2in Mortar in Fiber Tube	munition
Total (approximate)	425

*Refers to bursters overpacked without munitions or recoverable amounts of chemical agent. Exact numbers are dependent upon packaging (number of bursters per overpack).

The quantity of overpacks represents a limited scope and duration campaign at the SDCs. Feed rates for overpacked and rejected munitions will be below that which was demonstrated in the SDC Trial Burn period. The total agent mass represented by the munitions in Table 1-1 is the same as is contained in approximately 350 4.2-inch HD mortars, or 1-2 days of normal SDC facility processing. Also, the extended processing time associated with each overpack, and the fewer munitions fed per feed cycle compared to previous Trial Burn tests will result in much lower emission rates (ERs) of compounds of potential concern (COPC) and other regulated emissions than previously demonstrated. No new COPCs are expected from the processing of overpacks. Alternatives to performing a trial burn for permitting the treatment of these wastes are preferred because of these differences. Specifically, the case and requirements for submitting data in lieu of additional trial burns for a permitted incinerator have been evaluated. The regulatory and technical basis for performing a limited overpack campaign is presented in the remainder of this document.

2 BACKGROUND INFORMATION

The Colorado Code of Regulations (CCR), 6 CCR 1007-3 Part 100.41(b)(5)(v) reference states,

> *"The owner or operator may seek an exemption from the trial burn requirements to demonstrate conformance with § § 264.342 through 264.345 of these regulations and § 100.28 of these regulations by providing the information required by § 100.28 of these regulations from previous compliance testing of the device in conformance with § 265.140 of these regulations."*

The data needed to address the requirements in the quoted section of the CCR (§ § 264.342 through 264.345) was collected during the SDC Trial Burns that were conducted in March and April 2022. The SDC Agent (Phase 2) Trial Burn Plan (PCD Hazardous Waste Permit, CO-13-12-23-01, Annex 3 Attachment 13B) was designed and executed to document performance that meets the standards prescribed in § § 264.342 through 264.345 and § 265.140. The results and conclusions from the testing executed under this plan have been reported in four individual Trial Burn reports (Ref 1-4) that are summarized in the Summary Agent Trial Burn Report on Static Detonation Chamber (SDC) Agent (Phase 2) HD/HT Sites 1, 2, and 3 (24852-30R-SDC-L0021, Ref 5), referred to here as the “Final SDC Summary Trial Burn Report”. The Final SDC Summary Trial Burn Report documents performance of the systems across the three SDCs/four trial burns and is used as a single point of reference throughout this white paper. Successful treatment of the 4.2-inch HD and HT mortars was demonstrated at a waste feed-rate of 6 mortars per hour as presented in the Final SDC Summary Trial Burn Report. Because these tests were designed and conducted in compliance with § § 264.342 through 264.345 the outcome from those tests may be applied to waste streams with similar characteristics. Different types of Single Round Containers (SRCs) or overpacks were used throughout PCAPP operations. The overpacks are various diameter steel tubes with bolted flange endcaps. The true variation in waste feed is with the material stored inside the overpacks; the munitions and/or munition components. The SDC was designed to process these wastes (overpacked munitions/parts) and the design basis includes the processing of overpacks at a feed-rate reduced from the rate for boxed munitions. At a feed rate of one overpack every 2.5 hours, all agent-based overpack-related processing and waste feed will be at rates lower than those demonstrated during the SDC agent trial burns, regardless of munition type in the overpack (155mm, 105mm or 4.2-inch mortar). The wastes listed in Table 1-1 list overpacked propellant materials in addition to munition types. Although performance of the PCAPP SDCs while processing propellant material has not been measured, a similar unit in Anniston Alabama has been shown to effectively treat M67 propellant at rates much higher than what has been proposed for overpacks at the PCAPP SDCs. This document provides the information required by § 100.41(b)(5)(v) thus obviating the need for an additional Trial Burn.

The remainder of this white paper identifies the characteristics of the different wastes and other information required under § 100.41(b)(5)(v) to demonstrate conformance with § § 264.342 through 264.345 of the CCR. Munition, energetic, and propellant data is referenced from the PCAPP Design Criteria for Plant Process (Ref 8).

3 MUNITION DERIVED WASTE FEED CHARACTERIZATION AND PROPOSED PROCESSING RATES

The requirements of § 100.41(b)(5)(v) with respect to the treatment of munition-based wastes (delineated in Table 1-1) are as follows:

3.1 ANALYSIS OF THE WASTE/MIXTURE OF WASTES (§ 100.41(B)(5)(V)(A))

a. The heat value of the primary waste (HD or HT agent) is identical to what was treated/demonstrated as summarized/referenced in the Final SDC Summary Trial Burn Report (8,550.046 BTU/lb HD, 8,500-9,400 BTU/lb HT) (Ref 5). Other non-agent constituents of the waste stream can be found in Table 3-2

b. The viscosity of the liquid HD is 3.95 centistokes and 6.05 centistokes for liquid HT; these values are identical to those used in Trial Burn testing. Additional physical characteristics are provided in Table 3-1.

Table 3-1. Physical Properties of the Principal Organic Hazardous Constituents – HD and HT

Property	HD	HT
Chemical name	bis(2-chloroethyl) sulfide, or 2,2'-dichlorodiethyl sulfide	HD with 40 wt% agent T, bis[2(2-chloroethylthio)-ethyl] ether
Chemical formula	$C_4H_8Cl_2S$	(H) - $C_4H_8Cl_2S$; (T) - $C_8H_{16}Cl_2OS_2$
Molecular weight	159 g/mol	189.14764 g/mol
Vapor specific gravity (air = 1.00)	5.4	6.92
Liquid density at 68°F	79.49 lb/ft^3	79.49 lb/ft^3
Melting point	58°F ft^3	32 to 34.3°F
Boiling point	423°F	> 442°F (no constant boiling point)
Vapor pressure at 68°F	0.069 mmHg	0.066 mmHg
Flash point	221°F	212°F
Viscosity at 68°F	3.95 centistokes	6.05 centistokes
High heating value at 60°F	8,500 Btu/lb	8,500–9,400 Btu/lb
Color	Amber/dark brown liquid	Amber/dark brown liquid
Odor	Garlic	Garlic
Special properties	Permeates ordinary rubber	Permeates ordinary rubber
Solubility properties	Water (distilled), 0.092 g/100 cc at 72°F Completely soluble in acetone, chloromethane, tetrachloromethane, tetrachloroethane, ethyl benzoate, or ether	Water (distilled), 0.092 g/100 cc at 72°F Completely soluble in acetone, chloromethane, tetrachloromethane, tetrachloroethane, ethyl benzoate, or ether
Physical state at 70°F	Viscous liquid	Viscous liquid

c. The constituents and quantification of this waste stream are identical to that as summarized/referenced in the Final SDC Summary Trial Burn Report and shown in Table 3-2. Constituents associated with the M6 propellant charges (4.2" mortars only) are included based on one reject or item per feed (1/hr) in Table 3-3.This Table also answers the requirement of § 100.41(b)(5)(v)(4).

Table 3-2. Summary of Munition Type and Summary of Agent and Constituent Composition

Constituent	HD Component Mass per 4.2-inch mortar (lb)	PCAPP HT Component Mass per 4.2 inch mortar (lb)	PCAPP HD Component Mass per 155mm Munition (lb)	PCAPP HD Component Mass per 105mm Munition (lb)
Agent Mass Per Round	6	5.8	11.7	3.17
HD (bis(2-Chloroethyl)sulfide)	5.424	3.1726	10.5768	2.86568
Q (1,2-bis(2-Chloroethylthio)ethane)	0.1866	0.2726	0.3639	0.0986
T (bis(2-(2-Chloroethylthio)ethyl) ether)	0.0084	1.6878	0.0164	0.0044
1,4-Dithiane	0.0888	0.0870	0.1732	0.0469
1,4-Oxathiane	0.0042	0.0232	0.0082	0.0022
1,2-Dichloroethane	0.0390	0.0348	0.0761	0.0206
2-Methyl-1-propene	0.0012	-	0.0023	0.0006
Thiirane	0.0012	-	0.0023	0.0006
2-Chloroethyl-3-chloropropyl sulfide	0.0840	-	0.1638	0.0444
bis(2-Chloropropyl) sulfide	0.0222	-	0.0433	0.0117
2-Chloroethyl 4-chlorobutyl sulfide	0.0684	-	0.1334	0.0361
bis(2-Chloroethyl) disulfide	0.0546	-	0.1065	0.0288
Hexachloroethane	0.0090	-	0.0176	0.0048
1,1,2,2-Tetrachloroethane	0.0030	-	0.0059	0.0016
Tetrachloroethylene	0.0030	-	0.0059	0.0016
Vinyl chloride	< 0.00084	-	0.0016	0.0004
s-(2-Chloroethyl)-1,4-dithianium ion	0.2112	0.0133	0.4118	0.1116
t (2-(2-Chloroethylthio)ethyl 2-chloroethyl ether)	-	0.2900		
s-(2-Hydroxyethyl)-1,4-dithianium chloride	-	0.0075		
1,4-Dithioniabicyclo[2,2,2] octane dication	0.0756	< 0.00058	0.1474	0.0399
Metals				
Non-Carcinogenic				
Antimony	0.00016	0.00016	0.00032	0.00009
Mercury	0.00090	0.00090	0.00176	0.00048
Selenium	0.00013	0.00013	0.00025	0.00007
Silver	0.00014	0.00014	0.00028	0.00008
Thallium	0.00001	0.00001	0.00003	0.00001
Carcinogenic				
Arsenic	0.00003	0.00003	0.00006	0.00002
Beryllium	0.00001	0.00001	0.00003	0.00001
Fuze/Booster cup/Burster Energetics				
Burster Tetryl (mortar)/Tetrytol(munition)	0.14000	0.14000	0.41000	0.26000
AN #6 priming mix Potassium chlorate	0.00010	0.00010	-	0.00015
AN #6 priming mix Antimony sulfide	0.00003	0.00003	-	0.00005
AN #6 priming mix Lead azide	0.00003	0.00003	-	0.00004
AN #6 priming mix Carborundum	0.00001	0.00001	-	0.00001
Lead azide –	0.00030	0.00030	-	0.00120
Tetryl –	0.00050	0.00050	-	0.05080
Total Nitrogen (as a component of energetics)	0.03413	0.03413	0.09995	0.06338

d. Table 3-1 and Table 3-2 provide the quantification of constituents in the waste.

e. The sole principal hazardous organic constituent (POHC) in the waste is HD (bis(2-Chloroethylsulfide) or 54.7% (bis(2-Chloroethylsulfide (HD) and 29.31% (bis(2-(2-Chloroethylthio)ethyl) ether) (T) in HT.

Although tetrachloroethylene was identified as a POHC in the SDC Agent (Phase 2) Trial Burn Plan, its low percentage as a component of the agent (0.07% by weight in HD) resulted in it not being fed at rates sufficient to demonstrate 99.9999% destruction at the sampling and analytical method detection limit. At such a low concentration and feed rate this compound is not considered a POHC for future evaluations.

3.2 ENGINEERING DESCRIPTION OF THE SYSTEM USED TO TREAT THE WASTE (§ 100.41(B)(5)(V)(B))

As required by the regulation, a detailed engineering description of the system used for treating the overpacks containing munitions (the currently installed/permitted SDC systems) can be found in PCD Hazardous Waste Permit, CO-13-12-23-01, Annex 3 Attachment 8 - SDC Process Description.

3.3 DESCRIPTION OF THE WASTE TO BE BURNED (§ 100.41(B)(5)(V)(C))

A description and analysis of the waste to be burned and comparison with that used in previous Trial Burn testing is provided below. The waste to be burned under this request is the same HD or HT containing munitions as previously demonstrated with additional nylon (or other fusible material, like aluminum) bolts and metal (steel) mass from the overpack. Nylon bolts (or other) will replace the original steel bolts used to close one side of the overpack. As the nylon (or other fusible) bolts melt/soften in the SDC chamber the contents of the overpack will be exposed and heated faster than if the container remained closed. It will also enable the subsequent treatment verification for munition demilitarization. Note that nylon is not a listed or characteristic waste, however the mass of the nitrogen component of nylon is considered in this assessment as a worst-case impact on feed rate/emissions. This is included in the data presented in Table 3-3. No consideration is required in these assessments for aluminum bolts. The feed rate of the nylon components is so low (0.074lb/feed) that incomplete combustion is not a concern; the thermal oxidizer (THO) will fully oxidize by-products of nylon combustion. As shown in the last two rows of Table 3-3 the per-feed nitrogen loading for overpack wastes is less than demonstrated during the trial burns in all but the 155mm munition feed, however the hourly rates for all overpack scenarios remain well below what was demonstrated in the SDC Trial Burns. The feed rates of the waste and its constituents are presented on a per feed basis in the table below.

Table 3-3. Summary Of Demonstrated and Proposed Waste Feed Constituents for Munition Derived Overpacked Wastes

Constituent	Demonstrated SDC Feed - Three 4.2" HD Mortars every 30 minutes	Demonstrated SDC Feed - Three 4.2" HT Mortars every 30 minutes	Proposed Feed - One Overpacked 4.2" HD Mortar Munition every 150 minutes	Proposed Feed - One Overpacked 4.2" HT Mortar Munition every 150 minutes	Proposed Feed - One Overpacked 155mm Munition every 150 minutes	Proposed Feed - One Overpacked 105mm Munition every 150 minutes	Proposed Feed - One 4.2" HD Mortar Munition (w/M6 prop charge) every 60 minutes
Agent Mass Per Feed	18	17.4	6	5.8	11.7	3.17	6
HD (bis(2-Chloroethyl)sulfide)	16.2720	9.5178	5.4240	3.1726	10.5768	2.8657	5.4240
Q (1,2-bis(2-Chloroethylthio)ethane)	0.5598	0.8178	0.1866	0.2726	0.3639	0.0986	0.1866
T (bis(2-(2-Chloroethylthio)ethyl) ether)	0.0252	5.0634	0.0084	1.6878	0.0164	0.0044	0.0084
1,4-Dithiane	0.2664	0.2610	0.0888	0.0870	0.1732	0.0469	0.0888
1,4-Oxathiane	0.0126	0.0696	0.0042	0.0232	0.0082	0.0022	0.0042
1,2-Dichloroethane	0.1170	0.1044	0.0390	0.0348	0.0761	0.0206	0.0390
2-Methyl-1-propene	0.0036	-	0.0012	-	0.0023	0.0006	0.0012
Thiirane	0.0036	-	0.0012	-	0.0023	0.0006	0.0012
2-Chloroethyl-3-chloropropyl sulfide	0.2520	-	0.0840	-	0.1638	0.0444	0.0840
bis(2-Chloropropyl) sulfide	0.0666	-	0.0222	-	0.0433	0.0117	0.0222
2-Chloroethyl 4-chlorobutyl sulfide	0.2052	-	0.0684	-	0.1334	0.0361	0.0684
bis(2-Chloroethyl) disulfide	0.1638	-	0.0546	-	0.1065	0.0288	0.0546
Hexachloroethane	0.0270	-	0.0090	-	0.0176	0.0048	0.0090
1,1,2,2-Tetrachloroethane	0.0090	-	0.0030	-	0.0059	0.0016	0.0030
Tetrachloroethylene	0.0090	-	0.0030	-	0.0059	0.0016	0.0030
Vinyl chloride	< 0.00252	-	< 0.00084	-	0.0016	0.0004	< 0.00084
s-(2-Chloroethyl)-1,4-dithianium ion	0.6336	0.0400	0.2112	0.0133	0.4118	0.1116	0.2112
t (2-(2-Chloroethylthio)ethyl 2-chloroethyl ether)	-	0.8700	-	0.2900			-
s-(2-Hydroxyethyl)-1,4-dithianium chloride	-	0.0226	-	0.0075			-
1,4-Dithioniabicyclo[2,2,2] octane dication	0.2268	-	0.0756	< 0.00058	0.1474	0.0399	0.0756
Metals							
Non-Carcinogenic							
Antimony	0.00049	0.00049	0.00016	0.00016	0.00032	0.00009	0.00049
Mercury	0.00270	0.00270	0.00090	0.00090	0.00176	0.00048	0.00270
Selenium	0.00038	0.00038	0.00013	0.00013	0.00025	0.00007	0.00038
Silver	0.00043	0.00043	0.00014	0.00014	0.00028	0.00008	0.00043
Thallium	0.00004	0.00004	0.00001	0.00001	0.00003	0.00001	0.00004
Carcinogenic							
Arsenic	0.00009	0.00009	0.00003	0.00003	0.00006	0.00002	0.00009
Beryllium	0.00004	0.00004	0.00001	0.00001	0.00003	0.00001	0.00004

Fuze/Booster cup/Burster Energetics							
Burster Tetryl (mortar)/Tetrytol(munition)	0.42000	0.42000	0.14000	0.14000	0.41000	0.25710	0.14000
AN #6 priming mix Potassium chlorate	0.00030	0.00030	0.00010	0.00010	-	0.00015	0.00010
AN #6 priming mix Antimony sulfide	0.00010	0.00010	0.00003	0.00003	-	0.00000	0.00003
AN #6 priming mix Lead azide	0.00008	0.00008	0.00003	0.00003	-	0.00000	0.00003
AN #6 priming mix Carborundum	0.00002	0.00002	0.00001	0.00001	-	0.00000	0.00001
Lead azide –	0.00090	0.00090	0.00030	0.00030	-	0.00120	0.00030
Tetryl –	0.00150	0.00150	0.00050	0.00050	-	0.05080	0.00050
M6 propellant - feed components (Mortars in fibertubes only)							0.43000
nitrocellulose	-	-	-	-	-	-	0.31300
nitroglycerin	-	-	-	-	-	-	0.25800
diethylphthalate	-	-	-	-	-	-	0.01800
potassium nitrate	-	-	-	-	-	-	0.00800
ethyl centralite	-	-	-	-	-	-	0.00400
Total Nitrogen (as a component of enegertics and nylon bolts)	0.10239	0.10239	0.04334	0.04334	0.10916	0.07260	0.04334
Total Nitrogen (as a component of enegertics and nylon bolts) per hour	0.20478	0.20478	0.01734	0.01734	0.04367	0.02904	0.01734

3.3.1 4.2-inch HD Mortar Fiber Tube Evaluation

4.2-inch HD mortars remaining in their fiber tubes are included in the stockpile of overpacked munitions that will be processed at the PCAPP SDCs. These tubes were characterized as hazardous waste during a baseline configuration in which mortars stored in tubes and boxes were manually repackaged onto pallets. These fiber tubes have been identified as hazardous waste based on the presence of up to 50 ppm lead (Pb) in the tubes. Low levels of PCBs were detected in the analysis of some fiber tube components, but these values were below the criteria for identification as a underlying hazardous constituent. No other component of the tubes has been identified as hazardous through the waste determination process (Ref 9). The relative amount of Pb in a fiber tube can be evaluated by estimating the maximum demonstrated Pb feed rate, allowing for the known amount of Pb in a single 4.2-inch HD mortar, and assuming the remaining amount of Pb in the feed is in a fiber tube at 50ppm. Solving for the unknown yields a “mass of the fiber tube” maximum mass; if this value is greater than what could be reasonably expected for the mass of the tube itself, then the total mass of Pb in a mortar plus fiber tube must be less than what was demonstrated in the Trial Burn. This comparison is as follows

Trace amounts of Pb were fed to the SDCs as part of Trial Burn operations by way of the lead azide ($Pb(N_3)_2$) in the fuzes, specifically at a rate of 0.00209lb Pb/feed (total for 3 munitions). For feeds including one 4.2-inch HD mortar and a fiber tube, the total overpack Pb feed rate is the sum of the lead azide in the mortar plus Pb in the fiber tube. The Pb per feed, minus 1 motar's-worth Pb is 0.00139 lb. At a maximum concentration of 50 ppm Pb in the fiber tube, the tube itself would have to weigh more than 27 pounds to exceed the demonstrated Pb per-feed values. Given that the steel mortar with liquid agent fill itself only weighs 24.3 lbs, therefore a fiber tube weight of 27lbs is unreasonable. Therefore, the per-mortar/fiber tube Pb feed rate will not exceed that which has been demonstrated during Trial Burns; the data presented in Table 3-3 is bounding.

3.4 SDC OPERATING CONDITIONS (§ 100.41(B)(5)(V)(D))

Operating conditions for the SDCs will be identical to those documented in the Final SDC Summary Trial Burn Report (Ref 5) except for waste feed rate/feed interval. For overpack munitions the feed rate will be 0.4 overpack/hr or 1 overpack every 2.5 hours and 1.0 rejected munition/hr or 1 rejected munition every 1 hour.

3.5 DATA TO DEMONSTRATE EFFECTIVE TREATMENT (§ 100.41(B)(5)(V)(E))

The previous trial burns were conducted in March-April 2022 and results of these 4 Trial Burns are summarized in the Final SDC Summary Trial Burn Report (Ref 5).

a. Sampling and analytical techniques used in the previous trial burn are discussed in the Final SDC Summary Trial Burn Report.

b. Methods for monitoring process conditions and the result of temperatures, waste feed rates, carbon monoxide, and an appropriate indicator of combustion gas velocity as well as their accuracy are discussed in the Final SDC Summary Trial Burn Report.

3.6 EXPECTED OPERATING RANGES FOR EFFECTIVE TREATMENT IN THE SYSTEM (§ 100.41(B)(5)(V)(F))

Expected operational information for treatment of overpacked munitions are as follows:

a. Expected CO levels in the stack gas will be approximately 0-5 ppmv CO at 7% O_2, the same as was demonstrated during the higher feed rates demonstrated during the SDC Agent (Phase 2) Trial Burn.

b. Maximum waste feed rate for overpacked 155mm munitions: 11.7lb agent/munition x 0.4munition/hr = 4.68lb HD/hr, or 13% of what was demonstrated.

c. Temperatures for the DC match the current SDC Operations Plan conditions that were validated during the SDC Agent (Phase 2) Trial Burn.

d. Combustion gas velocity match the current SDC Operations Plan conditions that were validated during the SDC Agent (Phase 2) Trial Burn.

e. Expected stack gas volume, flow rate, and temperature match the current SDC Operations Plan conditions that were validated during the SDC Agent (Phase 2) Trial Burn.

f. Residence time in the combustion zone for the metal components (overpack and munition bodies) will be 2.5 hours or 1.0 for rejected munitions bodies/components. Gas residence time will match the current SDC Operations Plan conditions that were validated during the SDC Agent (Phase 2) Trial Burn.

g. The expected hydrochloric acid removal efficiency matches the current SDC Operations Plan conditions that were validated during the SDC Agent (Phase 2) Trial Burn.

h. Expected fugitive emissions and their control procedures match the current SDC Operations Plan conditions that were validated during the SDC Agent (Phase 2) Trial Burn.

i. Automatic Waste Feed Cut Offs (AWFCOs) match the current SDC Operations Plan conditions that were validated during the SDC Agent (Phase 2) Trial Burn. This is true except for for feed rate, which will be set to 0.4 overpacks/hr (1 feed every 2.5 hours) or 1 rejected munition or item every hour.

3.7 ADDITIONAL JUSTIFICATION FOR NOT PERFORMING TRIAL BURNS (§ 100.41(B)(5)(V)(G))

This use of PCAPP SDC Trial Burn data Ref 4in lieu of performing an additional trial burn for overpacked munitions also represents a more conservative estimate of the emissions generated during overpack processing than can be obtained from a trial burn. Because of the reduced feed rates (13% of tested agent feed rate) and extended interval between feeds (2.5 hours) a steady stream of emissions cannot be sampled. In the case of 1 overpack per 2.5 hours, only two feeds will occur during a trial burn test sampling period. Feed rates relative to those demonstrated in PCAPP SDC Trial Burn testing are shown in Table 3-4.

Table 3-4. Pro-rated Feed Rates in a Theoretical 155mm Munition (worst case) Overpack Trial Burn Relative to Demonstrated Trial Burn Runs

Evaluation assumes that emissions are generated 30 minutes after feed. Values for the 2.5-hour feed interval converted to hourly equivalents as required by a Trial Burn		
In-period feeds		2
Max hourly rate (over sampling duration)		% of 4.2-inch Mortar demonstrated values
agent (lb/hr)	3.99	13%
energetics (lb/hr)	0.16	19.5%
nitrogen (lb/hr)	0.04	20.4%

The impact of various test scenarios on emissions can be reasonably estimated to account for different feed intervals by using the emissions data collected from the previous trial burns. All non-detect organic emissions from the previous trial burn were held constant while detected compounds had their emission rates adjusted by the different feed interval scenarios (each hour or every 2.5 hours). For comparison, the sum of all emission rates (including detection-limit based rates) from the SDC 4.2-inch mortar HD trial burn was 0.0264 lb/hr, compared to a projected 0.0064 lb/hr at 2.5hr intervals (24.2% of tested). Because the projected emission rates from processing the overpacks is almost four times lower than demonstrated in previous trial burns, no meaningful system performance or health impact data of consequence will be gathered from a trial burn for overpacked munitions. The existing trial burn data represents the most conservative assessment of SDC impacts treating the wastes listed in this White Paper.

4 PROPELLANT DERIVED WASTE FEED CHARACTERIZATION AND PROPOSED PROCESSING RATES

The remaining PCAPP stockpile includes a limited number of agent exposed or contaminated M67 propellant now stored in overpacks. The PCAPP SDCs have not performed trial burns using M67 propellant in the hazardous waste feed, however a similar system in Anniston Alabama has processed these wastes and met RCRA incinerator standards. The propellant material in the PCAPP overpacks may be mildly agent contaminated, but not with amounts that would significantly impact the treatability of the material and well within demonstrated agent processing rates. Previous testing at the Anniston Alabama SDC demonstrated effective treatment of HD-filled 4.2-inch mortars and performance with respect to meeting regulatory limits (Ref 6). Subsequently, this same SDC facility tested M67 propellant-based feeds (net explosive weight of 22.9432 lb/feed) and demonstrated acceptable treatment performance as documented in the Static Detonation Chamber Final Condition 2 Emissions Test Report (Ref 7). The PCAPP facility has demonstrated the capacity to treat HD-filled mortars using a similar but more robust OTS system with higher capacity equipment than the Anniston system that successfully treated HD-filled mortars and propellant-based feeds (description of Anniston equipment can be found in Ref 6, PCAPP system descriptions can be found in the Annex 3 of the PCD permit). The requirements of § 100.41(b)(5)(v) state that owner/operators may seek an exemption from Trial Burn requirements to demonstrate conformance with the performance standards, “from compliance testing or trial or operational burns of similar boilers or industrial furnaces burning similar hazardous wastes under similar conditions”. With respect to the treatment of propellant-based wastes (quantities in Table 1-1), the information to document that the Anniston SDC M67 propellant testing meets the regulatory requirement as a “similar boiler or industrial furnace burning similar hazardous wastes under similar conditions) for the PCAPP SDCs are detailed in the following subsections:

4.1 ANALYSIS OF THE WASTE/MIXTURE OF WASTES (§ 100.41(B)(5)(V)(A))

a. The heat value of the waste (M67 propellant) demonstrated in the 2017 Anniston SDC test (Ref 7) was 4,547 BTU/lb (@77F). The same material and heat value is proposed for treatment at the PCAPP SDCs.

b. The M67 propellant fed to the Anniston SDC was a waxy solid, as is the feed planned at the PCAPP SDCs. Additional physical characteristics are provided in Table 4-1. Additional metals were included in the feed stream during the Anniston SDC testing; these additional metals are not included in the PCAPP waste stream and are not considered in these assessments.

c. The composition and properties of PCAPP’s M67 propelling charge (note the M67 charge is a seven increment bag charge system that uses M1 propellant) are the same as demonstrated in the 2017 Anniston SDC test (Ref 7) and are provided in Table 4-1. Data is sourced from Ref 8. This table also answers the requirement of § 100.41(b)(5)(v)(4).

Table 4-1. Composition and Physical Properties of M1Propellant used in M67 Propelling Charge

Property	M1 Propellant (boxed 105mm munitions)
Chemical name	Nitrocellulose (86.1%), Dinitrotoluene (9.9%), Dibutylphthalate (3.0%), Diphenynlamine (1.0%)
Chemical formula	$C_{6.51038}H_{7.78732}N_{2.29648}O_{8.75626}$
Molecular weight	258.31
High heating value at 60°F	4,547 BTU/lb (@77F)
Physical state at 70°F	solid

d. The principal hazardous organic constituents (POHCs) in the waste are nitrocellulose, dinitrotoluene, dibutylphthalate, and diphenylamine.

4.2 ENGINEERING DESCRIPTION OF THE SYSTEM USED TO TREAT THE WASTE (§ 100.41(B)(5)(V)(B))

As required by the regulation, a detailed engineering description of the system used for treating M67 propellant at Anniston can be found in Section 2.0 in the Anniston report (Ref 7). The PCAPP SDCs are equivalent or more robust in every case. A description of the PCAPP system can be found in Annex 3 Attachment 8 - SDC Process Description and the Anniston Systems in Ref 6.

4.3 DESCRIPTION OF THE WASTE TO BE BURNED (§ 100.41(B)(5)(V)(C))

A description and analysis of the waste to be burned and comparison with that used in previous Trial Burn testing are provided below. The waste to be burned under this request is the same (M67 propelling charge with M1 propellant) as treated in the Anniston SDC with additional metal (steel) mass from the overpacks and nylon bolts. Nylon bolts will replace the original steel bolts used to close one side of the overpacks. As the nylon bolts melt in the SDC chamber the contents of the overpacks will be exposed and aid in the heating of the munition. It will also make the subsequent waste (treated munition and overpack bodies) easier to document as having been demilitarized. Note that nylon is not a listed or characteristic waste. Feed rates of nylon for PCAPP overpack processing are negligible compared to the demonstrated energetics feed rates at the Anniston SDCs and are summarized in Table 4-2. The proposed PCAPP feed rate of M67 propellant is approximately 1.4% of that demonstrated in the Anniston SDCs.

Table 4-2. Summary Of Demonstrate and Proposed Waste Feed Rates for Propellant Derived Wastes

Feed Characteristic/Type	feed lb/feed event	feed lb/hr (leaker/reject)
Anniston M67 Feed	22.9432	83.2838
Proposed PCAPP Feed	2.8300	1.1320/2.8300
PCAPP Percent of Aniston Feed	12.33%	1.36%/12.33%

4.4 SDC OPERATING CONDITIONS (§ 100.41(B)(5)(V)(D))

Operating conditions for the SDCs will be equivalent or more restrictive than those implemented in the Anniston SDC demonstrations of propellant processing. Overpacked propellant will be fed to the PCAPP SDCs at a rate of 0.4 overpack/hr or 1 overpack every 2.5 hours.

4.5 DATA TO DEMONSTRATE EFFECTIVE TREATMENT (§ 100.41(B)(5)(V)(E))

A previous trial burn demonstrating propellant treatment was performed at the Anniston SDCs in a unit comparable to the PCAPP SDCs. Agent destruction emissions testing conducted at Anniston (Ref 6) and the PCAPP SDCs (Ref 5) demonstrates that both units are capable of effectively treating HD containing hazardous waste under similar conditions and using similar sampling and analysis methods. Sampling and analytical techniques, operating, parameters, waste feed rates, combustion gas velocity, carbon monoxide levels, emissions data (information to address the requirements of (§ 100.41(b)(5)(v)(E)) and other results from the Anniston testing of propellant is reported in the Static Detonation Chamber Final Condition 2 Emissions Test Report (Ref 7). This body of data from Anniston can also be used to evaluate the potential impact of propellant processing to PCAPP SDC risk and hazard as evaluated in the Multiple Pathway Health Risk Assessment (MPHRA) process.

Anniston SDC emissions were compared to emissions measured during the PCAPP SDC trial burns to predict the risk and hazard to assess the emissions impact of propellant processing. For this analysis, the emission rates and risk/hazard values for the top 10 chemicals of potential concern (COPC) from the individual PCAPP SDC Trial Burn tests (Ref 1, Ref 2, Ref 3, and Ref 4) were compared to emission rates from the Anniston SDC trials. To do this the ratio of Anniston emission rate to the max SDC trial burn base emission rate is multiplied by the max risk/hazard component from the SDC-only Trial Burn MPHRA evaluations. The formula below scales the SDC MPHRA results based on the Anniston data.

$$Estimated\ PCAPP\ SDC\ risk\ or\ hazard\ = \frac{COPCER_{Anniston}}{COPCER_{PCAPPAvg}} \times COPC_{PCAPP\ SDC-only\ risk\ or\ hazard}$$

In cases where a specific COPC/analyte was not included in the Anniston data set, the PCAPP SDC emission was included in its place. It should be noted that the assumptions behind this comparison assume that the PCAPP SDCs would be processing propellant for the full operational duration of 30.5 months rather than the limited duration needed for the approximately 30 propellant waste containers. Comparisons for chronic risk, chronic hazard, and acute (onsite) hazard are shown in the three tables below. A separate assessment of acute (offsite) hazard was not conducted, because onsite estimates are higher than those for offsite.

Table 4-3. Evaluation of Anniston SDC Emissions Relative to PCAPP SDC Chronic Risk

Compiled SDC Top 10 Chronic Risk Components	SDC base emission rate (lb/hr)	Anniston SDC lb/hr	Site with lower ER	Predicted Max MPHRA Chronic Risk Impact (1e-6 limit)
cadmium	2.57E-07	5.82E-08	Anniston	9.94E-09
cobalt	4.16E-06	2.18E-07	Anniston	7.44E-10
chromium (6+)	5.11E-06	2.44E-06	Anniston	1.05E-09
nickel	1.40E-05	1.52E-06	Anniston	9.83E-11
Total PCDDs and PCDFs	na	na	na	6.08E-10
arsenic	3.33E-06	3.28E-07	Anniston	2.65E-11
bis(2-chloroethyl)ether	4.06E-06	1.94E-05	PCAPP	1.23E-09
2,4-dinitrotoluene	1.06E-06	1.60E-06	PCAPP	3.00E-10
beryllium	5.09E-08	1.72E-07	PCAPP	5.52E-10
HD	3.18E-06	3.18E-06	na	6.42E-11
benzaldehyde	1.12E-05	1.83E-05	PCAPP	2.73E-11
benzene	7.23E-04	2.64E-06	Anniston	2.88E-11
Summary Result as predicted with Anniston propellant processing data				**1.47E-08**
Summary Result as a percent of SDC-only MPHRA result				**26%**

Table 4-4. Evaluation of Anniston SDC Emissions Relative to PCAPP SDC Chronic Hazard

Compiled SDC Top 10 Chronic Hazard Components	SDC base emission rate (lb/hr)	Anniston SDC lb/hr	Processing with lower ER	Predicted Max MPHRA Chronic Hazard Impact (0.25 limit)
methyl mercury	5.57E-07	2.23E-06	PCAPP	0.088072
cadmium	2.57E-07	5.82E-08	Anniston	0.000544
Total PCDDs and PCDFs	na	na	na	0.000220
iron	5.93E-05	na	na	0.000120
zinc	2.92E-05	1.76E-05	Anniston	0.000055
aluminum	1.26E-04	na	na	0.000076
cobalt	4.16E-06	2.18E-07	Anniston	0.000002
manganese	2.29E-04	7.51E-06	Anniston	0.000002
selenium	2.85E-06	8.57E-07	Anniston	0.000007
mercuric chloride	5.57E-07	2.23E-06	PCAPP	0.000120
silver	1.48E-05	2.21E-06	Anniston	0.000007
tetryl	1.55E-06	na	na	0.088072
Summary Result as predicted with Anniston propellant processing data				**0.09**
Summary Result as a percent of SDC-only MPHRA result				**454%**

Table 4-5. Evaluation of Anniston SDC Emissions Relative to PCAPP SDC Acute (Onsite) Hazard

Compiled SDC Top 10 Acute Hazard Components	SDC base emission rate (lb/hr)	Anniston SDC lb/hr	Processing with lower ER	Predicted Max MPHRA Acute Hazard Impact (1.00 limit)
nickel	1.40E-05	1.52E-06	Anniston	0.0006355
arsenic	3.33E-06	3.28E-07	Anniston	0.0001369
HD	3.18E-06	3.18E-06	na	0.0003530
2-chlorobutane	1.29E-03	na	na	0.0002160
benzene	7.23E-04	2.64E-06	Anniston	0.0000082
chloroform	7.85E-05	1.16E-04	PCAPP	0.0000564
chlorine	8.51E-05	1.52E-04	PCAPP	0.0000602
copper	1.61E-05	1.62E-06	Anniston	0.0000013
silver	1.48E-05	2.21E-06	Anniston	0.0000018
2,3,7,8-TCDD	3.36E-12	1.96E-12	Anniston	0.0000054
hydrogen chloride	1.69E-04	7.34E-04	PCAPP	0.0000292
iron	5.93E-05	na	na	0.0000049
manganese	2.29E-04	7.51E-06	Anniston	0.0000002
Summary Result as predicted with Anniston propellant processing data				**0.0009**
Summary Result as a percent of SDC-only MPHRA result				**11%**

Most Anniston SDC emission rates are well below PCAPP trial burn rates therefore no impact to overall MPHRA outcome is anticipated. This is supported by the predicted MPHRA values for chronic risk and acute (onsite) hazard. For chronic hazard assessment Anniston mercury emissions drive the predicted outcome; this outcome is still well below Colorado hazard estimate requirements. Of the three component Anniston mercury results, two results were below detection limits with the third detected due to enhanced method performance for that sample. This suggests that actual mercury emissions in the Anniston off gas stream are at the lower limits of that method's detection and that the difference in emission rates between PCAPP and Anniston are largely due to differences in analytical method/sampling. Regardless of specific Anniston mercury emissions estimates, PCAPP emissions as demonstrated during the Trial Burns will likely be lower when processing overpacks and rejects due to the units' OTS configuration (PCAPP has two banks of sulfur impregnated carbon in its OTS whereas Anniston's SDC only had one bank). The PCAPP SDCs also utilize mercury CEMS to continuously monitor mercury in the stack gas. These CEMS utilize action/alarm concentrations lower than what was used for PCAPP SDC MPHRA evaluations, thus avoiding an exceedance of PCAPP SDC MPHRA conditions. The estimate of chronic hazard from non-mercury components from the Anniston emissions is less than observed at the PCAPP SDCs. Collectively, this assessment demonstrates that the Anniston SDC data, combined with existing monitoring requirements (mercury CEMS) in the PCAPP SDC permit, is sufficient to demonstrate effective treatment.

4.6 EXPECTED OPERATING RANGES FOR EFFECTIVE TREATMENT IN THE SYSTEM (§ 100.41(B)(5)(V)(F))

Expected operational information for treatment of overpacked munitions is as follows:

a. Expected CO levels in the stack gas will be approximately 0-5 ppmv CO at 7% O_2, the same as was demonstrated in the SDC Agent (Phase 2) Trial Burn (Ref 5).

b. Maximum waste feed rate will be for overpacked propellant is 2.83 lb/overpack (1.1320 lb/hr) or 1.36% of that demonstrated at the Anniston SDC.

c. Temperatures for the DC will match the current SDC Operations Plan conditions that were validated in the SDC Agent (Phase 2) Trial Burn.

d. Combustion gas velocity will match the current SDC Operations Plan conditions that were validated in the SDC Agent (Phase 2) Trial Burn.

e. Expected stack gas volume, flow rate, and temperature will match the current SDC Operations Plan conditions that were validated in the SDC Agent (Phase 2) Trial Burn.

f. Residence time in the combustion zone for the metal components (overpack and munition bodies) will be 2.5 hours or 1.0 for rejected munitions bodies/components, gas residence time will match the current SDC Operations Plan conditions that were validated in the SDC Agent (Phase 2) Trial Burn.

g. The expected hydrochloric acid removal efficiency matches the current SDC Operations Plan conditions that were validated in the SDC Agent (Phase 2) Trial Burn.

h. Expected fugitive emissions and their control procedures will match the current SDC Operations Plan conditions that were validated in the SDC Agent (Phase 2) Trial Burn.

i. Automatic Waste Feed Cut Off (AWFCO) will match the current SDC Operations Plan conditions that were validated during the SDC Agent (Phase 2) Trial Burn. This is true except for for feed rate, which will be set to 0.4 overpacks/hr (1 feed every 2.5 hours) or 1 rejected munition or item every hour.

4.7 ADDITIONAL JUSTIFICATION FOR NOT PERFORMING TRIAL BURNS (§ 100.41(B)(5)(V)(G))

This submittal of data in lieu of an additional trial burn for overpacked munitions or rejected munitions represents a conservative estimate of the expected emissions generated during waste processing and are likely more conservative than emissions data that may be obtained from an actual trial burn.

5 CONCLUSION AND RECOMENDATIONS

As summarized in this review, the Colorado Code of Regulations includes provisions for submittal of data in lieu of a trial burn test. This approach is warranted for the treatment of overpacked munitions at the PCAPP SDCs because the reduced waste feed rate in planned overpack processing would reduce the emissions to a fraction of those previously characterized and documented at PCAPP and Anniston (Ref 5, Ref 6, and

Ref 7). The process for submitting the referenced information to CDPHE as a justification for limited processing of overpacks at the PCAP SDCs should be initiated upon approval of all Trial Burn reports.

6 REFERENCES

Ref 1. 24852-30R-SDC-L0017 Final Report on HD Trial Burn for the Static Detonation Chamber Unit #2

Ref 2. 24852-30R-SDC-L0019 Final Report on HT Trial Burn for the Static Detonation Chamber Unit #2

Ref 3. 24852-30R-SDC-L0020 Final Report on HD Trial Burn for the Static Detonation Chamber Unit #1

Ref 4. 24852-30R-SDC-L0018 Final Report on HD Trial Burn for the Static Detonation Chamber Unit #3

Ref 5. 24852-30R-SDC-L0021 Summary Agent Trial Burn Report on Static Detonation Chamber (SDC) Agent (Phase 2) HD/HT Sites 1, 2, and 3

Ref 6. Anniston Chemical Agent Disposal Facility Final Static Detonation Chamber Emissions Test Report Condition 4b. Revision 0, October 2011

Ref 7. (Anniston) Static Detonation Chamber Final Condition 2 Emissions Test Report Revision 0, June 2017

Ref 8. 24852-RD-3DR-000-B0001 Design Criteria for Plant Process

Ref 9. PCAPP Hazardous Waste Determination Form: 4.2 Munition Fiber Tube (Profile number WPR180131-002)

Enclosure 17

AECOM: *Static Detonation Chamber Final Condition 2 Emissions Test Report , Rev. 0*

Design and Operating information for Anniston SDCs

AECOM

STATIC DETONATION CHAMBER
FINAL CONDITION 2 EMISSIONS TEST REPORT

Revision 0, June 2017

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ACRONYMS AND ABBREVIATIONS

% .... percent
± .... plus or minus
< .... less than
> .... greater than
≤ .... less than or equal to
≥ .... greater than or equal to
° .... degree
°C .... degrees Celsius
°F .... degrees Fahrenheit
5X .... 5 times
6X .... 6 times

ADEM .... Alabama Department of Environmental Management
AES .... atomic emission spectrometry

C2 .... Condition 2
CAA .... Clean Air Act
CCC .... calibration check compound
CCV .... continuing calibration verification
CDD .... octachlorinated dibenzo-p-dioxin
CEMS .... Continuous Emissions Monitoring System
cfm .... cubic feet per minute
CFR .... Code of Federal Regulations
CO .... carbon monoxide
CO_2 .... carbon dioxide
COC .... chain-of-custody
CON .... Control Room
CRO .... Control Room Operator
CVAAS .... cold vapor atomic absorption spectroscopy

DAS .... Data Acquisition System
DC .... detonation chamber
DI .... deionized
dscm .... dry standard cubic meter
dsL .... dry standard liter

EDL .... estimated detection limit
EPA .... Environmental Protection Agency

FID .... flame ionization detector
FPI .... feed prohibitive interlock

GC .... gas chromatography
GRAV .... gravimetric
gr/dscf .... grains per dry standard cubic feet

ACRONYMS AND ABBREVIATIONS (Continued)

HCl.................hydrogen chloride
HNO_3.............nitric acid
H_2O_2...............hydrogen peroxide
HPLC ....high performance liquid chromatography
HHRA ....Human Health Risk Assessment
HRGC ....high resolution gas chromatograph
HRMS ....high resolution mass spectroscopy
hrs...................hours
H_2SO_4............sulfuric acid

IAW................in accordance with
IC....................ion chromatography
ICAL ....initial calibration
ICP ....inductively coupled plasma
ICS ....interference check sample

in ....inches
inHg................inch of mercury
inwc................inch of water column

$KMnO_4$...........potassium permanganate

L ....liter
lbs/event ....pounds per event
lbs/hr ....pounds per hour
LC1 ....Loading Chamber 1
LC2 ....Loading Chamber 2
LCS ....laboratory control sample
LCSD ....laboratory control sample duplicate
LDC................Lower DC
L/min..............liters per minute

M1 ....US EPA Method 1
M2 ....US EPA Method 2
M3A ....US EPA Method 3A
M3B ....US EPA Method 3B
M4 ....US EPA Method 4
M5 ....US EPA Method 5
M6C ....US EPA Method 6C
M7E................US EPA Method 7E
M10 ....US EPA Method 10
M26A ....US EPA Method 26A
M29 ....US EPA Method 29
MM5E ....US EPA Modified Method 5
M0010 ....SW-846 Method 0010
M0023A ....SW-846 Method 0023A

ACRONYMS AND ABBREVIATIONS (Continued)

M0031............SW-846 Method 0031
M0040............SW-846 Method 0040
M3510C ....SW-846 Method 3510C
M3535............SW-846 Method 3535
M3540C ....SW-846 Method 3540C
M3542............SW-846 Method 3542
M5041A ....SW-846 Method 5041A
M6010............SW-846 Method 6010
M7470A ....SW-846 Method 7470A
M7471A ....SW-846 Method 7471A
M8260B ....SW-846 Method 8260B
M8270C ....SW-846 Method 8270C
M8290............SW-846 Method 8290
M8330............SW-846 Method 8330
MACT............Maximum Achievable Control Technologies
MDL..............method detection limit
mg ....milligram
mL..................milliliter
mmHg ....millimeters mercury
MS..................matrix spike
MS..................mass spectrometer
MSD..............matrix spike duplicate

N....................normal
NaOH ....sodium hydroxide
ND..................not detected
NEW ....net explosive weight
ng....................nanograms
ng/dscm ....nanograms per dry standard cubic meter
NOx................nitrogen oxides

O_2 ....oxygen
OGT ....Off-Gas Treatment (System)

PDARS...........Process Data Acquisition and Recording System
PIC ....product of incomplete combustion
PLC ....programmable logic controller
ppm_v ....parts per million by volume

QA..................quality assurance
QAPP ....Quality Assurance Project Plan
QC..................quality control

RATA.............Relative Accuracy Test Audit
RCRA.............Resources Conservation and Recovery Act
RF...................response factor

ACRONYMS AND ABBREVIATIONS (Continued)

RL ....reporting limit
RPD................relative percent difference
RSD................relative standard deviation
RT ....retention time

SAP ....Sampling and Analysis Plan
SDC................Static Detonation Chamber
SO_2 ....sulfur dioxide
SPCC.............system performance check compounds

TCO................total chromatographable organics
TEF ....toxic equivalent factor
TEQ................toxic equivalent quotient
TIC ....tentatively identified compound
TOC................total organic compounds
TRM...............temporary reference method

ug/dscm ....micrograms per dry standard cubic meter
UDC ....Upper DC
US ....United States

WDC ....Washington Demilitarization Company, LLC
WMM............waste military munition

ES.1 OVERVIEW

Washington Demilitarization Company (WDC) conducted an emissions test while processing non-mass detonating energetics and surrogate metals at increased feeds. This emissions test was conducted in accordance with (IAW) the requirements listed in the Resource Conservation and Recovery Act (RCRA) and Clean Air Act (CAA) Permits. As summarized in Table ES-1, the emissions test was performed March 22 - 25, 2017. A Relative Accuracy Test Audit (RATA) was also performed March 23 - 26, 2017.

The purpose of this final report is to convey to the Alabama Department of Environmental Management (ADEM) data regarding the performance standards and processing parameters that are enumerated in the RCRA and CAA Permits for the Static Detonation Chamber (SDC) System. The emissions test was performed to demonstrate the following objectives as outlined in the SDC Emissions Test Plan for Condition 2 (C2):

- Demonstrate a non-mass detonating feed rate of less than or equal to (≤) 23.0 pounds per event (lbs/event);
- Demonstrate that dioxin/furan emissions do not exceed 0.20 nanograms (by Toxic Equivalency Quotient) per dry standard cubic meter (ng-TEQ/dscm) corrected to 7 percent (%) oxygen (O_2);
- Demonstrate that mercury emissions do not exceed 8.1 micrograms per dry standard cubic meter (ug/dscm) corrected to 7% O_2;
- Demonstrate that lead and cadmium (combined) emissions do not exceed 10 ug/dscm corrected to 7% O_2;
- Demonstrate that arsenic, beryllium, and chromium (combined) emissions do not exceed 23 ug/dscm corrected to 7% O_2;
- Demonstrate that carbon monoxide (CO) emissions do not exceed 4.6 pounds per hour (lbs/hr) dry basis and corrected to 7% O_2 using facility Continuous Emissions Monitoring System (CEMS);
- Demonstrate that hydrochloric acid and chlorine gas emissions do not exceed 21 parts per million by volume (ppm_v), expressed as hydrochloric acid equivalents, dry basis and corrected to 7% O_2;
- Demonstrate that particulate matter emissions do not exceed 0.0016 grains per dry standard cubic feet (gr/dscf) corrected to 7% O_2;
- Demonstrate that emissions are less than the screening levels established in the SDC Human Health Risk Assessment (HHRA);
- Conduct a RATA during a test run to validate the facility CEMS data.

A total of 4 test runs were conducted; however, only Runs 2, 3, and 4 were used to compare emissions to permitted limits.

After the first 2-hours (hrs) of sampling for Run 1, port change commenced. During the port change, a leak in the SW-846 Method 0023A (M0023A) sampling train was discovered at a rate greater than allowed for correction per the method. Because of this failed leak check, the first 2-hrs of sampling for the M0023A sampling train were deemed invalid and abandoned. The M0023A sampling train was restarted during the second 2-hrs of sampling. After 4-hrs of sampling were completed for the other sampling trains, WDC opted not to continue sampling for another 2-hrs to complete the M0023A sampling train.

In addition to not completing the M0023A sampling train, off-scale readings were obtained for the CO and nitrogen oxides (NO_x) Temporary Reference Method (TRM) CEMS, and SW-846 Method 0400 (M0040) analysis yielded unspeciated carbon results that exceeded the calibration range. For these reasons, Run 1 was archived and only Runs 2, 3, and 4 were analyzed by the off-site laboratory.

All testing and system/analytical data collection planned for the emissions test were completed. WDC has reviewed the data to assess their usability and determined the data to be useable for their intended purpose.

The operating condition of the SDC System was captured by the Process Data Acquisition and Recording System (PDARS).

ES.2 SAMPLING METHODS

On-site sampling activities included the equipment staging in the field, sampling operations, data logging, and sample recovery. Exhaust gas samples were collected IAW the approved SDC C2 Emissions Test Plan using the following methods:

- United States (US) Environmental Protection Agency (EPA) Methods 1 (M1) and 2 (M2) for traverse sampling locations and flow rates;
- US EPA Method 3B (M3B)for carbon dioxide (CO_2) and O_2 levels;
- US EPA Method 4 (M4) for moisture;
- US EPA Method 6C (M6C) for sulfur dioxide (SO_2) emissions;
- US EPA Method 7E (M7E) for NO_x emissions;
- US EPA Method 10 (M10) for CO concentrations;
- SW-846 Method 0010 (M0010) for semivolatile organic emissions,
- SW-846 Method 0010 (M0010-Total Organic Compounds [TOC]) for unspeciated and gravimetric organic emissions;
- M0023A for dioxin/furan emissions;
- SW-846 Method 0031 (M0031) for volatile organic emissions;
- M0040 for volatile unspeciated organic emissions;
- US EPA Method 26A (M26A) for the acid gas and Method 5 (M5) particulate emissions;

- US EPA Method 29 (M29) for trace metal emissions, and
- US EPA Modified Method 5 (MM5E) for energetic emissions.

ES.3 DAILY RUN SUMMARIES

The following are daily accounts of the on-site test activities. These summaries are presented in sequential order for the entire emissions testing effort and include the preliminary measurements. Table ES-1 presents a summary of the sampling times.

Tuesday, March 21, 2017 - Preliminary Measurements: Preliminary velocity traverses and cyclonic flow checks were conducted at the exhaust blower duct prior to the start of the emissions test. Moisture runs were also conducted to verify the moisture content of the exhaust gas. The cyclonic flow measurements within the duct at the sampling location yielded results within specified limits. All velocity and moisture measurements were reliable indicators of actual flow and moisture conditions and did not change appreciably from run to run. The M0010, M0010-TOC, M0023A, M26A, M29, and MM5E field blank sampling trains were set-up and recovered.

Wednesday, March 22, 2017 - Run 1: Exhaust gas sampling commenced at 1000 hrs and was paused at 1200 hrs for port change. With the exception of the M0023A sampling train, all leak checks were successfully completed.

After the first 2-hrs of sampling for Run 1, port change commenced. During the port change, a leak in the M0023A sampling train was discovered at a rate greater than allowed for correction per the method. Because of this failed leak check, the first 2-hrs of sampling for the M0023A sampling train were deemed invalid and abandoned. The M0023A sampling train was restarted during the second 2-hrs of sampling. Sampling resumed in the second port at 1420 hrs and concluded at 1620 hrs with all leak checks successfully completed. After 4-hrs of sampling were completed for the other sampling trains, WDC opted not to continue sampling for another 2-hrs to complete the M0023A sampling train. All samples were recovered, labeled, and custody-sealed.

Thursday, March 23, 2017 - Run 2: Exhaust gas sampling commenced at 1025 hrs and was paused at 1225 hrs for port change. All leak checks were successfully completed. Sampling resumed in the second port at 1410 hrs and concluded at 1610 hrs with all leak checks successfully completed. All samples were recovered, labeled, and custody-sealed.

RATA Runs 1 and 2 were also conducted from 1730 to 1750 and 1805 to 1826 hrs.

Friday, March 24, 2017 - Run 3: Exhaust gas sampling commenced at 0910 hrs and was paused at 1110 hrs for port change. All leak checks were successfully completed. Sampling resumed in the second port at 1250 hrs and concluded at 1450 hrs with all leak checks successfully completed. All samples were recovered, labeled, and custody-sealed.

RATA Runs 3, 4, 5, and 6 were also conducted from 1530 to 1551, 1603 to 1624, 1633 to 1654, and 1703 to 1724 hrs, respectively.

Saturday, March 25, 2017 - Run 4: Exhaust gas sampling commenced at 0815 hrs and was paused at 1015 hrs for port change. All leak checks were successfully completed. Sampling resumed in the second port at 1235 hrs and concluded at 1435 hrs with all leak checks successfully completed. All samples were recovered, labeled, and custody-sealed.

RATA Run 7 was also conducted from 1611 to 1632 hrs.

Sunday, March 26, 2017: RATA Runs 8, 9, and 10 were conducted from 1031 to 1052, 1102 to 1123, and 1133 to 1154 hrs.

ES.4 PERFORMANCE STANDARDS

The isokinetic and non-isokinetic sampling summary for all sampling trains required to demonstrate performance standards are summarized in Section 4. No blank corrections have been made to the data. In instances where non-detects (NDs) were incurred, the reporting limit (RL) or estimated detection limit (EDL) was used to calculate an emissions rate. No RCRA Permit emission limits are associated with trace metal emissions. The performance standards are discussed in the following sections.

ES.4.1 Select Criteria Pollutant Emissions

CO concentrations were measured by the facility and TRM CEMS located on the exhaust blower duct. As summarized in Table ES-2, the average CO emission rates, measured by facility CEMS, were in compliance with the CAA Permit limit of 4.6 lbs/hr. The CO emissions as measured by the TRM CEMS produced a peak emissions rate of 7.83 lbs/hr with an average of 5.99 lbs/hr. WDC has requested an increased CO emissions limit under separate cover.

SO_2 emissions were measured by the TRM CEMS located on the exhaust blower duct. As summarized in Table ES-2, the average SO_2 emission rates were in compliance with the CAA Permit limit of 7.20 lbs/hr.

NO_x emissions were also measured by the TRM CEMS located on the exhaust blower duct. The NO_x emissions peaked at a rate of 1.56 lbs/hr with an average of 1.18 lbs/hr which exceeds the CAA Permit limit of 0.80 lbs/hr. WDC has requested an increased NO_x emissions limit under separate cover.

Composite exhaust gas samples were collected to determine the concentration of O_2 and CO_2 to be used in the calculation of the exhaust gas molecular weight. This calculated molecular weight was used by individual sampling trains to calculate specific parameters associated with gas flow and sampling train isokinetic percentages. In addition, the facility CEMS O_2 data was used to correct emission rates.

ES.4.2 Semivolatile Organic Emissions

Table ES-3 summarizes the semivolatile organic emissions results. No permitted emission limits are associated with semivolatile organic emissions.

ES.4.3 Dioxin/Furan Emissions

Table ES-4 summarizes the dioxin/furan emissions results. The US EPA toxicity equivalency factors (TEFs) were applied to the detected quantities of each isomer, as well as the total congeners (EPA/100/R-10/005). For the isomer-specific results, the applicable TEF was used to determine the TEQ. The dioxin/furan emission rates for all runs were in compliance with the CAA Permit limit of 0.20 ng-TEQ/dscm, corrected to 7% O_2 using facility CEMS.

ES.4.4 Volatile Organic Emissions

Table ES-5 summarizes the volatile organic emissions results. No permitted emission limits are associated with volatile organic emissions.

ES.4.5 TOC Emissions

Table ES-6 summarizes the TOC emissions results. No permitted emission limits are associated with TOC emissions.

ES.4.6 Acid Gases and Particulate Emissions

Table ES-7 summarizes the acid gas and particulate emissions results. The chlorine equivalent concentrations for all runs were in compliance with the CAA Permit limit of 21 ppm_v, corrected to 7% O_2 using facility CEMS data. The particulate emission rates for all runs were in compliance with the RCRA/CAA Permit limit of 0.013 gr/dscf, corrected to 7% O_2 using facility CEMS data.

ES.4.7 Trace Metal Emissions

Table ES-8 summarizes the trace metal emissions results. No RCRA Permit emission limits are associated with trace metal emissions.

Table ES-9 summarizes the low-volatile (arsenic, beryllium, and chromium combined), semivolatile (cadmium and lead combined), and high-volatile (mercury) metal emission rates. All runs were in compliance with the CAA Permit limits of 23, 10, and 8.1 ug/dscm, corrected to 7% O_2 using facility CEMS data, respectively.

ES.4.8 Energetic Emissions

Table ES-10 summarizes the energetic emissions results. No permitted emission limits are associated with energetic emissions.

ES.5 FEED PROHIBITIVE INTERLOCK (FPI) LIMITS

All FPI set points must be at an acceptable limit to enable feed initiation and prevent an over-feed event. The 1-second data at feed initiation of each tray for each respective run is summarized in Table 3-1. Based on the PDARS data collected at feed initiation, the FPI parameters were within those listed in RCRA Permit Table 5-1 each time feed was initiated during the test.

ES.6 DATA FOR USE IN THE HEALTH RISK ASSESSMENT

The emissions rates presented in this report are proposed for modeling in the HHRA, which will be submitted under separate cover. For more discussion on health risk, the current ANAD Risk Assessment Protocol should be consulted.

ES.7 PRELIMINARY CONCLUSIONS

With the exception of NOx and CO, which was addressed under a separate cover, the SDC achieved all compliance objectives specified in the SDC C2 Emissions Test Plan and RCRA/CAA Permits.

Table ES-1: Sampling Time Intervals

Run	Date	First Port (hrs)		Second Port (hrs)	
		Start	Stop	Start	Stop
1	03/22/17	1000	1200	1420	1620
2	03/23/17	1025	1225	1410	1610
3	03/24/17	0910	1110	1250	1450
4	03/25/17	0815	1015	1235	1435

Table ES-2: Summary of Select Criteria Pollutant Emissions

Parameter	Units	Run 2	Run 3	Run 4	Average	RCRA/CAA Permit Limit
Carbon Monoxide (Facility CEMS)	lbs/hr	2.85	3.52	3.54	3.30	4.6
Oxygen (Facility CEMS)	%	16.09	15.92	15.92	15.98	---
Carbon Monoxide (TRM CEMS)	lbs/hr	6.80	7.83	3.34	5.99	---
Oxygen (TRM CEMS)	%	15.57	15.47	15.49	15.51	---
Sulfur Dioxide (TRM CEMS)	lbs/hr	0.0078	0.0042	0.0057	0.0059	7.20
Nitrogen Oxides (TRM CEMS)	lbs/hr	0.70	1.56	1.28	1.18	0.80

Table ES-3: Summary of Semivolatile Organic Emissions

Parameter	Units	Run 2			Run 3			Run 4			Average		
Benzaldehyde	g/s	<	3.19E-06		<	2.56E-06		<	2.70E-06		<	2.82E-06	
Benzyl alcohol	g/s	<	1.73E-05	ND	<	1.67E-05	ND	<	1.72E-05	ND	<	1.70E-05	ND
bis(2-Ethylhexyl)-phthalate	g/s	<	2.45E-06		<	2.53E-06		<	2.63E-06		<	2.54E-06	
Fluoranthene	g/s	<	2.47E-06	ND	<	2.38E-06	ND	<	2.45E-06	ND	<	2.44E-06	ND
Naphthalene	g/s	<	2.47E-06	ND	<	2.38E-06	ND	<	2.45E-06	ND	<	2.44E-06	ND

Table ES-4: Summary of Dioxin/Furan Emissions

Total 2,3,7,8-	Units	Run 2		Run 3		Run 4		Average		CAA Permit Limit
TetraCDD	g/s	<	7.66E-14	<	6.95E-14	<	8.90E-14	<	7.84E-14	---
PentaCDD	g/s	<	5.20E-14	<	5.01E-14	<	4.58E-14	<	4.93E-14	---
HexaCDD	g/s		3.67E-13	<	1.87E-13	<	1.77E-13	<	2.44E-13	---
HeptaCDD	g/s		4.62E-13		3.15E-13		2.80E-13		3.53E-13	---
OctaCDD	g/s		1.70E-12		1.28E-12		1.25E-12		1.41E-12	---
TetraCDF	g/s	<	5.34E-14	<	5.51E-14	<	4.83E-14	<	5.23E-14	---
PentaCDF	g/s	<	1.06E-13	<	9.50E-14	<	1.40E-13	<	1.13E-13	---
HexaCDF	g/s	<	4.95E-13	<	3.68E-13	<	2.35E-13	<	3.66E-13	---
HeptaCDF	g/s		8.71E-13		5.60E-13		6.12E-13		6.81E-13	---
OctaCDF	g/s		3.61E-12		2.72E-12		2.93E-12		3.09E-12	---
CDD/CDF	ng-TEQ/dscm @ 7% O_2	<	0.0021	<	0.0016	<	0.0016	<	0.0018	0.20

Table ES-5: Summary of Volatile Organic Emissions

Parameter	Units	Run 2			Run 3			Run 4			Average		
Acetone	g/s	<	5.74E-06		<	4.06E-06		<	3.78E-06		<	4.52E-06	
Benzene	g/s	<	1.16E-04		<	1.41E-04		<	1.76E-04		<	1.44E-04	
1,3-Butadiene	g/s	<	5.23E-07	ND	<	5.70E-07		<	8.09E-07		<	6.34E-07	
Carbon Disulfide	g/s		7.81E-07			8.05E-07		<	8.72E-07		<	8.20E-07	
Carbon Tetrachloride	g/s	<	5.22E-07		<	5.50E-07		<	5.05E-07		<	5.26E-07	
Chlorobenzene	g/s	<	5.02E-07		<	5.38E-07	ND	<	5.14E-07		<	5.18E-07	
Chloroethane	g/s	<	1.89E-06		<	2.13E-06	ND	<	1.98E-06		<	2.00E-06	
Chloroform	g/s	<	6.67E-07		<	6.85E-07		<	6.84E-07		<	6.79E-07	
Chloromethane	g/s	<	3.11E-06		<	7.02E-06		<	9.21E-07		<	3.68E-06	
1,2-Dichloroethane	g/s	<	5.23E-07	ND	<	5.38E-07	ND	<	5.44E-07	ND	<	5.35E-07	ND
Dichlorodifluoromethane	g/s	<	1.45E-06		<	1.55E-06		<	1.10E-06		<	1.37E-06	
trans-1,2-Dichloroethene	g/s	<	4.95E-07		<	5.38E-07	ND	<	5.13E-07		<	5.15E-07	
Ethyl Benzene	g/s	<	5.09E-07		<	5.38E-07	ND	<	5.18E-07		<	5.22E-07	
Hexane	g/s	<	1.50E-06		<	1.65E-06		<	1.70E-06		<	1.62E-06	
Methylene Chloride	g/s	<	6.96E-07			1.48E-06		<	1.43E-06		<	1.20E-06	
1,1,1,2-Tetrachloroethane	g/s	<	4.90E-07		<	5.38E-07	ND	<	5.09E-07		<	5.12E-07	
1,1,2,2-Tetrachloroethane	g/s	<	1.03E-06	ND	<	1.06E-06	ND	<	1.07E-06	ND	<	1.06E-06	ND
1,1,1-Trichloroethane	g/s	<	1.03E-06	ND	<	1.06E-06	ND	<	9.80E-07		<	1.03E-06	
1,1,2-Trichloroethane	g/s	<	1.03E-06	ND	<	1.06E-06	ND	<	1.07E-06	ND	<	1.06E-06	ND
Trichloroethene	g/s	<	4.97E-07		<	5.38E-07	ND	<	5.17E-07		<	5.17E-07	
Trichlorofluoromethane	g/s	<	7.33E-07		<	8.20E-07		<	7.30E-07		<	7.61E-07	
Vinyl Chloride	g/s	<	1.22E-06	ND	<	1.25E-06	ND	<	1.17E-06		<	1.21E-06	
m,p-Xylene	g/s	<	9.89E-07		<	1.08E-06	ND	<	1.01E-06		<	1.03E-06	
o-Xylene	g/s	<	5.08E-07		<	5.38E-07	ND	<	5.14E-07		<	5.20E-07	

Table ES-6: Summary of TOC Emissions

Parameter	Units	Run 2		Run 3		Run 4		Average	
Concentration	mg/m^3	<	51.31	<	48.86	<	44.65	<	48.27
Emission Rate	lbs/hr	<	1.41E-01	<	1.32E-01	<	1.24E-01	<	1.32E-01
Emission Rate	g/s	<	1.77E-02	<	1.67E-02	<	1.57E-02	<	1.67E-02

Table ES-7: Summary of Acid Gases and Particulate Emissions

Parameter	Units	Run 2			Run 3			Run 4			Average			RCRA/CAA Permit Limit
Hydrogen Chloride	g/s	<	2.28E-05	ND	<	2.26E-05	ND	<	2.47E-05	ND	<	2.34-05	ND	---
Chlorine	g/s	<	4.96E-06	ND	<	4.95E-06	ND	<	4.45E-06	ND	<	4.78E-06	ND	---
Chloride Equivalents	ppm_v @ 7% O_2	<	0.160	ND	<	0.146	ND	<	0.156	ND	<	0.154	ND	21
Hydrogen Fluoride	g/s		2.25E-05			1.60E-05			1.36E-05			1.74E-05		---
Particulates	gr/dscf @ 7% O_2	<	0.00068		<	0.00065		<	0.00056		<	0.00063		0.013

Table ES-8: Summary of Trace Metal Emissions

Parameter	Units	Run 2			Run 3			Run 4			Average		
Antimony	g/s		1.98E-07			2.42E-07			2.18E-07			2.19E-07	
Arsenic	g/s	<	3.11E-07	ND		1.72E-07		<	1.74E-07		<	2.19E-07	
Barium	g/s		4.20E-07			4.16E-07			3.80E-07			4.05E-07	
Beryllium	g/s	<	7.77E-08	ND	<	7.75E-08	ND	<	7.70E-08	ND	<	7.74E-08	ND
Boron	g/s		9.56E-06		<	8.21E-06		<	9.47E-06		<	9.11E-06	
Cadmium	g/s	<	4.46E-08		<	7.75E-08	ND	<	7.70E-08	ND	<	6.64E-08	
Chromium	g/s		1.97E-07			1.84E-07			1.75E-07			1.85E-07	
Cobalt	g/s	<	1.18E-06		<	1.17E-06		<	1.54E-06	ND	<	1.29E-06	
Copper	g/s		8.73E-07			1.13E-06			8.76E-07			9.60E-07	
Lead	g/s	<	3.34E-07		<	2.97E-07		<	2.93E-07		<	3.08E-07	
Manganese	g/s		3.00E-07			2.44E-07			3.80E-07			3.08E-07	
Mercury	g/s	<	1.11E-07	ND	<	1.11E-07	ND	<	1.10E-07	ND	<	1.10E-07	ND
Nickel	g/s		1.26E-07			9.79E-08			8.23E-08			1.02E-07	
Phosphorus	g/s	<	2.46E-06		<	2.44E-06		<	2.41E-06		<	2.44E-06	
Selenium	g/s	<	3.11E-07	ND	<	3.10E-07	ND	<	3.08E-07	ND	<	3.10E-07	ND
Silver	g/s	<	1.55E-07	ND	<	1.55E-07	ND	<	1.54E-07	ND	<	1.55E-07	ND
Thallium	g/s	<	3.11E-07	ND	<	3.10E-07	ND	<	3.08E-07	ND	<	3.10E-07	ND
Tin	g/s	<	8.55E-06	ND	<	8.53E-06	ND	<	8.47E-06	ND	<	8.51E-06	ND
Vanadium	g/s	<	2.00E-07		<	3.88E-07	ND	<	3.85E-07	ND	<	3.24E-07	
Zinc	g/s		1.38E-06			1.10E-06			9.16E-06			1.13E-06	

Table ES-9: Summary of MACT Metal Emissions

Parameter	Units	Run 2			Run 3			Run 4			Average			CAA Permit Limit
Arsenic, Beryllium, & Chromium	ug/dscm @ 7% O_2	<	5.63		<	3.90		<	3.87		<	4.47		23
Cadmium and Lead	ug/dscm @ 7% O_2	<	3.63		<	3.37		<	3.36		<	3.46		10
Mercury	ug/dscm @ 7% O_2	<	1.07	ND	<	1.00	ND	<	1.00	ND	<	1.02	ND	8.1

Table ES-10: Summary of Energetic Emissions

Parameter	Units	Run 2			Run 3			Run 4			Average		
2,4-Dinitrotoluene	g/s	<	1.05E-07	ND	<	1.18E-07	ND	<	1.19E-07	ND	<	1.14E-07	ND
2,6-Dinitrotoluene	g/s	<	1.05E-07	ND	<	1.18E-07	ND	<	1.19E-07	ND	<	1.14E-07	ND
HMX	g/s	<	1.05E-07	ND	<	1.18E-07	ND	<	1.19E-07	ND	<	1.14E-07	ND
Nitroglycerin	g/s	<	5.39E-07	ND	<	5.92E-07	ND	<	5.94E-07	ND	<	5.75E-07	ND
RDX	g/s	<	1.05E-07	ND	<	2.18E-07		<	1.52E-07		<	1.58E-07	
2,4,6-Trinitrotoluene	g/s	<	1.05E-07	ND	<	1.18E-07	ND	<	1.19E-07	ND	<	1.14E-07	ND

1.0 TESTING PROGRAM

1.1 OVERVIEW

The SDC was designed and built for processing conventional waste military munitions (WMM), disassembled explosive components of WMM, including hazardous energetic and energetic-contaminated wastes, and non-energetic contaminated waste at the Anniston Army Depot in Anniston, Alabama.

The following general facility information pertains to the SDC:

Mailing Address:	7 Frankford Avenue c/o ANAD, Building 695 Anniston, AL 36201
Physical Address:	Same
EPA ID Number:	AL3 210 020 027
Facility Contact:	Timothy K. Garrett
Telephone Number:	(256) 238-1652

The purpose of the emissions test was to demonstrate the performance of the SDC System at normal operating conditions and while processing M67 propellant, M28B2 percussions charges, and surrogate metal oxides. WDC has the responsibility for operating the SDC, executing the emissions test, and reporting of the results. No operating parameters were established as part of this emissions test.

1.2 PLANNED EMISSIONS TESTING PROGRAM

The purpose of the emissions test was to demonstrate the objectives by executing a minimum of 3 test runs. The SDC System was operated at normal conditions. Normal system data was collected in addition to the specific sampling. Analyses were performed to confirm the efficiency of the SDC System. The sampling matrix for exhaust gas can be found in Table 1-1.

1.3 SUMMARY OF ACTUAL TESTING PERFORMED

The actual testing performed was consistent with the planned program described in the SDC C2 Emissions Test Plan, see Appendix B. Table 6-25 summarizes deviations from the approved SDC C2 Emissions Test Plan. The emissions results are presented in Section 7.

The emissions test began with preliminary activities on March 21 and ended on March 26, 2017. A total of 4 emissions test runs and 10 RATA test runs were conducted.

The following are daily accounts of the on-site test activities. These summaries are presented in sequential order for the entire emissions testing effort and include the preliminary measurements. Table 1-2 presents a summary of the sampling times.

Tuesday, March 21, 2017 - Preliminary Measurements: Preliminary velocity traverses and cyclonic flow checks were conducted at the exhaust blower duct prior to the start of the emissions test. Moisture runs were also conducted to verify the moisture content of the exhaust gas. The cyclonic flow measurements within the duct at the sampling location yielded results within specified limits. All velocity and moisture measurements were reliable indicators of actual flow and moisture conditions and did not change appreciably from run to run. The

M0010, M0010-TOC, M0023A, M26A, M29, and MM5E field blank sampling trains were set-up and recovered.

Wednesday, March 22, 2017 - Run 1: Exhaust gas sampling commenced at 1000 hrs and was paused at 1200 hrs for port change. With the exception of the M0023A sampling train, all leak checks were successfully completed.

After the 1st 2-hrs of sampling for Run 1, port change commenced. During the port change, a leak in the M0023A sampling train was discovered at a rate greater than allowed for correction per the method. Because of this failed leak check, the 1st 2-hrs of sampling for the M0023A sampling train were deemed invalid and abandoned. The M0023A sampling train was restarted during the 2nd 2-hrs of sampling. Sampling resumed in the 2nd port at 1420 hrs and concluded at 1620 hrs with all leak checks successfully completed. After 4-hrs of sampling were completed for the other sampling trains, WDC opted not to continue sampling for another 2-hrs to complete the M0023A sampling train. All samples were recovered, labeled, and custody-sealed.

Thursday, March 23, 2017 - Run 2: Exhaust gas sampling commenced at 1025 hrs and was paused at 1225 hrs for port change. All leak checks were successfully completed. Sampling resumed in the 2nd port at 1410 hrs and concluded at 1610 hrs with all leak checks successfully completed. All samples were recovered, labeled, and custody-sealed.

RATA Runs 1 and 2 were also conducted from 1730 to 1750 and 1805 to 1826 hrs.

Friday, March 24, 2017 - Run 3: Exhaust gas sampling commenced at 0910 hrs and was paused at 1110 hrs for port change. All leak checks were successfully completed. Sampling resumed in the 2nd port at 1250 hrs and concluded at 1450 hrs with all leak checks successfully completed. All samples were recovered, labeled, and custody-sealed.

RATA Runs 3, 4, 5, and 6 were also conducted from 1530 to 1551, 1603 to 1624, 1633 to 1654, and 1703 to 1724 hrs, respectively.

Saturday, March 25, 2017 - Run 4: Exhaust gas sampling commenced at 0815 hrs and was paused at 1015 hrs for port change. All leak checks were successfully completed. Sampling resumed in the 2nd port at 1235 hrs and concluded at 1435 hrs with all leak checks successfully completed. All samples were recovered, labeled, and custody-sealed.

RATA Run 7 was also conducted from 1611 to 1632 hrs.

Sunday, March 26, 2017: RATA Runs 8, 9, and 10 were conducted from 1031 to 1052, 1102 to 1123, and 1133 to 1154 hrs.

1.4 PROJECT PARTICIPANTS

The SDC was operated by WDC personnel during the emissions test. The Test Director was the point of contact for any concerns associated with the emissions test. AECOM-Austin conducted the exhaust gas sampling with TestAmerica, Inc. providing the laboratory analytical support. ADEM (Air and Land Divisions) and the Anniston Field Office provided oversight of sampling activities.

Table 1-1: Sampling Matrix for Exhaust Gas

Analyte	Sampling Method	Planned	Performed
Traverse Points	US EPA Method 1	Yes	Yes
Off-Gas Velocity	US EPA Method 2	Yes	Yes
Oxygen and Carbon Dioxide	US EPA Methods 3A & 3B	Yes	Yes
Moisture	US EPA Method 4	Yes	Yes
Sulfur Dioxides	US EPA Method 6C	Yes	Yes
Nitrogen Oxides	US EPA Method 7E	Yes	Yes
Carbon Monoxide	US EPA Method 10	Yes	Yes
Semivolatile Organics	SW-846 Method 0010	Yes	Yes
Total Organics	SW-846 Methods 0010 and 0040	Yes	Yes
Dioxins/Furans	SW-846 Method 0023A	Yes	Yes
Volatile Organics	SW-846 Method 0031	Yes	Yes
Acid Gases and Particulates	US EPA Method 26A	Yes	Yes
Trace Metals	US EPA Method 29	Yes	Yes
Energetics	Modified US EPA Method 5 (Energetics)	Yes	Yes

Table 1-2: Sampling Time Intervals

Run	Date	First Port (hrs)		Second Port (hrs)	
		Start	Stop	Start	Stop
1	03/22/17	1000	1200	1420	1620
2	03/23/17	1025	1225	1410	1610
3	03/24/17	0910	1110	1250	1450
4	03/25/17	0815	1015	1235	1435

2.0 PROCESS DESCRIPTION

This section provides a brief process description of the SDC System, design information, process monitors, and monitoring points.

2.1 DESCRIPTION OF THE SDC SYSTEM

The SDC was designed and built for processing conventional WMM, disassembled explosive components of WMM, including hazardous energetic and energetic-contaminated wastes, and non-energetic contaminated waste at the Anniston Army Depot in Anniston, Alabama. The WMM are fed via a conveyor system. The solid scrap material remaining from the WMM is emptied into a scrap-box via a scrap conveyor system. The off-gas generated is cleaned and filtered in the Off-Gas Treatment (OGT) System.

The loading area is where WMM are placed in ammunition trays and loaded onto the loading conveyor. The loading conveyor is designed to accept multiple trays prior to any conveyor transfer. After the loading conveyor is loaded, it moves one tray at a time to the lift. The lift transfers the tray to the level of the first loading chamber (LC1). From the lift, the item is then transferred to the apron of LC1. The loading conveyors and lift are also equipped with guides, interlocks, and sensors that prevent misalignment of trays or other problems and will halt movements automatically if problems arise.

Staging of a tray consists of deflating a pneumatic seal in the gate leading to LC1 and then raising the gate. An electrically operated ram, equipped with sensors to detect miss-feeds and other problems, pushes the tray into the LC1 and then retracts. The gate is lowered and pneumatic seal inflated forming a gas-tight boundary. Staging of a tray into LC1 can occur while the previous tray is being processed in the DC.

When conditions are verified to be acceptable for initiating feed to the DC, the Control Room (CON) Operator (CRO) initiates the loading sequence for staging the next tray into the second loading chamber (LC2). The actions of transferring a tray to the DC are automatic but monitored in the CON and can be manually interrupted. The seals on both sides of the gate leading to LC2 are deflated and the gate is raised. The hydraulically operated ram pushes the tray into a cradle located in LC2 and then retracts. The gate leading to LC2 is lowered and the seals on both sides of the gate are inflated. This gate is rated to withstand blast pressures of the detonation chamber (DC).

The cradle and fragment valve within LC2 move as 1 unit but are located perpendicular to each other. With the cradle in position to receive a tray, the fragment valve is located over the opening to the DC. When a tray is placed in the cradle, hydraulic pressure is released off the fragment valve and the cradle/fragment valve assembly rotates and dumps the tray into the DC. The cradle/fragment valve assembly is then rotated back into position. A hydraulic piston exerts pressure on the fragment valve to hold it in place during detonations/deflagration in the DC.

Upon entering the DC, the WMM are heated resulting in a detonation and/or deflagration. The increase of pressure within the WMM casing caused by the ambient heat of the DC alone is adequate to open the WMM case and destroy fill material without the presence of explosives. The DC consists of an upper portion (UDC) which is fixed to the loading system and a lower portion (LDC) which can separate from the UDC. During detonation, the UDC and LDC portions of the DC are sealed by means of a locking ring, rope gasket and 6 pneumatic seals

(3 on the top side of the locking ring, sealing to the UDC, and 3 underneath the locking ring, sealing the LDC).

To empty the DC, the pneumatic seals are deflated and locking ring is partially twisted to free the LDC. The LDC can then be lowered and tilted to empty the scrap. Following scrap emptying, the LDC is returned to the upright position and raised. The locking ring is twisted in the opposite direction to lock the UDC and LDC together and the pneumatic seals on both sides of the locking ring are inflated to seal the locking to each respective portion of the DC.

The LDC contains electric heaters to maintain the DC at high temperatures. Both the UDC and LDC are constructed of heat resistant steel which can withstand the mechanical stress loads caused by detonation pressures at high temperatures. Inside the LDC, a fragment shield acts as a sacrificial plate to absorb impacts from fragmentation.

The OGT System consist of a buffer tank which absorbs pressure perturbations caused by blast waves within the DC, followed by an orifice or control valve which also helps to equalize the flow going to downstream components of the system.

Off-gases from the detonation and/or deflagration are further treated by a spray dryer, baghouse filter, quench venturi, acid scrubber, and neutral scrubber. The thermal oxidizer treats the gas to ensure proper treatment of the contaminated gases. Off-gases received from the thermal oxidizer are cooled by a spray dryer followed by a baghouse to remove salts and particulates. The remaining contaminants are removed by the acid and neutralization scrubbers. The last step is a multistage exhaust filtration system, which acts as a safeguard to the OGT System prior to releasing the off-gas to the environment.

A detailed engineering description of the SDC and OGT Systems can be found in the RCRA Permit Application.

2.2 SUMMARY OF PROCESS MONITORS AND OFF-GAS ANALYZERS

2.2.1 Location and Description of the Process Control System

The proper operation of the Process Control System is necessary to ensure consistent compliance with all RCRA/CAA Permit conditions and safe, efficient operation of the SDC and OGT Systems. The CON is the remote location where the SDC and OGT Systems are normally operated. The CON houses an operator control console, which includes closed-circuit television monitors for observing operations at various locations, as well as emergency shutdown controls. All remote operations, with exception of emergency shutdown, are performed through an operator keyboard using the equipment controls and indications displayed on screens. Processing and sequencing operations are controlled automatically through the programmable logic controller (PLC), which continuously communicates with the operator console in the CON.

The PLC is programmed to continually scan for alarm conditions and to initiate alarms in the CON, alerting the operator of abnormal conditions. The process control software was designed to provide pre-alarms in the CON. These pre-alarms are used to warn the CON operator in time to take corrective action should a process variable approach a FPI condition which may prevent initiation of feed. Process parameters and associated FPI set points used by the PLC are listed in Table 2-1.

The PDARS logs and notes the time of all abnormal conditions, as well as, the starting and stopping of equipment and operator entries. This system is also used to record process data such as temperature, pressure, and waste feed intervals. PDARS records data at varying intervals. The PDARS takes instantaneous readings at a maximum interval of 15 seconds. The collected data is then averaged on a 1-minute basis. All PDARS data collected for RCRA/CAA instrumentation is included in the SDC operating record as required by the CAA/RCRA Permits and applicable regulations.

2.2.2 Off-Gas Monitoring

The SDC System flue gases were monitored for select criteria pollutants by facility CEMS which monitors for CO and O_2 in the exhaust blower duct and is programmed into the FPI System (see Table 2-1).

Table 2-1: FPI Conditions for Conventional WMM

Item No.	Instrument Tag Number	Process Data Description	Range	Parameter[(1)]
SDC-FPI-01	PI 12007	Detonation Chamber Static Pressure Indication	Maximum	18.32 psi
SDC-FPI-02	TI 12021	Detonation Chamber Temperature Indication	Minimum	1,000ºF
SDC-FPI-03	TICS 310 AVG	Thermal Oxidizer Temperature	Minimum	1,741ºF
SDC-FPI-04	PICS 310 AVG	Thermal Oxidizer Pressure	Maximum	-0.01 psi
SDC-FPI-05	TICS 320 AVG	Spray Dryer Temperature	Maximum	400ºF
SDC-FPI-06	PDS 33001	Bag-house Differential Pressure	Maximum	0.18 psi
SDC-FPI-07	FIA 34204	Acid Scrubber Process Flow	Minimum	3.2 cfm
SDC-FPI-08	FIS 34203	Quench Tower Flow	Minimum	2.4 cfm
SDC-FPI-09	TIS 34003, 34004	Quench Tower Temperature	Maximum	170ºF
SDC-FPI-10	TIA 37002	Neutral Scrubber Discharge Temperature	Maximum	200ºF
SDC-FPI-11	AAHH-900	CO Concentration	Maximum	100 ppm, dry basis @ 7% O_2 (instantaneous)
SDC-FPI-12	QICA 36008	Neutral Scrubber pH	Set Point	7.0 pH

Note: Operational parameter(s) interlock will prohibit the transfer from LC1 into LC2 until all conditions are met or within range.

3.0 PROCESS PARAMETERS

Process information for the SDC was collected by PDARS during the emissions test. The data recorded by PDARS includes the average, minimum, and maximum values collected for each FPI parameter. This information has been included as Appendix A.

3.1 FEED PROHIBITIVE INTERLOCKS

FPIs were established during previous testing events and not intended to be re-established as part of this emissions test. These FPIs, which are presented in Table 2-1, were identified to ensure emissions do not exceed the performance standards as stated in RCRA Permit Condition V.D.3. The FPI reading at the initiation of feed was recorded for each tray using the specific 1-second value (see Appendix A-1). The FPI readings were continuously monitored and recorded by the PDARS for the duration of each testing event using 1-minute values calculated from the average of 60 second readings (see Appendix A-2).

Control systems for the SDC have been specifically designed by the manufacturer to control the operation of the system for any waste feed event. Specific process and equipment parameters are interlocked within the control system to ensure the operating parameters are within allowable range, ready to receive waste for processing, and treatment cycle for previous charge has been completed. These parameters, known as FPI, have been established by the manufacturer based upon design criteria, equipment specifications and capabilities, and previous operational history, see Table 2-1.

Each of the FPI, which are essential to safe and environmentally compliant operation of the SDC, is interlocked into the code controlling the feed process for the unit. Should any one of the parameters be outside of the allowable range, the control system will not allow the loading/feeding process to engage thus eliminating the ability to overfeed the system.

Table 2-1 lists the FPI parameters which prevents the next feed event should the FPI alarm remain active. Table 3-1 lists the operating conditions for the FPI parameters at the initiation of the feed sequence. As noted in Table 3-1, there were not instances of initiating the feed sequence with an FPI greater than the established set point.

It should be noted that if an alarm is activated during the destruction phase, appropriate actions are taken to return the system to within the normal operating range; however, exceeding the FPI set point during processing is not considered a regulatory reporting event.

3.2 FEED RATES

M67 propellant and M28B2 percussion charges were fed to demonstrate a net explosive weight (NEW) feed rate during the emissions test. As summarized in Table 3-2, the demonstrated NEW feed rate was 22.9432 lbs/event for Runs 2, 3, and 4.

Eleven metal compounds were mixed into a lot and then divided into 45 bags, see Table 3-3. The bags of metal oxides were fed at a feed rate of 1.5 bags/tray, along with the M67/M28B2 NEW charge, with a destruction timer of 15 minutes (which does not include tray transfer time), see Table 3-2. The demonstrated feed rate for metal constituents in lbs/hr is summarized in Table 3-4.

Table 3-1: Summary of FPI Conditions at Feed Initiation

Parameter/Description	Instrument Tag Number	Range	Units	Statistic	Run 2	Run 3	Run 4
SDC-FPI-01 Detonation Chamber Pressure	PISA 12007	≤ 18.32	psi	Minimum	1.57	0.81	1.57
				Maximum	2.00	2.53	2.53
SDC-FPI-02 Detonation Chamber Temperature	TICSA 12021	≥ 1,000	°F	Minimum	1,098.96	1098.38	1,098.96
				Maximum	1,101.27	1114.00	1,106.77
SDC-FPI-03 Thermal Oxidizer Temperature	TIC 31001/2/3	≥ 1,741	°F	Minimum	1,794.06	1,792.71	1,788.90
				Maximum	1,799.14	1,802.52	1,799.99
SDC-FPI-04 Thermal Oxidizer Pressure	PIC 31006/7/8	≤ -0.01	psi	Minimum	-0.084	-0.079	-0.081
				Maximum	-0.033	-0.055	-0.022
SDC-FPI-05 Spray Dryer Temperature	TIC 32009/10/11	≤ 400	°F	Minimum	345.14	344.15	341.44
				Maximum	354.75	352.23	351.86
SDC-FPI-06 Bag House Pressure	PDS 33001	≤ 0.18	psi	Minimum	0.026	0.026	0.023
				Maximum	0.12	0.12	0.11
SDC-FPI-07 Acid Scrubber Flow Rate	FIS 34204	≥ 3.2	cfm	Minimum	4.38	4.38	4.38
				Maximum	4.68	4.71	4.70
SDC-FPI-08 Quench Tower Flow Rate	FIS 34203	≥ 2.4	cfm	Minimum	3.16	3.11	3.14
				Maximum	3.33	3.33	3.32
SDC-FPI-09 Quench Tower Temperature	TI 34003	≤ 170	°F	Minimum	147.62	142.66	147.70
				Maximum	152.80	154.05	154.59
SDC-FPI-10 Neutral Scrubber Temperature	TIA 37002	≤ 200	°F	Minimum	176.19	174.25	175.84
				Maximum	182.93	182.02	182.91
SDC-11, CO Concentration (Instantaneous, dry basis @ 7% O_2)	AAHH-900	≤ 100	ppmv	Minimum	16.42	16.33	16.29
				Maximum	17.30	18.28	18.05
SDC-12 Neutral Scrubber pH	QICA-36008	≥ 7.0	pH	Minimum	8.60	8.67	8.69
				Maximum	9.01	8.99	8.99

Table 3-2: Summary of Tray Weights and Time Intervals

Run	Sampling Time	Tray	M67/M28B2 (NEW/tray)(1)	Metal Oxides (bag/tray)	Entered DC (hrs)	Interval (minutes)
Run 2	Port 1 (1025-1225 hrs)	5	22.9432	2	1025	20
		6		2	1041	16
		7		1	1058	17
		8		1	1114	16
		9		2	1131	17
		10		2	1147	16
		11		1	1204	17
		12		1	1222	18
	Port 2 (1410-1610 hrs)	13		2	1410	15
		14		2	1426	16
		15		1	1442	16
		16		1	1459	17
		17		2	1516	17
		18		2	1532	16
		19		1	1548	16
		20		1	1606	18
	Run 2 Average:		22.9432	1.5	---	16.75
Run 3	Port 1 (0910-1110 hrs)	1	22.9432	2	9:10	15
		2		2	9:27	17
		3		1	9:44	17
		4		1	10:00	16
		5		2	10:17	17
		6		2	10:34	17
		7		1	10:51	17
		8		1	11:08	17
	Port 2 (1250-1450 hrs)	9		2	12:51	15
		10		2	13:07	16
		11		1	13:24	17
		12		1	13:40	16
		13		2	13:57	17
		14		2	14:13	16
		15		1	14:30	17
		16		1	14:47	17
	Run 3 Average:		22.9432	1.5	---	16.50

Table 3-2: Summary of Tray Weights and Time Intervals (Continued)

Run	Sampling Time	Tray	M67/M28B2 (NEW/tray)(1)	Metal Oxides (bag/tray)	Entered DC (hrs)	Interval (minutes)
Run 4	Port 1 (0815-1015 hrs)	1	22.9432	2	8:15	15
		2		2	8:32	17
		3		1	8:48	16
		4		1	9:05	17
		5		2	9:21	16
		6		2	9:38	17
		7		1	9:55	17
		8		1	10:11	16
	Port 2 (1235-1435 hrs)	9		2	12:36	15
		10		2	12:52	16
		11		1	13:09	17
		12		1	13:25	16
		13		2	13:41	16
		14		2	13:58	17
		15		1	14:15	17
		16		1	14:31	16
	Run 4 Average:		22.9432	1.5	---	16.31

Footnote:

(1) Each tray contained 8 sets of the M28B2 percussion primers and M67 propellent charges. Each set of M28B2/M67 components contains 2.8679 lbs/set. Eight sets/tray contribute a total of 22.9432 lbs NEW/tray.

Table 3-3: Metal Oxide Compound Characterization

Metal Oxide[(1)]	Formula	Mesh Size	Compound Assay Purity (%)	Compound Weight (kg/lot)	(lbs/lot)	(bags/lot)[(2)]	(lbs/bag)	($lbs_{purity\ adj}$/bag)	Constituent (lbs/bag)
Arsenic (III) Oxide	As_2O_3	-100	99.9	1.67	3.68E+00	45	8.18E-02	8.17E-02	6.19E-02
Beryllium Sulfate	$BeSO_4$	-6	99.8	0.115	2.54E-01		5.63E-03	5.62E-03	4.82E-04
Cadmium Oxide	CdO	-325	99.6	0.038	8.38E-02		1.86E-03	1.85E-03	1.62E-03
Chromium (III) Acetate, Monohydrate	$Cr(OOCCH_3)_3H_2O$	-200	23.5[(3)]	51.23	1.13E+02		2.51E+00	---	5.90E-01
Copper (II) Oxide	CuO	-325	98.9	2.1	4.63E+00		1.03E-01	1.02E-01	8.13E-02
Lead (IV) Oxide	PbO_2	-100	96.33	121.59	2.68E+02		5.96E+00	5.74E+00	4.97E+00
Mercury (II) Oxide	HgO	powder	92.26[(3)]	0.075	1.65E-01		3.67E-03	---	3.39E-03
Sodium Phosphate	NaH_2PO_4	-50	99.17	142.33	3.14E+02		6.97E+00	6.92E+00	1.79E+00
Silver (I) Oxide	Ag_2O	-100	99.95	0.053	1.17E-01		2.60E-03	2.60E-03	2.42E-03
Sodium Metavanadate	$NaVO_3$	-100	41.43[(3)]	0.045	9.92E-02		2.20E-03	---	9.13E-04
Zinc Oxide	ZnO	-200	99.9	6.3	1.39E+01		3.09E-01	3.08E-01	2.48E-01

Footnotes:
(1) Specific information can be found in Appendix G, Certificates of Analysis.
(2) Eleven metal compounds were mixed into a lot and divided into 45 bags as noted on the received drums.
(3) For these oxides, the constituent versus compound assay purity was provided.

Table 3-4: Demonstrated Metals Feed Rates

Constituent	Constituent (lbs/bag)[1,3]	All Runs (bags/tray)[2]	Run 2		Run 3		Run 4		Average (lbs/hr)
			Interval[2]	(lbs/hr)	Interval[2]	(lbs/hr)	Interval[2]	(lbs/hr)	
Arsenic	6.19E-02	1.5	16.75	0.33	16.50	0.34	16.31	0.34	0.34
Beryllium	4.82E-04			0.0026		0.0026		0.0027	0.0026
Cadmium	1.62E-03			0.0087		0.0089		0.0090	0.0088
Chromium	5.90E-01			3.17		3.22		3.25	3.21
Copper	8.13E-02			0.44		0.44		0.45	0.44
Lead	4.97E+00			26.71		27.11		27.43	27.08
Mercury	3.39E-03			0.018		0.018		0.019	0.018
Phosphorus	1.79E+00			9.59		9.74		9.85	9.73
Silver	2.42E-03			0.013		0.013		0.013	0.013
Vanadium	9.13E-04			0.0049		0.0050		0.0050	0.0050
Zinc	2.48E-01			1.33		1.35		1.37	1.35

Footnotes:
(1) See Table 3-3.
(2) The calculation of the average feed rate can be found in Table 3-2.
(3) The adjusted feed rate accounts for the metal fraction of the metal oxide compound and the compound purity or actual metal concentration based on the assay results provided by the manufacturer. Specific information can be found in Appendix G, Certificates of Analysis.

4.0 EXHAUST GAS SAMPLING

AECOM-Austin collected all exhaust gas samples during the emissions test. The sampling locations were selected to yield representative samples for the stream being collected.

The exhaust blower duct sampling location was accessed through flanged ports in the duct between the exhaust blower and stack. The inner diameter of the exhaust blower duct was measured prior to testing and determined to be 12 inches (in) at the sampling location. This sampling location was downstream of any online OGT equipment and was previously evaluated by M1 and M2 for representativeness. A schematic of the traverse point locations for the exhaust blower duct can be found in Appendix C. Eight-point tests were conducted during each isokinetic test run. The M0031 sampling train was collected from the port that was situated closest to the stack, with the probe located at a single point within the duct. The M0040 sampling train was collected from a port located in the stack in the monitoring house, with the probe located at a single point within the duct. The TRM CEMS probe was located on the exhaust duct at a port between the M0031 and M26A sampling trains.

This section describes the procedures that were followed during the field sampling program. Throughout the overall program, US EPA-approved sampling protocols were utilized.

4.1 FIELD PROGRAM DESCRIPTION

The exhaust gas test methods that were utilized are as follows:

- M1: "*Sample Velocity Traverse for Stationary Sources,*" 40 Code of Federal Regulations (CFR) Part 60, Appendix A;
- M2: "*Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube),*" 40 CFR Part 60, Appendix A;
- US EPA Method 3A (M3A): "*Determination of Oxygen and Carbon Dioxide ConcentrationsiIn Emissions from Stationary Sources (Instrumental Analyzer Procedure),*" 40 CFR Part 60, Appendix A;
- M3B: "*Gas Analysis for the Determination of Dry Molecular Weight,*" 40 CFR Part 60, Appendix A;
- M4: "*Determination of Moisture Content in Stack Gases*," 40 CFR Part 60, Appendix A;
- M6C: "*Determination of Sulfur Dioxide Emissions from Stationary Sources*," 40 CFR Part 60, Appendix A;
- M7E: "*Determination of Nitrogem Oxides Emissions from Stationary Sources,*" 40 CFR Part 60, Appendix A;
- M10: "*Determination of Carbon Monoxide Emissions from Stationary Sources,*" 40 CFR Part 60, Appendix A;
- M0010: "*Modified Method 5 Sampling Train,*" EPA 600/8-85-003;
- M0010-TOC: "*Guidance for Total Organics,*" EPA 600/R-96-033;

- M0023A: *"Determination of Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans from Stationary Sources,"* EPA 600/8-85-003;
- M0031: *"Sampling Method for Volatile Organic Compounds (SMVOC),"* EPA 600/8-85-003;
- M0040: *"Sampling of Principal Organic Hazardous Constituents from Combustion Sources Using Tedlar Bags,"* EPA 600/8-85-003;
- M26A: *"Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources,"* 40 CFR Part 60, Appendix A. [Particulates were determined from this train as well.]
- M29: "*Determination of Metals Emissions from Stationary Sources*," 40 CFR Part 60, Appendix A; and
- MM5E: *"Determination of Particulate Emissions from Stationary Sources,"* 40 CFR Part 60, Appendix A. [**NOTE:** This method was modified to determine energetic constituents. The modified method, Revision 1.06, was submitted to ADEM for review and was approved for use.]

4.2 PRESAMPLING ACTIVITIES

Presampling activities included equipment calibration, sample media preparation, and precleaning of the sample train glassware. Each of these activities are described or referenced in the following subsections. Other presampling activities included team meetings and conferences, equipment packing, equipment setup, and finalization of all details leading up to the coordinated initiation of the sampling program.

4.2.1 Equipment Calibration

Actions were taken to prevent the failure of equipment or instruments during use. Maintenance and calibration were employed to ensure accurate measurements from the field and laboratory instruments.

Equipment scheduled for field use was cleaned and checked prior to calibration, as appropriate. General readiness of the equipment entailed a visual inspection of the meter boxes, sample hot boxes, probes, and umbilicals for dust, oil, or dirt in lines, and loose fittings and connections. An adequate supply of spare parts was taken to the field to minimize downtime due to equipment failure.

Equipment calibration was conducted IAW the procedures outlined in US EPA documents entitled "*Quality Assurance Handbook for Air Pollution Measurement Systems; Volume III - Stationary Source Specific Methods*" (EPA 600/4-77-0276). All required calibrations were performed prior to the test program, with post-test calibrations performed as required. Documentation of pretest calibrations was kept in the project file during the field effort and copies were provided to the regulatory observers prior to the start of the emissions tests. The calibration procedures for the equipment are summarized in Table 4-1. Copies of the exhaust gas sampling equipment and facility CEMS calibration forms can be found in Appendices C and D, repectively.

4.2.2 Glassware Preparation

Prior to field use, sample train glassware was subjected to method-specific cleaning procedures in order to minimize sample contamination. Cleaning and storage procedures for sampling train glassware were IAW the procedures summarized in the Sampling and Analysis Plan (SAP)/Quality Assurance Project Plan (QAPP). Sample bottles were purchased pre-cleaned and sealed to specified US EPA protocols. Sample bottles were fitted with Teflon® cap liners.

4.2.3 Sample Media Preparation

Reagents used for the testing program were of sufficient grade or quality to meet or exceed method requirements. This included the use of spectro-grade solvents from the same lot, when possible, and the collection and analysis of the appropriate blanks. Deionized (DI) reagent water used in all organic sampling trains was of a grade and quality that was demonstrated to be "organic-free" as per SW-846 requirements.

Resin used in the M0010, M0010-TOC, M0023A, and MM5E sampling trains was prepared and certified clean by TestAmerica. The sorbent traps were loaded with resin at the laboratories with the openings packed with cleaned glass wool to ensure no resin would be lost. Field surrogates were added by the laboratory prior to shipping, as required. The M0031 traps were conditioned by the laboratory IAW procedures specified in M0031.

4.3 SAMPLING METHODS

On-site sampling activities included the equipment staging in the field, sampling operations, data logging (except where noted below), and sample recovery. Copies of field sampling data sheets can be found in Appendix C.

Each isokinetic test run had a total sample time of 240 minutes (2 ports at 120 minutes/port). The M0031 sampling train, which is non-isokinetic, was operated for a total of 160 minutes (40 minutes/set of traps). The non-isokinetic M0040 sampling train was operated to collect 2 1-hr bag samples. The M3B (integrated sample) was sampled using an independent sampling probe and conditioning system.

4.3.1 US EPA Methods 1 and 2

Velocity traverses were conducted at the exhaust blower duct sampling location with an S-type pitot assembly IAW M1 and M2. An S-type pitot tube with an attached inclined manometer was used to measure the gas velocities. An attached Type-K thermocouple with remote digital display was used to determine the exhaust gas temperature.

Prior to commencing sampling, a preliminary determination of exhaust gas velocity and volumetric flow rate was performed to assist in selecting the correct nozzle diameter to ensure all isokinetic testing requirements were met. During the actual sampling, exhaust gas velocity and volumetric flow rate measurements were conducted with each isokinetic sampling train. The required number of sampling traverse points for each sampling location was determined following M1. Pitot tubes were leak-checked before and after each test run.

Exhaust duct static pressure measurements, as required by M2, were recorded manually once per run. This static pressure reading was used to calculate stack gas volumetric flow rate for each isokinetic sampling train.

A cyclonic flow check was conducted at the sampling location prior to testing IAW Section 11.4 of M1 during a previous testing event. This procedure was used to ensure the flow was not “swirling” at the sampling location. The equipment used consisted of an S-type pitot tube connected to an inclined manometer to measure the duct’s differential pressure, and an angle finding device (i.e., leveled angle finder for horizontal ports or delineated port plate for vertical ports). The pitot tube was positioned at each traverse point so that the face openings of the pitot tube were perpendicular to the exhaust duct cross-sectional plane. This position is called the zero reference. If the velocity pressure reading was zero, the cyclonic angle was recorded as 0 degrees (º). If the velocity pressure reading was not zero, the pitot tube was rotated clockwise or counterclockwise until the velocity pressure reading became zero. This angle was then measured and reported to the nearest degree. After this technique was applied at each traverse point, the average of the absolute values of the cyclonic angles was calculated. This average was less than (<) 9º and the flow conditions in the source were deemed acceptable to test.

4.3.2 <u>US EPA Method 3A</u>

O_2 and CO_2 concentrations were determined during each test run using a TRM CEMS IAW M3A. Two 2-hr runs were completed for each run to allow for parsing of the data such that it would correspond with the actual times each port was sampled by the isokinetic sampling trains.

A logbook was kept and calibrations, quality assurance (QA)/quality control (QC) activities, routine maintenance, and repair activities were documented for the O_2 and CO_2 testing. Activities related to the pre-test checks were also recorded. All data related to O_2 and CO_2 sampling and the pre-test activities were logged using the Data Acquisition System (DAS).

The TRM CEMS was calibrated IAW M3A. In general, the QA/QC measures included the use of US EPA protocol calibration gases and pre-test run calibrations. Copies of the certifications for the gas standards, documentation of all TRM CEMS QA/QC procedures, and results summaries of the TRM CEMS QC are provided in Appendix C.

4.3.3 <u>US EPA Method 3B</u>

O_2 and CO_2 concentrations were determined during each test run using a bag sampling system IAW M3B. The exhaust gas was collected in an evacuated Tedlar® bag. One sample was collected for each run.

Analysis was conducted using an Orsat combustion gas analyzer. A sample from the Tedlar® bag from each run was drawn into the analyzer and analyzed onsite for the concentrations of CO_2 and O_2 on a percentage basis. Analysis and calculation procedures were repeated until the individual dry molecular weights for any 3 analyses differed from their mean by no more than 0.3 gram per gram-mole. To determine the actual O_2 and CO_2 concentrations for each run, the resulting 3 acceptable readings for each parameter were averaged. These average results were then used by all isokinetic sampling trains in the determination of the exhaust gas molecular weight. In addition, the O_2 concentrations were used for correcting emissions, as applicable, to 7% O_2.

4.3.4 <u>US EPA Method 4</u>

Prior to the test runs, during preliminary measurements, an initial exhaust gas moisture measurement was performed IAW M4. This method is applicable for the determination of the moisture content of stack gas. A gas sample was extracted at a constant rate from the duct, and the moisture removed from the gas stream by a series of chilled impingers. The amount of the collected moisture was then determined gravimetrically and used in the calculation of percent moisture. M4 was used in conjunction with M0010, M0010-TOC, M0023A, M26A, M29, and MM5E for the determination of moisture at the sampling location. The weight gain for each sample train's impinger configuration was recorded and used in the exhaust gas moisture determination calculation.

4.3.5 US EPA Method 6C

SO_2 was determined during each test run using a TRM CEMS. Two 2-hr runs were completed for each run to allow for parsing of the data such that it would correspond with the actual times each port was sampled by the isokinetic sampling trains.

A logbook was kept and calibrations, QA/QC activities, routine maintenance, and repair activities were documented for the SO_2 testing. Activities related to the pre-test checks (calibration drift/error and response time tests) were also recorded. All data related to SO_2 sampling and the pre-test activities were logged using the DAS.

The TRM CEMS was calibrated IAW M6C. In general, the QA/QC measures included the use of US EPA protocol calibration gases, pre- and post-test run calibrations, calibration error, and bias tests. Copies of the certifications for the gas standards, documentation of all TRM CEMS QA/QC procedures, and results summaries of the TRM CEMS QC are provided in Appendix C.

4.3.6 US EPA Method 7E

NO_x was determined during each test run using a TRM CEMS. Two 2-hr runs were completed for each run to allow for parsing of the data such that it would correspond with the actual times each port was sampled by the isokinetic sampling trains.

A logbook was kept and calibrations, QA/QC activities, routine maintenance, and repair activities were documented for the NO_x testing. Activities related to the pre-test checks (calibration drift/error and response time tests) were also recorded. All data related to NO_x sampling and the pre-test activities were logged using the DAS and/or the digital strip chart recorder.

The TRM CEMS was calibrated IAW M7E. In general, the QA/QC measures included the use of US EPA protocol calibration gases, a converter check, pre- and post-test run calibrations, calibration error, and bias tests. Copies of the certifications for the gas standards, documentation of all TRM CEMS QA/QC procedures, and results summaries of the TRM CEMS QC are provided in Appendix C.

4.3.7 US EPA Method 10

CO was determined during each test run using a TRM CEMS. Two 2-hr runs were completed for each run to allow for parsing of the data such that it would correspond with the actual times each port was sampled by the isokinetic sampling trains. CO was also analyzed from an integrated sample bag collected during each run as allowed by M10. Analysis of the bag sample allowed an average CO to be reported for each run when off-scale results were encountered with the real-time analysis.

A logbook was kept and calibrations, QA/QC activities, routine maintenance, and repair activities were documented for the CO testing. Activities related to the pre-test checks (calibration drift/error and response time tests) were also recorded. All data related to CO sampling and the pre-test activities were logged using the DAS and/or the digital strip chart recorder.

The TRM CEMS was calibrated IAW M7E. In general, the QA/QC measures included the use of US EPA protocol calibration gases, pre- and post-test run calibrations, calibration error, and bias tests. Copies of the certifications for the gas standards, documentation of all TRM CEMS QA/QC procedures, and results summaries of the TRM CEMS QC are provided in Appendix C.

4.3.8 SW-846 Method 0010

Two sampling trains were used to measure and determine the emission rate of the semivolatile products of incomplete combustion (PICs) and tentatively identified compounds (TICs) and total chromatigraphable and gravimetric organics IAW M0010. Table 4-2 summarizes the exhaust gas characteristics measured by the M0010 sampling train.

The sampling train consisted of a heated, glass-lined probe with a glass button-hook nozzle, and a heated Teflon® transfer line. A thermocouple and S-type pitot tube with an inclined manometer were attached to the probe for measurement of gas temperature and velocity. The sample gas passed through the probe to a heated, glass fiber filter. The probe and the filter holder were maintained at 248 plus or minus (±) 25 degrees Fahrenheit (ºF) throughout each test period. Downstream of the heated filter, the gas passed through a heated Teflon® transfer line to a water-cooled condenser module, then through a sorbent module containing resin. The heated Teflon® transfer line was maintained at 248 ± 25ºF throughout each test period. The temperature of the exhaust gas entering the resin module was kept below 68ºF. The gas then passed through a series of ice-cooled impingers kept below 68ºF to enable condensation and collection of entrained moisture.

The 1st impinger, acting as a condensate reservoir (knockout) connected to the outlet of the resin module, was modified with a short stem IAW method requirements. The next 2 impingers each contained 100-milliliter (mL) of DI water. The 2nd DI water-filled impinger was equipped with a Greenburg-Smith impinger stem. The 4th impinger was empty, and the 5th impinger was loaded with indicating silica gel. All connections within the train were glass or Teflon®. No sealant greases were used. A dry gas meter, pump, and calibrated orifice meter followed the impingers. The M0010 sampling train configuration can be found in Appendix C.

A M0010 sample was collected over a 240-minute sampling period for each test run. Sampling was isokinetic (90 to 110%) with readings of exhaust gas and necessary sampling parameters recorded 6 times (6X) for each of the 8 sampling points.

Leak checks of the entire M0010 sampling train were performed prior to the start of sampling, during port changes, and at the completion of sampling. The initial and final leakage rates were documented on the relevant field test data sheet. The acceptance standard for the M0010 sampling train was a leak rate of ≤ 0.02 cubic feet per minute (cfm) performed at the highest vacuum reached during the period since the previous leak check. Pitot tubes were also successfully leak checked, both prior to and after sampling.

Following the completion of each test run (including final leak check), the M0010 sampling train was disassembled at the sampling location, partially recovered, and transported to a recovery trailer onsite. The sample recovery sequence is detailed on the field sampling log for the sampling train found in Appendix C. Each M0010 train resulted in the following sample fractions:

- Front-half (probe, heated Teflon® transfer line, nozzle, front-half glassware) recovery rinse,
- Filter,
- Back-half (back-half filter holder and condenser) recovery rinse,
- Resin module,
- Condensate, and
- 1st impinger condensate and rinse.

4.3.9 SW-846 Method 0010 for TOCs

A sampling train was used to measure and determine the emission rate of the semi- and nonvolatile TOCs IAW M0010. Table 4-2 summarizes the exhaust gas characteristics measured by the M0010-TOC sampling train.

This train was run in conjunction with the M0040 which yielded the volatile portion for the TOC. The methods provide for the sampling and analysis of total organics from stack gas emissions, combining the organics from 3 specific boiling point/vapor pressure ranges: light hydrocarbons and volatile organics, semivolatile organics, and nonvolatile organics. Two sampling procedures and 4 analytical techniques were combined to generate a value for total organics. The mass of organics that remain after correction for the identified organics, from SW-846 methodologies, is called residual organic carbon. This mass is used in estimating risk from unidentified organic emissions.

The sampling train consisted of a heated, glass-lined probe with a glass button-hook nozzle, and a heated Teflon® transfer line. A thermocouple and S-type pitot tube with an inclined manometer were attached to the probe for measurement of gas temperature and velocity. The sample gas passed through the probe to a heated, glass fiber filter. The probe and the filter holder were maintained at 248 ± 25ºF throughout each test period. Downstream of the heated filter, the gas passed through a heated Teflon® transfer line to a water-cooled condenser module, then through a sorbent module containing resin. The heated Teflon® transfer line was maintained at 248 ± 25ºF throughout each test period. The temperature of the exhaust gas entering the resin module was kept below 68ºF. The gas then passed through a series of ice-cooled impingers kept below 68ºF to enable condensation and collection of entrained moisture.

The 1st impinger, acting as a condensate reservoir (knockout) connected to the outlet of the resin module, was modified with a short stem IAW method requirements. The next 2 impingers each contained 100-mL of DI water. The 2nd DI water-filled impinger was equipped with a Greenburg-Smith impinger stem. The 4th impinger was empty, and the 5th impinger was loaded with indicating silica gel. All connections within the train were glass or Teflon®. No sealant greases were used. A dry gas meter, pump, and calibrated orifice meter followed the impingers. The M0010-TOC sampling train configuration is depicted in Appendix C.

A M0010-TOC sample was collected over a 240-minute sampling period during each emissions test. Sampling was isokinetic (90 to 110%) with readings of exhaust gas and necessary sampling parameters recorded 6X times for each of the 8 sampling points.

Leak checks of the entire M0010-TOC sampling train were performed prior to the start of sampling, during port changes, and at the completion of sampling. All leak checks and leakage rates were documented on the relevant field test data sheet. The acceptance standard for the M0010-TOC sampling train was a leak rate of ≤ 0.02 cfm performed at the highest vacuum reached during the period since the previous leak check. Pitot tubes were also successfully leak checked, both prior to and after sampling.

Following the completion of each test run (including final leak check), the M0010-TOC sampling train was disassembled at the sampling location, partially recovered, and transported to a recovery trailer onsite. The sample recovery sequence is detailed on the field sampling log for the sampling train found in Appendix C. Each M0010-TOC train resulted in the following sample fractions:

- Front-half (probe, heated Teflon® transfer line, nozzle, front-half glassware) recovery rinse,
- Filter,
- Back-half (back-half filter holder and condenser) recovery rinse,
- Resin module,
- Condensate, and
- 1st impinger condensate and rinse.

4.3.10 SW-846 Method 0023A

A sampling train was used to measure and determine the emission rate of the dioxins/furans IAW M0023A. Table 4-2 summarizes the exhaust gas characteristics for dioxins/furans measured by the M0023A sampling trains.

The sampling train consisted of a heated, glass-lined probe with a glass button-hook nozzle, and a heated Teflon® transfer line. A thermocouple and S-type pitot tube with an inclined manometer were attached to the probe for measurement of gas temperature and velocity. The sample gas passed through the probe to a heated, glass fiber filter. The probe and the filter holder were maintained at 248 ± 25ºF throughout each test period. Downstream of the heated filter, the gas passed through a heated Teflon® transfer line to a water-cooled condenser module, then through a sorbent module containing resin. The heated Teflon® transfer line was maintained at 248 ± 25ºF throughout each test period. The temperature of the exhaust gas entering the resin module was kept below 68ºF. The gas then passed through a series of ice-cooled impingers kept below 68ºF to enable condensation and collection of entrained moisture.

The 1st impinger, acting as a condensate reservoir (knockout) connected to the outlet of the resin module, was modified with a short stem IAW method requirements. The next 2 impingers each contained 100-mL of DI water. The 2nd DI water-filled impinger was equipped with a Greenburg-Smith impinger stem. The 4th impinger was empty, and the 5th impinger was loaded with indicating silica gel. All connections within the train were glass or Teflon®. No sealant greases were used. A dry gas meter, pump, and calibrated orifice meter followed the impingers. The M0023A sampling train configuration can be found in Appendix C.

A M0023A sample was collected over a 240-minute sampling period for each test run. Sampling was isokinetic (90 to 110%) with readings of exhaust gas and necessary sampling parameters recorded 6X for each of the 8 sampling points.

Leak checks of the entire M0023A sampling train were performed prior to the start of sampling, during port changes, and at the completion of sampling. The initial and final leakage rates were documented on the relevant field test data sheet. The acceptance standard for the M0023A sampling train was a leak rate of ≤ 0.02 cfm performed at the highest vacuum reached during the period since the previous leak check. Pitot tubes were also successfully leak checked, both prior to and after sampling.

Following the completion of each test run (including final leak check), the M0023A sampling train was disassembled at the sampling location, partially recovered, and transported to a recovery trailer onsite. The sample recovery sequence is detailed on the field sampling log for the sampling train found in Appendix C. Each M0023A train resulted in the following sample fractions:

- Front-half (probe, heated Teflon® transfer line, nozzle, front-half glassware) recovery rinse,
- Filter,
- Back-half rinse, and
- Resin module.

4.3.11 SW-846 Method 0031

The M0031 was used to determine emission rates of the volatile PICs/TICs in the exhaust gas. M0031 procedures and QA/QC requirements as described in M0031 were followed. The M0031 sampling system is a non-isokinetic sampling train, and sampling rates are predetermined based on desired run times.

Table 4-3 summarizes the exhaust gas characteristics measured by the M0031 sampling train. Approximately 20 liters (L) were collected through each set of traps at a sampling rate of approximately 0.5 liters per minute (L/min). Four sets of traps were collected for each test run. The condensate was collected at the end of the run. A diagram of the sampling train can be found in Appendix C.

Handling precautions were followed to reduce the potential for contamination of the resin. Tenax resin is susceptible to contamination. The resin stock was thermally desorbed under helium and stored either sealed in the collection traps or under helium. A packed trap was desorbed to serve as a laboratory blank prior to placing the batch of Tenax traps in the field. The laboratory prepared sufficient sealed blank traps in sealed containers for the M0031 sampling. Four pairs of traps and a condensate sample were collected during each test run. One pair of field blanks were collected for each test run, and 1 pair of trip blanks were provided for each shipping container containing M0031 samples being shipped to the laboratory. M0031 data is reported in Section 7, uncorrected for any field blank contamination.

4.3.12 SW-846 Method 0040

A M0040 sampling train was used to measure and determine the emission rates of volatile TOCs IAW M0040. Table 4-3 summarizes the exhaust gas characteristics measured by the M0040 sampling train.

The methods provide for the sampling and analysis of total organics from stack gas emissions, combining the organics from 3 specific boiling point/vapor pressure ranges: light hydrocarbons and volatile organics, semi-volatile organics, and nonvolatile organics. Two sampling procedures and 4 analytical techniques were combined to generate a value for total organics. The mass of organics that remain after correction for the identified organics, from SW-846 methodologies, is called residual organic carbon. This mass will be used in estimating risk from unidentified organic emissions.

The M0040 sampling train consisted of a glass-lined probe, a heated glass or Teflon® filter holder and quartz filter attached to 1 of 2 inlets of a glass and Teflon® 3-way isolation valve. The 2nd valve inlet was connected to a charcoal trap to filter incoming air when releasing system pressure after leak checks. The outlet of the isolation valve was connected to a glass, water-cooled, coil-type condenser and a glass condensate trap for the removal and collection of condensable liquids present in the gas stream. A Teflon® transfer line connected the condensate trap to a 2nd 3-way isolation valve and the isolation valve to a Tedlar bag contained in a rigid, air-tight container for sampling, storage and transport. The bag container was connected to a control console with a Teflon® vacuum line between the bag container and the control console to protect the console and sampling personnel from hazardous emissions in case of a bag rupture during sampling. The M0040 sampling train configuration is depicted in Appendix C.

Leak checks of the entire M0040 train were performed before and after each sampling run. In the event any portion of the train was disassembled and reassembled, leak checks were performed prior to disassembling the train and again upon reassembly. All leak checks and leakage rates were documented on the relevant field test data sheets.

Two Tedlar® bag gas samples were collected per run with approximately 30 L of sample collected into each Tedlar® bag at a flow rate of approximately 0.5 L/min. A daily field blank was also collected. Each run produced the following samples:

- Tedlar® bag sample 1,
- Condensate sample 1,
- Tedlar® bag sample 2,
- Condensate sample 2,
- Tedlar® bag field blank (1/day), and
- Condensate field blank (1/day).

A field control spike was conducted using 1 bag during 1 of the sampling runs for each condition. The field control spikes consisted of a known concentration of a target compound (propane) injected directly into the Tedlar® bag of a field sample.

4.3.13 <u>US EPA Method 26A</u>

A sampling train was used to measure and determine the emission rate of the acid gases IAW M26A. Table 4-2 summarizes the exhaust gas characteristics measured by the M26A sampling train.

The sampling train consisted of a heated, glass-lined probe with a glass button-hook nozzle, and a Teflon® transfer line. A thermocouple and S-type pitot tube with an inclined manometer were attached to the probe for measurement of gas temperature and velocity. The sample gas passed through the probe to a heated filter. The probe and the filter holder were maintained in the range of 248 to 273ºF throughout each test period with exceptions noted in Section 6. The gas then passed through a series of 6 ice-cooled impingers kept below 68°F to enable condensation and collection of entrained moisture.

The 1st impinger served as a moisture knockout and contained 50 mL of 0.1 normal (N) sulfuric acid (H_2SO_4). The next 2 impingers contained 100 mL of 0.1N H_2SO_4. The 4th and 5th impingers contained 100 mL of 0.1N sodium hydroxide (NaOH). The 6th impinger contained a pre-weighed amount of silica gel. The impingers were followed by a dry gas meter pump and calibrated orifice meter. The M26A sampling train configuration can be found in Appendix C.

A M26A sample was collected over a 240-minute sampling period for each test run. Sampling was isokinetic (90 to 110%) with readings of exhaust gas and necessary sampling parameters recorded 6X for each of the 8 sampling points.

Leak checks of the entire M26A sampling train were performed prior to the start of sampling, during port changes, and at the completion of sampling. The initial and final leak checks and leakage rates were documented on the relevant field test data sheet. The acceptance standard for the M26A sampling train was a leak rate of ≤ 0.02 cfm performed at the highest vacuum reached during the period since the previous leak check. Pitot tubes were also successfully leak checked, both prior to and after sampling.

Following the completion of each test run (including the final leak check), the filter and filter housing was visually inspected to verify that there was no moisture present and that a purge with filtered air was not required. The sample recovery sequence is detailed on the field sampling log for the sampling train found in Appendix C. Each M26A train resulted in the following sample fractions:

- Filter,
- Front-half solvent rinse,
- 0.1N H_2SO_4 impinger catches, and
- 0.1N NaOH impinger catches.

4.3.14 <u>US EPA Method 29</u>

A sampling train was used to measure and determine the emission rate of the trace metals IAW M29. Table 4-2 summarizes the exhaust gas characteristics measured by the M29 sampling train.

The sampling train consisted of a heated glass-lined probe with a glass button-hook nozzle, and a Teflon® transfer line. A thermocouple and S-type pitot tube with an inclined manometer were attached to the probe for measurement of gas temperature and velocity. The sample gas passed through the probe to a heated filter. The probe and the filter holder were maintained at 248 ± 25ºF throughout each test period. Downstream of the heated filter, the gas passed through a series of 7 ice-cooled impingers kept below 68°F to enable condensation and collection of entrained moisture.

The 1st impinger was empty and served as a moisture knockout. The 2nd and 3rd impingers contained 100 mL of a 5% nitric acid (HNO_3)/10% hydrogen peroxide (H_2O_2) solution. The 4th impinger was empty. The 5th and 6th impingers contained 100 mL of a 4% potassium permanganate ($KMnO_4$)/10% H_2SO_4 solution. The 7th impinger contained a pre-weighed amount of silica gel. The impingers were followed by a dry gas meter, pump, and calibrated orifice meter. The M29 sampling train configuration can be found in Appendix C.

A M29 sample was collected over a 240-minute sampling period for each test run. Sampling was isokinetic (90 to 110%) with readings of exhaust gas and necessary sampling parameters recorded 6X for each of the 8 sampling points.

Leak checks of the entire M29 sampling train were performed prior to the start of sampling, during port changes, and at the completion of sampling. The initial and final leak checks and leakage rates were documented on the relevant field test data sheet. The acceptance standard for the M29 sampling train was a leak rate of ≤ 0.02 cfm performed at the highest vacuum reached during the period since the previous leak check. Pitot tubes were also successfully leak checked, both prior to and after sampling.

Following the completion of each test run (including final leak check), the M29 sampling train was disassembled at the sampling location, partially recovered, and transported to a recovery trailer onsite. The sample recovery sequence is detailed on the field sampling log for the sampling train found in Appendix C. Each M29 train resulted in the following sample fractions:

- Filter,
- Probe nozzle and front-half filter housing 0.1N HNO_3 rinse,
- Back-half filter housing and 0.1N HNO_3 impinger catch (impingers 1, 2, and 3),
- Impinger 4 - 0.1N HNO_3 rinse (empty),
- Impingers 5 and 6 - acidified $KMnO_4$ impinger catch, and
- Impingers 5 and 6 hydrogen chloride (HCl) rinse.

4.3.15 US EPA Modified Method 5 for Energetics

A sampling train was used to measure and determine the emission rate of target energetic compounds IAW MM5E. Table 4-2 summarizes the exhaust gas characteristics measured by the MM5E sampling train.

The sampling train consisted of a heated, glass-lined probe with a glass button-hook nozzle and a heated sample line. A thermocouple and S-type pitot tube attached to an inclined manometer were attached to the probe for measurement of gas temperature and velocity measurement. The sample gas passed through the probe assembly to a heated filter. The probe, filter holder, and transfer line were maintained at 248 ± 25ºF throughout each test period. Downstream of the heated filter, the gas passed through a heated sample line and then through a series of 3 ice-cooled impingers kept below 68ºF to enable condensation of entrained moisture. The 1st impinger had a short stem and was charged with 50 mL of DI water to serve as the primary condensate knockout. The 2nd and 3rd impingers were empty. After passing through the 1st 3 impingers, the sample gas passed through a 2-section sorbent module. Each section of the module contained approximately 10 grams of resin separated by a glass wool plug. The gas then passed through a 4th ice-cooled impinger (empty) and finally through a 5th impinger containing a preweighed amount of silica gel. All connections within the train were glass or Teflon®. No sealant greases were used. The impingers were followed by a dry gas meter, pump, and calibrated orifice meter. The MM5E sampling train configuration can be found in Appendix C.

A MM5E sample was collected over a 240-minute sampling period for each test run. Sampling was isokinetic (90 to 110%) with readings of exhaust gas and necessary sampling parameters recorded 6X for each of the 8 sampling points.

Leak checks of the entire MM5E sampling train were performed prior to the start of sampling, during port changes, and at the completion of sampling. The initial and final leak checks and leakage rates were documented on the relevant field test data sheet. The acceptance standard for the MM5E sampling train was a leak rate of ≤ 0.02 cfm performed at the highest vacuum reached during the period since the previous leak check. Pitot tubes were also successfully leak checked, both prior to and after sampling.

Following the completion of each test run (including final leak check), the MM5E sampling train was disassembled at the sampling location, partially recovered, and transported to a recovery trailer onsite. The sample recovery sequence is detailed on the field sampling log for the sampling train found in Appendix C. Each MM5E train resulted in the following sample fractions:

- Front-half rinse and filter,
- Impingers 1, 2, 3, and 4 condensate and rinsate, and
- Resin module.

Table 4-1: Calibration Procedures for Equipment

Equipment	Reference	Procedure	Frequency
Probe Nozzles	QA Handbook, Volume III, Section 3.4.2, page 19	Measured 3 internal diameters of the nozzle to 0.001 inches and averaged. Acceptance criteria: the difference between high and low values ≤ 0.004 inches.	Every nozzle prior to use and post-test physical inspection.
Pitot tubes	QA Handbook Volume III, Section 3.1.2, pages 1 to 13	All dimension specifications met according to Section 2 of EPA Method 2. Measured for appropriate spacing and dimensions when utilized in probe configuration. Rejection criteria given on the calibration sheet.	Post-test inspection for damage to the sensing heads. Calibration verification performed using geometric configuration prior to subsequent test events.
Thermocouples	QA Handbook, Volume III, Section 3.4.2, pages 12 to 18 and ALT Method 011	Verified against a mercury-in-glass thermometer at 3 points including the anticipated measurement range or according to EPA's Alternative Method 2 Thermocouple Calibration Procedure (ALT-011). Acceptance criteria: • impinger ± 2°F • dry gas meter ± 5.4°F • stack ± 1.5% of stack temperature	Initial calibration conducted using 3 temperature points. Calibration verification performed using a single temperature point prior to subsequent test events.
Dry gas meters, Isokinetic sampling consoles	US EPA 40 CFR Part 60, Method 5, Section 10.3.1	Calibrated using a critical orifice set. Acceptance criteria: • pre-test: Yi = Y ± 0.02 • post-test: Yi = Y ± 0.05	Pre-test and post-test.
Dry gas meters, Non-isokinetic sampling consoles		Calibrated using a critical orifice set. Acceptance criteria: • pre-test: Yi = Y ± 0.02 • post-test: Yi = Y ± 0.05	Pre-test and post-test.
Trip Balance	EPA Method 5, Section 10.7 and QA Handbook, Volume III, Section 3.4.2, page 19	Standard weights measured within 0.5 grams of stated value. Corrective action: have manufacturer re-calibrate or adjust.	Balance calibrated yearly by manufacturer or metroligist. Calibration verification performed using Class 6 weights daily prior to using the balance.

Table 4-1: Calibration Procedures for Equipment (Continued)

Equipment	Reference	Procedure	Frequency
Probe Heating System	US EPA 40 CFR Part 60, Method 5, Section 10.4	Capable of maintaining 248 ± 25°F	Periodic checks of calibrated thermocouple readout during sampling.
	SW-846 Method 0031	Capable of maintaining 266 ± 9°F	

Table 4-2: Isokinetic Sampling Train Summary

Parameter	Units	Run 2	Run 3	Run 3	Average
SW-846 Method 0010					
Sample Volume	dscf	150.760	156.412	154.894	154.02
Exhaust Gas Flow Rate	dscfm	746	745	759	750.00
Exhaust Gas Temperature	^oF	164.5	165.8	161.9	164.07
Exhaust Gas Moisture	%	22.18	22.09	22.75	22.34
Isokinetics	%	99.50	103.36	100.60	101.15
SW-846 Method 0010 for Total Organic Compounds					
Sample Volume	dscf	149.604	149.332	155.135	151.36
Exhaust Gas Flow Rate	dscfm	732	723	744	733.00
Exhaust Gas Temperature	^oF	166.4	165.5	162.9	164.93
Exhaust Gas Moisture	%	22.17	21.89	22.69	22.25
Isokinetics	%	99.55	100.57	101.59	100.57
SW-846 Method 0023A					
Sample Volume	dscf	159.357	170.521	166.500	165.46
Exhaust Gas Flow Rate	dscfm	727	774	757	752.67
Exhaust Gas Temperature	^oF	159.3	160.0	157.8	159.03
Exhaust Gas Moisture	%	22.21	22.08	22.68	22.32
Isokinetics	%	100.93	101.40	101.27	101.20
US EPA Method 26A					
Sample Volume	dscf	147.548	156.925	157.062	153.85
Exhaust Gas Flow Rate	dscfm	703	737	733	724.33
Exhaust Gas Temperature	^oF	162.6	163.1	159.9	161.87
Exhaust Gas Moisture	%	22.31	22.16	22.84	22.44
Isokinetics	%	101.01	102.58	103.24	102.28
US EPA Method 29					
Sample Volume	dscf	136.550	141.283	140.968	139.60
Exhaust Gas Flow Rate	dscfm	637	657	651	648.33
Exhaust Gas Temperature	^oF	164.1	164.4	161.2	163.23
Exhaust Gas Moisture	%	22.56	22.56	23.30	22.81
Isokinetics	%	101.52	101.85	102.51	101.96

Table 4-2: Isokinetic Sampling Train Summary (Continued)

Parameter	Units	Run 2	Run 3	Run 3	Average
US EPA Modified Method 5					
Sample Volume	dscf	156.705	162.605	161.978	160.43
Exhaust Gas Flow Rate	dscfm	700	730	723	717.67
Exhaust Gas Temperature	^oF	165.5	165.0	162.1	164.20
Exhaust Gas Moisture	%	22.46	22.35	23.10	22.64
Isokinetics	%	101.87	101.48	102.03	101.79

Table 4-3: Non-Isokinetic Sampling Train Summary

Parameter	Run 2			Run 3			Run 4		
Barometric Pressure (inHg)	29.46			A&B: 29.49, C&D: 29.46			A&B: 29.34, C&D: 29.23		
Meter Calibration Factor	1.008			1.008			1.008		
Collection Time (hrs)	Tube A: 1025-1105			Tube A: 0910-0950			Tube A: 0815-0855		
	Tube B: 1122-1202			Tube B: 1004-1044			Tube B: 0907-0947		
	Tube C: 1410-1450			Tube C: 1250-1330			Tube C: 1235-1315		
	Tube D: 1504-1544			Tube D: 1344-1414			Tube D: 1329-1409		
M0030 Tube Pairs	**Sample Volume (L, dry)**	**Temp. (^oF)**	**Corrected Volume (dsL)**	**Sample Volume (L, dry)**	**Temp. (^oF)**	**Corrected Volume (dsL)**	**Sample Volume (L, dry)**	**Temp. (^oF)**	**Corrected Volume (dsL)**
Tube A	20.21	73.00	19.87	20.04	69.60	19.85	20.02	70.80	19.68
Tube B	20.30	80.80	19.67	20.08	75.40	19.67	20.14	76.80	19.58
Tube C	20.15	82.60	19.46	20.14	80.40	19.53	20.16	82.00	19.34
Tube D	20.27	86.60	19.43	20.16	86.00	19.355	20.14	87.00	19.14
Totals	---	---	78.43	---	---	78.39	---	---	77.75
Barometric Pressure (inHg)	29.44			A: 29.47, B: 29.44, FB: 29.46			A & FB: 29.322, B: 29.214		
Meter Calibration Factor	0.996			0.996			0.996		
Collection Time	Bag A: 1030-1130			Bag A: 0920-1020			Bag A: 0820-0920		
	Bag B: 1420-1520			Bag B: 1255-1355			Bag B: 1240-1340		
	Field Blank: 1200-1300			Field Blank: 1045-1145			Field Blank: 0955-1055		
M0040 Tube Pairs	**Sample Volume (L, dry)**	**Temp. (^oF)**	**Corrected Volume (dsL)**	**Sample Volume (L, dry)**	**Temp. (^oF)**	**Corrected Volume (dsL)**	**Sample Volume (L, dry)**	**Temp. (^oF)**	**Corrected Volume (dsL)**
Bag A	34.91	74.33	33.80	34.15	74.83	33.07	35.78	73.33	34.57
Bag B	34.48	75.75	33.30	34.75	74.92	33.61	34.85	74.83	33.45
Field Blank	35.42	76.58	34.15	34.51	76.08	33.33	35.43	76.08	34.06

5.0 ANALYTICAL PROCEDURES

The analytical program that was performed in support of the emissions test consisted of the analysis of exhaust gas samples. The program used US EPA analytical methods, project-specific procedures, and laboratory-specific procedures as specified in the SAP/QAPP. The analytical reports are located in Appendix F.

5.1 SUMMARY OF ON-SITE ANALYTICAL PROCEDURES

5.1.1 O_2 and CO_2

Both M3A and M3B sampling was performed to determine O_2 and CO_2 concentrations during the test.

The quality of data generated by this TRM CEMS was evaluated by conducting system performance checks before testing began.

During each test run, the zero, mid-level, and high-level calibrations were considered verification of the quality of data received. Data was reported on 1-minute intervals and was archived in the TRM CEMS data acquisition system.

M3B sampling was performed by collecting an integrated bag sample that was analyzed using an Orsat analyzer. One integrated bag sample was collected during each run. Each sample was analyzed and the resulting O_2 and CO_2 values were used for all sampling trains. Each sample was collected at a constant rate resulting in a total sample volume. All Tedlar® bags were leak checked prior to use.

The Orsat analyzer was successfully leak-checked prior to analysis of each sample IAW the procedures in M3B. The Orsat accuracy was checked with ambient air on a daily basis and with cylinder audits once during each condition. Two cylinders, each containing different CO_2 and O_2 concentrations, were used to conduct each audit. Results of the cylinder audits are recorded on the field data sheets provided in Appendix C.

5.1.2 SO_2

SO_2 concentration was determined during each test run using a TRM CEMS operated IAW M6C. The quality of data generated by this TRM CEMS was evaluated by conducting system performance checks before testing began, by conducting calibration checks during each test run, and reviewing all data records obtained during the initial instrument performance evaluation.

During each test run, the zero and span checks of the monitors were considered verification of the quality of data received. Data was reported on 1-minute intervals and was archived in the TRM CEMS data acquisition system. The calibration gas used to calibrate the instrument conformed to the US EPA *Traceability Protocol for Assay and Certification of Gaseous Calibration Standards* (RTI/6960/208-01F).

5.1.3 NO_x

NO_x concentration was determined during each test run using a TRM CEMS operated IAW M7E. The quality of data generated by this TRM CEMS was evaluated by conducting system performance checks before testing began (i.e., stratification check, interference check, and NO_2 to NO conversion efficiency), by conducting calibration checks during each test run, and reviewing all data records obtained during the initial instrument performance evaluation.

During each test run, the zero and span checks of the monitors were considered verification of the quality of data received. Data was reported on 1-minute intervals and was archived in the TRM CEMS DAS. The calibration gas used to calibrate the instrument conformed to the US EPA *Traceability Protocol for Assay and Certification of Gaseous Calibration Standards* (RTI/6960/208-01F).

For Run 2, the NOx result was taken from the integrated bag sample collected for M3B analysis. This was performed to mitigate the higher than span readings obtained during the run.

5.1.4 CO

CO concentration was determined during each test run using a TRM CEMS operated IAW M10. The quality of data generated by this TRM CEMS was evaluated by conducting system performance checks before testing began, by conducting calibration checks during each test run, and reviewing all data records obtained during the initial instrument performance evaluation.

During each test run, the zero and span checks of the monitors were considered verification of the quality of data received. Data was reported on 1-minute intervals and was archived in the TRM CEMS data acquisition system. The calibration gas used to calibrate the instrument conformed to the US EPA *Traceability Protocol for Assay and Certification of Gaseous Calibration Standards* (RTI/6960/208-01F).

CO was also determined by analysis of the integrated bag sample collected for M3B analysis to mitigate the off-scale readings obtained during each test run.

5.1.5 Volatile TOCs

TOC sampling and analysis was accomplished by following the procedures identified and referenced in "*Guidance for Total Organics, Final Report*" (EPA/600/R-96/033). Two separate sampling trains were employed to collect the samples necessary to make the TOC determination. A M0040 sampling train was used to collect exhaust gas samples for the determination of total volatile unspeciated organics and a M0010 sampling train was used to collect exhaust gas samples for total unspeciated semivolatile and non-volatile organics.

For the volatile TOCs, 2 bag samples per run were collected and analyzed on-site for C_1-C_7 compounds via GC/flame ionization detector (FID). The condensate collected ahead of the Tedlar® bag during each run was analyzed for C_4-C_7 compounds off-site, as were the samples collected with the M0010-TOC.

The exhaust gas samples collected into the Tedlar® bags were analyzed in the field by GC/FID. The GC was set up in the field with column and conditions appropriate for the analysis of C_1 through C_7 n-alkanes. Retention times were determined and a calibration was performed with certified gas standards of C_1 through C_7 alkanes in air or nitrogen. Compounds of interest were identified by retention times or retention time ranges and quantitative analysis was performed. Results of the Tedlar® bag analyses were added to the volatile organics from the condensate to yield the volatile organics portion of the TOC number.

5.2 SUMMARY OF OFF-SITE ANALYTICAL PROCEDURES

All exhaust gas samples were analyzed by off-site laboratories. The analytical methods employed for exhaust gas samples are listed below.

Parameter	Analysis Method
Semivolatile Organics	SW-846 Method 8270C (M8270C)
Dioxins/Furans	SW-846 Methods 8290 (M8290)
Volatile Organics	SW-846 Method 8260B (M8260B)
Total Volatile, Semivolatile, and Nonvolatile Unspeciated Organics	"*Guidance for Total Organics*" EPA/600/R-96/033
Acid Gases	M26A
Particulate Matter	M5
Metals	SW-846 Methods 6010 (M6010), 7470A (M7470A), and 7471A (M7471A)
Energetics	SW-846 Method 8330 (M8330)

5.2.1 Semivolatile Organics

Sampling for semivolatile organics was accomplished by M0010. Preparation of the sampling train was performed IAW SW-846 Method 3542 (M3542). Analysis of the 3 analytical fractions of the M0010 sampling train was performed IAW M8270C by gas chromatography (GC)/mass spectrometer (MS).

Sample fractions were prepared for analysis IAW M3542. This method provides procedures by which the samples generated by the M0010 sampling train are separated and solvent extracted IAW SW-846 Method 3540C (M3540C) (filter and XAD/back-half rinse fractions) and SW-846 Method 3510C (M3510C) (front-half rinse and condensate/condensate rinse fractions) with method exceptions as noted in M3542. Extracts are concentrated to final volume IAW M3540C. In total, the sample fractions recovered from the M0010 sampling train prepared for analysis by M3542 yielded 3 extracts for analysis by M8270C.

M8270C is a GC/MS method where samples that have been prepared for analysis using one or more of the aforementioned sample preparation procedures are introduced into a GC by injecting an aliquot of the concentrated sample extract. The GC is equipped with a fused-silica capillary column. The GC oven is temperature-programmed to allow separation of the analytes, which are then detected by a MS interfaced to the GC. Analytes eluted from the capillary column are introduced into the MS whereby identification of target analytes is accomplished by comparing their mass spectra with the electron impact spectra of authentic standards. Quantitation is accomplished by comparing the response of a major (quantitation) ion relative to an internal standard using a multi-point calibration curve.

5.2.2 Dioxins/Furans

Sampling for dioxins/furans was accomplished by M0023A. Samples were extracted and concentrated as described in the method. Analysis of the sample extracts was performed by high resolution gas chromatograph (HRGC)/high resolution mass spectrometer (HRMS) IAW M8290.

Samples were solvent extracted IAW the matrix-specific technique described in M8290 after the addition of internal standards and surrogates, as required (surrogate standards are added to the sorbent/back-half prior to sampling). Sample extracts are solvent exchanged and concentrated using a nitrogen evaporative concentrator to reduce the volume of the extract. After the concentrated samples are subject to a clean-up step, fractionated, and subject to additional clean-up steps, they are ready for analysis by M8290.

M8290 employs a HRGC column coupled to a HRMS. An aliquot of each concentrated sample extract is injected into the HRGC/HRMS system. The system is capable of performing selected ion monitoring at resolving powers of at least 10,000 (10% valley definition). Identification of the target analytes for which a C_{13}-labeled standard is available in the sample fortification and recovery standard solutions (added prior to sample analysis) is based on their elution at their exact retention time (-1 to +3 seconds from the respective internal or recovery standard signal) and simultaneous detection of the 2 most abundant ions in the molecular ion region. All other target analytes are identified when their relative retention times fall within their respective dioxins/furans retention time windows, as established using a column performance evaluation solution, and the simultaneous detection of the 2 most abundant ions in the molecular ion region. The identification of octachlorodibenzofuran is based on its retention time relative to $^{13}C_{12}$- octachlorinated dibenzo-p-dioxin (CDD) and the simultaneous detection of the 2 most abundant ions in the molecular ion region. Confirmation is based on a comparison of the ratio of the integrated ion abundance of the molecular ion species to their theoretical abundance ratio. Quantitation of the individual congeners, total dioxins, and total furans is achieved in conjunction with the establishment of a multi-point calibration curve for each homologue, during which each calibration solution is analyzed once.

5.2.3 Volatile Organics

Sampling for selected volatile organics was accomplished by M0031. Analysis of the M0031 samples was performed IAW SW-846 Methods 5041A (M5041A) and M8260B. The sample fraction analyzed included the Tenax tubes, the Anasorb tubes, and the condensate from each run.

M5041A, is a method in which the sorbent tubes are thermally desorbed by heating and purging with organic-free helium. The gaseous effluent from the tubes is bubbled through pre-purged organic-free reagent water and trapped on an analytical sorbent trap in a purge-and-trap unit. For condensate samples, a sample aliquot is placed directly into the purging chamber of the purge-and-trap unit where volatile organic constituents are purged onto the analytical sorbent trap. After desorption, the analytical sorbent trap is heated rapidly and the gas flow from the analytical trap is directed to the head of a fused-silica capillary column. The volatile organic compounds desorbed from the analytical trap are determined by M8260B.

M8260B is a GC/MS method where volatile compounds are introduced into a GC using appropriate purge-and-trap methods. The GC is equipped with a fused-silica capillary column. The GC oven is temperature-programmed to allow separation of the analytes, which are then detected by a MS interfaced to the GC. Analytes eluted from the capillary column are introduced into the MS whereby identification of target analytes is accomplished by comparing their mass spectra with the electron impact spectra of authentic standards. Quantitation is accomplished by comparing the response of a major (quantitation) ion relative to an internal standard using a multi-point calibration curve.

5.2.4 Total Volatile, Semivolatile, and Nonvolatile Organics

TOC sampling and analysis was accomplished by following the procedures identified and referenced in "*Guidance for Total Organics, Final Report*" (EPA/600/R-96/033). Two separate sampling trains were employed to collect the samples necessary to make the TOC determination. A M0040 sampling train was used to collect samples for the determination of the volatile fraction of the TOC and a M0010 sampling train was used to collect exhaust gas samples for the determination of the semivolatile and nonvolatile fractions of the TOC.

For the volatile fraction of the TOC, 2 bag samples per run were collected and analyzed on-site for C_1 through C_7 compounds via field GC/FID as described in Section 6.1.2. The condensate collected ahead of the Tedlar® bag during each run was analyzed for C_4 through C_7 compounds by an off-site laboratory IAW the method described in "*Guidance for Total Organics, Final Report*" (EPA/600/R-96/033). This is GC/FID method where samples are purged onto a sorbent trap and the sorbent trap is then desorbed into a GC. The GC is equipped with a fused-silica capillary column. The GC oven is temperature-programmed to allow separation of the analytes, which are then detected by a FID. Uniform FID response for varying compound classes is assumed in this methodology. Compounds found with retention times prior to the C_4 retention time are quantified with an appropriate response factor and reported as C_4 with the other results quantitated against a multi-point calibration curve prepared using C_5 through C_7 standards. Results of the condensate are added to the field determined volatile organics values to yield the total volatile fraction of the TOC.

For the total semivolatile and nonvolatile fractions of the TOC, samples are prepared IAW M0010, Appendix B. Specifically, 2 standards were added to each sample prior to extraction to bracket the quantitation range. One of the standards serves as a surrogate to provide an additional QC measure for the analysis. The 3 extracts from the total sampling train are combined prior to analysis, and the combined extract is split to allow separate analysis.

The total chromatographable organic (TCO) method is a capillary GC/FID method quantifying chromatographable material in the 100 to 300 degrees Celsius (°C) boiling point range. An aliquot of the prepared extract is injected onto a capillary GC column with a FID detector, and the peak areas are summed over the retention time window that encompasses the TCO boiling point range. The TCO value is determined from the multipoint calibration curve, generated with hydrocarbon standards that fall within the TCO range, specifically decane, dodecane, and tetradecane. The organics identified in the prescribed boiling point range are quantified and summed (totaled) to obtain the TCO portion of the TOC.

The gravimetric (GRAV) method quantifies nonvolatile organic material with a boiling point greater than 300°C. A carefully measured aliquot of the prepared extract is placed in a pre-cleaned weighing pan and allowed to dry in air at room temperature, then come to complete dryness in a room temperature desiccator, while exposure to dust and contaminants are minimized. The residue in the pan is weighed and the mass is recorded to determine the GRAV value.

The TOC value is reported as the sum of the volatile, semivolatile, and nonvolatile unspeciated organics results.

5.2.5 Acid Gases

Acid gas sampling and analysis were accomplished by following the procedures in M26A. A small volume of each M26A sample is injected into an ion chromatograph (IC) to flush and fill a constant volume sample loop. The sample is then injected into a stream of carbonate-bicarbonate eluent of the same strength as the impinger solutions. The sample is pumped through 3 different ion exchange columns and into a conductivity detector. The 1st 2 columns, a precolumn or guard column and a separator column, are packed with low-capacity, strongly basic anion exchanger. Ions are separated into discrete bands based on their affinity for the exchange sites of the resin. The last column is a suppressor column that reduces the background conductivity of the eluent to a low or negligible level and converts the anions in the sample to their corresponding acids. The separated anions in their acid form are measured using an electrical-conductivity cell. Anions are identified based on their retention times compared to known standards. Quantitation is accomplished by measuring the peak height or area and comparing it to a calibration curve generated from known standards.

5.2.6 Particulate Matter

Particulate matter analyses were accomplished following the procedures in M5. The sampling for particulate matter emissions was done with the M26A isokinetic sampling train. Particulate matter determination was performed during all runs.

Prior to use in the field, each filter used was desiccated to a constant weight, placed in glass petri dishes, and sealed with Teflon® tape. An identification label was placed on each dish, and the weight of each filter was recorded. The beakers used for the dry-down of the acetone rinse were cleaned and dried in a drying oven. The beakers were desiccated to a constant weight.

Analysis of the particulate matter samples was accomplished by: drying the front-half acetone rinses in a tared beaker, desiccating, and weighing to a constant weight. The filters were desiccated and weighed to a constant weight. The net weight for the front-half acetone rinse and filter was determined by calculating the difference in weight. The sum of the net weights for the probe wash and filter catch was used to calculate the particulate matter concentrations in the exhaust gas.

5.2.7 Trace Metals

Metals sampling and preparation of the sampling trains for analysis were accomplished by following the procedures in M29. The M29 sample preparation procedures employ acid digestion using acid/reagent combinations specified in the method for each sample fraction collected from the sampling train.

As the laboratory uses boric acid with the front-half fraction digestate, the M29 front-half sample preparation procedure was modified to incorporate a 2-step digestion to allow for the reporting of boron for the front-half fraction (no changes are required for the back-half fraction). With the 2-step digestion, the laboratory performs an initial digestion that does not include the addition of boric acid and analyzes an aliquot for all M6010C metals including boron. The remaining aliquot and filter are subject to an additional digestion with hydrofluoric acid and the addition of boric acid prior to analysis. This digestate is analyzed for all M6010C metals except boron. For all metals except boron, the results are combined and represent the total mass for each metal. The case narrative provided in the laboratory's final report (see Appendic F-8) provides a detailed description of how the results from each digestate were determined.

Analysis of the prepared and combined sample fractions, as specified by M29, was conducted by cold vapor atomic absorption spectroscopy (CVAAS) for mercury, M7470A/M7471A, and by inductively coupled plasma (ICP)/Atomic Emission Spectrometry (AES), M6010B, for the remaining metals.

In the CVAAS technique used for mercury analysis (M7470A/M7471A), analysis is based on the absorption of radiation at 253.7-nanometer by mercury vapor. The mercury is reduced to the elemental state and aerated from solution in a closed system. The mercury vapor passes through a cell positioned in the light path of an atomic absorption spectrophotometer. Absorbance is measured as a function of mercury concentration.

M6010, used to analyze M29 samples for all target metal concentrations except mercury, is a multi-element procedure that uses ICP/AES. The method measures characteristic emission spectra by optical spectrometry. Samples are nebulized and the resulting aerosol is transported to the plasma torch. Element-specific emission spectra are produced by a radio-frequency inductively coupled plasma. The spectra are dispersed by a grating spectrometer, and the intensities of the emission lines are monitored by photosensitive devices. Appropriate background corrections are applied to account for spectral interferences.

5.2.8 Energetics

Sampling of energetic compounds was accomplished using a modified M5 sampling train. Each sampling train yielded 3 fractions for preparation and 4 fractions for analysis: the front-half rinse and filter, the condensate and impinger rinsate, and the 2-section resin module. The front-half rinse and filter fraction was prepared for analysis by decanting the solvent phase. The condensate and condensate rinse fraction was prepared for analysis IAW SW-846 Method 3535 (M3535). Each resin section was prepared for analysis by serial extraction with acetonitrile. Analysis of the analytical fractions of the modified M5 train was done IAW M8330 (modified) by high-performance liquid chromatography (HPLC) with ultra-violet detection. The 2nd resin section results are only included in train totals when analytes are detected in the 1st resin section analysis IAW the approved energetics procedure.

6.0 QUALITY ASSURANCE/QUALITY CONTROL RESULTS

QA/ QC measures for this program were based on the sampling requirements outlined in the SDC C2 Emissions Test Plan (see Appendix B). Results of the QA/QC activities employed during the testing program are summarized in this section. All calculations were performed using standardized equations.

Field data was reduced using a personal computer with software containing validated equations. Isokinetic ratios were determined after each test run. Reduced data shown in Appendix C were generated after each test run with the exception of pollutant concentrations and emission rates, which were determined after sample analyses were completed. All sampling trains were leak checked prior to, and immediately after, sampling in each port.

Exhaust gas samples were collected by AECOM-Austin. Sample collection, documentation, and management procedures were performed IAW the SAP/QAPP. Table 6-1 provides a summary of laboratory and field samples collected and analyzed in support of the emissions tests.

Four runs were conducted, but only 3 runs, Runs 2, 3, and 4, were designated for analysis. As such, only sampling and analysis results for Runs 2, 3, and 4 are addressed in this section.

6.1 LABORATORY QUALIFICATIONS AND ANALYTICAL STANDARDS

The off-site analytical laboratories used to perform sample analysis were TestAmerica in Knoxville, Tennessee, and Sacramento, California. Both laboratories have extensive experience in these methods and have conducted emissions testing in support of demilitarization facilities.

6.1.1 Data Validation

Analytical data were initially verified by the subcontractor laboratory QC and/or supervisory personnel and then subjected to validation by SDC-designated personnel. The field and laboratory blanks, replicate samples, and internal QC sample results were used to assess the analytical results. Designated personnel reviewed subcontractor laboratory raw analytical data to verify the calculated results. The criteria used to evaluate the analytical data includes use of approved analytical procedures, use of properly operating and calibrated instrumentation, and acceptable results from analyses of QC samples.

6.1.2 Data Reporting

All data were reported in standard units depending on the measurement and the ultimate use of the data.

6.2 FIELD QC SUMMARY

6.2.1 Calibration Procedures

Prior to the field sampling effort, the field sampling equipment was calibrated. Copies of the calibration documentation were on-site during the emissions test and are included in Appendix C. Calibrations were performed as described in the US EPA publications "*Quality Assurance Handbook for Air Pollution Measurement Systems; Volume III - Stationary Source Specific Methods*," (EPA-600/4-77-027b) and US EPA 40 CFR Part 60, Appendix A. Field sampling equipment that required calibration included the sample metering system, nozzles, thermocouples, pitot tubes, and the barometer. Calibration documentation for facility CEMS are also included in Appendix D.

6.2.2 Equipment Leak Checks

Prior to sampling, each isokinetic sampling train was leak checked IAW the procedures outlined in M5 and/or the applicable sampling method. During the course of each test run, a leak check was conducted before and after sampling in each port. Leakage rates for each isokinetic sampling train were recorded on the appropriate field data sheets (see Appendix C). Table 6-2 summarizes the leak check results recorded for each isokinetic sampling train.

The M0031 sampling train leak checks were performed between the 3-way valve downstream of the probe and the pump. The acceptance criteria used for each M0031 leak check was a leakage rate of < 0.1 inches of mercury (inHg) as shown on the vacuum gauge after one minute. All M0031 leak checks met acceptance criteria and were recorded on the appropriate field data sheets.

The M0040 sampling train was leak checked before and after each sample was collected. The acceptance criteria used for each M0040 leak check was a leakage rate of < 0.1 inHg as shown on the vacuum gauge after 1 minute. All M0040 leak checks for each bag sample submitted for analysis from each run met acceptance criteria and were recorded on the appropriate field data sheets, copies of which will be included in the final report.

6.2.3 Field Blanks

Field blanks for exhaust gas sampling methods were collected during the field sampling program IAW the SDC C2 Emissions Test Plan.

6.3 SAMPLE MANAGEMENT

This section presents the sample preservation, transportation and receiving, holding times, traceability, and chain-of-custody (COC) documentation.

6.3.1 Sample Preservation

The exhaust gas samples were preserved by storing them on ice, as required, until packaged for shipment to the off-site laboratories. Samples requiring cooling were packed with ice to maintain temperatures within the required range for shipment to the laboratory. All shipments arrived at the laboratories at temperatures prescribed in the SAP/QAPP.

6.3.2 Sample Traceability

Sample traceability procedures were employed IAW the SDC C2 Emissions Test Plan to document the identity of each sample and its handling from its first existence as a sample until analysis and data reduction was completed. Custody records traced a sample from its collection through all transfers of custody until it was transferred to the analytical laboratory. Internal laboratory records then documented the custody of the sample through its final disposition.

Sample integrity was maintained throughout all sampling and analysis programs. IAW SW-846 guidance, a sample was considered to be under a person's custody if the sample was:

- In that person’s physical possession,
- In view of that person after acquiring possession,
- Secured by that person so that no one could tamper with the sample, and/or
- Secured by that person in an area that was restricted to authorized personnel.

These criteria were used to define the meaning of "custody" and to ensure the integrity of the test program samples from collection to data reporting. Restricted access to the samples was an integral part of the COC procedure. Samples were held within sight of the samplers or sample custodian or kept in sealed and secured containers at all times. Custody seals were applied to each sample container and/or the shipping container used to ship the samples to the off-site laboratories.

6.3.3 Sample Transportation and Receiving

The exhaust gas samples were stored on-site until they were transported via commercial carrier (e.g., FedEx) or a TestAmerica laboratory courier. For commercial carrier deliveries, a laboratory representative accepted delivery of the cooler from the commercial carrier's courier. For samples designated for transport by the TestAmerica courier, custody of the samples was transferred directly from the AECOM-Austin sample custodian that accompanied the samples to the designated meeting area. Upon receipt at the laboratories, the samples were logged into the laboratory sample tracking system with a unique laboratory sample number.

6.3.4 Sample Shipping

Samples were packaged, transported, and shipped IAW applicable US Department of Transportation, International Air Transportation Authority, and US EPA regulations. A COC form accompanied the samples. The COC form listed the parameters to be analyzed by the laboratory for each sample and the total number and type of samples shipped for analysis. Authorized laboratory personnel acknowledged receipt of shipment by signing and dating the COC form.

6.3.5 Sample Preservation and Holding Times

The sample preservation requirements and holding times are presented in Table A-10 of the SAP/QAPP. The sampling personnel preserved the samples by keeping them in a cooler packed with ice, during the transport, as required. Sample temperatures were monitored upon receipt at the laboratory. Holding times were monitored by keeping track of the day(s) from the time the samples were collected to the time that they were prepared, extracted, and/or analyzed. All samples met the holding time requirements as specified in Table A-10 of the SAP/QAPP.

6.3.6 COC Documentation

6.3.6.1 Labeling

Sample identification labels were used to ensure the required information was entered in the field. Exhaust gas sample labels were affixed to the appropriate container at the time of sample recovery. All samples collected were labeled with a preprinted sample label. All discrepancies between the sample name listed on the label and the name listed on the COC were resolved and the required analyses were performed.

6.3.6.2 Field Logbook

Information pertinent to the sampling was recorded in a sampling log. Entries were made in indelible ink and corrections generally followed the error correction protocol of one line through the error, initial of the person performing the correction, and the date of the correction. Sampling personnel also recorded required information using the appropriate field data sheets. A copy of the field logbook and field data sheets is provided in Appendix C.

6.3.6.3 COC Forms

To establish the documentation necessary to trace sample possession from the time of collection, a COC form was filled out and accompanied every sample or group of individually identified samples. Each person who had custody signed the COC form.

6.4 SAMPLE COLLECTION

Exhaust gas sampling procedures were performed using the methods listed in Section 5.3. Isokinetic samples (M0010, M0010-TOC, M0023A, MM5E, M26A, and M29) and non-isokinetic samples (M0031) were collected from ports located in the exhaust duct that extends between the induced draft fan and stack. The M0040 samples were collected from a sampling port located on the stack from a location inside the monitoring house. The number and location of exhaust gas sampling points were determined IAW the procedures specified in M1. The sampling port locations met the requirements for acceptable distances from flow disturbances as specified in M1, and all traverse points were at least ½-in from the inner wall of the duct.

Verification of the absence of cyclonic flow in the sampling duct was performed on 03/21/17, with no cyclonic flow present. Cyclonic flow data sheets can be found in Appendix C. Calibration of the pitot tubes used for flow testing was performed IAW 40 CFR 60, Appendix A. Calibration data are presented in Appendix D.

Prior to sampling, all sampling train glassware was cleaned as required by each respective sampling method. All reagents used during sampling met the specifications of each respective sampling method. All sample containers were received in sealed boxes from the vendor with certificates of QA compliance IAW US EPA specifications.

Each sampling train was operated IAW the applicable method and SAP/QAPP requirements. For the isokinetic sampling trains the time, velocity pressure, orifice pressure, stack gas temperature, probe temperature, transfer line temperature (as applicable), sorbent trap inlet temperature (as applicable), silica gel impinger outlet temperature, dry gas meter temperature, dry gas meter volume, and sample vacuum were recorded every 5 minutes at each traverse point.

6.4.1 Isokinetic Sampling

For each isokinetic sampling train (i.e., M0010, M0010-TOC, M0023A, M26A, M29, and MM5E) the following key sampling procedures were performed to comply with US EPA and SDC C2 Emissions Test Plan requirements:

- A minimum of 3 dry standard cubic meters (dscm) total sample volume was collected over a 240-minute sampling period for each completed sampling train during each run. The sample volume collected for each run is presented in Appendix C.
- One field blank sample was collected by assembling a complete sampling train at the sampling area. The filter housing and probe on the blank train were heated to the appropriate temperature and the train was leak checked the same number of times as an actual sample train. The sample was then recovered in the same manner as an actual sample.
- Sample recovery was conducted both at the sampling location and in a controlled laboratory setting IAW the procedures specified in the reference method.

- For M0010, M0010-TOC, M0023A, and MM5E, the resin was packed in air-tight glass traps. The resin was purchased pre-cleaned and packed by the laboratory IAW the procedures specified in the reference method.
- For M0010, M0010-TOC, and M0023A the temperature of the sample gas stream between the outlet of the condenser and the inlet to the resin trap was maintained below 68°F.
- For M0010, M0010-TOC, M0023A, and MM5E, the temperatures of the probe, transfer line, and filter were maintained between 223 and 273°F. For the M29, the temperatures of the probe and filter were maintained between 223 and 273°F. For the M26A, the temperatures of the probe and filter were maintained between 248 and 273°F. These temperatures were monitored and recorded on field data sheets during each run. The field data sheets are included in Appendix C.
- An initial and final leak check was conducted on each sampling train for each traverse with a maximum allowable leak rate of 0.02 cfm over a 1-minute time period. The initial pre-test leak check for each run was conducted at a minimum vacuum of approximately 10 to 15 inHg. The leak checks performed during the sampling run, at port change, and at the completion of the test were conducted at a vacuum greater than or equal to the maximum value reached during the sampling run. Passing leak check results were obtained for all completed sampling trains. The leak check results are presented in Table 6-2 and Appendix C.
- An initial and final leak check was conducted for each test run on the Type S pitot tube at a minimum velocity pressure reading of 3.0 inches of water column (inwc). Both the pitot impact opening and the static pressure opening on the pitot tube passed the leak check.
- Isokinetic sampling rates were maintained during each of the sampling runs for all completed sampling trains. Percent isokinetic data for each run is presented in Appendix C.

6.4.2 <u>Non-Isokinetic Sampling</u>

6.4.2.1 Volatile Organics

The following key sampling procedures were performed to comply with US EPA and SDC C2 Emissions Test Plan requirements for M0031 sampling:

- Four sets of sorbent traps and one condensate sample were collected for each run. Each sorbent trap set consisted of 2 tenax tubes and 1 tenax/charcoal tube (used in lieu of anasorb).
- A field blank sample was collected during each run at the sampling location. The field blank traps were loaded into the sampling train, leak checked, and recovered in the same manner as a field sample. After collection, the field blank sample was handled and analyzed in the same manner as the actual sample.
- A trip blank sample set was included with the actual sample traps during shipment to the site, sampling, and shipment to the laboratory. The end caps were not removed from the trip blank.

- A trip blank consisting of organic-free water was included with the actual sample condensates during shipment to the laboratory.
- The samples were delivered to the laboratory in a sealed cooler packed with ice. Documentation of analysis and a COC form relinquishing custody of the samples accompanied the samples.
- The samples were maintained at < 10°C at all times, before and after sampling, prior to analysis.
- Each sample was collected by drawing the exhaust gas through the train at a rate of approximately 0.5 L/min for 40 minutes. Approximately 20 dry standard liters (dsL) of exhaust gas sample volume were pulled through each set of traps. The sample volume collected and field data sheets for each run are presented in Appendix C.
- The cooling water used for circulating through the condensers came from an ice water bath. The temperature of the sample gas stream between the outlet of the first condenser and the paired tenax sorbent traps and between the outlet of the second condenser and the tenax/charcoal trap was maintained below 68°F.
- An initial leak check was conducted for each sample collected, with a maximum allowable leak rate of 2.5 millimeters mercury (mmHg) over a one-minute time period while pulling a vacuum greater than (>) 10 inHg (this value exceeds the normal operating pressure). A final leak check was conducted for each sample collected, with a maximum allowable leak rate of 2.5 mmHg over a one-minute time period while pulling a vacuum of greater than or equal to the highest vacuum encountered during collection of the sample. The M0031 sampling train passed all leak checks. The leak check results are presented in Appendix C.

6.4.2.2 Volatile TOCs

The following key sampling procedures were performed to comply with US EPA and SDC C2 Emissions Test Plan requirements for M0040 sampling:

- Approximately 30 L of exhaust gas was collected per bag sample collected. The sample volume collected and field data sheets for each run are presented in Appendix C.
- All bag samples were collected into tedlar bags.
- One condensate sample was collected per bag sample collected. Amber glass septum cap vials were used to collect the condensate.
- 2 bag samples were collected during each run.
- A daily field blank sample was collected.
- The temperatures of the probe, filter, and valve were maintained between 266 and 284ºF during collection of each sample.
- The condenser temperature was maintained at a temperature of < 68ºF. Temperatures were recorded every 5 minutes. Field data sheets documenting the temperatures are found in Appendix C.

6.4.2.3 O_2 and CO_2

M3B sampling was performed to determine O_2 and CO_2 concentrations by collecting an integrated bag sample that was analyzed using an Orsat analyzer.

- Integrated bag samples were collected during each run in conjunction with one of the isokinetic sampling trains.
- Each sample was collected at a constant rate during each traverse into a tedlar bag and leak checked prior to sampling.
- The Orsat analyzer was successfully leak checked prior to analysis of each sample according to the procedures in M3B.
- Each Orsat bag sample was analyzed 3 times and the average was calculated and used for reporting O_2 and CO_2 concentration. Orsat analysis readings are recorded on field data sheets included in Appendix C.

6.4.2.4 SO_2

SO_2 was determined during each run IAW M6C. Two SO_2 runs were completed for each run that encompassed the sampling times of the isokinetic sampling trains.

A logbook was kept and calibrations, QC activities, routine maintenance, and repair activities were documented for the SO_2 testing. Activities related to the pre-test checks (e.g., calibration drift/error) were also recorded. All data related to SO_2 sampling and the pre-test activities were logged using the DAS.

The analyzer was calibrated IAW M6C (references M7E). The QC measures included the use of US EPA protocol calibration gases, pre- and post-test run calibrations, calibration error, and bias tests. Copies of the certifications for the gas standards are provided in Appendix C.

6.4.2.5 NO_x

NO_x was determined during each run IAW M7E. Two NO_x runs were completed for each run that encompassed the sampling times of the isokinetic sampling trains.

A logbook was kept and calibrations, QC activities, routine maintenance, and repair activities were documented for the NO_x testing. Activities related to the pre-test checks (e.g., calibration drift/error and response time tests) were also recorded. All data related to NO_x sampling and the pre-test activities were logged using the DAS.

The analyzer was calibrated IAW M7E. The QC measures included the use of US EPA protocol calibration gases, conversion efficiency, pre- and post-test run calibrations, calibration error, and bias tests. Copies of the certifications for the gas standards are provided in Appendix C.

For Runs 1 and 2, NOx results exceeding the span of the calibration gas concentration. A higher range calibration gas was obtained and Runs 3 and 4 results are within the calibrated span of the analyzer. For Runs 1 and 2, the integrated bag collected to support the M3B analysis was analyzed to determine average NOx. To assess the potential loss of analyte with the analysis of the integrated bag, a control bag was prepared and analyzed on 03/23/16. Results from this control bag are provided in Appendix C and demonstrate no significant loss of analyte. Runs 1 and 2 average NOx results should be considered estimated.

6.4.2.6 CO

CO was determined during each run IAW M10. Two CO runs were completed for each run that encompassed the sampling times of the isokinetic sampling trains.

A logbook was kept and calibrations, QC activities, routine maintenance, and repair activities were documented for the CO testing. Activities related to the pre-test checks (e.g., calibration drift/error) were also recorded. All data related to CO sampling and the pre-test activities were logged using the DAS.

The analyzer was calibrated IAW M10 (references M7E). The QC measures included the use of US EPA protocol calibration gases, pre- and post-test run calibrations, calibration error, and bias tests. Copies of the certifications for the gas standards are provided in Appendix C.

Not all CO readings were within span as there were significant “spikes” of CO during each run. Though a higher range calibration gas was obtained to increase the span, this did not mitigate the off-scale measurements. For Runs 2 and 3, the integrated bag collected to support the M3B analysis was analyzed to determine average CO. For Run 4, the 1-hour bag samples collected with the M0040 sampling train were analyzed to determine average CO. Analysis of the integrated bag samples is allowed by the reference method and qualification is not indicated.

6.5 DATA VALIDATION RESULTS

Blank and spiked samples were analyzed IAW the QA/QC requirements specified in the SDC C2 Emissions Test Plan. Blank samples included reagent blanks, field blanks, trip blanks, and method blanks. Method blanks were used to measure any contaminants that may have been introduced to the sample during sample preparation and analysis in the laboratory. Reagent blanks were used to assess the cleanliness of the reagents used in the field. Field blanks were used to measure any contaminants that may have been introduced to the samples from the sampling equipment and sampling technique.

Trip blanks provide a measure of any sample contamination that may be introduced during shipping of the samples from the site to the laboratory. The spike samples consisted of matrix spike and matrix spike duplicates (MS/MSD), laboratory control sample and duplicate (LCS/LCSD), blank spikes, and surrogate spikes. These samples were used to assess method performance and the recovery efficiency of the various analytical methods used in this work. Exhaust gas samples are generally consumed in their entirety during the initial preparation and analysis of each sample. In instances where re-extraction and/or analysis are indicated in response to poor spike recovery, such action cannot be taken, as there is no additional sample aliquot available.

Analytical precision was assessed by performing spikes and spike duplicates with the analytes of interest and measuring the relative percent difference (RPD) between the duplicate analyses. The recovery of the spiked samples was used to assess the bias (accuracy) of the analysis. The surrogate spikes, which are authentic standards (not likely to be found in the matrix) added to every organic sample prior to preparation and/or analysis, were used to provide an additional measure of QC for each sample. Surrogate spikes provide data that allows items such as matrix effects, gross sample-processing errors, and extraction efficiency to be assessed.

The following subsections summarize the QA/QC assessment for the exhaust gas samples collected and analyzed.

6.5.1 Semivolatile Organics

During each run, a M0010 sampling train was used to collect samples for the determination of emission levels of the semivolatile PIC and TIC as specified in the SAP/QAPP. M0010 samples collected during each run were extracted IAW M3542 and analyzed IAW M8270C. QC protocols included the use of a field surrogate, which was spiked onto the XAD trap prior to sampling, additional surrogates added to the samples in the laboratory prior to extraction, and internal standards added prior to analysis. The preparation of the M0010 sampling train yields 3 fractions for analysis by M8270C. Table 6-3 provides a summary of the dates each sample was prepared and analyzed and demonstrates all holding time requirements were satisfied.

GC/MS Tuning

GC/MS instruments were tuned to ensure mass resolution, identification, and sensitivity. For semivolatile sample analysis, instruments were tuned by analyzing decafluorotriphenylphosphine at the beginning of each 12-hour period during which samples or standards are analyzed and comparing the ion abundance for selected mass to electron ratios to the ion abundance criteria specified in M8270C. All GC/MS instrument tunings met the criteria during analysis of the samples.

An additional part of the M8270C tune is the system performance check on the injection port inertness and column performance. These additional items were evaluated with each instrument. The criteria for injection port inertness and peak tailing were met for each tune check.

Instrument Calibration

Requirements for instrument calibration are established to ensure the instrument is capable of producing acceptable qualitative and quantitative data. Initial calibration (ICAL) demonstrates the instrument is capable of producing a linear calibration curve, and continuing calibration demonstrates maintenance of the linear curve on a daily basis. System performance check compounds (SPCC) and calibration check compounds (CCC) must meet criteria specified in the method for the calibration to be valid.

Instruments were initially calibrated by analyzing standards containing compounds of interest at a minimum of 5 concentrations. Because not all target analytes were contained in a single calibration standard, there are 2 ICALs associated with each instrument with each ICAL containing a subset of the entire target analyte list. These 2 calibrations are identified in the raw data as the “ICAL” and the “X” lists. The concentrations of each compound were quantitated relative to the closest eluting internal standard and a RF was determined. The average RFs for each compound were calculated. The 4 SPCC compounds were checked for a minimum average RF. The minimum acceptable average RF is 0.05. If the minimum RF criteria are not met, all detects should be considered estimated and ND should be flagged as “rejected” (unusable).

The relative standard deviation (RSD) for the CCCs was calculated using the RF from the ICAL. The RSD for each CCC should be < 30% for the calibration to be valid. The RSD for each non-CCC should be < 15% if the average RF was used by the laboratory for quantitation. If the RSD for any target analyte is > 15%, an alternate means of quantitation should be employed (e.g., use of a quadratic curve). When the RSD is > 15% but < 90% all detects and NDs should be considered estimated. When the RSD is > 90% all detects should be considered estimated and NDs should be flagged as “rejected” (unusable).

The ICAL curve was checked and verified once every 12 hrs of analysis time for each target compound. This verification was accomplished by analyzing a calibration standard and checking the SPCC and CCC. The RFs for the SPCCs and target compounds were evaluated similarly for both the continuing and initial calibration.

The CCC were evaluated by comparing the % drift between the CCC standard concentrations with the measured concentrations. The % drift for each CCC should be < 20% for the continuing calibration to be valid. When the % drift is > 20% but < 90% all detects and NDs should be considered estimated. When the % drift is > 90% all detects should be considered estimated and NDs should be flagged as “rejected” (unusable).

All samples were quantitated against the same initial calibration (i.e., instrument MD on 01/19/17 [ICAL and X]) and all criteria were met without exception and qualification of the data is not indicated. All samples were run following 2 continuing calibrations (i.e., instrument “MD” on 03/30/17 and 03/31/17) and all criteria were met without exception and qualification of the data is not indicated.

Surrogate Standard Results

Laboratory performance on individual samples was established by means of spiking activities. All samples were spiked with 6 surrogate compounds prior to sample analysis. Each XAD trap was spiked with a field surrogate, $^{13}C_6$-Naphthalene, to provide an indication of possible breakthrough or loss due to sampling handling procedures.

All surrogate recoveries were within acceptance limits and qualification of the data is not indicated. Surrogate recoveries are presented in Table 6-4.

Internal Standard Performance

Internal standards are monitored to ensure GC/MS sensitivity and response is stable during every instrument run. Six internal standards were added to each sample prior to analysis: 1,4-dichlorobenzene-d_4, naphthalene-d_8, acenaphthene-d_{10}, phenanthrene-d_{10}, chrysene-d_{12}, and perylene-d_{12}.

M8270C specifies that internal standard area counts for the continuing calibration standard must not vary by more than a factor of 2 (-50% to + 200%) from the associated ICAL standards and the retention time (RT) must not vary by > 30 seconds. Internal standard acceptance criteria for samples and blanks are not specified by M8270C. For validation purposes, samples and blanks were evaluated to verify internal standard area counts did not vary by more than a factor of 2 (-50% to + 100%) from the associated continuing calibration standard and the RT did not vary by > 30 seconds. Should the area response be outside the criteria, professional judgment is used to assess the impact on the reported results. All internal standard area and RTs were found to have met acceptance criteria for all continuing calibrations, samples, and blanks.

Method Blank Results

Laboratory (method) blank samples are analyzed to determine the existence and magnitude of contamination resulting from laboratory activities.

No target analytes were found in the laboratory blank associated with the condensate fractions and qualification of the reported sample results is not indicated. The laboratory blank associated with the back-half train fractions had benzaldehyde detected. The sample results are not corrected for method blank contamination. However, all associated sample results for this analyte should be considered estimated.

Field Blank Results

Field blanks are indicators of ambient and sample handling contamination. A field blank was collected by setting up a sampling train at the sampling location, heating the train, and performing leak checks. The field blank is recovered in the same manner as the field samples.

No target analytes were detected in the front-half and condensate fractions of the field blank. Benzaldehyde was found in the back-half field blank fraction. The sample results are not corrected for field blank contamination. However, all associated sample results for this analyte should be considered estimated.

Reagent Blank Results

Reagent blanks are indicators of the cleanliness of the reagents and materials used in the field. Reagent blanks were collected that included the filter and solvent.

No compounds were detected for the solvent blank or the filter blank and qualification is not indicated.

Trip Blank Results

Trip blanks are indicators of ambient and sample handling contamination introduced during shipping of the samples. A trip blank consisting of a resin trap was shipped with the samples to the laboratory and analyzed. It is noted that this sample was identified as a reagent blank (A.SDC-Stk-CPTRRB-M0010-Semis-XAD) by AECOM-Austin.

Benzaldehyde was found in the in the trip blank. The sample results are not corrected for trip blank contamination. However, all associated sample results for this analyte should be considered estimated.

LCS Results

LCS/LCSD were analyzed to provide information on the accuracy of the analytical method and on laboratory performance. The results of the LCS/LCSD analyses are presented in Table 6-5.

All LCS/LCSD recoveries and RPDs were within acceptance limits and qualification is not indicated. It is noted that the laboratory did not report acceptance limits for benzaldehyde. Acceptance limits of 50 to 150% and a maximum RPD of 25% were applied.

6.5.2 Semivolatile and Nonvolatile TOCs

Exhaust gases were collected for semivolatile and nonvolatile total organics IAW M0010-TOC. The following subsections discuss the semivolatile and nonvolatile total organic analysis. The preparation of the M0010-TOC sampling train yields one fraction that is split and analyzed by for semivolatile and nonvolatile TOCs. Table 6-6 provides a summary of the dates each sample was prepared and analyzed and demonstrates all holding time requirements were satisfied.

Instrument Calibration

Requirements for instrument calibration are established to ensure the instrument is capable of producing acceptable qualitative and quantitative data. ICAL demonstrates the instrument is capable of acceptable performance prior to sample analysis, and continuing calibration sample analyses verify that the ICAL is still valid. A multi-point calibration curve was prepared to determine an average RF for the C_8-C_{17} range. Instrument calibration met all acceptance criteria.

For the nonvolatile total organics the analytical balance calibration was verified each day of use using reference weights. These performance checks demonstrate that the analytical balance was in control and capable of producing valid results. The balance calibration verification was not included in the laboratory report. The data validator requested this information, the laboratory provided the balance calibration verification log book pages, and they have been attached to the laboratory report included in Appendix F-2.

Surrogate Standard Results

For the semivolatile total organics analysis, laboratory performance on individual samples is established by means of spiking samples with known concentrations of selected compounds. All samples were spiked with n-heptadecane as a surrogate compound prior to sample analysis. Surrogates are not used with the nonvolatile total organics analysis.

Evaluation criteria for the surrogate include estimating sample results when any surrogate has a recovery greater than or equal to (≥) 10%, but below the lower SAP/QAPP QC limit. If any surrogate has < 10% recovery, concentrations of detected compounds are qualified as estimated and compounds with concentrations < method detection limit (MDL) are rejected. All surrogate recoveries were within acceptance limits. Qualification of the results based on surrogate recovery is not indicated. Surrogate recoveries are shown in Table 6-6.

Method Blank Results

A method blank was prepared and analyzed along with the field samples to determine the existence and magnitude of contamination resulting from laboratory activities. The method blank results also reflect the background level of artifacts present in resin.

The semivolatile fraction method blank associated with the back-half fraction showed that there was contamination above the RL at a reported concentration of 0.15 milligrams (mg) at a reported mass of 0.2068 mg. The nonvolatile method blanks associated with the front-half fraction and the back-half fraction showed contamination above the RL at reported masses of 1.960 and 1.307 mg, respectively. All semivolatile and nonvolatile total organic sample results should be considered estimated and biased high.

Field Blank Results

Field blanks are indicators of ambient and sample handling contamination. A field blank was collected by setting up a sampling train, bringing the train to the sampling location, heating the train, and performing leak checks. The field blank is recovered in the same manner as the field samples.

The semivolatile fraction of the field blank showed contamination at 0.3452 mg. The nonvolatile fraction showed contamination at 1.06 mg. The sample results are not corrected for field blank contamination. However, all semivolatile and nonvolatile total organic sample results should be considered estimated and biased high considering the contamination present in the field blank.

Reagent Blank Results

Reagent blanks are indicators of the cleanliness of the reagents and materials used in the field. Reagent blanks were collected that included the filter and solvents.

Neither the semivolatile nor the nonvolatile fractions of the reagent blanks showed contamination and qualification is not indicated.

Trip Blank Results

Trip blanks are indicators of ambient and sample handling contamination introduced during shipping of the samples. A trip blank consisting of a resin trap was shipped with the samples to the laboratory. It is noted that this sample was identified as a reagent blank (A.SDC-STK-CPTRRB-M0010-TOE-XAD) by AECOM-Austin

The semivolatile fraction of the trip blank showed contamination at 0.259 mg. No nonvolatile organics were found above the RL. The sample results are not corrected for trip blank contamination. However, all semivolatile total organic sample results should be considered estimated and biased high considering the contamination present in the trip blank.

LCS Results

LCSs are samples of known concentration or mass that are prepared and analyzed along with the samples. The LCS is used to monitor the overall performance of the preparation and analysis process. The LCSs are presented in Table 6-7. All LCS results were within SAP/QAPP QC limits.

6.5.3 Dioxins/Furans

During each run, a M0023A sampling train was used to collect samples for the determination of emission levels of dioxins/furans as specified in the SAP/QAPP.

M0023A samples collected during each run were extracted IAW M0023A and analyzed IAW M8290 for dioxins/furans. QC protocols included the use of field surrogates, which were spiked onto the XAD trap prior to sampling, additional surrogates, and internal standards added to the samples in the laboratory prior to extraction and analysis. The preparation of the M0023A sampling train for dioxin/furan analysis yields 2 fractions for analysis: the front-half which includes the front-half rinse and particulate filter and the back-half which includes the XAD trap and solvent rinse from the XAD trap forward to the back-half of the filter housing. Table 6-8 provides a summary of the dates each sample was prepared and analyzed and demonstrates all holding time requirements were satisfied.

For dioxins/furans, train totals used in emission rate calculations should incorporate the estimated detection limit for NDs as recommended in EPA guidance.

GC/MS Tuning

GC/MS instruments were tuned to ensure mass resolution, identification, and sensitivity. For dioxin/furan sample analysis, instruments were tuned by analyzing perfluorokerosene prior to each 12-hour period during which samples or standards were analyzed and comparing the mass resolution for selected mass to electron ratios to the mass resolution criteria of 10,000 (10% valley definition). All GC/MS instrument tunes met the criteria during analysis of the samples.

Instrument Calibration

Requirements for instrument calibration are established to ensure the instrument is capable of producing acceptable qualitative and quantitative data for target compounds. ICAL demonstrates that the instrument is capable of producing a linear curve, and continuing calibration demonstrates maintenance of the linear curve on a daily basis.

Instruments were initially calibrated by analyzing standards containing compounds of interest at 5 concentrations. The concentrations of each compound were quantitated relative to the closest eluting internal standard, and RF and average RF for each compound were calculated.

The RSD for labeled and unlabeled dioxin/furan standards should be ≤ 30% and ≤ 20%, respectively, for the calibration to be valid. The ICAL curve was checked and verified once every 12 hrs of analysis time for each target compound. This verification was accomplished by analyzing a calibration standard and checking target analytes and internal standards. The RFs for the target compounds were evaluated similarly for both the continuing and the initial calibration.

The target analytes were evaluated by comparing the % drift between the standard concentrations with the measured concentrations. The % drift for labeled and unlabeled dioxin/furan standards should be ≤ 30% and ≤ 20%, respectively, for the beginning continuing calibration to be valid and ≤ 35% and ≤ 25%, respectively, for the ending continuing calibration to be valid.

All ICAL and continuing calibration criteria were met and qualification of the sample results is not indicated.

Internal and Surrogate Standard Results

Laboratory performance on individual samples was established by means of spiking activities. All samples were spiked with 9 internal standard compounds prior to sample analysis. Evaluation criteria for internal standards include estimating sample results when any one of the internal standards have recoveries outside the acceptance limits provided the recovery is ≥ 10%. If any internal standard has < 10% recovery, associated sample results for that fraction may be rejected.

Sampling efficiencies on individual samples are established by means of spiking activities. Prior to sampling, the resin traps of all samples were spiked with 5 labeled compounds. The surrogates are used to monitor efficiency and are not used in the quantitation of unlabeled analytes. Prior to extraction, the same 5 standards were spiked onto the particulate filter to monitor the extraction efficiency of the front-half fraction of the sampling train. Low recoveries, < 70%, could be indicative of breakthrough taking place during sampling. Table 6-9 presents the internal and surrogate standard recoveries for all samples.

All internal and surrogate standard results were within acceptance limits and qualification of the samples is not indicated.

Method Blank Results

Laboratory (method) blank samples were analyzed to determine the existence and magnitude of contamination resulting from laboratory activities.

For the method blank associated with the front-half fractions, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, OCDD, 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF were reported between the RL and EDL. For the method blank associated with the back-half fraction, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, OCDD, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF were reported between the RL and EDL. The sample results are not corrected for method blank contamination.

However, all associated sample results for these dioxins and furans should be considered estimated and biased high considering the contamination present in the method blanks.

Field Blank Results

Field blanks are indicators of ambient and sample handling contamination. A field blank was collected by setting up a sampling train, bringing the train to the sampling location, heating the train, and performing leak checks. The field blank is recovered in the same manner as the field samples.

For the front-half fraction of the field blank, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, OCDD, 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF were reported between the RL and EDL. For the back-half fraction of the field blank, 1,2,3,7,8,9-HxCDD, OCDD, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF were reported between the RL and EDL. The sample results are not corrected for field blank contamination. However, all associated sample results for these dioxins and furans should be considered estimated and biased high considering the contamination present in the field blank samples.

Reagent Blank Results

Reagent blanks are indicators of the cleanliness of the reagents and materials used in the field. Reagent blanks were collected that included the filter and solvents.

For the filter blank, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, OCDD, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF were reported between the RL and EDL. For the solvent blank, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, OCDD, 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF were reported between the RL and EDL. The sample results are not corrected for reagent blank contamination. However, all associated sample results for these dioxins and furans should be considered estimated and biased high considering the contamination present in the reagent blank samples.

Trip Blank Results

Trip blanks are indicators of ambient and sample handling contamination introduced during shipping of the samples. A trip blank consisting of a resin trap was shipped with the samples to the laboratory and analyzed. It is noted that this sample was identified as a reagent blank (A.SDC-STK-CPTRRB-M0023A-XAD) by AECOM-Austin

The trip blank showed contamination between the RL and EDL for all target dioxins and furans except 2,3,7,8-TCDD, 2,3,7,8-TCDF, and 1,2,3,7,8-PeCDD. No nonvolatile organics were found above the RL. The sample results are not corrected for trip blank contamination. However, all reported dioxin and furan results, with the exception of 2,3,7,8-TCDD, 2,3,7,8-TCDF, and 1,2,3,7,8-PeCDD, should be considered estimated and biased high considering the contamination present in the trip blank.

LCS Results

LCS were analyzed to provide information on the accuracy of the analytical method and on laboratory performance. The LCS associated with the preparation and analysis of the field samples are presented in Table 6-10. All LCS results were within SAP/QAPP QC limits.

6.5.4 Volatile Organics

During each run, a M0031 sampling train was used to collect samples for the determination of emission levels of volatile PICs/TICs as specified in the SAP/QAPP. M0031 samples collected during each run were analyzed IAW M5041A and M8260B. Four paired tenax tube samples, 4 tenax/charcoal tube samples, and a single condensate sample were collected during each run. [Note: The tenax/charcoal tubes were used in lieu of anasorb tubes due to reported quality issues with anasorb tubes. Use of the tenax/charcoal tubes is consistent with previous testing performed and should not impact the usability of the results in any way.] Prior to analysis, each sample was spiked with surrogate standards. The paired tenax tubes and tenax/charcoal tubes were prepared and analyzed separately, allowing breakthrough to be assessed. Table 6-11 provides a summary of the date each sample was analyzed and demonstrates all holding time requirements were satisfied.

GC/MS Tuning

Samples were analyzed by a GC/MS tuned to ensure mass resolution, identification, and sensitivity. For volatile organic sample analyses, instruments were tuned by analyzing 4-bromofluorobenzene at the beginning of each 12-hour period during which samples or standards were analyzed and comparing the ion abundance for selected mass to electron ratios to the ion abundance criteria specified in M8260B. All associated GC/MS instrument tunings met requirements prior to sample analysis.

Instrument Calibration

Requirements for instrument calibration were established to ensure the instrument was capable of producing acceptable qualitative and quantitative data for target compounds. ICAL demonstrates that the instrument is capable of producing a linear curve, and continuing calibration demonstrates maintenance of the linear curve on a daily basis. SPCC and CCC must meet criteria in the method for the calibration to be valid.

Instruments were initially calibrated by analyzing standards containing compounds of interest at a minimum of 5 concentrations. The concentrations of each compound were quantitated relative to the closest eluting internal standard and RF. The average RF for each compound were calculated. The 5 SPCC compounds were checked for a minimum average RF. The minimum acceptable average RF was 0.10 for chloromethane, 1,1-dichloroethane, and bromoform. The minimum acceptance average RF was 0.30 for 1,1,2,2-tetrachloroethane and chlorobenzene. If the minimum RF criteria are not met, all detects should be considered estimated and ND should be flagged as “rejected” (unusable).

The RSD for the CCC was calculated using the RF from the ICAL. The RSD for each CCC must be < 30% for the calibration to be valid. The RSD for each non-CCC should be < 15% if the average RF was used by the laboratory for quantitation. If the RSD for any target analyte is > 15%, an alternate means of quantitation should be employed (e.g., use of a quadratic curve). When the RSD is > 15% but < 90% all detects and ND should be considered estimated. When the RSD is > 90% all detects should be considered estimated and ND should be flagged as "rejected" (unusable).

The ICAL curve was checked and verified once every 12 hrs of analysis time for each target compound. This verification was accomplished by analyzing a calibration standard and checking the SPCC and CCC. The RF for the SPCC and target compounds were evaluated similarly for both the continuing and initial calibration.

The CCC were evaluated by comparing the % drift between the CCC standard concentrations with the measured concentrations. The % drift for each CCC should be < 20% for the continuing calibration to be valid. When the % drift is > 20% but < 90% all detects and ND should be considered estimated. When the % drift is > 90% all detects should be considered estimated and NDs should be flagged as "rejected" (unusable).

All ICAL criteria were met with no exceptions. All continuing calibration criteria were met with the following exceptions:

- For the continuing calibration associated with samples A-SDC-STK-CPTRTB1-M0031-COND, A.SDC-STK-CPTR4-M0031-COND, A.SDC-STK-CPTR3-M0031-COND, and A.SDC-STK-CPTR2-M0031-COND (i.e., instrument "MX" on 03/28/17), the RSD for target analytes was < 20% with the exception of 1,3-butadiene (28.0%) and acetone (-26.1%). All associated sample results for these analytes should be considered estimated.
- For the continuing calibration associated with samples A.SDC-STK-CPTRTB1-M0031-T1A/T2A, A.SDC-STK-CPTRTB1-M0031-A, A.SDC-STK-CPTR4-M0031-T1BK/T2BK, A.SDC-STK-CPTR4-M0031-ANBK, A.SDC-STK-CPTR3-M0031-T1BK/T2BK, A.SDC-STK-CPTR3-M0031-ANBK, A.SDC-STK-CPTR2-M0031-T1BK/T2BK, and A.SDC-STK-CPTR2-M0031-ANBK, (i.e., instrument "MX" on 03/30/17), the RSD for target analytes was < 20% with the exception of acetone (-25.8%). All associated sample results for these analytes should be considered estimated.
- For the continuing calibration associated with samples A.SDC.STK-CPTR4-M0031-T1A/T2A, A.SDC.STK-CPTR4-M0031-ANA, A.SDC.STK-CPTR4-M0031-T1B/T2B, A.SDC.STK-CPTR4-M0031-ANB, A.SDC.STK-CPTR4-M0031-T1C/T2C, A.SDC.STK-CPTR4-M0031-ANC, A.SDC.STK-CPTR4-M0031-T1D/T2D, and A.SDC.STK-CPTR4-M0031-AND, (i.e., instrument "MZ" on 04/04/17), the RSD for target analytes was < 20% with the exception of 1,3-butadiene (34.1%) and acetone (27.5%). All associated sample results for these analytes should be considered estimated.

The ICAL establishes a linear range with an upper limit determined by the highest ICAL standard. When the initial analysis of a sample has a concentration of any analyte that exceeds the ICAL range, the sample should be diluted and reanalyzed if possible. For M0031, neither dilution nor reanalysis is possible as the sample is used in its entirety during the initial analysis. For M0031, analyte concentrations that exceed the linear range should be considered estimated. All reported results were within the linear range of the instrument on which they were analyzed with the exception of benzene in all paired tenax fractions. These benzene results were significantly above the linear range of the instrument and are indicated as "potential peak saturation" on the raw data, though the reconstructed ion chromatogram is scaled to show a resolvable peak. These benzene results should be considered estimated.

Surrogate Standard Results

Laboratory performance on individual samples was established by means of spiking activities with 4 surrogate compounds prior to sample analysis – dibromofluoromethane, 1,2-dichloroethane-d_4, toluene-d_8, and 4-bromofluorobenzene.

Evaluation criteria for surrogates include estimating sample results when any one of the surrogates has recoveries outside the acceptance limits provided the recovery is ≥ 10%. If any surrogate has < 10% recovery, sample results for that fraction may be rejected. Surrogate recoveries are presented in Table 6-11. All surrogate recoveries were within the SAP/QAPP acceptance limits with the exception of 1,2-dichloroethane-d_4 in samples A.SDC-STK-CPTR2-M0031-ANA (39%), A.SDC-STK-CPTR3-M0031-T1A/T2A (174%), and A.SDC.STK-CPTR4-M0031-T1D/T2D (45%) and dibromofluoromethane in samples A.SDC-STK-CPTR2-M0031-ANA (33%) and A.SDC-STK-CPTR3-M0031-ANA (44%). Results for these samples should be considered estimated.

It is noted that the laboratory evaluated the surrogate recoveries using statistically derived limits that were more stringent than those indicated in the SAP/QAPP. The laboratory developed limits for both sorbent tubes and condensate. When the sorbent tube surrogate recoveries are evaluated using the laboratory derived limits there is one additional recovery outlier. Recovery limits were assessed using the limits indicated in the SAP/QAPP. Table 6-11 lists the acceptance limits specified in the SAP/QAPP.

Internal Standard Results

Internal standards are monitored to ensure GC/MS sensitivity and response is stable during every instrument run. Three internal standards were added to each sample prior to analysis: fluorobenzene, chlorobenzene-d_5, and 1,4-dichlorobenzene-d_4.

M8260B specifies that internal standard area counts for the continuing calibration standard must not vary by more than a factor of 2 (-50% to + 200%) from the associated ICAL standards and the RT must not vary by > 30 seconds. Internal standard acceptance criteria for samples and blanks are not specified by M8260B. For validation purposes, samples and blanks were evaluated to verify that internal standard area counts did not vary by a factor of 2 (-50 to + 100%) from the associated continuing calibration standard and the RT did not vary by > 30 seconds. Should the area response be outside the criteria, professional judgment is used to assess the impact on the reported results. Internal standard RTs were found to have met acceptance criteria for all samples. Internal standard area response for one or more internal standards for samples A.SDC-STK-CPTR2-M0031-ANA and A.SDC-STK-CPTR3-M0031-ANA was below the lower acceptance limit. Associated sample results should be considered estimated.

Method Blank Results

Laboratory (method) blank samples were analyzed to determine the existence and magnitude of contamination resulting from laboratory activities.

For the method blanks associated with the tenax and tenax/charcoal tubes, benzene, chloromethane, hexane, methylene chloride, o-xylene, and trichlorofluoromethane were found in one or more of the method blanks. Field samples have not been corrected for method blank contamination. However, all associated sample results for the aforementioned analytes should be considered estimated.

For the method blank associated with the condensate, carbon disulfide and methylene chloride were found. Field samples have not been corrected for method blank contamination. However, all associated sample results for the aforementioned analytes should be considered estimated.

Field Blank Results

Field blanks are indicators of ambient and sample handling contamination. A field blank was collected with each run.

Carbon disulfide, chloromethane, methylene chloride, and benzene were detected in 1 or more field blanks. Field samples have not been corrected for field blank contamination. However, all associated sample results for the aforementioned analytes should be considered estimated.

Trip Blank Results

A trip blank is an indicator of ambient and sample handling contamination introduced during shipping of media and samples. A trip blank consists of 2 tenax tubes, a tenax/charcoal tube, and reagent water in a septum cap vial that were shipped with the samples to the laboratory and analyzed.

Carbon disulfide, chloromethane, and methylene chloride were detected in the tenax and tenax/charcoal trip blank samples. Field samples have not been corrected for trip blank contamination. However, all associated results for the aforementioned analytes should be considered estimated.

Carbon disulfide, acetone, and methylene chloride were detected in the condensate trip blank sample. Field samples have not been corrected for trip blank contamination. However, all associated results for the aforementioned analytes should be considered estimated.

LCS/LCSD Results

For the tenax and tenax/charcoal tubes, the entire sample is consumed with each analysis and it is not possible to provide MS/MSD. For the condensate fraction, a single sample container is provided to the laboratory and though the entire sample is not consumed, the laboratory procedure does not provide for replicate analyses from the same container. For these samples, LCS/LCSD were prepared in the laboratory by spiking blanks with known concentrations of each target analyte provided by an independent vendor. The LCS/LCSD results are summarized in Table 6-12. QC objectives were met in all instances and qualification of the data is not indicated.

It is noted that the SAP/QAPP requires 5 compounds to be spiked and evaluated for LCS/LCSD pairs. The laboratory spiking solution contains more than the 5 required compounds and represents the full target analyte list (not all of the spiking compounds in the SAP/QAPP are target analytes). Recovery and RPD for all spiked analytes are within the laboratory's acceptance limits. Qualification is not indicated.

Breakthrough

The results of compounds detected on the paired tenax tubes and the tenax/charcoal tube of each M0031 tube set were evaluated for breakthrough to determine if a compound may have exceeded the absorbing capacity of the tube set. According to EPA/625/6-89/023, breakthrough is indicated when > 30% of a compound detected on the front tube (paired tenax) is present in the back tube (tenax/charcoal). The breakthrough analysis does not apply when the analyte is not detected on the front tube and when < 75 nanograms (ng) is detected on the back tube. With the exceptions noted below, breakthrough determination was not required as no target analytes were detected on both the front and back tube when a compound was present on the back tube at a concentration of ≥75 ng for any sample.

The chloromethane results from Run 2-Set A and Run 3-Sets A/B/C meet the US EPA's definition of breakthrough as reportable concentrations were found on the corresponding paired tenax/tenax tubes and > 75 ng was detected on each tenax/charcoal tube. Chloromethane is a common analysis artifact and is often detected in laboratory, field, and trip blanks. Considering the actual concentrations detected on the tenax/tenax tubes and typical blank results, it is not believed that these results are indicative of actual breakthrough. However, all associated sample results for chloromethane should be considered estimated.

6.5.5 Volatile TOCs

Exhaust gases were sampled for volatile total organics IAW M0040. The following subsections discuss the volatile total organic analysis.

Instrument Calibration (Bag Analysis)

Requirements for instrument calibration were established to ensure the instrument was capable of producing acceptable qualitative and quantitative data for target compounds. ICAL demonstrates that the instrument is capable of producing a linear curve and continuing calibration demonstrates maintenance of the linear curve on a daily basis.

The field GC was calibrated on 03/22/17, 03/23/17, and 03/24/17 and the ICAL acceptance criteria of 5% RSD for RT and area responses were satisfied. A continuing calibration verification (CCV) was analyzed at the beginning of each analytical sequence with the exception of 03/23/17 and 03/24/17 where samples were analyzed after the initial calibration was completed. The acceptance criterion for CCV analysis is ± 10% for RT and area responses. All CCV analyses were within acceptance limits and qualification of the reported results is not indicated

Field Spike Results (Bag Analysis)

A field spike is a field-collected sample that is spiked with a known quantity of 1 or more target analytes. For this sampling event, the field spike was performed with propane. The field spike provides information about the effect of each sample matrix on the analysis procedure. The results of the field spike are presented in Table 6-14. The field spike recovery was within the acceptance limits and qualification of the sample results is not indicated.

LCS Results (Bag Analysis)

LCSs were analyzed to provide information on the accuracy of the analytical method and on laboratory performance. The CCV conducted at the beginning of each analytical sequence served as the LCS for each day with the exception of 03/23/17 and 03/24/17 where samples were analyzed after the initial calibration was completed. For 03/25/17, the mid-point standard analyses served as the LCS. The results of the LCSs are presented in Table 6-15. All LCS recoveries were within the acceptance limits and qualification of the sample results is not indicated.

Field Blank Results (Bag Analysis)

Field blanks are Tedlar bags filled with nitrogen that are sampled in the same manner as a field sample. The blanks act as an indicator of contamination that may occur during field sampling. A daily field blank was collected IAW SAP/QAPP requirements.

For Runs 3 and 4, C_1 contamination was observed in the daily field blank. Significant quantities of C_1 were found in all field samples such that the level of C_1 found in the field blanks was insignificant. Field sample results are not corrected for field blank contamination and qualification of the results is not indicated.

Trip Blank Results (Bag Analysis)

A trip blank is a tedlar bag that is filled with nitrogen in the field laboratory, carried to the sampling location, and returned to the field laboratory for analysis. Trip blanks were collected and used to assess the existence and magnitude of contamination resulting from ambient conditions. There were no reported detections for the trip blanks and qualification of the results is not indicated.

Instrument Calibration (Condensate Analysis)

A multi-point calibration curve of pentane (C_5) through heptane (C_7) was prepared to determine an average RF factor for each carbon range. IAW the method requirements, C_4 is reported using the C_5 RF. A CCV and blank are analyzed every 10 samples. The CCV must be within 15% for the calibration to be valid. The continuing calibration and RT window criteria were met for the method.

Method Blank Results (Condensate Analysis)

A method blank was analyzed to determine the existence and magnitude of contamination resulting from laboratory activities. All method blank results were < RL and qualification of the results is not indicated.

Surrogate Standard Results (Condensate Analysis)

Laboratory performance on individual samples was established by means of spiking samples with known concentrations of selected compounds. All samples were spiked with n-octane as a surrogate compound prior to sample analysis.

Evaluation criteria for the surrogate include estimating sample results if the surrogate recovery is outside the acceptance limits provided the recovery is ≥ 10%. If the surrogate has < 10% recovery, sample results may be rejected. Surrogate recoveries are presented in Table 6-13. All objectives were met, and qualification of the data is not indicated.

LCS Results (Condensate Analysis)

LCSs were prepared in the laboratory by filling sample containers with reagent water spiked with known concentrations of selected compounds. A LCS was analyzed in duplicate to provide information on the accuracy of the analytical method and on laboratory performance. The results of the LCS are presented in Table 6-16. All objectives were met and qualification of the data is not indicated.

Field Blank Results (Condensate Analysis)

Condensate field blanks represent the collected reagent water rinse during recovery of each field blank. The blanks act as an indicator of contamination that may occur during field sampling. A daily field blank was collected resulting in one field blank for each run of the performance test.

All field blank results were non-detects and qualification of the associated sample results is not indicated.

Trip Blank Results (Condensate Analysis)

Trip blanks are sample vials filled with reagent water that are packaged with the field samples for shipment to the off-site laboratory. Trip blanks may be used to determine the existence and magnitude of contamination resulting from ambient conditions. A condensate trip blank was not provided to the laboratory for analysis. Reported sample results are not impacted by this circumstance.

6.5.6 Acid Gases

During each run, a M26A sampling train was used to collect samples for the determination of acid gas emission levels. The samples were analyzed IAW procedures identified in the sampling and analysis method, M26A. Table 6-17 provides a summary of the dates each sample was collected and analyzed and demonstrates all holding time requirements were satisfied.

Instrument Calibration

Requirements for instrument calibration are established to ensure the instrument is capable of producing acceptable qualitative and quantitative data. ICAL demonstrates the instrument is capable of acceptable performance prior to sample analysis, and continuing calibration sample analyses verify that the ICAL is still valid.

The IC was calibrated IAW M26A, using a minimum of 5 points for the ICAL. The correlation coefficient for chloride and fluoride were > 0.995 for each ICAL curve. Initial and continuing calibration verification sample results were within the acceptable control limits of 90 to 110% recovery.

Duplicate Injections

Duplicate injections of the samples were performed to ensure the precision of the reported result. The duplicate injections of each sample should be within 5% RPD when sample results are > 5 times (5X) the RL. No field sample results were > 5X the RL and RPD was not evaluated.

Method Blank Results

Laboratory (method) blank samples were analyzed to determine the existence and magnitude of contamination resulting from laboratory activities. No target analytes were detected at or above the MDL in any of the laboratory blanks. No qualification of samples was performed based on laboratory blank results.

Field and Reagent Blank Results

Reagent blanks are indicators of reagent contamination. Field blanks are indicators of reagent and ambient contamination that may have contaminated the sample. No target analytes were detected at or above the MDL in the field and reagent blanks.

LCS Results

LCS were samples of known concentration that are prepared and analyzed along with the field samples. The LCS were used to monitor the overall performance of the analysis process. The results of the LCS analyses are summarized in Table 6-18. All objectives were met, and qualification of the data was not necessary.

MS/MSD Results

The MS/MSD sample results provide information about the effect of each sample matrix on the analysis procedure. The MS/MSD results are summarized in Table 6-19. All objectives were met, and qualification of the data was not necessary.

6.5.7 Particulates

A M26A sampling train was used to collect samples for the determination of emission levels of particulates. The samples were analyzed for particulates gravimetrically IAW M5. QC measures included the use of appropriate class weights to verify the accuracy of the analytical balance, the collection and analysis of blank samples, and replicate weighings of each sample collected.

All sample analyses were completed within the holding times specified in the SAP/QAPP. The balance calibration was verified prior to each use as required and replicate weighings were performed and meet QC requirements.

There was field and reagent blank contamination observed that would have biased the reported results. Particulate was present in the reagent and field blank solvent rinse (0.825 and 2.01 mg, respectively). Particulate was present on the field blank filter at 3.21 mg. The mass found in the field blank solvent rinse is mass is greater than the mass found for the Runs 2, 3, and 4 front-half rinse. All sample results should be considered estimated and may be biased high.

6.5.8 Trace Metals

During each run, a M29 sampling train was used to collect samples for the determination of emission levels of metals as indicated in the SAP. The analysis of the samples for mercury was performed IAW M7470A. All other metals analysis was performed IAW M6010C. Instrument calibration and calibration verification for each method employed was performed IAW method requirements.

As described in Section 5.2.7, the preparation of the front-half fraction included a two-step digestion to facilitate the reporting of boron in addition to the other metals of interest. The laboratory's narrative included in the final report (see Appendix F-8) provides a detailed description of how the results from each digestate were determined. The laboratory's treatment of detected and ND values for the digestates is such that if a metal is ND in either digestate, the metal is reported as a ND at the adjusted RL/MDL (both are reported). If a metal is detected above the MDL in both digestates, the metal is reported as detected at the combined amount found. If a metal is detected in only 1 digestate and the detected amount is above the combined MDL, the metal is reported as detected at the found amount.

It is the combined front-half result that should be used with the back-half result to determine the total catch that is used in emission rate determination as described in Section 11.3.1 of the SAP/QAPP.

Though it is expected that the initial extraction that is performed is sufficient to capture all boron present in the front-half fraction, boron results should be considered estimated as it is not possible to accurately assess any boron that may be present in the other digestate.

Instrument Tune

Instrument tuning is not performed with either ICP/AES or CVAAS analysis and assessment is not required.

Instrument Calibration

Instrument calibration was performed to ensure the instrument was capable of producing acceptable quantitative data. ICAL demonstrated that the instrument was capable of acceptable performance prior to sample analysis and continuing calibration sample analyses verified that the ICAL was still valid.

M6010C, ICP/AES, was used for the analysis of antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, lead, manganese, nickel, potassium, selenium, silver, thallium, tin, vanadium, and zinc. M7470A, CVAAS, was used for the determination of mercury. The ICP/AES and CVAAS were calibrated IAW M6010C and M7470A, respectively. Initial and continuing calibration verification sample results were within the acceptable control limits of 90 to 110% recovery for ICP/AES and 80 to 120% for CVAAS throughout the analysis of all exhaust gas samples.

Internal Standard Results

M6010C provides for the use of internal standards. Internal standards were added to each sample analyzed by M6010C. Internal standard responses fell between 70 and 130% of the internal standard intensities in the ICP and qualification is not indicated.

Interference Check Samples

M6010C requires interference check samples (ICS) to be analyzed at the beginning of each analytical sequence. Two check sample solutions are run, an “A” solution (i.e., ICSA) containing only interfering elements at high concentrations and an “AB” solution (i.e., ICSAB), containing all analytes of interest including the interfering elements. The EPAs validation guidelines are written for a modified procedure that requires an additional ICS at the end of each analytical sequence. M6010C does not require an ending ICS analysis and the review criteria applied only considered the required ICS. The ICS results were within ± 20% of the true value for all target analytes in the ICS solutions for each run analyzed.

M7470A has no interference check sample requirements.

Method Blank Results

Method blanks were analyzed to determine the existence and magnitude of contamination resulting from laboratory handling of the samples. Method blank results are summarized in Table 6-20. No target elements were detected above the RL though there were instances where target metals were found between the RL and MDL. Qualification of the reported results is not indicated.

Field and Reagent Blank Results

Reagent blanks are indicators of the quality of the reagents used in the preparation and recovery of the sampling trains. Field blanks are indicators of reagent and ambient contamination that may have occurred in the field. The results of reagent and field blank are presented in Table 6-20.

M29 allows for correction of the field sample results for reagent blank contribution. However, the field sample results were not corrected for reagent blank metals content, which allows for reporting the most conservative metals emissions data. Reported “total catch” results should be considered biased high for those metals identified in Table 6-20 that were found in the field and reagent blanks.

LCS Results

LCS are samples of known concentration that were prepared and analyzed along with the field samples. The LCS were used to monitor the overall performance of the preparation and analysis process. The results of the LCS are summarized in Table 6-21. All objectives were met and qualification of the data was not necessary.

It is noted that while the SAPP/QAPP requires an LCS to be performed, the laboratory prepared and analyzed and LCS/LCSD with each fraction. Results of the LCS/LCSD for each fraction have been included in this report.

MS/MSD Results

The MS/MSD sample results provide information about the effect of each sample matrix on the preparation and analysis procedure. For the M29 sampling train, the MS/MSD are post-digestion spike/post-digestion spike duplicates for the front- and back-half fractions of the sampling train as the sample cannot be split and separate aliquots spiked prior to sample preparation. Only the back-half mercury fractions have an MS/MSD that is prepared by spiking sample aliquots prior to digestion. The MS/MSD results are summarized in Table 6-22.

With the exception of the tin recovery (127%) in the back-half fraction post-digestion spike duplicate, all MS/MSD recoveries and RPD were within acceptance limits. Qualification of the reported sample results is not indicated.

Serial Dilution Results

Serial dilution, or dilution test, is required by M6010C and is used to determine whether significant physical or chemical interferences exist attributable to sample matrix. If the analyte concentration is 50 times > MDL, the serial dilution results should be within 10% of the original determination. The laboratory conducted serial dilution analysis with each analytical batch per instrument as required.

All serial dilution results were within acceptance limits and qualification is not indicated.

6.5.9 Energetics

Exhaust gases were sampled for energetic compounds using the MM5E. The laboratory provided preloaded and surrogate spiked (3,4-dinitrotoluene) XAD traps, and the impinger fraction of the sampling train was spiked by AECOM-Austin prior to sampling with surrogate. Following any necessary extraction, the sampling train components were analyzed for energetic compounds using M8330, HPLC. Table 6-23 provides a summary of the dates each sample was prepared and analyzed and demonstrates all holding time requirements were satisfied. The following subsections discuss the energetic analysis.

For energetics, train totals should not include any bottom section ND in the train totals as indicated in Section 5.1 of the approved energetics sampling, preparation, and analysis procedure.

Instrument Calibration

Instrument calibration was performed to ensure that the instrument was capable of producing acceptable quantitative data. ICAL demonstrates that the instrument is capable of acceptable performance prior to sample analysis, and continuing calibration sample analyses verify that the ICAL is still valid. Instrument calibration met all acceptance criteria.

Surrogate Standard Results

Laboratory performance on individual samples was established by field spiking impinger and XAD samples with known concentrations of 3,4-dinitrotoluene. No further surrogate spiking was performed in the laboratory for the field samples. The method blanks and LCSs/LCSDs associated with the impinger and XAD fractions were spiked with equivalent concentrations of 3,4-dintrotoluene prior to extraction at the laboratory.

Evaluation criteria for the surrogate include estimating sample results when any surrogate has a recovery ≥ 10%, but below the lower QC limit. If any surrogate has < 10% recovery reported, concentrations may be rejected. Surrogate recoveries are presented in Table 6-23. The reported surrogate recoveries for the XAD fraction represent the combined recovery from all extractions performed. All recovery objectives were met, and qualification of the data is not indicated.

Method Blank Results

A method blank was prepared and analyzed along with the field samples to determine the existence and magnitude of contamination resulting from laboratory activities. The method blank results also reflect the background level of artifacts present in the resin. No target analytes were detected in any of the method blanks and qualification of the data is not indicated.

Field Blank Results

Field blanks are indicators of ambient and sample handling contamination. A field blank was collected by setting up a sampling train, bringing the train to the sampling location, heating the train, and performing leak checks. The field blank is recovered in the same manner as the field samples. No target analytes were detected in any field blank fraction.

Reagent Blank Results

Reagent blanks are indicators of the cleanliness of the reagents and materials used in the field. Reagent blanks were collected that included the filter, solvent, and reagent water. No target analytes were detected in any of the reagent blanks samples.

Trip Blank Results

Trip blanks are indicators of ambient and sample handling contamination introduced during shipping of the samples. A trip blank consisting of a resin trap was shipped with the samples to the laboratory and analyzed. It is noted that this sample was identified as a reagent blank

(A.SDC-STK-CPTRRB-MM5E-XAD TOP and A.SDC-STK-CPTRRB-MM5E-XAD BOTTOM) by AECOM-Austin. No target analytes were detected in the trip blank samples.

LCS Results

LCSs were analyzed to provide information on the accuracy of the analytical method and on laboratory performance. The results of the LCSs are presented in Table 6-24. All objectives were met for all fractions and qualification of the data is not indicated.

6.6 AUDIT SAMPLE RESULTS

Audit samples for M26A and M29 were obtained from one of the 2 accredited audit sample providers in the Stationary Source Audit Program and submitted for analysis with the field samples. Evaluations of the audit sample results were sent directly from the audit sample provider to ADEM, WDC, the laboratory, and AECOM-Austin.

6.6.1 M26A Audit Sample Results

An audit sample consisting of hydrogen halides/halogens in impinger solution was submitted for analysis and results reported to the audit sample provider for evaluation. The reported hydrogen chloride and hydrogen fluoride results were found to be acceptable.

6.6.2 M29 Audit Sample Results

Audit samples consisting of metals on filter paper, mercury on filter paper, metals in impinger solution, and mercury in impinger solution were submitted for analysis and results reported to the audit sample provider for evaluation. The reported metals in impinger solution, mercury on filter paper, and mercury in impinger solution results were found to be acceptable. The reported metals on filter paper results were found to be acceptable for all metals except silver (below acceptance limit), chromium (above acceptance limit), and nickel (above acceptance limit). Front-half silver results should be considered estimated and may be biased low. Front-half chromium and nickel results should be considered estimated and may be biased high.[1]

The data validator's communication with the laboratory indicates the low recovery for silver on filter paper was not unexpected as low recovery of silver has consistently been observed for metals on filter paper audits provided through the Stationary Source Audit Program. The laboratory had an open corrective action investigation into this matter based on prior audit sample performance. As part of the corrective action investigation, the laboratory includes spiked filter quality control samples from a third-party provider that are prepared and analyzed alongside the audit and field samples. For this project, the laboratory included 2 quality control samples from Phenova (Lot Numbers 1050-04 and 1051-04) as an additional demonstration of capability for silver. Results for these quality control samples are included in the laboratory report (see Appendix F-6) and show acceptable recoveries for silver. While it is understood that

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[1] It is noted that the results submitted for evaluation by the laboratory for the metals on filter paper did not represent the final reported results for the front-half fraction as a calculation error was found that over-estimated the metals present in the front-half fraction. Though the audit provider does not re-evaluate results in such instances, the recalculated results show that chromium would have been within the acceptable range, but silver and nickel would still have been outside the acceptance limit.

these results do not change the audit sample performance for silver on filter paper, they do suggest the laboratory's audit sample performance for silver may not be indicative of performance for actual field samples. From a data usability standpoint, silver was not found above the MDL in any field sample fraction and train totals have been calculated using the reporting limits. Use of the RL introduces a level of conservatism in which silver emissions are "over-estimated" and these results should be usable for estimating risk without further qualification. For additional discussion on quality control measures to address low silver recovery, see Appendix I.

6.7 CONCLUSIONS

6.7.1 Comparability of Analytical Data

IAW the SDC C2 Emissions Test Plan, standardized methodologies (e.g., approved US EPA sample collection procedures and site specific procedures) were employed to collect samples and generate data in common units. Samples were analyzed using the US EPA approved procedures described in the SDC C2 Emissions Test Plan. For this reason, the results generated during this test are comparable to other results collected using the same methodologies and procedures.

6.7.2 Representativeness of Analytical Data

Based on a review of the sampling and analysis results, the exhaust gas sample results are believed to be representative. The exhaust gas sampling locations met US EPA specifications for distance from flow disturbances and absence of cyclonic flow was demonstrated at the isokinetic sampling locations. Approved US EPA sampling methods were used to collect all exhaust gas samples and the analytical procedures specified in the SDC C2 Emissions Test Plan were employed in their analysis.

6.7.3 Completeness of Analytical Data

The SDC C2 Emissions Test Plan identified obtaining 3 complete exhaust gas sample sets as the critical measurement. Based on a review of the sampling and analysis results, the exhaust gas sample results are considered complete. Exhaust gas samples from a minimum of 3 test runs were collected and analyzed. Though some results should be considered estimated based on the data validation findings, no results were rejected or flagged as unusable.

On an individual analyte basis, there were a total of 1,005 individual analytes planned to be reported for the field samples collected from 3 runs. None of the 1,005 individual analytes were reported to be unusable. With 1,005 of 1,005 individual analytes reported to be usable, this represents a completeness of 100%.

6.7.4 Analytical Data Usability

Without exception, the analytical data generated from the SDC C2 field samples is valid and considered usable for their intended purpose. Results qualified as estimated can be used as long as the limitations of the results are understood.

6.8 DEVIATIONS FROM THE APPROVED PLAN

With very few exceptions, the facility operations, sampling, and analysis performed during Runs 2, 3, and 4, were consistent with the planned operations, sampling, and analysis described in the approved SDC C2 Emissions Test Plan. Table 6-25 summarizes the recognized deviations that did occur and discusses the basis and impact of the deviations. Despite these deviations, no significant impacts to the validity of the data were incurred.

Table 6-1: Field and Laboratory Sample Identification Cross Reference Guide

Laboratory Sample No.	Field Sample No.	Test Run No.	Sampling Date	Semivolatile Organics	Semivolatile Unspeciated and Gravimetric Organics	Dioxins/Furans	Volatile Organics	Volatile Unspeciated Organics	Hydrogen Chloride/Fluoride	Total Chlorine	Particulates	Trace Metals	Energetics
				Analytical Testing Parameters									
140-7605-1	A.SDC-STK-CPTRFB-M0010-SEMIS-PNR/FILT	---	3/21/2017	X									
140-7605-2	A.SDC-STK-CPTRFB-M0010-SEMIS-CR/XAD	---	3/21/2017	X									
140-7605-3	A.SDC-STK-CPTRFB-M0010-SEMIS-IR	---	3/21/2017	X									
140-7605-4	A.SDC-STK-CPTRRB-M0010-SEMIS-FILT	---	3/25/2017	X									
140-7605-5	A.SDC-STK-CPTRRB-M0010-SEMIS-XAD	---	3/25/2017	X									
140-7605-6	A.SDC-STK-CPTRRB-M0010-SEMIS-MECL/MEOH	---	3/25/2017	X									
140-7605-10	A-SDC-STK-CPTR2-M0010-SEMIS-PNR/FILT	2	3/23/2017	X									
140-7605-11	A-SDC-STK-CPTR2-M0010-SEMIS-CR/XAD	2	3/23/2017	X									
140-7605-12	A-SDC-STK-CPTR2-M0010-SEMIS-CONDA/IR	2	3/23/2017	X									
140-7605-13	A-SDC-STK-CPTR3-M0010-SEMIS-PNR/FILT	3	3/24/2017	X									
140-7605-14	A-SDC-STK-CPTR3-M0010-SEMIS-CR/XAD	3	3/24/2017	X									
140-7605-15	A-SDC-STK-CPTR3-M0010-SEMIS-CONDA/IR	3	3/24/2017	X									
140-7605-16	A-SDC-STK-CPTR4-M0010-SEMIS-PNR/FILT	4	3/25/2017	X									
140-7605-17	A-SDC-STK-CPTR4-M0010-SEMIS-CR/XAD	4	3/25/2017	X									
140-7605-18	A-SDC-STK-CPTR4-M0010-SEMIS-CONDA/IR	4	3/25/2017	X									
140-7605-19	A-6220 MEDIA CHECK XAD	---	3/21/2017	X									
140-7605-20	A-6223 MEDIA CHECK FILTER	---	3/21/2017	X									
140-7606-1	A.SDC-STK-CPTRFB-M0010-TOE-PNR/FILT	---	3/21/2017		X								
140-7606-2	A.SDC-STK-CPTRFB-M0010-TOE-XAD/BHRNs	---	3/21/2017		X								
140-7606-3	A.SDC-STK-CPTRRB-M0010-TOE-FILT	---	3/25/2017		X								
140-7606-4	A.SDC-STK-CPTRRB-M0010-TOE-XAD	---	3/25/2017		X								
140-7606-5	A.SDC-STK-CPTRRB-M0010-TOE-MeCl/MeOH	---	3/25/2017		X								

Table 6-1: Field and Laboratory Sample Identification Cross Reference Guide (Continued)

Laboratory Sample No.	Field Sample No.	Test Run No.	Sampling Date	Analytical Testing Parameters: Semivolatile Organics	Semivolatile Unspeciated and Gravimetric Organics	Dioxins/Furans	Volatile Organics	Volatile Unspeciated Organics	Hydrogen Chloride/Fluoride	Total Chlorine	Particulates	Trace Metals	Energetics
140-7606-9	A.SDC-STK-CPTR2-M0010-TOE-PNR/FILT	2	3/23/2017		X								
140-7606-10	A.SDC-STK-CPTR2-M0010-TOE-XAD/BHRNs	2	3/23/2017		X								
140-7606-11	A.SDC-STK-CPTR2-M0010-TOE-COND A	2	3/23/2017		X								
140-7606-12	A.SDC-STK-CPTR3-M0010-TOE-PNR/FILT	3	3/24/2017		X								
140-7606-13	A.SDC-STK-CPTR3-M0010-TOE-XAD/BHRNs	3	3/24/2017		X								
140-7606-14	A.SDC-STK-CPTR3-M0010-TOE-COND A	3	3/24/2017		X								
140-7606-15	A.SDC-STK-CPTR4-M0010-TOE-PNR/FILT	4	3/25/2017		X								
140-7606-16	A.SDC-STK-CPTR4-M0010-TOE-XAD/BHRNs	4	3/25/2017		X								
140-7606-17	A.SDC-STK-CPTR4-M0010-TOE-COND A	4	3/25/2017		X								
140-7606-18	A-6224 MEDIA CHECK FILTER	---	3/21/2017		X								
140-7606-19	A-6221 MEDIA CHECK XAD	---	3/21/2017		X								
140-7604-1	A. SDC-STK-CPTRFB-M0023A-PNR/FILT	---	3/21/2017			X							
140-7604-2	A. SDC-STK-CPTRFB-M0023A-CR/XAD	---	3/21/2017			X							
140-7604-3	A. SDC-STK-CPTRRB-M0023A-FILT	---	3/25/2017			X							
140-7604-4	A. SDC-STK-CPTRRB-M0023A-XAD	---	3/25/2017			X							
140-7604-5	A. SDC-STK-CPTRRB-M0023A-RSB	---	3/25/2017			X							
140-7604-8	A. SDC-STK-CPTR2-M0023A-PNR/FILT	2	3/23/2017			X							
140-7604-9	A. SDC-STK-CPTR2-M0023A-CR/XAD	2	3/23/2017			X							
140-7604-10	A. SDC-STK-CPTR3-M0023A-PNR/FILT	3	3/24/2017			X							
140-7604-11	A. SDC-STK-CPTR3-M0023A-CR/XAD	3	3/24/2017			X							
140-7604-12	A. SDC-STK-CPTR4-M0023A-PNR/FILT	4	3/25/2017			X							
140-7604-13	A. SDC-STK-CPTR4-M0023A-CR/XAD	4	3/25/2017			X							

Table 6-1: Field and Laboratory Sample Identification Cross Reference Guide (Continued)

Laboratory Sample No.	Field Sample No.	Test Run No.	Sampling Date	Analytical Testing Parameters: Semivolatile Organics	Semivolatile Unspeciated and Gravimetric Organics	Dioxins/Furans	Volatile Organics	Volatile Unspeciated Organics	Hydrogen Chloride/Fluoride	Total Chlorine	Particulates	Trace Metals	Energetics
140-7604-14	A-6222 MEDIA CHECK XAD	---	3/21/2017			X							
140-7604-15	A-6225 MEDIA CHECK FILTER	---	3/21/2017			X							
140-7608-12	A.SDC-STK-CPTR2-M0031-T1A/T1B	2	3/23/2017				X						
140-7608-13	A.SDC-STK-CPTR2-M0031-ANA	2	3/23/2017				X						
140-7608-14	A.SDC-STK-CPTR2-M0031-T1B/T2B	2	3/23/2017				X						
140-7608-15	A.SDC-STK-CPTR2-M0031-ANB	2	3/23/2017				X						
140-7608-16	A.SDC-STK-CPTR2-M0031-T1C/T2C	2	3/23/2017				X						
140-7608-17	A.SDC-STK-CPTR2-M0031-ANC	2	3/23/2017				X						
140-7608-18	A.SDC-STK-CPTR2-M0031-T1D/T2D	2	3/23/2017				X						
140-7608-19	A.SDC-STK-CPTR2-M0031-AND	2	3/23/2017				X						
140-7608-20	A.SDC-STK-CPTR2-M0031-T1BK/T2BK	2	3/23/2017				X						
140-7608-21	A.SDC-STK-CPTR2-M0031-ANBK	2	3/23/2017				X						
140-7608-22	A.SDC-STK-CPTR2-M0031-COND	2	3/23/2017				X						
140-7608-23	A.SDC-STK-CPTR3-M0031-T1A/T2A	3	3/24/2017				X						
140-7608-24	A.SDC-STK-CPTR3-M0031-ANA	3	3/24/2017				X						
140-7608-25	A.SDC-STK-CPTR3-M0031-T1B/T2B	3	3/24/2017				X						
140-7608-26	A.SDC-STK-CPTR3-M0031-ANB	3	3/24/2017				X						
140-7608-27	A.SDC-STK-CPTR3-M0031-T1C/T2C	3	3/24/2017				X						
140-7608-28	A.SDC-STK-CPTR3-M0031-ANC	3	3/24/2017				X						
140-7608-29	A.SDC-STK-CPTR3-M0031-T1D/T2D	3	3/24/2017				X						
140-7608-30	A.SDC-STK-CPTR3-M0031-AND	3	3/24/2017				X						
140-7608-31	A.SDC-STK-CPTR3-M0031-T1BK/T2BK	3	3/24/2017				X						

Table 6-1: Field and Laboratory Sample Identification Cross Reference Guide (Continued)

Laboratory Sample No.	Field Sample No.	Test Run No.	Sampling Date	Analytical Testing Parameters									
				Semivolatile Organics	Semivolatile Unspeciated and Gravimetric Organics	Dioxins/Furans	Volatile Organics	Volatile Unspeciated Organics	Hydrogen Chloride/Fluoride	Total Chlorine	Particulates	Trace Metals	Energetics
140-7608-32	A.SDC-STK-CPTR3-M0031-ANBK	3	3/24/2017				X						
140-7608-33	A.SDC-STK-CPTR3-M0031-COND	3	3/24/2017				X						
140-7608-34	A.SDC.STK-CPTR4-M0031-T1A/T2A	4	3/25/2017				X						
140-7608-35	A.SDC.STK-CPTR4-M0031-ANA	4	3/25/2017				X						
140-7608-36	A.SDC.STK-CPTR4-M0031-T1B/T2B	4	3/25/2017				X						
140-7608-37	A.SDC.STK-CPTR4-M0031-ANB	4	3/25/2017				X						
140-7608-38	A.SDC.STK-CPTR4-M0031-T1C/T2C	4	3/25/2017				X						
140-7608-39	A.SDC.STK-CPTR4-M0031-ANC	4	3/25/2017				X						
140-7608-40	A.SDC.STK-CPTR4-M0031-T1D/T2D	4	3/25/2017				X						
140-7608-41	A.SDC.STK-CPTR4-M0031-AND	4	3/25/2017				X						
140-7608-42	A.SDC-STK-CPTR4-M0031-T1BK/T2BK	4	3/25/2017				X						
140-7608-43	A.SDC-STK-CPTR4-M0031-ANBK	4	3/25/2017				X						
140-7608-44	A.SDC-STK-CPTR4-M0031-COND	4	3/25/2017				X						
140-7608-45	A.SDC-STK-CPTRTB1-M0031-T1A/T2A	---	3/25/2017				X						
140-7608-46	A.SDC-STK-CPTRTB1-M0031-ANA	---	3/25/2017				X						
140-7608-47	A-SDC-STK-CPTRTB1-M0031-COND	---	3/25/2017				X						
140-7608-48	A-6201 MEDIA CHECK TENAX	---	3/22/2017				X						
140-7608-49	A-6202 MEDIA CHECK TENAX/CHAR	---	3/22/2017				X						
140-7612-2	A.SDC-STK-CPTR2-M0040-TOE-COND 2A	2	3/23/2017					X					
140-7612-3	A.SDC-STK-CPTR3-M0040-TOE-COND 3A	3	3/24/2017					X					
140-7612-4	A.SDC-STK-CPTR4-M0040-TOE-COND 4A	4	3/25/2017					X					
140-7612-6	A.SDC-STK-CPTR2-M0040-TOE-COND 2B	2	3/23/2017					X					

Table 6-1: Field and Laboratory Sample Identification Cross Reference Guide (Continued)

Laboratory Sample No.	Field Sample No.	Test Run No.	Sampling Date	Analytical Testing Parameters									
				Semivolatile Organics	Semivolatile Unspeciated and Gravimetric Organics	Dioxins/Furans	Volatile Organics	Volatile Unspeciated Organics	Hydrogen Chloride/Fluoride	Total Chlorine	Particulates	Trace Metals	Energetics
140-7612-7	A.SDC-STK-CPTR3-M0040-TOE-COND 3B	3	3/24/2017					X					
140-7612-8	A.SDC-STK-CPTR4-M0040-TOE-COND 4B	4	3/25/2017					X					
140-7612-10	A.SDC-STK-CPTR2-M0040-TOE-COND BK	2	3/23/2017					X					
140-7612-11	A.SDC-STK-CPTR3-M0040-TOE-COND BK	3	3/24/2017					X					
140-7612-12	A.SDC-STK-CPTR4-M0040-TOE-COND BK	4	3/25/2017					X					
140-7609-11	A.SDC-STK-CPTR3-M5/26A-ACDIMPA/B	3	3/24/2017						X				
140-7609-15	A.SDC-STK-CPTR4-M5/26A-ACDIMPA/B	4	3/25/2017						X				
140-7609-17	A.SDC-STK-CPTRAUDIT-M5/26A-H2SO4 SOLN	---	3/25/2017						X				
140-7609-20	A.SDC-STK-CPTRFB-M5/26A-ACDIMPA	---	3/21/2017						X				
140-7609-24	A.SDC-STK-CPTRRB-M5/26A-H2SO4 SOLN	---	3/25/2017						X				
140-7609-26	A.SDC-STK-CPTRRB-M5/26A-WATER	---	3/25/2017						X				
140-7609-7	A.SDC-STK-CPTR2-M5/26A-ACDIMPA/B	2	3/23/2017						X				
140-7609-12	A.SDC-STK-CPTR3-M5/26A-ALKIMP	3	3/24/2017							X			
140-7609-16	A.SDC-STK-CPTR4-M5/26A-ALKIMP	4	3/25/2017							X			
140-7609-21	A.SDC-STK-CPTRFB-M5/26A-ALKIMP	---	3/21/2017							X			
140-7609-25	A.SDC-STK-CPTRRB-M5/26A-NAOH SOLN	---	3/25/2017							X			
140-7609-8	A.SDC-STK-CPTR2-M5/26A-ALKIMP	2	3/23/2017							X			
140-7609-5	A.SDC-STK-CPTR2-M5/26A-PNR	2	3/23/2017								X		
140-7609-6	A.SDC-STK-CPTR2-M5/26A-FILT	2	3/23/2017								X		
140-7609-9	A.SDC-STK-CPTR3-M5/26A-PNR	3	3/24/2017								X		
140-7609-10	A.SDC-STK-CPTR3-M5/26A-FILT	3	3/24/2017								X		
140-7609-13	A.SDC-STK-CPTR4-M5/26A-PNR	4	3/25/2017								X		

Table 6-1: Field and Laboratory Sample Identification Cross Reference Guide (Continued)

Laboratory Sample No.	Field Sample No.	Test Run No.	Sampling Date	Analytical Testing Parameters: Semivolatile Organics	Semivolatile Unspeciated and Gravimetric Organics	Dioxins/Furans	Volatile Organics	Volatile Unspeciated Organics	Hydrogen Chloride/Fluoride	Total Chlorine	Particulates	Trace Metals	Energetics
140-7609-14	A.SDC-STK-CPTR4-M5/26A-FILT	4	3/25/2017								X		
140-7609-18	A.SDC-STK-CPTRFB-M5/26A-PNR	---	3/21/2017								X		
140-7609-19	A.SDC-STK-CPTRFB-M5/26A-FILT	---	3/21/2017								X		
140-7609-22	A.SDC-STK-CPTRRB-M5/26A-FILT	---	3/25/2017								X		
140-7609-23	A.SDC-STK-CPTRRB-M5/26A-ACE	---	3/25/2017								X		
140-7609-27	A-6200 MEDIA CHECK M5 FILTER	---	3/21/2017								X		
140-7610-6	A.SDC-STK-CPTR2-M29-PNR/FILT	2	3/23/2017									X	
140-7610-7	A.SDC-STK-CPTR2-M29-NPIA/B	2	3/23/2017									X	
140-7610-8	A.SDC-STK-CPTR2-M29-EIR	2	3/23/2017									X	
140-7610-9	A.SDC-STK-CPTR2-M29-PERM	2	3/23/2017									X	
140-7610-10	A.SDC-STK-CPTR2-M29-HCLRNS	2	3/23/2017									X	
140-7610-11	A.SDC-STK-CPTR3-M29-PNR/FILT	3	3/24/2017									X	
140-7610-12	A.SDC-STK-CPTR3-M29-NPIA/B	3	3/24/2017									X	
140-7610-13	A.SDC-STK-CPTR3-M29-EIR	3	3/24/2017									X	
140-7610-14	A.SDC-STK-CPTR3-M29-PERM	3	3/24/2017									X	
140-7610-15	A.SDC-STK-CPTR3-M29-HCLRNS	3	3/24/2017									X	
140-7610-16	A.SDC-STK-CPTR4-M29-PNR/FILT	4	3/25/2017									X	
140-7610-17	A.SDC-STK-CPTR4-M29-NPIA/B	4	3/25/2017									X	
140-7610-18	A.SDC-STK-CPTR4-M29-EIR	4	3/25/2017									X	
140-7610-19	A.SDC-STK-CPTR4-M29-PERM	4	3/25/2017									X	
140-7610-20	A.SDC-STK-CPTR4-M29-HCLRNS	4	3/25/2017									X	
140-7610-21	A.SDC-STK-CPTRAUDIT1-M29-FILT	---	3/25/2017									X	

Table 6-1: Field and Laboratory Sample Identification Cross Reference Guide (Continued)

Laboratory Sample No.	Field Sample No.	Test Run No.	Sampling Date	Analytical Testing Parameters: Semivolatile Organics	Semivolatile Unspeciated and Gravimetric Organics	Dioxins/Furans	Volatile Organics	Volatile Unspeciated Organics	Hydrogen Chloride/Fluoride	Total Chlorine	Particulates	Trace Metals	Energetics
140-7610-22	A.SDC-STK-CPTRAUDIT1-M29-NPI	---	3/25/2017									X	
140-7610-23	A.SDC-STK-CPTRAUDIT2-M29-FILT	---	3/25/2017									X	
140-7610-24	A.SDC-STK-CPTRAUDIT2-M29-NPI	---	3/25/2017									X	
140-7610-25	A.SDC-STK-CPTRFB-M29-PNR/FILT	---	3/21/2017									X	
140-7610-26	A.SDC-STK-CPTRFB-M29-NPIA	---	3/21/2017									X	
140-7610-27	A.SDC-STK-CPTRFB-M29-EIR	---	3/21/2017									X	
140-7610-28	A.SDC-STK-CPTRFB-M29-PERM	---	3/21/2017									X	
140-7610-29	A.SDC-STK-CPTRFB-M29-HCLRNS	---	3/21/2017									X	
140-7610-30	A.SDC-STK-CPTRRB-M29-FILT	---	3/25/2017									X	
140-7610-31	A.SDC-STK-CPTRRB-M29-NA RNS SOLN	---	3/25/2017									X	
140-7610-32	A.SDC-STK-CPTRRB-M29-NP SOLN	---	3/25/2017									X	
140-7610-33	A.SDC-STK-CPTRRB-M29-PERM SOLN	---	3/25/2017									X	
140-7610-34	A.SDC-STK-CPTRRB-M29-HCL SOLN	---	3/25/2017									X	
140-7610-35	A-6199 MEDIA CHECK FILTER	---	3/21/2017									X	
140-7610-36	AE METALS ON FILTER PAPER LOT# 1050-04	---	3/21/2017									X	
140-7610-37	AE METALS ON FILTER PAPER LOT# 1051-04	---	3/21/2017									X	
140-7610-38	MEDIA BLANK FILTERS	---	3/21/2017									X	
140-7581-2	A.SDC-STK-CPTRFB-MM5E-COND A	---	3/22/2017										X
140-7581-3	A.SDC-STK-CPTR2-MM5E-COND A,B	2	3/23/2017										X
140-7581-4	A.SDC-STK-CPTRFB-MM5E-PNR/FILT	---	3/21/2017										X
140-7581-5	A.SDC-STK-CPTRFB-MM5E-XAD TOP	---	3/21/2017										X
140-7581-6	A.SDC-STK-CPTRFB-MM5E-XAD BOTTOM	---	3/21/2017										X

Table 6-1: Field and Laboratory Sample Identification Cross Reference Guide (Continued)

Laboratory Sample No.	Field Sample No.	Test Run No.	Sampling Date	Analytical Testing Parameters: Semivolatile Organics	Semivolatile Unspeciated and Gravimetric Organics	Dioxins/Furans	Volatile Organics	Volatile Unspeciated Organics	Hydrogen Chloride/Fluoride	Total Chlorine	Particulates	Trace Metals	Energetics
140-7581-10	A.SDC-STK-CPTR2-MM5E-PNR/FILT	2	3/23/2017										X
140-7581-11	A.SDC-STK-CPTR2-MM5E-XAD TOP	2	3/23/2017										X
140-7581-12	A.SDC-STK-CPTR2-MM5E-XAD BOTTOM	2	3/23/2017										X
140-7581-13	A.SDC-STK-CPTR3-MM5E-PNR/FILT	3	3/24/2017										X
140-7581-14	A.SDC-STK-CPTR3-MM5E-COND A,B	3	3/24/2017										X
140-7581-15	A.SDC-STK-CPTR3-MM5E-XAD TOP	3	3/24/2017										X
140-7581-16	A.SDC-STK-CPTR3-MM5E-XAD BOTTOM	3	3/24/2017										X
140-7581-17	A.SDC-STK-CPTR4-MM5E-PNR/FILT	4	3/25/2017										X
140-7581-18	A.SDC-STK-CPTR4-MM5E-COND A,B	4	3/25/2017										X
140-7581-19	A.SDC-STK-CPTR4-MM5E-XAD TOP	4	3/25/2017										X
140-7581-20	A.SDC-STK-CPTR4-MM5E-XAD BOTTOM	4	3/25/2017										X
140-7581-21	A.SDC-STK-CPTRRB-MM5E-ACNT	---	3/25/2017										X
140-7581-22	A.SDC-STK-CPTRRB-MM5E-XAD TOP	---	3/25/2017										X
140-7581-23	A.SDC-STK-CPTRRB-MM5E-XAD BOTTOM	---	3/25/2017										X
140-7581-24	A.SDC-STK-CPTRRB-MM5E-WATER	---	3/25/2017										X
---	Run 2, Bag 1	2						X					
---	Run 2, Bag Blank	2						X					
---	Trip Blank 1	2						X					
---	Run 2, Bag 2	2						X					
---	Run 3, Bag 1	3						X					
---	Run 3, Bag 1 Spike	3						X					
---	Run 3, Bag Blank	3						X					

Table 6-1: Field and Laboratory Sample Identification Cross Reference Guide (Continued)

Laboratory Sample No.	Field Sample No.	Test Run No.	Sampling Date	Analytical Testing Parameters: Semivolatile Organics	Semivolatile Unspeciated and Gravimetric Organics	Dioxins/Furans	Volatile Organics	Volatile Unspeciated Organics	Hydrogen Chloride/Fluoride	Total Chlorine	Particulates	Trace Metals	Energetics
---	Run 3, Bag 2	3						X					
---	Run 4, Bag 1	4						X					
---	Trip Blank 2	4						X					
---	Run 4, Bag Blank	4						X					
---	Run 4, Bag 2	4						X					

Table 6-2: Isokinetic Train Leak Checks

Run	Sample Train	Initial		Port Change				Final	
		VAC (inHg)	Rate (cf)	VAC (inHg)	Rate (cf)	VAC (in Hg)	Rate (cf)	VAC (inHg)	Rate (cf)
2	M0010	16	0.003	6	0.000	13	0.003	10	0.000
	M0010-TOC	15	0.002	10	0.001	15	0.001	9	0.000
	M0023A	15	0.001	10	0.003	16	0.005	10	0.001
	M26A	16	0.003	8	0.003	16	0.001	10	0.000
	M29	15	0.000	5	0.000	15	0.002	6	0.001
	MM5E	15	0.001	9.5	0.003	15	0.004	11	0.001
3	M0010	15.5	0.005	12	0.003	16	0.002	8	0.000
	M0010-TOC	15	0.003	9	0.001	15	0.002	10.5	0.001
	M0023A	15	0.000	10	0.002	15	0.003	11.5	0.000
	M26A	16	0.003	7	0.000	16	0.002	10.5	0.000
	M29	16	0.002	6	0.002	16	0.001	7	0.000
	MM5E	15	0.001	8	0.002	15	0.003	8	0.002
4	M0010	16	0.002	11	0.000	17	0.003	11	0.000
	M0010-TOC	15	0.002	11	0.001	15	0.001	10	0.000
	M0023A	17.5	0.001	10	0.001	15	0.004	11	0.003
	M26A	15	0.000	8	0.001	16	0.001	10	0.002
	M29	17	0.000	5	0.000	17	0.001	5	0.000
	MM5E	16	0.002	7	0.002	15	0.002	8	0.001

Table 6-3: Semivolatile Organic Sample Holding Time Summary

Sample Name	Sample Date	Preparation Date	Analysis Date	Collection to Extraction (Days)	Extraction to Analysis (Days)
A-SDC-STK-CPTR2-M0010-SEMIS-PNR/FILT	03/23/17	03/28/17	03/31/17	5	3
A-SDC-STK-CPTR2-M0010-SEMIS-CR/XAD	03/23/17	03/28/17	03/31/17	5	3
A-SDC-STK-CPTR2-M0010-SEMIS-CONDA/IR	03/23/17	03/28/17	03/31/17	5	3
A-SDC-STK-CPTR3-M0010-SEMIS-PNR/FILT	03/24/17	03/28/17	03/31/17	4	3
A-SDC-STK-CPTR3-M0010-SEMIS-CR/XAD	03/24/17	03/28/17	03/31/17	4	3
A-SDC-STK-CPTR3-M0010-SEMIS-CONDA/IR	03/24/17	03/28/17	03/31/17	4	3
A-SDC-STK-CPTR4-M0010-SEMIS-PNR/FILT	03/25/17	03/28/17	03/31/17	3	3
A-SDC-STK-CPTR4-M0010-SEMIS-CR/XAD	03/25/17	03/28/17	03/31/17	3	3
A-SDC-STK-CPTR4-M0010-SEMIS-CONDA/IR	03/25/17	03/28/17	03/31/17	3	3
A.SDC-STK-CPTRFB-M0010-SEMIS-PNR/FILT	03/21/17	03/28/17	03/31/17	7	3
A.SDC-STK-CPTRFB-M0010-SEMIS-CR/XAD	03/21/17	03/28/17	03/31/17	7	3
A.SDC-STK-CPTRFB-M0010-SEMIS-IR	03/21/17	03/28/17	03/31/17	7	3
A.SDC-STK-CPTRRB-M0010-SEMIS-FILT	03/25/17	03/28/17	03/31/17	3	3
A.SDC-STK-CPTRRB-M0010-SEMIS-XAD	03/25/17	03/28/17	03/31/17	3	3
A.SDC-STK-CPTRRB-M0010-SEMIS-MECL/MEOH	03/25/17	03/28/17	03/31/17	3	3
A-6220 MEDIA CHECK XAD	03/21/17	03/28/17	03/30/17	7	2
A-6223 MEDIA CHECK FILTER	03/21/17	03/28/17	03/30/17	7	2
MB 140-9966/1-B	---	03/28/17	03/30/17	---	2
MB 140-9967/1-B	---	03/28/17	03/30/17	---	2
MB 140-9968/1-B	---	03/28/17	03/31/17	---	3
LCS 140-9966/2-B (10094)	---	03/28/17	03/30/17	---	2
LCSD 140-9966/3-B (10094)	---	03/28/17	03/30/17	---	2
LCS 140-9967/2-B (10094)	---	03/28/17	03/30/17	---	2
LCSD 140-9967/3-B (10094)	---	03/28/17	03/30/17	---	2
LCS 140-9968/2-B (10130)	---	03/28/17	03/31/17	---	3
LCSD 140-9968/3-B (10130)	---	03/28/17	03/31/17	---	3

SAP/QAPP Limit: 14 days from collection to extraction and 40 days from extraction to analysis

Table 6-4: Semivolatile Surrogate Standard Results

Sample Name	$^{13}C_6$-Naphthalene	2-Fluorobiphenyl	2-Fluorophenol	Nitrobenzene-d_5	Phenol-d_5	Terphenyl-d_{14}	2,4,6-Tribromophenol
	SAP/QAPP Limit (%)						
Sample Name	**---**	**48-110**	**37-105**	**43-107**	**48-114**	**67-112**	**34-121**
A-SDC-STK-CPTR2-M0010-SEMIS-PNR/FILT	---	80	72	70	78	92	89
A-SDC-STK-CPTR3-M0010-SEMIS-PNR/FILT	---	69	63	62	67	84	78
A-SDC-STK-CPTR4-M0010-SEMIS-PNR/FILT	---	85	78	79	84	91	87
A.SDC-STK-CPTRFB-M0010-SEMIS-PNR/FILT	---	72	66	66	72	86	81
A.SDC-STK-CPTRRB-M0010-SEMIS-FILT	---	87	82	83	86	93	84
A-6223 MEDIA CHECK FILTER	---	92	87	85	89	98	81
A.SDC-STK-CPTRRB-M0010-SEMIS-MECL/MEOH	---	87	83	82	88	95	85
MB 140-9966/1-B	---	88	81	82	82	95	72
LCS 140-9966/2-B (10094)	---	89	82	85	86	97	102
LCSD 140-9966/3-B (10094)	---	91	85	88	89	95	98
	50-150	**48-111**	**42-104**	**45-110**	**50-118**	**73-108**	**51-125**
A-SDC-STK-CPTR2-M0010-SEMIS-CR/XAD	69	78	67	69	76	89	95
A-SDC-STK-CPTR3-M0010-SEMIS-CR/XAD	72	75	70	69	77	90	98
A-SDC-STK-CPTR4-M0010-SEMIS-CR/XAD	69	75	69	67	77	89	94
A.SDC-STK-CPTRFB-M0010-SEMIS-CR/XAD	76	83	73	70	84	92	93
A.SDC-STK-CPTRRB-M0010-SEMIS-XAD	81	86	83	80	90	91	92
A-6220 MEDIA CHECK XAD	---	85	83	80	88	90	83
MB 140-9967/1-B	---	86	82	82	87	91	89
LCS 140-9967/2-B (10094)	---	85	79	82	83	89	96
LCSD 140-9967/3-B (10094)	---	88	82	85	86	94	96

Table 6-4: Semivolatile Surrogate Standard Results (Continued)

Sample Name	$^{13}C_6$-Naphthalene	2-Fluorobiphenyl	2-Fluorophenol	Nitrobenzene-d_5	Phenol-d_5	Terphenyl-d_{14}	2,4,6-Tribromophenol
	SAP/QAPP Limit (%)						
	---	56-109	29-90	52-109	19-134	55-115	40-127
A-SDC-STK-CPTR2-M0010-SEMIS-CONDA/IR	---	68	50	64	63	81	73
A-SDC-STK-CPTR3-M0010-SEMIS-CONDA/IR	---	68	47	64	64	87	82
A-SDC-STK-CPTR4-M0010-SEMIS-CONDA/IR	---	66	50	64	63	82	72
A.SDC-STK-CPTRFB-M0010-SEMIS-IR	---	84	62	81	76	89	74
MB 140-9968/1-B	---	82	66	80	79	87	66
LCS 140-9968/2-B (10130)	---	81	57	79	75	90	93
LCSD 140-9968/3-B (10130)	---	82	57	82	75	90	94

Note: $^{13}C_6$-Naphthalene is a field surrogate that is only added to the resin trap. As such, only back-half sample fractions have a recovery reported for this surrogate.

Table 6-5: Semivolatile LCS Results

Laboratory ID:	140-9966/2-B / 140-9966/3-B							
	Concentration (ug)			**Recovery (%)**		**RPD**	**SAP/QAPP Limits (%)**	
Spiked Compound	**True**	**LCS**	**LCSD**	**LCS**	**LCSD**	**(%)**	**Recovery**	**RPD**
Benzyl Alcohol	100	88.41	91.03	88	91	3	54 - 122	28
Benzaldehyde	100	75.17	79.48	75	79	6	50 - 150	25
bis(2-Ethylhexyl) phthalate	100	95.55	93.34	96	93	2	77 - 128	25
Fluoranthene	100	93.38	96.54	93	97	3	55 - 120	25
Naphthalene	100	81.31	83.13	81	83	2	59 - 120	25
Laboratory ID:	140-9967/2-B / 140-9967/3-B							
	Concentration (ug)			**Recovery (%)**		**RPD**	**SAP/QAPP Limits (%)**	
Spiked Compound	**True**	**LCS**	**LCSD**	**LCS**	**LCSD**	**(%)**	**Recovery**	**RPD**
Benzyl Alcohol	100	87.92	92.01	88	92	5	59 - 121	42
Benzaldehyde	100	83.79	86.00	84	86	3	50 - 150	25
bis(2-Ethylhexyl) phthalate	100	90.54	92.55	91	93	2	84 - 125	34
Fluoranthene	100	88.14	89.11	88	89	1	60 - 117	34
Naphthalene	100	77.39	80.15	77	80	4	61 - 120	28
Laboratory ID:	140-9968/2-B / 140-9968/3-B							
	Concentration (ug)			**Recovery (%)**		**RPD**	**SAP/QAPP Limits (%)**	
Spiked Compound	**True**	**LCS**	**LCSD**	**LCS**	**LCSD**	**(%)**	**Recovery**	**RPD**
Benzyl Alcohol	100	82.41	82.88	82	83	1	70 - 118	28
Benzaldehyde	100	76.14	79.63	76	80	4	50 - 150	25
bis(2-Ethylhexyl) phthalate	100	86.90	87.70	87	88	1	80 - 123	20
Fluoranthene	100	87.67	88.77	88	89	1	64 - 128	20
Naphthalene	100	76.66	78.64	77	79	3	62 - 120	28

Notes: (A) Only the 5 spiking compounds corresponding to the 5 target analytes are included in the summary tables.
(B) Recovery limits and RPD are the TestAmerica-Knoxville acceptance limits with the exception of benzaldehyde where a laboratory specific limit was not established and default limits were applied.

Table 6-6: Semivolatile TOC Holding Time and Surrogate Standard Results

Sample	Sample Date	Preparation Date	Analysis Date	Collection to Extraction (Days)	Extraction to Analysis (Days)	n-Heptadecane (%)
A.SDC-STK-CPTRFB-M0010-TOE-PNR/FILT	03/21/17	03/27/17	03/31/17	6	4	92
A.SDC-STK-CPTR2-M0010-TOE-XAD/BHRNs	03/23/17	03/27/17	03/31/17	4	4	89
A.SDC-STK-CPTR2-M0010-TOE-COND A	03/23/17	03/27/17	03/31/17	4	4	93
A.SDC-STK-CPTR3-M0010-TOE-PNR/FILT	03/24/17	03/27/17	03/31/17	3	4	87
A.SDC-STK-CPTR3-M0010-TOE-XAD/BHRNs	03/24/17	03/27/17	03/31/17	3	4	88
A.SDC-STK-CPTR3-M0010-TOE-COND A	03/24/17	03/27/17	03/31/17	3	4	109
A.SDC-STK-CPTR4-M0010-TOE-PNR/FILT	03/25/17	03/27/17	03/31/17	2	4	77
A.SDC-STK-CPTR4-M0010-TOE-XAD/BHRNs	03/25/17	03/27/17	03/31/17	2	4	94
A.SDC-STK-CPTR4-M0010-TOE-COND A	03/25/17	03/27/17	03/31/17	2	4	89
A-6224 MEDIA CHECK FILTER	03/21/17	03/27/17	03/31/17	6	4	86
A-6221 MEDIA CHECK XAD	03/21/17	03/27/17	03/31/17	6	4	90
A.SDC-STK-CPTRFB-M0010-TOE-XAD/BHRNs	03/21/17	03/27/17	03/31/17	6	4	84
A.SDC-STK-CPTRRB-M0010-TOE-FILT	03/25/17	03/27/17	03/31/17	2	4	88
A.SDC-STK-CPTRRB-M0010-TOE-XAD	03/25/17	03/27/17	03/31/17	2	4	98
A.SDC-STK-CPTRRB-M0010-TOE-MeCl/MeOH	03/25/17	03/27/17	03/31/17	2	4	83
A.SDC-STK-CPTR2-M0010-TOE-PNR/FILT	03/23/17	03/27/17	03/31/17	4	4	83
MB 140-9886/1-A	---	03/27/17	03/31/17	---	4	95
LCS 140-9886/2-A	---	03/27/17	03/31/17	---	4	96
LCSD 140-9886/3-A	---	03/27/17	03/31/17	---	4	102
MB 140-9892/1-A	---	03/27/17	03/31/17	---	4	96
LCS 140-9892/2-A	---	03/27/17	03/31/17	---	4	102
LCSD 140-9892/3-A	---	03/27/17	03/31/17	---	4	101

Table 6-6: Semivolatile TOC Holding Time and Surrogate Standard Results (Continued)

Sample	Sample Date	Preparation Date	Analysis Date	Collection to Extraction (Days)	Extraction to Analysis (Days)	n-Heptadecane (%)
MB 140-9894/1-A	---	03/27/17	03/31/17	---	4	86
LCS 140-9894/2-A	---	03/27/17	03/31/17	---	4	96
LCSD 140-9894/3-A	---	03/27/17	03/31/17	---	4	96

SAP/QAPP Limit: 14 days from collection to extraction
40 days from extraction to analysis
Recovery = 50 to 150%;

Table 6-7: Semivolatile TOC LCS Results

Sample ID	Concentration (mg)			Recovery (%)		RPD (%)
	True	LCS	LCSD	LCS	LCSD	
Total Chromatographic Organics						
LCS 140-9886/2-A,3-A	0.225	0.1775	0.1827	79	81	3
LCS 140-9892/2-A,3-A	0.225	0.1756	0.1508	78	67	15
LCS 140-9894/2-A, 3-A	0.225	0.1767	0.1771	79	79	0
Gravimetric Organics						
LCS 140-9896/2-A,3-A	2.50	2.293	2.480	92	99	8
LCS 140-9898/2-A,3-A	2.50	3.120	3.120	125	125	0
LCS 140-9900/2-A,3-A	2.50	2.253	2.947	90	118	27

SAP/QAPP Limits: Recovery = TCO: 40 to 120%, GRAV: 50 to 150%
RPD = TCO: ≤ 50%, GRAV: ≤ 35%

Table 6-8: Dioxin/Furan Sample Holding Time Summary

Sample Name	Sample Date	Preparation Date	Analysis Date	Collection to Extraction (Days)	Extraction to Analysis (Days)
A. SDC-STK-CPTR2-M0023A-PNR/FILT	03/23/17	03/28/17	04/03/17	5	6
A. SDC-STK-CPTR2-M0023A-CR/XAD	03/23/17	03/28/17	04/03/17	5	6
A. SDC-STK-CPTR3-M0023A-PNR/FILT	03/24/17	03/28/17	04/03/17	4	6
A. SDC-STK-CPTR3-M0023A-CR/XAD	03/24/17	03/28/17	04/03/17	4	6
A. SDC-STK-CPTR4-M0023A-PNR/FILT	03/25/17	03/28/17	04/03/17	3	6
A. SDC-STK-CPTR4-M0023A-CR/XAD	03/25/17	03/28/17	04/03/17	3	6
A. SDC-STK-CPTRFB-M0023A-PNR/FILT	03/21/17	03/28/17	04/02/17	7	5
A. SDC-STK-CPTRFB-M0023A-CR/XAD	03/21/17	03/28/17	04/03/17	7	6
A. SDC-STK-CPTRRB-M0023A-FILT	03/25/17	03/28/17	04/03/17	3	6
A. SDC-STK-CPTRRB-M0023A-XAD	03/25/17	03/28/17	04/03/17	3	6
A. SDC-STK-CPTRRB-M0023A-RSB	03/25/17	03/28/17	04/02/17	3	5
A-6225 MEDIA CHECK FILTER	03/21/17	03/28/17	04/02/17	7	5
A-6222 MEDIA CHECK XAD	03/21/17	03/28/17	04/03/17	7	6
MB 140-9993/9-B(10151)	---	03/28/17	04/02/17	---	5
MB 140-9994/8-B(10164)	---	03/28/17	04/03/17	---	6
LCS 140-9993/10-B(10151)	---	03/28/17	04/02/17	---	5
LCSD 140-9993/11-B(10151)	---	03/28/17	04/02/17	---	5
LCS 140-9994/9-B(10184)	---	03/28/17	04/03/17	---	6
LCSD 140-9994/10-B(10184)	---	03/28/17	04/03/17	---	6

SAP/QAPP Limits: 30 days from collection to extraction
45 days from extraction to analysis

Table 6-9: Dioxin/Furan Internal and Surrogate Standard Results

	Internal Standards										Surrogates				
	^{13}C-2,3,7,8-TetraCDD	^{13}C-1,2,3,7,8-PentaCDD	^{13}C-1,2,3,6,7,8-HexaCDD	^{13}C-1,2,3,4,6,7,8-HeptaCDD	^{13}C-OctaCDD	^{13}C-2,3,7,8-TetraCDF	^{13}C-1,2,3,7,8-PentaCDF	^{13}C-1,2,3,6,7,8-HexaCDF	^{13}C-1,2,3,4,6,7,8-HeptaCDF	^{13}C-OctaCDF	^{37}C$_{l4}$-2,3,7,8-TetraCDD	^{13}C-2,3,4,7,8-PentaCDF	^{13}C-1,2,3,4,7,8-HexaCDF	^{13}C-1,2,3,4,7,8-HexaCDD	^{13}C-1,2,3,4,7,8,9-HeptaCDF
Sample Name	**40-135%**										**70-130%**				
A. SDC-STK-CPTR2-M0023A-PNR/FILT	74	73	85	84	67	88	85	109	93	63	86	80	92	105	79
A. SDC-STK-CPTR2-M0023A-CR/XAD	73	93	74	78	77	82	95	83	75	67	89	92	99	112	91
A. SDC-STK-CPTR3-M0023A-PNR/FILT	70	82	76	74	58	89	84	99	86	54	92	98	95	115	77
A. SDC-STK-CPTR3-M0023A-CR/XAD	74	93	71	78	77	80	95	79	73	68	88	92	99	115	93
A. SDC-STK-CPTR4-M0023A-PNR/FILT	64	85	76	65	51	95	93	87	72	51	95	93	97	110	87
A. SDC-STK-CPTR4-M0023A-CR/XAD	71	91	75	82	90	79	91	80	77	73	89	95	97	106	90
A. SDC-STK-CPTRFB-M0023A-PNR/FILT	70	80	77	77	63	88	86	98	86	62	88	87	90	102	77
A. SDC-STK-CPTRFB-M0023A-CR/XAD	73	85	79	81	68	114	93	109	87	68	92	89	91	111	88
A. SDC-STK-CPTRRB-M0023A-FILT	67	89	80	74	60	86	96	106	86	58	88	88	92	108	76
A. SDC-STK-CPTRRB-M0023A-XAD	71	86	78	83	83	78	85	85	77	73	87	92	99	110	94
A. SDC-STK-CPTRRB-M0023A-RSB	70	79	79	85	72	85	85	93	96	71	---	---	---	---	---
A-6225 MEDIA CHECK FILTER	70	84	80	86	81	83	88	95	95	75	---	---	---	---	---
A-6222 MEDIA CHECK XAD	74	84	79	83	69	89	87	95	97	66	---	---	---	---	---
MB 140-9993/9-B(10151)	69	78	74	75	60	83	83	84	85	51	---	---	---	---	---
MB 140-9994/8-B(10164)	69	81	73	93	85	100	82	88	103	79	---	---	---	---	---

Table 6-9: Dioxin/Furan Internal and Surrogate Standard Results (Continued)

	Internal Standards										Surrogates				
	^{13}C-2,3,7,8-TetraCDD	^{13}C-1,2,3,7,8-PentaCDD	^{13}C-1,2,3,6,7,8-HexaCDD	^{13}C-1,2,3,4,6,7,8-HeptaCDD	^{13}C-OctaCDD	^{13}C-2,3,7,8-TetraCDF	^{13}C-1,2,3,7,8-PentaCDF	^{13}C-1,2,3,6,7,8-HexaCDF	^{13}C-1,2,3,4,6,7,8-HeptaCDF	^{13}C-OctaCDF	$^{37}C_{l4}$-2,3,7,8-TetraCDD	^{13}C-2,3,4,7,8-PentaCDF	^{13}C-1,2,3,4,7,8-HexaCDF	^{13}C-1,2,3,4,7,8-HexaCDD	^{13}C-1,2,3,4,7,8,9-HeptaCDF
Sample Name	**40-135%**										**70-130%**				
LCS 140-9993/10-B(10151)	74	93	77	89	89	89	84	89	98	78	---	---	---	---	---
LCSD 140-9993/11-B(10151)	68	88	78	80	80	81	93	88	90	75	---	---	---	---	---
LCS 140-9994/9-B(10184)	75	96	75	89	94	80	92	80	87	84	---	---	---	---	---
LCSD 140-9994/10-B(10184)	71	91	74	90	99	79	89	76	84	86	---	---	---	---	---

Table 6-10: Dioxin/Furan LCS Results

Laboratory ID:	LCS 140-9993/10-B/LCSD 140-9993/11-B					
	Concentration (pg)			Recovery (%)		RPD
Spiked Compound	**True**	**LCS**	**LCSD**	**LCS**	**LCSD**	**(%)**
2,3,7,8-TCDD	200	228.4	242.7	114	121	6
1,2,3,7,8-PeCDD	1,000	1,038	1,082	104	108	4
1,2,3,4,7,8-HxCDD	1,000	1,088	1,143	109	114	5
1,2,3,6,7,8-HxCDD	1,000	1,029	1,037	103	104	1
1,2,3,7,8,9-HxCDD	1,000	1,163	1,171	116	117	1
1,2,3,4,6,7,8-HpCDD	1,000	1,001	1,044	100	104	4
OCDD	2,000	1,993	2,020	100	101	1
2,3,7,8-TCDF	200	212.1	224.5	106	112	6
1,2,3,7,8-PeCDF	1,000	1,031	1,070	103	107	4
2,3,4,7,8-PeCDF	1,000	1,126	959.8	113	96	16
1,2,3,4,7,8-HxCDF	1,000	1,179	1,158	118	116	2
1,2,3,6,7,8-HxCDF	1,000	1,079	1,101	108	110	2
2,3,4,6,7,8-HxCDF	1,000	1,076	1,098	108	110	2
1,2,3,7,8,9-HxCDF	1,000	1,054	1,004	105	100	5
1,2,3,4,6,7,8-HpCDF	1,000	972.8	1,008	97	101	4
1,2,3,4,7,8,9-HpCDF	1,000	879.3	918.3	88	92	4
OCDF	2,000	1,896	2,004	95	100	6

Table 6-10: Dioxin/Furan LCS Results (Continued)

Laboratory ID:	LCS 140-9994/9-B/LCSD 140-9994/10-B					
	Concentration (pg)			**Recovery (%)**		**RPD**
Spiked Compound	**True**	**LCS**	**LCSD**	**LCS**	**LCSD**	**(%)**
2,3,7,8-TCDD	200	220.2	224.7	110	112	2
1,2,3,7,8-PeCDD	1,000	982.3	1,015	98	101	3
1,2,3,4,7,8-HxCDD	1,000	1,086	1,085	109	108	0
1,2,3,6,7,8-HxCDD	1,000	994.8	983.7	99	98	1
1,2,3,7,8,9-HxCDD	1,000	1,169	1,180	117	118	1
1,2,3,4,6,7,8-HpCDD	1,000	955.2	964.6	96	96	1
OCDD	2,000	1,821	1,887	91	94	4
2,3,7,8-TCDF	200	203.3	210.0	102	105	3
1,2,3,7,8-PeCDF	1,000	957.1	983.9	96	98	3
2,3,4,7,8-PeCDF	1,000	976.6	993.7	98	99	2
1,2,3,4,7,8-HxCDF	1,000	1,119	1,141	112	114	2
1,2,3,6,7,8-HxCDF	1,000	1,033	1,047	103	105	1
2,3,4,6,7,8-HxCDF	1,000	1,090	1,123	109	112	3
1,2,3,7,8,9-HxCDF	1,000	1,136	1,169	114	117	3
1,2,3,4,6,7,8-HpCDF	1,000	948.4	960.3	95	96	1
1,2,3,4,7,8,9-HpCDF	1,000	995.5	1,012	100	101	2
OCDF	2,000	1,821	1,887	91	94	4

SAP/QAPP Limits: Recovery = 70 to 130%
RPD = ≤ 20%

Table 6-11: Volatile Holding Time Summary and Surrogate Standard Results

Sample Name	Sample Date	Analysis Date	Collection to Analysis (Days)	Surrogate: Dibromofluoromethane	Surrogate: 1,2-Dichloroethane-d_4	Surrogate: Toluene-d_8	Surrogate: 4-Bromofluorobenzene
			QC Limit (%)	50-150	50-150	10-150	10-150
A.SDC-STK-CPTR2-M0031-COND	03/23/17	03/28/17	5	110	96	101	107
A.SDC-STK-CPTR2-M0031-T1A/T1B	03/23/17	04/03/17	11	84	142	102	91
A.SDC-STK-CPTR2-M0031-ANA	03/23/17	04/03/17	11	**33**	**39**	72	72
A.SDC-STK-CPTR2-M0031-T1B/T2B	03/23/17	04/03/17	11	73	75	95	79
A.SDC-STK-CPTR2-M0031-ANB	03/23/17	04/03/17	11	86	82	104	90
A.SDC-STK-CPTR2-M0031-T1C/T2C	03/23/17	04/03/17	11	85	86	104	90
A.SDC-STK-CPTR2-M0031-ANC	03/23/17	04/03/17	11	82	85	100	93
A.SDC-STK-CPTR2-M0031-T1D/T2D	03/23/17	04/03/17	11	84	93	109	95
A.SDC-STK-CPTR2-M0031-AND	03/23/17	04/03/17	11	84	86	106	93
A.SDC-STK-CPTR3-M0031-COND	03/24/17	03/28/17	4	107	100	108	111
A.SDC-STK-CPTR3-M0031-T1A/T2A	03/24/17	04/03/17	10	85	**174**	106	92
A.SDC-STK-CPTR3-M0031-ANA	03/24/17	04/03/17	10	**44**	52	74	84
A.SDC-STK-CPTR3-M0031-T1B/T2B	03/24/17	04/03/17	10	85	85	108	91
A.SDC-STK-CPTR3-M0031-ANB	03/24/17	04/03/17	10	80	77	103	90
A.SDC-STK-CPTR3-M0031-T1C/T2C	03/24/17	04/03/17	10	82	83	107	93
A.SDC-STK-CPTR3-M0031-ANC	03/24/17	04/03/17	10	80	75	102	98
A.SDC-STK-CPTR3-M0031-T1D/T2D	03/24/17	04/03/17	10	82	59	109	97
A.SDC-STK-CPTR3-M0031-AND	03/24/17	04/03/17	10	88	82	107	92
A.SDC-STK-CPTR4-M0031-COND	03/25/17	03/28/17	3	113	104	105	115
A.SDC.STK-CPTR4-M0031-T1A/T2A	03/25/17	04/04/17	10	80	54	104	87
A.SDC.STK-CPTR4-M0031-ANA	03/25/17	04/04/17	10	87	84	106	95
A.SDC.STK-CPTR4-M0031-T1B/T2B	03/25/17	04/04/17	10	75	50	98	82
A.SDC.STK-CPTR4-M0031-ANB	03/25/17	04/04/17	10	83	81	103	91
A.SDC.STK-CPTR4-M0031-T1C/T2C	03/25/17	04/04/17	10	80	73	108	93
A.SDC.STK-CPTR4-M0031-ANC	03/25/17	04/04/17	10	79	78	99	88
A.SDC.STK-CPTR4-M0031-T1D/T2D	03/25/17	04/04/17	10	77	**45**	107	96
A.SDC.STK-CPTR4-M0031-AND	03/25/17	04/04/17	10	88	80	103	87

Table 6-11: Volatile Holding Time Summary and Surrogate Standard Results (Continued)

Sample Name	Sample Date	Analysis Date	Collection to Analysis (Days)	Surrogate: Dibromofluoromethane	Surrogate: 1,2-Dichloroethane-d_4	Surrogate: Toluene-d_8	Surrogate: 4-Bromofluorobenzene
			QC Limit (%)	50-150		10-150	
A.SDC-STK-CPTR2-M0031-T1BK/T2BK	03/23/17	03/30/17	7	103	82	107	94
A.SDC-STK-CPTR2-M0031-ANBK	03/23/17	03/30/17	7	109	87	114	106
A.SDC-STK-CPTR3-M0031-T1BK/T2BK	03/24/17	03/30/17	6	112	89	113	104
A.SDC-STK-CPTR3-M0031-ANBK	03/24/17	03/30/17	6	111	87	109	106
A.SDC-STK-CPTR4-M0031-T1BK/T2BK	03/25/17	03/30/17	5	107	89	108	98
A.SDC-STK-CPTR4-M0031-ANBK	03/25/17	03/30/17	5	111	89	113	106
A.SDC-STK-CPTRTB1-M0031-T1A/T2A	03/25/17	03/30/17	5	111	90	108	105
A.SDC-STK-CPTRTB1-M0031-ANA	03/25/17	03/30/17	5	103	85	105	100
A-SDC-STK-CPTRTB1-M0031-COND	03/25/17	03/28/17	3	109	98	107	105
MB 140-10087/19 (10087)	---	03/30/17	---	103	91	110	98
MB 140-10161/26 (10161)	---	04/03/17	---	89	81	104	89
MB 140-10190/10 (10190)	---	04/04/17	---	79	68	98	82
MB 140-9917/5-A (9982)	---	03/28/17	---	109	103	105	114
LCS 140-10087/17 (10087)	---	03/30/17	---	106	85	112	88
LCSD 140-10087/18 (10087)	---	03/30/17	---	106	90	114	94
LCS 140-10161/7 (10161)	---	04/03/17	---	87	74	103	81
LCSD 140-10161/8 (10161)	---	04/03/17	---	93	84	105	92
LCS 140-10190/8 (10190)	---	04/04/17	---	88	77	107	84
LCSD 140-10190/33 (10190)	---	04/04/17	---	90	82	107	89
LCS 140-9917/6-A (9982)	---	03/28/17	---	109	102	104	105
LCSD 140-9917/7-A (9982)	---	03/28/17	---	105	103	108	104
A.SDC-STK-CPTR2-M0031-COND	03/23/17	03/28/17	5	110	96	101	107
A.SDC-STK-CPTR3-M0031-COND	03/24/17	03/28/17	4	107	100	108	111
A.SDC-STK-CPTR4-M0031-COND	03/25/17	03/28/17	3	113	104	105	115
A-SDC-STK-CPTRTB1-M0031-COND	03/25/17	03/28/17	3	109	98	107	105

Table 6-11: Volatile Holding Time Summary and Surrogate Standard Results (Continued)

Sample Name	Sample Date	Analysis Date	Collection to Analysis (Days)	Surrogate: Dibromofluoromethane	Surrogate: 1,2-Dichloroethane-d_4	Surrogate: Toluene-d_8	Surrogate: 4-Bromofluorobenzene
			QC Limit (%)	50-150		10-150	
MB 140-10161/26 (10161)	---	04/03/17	---	89	81	104	89
LCS 140-10161/7 (10161)	---	04/03/17	---	87	74	103	81
LCSD 140-10161/8 (10161)	---	04/03/17	---	93	84	105	92

Note: **Shading** indicates a result that is outside the acceptable SAP/QAPP limit.

SAP/QAPP Limit: 14 days from sample collection to analysis

Table 6-12: Volatile LCS Results

Laboratory ID:	LCS 140-10087/17,LCSD 140-10087/18							
Date Analyzed:	03/30/17							
	Concentration (ug)			Recovery (%)		RPD	QC Limits (%)	
Spiked Compound	True	LCS	LCSD	LCS	LCSD	(%)	Recovery	RPD
Chloromethane	0.250	0.2899	0.2722	116	109	6	44 - 176	50
Vinyl Chloride	0.250	0.2835	0.2593	113	104	9	64 - 142	33
Chloroethane	0.250	0.2600	0.2410	104	96	8	43 - 163	32
Trichlorofluoromethane	0.250	0.2731	0.2649	109	106	3	58 - 147	26
Carbon Disulfide	0.250	0.3076	0.2863	123	115	7	40 - 157	23
Acetone	1.00	1.282	1.261	128	126	2	20 - 191	50
Methylene Chloride	0.250	0.2823	0.2113	113	85	29	60 - 134	41
trans-1,2-Dichloroethene	0.250	0.2744	0.2662	110	106	3	78 - 128	23
Hexane	0.250	0.3172	0.3000	127	120	6	40 - 140	50
Chloroform	0.250	0.2346	0.2417	94	97	3	63 - 123	27
1,1,1-Trichloroethane	0.250	0.2697	0.2650	108	106	2	65 - 131	23
Carbon Tetrachloride	0.250	0.2903	0.2895	116	116	0	67 - 135	23
Benzene	0.250	0.2452	0.2422	98	97	1	68 - 128	22
1,2-Dichloroethane	0.250	0.1740	0.1728	70	69	1	36 - 124	37
Trichloroethene	0.250	0.2622	0.2649	105	106	1	80 - 141	32
1,1,2-Trichloroethane	0.250	0.1553	0.1654	62	66	6	41 - 120	38
Chlorobenzene	0.250	0.2102	0.2227	84	89	6	65 - 120	26
Ethylbenzene	0.250	0.2328	0.2368	93	95	2	72 - 127	23
O-Xylene	0.250	0.2215	0.2260	89	90	2	64 - 120	37
1,1,2,2-Tetrachloroethane	0.250	0.1183	0.1334	47	53	12	30 - 120	50
1,1,1,2-Tetrachloroethane	0.250	0.2042	0.2098	82	84	3	53 - 120	35
Dichlorodifluoromethane	0.250	0.2915	0.2577	117	103	12	25 - 146	42
1,3-Butadiene	0.250	0.3134	0.2969	125	119	5	40 - 140	50
m,p-Xylene	0.250	0.2406	0.2494	96	100	4	74 - 126	38

Table 6-12: Volatile LCS Results (Continued)

Laboratory ID:	LCS 140-10161/7,LCSD 140-10161/8							
Date Analyzed:	04/03/17							
	Concentration (ug)			**Recovery (%)**		**RPD**	**QC Limits (%)**	
Spiked Compound	**True**	**LCS**	**LCSD**	**LCS**	**LCSD**	**(%)**	**Recovery**	**RPD**
Chloromethane	0.250	0.2496	0.2320	100	93	7	44 - 176	50
Vinyl Chloride	0.250	0.2756	0.2541	110	102	8	64 - 142	33
Chloroethane	0.250	0.2747	0.2257	110	90	20	43 - 163	32
Trichlorofluoromethane	0.250	0.2695	0.2584	108	103	4	58 - 147	26
Carbon Disulfide	0.250	0.2946	0.2795	118	112	5	40 - 157	23
Acetone	1.000	0.7072	0.9381	71	94	28	20 - 191	50
Methylene Chloride	0.250	0.1921	0.1993	77	80	4	60 - 134	41
trans-1,2-Dichloroethene	0.250	0.2577	0.2413	103	97	7	78 - 128	23
Hexane	0.250	0.3188	0.3006	128	120	6	40 - 140	50
Chloroform	0.250	0.2071	0.2087	83	83	1	63 - 123	27
1,1,1-Trichloroethane	0.250	0.2515	0.2385	101	95	5	65 - 131	23
Carbon Tetrachloride	0.250	0.2618	0.2483	105	99	5	67 - 135	23
Benzene	0.250	0.2238	0.2229	90	89	0	68 - 128	22
1,2-Dichloroethane	0.250	0.1544	0.1732	62	69	11	36 - 124	37
Trichloroethene	0.250	0.2393	0.2234	96	89	7	80 - 141	32
1,1,2-Trichloroethane	0.250	0.1442	0.1584	58	63	9	41 - 120	38
Chlorobenzene	0.250	0.1958	0.2101	78	84	7	65 - 120	26
Ethylbenzene	0.250	0.2434	0.2407	97	96	1	72 - 127	23
O-Xylene	0.250	0.2062	0.2201	82	88	7	64 - 120	37
1,1,2,2-Tetrachloroethane	0.250	0.1178	0.1473	47	59	22	30 - 120	50
1,1,1,2-Tetrachloroethane	0.250	0.1837	0.1950	73	78	6	53 - 120	35
Dichlorodifluoromethane	0.250	0.2659	0.2383	106	95	11	25 - 146	42
1,3-Butadiene	0.250	0.2938	0.2636	118	105	11	40 - 140	50
m,p-Xylene	0.250	0.2352	0.2362	94	94	0	74 - 126	38

Table 6-12: Volatile LCS Results (Continued)

Laboratory ID:	LCS 140-10190/8,LCSD 140-10190/33							
Date Analyzed:	04/04/17							
	Concentration (ug/L)			**Recovery (%)**		**RPD**	**QC Limits (%)**	
Spiked Compound	**True**	**LCS**	**LCSD**	**LCS**	**LCSD**	**(%)**	**Recovery**	**RPD**
Chloromethane	0.250	0.2328	0.2364	93	95	2	44 - 176	50
Vinyl Chloride	0.250	0.2753	0.2807	110	112	2	64 - 142	33
Chloroethane	0.250	0.3016	0.3091	121	124	2	43 - 163	32
Trichlorofluoromethane	0.250	0.2552	0.2580	102	103	1	58 - 147	26
Carbon Disulfide	0.250	0.2683	0.2747	107	110	2	40 - 157	23
Acetone	1.00	0.7511	0.9103	75	91	19	20 - 191	50
Methylene Chloride	0.250	0.1899	0.1974	76	79	4	60 - 134	41
trans-1,2-Dichloroethene	0.250	0.2283	0.2351	91	94	3	78 - 128	23
Hexane	0.250	0.2916	0.2914	117	117	0	40 - 140	50
Chloroform	0.250	0.1934	0.2010	77	80	4	63 - 123	27
1,1,1-Trichloroethane	0.250	0.2263	0.2295	91	92	1	65 - 131	23
Carbon Tetrachloride	0.250	0.2322	0.2353	93	94	1	67 - 135	23
Benzene	0.250	0.2051	0.2178	82	87	6	68 - 128	22
1,2-Dichloroethane	0.250	0.1560	0.1676	62	67	7	36 - 124	37
Trichloroethene	0.250	0.2084	0.2310	83	92	10	80 - 141	32
1,1,2-Trichloroethane	0.250	0.1497	0.1521	60	61	2	41 - 120	38
Chlorobenzene	0.250	0.1947	0.2068	78	83	6	65 - 120	26
Ethylbenzene	0.250	0.2359	0.2466	94	99	4	72 - 127	23
O-Xylene	0.250	0.2132	0.2142	85	86	0	64 - 120	37
1,1,2,2-Tetrachloroethane	0.250	0.1189	0.1354	48	54	13	30 - 120	50
1,1,1,2-Tetrachloroethane	0.250	0.1825	0.1897	73	76	4	53 - 120	35
Dichlorodifluoromethane	0.250	0.2243	0.2304	90	92	3	25 - 146	42
1,3-Butadiene	0.250	0.3391	0.3473	136	139	2	40 - 140	50
m,p-Xylene	0.250	0.2355	0.2356	94	94	0	74 - 126	38

Table 6-12: Volatile LCS Results (Continued)

Laboratory ID:	LCS 140-9917/6-A,LCSD 140-9917/7-A							
Date Analyzed:	03/28/17							
	Concentration (ug/L)			**Recovery (%)**		**RPD**	**QC Limits (%)**	
Spiked Compound	**True**	**LCS**	**LCSD**	**LCS**	**LCSD**	**(%)**	**Recovery**	**RPD**
Chloromethane	0.400	0.4354	0.4475	109	112	3	54 - 133	20
Vinyl Chloride	0.400	0.4320	0.4530	108	113	5	64 - 129	21
Chloroethane	0.400	0.4309	0.4287	108	107	1	65 - 122	20
Trichlorofluoromethane	0.400	0.4017	0.4233	100	106	5	62 - 128	20
Carbon Disulfide	0.400	0.4702	0.4998	118	125	6	35 - 126	20
Acetone	1.60	1.339	1.298	84	81	3	62 - 131	50
Methylene Chloride	0.400	0.3977	0.4081	99	102	3	67 - 120	20
trans-1,2-Dichloroethene	0.400	0.4401	0.4538	110	113	3	74 - 123	20
Hexane	0.400	0.4572	0.4738	114	118	4	50 - 145	20
Chloroform	0.400	0.4234	0.4358	106	109	3	80 - 121	20
1,1,1-Trichloroethane	0.400	0.4468	0.4625	112	116	3	77 - 131	24
Carbon Tetrachloride	0.400	0.4671	0.4851	117	121	4	73 - 135	29
Benzene	0.400	0.4244	0.4428	106	111	4	75 - 120	20
1,2-Dichloroethane	0.400	0.3821	0.3806	96	95	0	74 - 139	20
Trichloroethene	0.400	0.4338	0.4395	108	110	1	80 - 120	20
1,1,2-Trichloroethane	0.400	0.3566	0.3434	89	86	4	76 - 120	20
Chlorobenzene	0.400	0.4004	0.4027	100	101	1	77 - 120	20
Ethylbenzene	0.400	0.3956	0.4105	99	103	4	75 - 120	20
o-Xylene	0.400	0.4147	0.4145	104	104	0	78 - 120	20
1,1,2,2-Tetrachloroethane	0.400	0.3691	0.3640	92	91	1	76 - 120	20
1,1,1,2-Tetrachloroethane	0.400	0.4163	0.4115	104	103	1	80 - 120	25
Dichlorodifluoromethane	0.400	0.4454	0.4495	111	112	1	45 - 140	25
1,3-Butadiene	0.400	0.5143	0.5563	129	139	8	40 - 160	35
m,p-Xylene	0.400	0.4258	0.4327	106	108	2	76 - 120	20

Notes:

(A) The SAP/QAPP provided for 5 spiking compounds, not all of which were target analytes for this project. Consequently, the spiking compounds reported in Table 6-12 represent the complete list of volatile organic target analytes.

(B) Recovery limits represent the compound-specific recovery limits and RPD developed by TestAmerica-Knoxville.

Table 6-13: Volatile TOC Condensate Holding Time Summary and Surrogate Standard Results

Sample	Sample Date	Preparation Date	Analysis Date	Collection to Analysis (Days)	n-Octane Recovery (%)
A.SDC-STK-CPTR2-M0040-TOE-COND 2A	03/23/17	04/5/17	04/5/17	13	108
A.SDC-STK-CPTR3-M0040-TOE-COND 3A	03/24/17	04/5/17	04/5/17	12	103
A.SDC-STK-CPTR4-M0040-TOE-COND 4A	03/25/17	04/5/17	04/5/17	11	107
A.SDC-STK-CPTR2-M0040-TOE-COND 2B	03/23/17	04/5/17	04/5/17	13	116
A.SDC-STK-CPTR3-M0040-TOE-COND 3B	03/24/17	04/5/17	04/5/17	12	105
A.SDC-STK-CPTR4-M0040-TOE-COND 4B	03/25/17	04/5/17	04/5/17	11	102
A.SDC-STK-CPTR2-M0040-TOE-COND BK	03/23/17	04/5/17	04/5/17	13	104
A.SDC-STK-CPTR3-M0040-TOE-COND BK	03/24/17	04/5/17	04/5/17	12	93
A.SDC-STK-CPTR4-M0040-TOE-COND BK	03/25/17	04/5/17	04/5/17	11	98
MB 140-10327/5-A	---	04/5/17	04/5/17	---	109
LCS 140-10327/1-A	---	04/5/17	04/5/17	---	98
LCSD 140-10327/2-A	---	04/5/17	04/5/17	---	98

SAP/QAPP Limit: Recovery = 50 to 150%

Table 6-14: Volatile TOC Field Spike Results

Spike Sample:	Run 3 Bag "A"			
Compounds	True (ppmv)	Sample Result (ppmv)	Field Spike Result (ppmv)	Recovery (%)
C_3-Propane	0.225	0.066	0.284	96.9

Note: The field spike was performed on the diluted bag. The sample and spike concentrations shown here represents the "as found" concentration and do not have the dilution factor applied.

SAP/QAPP Limit: Recovery = 80 to 120%

Table 6-15: Volatile TOC LCS Results

	Run Number:	Run 2		Run 3		Run 4	
	Date:	03/23/17		03/24/17		03/25/17	
Analyte	**True (ppmv)**	**LCS (ppmv)**	**Recovery (%)**	**LCS (ppmv)**	**Recovery (%)**	**LCS (ppmv)**	**Recovery (%)**
Methane (C_1)	12.165	---	---	---	---	12.222	100.5
Ethane (C_2)	11.995	---	---	---	---	12.038	100.4
Propane (C_3)	12.115	---	---	---	---	12.147	100.3
Butane (C_4)	12.090	---	---	---	---	12.163	100.6
Pentane (C_5)	12.000	---	---	---	---	12.126	101.0
Hexane (C_6)	12.048	---	---	---	---	12.262	101.8
Heptane (C_7)	12.575	---	---	---	---	12.981	103.2

Note: Runs 2 and 3samples were analyzed on the same day as the initial calibration and an LCS was not required.

SAP/QAPP Limit: Recovery = 75 to 125%

Table 6-16: Volatile TOC Condensate LCS/LCSD Results

Sample ID:	LCS 140-10327/1-A,LCSD 140-10327/2-A					
Analysis Date:	4/5/17					
	Concentration (ug/sample)			**Recovery (%)**		**RPD (%)**
Element	**True**	**LCS**	**LCSD**	**LCS**	**LCSD**	
C_5-Pentane	1.00	1.00	1.05	100	105	2
C_6-Hexane	0.997	0.950	0.998	95	100	3
C_7-Heptane	0.985	0.964	0.992	98	101	0

SAP/QAPP Limit: Recovery = 50 to 150%
RPD = 0 to 35%

Table 6-17: Acid Gas Sample Holding Time Summary

Sample Name	Sample Date	Preparation Date	Analysis Date	Collection to Analysis (Days)
A.SDC-STK-CPTR2-M5/26A-ACDIMPA/B	03/23/17	03/30/17	04/03/17	11
A.SDC-STK-CPTR3-M5/26A-ACDIMPA/B	03/24/17	03/30/17	04/03/17	10
A.SDC-STK-CPTR4-M5/26A-ACDIMPA/B	03/25/17	03/30/17	04/03/17	9
A.SDC-STK-CPTRAUDIT-M5/26A-H2SO4 SOLN	---	03/30/17	04/03/17	---
A.SDC-STK-CPTRFB-M5/26A-ACDIMPA	03/21/17	03/30/17	04/03/17	13
A.SDC-STK-CPTRRB-M5/26A-H2SO4 SOLN	03/25/17	03/30/17	04/03/17	9
A.SDC-STK-CPTRRB-M5/26A-WATER	03/25/17	03/30/17	04/03/17	9
MB 140-10089/3-A	---	03/30/17	04/03/17	---
LCS 140-10089/1-A	---	03/30/17	04/03/17	---
LCSD 140-10089/2-A	---	03/30/17	04/03/17	---
A.SDC-STK-CPTR2-M5/26A-ACDIMPA/B MS	03/23/17	03/30/17	04/03/17	11
A.SDC-STK-CPTR2-M5/26A-ACDIMPA/B MSD	03/23/17	03/30/17	04/03/17	11
A.SDC-STK-CPTR2-M5/26A-ALKIMP	03/23/17	03/30/17	04/03/17	11
A.SDC-STK-CPTR3-M5/26A-ALKIMP	03/24/17	03/30/17	04/04/17	11
A.SDC-STK-CPTR4-M5/26A-ALKIMP	03/25/17	03/30/17	04/04/17	10
A.SDC-STK-CPTRFB-M5/26A-ALKIMP	03/21/17	03/30/17	04/04/17	14
A.SDC-STK-CPTRRB-M5/26A-NAOH SOLN	03/25/17	03/30/17	04/04/17	10
MB 140-10089/20-A	---	03/30/17	04/03/17	---
LCS 140-10089/21-A	---	03/30/17	04/03/17	---
LCSD 140-10089/22-A	---	03/30/17	04/03/17	---
A.SDC-STK-CPTR2-M5/26A-ALKIMP MS	03/23/17	03/30/17	04/04/17	12
A.SDC-STK-CPTR2-M5/26A-ALKIMP MSD	03/23/17	03/30/17	04/04/17	12

SAP/QAPP Limit: 28 days from collection to analysis

Table 6-18: Acid Gas LCS/LCSD Results

Sample ID	Analysis Date	Parameter	Units	Concentration				Recovery (%)		RPD (%)
				Spike	Sample	LCS	LCSD	LCS	LCSD	
LCS 140-10089/21-A, LCSD 140-10089/22-A	04/03/17	Chlorine	mg	750	---	765.5	766.7	102	102	0
LCS 140-10089/1-A,LCSD 140-10089/2-A	04/03/17	Hydrochloric Acid	mg	77.1	---	77.88	77.28	101	100	1
LCS 140-10089/1-A, LCSD 140-10089/2-A	04/03/17	Hydrogen Fluoride	mg	79.0	---	80.14	81.31	101	103	1

SAP/QAPP Limit: Recovery = 90 to 110%
RPD = Not specified, 20% applied

Table 6-19: Acid Gas MS/MSD Results

Sample ID	Analysis Date	Parameter	Units	Concentration				Recovery (%)		RPD (%)
				Spike	Sample	MS	MSD	MS	MSD	
A.SDC-STK-CPTR2-M5/26A-ALKIMP MS/MSD	04/04/17	Chlorine	mg	624	ND	607.2	619.4	97	99	2
A.SDC-STK-CPTR2-M5/26A-ACDIMPA/B MS/MSD	04/03/17	Hydrochloric Acid	mg	2,860	ND	2,922	2,950	102	103	1
A.SDC-STK-CPTR2-M5/26A-ACDIMPA/B MS/MSD	04/03/17	Hydrogen Fluoride	mg	2,930	283	3,256	3,296	101	103	1

SAP/QAPP Limit: Recovery = 85 to 125%
RPD = 0 to 25%

Table 6-20: Trace Metal Blank Results

Parameter	Method Blank (ug)			Field Blank (ug)		Reagent Blank (ug)		
	Front-Half Digestion 1	Front-Half Digestion 2	Back-Half	Front-Half	Back-Half	Front-Half	0.1 N HNO_3	Other
Antimony	ND	ND	0.437	2.13	0.664	2.05	ND	0.677
Arsenic	ND	0.7360	ND	1.43	ND	1.42	0.430	ND
Barium	ND	ND	ND	3.90	ND	3.03	ND	ND
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND
Boron	ND	---	ND	ND	17.2	ND	ND	8.25
Cadmium	ND	ND	ND	0.149	0.083	ND	ND	ND
Chromium	ND	ND	ND	1.80	0.360	1.27	ND	ND
Cobalt	ND	ND	ND	ND	0.170	ND	ND	ND
Copper	0.412	ND	ND	0.626	0.287	ND	0.860	1.12
Lead	ND	0.570	ND	ND	ND	ND	ND	ND
Manganese	ND	ND	ND	2.87	0.237	0.668	ND	0.163
Mercury (Front-Half)	---	ND	---	ND	---	ND	---	---
Mercury (HNO_3/H_2O_2)	---	---	ND	---	ND	---	ND	ND
Mercury ($KMnO_4$)	---	---	ND	---	ND	---	---	ND
Mercury (Empty Impinger)	---	---	ND	---	ND	---	---	---
Mercury (HCl)	---	---	ND	---	ND	---	---	ND
Nickel	ND	ND	ND	1.18	0.252	0.560	ND	ND
Phosphorus	ND	ND	ND	ND	0.903	ND	ND	ND
Selenium	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	ND	ND	ND	ND	ND	ND	ND	ND
Tin	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	ND	ND	0.518	6.30	3.57	0.989	ND	0.395

Table 6-21: Trace Metal LCS/LCSD Results

Sample ID:	LCS 140-9983/17-A/LCSD 140-9983/18-A (FH Digestion 1)					
	Concentration (ug)			**Recovery (%)**		**RPD (%)**
Element	**True**	**LCS**	**LCSD**	**LCS**	**LCSD**	
Antimony	50.0	48.47	48.66	97	97	0
Arsenic	10.0	9.797	9.999	98	100	2
Barium	10.0	9.623	9.750	96	98	1
Beryllium	5.00	5.122	5.169	102	103	1
Boron	100	102.1	103.5	102	103	1
Cadmium	5.00	5.082	5.095	102	102	0
Chromium	20.0	19.90	20.15	100	101	1
Cobalt	10.0	9.980	10.03	100	100	0
Copper	25.0	24.48	24.57	98	98	0
Lead	10.0	10.21	10.37	102	104	2
Manganese	10.0	10.19	10.20	102	102	0
Nickel	50.0	50.33	50.56	101	101	0
Phosphorus	500	505.5	508.6	101	102	1
Selenium	15.0	15.18	14.84	101	99	2
Silver	5.00	4.930	4.985	99	100	1
Thallium	40.0	41.14	41.68	103	104	1
Tin	50.0	51.43	51.87	103	104	1
Vanadium	20.0	19.86	20.01	99	100	1
Zinc	50.0	50.53	50.98	101	102	1

Table 6-21: Trace Metal LCS/LCSD Results (Continued)

Sample ID:	LCS 140-10832/17-B/LCSD 140-10832/18-B (FH Digestion 2)					
	Concentration (ug)			**Recovery (%)**		**RPD (%)**
Element	**True**	**LCS**	**LCSD**	**LCS**	**LCSD**	
Antimony	50.0	55.71	56.58	111	113	2
Arsenic	10.0	11.44	11.85	114	119	4
Barium	10.0	10.79	10.72	108	107	1
Beryllium	5.00	5.448	5.462	109	109	0
Cadmium	5.00	5.448	5.546	110	111	1
Chromium	20.0	21.96	21.98	110	110	0
Cobalt	10.0	10.92	11.04	109	110	1
Copper	25.0	27.53	27.74	110	111	1
Lead	10.0	11.27	11.21	113	112	1
Manganese	10.0	11.22	11.33	112	113	1
Nickel	50.0	55.12	55.61	110	111	1
Phosphorus	500	553.5	559.7	111	112	1
Selenium	15.0	16.04	16.31	107	109	2
Silver	5.00	5.286	5.412	106	108	2
Thallium	40.0	45.34	45.62	113	114	1
Tin	50.0	55.93	56.61	112	113	1
Vanadium	20.0	21.59	21.70	108	109	1
Zinc	50.0	56.21	56.93	112	114	1

Table 6-21: Trace Metal LCS/LCSD Results (Continued)

Sample ID:	LCS 140-9955/9-A/LCSD 140-9955/10-A					
Element	**Concentration (ug)**			**Recovery (%)**		**RPD (%)**
	True	**LCS**	**LCSD**	**LCS**	**LCSD**	
Antimony	50.0	49.99	48.56	100	97	3
Arsenic	10.0	9.881	9.596	99	96	3
Barium	10.0	10.16	9.713	102	97	4
Beryllium	5.00	5.405	5.244	108	105	3
Boron	100.	103.0	100.5	103	101	2
Cadmium	5.00	5.204	5.055	104	101	3
Chromium	20.0	20.79	20.03	104	100	4
Cobalt	10.0	10.32	9.974	103	100	3
Copper	25.0	25.37	24.43	101	98	4
Lead	10.0	10.42	9.946	104	99	5
Manganese	10.0	10.51	10.18	105	102	3
Nickel	50.0	52.14	50.56	104	101	3
Phosphorus	500.0	509.3	496.9	102	99	2
Selenium	15.00	15.27	14.82	102	99	3
Silver	5.00	4.986	4.857	100	97	3
Thallium	40.0	41.00	39.73	102	99	3
Tin	50.0	52.51	51.25	105	102	2
Vanadium	20.0	20.73	20.04	104	100	3
Zinc	50.0	51.82	50.37	104	101	3
Sample ID:	LCS 140-10371/10-B/LCSD 140-10371/11-B, LCS 140-10289/10-B/, LCS 140-10141/9-B/, LCS 140-10178/8-B/, LCS 140-10180/9-B/					
Mercury	**Concentration (ug)**			**Recovery (%)**		**RPD (%)**
	True	**LCS**	**LCSD**	**LCS**	**LCSD**	
Front-Half	5.00	5.25	5.43	105	109	3.0
HNO_3/H_2O	10.0	10.18	---	102	---	---
Empty	0.500	0.509	---	102	---	---
$KMnO_4$	5.00	5.130	---	103	---	---
HCl	1.25	1.198	---	96	---	---

SAP/QAPP Limit: Recovery = 75 to 125%
RPD = Not specified, 20% applied

Table 6-22: Trace Metal MS/MSD Results

Sample ID:	140-7610-6 PDS, 140-7610-6 PDSD (Digestion 1)						
	Concentration (ug)				Recovery (%)		RPD
Element	True	Sample	MS	MSD	MS	MSD	(%)
Antimony	50.0	ND	48.86	50.21	98	100	3
Arsenic	10.0	ND	10.28	10.10	103	101	2
Barium	10.0	1.01	10.81	10.69	98	97	1
Beryllium	5.0	ND	5.200	5.160	104	103	0.8
Boron	100	5.1	108.5	108.2	103	103	0.3
Cadmium	5.0	ND	5.247	5.215	105	104	0.6
Chromium	20.0	0.4	20.75	20.57	102	101	0.9
Cobalt	10.0	ND	10.21	10.20	102	102	0.1
Copper	25.0	0.391	25.02	25.02	99	99	0
Lead	10.0	ND	10.54	10.65	105	107	1
Manganese	10.0	1.35	11.65	11.52	103	102	1
Nickel	50.0	0.31	51.8	51.6	103	103	0.4
Phosphorus	500	ND	512.5	525.2	102	105	2
Selenium	15.0	ND	15.40	15.12	103	101	2
Silver	5.00	ND	5.031	5.024	101	100	0.1
Thallium	40.0	ND	43.0	42.7	107	107	0.6
Tin	50.0	ND	52.01	53.62	104	107	3
Vanadium	20.0	ND	20.19	20.00	101	100	1
Zinc	50.0	4.2	56.47	56.31	105	104	0.3

Table 6-22: Trace Metal MS/MSD Results (Continued)

Sample ID:	140-7610-6 PDS, 140-7610-6 PDSD (Digestion 2)						
	Concentration (ug)				**Recovery (%)**		**RPD**
Element	**True**	**Sample**	**MS**	**MSD**	**MS**	**MSD**	**(%)**
Antimony	50.0	4.13	53.91	53.73	100	99	0.3
Arsenic	50.0	2.07	50.99	52.09	98	100	2
Barium	10.0	7.00	16.91	16.79	99	98	0.7
Beryllium	5.00	0.0160	5.050	5.055	101	101	0.1
Cadmium	5.00	ND	4.129	4.149	83	83	0.5
Boron	---	---	---	---	---	---	---
Chromium	20.0	2.98	23.56	23.61	103	103	0.2
Cobalt	50.0	ND	50.26	50.38	101	101	0.2
Copper	25.0	0.868	28.01	27.75	109	108	0.9
Lead	50.0	ND	42.67	43.21	85	86	1
Manganese	10.0	3.15	13.65	13.66	105	105	0.09
Nickel	250	1.42	253.7	255.6	101	102	0.7
Phosphorus	500	ND	479.6	481.3	96	96	0.4
Selenium	75.0	ND	77.11	75.63	103	101	2
Silver	5.00	ND	5.137	5.133	103	103	0.08
Thallium	200	ND	208.9	211.3	104	106	1
Tin	50.0	ND	46.20	46.29	92	93	0.2
Vanadium	20.0	ND	20.65	20.61	103	103	0.2
Zinc	50.0	6.41	55.82	55.77	99	99	0.09
Mercury	1.00	ND	0.9210	0.9580	92	96	4

Table 6-22: Trace Metal MS/MSD Results (Continued)

Sample ID:	140-7610-7 PDS, 140-7610-7 PDSD						
	Concentration (ug)				**Recovery (%)**		**RPD**
Element	**True**	**Sample**	**MS**	**MSD**	**MS**	**MSD**	**(%)**
Antimony	50.0	0.474	49.02	49.68	97	98	1
Arsenic	10.0	ND	10.13	10.38	101	104	2
Barium	10.0	1.400	11.23	11.43	98	100	2
Beryllium	5.00	ND	5.392	5.533	108	111	3
Boron	100.0	119.0	220.9	222.4	102	103	1
Cadmium	5.00	0.074	5.253	5.384	104	106	2
Chromium	20.0	0.820	21.48	21.99	103	106	2
Cobalt	10.0	0.136	10.27	10.45	101	103	2
Copper	25.0	10.60	34.63	35.10	96	98	1
Lead	10.0	1.290	11.60	11.77	103	105	1
Manganese	10.0	1.610	11.92	12.17	103	106	2
Nickel	50.0	0.763	52.48	53.66	103	106	2
Phosphorus	500.0	1.660	515.7	523.7	103	104	2
Selenium	15.0	ND	15.08	15.18	101	101	1
Silver	5.00	ND	4.991	5.148	100	103	3
Thallium	40.0	ND	40.47	41.34	101	103	2
Tin	50.0	ND	62.34	63.35	125	**127**	2
Vanadium	20.0	0.068	20.38	20.96	102	104	3
Zinc	50.0	12.40	63.14	64.13	102	104	2

Sample ID:	140-7610-7 MS/140-7610-7 MSD, 140-7610-8 MS/140-7610-8 MSD, 140-7610-9 MS/140-7610-9 MSD 140-7610-10 MS/140-7610-10 MSD						
	Concentration (ug)				**Recovery (%)**		**RPD**
Mercury	**True**	**Sample**	**MS**	**MSD**	**MS**	**MSD**	**(%)**
HNO_3/H_2O	2.00	ND	1.690	1.668	85	83	1
Empty	2.00	ND	2.020	2.040	101	102	1
$KMnO_4$	0.78	ND	0.758	0.742	97	95	2
HCl	1.35	ND	1.245	1.230	92	91	1

Note: **Shading** indicates a result that is not within the QC limits.

SAP/QAPP Limit: Recovery = 75 to 125%
RPD = Not specified, 20% applied

Table 6-23: Energetic Holding Time Summary and Surrogate Standard Results

Sample Name	Sample Date	Preparation Date	Analysis Date	Collection to Extraction (Days)	Extraction to Analysis (Days)	3,4-Dinitrotoluene QC Limit (%) 70-130 (COND) 50-150 (XAD)
A.SDC-STK-CPTR2-MM5E-PNR/FILT	03/23/17	03/28/17	04/21/17	5	24	---
A.SDC-STK-CPTR2-MM5E-XAD TOP	03/23/17	03/28/17	04/20/17	5	23	63
A.SDC-STK-CPTR2-MM5E-XAD TOP	03/23/17	03/28/17	04/21/17	5	24	65 [B]
A.SDC-STK-CPTR2-MM5E-COND A,B	03/23/17	03/28/17	04/21/17	5	24	90
A.SDC-STK-CPTR2-MM5E-COND A,B	03/23/17	03/28/17	04/22/17	5	25	110 [B]
A.SDC-STK-CPTR3-MM5E-PNR/FILT	03/24/17	03/28/17	04/21/17	4	24	---
A.SDC-STK-CPTR3-MM5E-XAD TOP	03/24/17	03/28/17	04/20/17	4	23	56
A.SDC-STK-CPTR3-MM5E-XAD TOP	03/24/17	03/28/17	04/22/17	4	25	55 [B]
A.SDC-STK-CPTR3-MM5E-XAD BOTTOM	03/24/17	03/28/17	04/20/17	4	23	---
A.SDC-STK-CPTR3-MM5E-XAD BOTTOM	03/24/17	03/28/17	04/22/17	4	25	--- [B]
A.SDC-STK-CPTR3-MM5E-COND A,B	03/24/17	03/28/17	04/21/17	4	24	90
A.SDC-STK-CPTR3-MM5E-COND A,B	03/24/17	03/28/17	04/22/17	4	25	110 [B]
A.SDC-STK-CPTR4-MM5E-PNR/FILT	03/25/17	03/28/17	04/21/17	3	24	---
A.SDC-STK-CPTR4-MM5E-XAD TOP	03/25/17	03/28/17	04/20/17	3	23	55
A.SDC-STK-CPTR4-MM5E-XAD TOP	03/25/17	03/28/17	04/22/17	3	25	56 [B]
A.SDC-STK-CPTR4-MM5E-XAD BOTTOM	03/25/17	03/28/17	04/20/17	3	23	---
A.SDC-STK-CPTR4-MM5E-COND A,B	03/25/17	03/28/17	04/21/17	3	24	91
A.SDC-STK-CPTR4-MM5E-COND A,B	03/25/17	03/28/17	04/22/17	3	25	113 [B]
A.SDC-STK-CPTRFB-MM5E-PNR/FILT	03/21/17	03/28/17	04/21/17	7	24	---
A.SDC-STK-CPTRFB-MM5E-XAD TOP	03/21/17	03/28/17	04/20/17	7	23	55
A.SDC-STK-CPTRFB-MM5E-COND A	03/22/17	03/28/17	04/21/17	6	24	90
A.SDC-STK-CPTRFB-MM5E-COND A	03/22/17	03/28/17	04/22/17	6	25	102 [B]
A.SDC-STK-CPTRRB-MM5E-ACNT	03/25/17	03/28/17	04/21/17	3	24	---
A.SDC-STK-CPTRRB-MM5E-WATER	03/25/17	03/28/17	04/21/17	3	24	88
A.SDC-STK-CPTRRB-MM5E-WATER	03/25/17	03/28/17	04/22/17	3	25	95 [B]
A.SDC-STK-CPTRRB-MM5E-XAD TOP	03/25/17	03/28/17	04/21/17	3	24	54
MB 320-157060/1-A	---	03/28/17	04/21/17	---	24	---
MB 320-157061/1-A	---	03/28/17	04/20/17	---	23	82
MB 320-157061/1-A	---	03/28/17	04/21/17	---	24	86 [B]

Table 6-23: Energetic Holding Time Summary and Surrogate Standard Results (Continued)

Sample Name	Sample Date	Preparation Date	Analysis Date	Collection to Extraction (Days)	Extraction to Analysis (Days)	3,4-Dinitrotoluene QC Limit (%) 70-130 (COND) 50-150 (XAD)
MB 320-160708/1-A	---	03/28/17	04/21/17	---	24	89
MB 320-160708/1-A	---	03/28/17	04/22/17	---	25	95 [B]
LCS 320-157060/2-A	---	03/28/17	04/21/17	---	24	---
LCSD 320-157060/3-A	---	03/28/17	04/21/17	---	24	---
LCS 320-157061/2-A	---	03/28/17	04/20/17	---	23	90
LCSD 320-157061/3-A	---	03/28/17	04/20/17	---	23	88
LCS 320-160708/2-A	---	03/28/17	04/21/17	---	24	93
LCSD 320-160708/3-A	---	03/28/17	04/21/17	---	24	97

Notes:

(A) For the condensate fraction a 7 day holding time to extraction is applied. For the resin fraction a 14 day holding time to extraction is applied. For all fractions a 40 day holding time from extraction to analysis is applied. Surrogate is not added to the front-half rinse/filter fraction or the bottom half resin fraction. As such, no recoveries are reported.

(B) Secondary (confirmatory) column analysis.

Table 6-24: Energetic LCS Results

Sample ID:	LCS 320-157060/2-A/LCSD 320-157060/3-A					
Date Extracted:	03/28/17					
Date Analyzed:	04/21/17					
	Concentration (ug)			**Recovery (%)**		
Compound	**True**	**LCS**	**LCSD**	**LCS**	**LCSD**	**RPD (%)**
2,4-Dinitrotoluene	29,900	29,940	29,850	100	100	0
2,6-Dinitrotoluene	29,900	29,600	29,540	99	99	0
HMX	29,900	32,890	32,840	110	110	0
Nitroglycerin	29,900	30,100	30,030	101	101	0
RDX	29,900	31,090	31,220	104	105	0
2,4,6-Trinitrotoluene	29,900	28,460	28,360	95	95	0
Sample ID:	LCS 320-157061/2-A/LCSD 320-157061/3-A					
Date Extracted:	03/28/17					
Date Analyzed:	04/20/17					
	Concentration (ug)			**Recovery (%)**		
Compound	**True**	**LCS**	**LCSD**	**LCS**	**LCSD**	**RPD (%)**
2,4-Dinitrotoluene	50,000	46,600	45,450	93	91	2
2,6-Dinitrotoluene	50,000	46,130	45,000	92	90	2
HMX	50,000	52,130	51,570	104	103	1
Nitroglycerin	50,000	48,630	49,390	97	99	2
RDX	50,000	49,440	48,970	99	98	1
2,4,6-Trinitrotoluene	50,000	44,690	43,440	89	87	3
Sample ID:	LCS 320-160708/2-A/LCSD 320-160708/3-A					
Date Extracted:	03/28/17					
Date Analyzed:	04/21/17					
	Concentration (ug)			**Recovery (%)**		
Compound	**True**	**LCS**	**LCSD**	**LCS**	**LCSD**	**RPD (%)**
2,4-Dinitrotoluene	2,000	1,928	2,000	96	100	4
2,6-Dinitrotoluene	2,000	1,900	1,972	95	99	4
HMX	2,000	2,211	2,290	111	115	4
Nitroglycerin	2,000	1,985	2,038	99	102	3
RDX	2,000	2,120	2,197	106	110	4
2,4,6-Trinitrotoluene	2,000	1,834	1,902	92	95	4

SAP/QAPP Limit: Recovery = 75 to 125%
RPD = Not specified, 50% applied

Table 6-25: Deviations Summary

Test Element	Deviation	Basis and Impact
OPERATIONAL		
---	None.	No operational deviations were observed.
SAMPLING		
---	For all runs of the M0040 bag sampling train, the operator did not record the meter orifice pressure on the data sheet.	No impact. A conservative orifice pressure of 0.0 inwc was used to calculate the volume at standard conditions. The expected orifice pressure was 1.0 inwc. Use of the lower value yields a lower, more conservative, sample volume.
ANALYTICAL		
SAP/QAPP, Table A-4	Exhaust gas analyses were generally performed within all required QC criteria. However, there were some sample analyses where not all SAP/QAPP QC criteria were met. Specific failures are addressed in Section 6.5.	No impact. The failures include items such as surrogate recovery, internal standard area response, and continuing calibration performance. In all instances, the reported results are considered estimated and usable for determining emissions of the target analytes.
SAP/QAPP, Section 6.4 and Table A-3	The reported Run 2 NO_X result is taken from the analysis of the integrated bag sample collected for M3B analysis.	Minor impact. Though not described in the method, analysis of the bag was indicated due to higher than span results obtained during the run. To evaluate potential loss of analyte in the bag, a bag filled with a known concentration of NO_X and O_2 was analyzed, held in the field for the same duration as the sample bag, and then reanalyzed. Results of this evaluation show an 87% recovery. The Run 2 NOx result should be considered estimated with a potential low bias.
	For all runs, the M10 CO result is reported from an analysis of the integrated bag sample collected for M3B analysis	No impact. While the analysis of the integrated bag was not planned, it is allowed by the reference method and was necessary to provide useable results given the off-scale CO readings obtained during the run. The CO results are useable without qualification.
SAP/QAPP, Section 6.4 and Table A-4	The Run 4 SO_2 system bias and drift checks were performed using span gas and not the mid gas.	No impact. The mid gas had been consumed during initial calibration and was not available to be used for the system bias and drift checks. Acceptable drift and system bias results were obtained with the span gas. The Run 4 SO_2 results are considered useable without qualification.
SAP/QAPP, Table A-3	The Run 4 CO result is reported from the analysis of the 2 bag samples collected with the M0040 sampling train.	No impact. The integrated bag sample collected during Run 4 was emptied after M3B analysis was completed. The 2 M0040 bag samples represent 1-hour of each 2-hour period the isokinetic trains were operated. The Run 4 CO result is considered useable without qualification.

Note: Only deviations pertaining to Runs 2, 3, and 4 are described in this table.

7.0 EMISSIONS TEST RESULTS SUMMARY

This section presents a summary of the results of the emissions test. All supporting data are presented in the report appendices.

7.1 PERFORMANCE STANDARD RESULTS

The isokinetic and non-isokinetic sampling summary for all sampling trains required to demonstrate performance standards are summarized in Tables 4-2 and 4-3. A cyclonic flow check was conducted in two (2) ports of the exhaust blower duct on March 21, 2017. The ports were found to be free of cyclonic flow (< 20°) with a mean cyclonic of ~ 9°.

No blank corrections have been made to the data. In instances where NDs were incurred, the RL or EDL was used to calculate an emissions rate. The performance standards are discussed in the following sections.

7.1.1 Select Criteria Pollutant Emissions

CO concentrations were measured by the facility and TRM CEMS located on the exhaust blower duct. As summarized in Table 7-1, the average CO emission rates, measured by facility CEMS, were in compliance with the CAA Permit limit of 4.6 lbs/hr. The CO emissions as measured by the TRM CEMS produced a peak emissions rate of 7.83 lbs/hr with an average of 5.99 lbs/hr. WDC requested an increased CO emissions limit under separate cover.

SO_2 emissions were measured by the TRM CEMS located on the exhaust blower duct. As summarized in Table 7-1, the average SO_2 emission rates were in compliance with the CAA Permit limit of 7.2 lbs/hr.

NO_x emissions were also measured by the TRM CEMS located on the exhaust blower duct. The NO_x emissions peaked at a rate of 1.56 lbs/hr with an average of 1.18 lbs/hr which exceeds the CAA Permit limit of 0.80 lbs/hr. WDC requested an increased NO_x emissions limit under separate cover.

Composite exhaust gas samples were collected to determine the concentration of O_2 and CO_2 to be used in the calculation of the exhaust gas molecular weight. This calculated molecular weight was used by individual sampling trains to calculate specific parameters associated with gas flow and sampling train isokinetic percentages. In addition, the facility CEMS O_2 data was used to correct emission rates, see Appendix A.

7.1.2 Semivolatile Organic Emissions

Table 7-2 summarizes the semivolatile organic emissions results. No blank corrections have been made to the data. A summary analytical report for semivolatile organics can be found in Appendix F-1.

7.1.3 Dioxin/Furan Emissions

Table 7-3 summarizes the dioxin/furan emissions results. No blank corrections have been made to the data. The US EPA TEFs were applied to the detected quantities of each isomer, as well as the total congeners (EPA/100/R-10/005). For the isomer-specific results, the applicable TEF was used to determine the TEQ. The dioxin/furan emission rates for all runs were in compliance with the CAA Permit limit of 0.20 ng-TEQ/dscm, corrected to 7% O_2 using facility CEMS. A summary analytical report for dioxins/furans can be found in Appendix F-3.

7.1.4 Volatile Organic Emissions

Table 7-4 summarizes the volatile organic emissions results. No blank corrections have been made to the data. A summary analytical report for volatile organics can be found in Appendix F-4.

7.1.5 TOC Emissions

Tables 7-5, 7-6, and 7-7 summarize the TOC emissions results. No permitted emission limits are associated with TOC emissions. Summary analytical reports for TOC can be found in Appendices C, F-2, and F-5.

7.1.6 Acid Gases and Particulate Emissions

Table 7-8 summarizes the acid gas and particulate emissions results. The chlorine equivalent concentrations for all runs were in compliance with the CAA Permit limit of 21 ppm_v, corrected to 7% O_2 using facility CEMS data. The particulate emission rates for all runs were in compliance with the RCRA/CAA Permit limit of 0.013 gr/dscf, corrected to 7% O_2 using facility CEMS data. A summary analytical report for acid gases and particulates can be found in Appendix F-7.

7.1.7 Trace Metal Emissions

Table 7-9 summarizes the trace metal emissions results. No RCRA Permit emission limits are associated with trace metal emissions. A summary analytical report for trace metals can be found in Appendix F-8.

Table 7-10 summarizes the low-volatile (arsenic, beryllium, and chromium combined), semivolatile (cadmium and lead combined), and high-volatile (mercury) metal emission rates. All runs were in compliance with the CAA Permit limits of 23, 10, and 8.1 ug/dscm, corrected to 7% O_2 using facility CEMS data, respectively.

7.1.8 Energetic Emissions

Table 7-11 summarizes the energetic emissions results. No permitted emission limits are associated with energetic emissions. A summary analytical report for energetics can be found in Appendix F-9.

7.2 FPI LIMITS

All FPI set points must be at an acceptable limit to enable feed initiation and prevent an over-feed event. The 1-second data at feed initiation of each tray for the respective run is summarized in Table 3-1. Based on the PDARS data collected at feed initiation, the FPI parameters were within those listed in RCRA Permit Table 5-1.

7.3 PROPOSED FEED RATES

During the conduct of the emissions test, WDC spiked metal oxide compounds to validate the feed determination method employed after the initial testing was performed in 2010 and 2011. The purpose for the spiking was to demonstrate that the method employed in the initial testing was valid and supportive of continued use moving forward after the completion this emissions test.

Results from the emissions test demonstrate that the feed calculation method remains valid. Based upon successful demonstration of feed determination for the SDC, WDC has applied information gathered from this most recent test to support the proposed feed rates listed in Table 7-12.

During the conduct of this emission test, phosphorous and zinc were planned to be spiked at levels greater than the current allowable permitted feed limits. In selecting the packaging weights for the metal oxides, WDC initially planned for 5 bags of metal oxides to be charged to the system each hour during the test but caveated the spiking table to indicate that the actual feed rates may increase. Due to the excellent performance of the SDC at the increased energetic feed rate, the feed intervals allowed for 6 bags of metal oxides to be charged to the system each hour. As a result of this performance during the emissions test, all metals spiked to the system were done so at a level greater than the current approved feed rates.

Five of the metals spiked - chromium, mercury, phosphorous, silver and zinc - produced emissions rates that were less than the levels in current HHRA model. Neither mercury nor silver were detected in any of the emissions test runs.

The energetic feed rate demonstrated during emissions test was 22.9432 lbs/event for all runs as summarized in Table 3-2. WDC proposes retention of the current approved feed rate for non-mass detonating energetic material, or ≤ 23.0 lbs/event. The tray weight, mass detonating explosive, chlorine, and sulfur feed rates were not intended to be re-established based on emissions testing. WDC proposes retaining the manufacturers' specifications as listed in RCRA Permit Condition V.3.c for normal operations.

WDC has completed all planned emissions testing for the operation of the SDC. These tests were completed in a manner consistent with the approved test plan and have provided results supportive of the goal of demonstrating compliance with applicable emissions standards, operating conditions and to establish increased metals and energetic feed rates.

When the SDC was originally permitted, the MACT standards for new incinerators were applied by permit to the SDC. Within these regulations, MACT contains specific emissions limits for 6 metals. In addition, an HHRA has been conducted for the SDC which proves that emissions of elements controlled under permit do not present any unacceptable risk. WDC has demonstrated compliance with these emissions limits during multiple tests at the facility.

In proposing feed rates based upon the success of this most recent test, WDC has demonstrated compliance with the MACT emissions at twice the rates emitted during the test. With the exception of phosphorous and zinc, the metals mentioned above that were spiked at levels increased well above current permitted levels, WDC request revised feed rates at twice what was demonstrated during this emissions test.

To address phosphorous and zinc, WDC proposes to calculate a feed rate based upon the emissions levels that are being modeled as maximum emissions in the HHRA and to then apply a 25% safety factor on that calculated rate. By applying the safety factor, the requested feed rate remains conservative as our maximum feed will remain well below what is demonstrated to provide no unacceptable risk.

The results of the HHRA using the proposed emissions rates will be supplied to ADEM once completed. Once ADEM has approved this final report and the HHRA results with the increased feed and emissions rates, WDC proposes to adjust allowable feed rates to the SDC to levels summarized in Table 7-12. In the interim, feed rates to the SDC will be managed IAW post emissions test limitations as described in the preliminary report.

7.4 DATA FOR USE IN THE HHRA

The emissions rates presented in this report are proposed for modeling in the HHRA, which will be submitted under separate cover. For more discussion on health risk, the current SDC Risk Assessment Protocol should be consulted.

7.5 FINAL CONCLUSIONS

With the exception of NOx and CO which were addressed under a separate cover, the SDC achieved all compliance objectives specified in the SDC C2 Emissions Test Plan and RCRA/CAA Permits.

Table 7-1: Summary of Select Criteria Pollutant Emissions

Parameter	Units	Run 2	Run 3	Run 4	Average	RCRA/CAA Permit Limit
Carbon Monoxide (Facility CEMS)	lbs/hr	2.85	3.52	3.54	3.30	4.6
Oxygen (Facility CEMS)	%	16.09	15.92	15.92	15.98	---
Carbon Monoxide (TRM CEMS)	lbs/hr	6.80	7.83	3.34	5.99	---
Oxygen (TRM CEMS)	%	15.57	15.47	15.49	15.51	---
Sulfur Dioxide (TRM CEMS)	lbs/hr	0.0078	0.0042	0.0057	0.0059	7.20
Nitrogen Oxides (TRM CEMS)	lbs/hr	0.70	1.56	1.28	1.18	0.80

Table 7-2: Semivolatile Organic Emissions Summary

Constituent	Parameter	Units	Run 2	Run 3	Run 4	Average
	Sample Volume	dscf	150.760	156.412	154.894	154.02
	Flow Rate	dscfm	746	745	759	750.00
Benzaldehyde	Total Catch	ug	< 38.7	< 32.3	< 33.0	< 34.67
	Concentration	ug/dscm	9.06	7.29	7.52	7.96
	Emission Rate	lbs/hr	2.53E-05	2.04E-05	2.14E-05	2.24E-05
	Emission Rate	g/s	3.19E-06	2.56E-06	2.70E-06	2.82E-06
Benzyl alcohol	Total Catch	ug	< 210 ND	< 210 ND	< 210 ND	< 210 ND
	Concentration	ug/dscm	49.18	47.41	47.87	48.15
	Emission Rate	lbs/hr	1.37E-04	1.32E-04	1.36E-04	1.35E-04
	Emission Rate	g/s	1.73E-05	1.67E-05	1.72E-05	1.70E-05
bis(2-Ethylhexyl)-phthalate	Total Catch	ug	< 29.74	< 31.88	< 32.18	< 31.27
	Concentration	ug/dscm	6.97	7.20	7.34	7.17
	Emission Rate	lbs/hr	1.95E-05	2.01E-05	2.09E-05	2.01E-05
	Emission Rate	g/s	2.45E-06	2.53E-06	2.63E-06	2.54E-06
Fluoranthene	Total Catch	ug	< 30 ND	< 30 ND	< 30 ND	< 30 ND
	Concentration	ug/dscm	7.03	6.77	6.84	6.88
	Emission Rate	lbs/hr	1.96E-05	1.89E-05	1.94E-05	1.93E-05
	Emission Rate	g/s	2.47E-06	2.38E-06	2.45E-06	2.44E-06
Naphthalene	Total Catch	ug	< 30 ND	< 30 ND	< 30 ND	< 30 ND
	Concentration	ug/dscm	7.03	6.77	6.84	6.88
	Emission Rate	lbs/hr	1.96E-05	1.89E-05	1.94E-05	1.93E-05
	Emission Rate	g/s	2.47E-06	2.38E-06	2.45E-06	2.44E-06
Butanoic Acid, methyl ester [TIC]	Total Catch	ug	19.76	NO TIC	NO TIC	19.76
	Concentration	ug/dscm	4.63			4.63
	Emission Rate	lbs/hr	1.29E-05			1.29E-05
	Emission Rate	g/s	1.63E-06			1.63E-06

Table 7-2: Semivolatile Organic Emissions Summary (Continued)

Constituent	Parameter	Units	Run 2	Run 3	Run 4	Average
Nonane [TIC]	Total Catch	ug	11.05	NO TIC	NO TIC	11.05
	Concentration	ug/dscm	2.59			2.59
	Emission Rate	lbs/hr	7.23E-06			7.23E-06
	Emission Rate	g/s	9.11E-07			9.11E-07
Nonane, 4-methyl [TIC]	Total Catch	ug	4.17	NO TIC	NO TIC	4.17
	Concentration	ug/dscm	0.98			0.98
	Emission Rate	lbs/hr	2.73E-06			2.73E-06
	Emission Rate	g/s	3.44E-07			3.44E-07
Nonane, 3-methyl [TIC]	Total Catch	ug	14.46	NO TIC	NO TIC	14.46
	Concentration	ug/dscm	3.39			3.39
	Emission Rate	lbs/hr	9.46E-06			9.46E-06
	Emission Rate	g/s	1.19E-06			1.19E-06
Decane [TIC]	Total Catch	ug	32.61	5.82	4.41	14.28
	Concentration	ug/dscm	7.64	1.31	1.01	3.32
	Emission Rate	lbs/hr	2.13E-05	3.67E-06	2.86E-06	9.29E-06
	Emission Rate	g/s	2.69E-06	4.62E-07	3.60E-07	1.17E-06
Nonanal [TIC]	Total Catch	ug	4.06	NO TIC	NO TIC	4.06
	Concentration	ug/dscm	0.95			0.95
	Emission Rate	lbs/hr	2.66E-06			2.66E-06
	Emission Rate	g/s	3.35E-07			3.35E-07
9-Octadecenamide, (Z)- [TIC]	Total Catch	ug	33.44	11.60	5.80	16.95
	Concentration	ug/dscm	7.83	2.62	1.32	3.92
	Emission Rate	lbs/hr	2.19E-05	7.31E-06	3.76E-06	1.10E-05
	Emission Rate	g/s	2.76E-06	9.21E-07	4.74E-07	1.38E-06

Table 7-2: Semivolatile Organic Emissions Summary (Continued)

Constituent	Parameter	Units	Run 2	Run 3	Run 4	Average
Benzene [TIC]	Total Catch	ug	388.00	459.53	513.00	453.51
	Concentration	ug/dscm	90.87	103.74	116.94	103.85
	Emission Rate	lbs/hr	2.54E-04	2.90E-04	3.33E-04	2.92E-04
	Emission Rate	g/s	3.20E-05	3.65E-05	4.19E-05	3.68E-05
Cyclohexanone [TIC]	Total Catch	ug	10.60	11.70	NO TIC	11.15
	Concentration	ug/dscm	2.48	2.64		2.56
	Emission Rate	lbs/hr	6.94E-06	7.37E-06		7.15E-06
	Emission Rate	g/s	8.74E-07	9.29E-07		9.02E-07
Benzoic Acid, methyl ester [TIC]	Total Catch	ug	6.63	6.41	6.59	6.54
	Concentration	ug/dscm	1.55	1.45	1.50	1.50
	Emission Rate	lbs/hr	4.34E-06	4.04E-06	4.27E-06	4.22E-06
	Emission Rate	g/s	5.47E-07	5.09E-07	5.38E-07	5.31E-07
Isophthalaldehyde [TIC]	Total Catch	ug	35.80	NO TIC	NO TIC	35.80
	Concentration	ug/dscm	8.38			8.38
	Emission Rate	lbs/hr	2.34E-05			2.34E-05
	Emission Rate	g/s	2.95E-06			2.95E-06
Benzaldehyde, 4-ethyl [TIC]	Total Catch	ug	13.20	8.93	8.90	10.34
	Concentration	ug/dscm	3.09	2.02	2.03	2.38
	Emission Rate	lbs/hr	8.64E-06	5.63E-06	5.77E-06	6.68E-06
	Emission Rate	g/s	1.09E-06	7.09E-07	7.27E-07	8.41E-07
Diethyl Phthalate [TIC]	Total Catch	ug	18.39	4.11	4.47	8.99
	Concentration	ug/dscm	4.31	0.93	1.02	2.08
	Emission Rate	lbs/hr	1.20E-05	2.59E-06	2.90E-06	5.84E-06
	Emission Rate	g/s	1.52E-06	3.26E-07	3.65E-07	7.36E-07

Table 7-2: Semivolatile Organic Emissions Summary (Continued)

Constituent	Parameter	Units	Run 2	Run 3	Run 4	Average
Benzeneamine, N,N-dimethyl-4- [TIC]	Total Catch	ug	21.30	21.50	15.20	19.33
	Concentration	ug/dscm	4.99	4.85	3.47	4.44
	Emission Rate	lbs/hr	1.39E-05	1.35E-05	9.85E-06	1.24E-05
	Emission Rate	g/s	1.76E-06	1.71E-06	1.24E-06	1.57E-06
Benzoic Acid [TIC]	Total Catch	ug	NO TIC	4.98	NO TIC	4.98
	Concentration	ug/dscm		1.12		1.12
	Emission Rate	lbs/hr		3.14E-06		3.14E-06
	Emission Rate	g/s		3.95E-07		3.95E-07
Benzaldehyde, 3-ethyle [TIC]	Total Catch	ug	NO TIC	21.10	20.90	21.00
	Concentration	ug/dscm		4.76	4.76	4.76
	Emission Rate	lbs/hr		1.33E-05	1.35E-05	1.34E-05
	Emission Rate	g/s		1.68E-06	1.71E-06	1.69E-06
n-Hexadecanoic Acid [TIC]	Total Catch	ug	NO TIC	4.22	4.10	4.16
	Concentration	ug/dscm		0.95	0.93	0.94
	Emission Rate	lbs/hr		2.66E-06	2.66E-06	2.66E-06
	Emission Rate	g/s		3.35E-07	3.35E-07	3.35E-07
Cyclohexene [TIC]	Total Catch	ug	NO TIC	4.32	4.13	4.23
	Concentration	ug/dscm		0.98	0.94	0.96
	Emission Rate	lbs/hr		2.72E-06	2.68E-06	2.70E-06
	Emission Rate	g/s		3.43E-07	3.37E-07	3.40E-07
Cyclopentanone, 2-methyl [TIC]	Total Catch	ug	NO TIC	NO TIC	11.60	11.60
	Concentration	ug/dscm			2.64	2.64
	Emission Rate	lbs/hr			7.52E-06	7.52E-06
	Emission Rate	g/s			9.47E-07	9.47E-07

Table 7-2: Semivolatile Organic Emissions Summary (Continued)

Notes:

(A) Blank corrections have not been made to these data.

(B) Target compounds that are ND are reported at the laboratory RL. Values reported between the laboratory RL and MDL are incorporated into the emission estimate as reported.

(C) Note that only TICs detected in multiple runs are averaged. If detected in only a single run, that value is reported in the "Average" column. "NO TIC" is reported for the runs in which the TIC was not found. In instances where a TIC was identified more than once in one (1) or more sample fractions, the reported value represents the sum of all reported values.

Table 7-3: Dioxin/Furan Emissions Summary

Parameter	Units	Run 2					CAA Permit Limit
Sample Volume	dscf	159.357					
Gas Flow Rate	dscfm	727					
O_2 Level	%	16.09					
Congeners	**TEF** [EPA/100/R-10/005]		**Measured Catch (pg)**		**Weighted Catch (pg)**	**Emission Rate (g/s)**	**CAA Permit Limit**
2,3,7,8-TetraCDD	1.0	<	1.01	ND	1.01	---	---
Total 2,3,7,8-TetraCDD	---	<	1.01	ND	---	7.66E-14	---
1,2,3,7,8 PentaCDD	1.0	<	0.68		0.68	---	---
Total 2,3,7,8-PentaCDD	---	<	0.68		---	5.20E-14	---
1,2,3,4,7,8 HexaCDD	0.1		1.53		0.15	---	---
1,2,3,6,7,8 HexaCDD	0.1		1.41		0.14	---	---
1,2,3,7,8,9 HexaCDD	0.1		1.89		0.19	---	---
Total 2,3,7,8-HexaCDD	---		4.83		---	3.67E-13	---
1,2,3,4,6,7,8 HeptaCDD	0.01		6.08		0.061	---	---
Total 2,3,7,8-HeptaCDD	---		6.08		---	4.62E-13	---
Total OctaCDD	0.0003		22.40		0.0067	1.70E-12	---
Sum	pg				2.24		
Concentration	ng-TEQ/dscm @ 7% O_2				0.0014		
2,3,7,8 TetraCDF	0.1	<	0.70	ND	0.070	---	---
Total 2,3,7,8-TetraCDF	---	<	0.70	ND	---	5.34E-14	---
1,2,3,7,8 PentaCDF	0.03	<	0.81		0.024	---	---
2,3,4,7,8 PentaCDF	0.3	<	0.58	ND	0.17	---	---
Total 2,3,7,8-PentaCDF	---	<	1.39		---	1.06E-13	---
1,2,3,4,7,8 HexaCDF	0.1		2.72		0.27	---	---
1,2,3,6,7,8 HexaCDF	0.1	<	1.03		0.10	---	---
2,3,4,6,7,8 HexaCDF	0.1	<	1.60		0.16	---	---
1,2,3,7,8,9 HexaCDF	0.1	<	1.15		0.12	---	---
Total 2,3,7,8-HexaCDF	---	<	6.51		---	4.95E-13	---
1,2,3,4,6,7,8 HeptaCDF	0.01		6.96		0.070	---	---
1,2,3,4,7,8,9 HeptaCDF	0.01		4.49		0.045	---	---
Total 2,3,7,8-HeptaCDF	---		11.45		---	8.71E-13	---
Total OctaCDF	0.0003		47.50		0.014	3.61E-12	---
Sum	pg				1.05		
Concentration	ng-TEQ/dscm @ 7% O_2				0.00067		
Total Dioxins/Furans	ng-TEQ/dscm @ 7% O_2				0.0021		0.20

Table 7-3: Dioxin/Furan Emissions Summary (Continued)

Parameter	Units	Run 3					CAA Permit Limit
Sample Volume	dscf		170.521				
Gas Flow Rate	dscfm		774				
O_2 Level	%		15.92				
Congeners	**TEF** [EPA/100/R-10/005]		**Measured Catch (pg)**		**Weighted Catch (pg)**	**Emission Rate (g/s)**	
2,3,7,8-TetraCDD	1.0	<	0.92	ND	0.92	---	---
Total 2,3,7,8-TetraCDD	---	<	0.92	ND	---	6.95E-14	---
1,2,3,7,8 PentaCDD	1.0	<	0.66	ND	0.66	---	---
Total 2,3,7,8-PentaCDD	---	<	0.66	ND	---	5.01E-14	---
1,2,3,4,7,8 HexaCDD	0.1		0.82		0.082	---	---
1,2,3,6,7,8 HexaCDD	0.1	<	0.60		0.060	---	---
1,2,3,7,8,9 HexaCDD	0.1		1.06		0.11	---	---
Total 2,3,7,8-HexaCDD	---	<	2.47		---	1.87E-13	---
1,2,3,4,6,7,8 HeptaCDD	0.01		4.17		0.042	---	---
Total 2,3,7,8-HeptaCDD	---		4.17		---	3.15E-13	---
Total OctaCDD	0.0003		16.94		0.0051	1.28E-12	---
Sum	pg				1.88		
Concentration	ng-TEQ/dscm @ 7% O_2				0.0011		
2,3,7,8 TetraCDF	0.1	<	0.73	ND	0.073	---	---
Total 2,3,7,8-TetraCDF	---	<	0.73	ND	---	5.51 E-14	---
1,2,3,7,8 PentaCDF	0.03	<	0.51	ND	0.02	---	---
2,3,4,7,8 PentaCDF	0.3	<	0.75		0.22	---	---
Total 2,3,7,8-PentaCDF	---	<	1.26		---	9.50E-14	---
1,2,3,4,7,8 HexaCDF	0.1		1.80		0.18	---	---
1,2,3,6,7,8 HexaCDF	0.1	<	1.02		0.10	---	---
2,3,4,6,7,8 HexaCDF	0.1	<	1.46		0.15	---	---
1,2,3,7,8,9 HexaCDF	0.1	<	0.59	ND	0.059	---	---
Total 2,3,7,8-HexaCDF	---	<	4.87		---	3.68E-13	---
1,2,3,4,6,7,8 HeptaCDF	0.01		4.63		0.046	---	---
1,2,3,4,7,8,9 HeptaCDF	0.01		2.77		0.028	---	---
Total 2,3,7,8-HeptaCDF	---		7.40		---	5.60E-13	---
Total OctaCDF	0.0003		35.90		0.011	2.72E-12	---
Sum	pg				0.88		
Concentration	ng-TEQ/dscm @ 7% O_2				0.00051		
Total Dioxins/Furans	ng-TEQ/dscm @ 7% O_2				0.0016		0.20

Table 7-3: Dioxin/Furan Emissions Summary (Continued)

Parameter	Units	Run 4					CAA Permit Limit
Sample Volume	dscf	166.500					
Gas Flow Rate	dscfm	757					
O_2 Level	%	15.92					
Congeners	**TEF** [EPA/100/R-10/005]		**Measured Catch (pg)**		**Weighted Catch (pg)**	**Emission Rate (g/s)**	**CAA Permit Limit**
2,3,7,8-TetraCDD	1.0	<	1.17	ND	1.17	---	---
Total 2,3,7,8-TetraCDD	---	<	1.17	ND	---	8.90E-14	---
1,2,3,7,8 PentaCDD	1.0	<	0.60	ND	0.60	---	---
Total 2,3,7,8-PentaCDD	---	<	0.60	ND	---	4.58E-14	---
1,2,3,4,7,8 HexaCDD	0.1		1.08		0.11	---	---
1,2,3,6,7,8 HexaCDD	0.1	<	0.52		0.052	---	---
1,2,3,7,8,9 HexaCDD	0.1	<	0.74		0.074	---	---
Total 2,3,7,8-HexaCDD	---	<	2.34		---	1.77E-13	---
1,2,3,4,6,7,8 HeptaCDD	0.01		3.70		0.037	---	---
Total 2,3,7,8-HeptaCDD	---		3.70		---	2.80E-13	---
Total OctaCDD	0.0003		16.51		0.0050	1.25E-12	---
Sum	pg				2.05		
Concentration	ng-TEQ/dscm @ 7% O_2				0.0012		
2,3,7,8 TetraCDF	0.1	<	0.64	ND	0.064	---	---
Total 2,3,7,8-TetraCDF	---	<	0.64	ND	---	4.83E-14	---
1,2,3,7,8 PentaCDF	0.03		1.15		0.034	---	---
2,3,4,7,8 PentaCDF	0.3	<	0.70		0.21	---	---
Total 2,3,7,8-PentaCDF	---	<	1.84		---	1.40E-13	---
1,2,3,4,7,8 HexaCDF	0.1	<	0.73	ND	0.073	---	---
1,2,3,6,7,8 HexaCDF	0.1	<	0.63	ND	0.063	---	---
2,3,4,6,7,8 HexaCDF	0.1	<	0.95		0.095	---	---
1,2,3,7,8,9 HexaCDF	0.1	<	0.79	ND	0.079	---	---
Total 2,3,7,8-HexaCDF	---	<	3.11		---	2.35E-13	---
1,2,3,4,6,7,8 HeptaCDF	0.01		5.17		0.052	---	---
1,2,3,4,7,8,9 HeptaCDF	0.01		2.90		0.029	---	---
Total 2,3,7,8-HeptaCDF	---		8.07		---	6.12E-13	---
Total OctaCDF	0.0003		38.68		0.012	2.93E-12	---
Sum	pg				0.71		
Concentration	ng-TEQ/dscm @ 7% O_2				0.00042		
Total Dioxins/Furans	ng-TEQ/dscm @ 7% O_2				0.0016		0.20

Table 7-3: Dioxin/Furan Emissions Summary (Continued)

Parameter	Units	Average					CAA Permit Limit
Sample Volume	dscf	165.46					
Gas Flow Rate	dscfm	752.67					
O_2 Level	%	15.98					
Congeners	**TEF** [EPA/100/R-10/005]		**Measured Catch (pg)**		**Weighted Catch (pg)**	**Emission Rate (g/s)**	**CAA Permit Limit**
2,3,7,8-TetraCDD	1.0	<	1.03	ND	1.03	---	<
Total 2,3,7,8-TetraCDD	---	<	1.03	ND	---	7.84E-14	<
1,2,3,7,8 PentaCDD	1.0	<	0.65		0.65	---	<
Total 2,3,7,8-PentaCDD	---	<	0.65		---	4.93E-14	<
1,2,3,4,7,8 HexaCDD	0.1		1.14		0.11	---	
1,2,3,6,7,8 HexaCDD	0.1	<	0.84		0.084	---	<
1,2,3,7,8,9 HexaCDD	0.1	<	1.23		0.12	---	<
Total 2,3,7,8-HexaCDD	---	<	3.21		---	2.44E-13	<
1,2,3,4,6,7,8 HeptaCDD	0.01		4.65		0.047	---	
Total 2,3,7,8-HeptaCDD	---		4.65		---	3.53E-13	
Total OctaCDD	0.0003		18.62		0.0056	1.41E-12	
Sum	pg				2.06		
Concentration	ng-TEQ/dscm @ 7% O_2				0.0012		
2,3,7,8 TetraCDF	0.1	<	0.69	ND	0.069	---	<
Total 2,3,7,8-TetraCDF	---	<	0.69	ND	---	5.23E-14	<
1,2,3,7,8 PentaCDF	0.03	<	0.82		0.025	---	<
2,3,4,7,8 PentaCDF	0.3	<	0.67		0.20	---	<
Total 2,3,7,8-PentaCDF	---	<	1.50		---	1.13E-13	<
1,2,3,4,7,8 HexaCDF	0.1	<	1.75		0.17	---	<
1,2,3,6,7,8 HexaCDF	0.1	<	0.90		0.090	---	<
2,3,4,6,7,8 HexaCDF	0.1	<	1.34		0.13	---	<
1,2,3,7,8,9 HexaCDF	0.1	<	0.85		0.085	---	<
Total 2,3,7,8-HexaCDF	---	<	4.83		---	3.66E-13	<
1,2,3,4,6,7,8 HeptaCDF	0.01		5.59		0.056	---	
1,2,3,4,7,8,9 HeptaCDF	0.01		3.39		0.034	---	
Total 2,3,7,8-HeptaCDF	---		8.97		---	6.81E-13	
Total OctaCDF	0.0003		40.69		0.012	3.09E-12	
Sum	pg				0.88		
Concentration	ng-TEQ/dscm @ 7% O_2				0.00053		
Total Dioxins/Furans	ng-TEQ/dscm @ 7% O_2				0.0018		0.20

Notes:

(A) Blank corrections have not been made to these data.

(B) Target compounds that are ND are reported at the laboratory EDL. Values reported between the laboratory RL and EDL are incorporated into the emission estimate as reported.

Table 7-4: Volatile Organic Emissions Summary

Constituent	Parameter	Units		Run 2		Run 3		Run 4		Average
	Sample Volume	liters		78.43		78.39		77.75		78.19
	Gas Flow Rate	dscfm		707.50		727.67		727.83		721.00
Acetone	Total Catch	ug	<	1.35	<	0.93	<	0.85	<	1.04
	Concentration	ug/dscm		17.19		11.81		10.99		13.34
	Emission Rate	lbs/hr		4.56E-05		3.22E-05		3.00E-05		3.59E-05
	Emission Rate	g/s		5.74E-06		4.06E-06		3.78E-06		4.52E-06
Benzene	Total Catch	ug	<	27.24	<	32.10	<	39.75	<	33.03
	Concentration	ug/dscm		347.27		409.46		511.23		422.40
	Emission Rate	lbs/hr		9.20E-04		1.12E-03		1.39E-03		1.14E-03
	Emission Rate	g/s		1.16E-04		1.41E-04		1.76E-04		1.44E-04
1,3-Butadiene	Total Catch	ug	<	0.12	ND <	0.13	<	0.18	<	0.15
	Concentration	ug/dscm		1.57		1.66		2.35		1.86
	Emission Rate	lbs/hr		4.15E-06		4.52E-06		6.42E-06		5.03E-06
	Emission Rate	g/s		5.23E-07		5.70E-07		8.09E-07		6.34E-07
Carbon Disulfide	Total Catch	ug		0.18		0.18	<	0.20	<	0.19
	Concentration	ug/dscm		2.34		2.34		2.54		2.41
	Emission Rate	lbs/hr		6.20E-06		6.39E-06		6.92E-06		6.50E-06
	Emission Rate	g/s		7.81E-07		8.05E-07		8.72E-07		8.20E-07
Carbon Tetrachloride	Total Catch	ug	<	0.12	<	0.13	<	0.11	<	0.12
	Concentration	ug/dscm		1.56		1.60		1.47		1.54
	Emission Rate	lbs/hr		4.14E-06		4.37E-06		4.01E-06		4.17E-06
	Emission Rate	g/s		5.22E-07		5.50E-07		5.05E-07		5.26E-07
Chlorobenzene	Total Catch	ug	<	0.12	<	0.12	ND <	0.12	<	0.12
	Concentration	ug/dscm		1.50		1.57		1.50		1.52
	Emission Rate	lbs/hr		3.99E-06		4.27E-06		4.08E-06		4.11E-06
	Emission Rate	g/s		5.02E-07		5.38E-07		5.14E-07		5.18E-07

Table 7-4: Volatile Organic Emissions Summary (Continued)

Constituent	Parameter	Units	Run 2			Run 3			Run 4			Average		
Chloroethane	Total Catch	ug	<	0.44		<	0.49	ND	<	0.45		<	0.46	
	Concentration	ug/dscm		5.65			6.19			5.75			5.87	
	Emission Rate	lbs/hr		1.50E-05			1.69E-05			1.57E-05			1.58E-05	
	Emission Rate	g/s		1.89E-06			2.13E-06			1.98E-06			2.00E-06	
Chloroform	Total Catch	ug	<	0.16		<	0.16		<	0.15		<	0.16	
	Concentration	ug/dscm		2.00			2.00			1.99			2.00	
	Emission Rate	lbs/hr		5.30E-06			5.44E-06			5.43E-06			5.39E-06	
	Emission Rate	g/s		6.67E-07			6.85E-07			6.84E-07			6.79E-07	
Chloromethane	Total Catch	ug	<	0.73		<	1.60		<	0.21		<	0.85	
	Concentration	ug/dscm		9.30			20.45			2.68			10.83	
	Emission Rate	lbs/hr		2.47E-05			5.57E-05			7.31E-06			2.92E-05	
	Emission Rate	g/s		3.11E-06			7.02E-06			9.21E-07			3.68E-06	
1,2-Dichloroethane	Total Catch	ug	<	0.12	ND	<	0.12	ND	<	0.12	ND	<	0.12	ND
	Concentration	ug/dscm		1.57			1.57			1.58			1.57	
	Emission Rate	lbs/hr		4.15E-06			4.27E-06			4.31E-06			4.24E-06	
	Emission Rate	g/s		5.23E-07			5.38E-07			5.44E-07			5.35E-07	
Dichlorodifluoromethane	Total Catch	ug	<	0.34		<	0.35		<	0.25		<	0.32	
	Concentration	ug/dscm		4.35			4.53			3.21			4.03	
	Emission Rate	lbs/hr		1.15E-05			1.23E-05			8.75E-06			1.09E-05	
	Emission Rate	g/s		1.45E-06			1.55E-06			1.10E-06			1.37E-06	
trans-1,2-Dichloroethene	Total Catch	ug	<	0.12		<	0.12	ND	<	0.12		<	0.12	
	Concentration	ug/dscm		1.48			1.57			1.49			1.51	
	Emission Rate	lbs/hr		3.93E-06			4.27E-06			4.07E-06			4.09E-06	
	Emission Rate	g/s		4.95E-07			5.38E-07			5.13E-07			5.15E-07	

Table 7-4: Volatile Organic Emissions Summary (Continued)

Constituent	Parameter	Units		Run 2			Run 3			Run 4			Average	
Ethyl Benzene	Total Catch	ug	<	0.12		<	0.12	ND	<	0.12		<	0.12	
	Concentration	ug/dscm		1.53			1.57			1.51			1.53	
	Emission Rate	lbs/hr		4.04E-06			4.27E-06			4.11E-06			4.14E-06	
	Emission Rate	g/s		5.09E-07			5.38E-07			5.18E-07			5.22E-07	
Hexane	Total Catch	ug	<	0.35		<	0.38		<	0.38		<	0.37	
	Concentration	ug/dscm		4.49			4.81			4.94			4.74	
	Emission Rate	lbs/hr		1.19E-05			1.31E-05			1.35E-05			1.28E-05	
	Emission Rate	g/s		1.50E-06			1.65E-06			1.70E-06			1.62E-06	
Methylene Chloride	Total Catch	ug	<	0.16			0.34		<	0.32		<	0.28	
	Concentration	ug/dscm		2.09			4.30			4.17			3.52	
	Emission Rate	lbs/hr		5.53E-06			1.17E-05			1.14E-05			9.54E-06	
	Emission Rate	g/s		6.96E-07			1.48E-06			1.43E-06			1.20E-06	
1,1,1,2-Tetrachloroethane	Total Catch	ug	<	0.12		<	0.12	ND	<	0.12		<	0.12	
	Concentration	ug/dscm		1.47			1.57			1.48			1.51	
	Emission Rate	lbs/hr		3.89E-06			4.27E-06			4.04E-06			4.07E-06	
	Emission Rate	g/s		4.90E-07			5.38E-07			5.09E-07			5.12E-07	
1,1,2,2-Tetrachloroethane	Total Catch	ug	<	0.24	ND	<	0.24	ND	<	0.24	ND	<	0.24	ND
	Concentration	ug/dscm		3.10			3.10			3.13			3.11	
	Emission Rate	lbs/hr		8.20E-06			8.44E-06			8.52E-06			8.39E-06	
	Emission Rate	g/s		1.03E-06			1.06E-06			1.07E-06			1.06E-06	
1,1,1-Trichloroethane	Total Catch	ug	<	0.24	ND	<	0.24	ND	<	0.22		<	0.24	
	Concentration	ug/dscm		3.10			3.10			2.85			3.02	
	Emission Rate	lbs/hr		8.20E-06			8.44E-06			7.77E-06			8.14E-06	
	Emission Rate	g/s		1.03E-06			1.06E-06			9.80E-07			1.03E-06	

Table 7-4: Volatile Organic Emissions Summary (Continued)

Constituent	Parameter	Units		Run 2			Run 3			Run 4			Average	
1,1,2-Trichloroethane	Total Catch	ug		0.24			0.24			0.24			0.24	
	Concentration	ug/dscm	<	3.10	ND	<	3.10	ND	<	3.13	ND	<	3.11	ND
	Emission Rate	lbs/hr		8.20E-06			8.44E-06			8.52E-06			8.39E-06	
	Emission Rate	g/s		1.03E-06			1.06E-06			1.07E-06			1.06E-06	
Trichloroethene	Total Catch	ug		0.12			0.12			0.12			0.12	
	Concentration	ug/dscm	<	1.49		<	1.57	ND	<	1.50		<	1.52	
	Emission Rate	lbs/hr		3.95E-06			4.27E-06			4.10E-06			4.11E-06	
	Emission Rate	g/s		4.97E-07			5.38E-07			5.17E-07			5.17E-07	
Trichlorofluoromethane	Total Catch	ug		0.17			0.19			0.17			0.17	
	Concentration	ug/dscm	<	2.20		<	2.39		<	2.12		<	2.24	
	Emission Rate	lbs/hr		5.82E-06			6.51E-06			5.79E-06			6.04E-06	
	Emission Rate	g/s		7.33E-07			8.20E-07			7.30E-07			7.61E-07	
Vinyl Chloride	Total Catch	ug		0.29			0.29			0.27			0.28	
	Concentration	ug/dscm	<	3.64	ND	<	3.64	ND	<	3.41		<	3.57	
	Emission Rate	lbs/hr		9.65E-06			9.93E-06			9.31E-06			9.63E-06	
	Emission Rate	g/s		1.22E-06			1.25E-06			1.17E-06			1.21E-06	
m,p-Xylene	Total Catch	ug		0.23			0.25			0.23			0.24	
	Concentration	ug/dscm	<	2.96		<	3.13	ND	<	2.95		<	3.02	
	Emission Rate	lbs/hr		7.85E-06			8.54E-06			8.05E-06			8.15E-06	
	Emission Rate	g/s		9.89E-07			1.08E-06			1.01E-06			1.03E-06	
o-Xylene	Total Catch	ug		0.12			0.12			0.12			0.12	
	Concentration	ug/dscm	<	1.52		<	1.57	ND	<	1.50		<	1.53	
	Emission Rate	lbs/hr		4.03E-06			4.27E-06			4.08E-06			4.13E-06	
	Emission Rate	g/s		5.08E-07			5.38E-07			5.14E-07			5.20E-07	

Table 7-4: Volatile Organic Emissions Summary (Continued)

Constituent	Parameter	Units	Run 2	Run 3	Run 4	Average
Cyclopropane, 1,1-dimethyl- [TIC]	Total Catch	ug	0.028	NO TIC	NO TIC	0.028
	Concentration	ug/dscm	0.35			0.35
	Emission Rate	lbs/hr	9.29E-07			9.29E-07
	Emission Rate	g/s	1.17E-07			1.17E-07
Pentane, 2-methyl- [TIC]	Total Catch	ug	0.095	0.025	NO TIC	0.060
	Concentration	ug/dscm	1.21	0.32		0.77
	Emission Rate	lbs/hr	3.21E-06	8.80E-07		2.04E-06
	Emission Rate	g/s	4.04E-07	1.11E-07		2.57E-07
Cyclopentene, 3-methyl [TIC]	Total Catch	ug	0.049	0.044	NO TIC	0.046
	Concentration	ug/dscm	0.62	0.56		0.59
	Emission Rate	lbs/hr	1.64E-06	1.53E-06		1.58E-06
	Emission Rate	g/s	2.07E-07	1.93E-07		2.00E-07
Thiophene [TIC]	Total Catch	ug	0.14	0.19	0.12	0.15
	Concentration	ug/dscm	1.81	2.36	1.60	1.93
	Emission Rate	lbs/hr	4.79E-06	6.44E-06	4.37E-06	5.20E-06
	Emission Rate	g/s	6.04E-07	8.11E-07	5.51E-07	6.55E-07
Toluene [TIC]	Total Catch	ug	0.080	0.088	0.15	0.11
	Concentration	ug/dscm	1.03	1.13	1.93	1.36
	Emission Rate	lbs/hr	2.72E-06	3.07E-06	5.26E-06	3.68E-06
	Emission Rate	g/s	3.42E-07	3.87E-07	6.62E-07	4.64E-07
Nonane [TIC]	Total Catch	ug	0.14	0.027	0.030	0.066
	Concentration	ug/dscm	1.80	0.35	0.38	0.85
	Emission Rate	lbs/hr	4.78E-06	9.53E-07	1.04E-06	2.26E-06
	Emission Rate	g/s	6.02E-07	1.20E-07	1.31E-07	2.85E-07

Table 7-4: Volatile Organic Emissions Summary (Continued)

Constituent	Parameter	Units	Run 2	Run 3	Run 4	Average
Methane, bromo [TIC]	Total Catch	ug	0.046	0.095	NO TIC	0.070
	Concentration	ug/dscm	0.58	1.21		0.90
	Emission Rate	lbs/hr	1.54E-06	3.29E-06		2.42E-06
	Emission Rate	g/s	1.94E-07	4.15E-07		3.05E-07
Allene [TIC]	Total Catch	ug	0.074	NO TIC	NO TIC	0.074
	Concentration	ug/dscm	0.94			0.94
	Emission Rate	lbs/hr	2.48E-06			2.48E-06
	Emission Rate	g/s	3.13E-07			3.13E-07
1-Butene, 3-methyl- [TIC]	Total Catch	ug	NO TIC	0.055	NO TIC	0.055
	Concentration	ug/dscm		0.705		0.705
	Emission Rate	lbs/hr		1.92E-06		1.92E-06
	Emission Rate	g/s		2.42E-07		2.42E-07
Propyne [TIC]	Total Catch	ug	NO TIC	0.068	0.075	0.071
	Concentration	ug/dscm		0.86	0.96	0.91
	Emission Rate	lbs/hr		2.35E-06	2.62E-06	2.48E-06
	Emission Rate	g/s		2.96E-07	3.30E-07	3.13E-07
Cyclopentane [TIC]	Total Catch	ug	NO TIC	NO TIC	0.054	0.054
	Concentration	ug/dscm			0.70	0.70
	Emission Rate	lbs/hr			1.90E-06	1.90E-06
	Emission Rate	g/s			2.39E-07	2.39E-07
Cyclobutane, methyl [TIC]	Total Catch	ug	0.026	NO TIC	NO TIC	0.026
	Concentration	ug/dscm	0.33			0.33
	Emission Rate	lbs/hr	8.79E-07			8.79E-07
	Emission Rate	g/s	1.11E-07			1.11E-07

Table 7-4: Volatile Organic Emissions Summary (Continued)

Constituent	Parameter	Units	Run 2	Run 3	Run 4	Average
1-Methylcyclopropene [TIC]	Total Catch	ug	NO TIC	NO TIC	0.040	0.040
	Concentration	ug/dscm			0.52	0.52
	Emission Rate	lbs/hr			1.41E-06	1.41E-06
	Emission Rate	g/s			1.77E-07	1.77E-07
Undecane [TIC]	Total Catch	ug	NO TIC	NO TIC	0.033	0.033
	Concentration	ug/dscm			0.42	0.42
	Emission Rate	lbs/hr			1.15E-06	1.15E-06
	Emission Rate	g/s			1.45E-07	1.45E-07

Notes:
(A) No blank corrections have been made to these data. If undetected in the analysis, the DL is reported.
(B) Target compounds that are ND are reported at the laboratory RL. Values reported between the laboratory RL and MDL are incorporated into the emission estimate as reported.
(C) Note that only TICs detected in multiple runs are averaged. If detected in only a single run, that value is reported in the "Average" column. "NO TIC" is reported for the runs in which the TIC was not found. In instances where a TIC was identified more than once in 1 or more sample fractions, the reported value represents the sum of all reported values.

Table 7-5: TOC Emissions Summary

Parameter	Units	Run 2	Run 3	Run 4	Average
Concentration	mg/m^3	51.31	48.86	44.65	48.27
Emission Rate	lbs/hr	< 1.41E-01	< 1.32E-01	< 1.24E-01	< 1.33E-01
Emission Rate	g/s	1.77E-02	1.67E-02	1.57E-02	1.67E-02

Table 7-6: Semivolatile Unspeciated Organic Emissions Summary

Parameter	Units	Run 2	Run 3	Run 4	Average
Sample Volume	dscf	149.604	149.332	155.135	151.36
Gas Flow Rate	dscf/hr	43,914	43,387	44,621	43,974
Total Chromatographable Organics (C_8 through C_{17})					
Total Catch	mg	0.649	0.366	0.458	0.49
Concentration	mg/m^3	< 0.15	< 0.09	< 0.10	< 0.11
Emission Rate	lbs/hr	4.20E-04	2.34E-04	2.90E-04	3.15E-04
Emission Rate	g/s	5.29E-05	2.95E-05	3.66E-05	3.97E-05
Total Gravimetric Organics					
Total Catch	mg	2.843	1.50	2.267	2.20
Concentration	mg/m^3	< 0.67	< 0.35 ND	< 0.52	< 0.51
Emission Rate	lbs/hr	1.84E-03	9.61E-04	1.44E-03	1.41E-03
Emission Rate	g/s	2.32E-04	1.21E-04	1.81E-04	1.78E-04

Table 7-7: Volatile Unspeciated Organic Emissions Summary

Parameter	Units	Run 2 Bag 1	Run 2 Condensate 1	Run 2 Bag 2	Run 2 Condensate 2	Average Bags	Average Condensates
Gas Volume	dsL	33.80		33.30		33.55	
Flow Rate	dscf/hr	43,914		43,914		43,914	
C_1							
Concentration	ppm	67.6		76.0		71.80	
	ug/m³	45,102.54	---	50,707.00	---	47,904.77	---
Emission Rate	lbs/hr	1.24E-01		1.39E-01		1.31E-01	
C_2							
Concentration	ppm	0.05		0.05		0.050	
	ug/m³	< 62.53 ND	---	< 62.53 ND	---	< 62.53 ND	---
Emission Rate	lbs/hr	1.71E-04		1.71E-04		1.71E-04	
C_3							
Concentration	ppm	0.14		0.10		0.12	
	ug/m³	256.75	---	183.39	---	220.07	---
Emission Rate	lbs/hr	7.04E-04		5.03E-04		6.03E-04	
C_4							
Catch	ug	---	0.086	---	0.086	---	0.086
Concentration	ppm	< 0.03 ND	< --- ND	< 0.03 ND	< --- ND	< 0.030 ND	< --- ND
	ug/m³	72.52	2.54	72.52	2.58	72.52	2.56
Emission Rate	lbs/hr	1.99E-04	6.98E-06	1.99E-04	7.08E-06	1.99E-04	7.03E-06
C_5							
Total Catch	ug	---	0.043	---	0.057	---	0.050
Concentration	ppm	< 0.05 ND	< --- ND	< 0.05	---	< 0.050	---
	ug/m³	150.03	1.27	150.03	1.71	150.03	1.49
Emission Rate	lbs/hr	4.11E-04	3.49E-06	4.11E-04	4.69E-06	4.11E-04	4.09E-06

Table 7-7: Volatile Unspeciated Organic Emissions Summary (Continued)

Parameter	Units		Run 2 (Continued) Bag 1		Condensate 1		Bag 2		Condensate 2		Average Bags		Condensates
C_6													
Total Catch	ug		---		0.043		---		0.083		---		0.063
Concentration	ppm		0.34		---		0.37		---		0.36		---
	ug/m^3		1,218.56		1.27		1,326.08		2.49		1,272.32		1.88
Emission Rate	lbs/hr		3.34E-03		3.49E-06		3.64E-03		6.83E-06		3.49E-03		5.16E-06
C_7													
Total Catch	ug		---		0.062		---		0.080		---		0.071
Concentration	ppm	<	0.19	ND	---	<	0.19	ND	---	<	0.19	ND	---
	ug/m^3	<	791.80	ND	1.83	<	791.80	ND	2.40	<	791.80	ND	2.12
Emission Rate	lbs/hr		2.17E-03		5.03E-06		2.17E-03		6.59E-06		2.17E-03		5.81E-06
Total C_1 through C_7 Compounds													
Concentration	ug/m^3		47,654.72		6.92		53,293.34		9.19		50,474.03		8.06
		<	47,661.64	<	---	<	53,302.53	<	---	<	50,482.09	<	---
Emission Rate	lbs/hr	<	1.31E-01	<	---	<	1.46E-01	<	---	<	1.38E-01	<	---
	g/s		1.65E-02		---		1.84E-02		---		1.74E-02		---

Table 7-7: Volatile Unspeciated Organic Emissions Summary (Continued)

Parameter	Units	Run 3				Average	
		Bag 1	Condensate 1	Bag 2	Condensate 2	Bags	Condensates
Gas Volume	dsL	33.07		33.61		33.34	
Flow Rate	dscf/hr	43,387		43,387		43,387	
C_1							
Concentration	ppm	64.2		72.8		68.50	
	ug/m^3	42,834.07	---	48,571.97	---	45,703.02	---
Emission Rate	lbs/hr	1.16E-01		1.32E-01		1.24E-01	
C_2							
Concentration	ppm	0.05		0.05		0.050	
	ug/m^3	< 62.53 ND	---	< 62.53 ND	---	< 62.53 ND	---
Emission Rate	lbs/hr	1.69E-04		1.69E-04		1.69E-04	
C_3							
Concentration	ppm	0.09		0.08		0.085	
	ug/m^3	165.05	---	146.71	---	155.88	---
Emission Rate	lbs/hr	4.47E-04		3.97E-04		4.22E-04	
C_4							
Catch	ug	---	0.086	---	0.084	---	0.085
Concentration	ppm	0.03	---	0.03	---	0.03	---
	ug/m^3	72.52 ND	< 2.60 ND	72.52 ND	< 2.50 ND	72.52 ND	< 2.55 ND
Emission Rate	lbs/hr	1.96E-04	7.04E-06	1.96E-04	6.77E-06	1.96E-04	6.91E-06
C_5							
Total Catch	ug	---	0.043	---	0.042	---	0.043
Concentration	ppm	0.05	---	0.05	---	0.05	---
	ug/m^3	< 150.03 ND	< 1.30 ND	< 150.03 ND	< 1.25 ND	< 150.03 ND	< 1.27 ND
Emission Rate	lbs/hr	4.06E-04	3.52E-06	4.06E-04	3.38E-06	4.06E-04	3.45E-06

Table 7-7: Volatile Unspeciated Organic Emissions Summary (Continued)

Parameter	Units		Run 3 (Continued) Bag 1		Condensate 1		Bag 2		Condensate 2		Average Bags		Condensates
C_6													
Total Catch	ug		---		0.069		---		0.084		---		0.077
Concentration	ppm		0.35		---		0.47		---		0.41		---
	ug/m^3		1,254.40		2.09		1,684.48		2.50		1,469.44		2.29
Emission Rate	lbs/hr		3.40E-03		5.65E-06		4.56E-03		6.77E-06		3.98E-03		6.21E-06
C_7													
Total Catch	ug		---		0.12		---		0.087		---		0.10
Concentration	ppm	<	0.19	ND	---	<	0.19	ND	---	<	0.19	ND	---
	ug/m^3	<	791.80	ND	3.63	<	791.80	ND	2.59	<	791.80	ND	3.11
Emission Rate	lbs/hr		2.14E-03		9.83E-06		2.14E-03		7.01E-06		2.14E-03		8.42E-06
Total C_1 through C_7 Compounds													
Concentration	ug/m^3		45,330.40		9.62		51,480.03		8.84		48,405.21		9.23
		<	45,340.01	<	---	<	51,488.87	<	---	<	48,414.44	<	---
Emission Rate	lbs/hr		1.23E-01		---		1.39E-01		---		1.31E-01		---
	g/s		1.55E-02		---		1.76E-02		---		1.65E-02		---

Table 7-7: Volatile Unspeciated Organic Emissions Summary (Continued)

Parameter	Units	Run 4				Average	
		Bag 1	Condensate 1	Bag 2	Condensate 2	Bags	Condensates
Gas Volume	dsL	34.57		33.45		34.01	
Flow Rate	dscf/hr	44,621		44,621		44,621	
C_1							
Concentration	ppm	61.9		58.8		60.35	
	ug/m^3	41,299.52	---	39,231.20	---	40,265.36	---
Emission Rate	lbs/hr	1.15E-01		1.09E-01		1.12E-01	
C_2							
Concentration	ppm	0.05		0.05		0.05	
	ug/m^3	< 62.53 ND	---	< 62.53 ND	---	< 62.53 ND	---
Emission Rate	lbs/hr	1.74E-04		1.74E-04		1.74E-04	
C_3							
Concentration	ppm	0.04		0.04		0.04	
	ug/m^3	< 73.36 ND	---	< 73.36 ND	---	< 73.36 ND	---
Emission Rate	lbs/hr	2.04E-04		2.04E-04		2.04E-04	
C_4							
Catch	ug	---	0.088	---	0.087	---	0.088
Concentration	ppm	< 0.03 ND	--- ND	< 0.03 ND	--- ND	< 0.03 ND	--- ND
	ug/m^3	72.52	2.55	72.52	2.60	72.52	2.57
Emission Rate	lbs/hr	2.02E-04	7.09E-06	2.02E-04	7.25E-06	2.02E-04	7.17E-06
C_5							
Total Catch	ug	---	0.044	---	0.044	---	0.044
Concentration	ppm	< 0.05 ND	--- ND	< 0.05 ND	--- ND	< 0.05 ND	--- ND
	ug/m^3	150.03	1.27	150.03	1.32	150.03	1.29
Emission Rate	lbs/hr	4.18E-04	3.55E-06	4.18E-04	3.66E-06	4.18E-04	3.61E-06

Table 7-7: Volatile Unspeciated Organic Emissions Summary (Continued)

Parameter	Units	Run 4 (Continued)				Average	
		Bag 1	**Condensate 1**	**Bag 2**	**Condensate 2**	**Bags**	**Condensates**
C_6							
Total Catch	ug	---	0.16	---	0.16	---	0.16
Concentration	ppm	0.63	---	0.82	---	0.73	---
	ug/m³	2,257.92	4.63	2,938.88	4.78	2,598.40	4.71
Emission Rate	lbs/hr	6.29E-03	1.29E-05	8.19E-03	1.33E-05	7.24E-03	1.31E-05
C_7							
Total Catch	ug	---	0.16	---	0.16	---	0.16
Concentration	ppm	< 0.19 ND	---	< 0.19 ND	---	< 0.19 ND	---
	ug/m³	791.80	4.63	791.80	4.78	791.80	4.71
Emission Rate	lbs/hr	2.21E-03	1.29E-05	2.21E-03	1.33E-05	2.21E-03	1.31E-05
Total C_1 through C_7 Compounds							
Concentration	ug/m³	44,707.66	13.07	43,320.31	13.48	44,013.99	13.28
		< 44,720.74	< ---	43,333.79 <	< ---	< 44,027.27	< ---
Emission Rate	lbs/hr	1.25E-01	---	1.21E-01	---	1.23E-01	---
	g/s	1.57E-02	---	1.52E-02	---	1.55E-02	---

Note: Target compounds that are ND are reported at the laboratory MDL.

Table 7-8: Acid Gas and Particulate Emissions Summary

Parameter	Units	Run 2			Run 3			Run 4			Average			RCRA/CAA Permit Limit
Sample Volume	dscf		147.548			156.925			157.062			153.85		
Gas Flow Rate	dscfm		703			737			743			724.33		
O_2 Level	%		16.09			15.92			15.92			15.98		
Hydrogen Chloride														
Catch	mg		0.287			0.289			0.318			0.298		
Concentration	ppm_v @ 7% O_2	<	0.13	ND	<	0.12	ND	<	0.13	ND	<	0.13	ND	---
Emission Rate	g/s		2.28E-05			2.26E-05			2.47E-05			2.34E-05		
Chlorine														
Catch	mg		0.0624			0.0632			0.057			0.061		
Concentration	ppm_v @ 7% O_2	<	0.029	ND	<	0.027	ND	<	0.024	ND	<	0.027	ND	---
Emission Rate	g/s		4.96E-06			4.95E-06			4.45E-06			4.78E-06		
Chloride Equivalents														
Concentration	ppm_v @ 7% O_2	<	0.160	ND	<	0.146	ND	<	0.156	ND	<	0.154	ND	21
Hydrogen Fluoride														
Catch	mg		0.283			0.205			0.175			0.22		---
Emission Rate	g/s		2.25E-05			1.60E-05			1.36E-05			1.74E-05		
Particulates														
Total Catch	mg		2.25			2.39			2.05			2.23		---
Concentration	gr/dscf @ 7% O_2	<	0.00068		<	0.00065		<	0.00056		<	0.00063		0.0016
Emission Rate	g/s		1.79E-04			1.87E-04			1.59E-04			1.75E-04		---

Notes:

(A) Blank corrections have not been made to these data.

(B) Results have been reported considering both the RL and DL as reported on the laboratory results page for each fraction. To provide the most conservative emission estimates, calibrated target compounds that are not detected are reported at the RL. Values reported between the RL and MDL are incorporated into the emission estimate as reported.

Table 7-9: Trace Metal Emissions Summary

Constituents	Parameter	Units		Run 2			Run 3			Run 4			Average
	Sample Volume	dscf		136.550			141.283			140.968			139.60
	Gas Flow Rate	dscfm		637			657			651			648.33
	O_2 Level	%		16.09			15.92			15.92			15.98
Antimony	Total Catch	ug		2.54			3.12			2.84			2.83
	Concentration	ug/dscm		0.66			0.78			0.71			0.72
	Emission Rate	lbs/hr		1.57E-06			1.92E-06			1.73E-06			1.74E-06
	Emission Rate	g/s		1.98E-07			2.42E-07			2.18E-07			2.19E-07
Arsenic	Total Catch	ug	<	4.00	ND		2.22		<	2.26		<	2.83
	Concentration	ug/dscm		1.03			0.55			0.57			0.72
	Emission Rate	lbs/hr		2.47E-06			1.37E-06			1.38E-06			1.74E-06
	Emission Rate	g/s		3.11E-07			1.72E-07			1.74E-07			2.19E-07
Barium	Total Catch	ug		5.40			5.37			4.94			5.24
	Concentration	ug/dscm		1.40			1.34			1.24			1.33
	Emission Rate	lbs/hr		3.33E-06			3.30E-06			3.02E-06			3.22E-06
	Emission Rate	g/s		4.20E-07			4.16E-07			3.80E-07			4.05E-07
Beryllium	Total Catch	ug	<	1.00	ND	<	1.00	ND	<	1.00	ND	<	1.00
	Concentration	ug/dscm		0.26			0.25			0.25			0.25
	Emission Rate	lbs/hr		6.17E-07			6.15E-07			6.11E-07			6.14E-07
	Emission Rate	g/s		7.77E-08			7.75E-08			7.70E-08			7.74E-08
Boron	Total Catch	ug		124.10		<	105.90		<	123.10		<	117.70
	Concentration	ug/dscm		32.09			26.47			30.83			29.80
	Emission Rate	lbs/hr		7.66E-05			6.51E-05			7.52E-05			7.23E-05
	Emission Rate	g/s		9.56E-06			8.21E-06			9.47E-06			9.11E-06
Cadmium	Total Catch	ug	<	0.57		<	1.00	ND	<	1.00	ND	<	0.86
	Concentration	ug/dscm		0.15			0.25			0.25			0.22
	Emission Rate	lbs/hr		3.54E-07			6.15E-07			6.11E-07			5.27E-07
	Emission Rate	g/s		4.46E-08			7.75E-08			7.70E-08			6.64E-08

Table 7-9: Trace Metal Emissions Summary (Continued)

Constituents	Parameter	Units		Run 2			Run 3			Run 4			Average	
	Total Catch	ug		2.53			2.37			2.28			2.39	
Chromium	Concentration	ug/dscm		0.65			0.59			0.57			0.61	
	Emission Rate	lbs/hr		1.56E-06			1.46E-06			1.39E-06			1.47E-06	
	Emission Rate	g/s		1.97E-07			1.84E-07			1.75E-07			1.85E-07	
	Total Catch	ug		15.14			15.06			20.00			16.73	
Cobalt	Concentration	ug/dscm	<	3.91		<	3.76		<	5.01	ND	<	4.23	
	Emission Rate	lbs/hr		9.34E-06			9.26E-06			1.22E-05			1.03E-05	
	Emission Rate	g/s		1.18E-06			1.17E-06			1.54E-06			1.29E-06	
	Total Catch	ug		11.23			14.59			11.38			12.40	
Copper	Concentration	ug/dscm		2.90			3.65			2.85			3.13	
	Emission Rate	lbs/hr		6.93E-06			8.97E-06			6.95E-06			7.62E-06	
	Emission Rate	g/s		8.73E-07			1.13E-06			8.76E-07			9.60E-07	
	Total Catch	ug		4.29			3.83			3.81			3.98	
Lead	Concentration	ug/dscm	<	1.11		<	0.96		<	0.95		<	1.01	
	Emission Rate	lbs/hr		2.65E-06			2.36E-06			2.32E-06			2.44E-06	
	Emission Rate	g/s		3.34E-07			2.97E-07			2.93E-07			3.08E-07	
	Total Catch	ug		3.86			3.15			4.94			3.98	
Manganese	Concentration	ug/dscm		1.00			0.79			1.24			1.01	
	Emission Rate	lbs/hr		2.38E-06			1.94E-06			3.02E-06			2.45E-06	
	Emission Rate	g/s		3.00E-07			2.44E-07			3.80E-07			3.08E-07	
	Total Catch	ug		1.43			1.43			1.43			1.43	
Mercury	Concentration	ug/dscm	<	0.37	ND	<	0.36	ND	<	0.36	ND	<	0.36	ND
	Emission Rate	lbs/hr		8.80E-07			8.80E-07			8.71E-07			8.77E-07	
	Emission Rate	g/s		1.11E-07			1.11E-07			1.10E-07			1.10E-07	

Table 7-9: Trace Metal Emissions Summary (Continued)

Constituents	Parameter	Units	Run 2			Run 3			Run 4			Average		
Nickel	Total Catch	ug		1.63			1.26			1.07			1.32	
	Concentration	ug/dscm		0.42			0.32			0.27			0.33	
	Emission Rate	lbs/hr		1.00E-06			7.77E-07			6.53E-07			8.11E-07	
	Emission Rate	g/s		1.26E-07			9.79E-08			8.23E-08			1.02E-07	
Phosphorus	Total Catch	ug		31.66			31.44			31.34			31.48	
	Concentration	ug/dscm	<	8.19		<	7.86		<	7.85		<	7.96	
	Emission Rate	lbs/hr		1.95E-05			1.93E-05			1.91E-05			1.93E-05	
	Emission Rate	g/s		2.46E-06			2.44E-06			2.41E-06			2.44E-06	
Selenium	Total Catch	ug		4.00			4.00			4.00			4.00	
	Concentration	ug/dscm	<	1.03	ND	<	1.00	ND	<	1.00	ND	<	1.01	ND
	Emission Rate	lbs/hr		2.47E-06			2.46E-06			2.44E-06			2.46E-06	
	Emission Rate	g/s		3.11E-07			3.10E-07			3.08E-07			3.10E-07	
Silver	Total Catch	ug		2.00			2.00			2.00			2.00	
	Concentration	ug/dscm	<	0.52	ND	<	0.50	ND	<	0.50	ND	<	0.51	ND
	Emission Rate	lbs/hr		1.23E-06			1.23E-06			1.22E-06			1.23E-06	
	Emission Rate	g/s		1.55E-07			1.55E-07			1.54E-07			1.55E-07	
Thallium	Total Catch	ug		4.00			4.00			4.00			4.00	
	Concentration	ug/dscm	<	1.034	ND	<	1.000	ND	<	1.002	ND	<	1.012	ND
	Emission Rate	lbs/hr		2.47E-06			2.46E-06			2.44E-06			2.46E-06	
	Emission Rate	g/s		3.11E-07			3.10E-07			3.08E-07			3.10E-07	
Tin	Total Catch	ug		110.00			110.00			110.00			110.00	
	Concentration	ug/dscm	<	28.44	ND	<	27.49	ND	<	27.55	ND	<	27.83	ND
	Emission Rate	lbs/hr		6.79E-05			6.77E-05			6.72E-05			6.76E-05	
	Emission Rate	g/s		8.55E-06			8.53E-06			8.47E-06			8.51E-06	

Table 7-9: Trace Metal Emissions Summary (Continued)

Constituents	Parameter	Units		Run 2		Run 3			Run 4			Average
Vanadium	Total Catch	ug		2.57		5.00			5.00			4.19
	Concentration	ug/dscm	<	0.66	<	1.25	ND	<	1.25	ND	<	1.06
	Emission Rate	lbs/hr		1.58E-06		3.08E-06			3.05E-06			2.57E-06
	Emission Rate	g/s		2.00E-07		3.88E-07			3.85E-07			3.24E-07
Zinc	Total Catch	ug		17.71		14.22			11.90			14.61
	Concentration	ug/dscm		4.58		3.55			2.98			3.70
	Emission Rate	lbs/hr		1.09E-05		8.75E-06			7.27E-06			8.98E-06
	Emission Rate	g/s		1.38E-06		1.10E-06			9.16E-07			1.13E-06

Notes:
(A) Blank corrections have not been made to these data.
(B) Target compounds that are ND are reported at the laboratory RL. Values reported between the laboratory RL and MDL are incorporated into the emission estimate as reported.

Table 7-10: MACT Metal Concentration Summary

Constituents	Parameter	Units		Run 2			Run 3			Run 4			Average		CAA Permit Limit
Arsenic	Concentration	ug/dscm @ 7% O_2	<	2.99	ND		1.55		<	1.58		<	2.04		---
Beryllium			<	0.75	ND	<	0.70	ND	<	0.70	ND	<	0.71	ND	---
Chromium				1.89			1.65			1.59			1.71		---
Combined			<	5.63		<	3.90		<	3.87		<	4.47		23
Cadmium	Concentration	ug/dscm @ 7% O_2	<	0.43		<	0.70	ND	<	0.70	ND	<	0.61		---
Lead			<	3.21		<	2.67		<	2.66		<	2.85		---
Combined			<	3.63		<	3.37		<	3.36		<	3.46		10
Mercury	Concentration	ug/dscm @ 7% O_2	<	1.07	ND	<	1.00	ND	<	1.00	ND	<	1.02	ND	8.1

Table 7-11: Energetic Emissions Summary

Constituents	Parameter	Units	Run 2			Run 3			Run 4			Average		
	Sample Volume	dscf		156.705			162.605			161.978			160.43	
Constituents	Gas Flow Rate	dscfm		700			730			723			717.67	
2,4-Dinitrotoluene	Total Catch	ug		1.41			1.58			1.60			1.53	
	Concentration	ug/dscm	<	0.32	ND	<	0.34	ND	<	0.35	ND	<	0.34	ND
	Emission Rate	lbs/hr		8.33E-07			9.37E-07			9.43E-07			9.05E-07	
	Emission Rate	g/s		1.05E-07			1.18E-07			1.19E-07			1.14E-07	
2,6-Dinitrotoluene	Total Catch	ug		1.41			1.58			1.60			1.53	
	Concentration	ug/dscm	<	0.32	ND	<	0.34	ND	<	0.35	ND	<	0.34	ND
	Emission Rate	lbs/hr		8.33E-07			9.37E-07			9.43E-07			9.05E-07	
	Emission Rate	g/s		1.05E-07			1.18E-07			1.19E-07			1.14E-07	
HMX	Total Catch	ug		1.41			1.58			1.60			1.53	
	Concentration	ug/dscm	<	0.32	ND	<	0.34	ND	<	0.35	ND	<	0.34	ND
	Emission Rate	lbs/hr		8.33E-07			9.37E-07			9.43E-07			9.05E-07	
	Emission Rate	g/s		1.05E-07			1.18E-07			1.19E-07			1.14E-07	
Nitroglycerin	Total Catch	ug		7.24			7.91			7.99			7.71	
	Concentration	ug/dscm	<	1.63	ND	<	1.72	ND	<	1.74	ND	<	1.70	ND
	Emission Rate	lbs/hr		4.28E-06			4.70E-06			4.72E-06			4.56E-06	
	Emission Rate	g/s		5.39E-07			5.92E-07			5.94E-07			5.75E-07	
RDX	Total Catch	ug		1.41			2.91			2.05			2.12	
	Concentration	ug/dscm	<	0.32	ND	<	0.63		<	0.45		<	0.47	
	Emission Rate	lbs/hr		8.33E-07			1.73E-06			1.21E-06			1.26E-06	
	Emission Rate	lbs/hr		1.05E-07			2.18E-07			1.52E-07			1.58E-07	
2,4,6-Trinitrotoluene	Total Catch	ug		1.41			1.58			1.60			1.53	
	Concentration	ug/dscm	<	0.32	ND	<	0.34	ND	<	0.35	ND	<	0.34	ND
	Emission Rate	lbs/hr		8.33E-07			9.37E-07			9.43E-07			9.05E-07	
	Emission Rate	g/s		1.05E-07			1.18E-07			1.19E-07			1.14E-07	

Notes:

(A) Blank corrections have not been made to these data.

(B) Target compounds that are ND are reported at the laboratory RL. Values reported between the laboratory RL and MDL are incorporated into the emission estimate as reported.

Table 7-12: Proposed Metal Feed Rates

	Demonstrated Rate		RCRA Permitted		Calculated
Constituents	Emission (lbs/hr)	Feed (lbs/hr)	Feed Rate (lbs/hr)	HHRA Levels (lbs/hr)	Feed Rate (lbs/hr)
Antimony	1.74E-06	---	0.56	---	1.12
Arsenic	1.74E-06	3.37E-01	0.31	---	0.67
Barium	3.22E-06	---	11.2	---	22.4
Beryllium	6.14E-07	2.63E-03	0.0024	---	0.0053
Boron	7.23E-05	---	0.34	---	0.68
Cadmium	5.27E-07	8.84E-03	0.0083	---	0.018
Chromium	1.47E-06	3.21E+00	2.64	---	6.43
Cobalt	1.03E-05	---	0.039	---	0.078
Copper	7.62E-06	4.43E-01	0.41	---	0.88
Lead	2.44E-06	2.71E+01	25.8	---	54.2
Manganese	2.45E-06	---	1.53	---	3.06
Mercury	8.77E-07	1.85E-02	0.017	---	0.037
Nickel	8.11E-07	---	0.11	---	0.22
Phosphorus	1.93E-05	9.73E+00	2.25	8.69E-05	32.8
Selenium	2.46E-06	---	0.0072	---	0.014
Silver	1.23E-06	1.32E-02	0.012	---	0.026
Thallium	2.46E-06	---	0.0015	---	0.0030
Tin	6.76E-05	---	0.23	---	0.46
Vanadium	2.57E-06	4.98E-03	0.0046	---	0.010
Zinc	8.98E-06	1.35E+00	0.31	1.09E-04	12.3

Enclosure 18

Differences in operating parameters between

Anniston and PCD Static Detonation Chambers (SDCs)

Differences in Operating Parameters between Anniston and PCD Static Detonation Chambers

Process Data Description	Anniston Range	Anniston Value/Parameter	Correlating PCD SDC Tag	PCD RCRA Parameter (Post Trial Burns)	Difference Justification
Detonation Chamber Static Pressure Indication	max	1.32 psi	B27-PI-112007 B27-PI-212007 B27-PI-312007	<218 psi	Controls safety of system; no direct impact on treatment effectiveness. No impact to processing from different setting.
Detonation Chamber Temperature Indication	min	1,000 F	B27-TIC-112021/54 B27-TIC-212021/54 B27-TIC-312021/54	>1,025F	PCAPP minimum temperature is higher; no negative impact to processing.
Thermal Oxidizer Temperature	min	1,741F	B28-TIC-1310AVG B28-TIC-2310AVG B28-TIC-3310AVG	>1,800F	PCAPP minimum temperature is higher; no negative impact to processing.
Thermal oxidizer Pressure	max	-0.01 psi	B28-PIC-1310AVG B28-PIC-2310AVG B28-PIC-3310AVG	< -0.03 psi	PCAPP maximum pressure is higher; no negative impact to processing.
Spray Dryer Temperature	max	400F	B28-TIC-1320AVG B28-TIC-2320AVG B28-TIC-3320AVG	< 392°F	PCAPP maximum temperature is lower; no negative impact to processing.
Bag-house Differential Pressure	max	0.18 psi	B28-PDS-133001 B28-PDS-233001 B28-PDS-333001	<0.30 psi	PCAPP maximum pressure is higher, no negative impact to processing.
Acid Scrubber Process Flow	min	3.2 cfm	B28-FI-134232 B28-FI-234232 B28-FI-334232	> 20 gpm	PCAPP managed acid scrubber liquor flow is tracked in gallons rather than cfm; Anniston value is approximately 24 gpm; PCAPP minimum is similar and balanced with overall OTS performance. There is no negative impact to processing.

Process Data Description	Anniston Range	Anniston Value/Parameter	Correlating PCD SDC Tag	PCD RCRA Parameter (Post Trial Burns)	Difference Justification
Quench Tower Flow	min	2.4 cfm	B28-FI-134222 B28-FI-234222 B28-FI-334222	> 20 gpm	PCAPP managed quench tower liquor flow is tracked in gallons rather than cfm; Anniston value is approximately 18 gpm; PCAPP minimum is similar and balanced with overall OTS performance. There is no negative impact to processing.
Quench Tower Temperature	max	170F	B28-TI-134003 B28-TI-234003 B28-TI-334003 B28-TI-134004 B28-TI-234004 B28-TI-334004	< 190 °F	PCAPP maximum temperature is higher but operates in balance with the remainder of the SDC OTS system, no negative impact to processing.
Neutral Scrubber Discharge Temperature	max	200F	B28-TI-136201 B28-TI-236201 B28-TI-336201	< 194F	Neutral scrubber temperature is lower than the ANCDF value; no negative impact to processing.
CO Concentration	max	100 ppm @ 7% O2	J13-AI 1001--A J13-AI 2001--A J13-AI 3001--A	< 100 ppm	No difference
Neutral Scrubber pH	setpoint	7.0 pH	B28-QI-135017 B28-QI-235017 B28-QI-335017	>5.5 pH	PCAPP manages neutral scrubber setpoints to manage pH above the low level (neutral scrubber setpoint is generally 9 pH). Treatment of acid gasses/carryover form acid scrubber is maintained. No impact to operations form a control point of 5.5 pH rather than setpoint of 7.0 pH

Enclosure 19

Permit Change Page(s): Part II,

General Facility Conditions

and between rows of palletized wastes in PCD permitted units G1009, G1103, G1104, G1105, G1107, G1108, G1109, and G1110.

II.H.4.a.ii) In PCD permitted storage Building 540, the Permittee must maintain aisle spaces of at least 3 feet between the unit walls or berms and hazardous waste storage containers. Secondary aisle space at least 3 feet wide between each row must be maintained, with rows not wider than two drums or one 4 x 4-foot pallet.

II.H.4.a.iii) In SDC permitted storage Igloos G101, G102, and G103, Permittee must maintain aisle spaces of least 3 feet between the unit walls and pallets of wastes, and between rows of palletized wastes.

II.H.4.a.iv) In SDC permitted storage Igloo H1102, there will be two rows of overpack pallets (OPPs). Rack storage allows double stacking, and there will be a minimum horizontal distance of 3 feet between OPPs and igloo structural walls at the base of the wall. Additionally, Igloo H1102 may store up to 18 crates of 6 overpacks each per crate. The crate will be set in two rows of 9 crates and will not be double stacked.

II.H.4.a.v) In the permitted SDC Waste Laydown Yard, the Permittee must maintain aisle spaces of at least 28 inches between rows of containers.

II.H.4.b. The roadways to all permitted hazardous waste management areas must be maintained to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment in an emergency.

II.H.5. Arrangements with Local Agencies

II.H.5.a. The Permittee must maintain arrangements with state and local agencies, familiarizing the agencies with the properties of the hazardous wastes handled at the Facility. The Permittee must document a written agreement with each agency outlining the agencies' responsibilities should emergency services be required. [6 CCR 1007-3 § 264.37]

II.H.5.b. The Permittee must maintain emergency response arrangements with the following agencies and meet all other requirements of 6 CCR 1007-3 § 264.37:

- Pueblo Rural Fire Department

Enclosure 20

Permit Change Page(s): Part III,

Storage in Containers

III.A.11. Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) Static Detonation Chamber (SDC) – Storage Igloos G101, G102, G103

Storage Igloos G101, G102, and G103 are located in the G Block of PCD as shown in **Annex 3 Attachment 1 Figure 1-3**. Storage of containers in Storage Igloos G101, G102, and G103 must be in accordance with **Annex 3, Attachments 7 and 15**. Storage configuration and aisle spacing in Igloos G101, G102, and G103 shall be in accordance with **Table 7-1** in **Annex 3, Attachment 7**. These igloos are permitted to store intact, non-leaking, palletized rounds; overpacked rounds (i.e., leakers, rejects, and recovered munitions); and agent-contaminated energetics (ignition cartridges, propellant, bursters) currently stored at PCD or PCAPP that contain mustard agents (distilled sulfur mustard [HD]/mustard-T mixture [HT]).

The maximum capacity of each igloo is 1,440 rounds, equivalent to a maximum of 1,584 gallons. Each round contains less than 1.10 gallons of agent. All wastes stored in the unit shall be in RCRA- or DOT-approved containers or in overpack containers (i.e., single round containers [SRCs], multiple round containers [MRCs]). Intact, non-leaking, palletized rounds do not require overpack containers but must be stored in enclosed overpack pallets (OPPs). See III.F for requirements regarding OPPs. All wastes shall be stored atop secondary containment pallets. The igloo consists of two end-walls with a door on one wall, an arched roof, and a floor. The walls, roof, and floor are constructed of concrete. An AFS shall also be maintained at each igloo.

III.A.12. PCAPP SDC – Storage Igloo H1102

Storage Igloo H1102 is located in the H Block of PCD as shown in **Annexes 2 and 3 Attachment 1 Figure 1-3**. Storage of containers in Storage Igloo H1102 must be in accordance with **Annex 3, Attachments 7 and 15.** Storage configuration and aisle spacing in Igloo H1102 shall be in accordance with **Table 7-1** in **Annex 3, Attachment 7**. Igloo H1102 is permitted to store intact, non-leaking, palletized rounds; overpacked rounds (i.e., leakers, rejects, and recovered munitions); and agent-contaminated energetics (ignition cartridges, propellant, bursters) currently stored at PCD or PCAPP that contain mustard agents (HD/HT). The maximum capacity of Igloo H1102 is 2,400 rounds, equivalent to a maximum of 2,640 gallons plus 108 overpacks in a single-stack arrangement, equivalent to 1,215 gallons for the largest overpack. Each round contains less than 1.10 gallons of agent. All wastes stored in the unit shall be in RCRA- or DOT-approved containers or in overpack containers (e.g., SRCs, MRCs). Intact, non-leaking, palletized rounds do not require overpack containers, but must be stored in enclosed OPPs. See III.F for requirements regarding OPPs. All wastes shall be stored atop secondary containment pallets. The igloo consists of two end-walls with a door on one wall, an arched roof, and a floor. The walls, roof, and floors are constructed of concrete. A continuous mustard agent monitoring system with

III.E. MANAGEMENT OF CONTAINERS FOR STORAGE

III.E.1. The Permittee shall keep all containers closed during storage, except when it is necessary to sample the container contents or to add or remove waste. The Permittee shall not open, handle, or store containers in a manner that may rupture the container or cause it to leak. [6 CCR 1007-3 § 264.173]

III.E.2. The Permittee must store hazardous waste in containers which meet the Colorado Department of Transportation or equivalent specifications found in 49 Code of Federal Regulations (CFR) Part 173. Containerized material must be stored in containers that are in good condition and appropriate for the type of material. Container requirements for individual units are as follows:

III.E.2.a. Igloos C509, C510, G1009, G1103, G1104, G1105, G1107, G1108, G1109, G101, G102, and G103

Approved containers include overpack containers (e.g., SRCs, MRCs), DOT bottles, steel ammunition boxes, drums, 1-cubic-yard boxes, and propelling charge cans. Other containers may be used where appropriate and in accordance with the applicable requirements of 6 CCR 1007-3 Part 264 Subpart I and Subpart CC, and applicable DOT requirements in 49 CFR Parts 173, 178, and 179. Containers shall be selected for each type of waste in accordance with the Hazardous Materials Table in 49 CFR 172.101. Containers must not be stacked.

III.E.2.b. Igloo G1110

Approved containers include SRCs, propelling charge cans, DOT- and RCRA-approved drums, DOT bottles, and 1-cubic-yard boxes. Containers must not be stacked. Other containers may be used where appropriate and in accordance with the applicable requirements of 6 CCR 1007-3 Part 264 Subpart I and Subpart CC, and applicable DOT specifications in 49 CFR Parts 173, 178, and 179. Containers shall be selected for each type of waste in accordance with the Hazardous Materials Table in 49 CFR 172.101.

III.E.2.c. Igloo H1102

Approved containers include intact, non-leaking palletized rounds; overpack containers (e.g., SRCs, MRCs); steel ammunition boxes; drums; and propelling charge cans. Wastes are placed on a rack arrangement except for when wastes are in overpacks.

III.E.2.d. PCD Building 540

Approved containers include DOT- and RCRA-approved drums and DOT bottles. Containers must not be less than 5-gallon capacity or more than 95-gallon capacity. Containers with less than 30-gallon capacity

Enclosure 21

Permit Change Page(s): Annex 3 Attachment 8 Appendix 8-3,

SDC Complex Support Equipment and Structures

Table 8-3-2. SDC Enclosure Containment Building Design and Operation Standards [6 CCR 1007-3 § 264.1101]

Regulatory Citation	Requirement	Meets Requirement? Y/N or NA	How
264.1101(b)	For a containment building used to manage hazardous wastes containing free liquids or treated with free liquids (the presence of which is determined by the paint filter test, a visual examination, or other appropriate means), the owner or operator must include: (see below)		The SDC will process munitions, overpacked munitions, and energetics (e.g., ignition cartridges, propellant, bursters) that contain mustard agents HD or HT. The liquids are contained within the munition or overpack that is processed. The munitions/items to be processed arrive at the SDC Vestibule inside plastic-shrouded OPPs or wooden crates (overpacked munitions). On arrival, each OPP or crate is monitored to determine any leaking munitions. ~~Overpacked agent-contaminated items are not unpacked for processing.~~
264.1101(b)(1)	A primary barrier designed and constructed of materials to prevent the migration of hazardous constituents into the barrier (e.g., a geomembrane covered by a concrete wear surface).	Y	Primary containment within the SDC Enclosure is provided by the hazardous waste treatment units which were evaluated prior to installation of the SDC/OTS systems. The compatibility of the materials of consturction were assessed in the initial RCRA Tank Assessment Report (24852-RD-30H-000-V0004), which confirmed that the design of the hazardous waste tank systems (tanks, piping, pumps) are adequate for their intended purpose. All of these units will be inspected for wear, gaps, cracks, corrosion, or other deterioration (inspection and frequency is described in **Annex 3 Attachment 2**) and repaired within the required timeframe.