BAE SYSTEMS

HOLSTON ARMY AMMUNITION PLANT

KINGSPORT, TENNESSEE

HAZARDOUS WASTE COMBUSTOR NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

COMPREHENSIVE PERFORMANCE TEST PLAN FOR HSAAP FLASHING FURNACE

SEPTEMBER 2021

Coterie ENVIRONMENTAL

1150 FIRST AVENUE, SUITE 501 ● KING OF PRUSSIA, PA 19406

610.945.1777 ● WWW.COTERIE-ENV.COM

TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices (to be supplied with Final CPT Plan)

1.0 INTRODUCTION

This comprehensive performance test (CPT) plan is being submitted by BAE Systems, Ordnance Systems Inc., (BAE), and the United States Army for the new flashing furnace system planned for installation at the Holston Army Ammunition Plant (HSAAP) in Kingsport, Tennessee. The flashing furnace will be subject to the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Hazardous Waste Combustors (HWCs) codified in Title 40 Code of Federal Regulations (CFR) Part 63 Subpart EEE.

This plan describes the CPT that will be conducted on the flashing furnace after its initial startup to demonstrate compliance with the HWC NESHAP standards for hazardous waste incinerators promulgated in October 2005. This plan has been prepared in draft form prior to permitting of the furnace and is being provided for public review and comment in accordance with 40 CFR § 63.1212(b)(2) and, by reference, 40 CFR § 63.1207(e)(1) as part of the Notification of Intent to Comply (NIC).

1.1 FACILITY OVERVIEW

HSAAP is a government-owned, contractor-operated facility that manufactures explosive compounds and explosive formulations for the Department of Defense (DoD). HSAAP is located in Hawkins and Sullivan Counties in northeastern Tennessee. The plant is comprised of two distinct manufacturing areas known as Area A and Area B. In addition to the production lines, these areas include explosive material storage magazines, an industrial landfill, an industrial wastewater treatment plant, and several office buildings that provide administrative, environmental, health, safety, and security support services.

The street address of the HSAAP is:

Holston Army Ammunition Plant
4509 West Stone Drive
Kingsport, Tennessee 37660

All correspondence should be directed to the facility contact at the following address and telephone number:

Ms. Claire Powell
Manager, Communications
BAE Systems, Ordnance Systems Inc.
4050 Peppers Ferry Road
Radford, Virginia 24143
(540) 639-7709

1.2 Hazardous Waste Combustor Overview

The new flashing furnace will be used to destroy a combination of hazardous explosive wastes and non-hazardous explosive contaminated solid wastes generated at the HSAAP. The flashing furnace will be equipped with an afterburner for organics destruction and a state-of-the-art air pollution control (APC) system, consisting of a gas cooler, a baghouse, a wet scrubber, a high-efficiency particulate air (HEPA) filter, and a selective catalytic reduction (SCR) unit. A selective non-catalytic reduction (SNCR) injection system will be included downstream of the afterburner for use during traditional decontamination cycles (*e.g.,* contaminated metal flashing cycles). During these cycles, the flue gases will divert around the HEPA and SCR to avoid the duct reheat necessary for treatment in the SCR after wet scrubbing.

1.3 Modes of Operation

The HSAAP flashing furnace system has two distinct modes of operation: incineration mode and decontamination mode. Hazardous wastes are only treated in the furnace in incineration mode; during decontamination mode, the furnace acts as a traditional decontamination oven or flashing furnace. Materials thermally treated in "decon-mode" include metal parts, concrete, and soil, provided it is not classified as hazardous waste.

Pursuant to 40 CFR § 63.1206(b)(1)(ii), the HWC NESHAP emission standards and operating requirements described herein do not apply when the furnace is operating in decon-mode, provided that HSAAP complies with all otherwise applicable requirements and standards promulgated under Sections 112 and 129 of the Clean Air Act (CAA) and that HSAAP documents the transition to this mode of operation in the operating record. Currently, the only limitations in effect during these periods are those required by the TDEC air operating permit, as there are no Federally applicable standards for traditional decontamination ovens.

1.4 HWC NESHAP Regulatory Overview

On September 30, 1999, the United States Environmental Protection Agency (USEPA) promulgated the HWC NESHAP under the joint authority of the Clean Air Act Amendments of 1990 (CAAA) and the Resource Conservation and Recovery Act (RCRA). The HWC NESHAP is codified in 40 CFR Part 63 Subpart EEE. The standards are based upon the maximum achievable control technology (MACT). Originally, the HWC NESHAP regulated emissions from three equipment categories: hazardous waste incinerators, cement kilns, and lightweight aggregate kilns. These sources are referred to as Phase I sources. On October 12, 2005, USEPA amended Subpart EEE to include Final Replacement Standards for Phase I sources and to incorporate standards for Phase II sources (*i.e.*, liquid fuel-fired boilers, solid fuel-fired boilers, and hydrochloric acid production furnaces that burn hazardous waste). The HWC NESHAP limits emissions from both new and existing facilities in each equipment category.

The new flashing furnace will be subject to the HWC NESHAP emission standards for new hazardous waste incinerators provided in 40 CFR § 63.1219. The applicable emission standards are summarized in Table 1-1 and are described below:

- 40 CFR § 63.1219(b)(1)(i) mandates that the furnace may not emit dioxins and furans (D/F) in excess of 0.11 nanograms toxic equivalence per dry standard cubic meter (ng TEQ/dscm) corrected to seven percent oxygen.
- 40 CFR § 63.1219(b)(2) mandates that the furnace may not emit mercury in excess of 8.1 micrograms per dry standard cubic meter (µg/dscm) corrected to seven percent oxygen.
- 40 CFR § 63.1219(b)(3) mandates that the furnace may not emit the semivolatile metals (SVM) lead and cadmium in excess of 10 µg/dscm corrected to seven percent oxygen.
- 40 CFR § 63.1219(b)(4) mandates that the furnace may not the low volatile metals (LVM) arsenic, beryllium, and chromium in excess of 23 µg/dscm corrected to seven percent oxygen.
- 40 CFR § 63.1219(b)(5)(i) mandates that the furnace may not emit carbon monoxide (CO) in excess of 100 parts per million by volume on a dry basis (ppmv dry) over an hourly rolling average and corrected to seven percent oxygen and hydrocarbons (HC) in excess of 10 ppmv dry over an hourly rolling average, corrected to seven percent oxygen, and reported as propane.
- 40 CFR § 63.1219(b)(6) mandates that the furnace may not emit hydrogen chloride and chlorine (HCl/Cl_2) in excess of 21 ppmv dry, expressed as a chloride (Cl^-) equivalent and corrected to seven percent oxygen.
- 40 CFR § 63.1219(b)(7) mandates that the furnace may not emit particulate matter (PM) in excess of 0.0016 grains per dry standard cubic foot (gr/dscf) corrected to seven percent oxygen.
- 40 CFR § 63.1219(c)(1) requires a destruction and removal efficiency (DRE) of 99.99 percent for each designated principal organic hazardous constituent (POHC).

TABLE 1-1
FINAL REPLACEMENT STANDARDS FOR NEW HAZARDOUS WASTE INCINERATORS

PARAMETER	UNITS [1]	EMISSION STANDARD
Dioxins and furans	ng TEQ/dscm	0.11
Mercury	µg/dscm	8.1
Semivolatile metals	µg/dscm	10
Low volatile metals	µg/dscm	23
Hydrogen chloride and chlorine	ppmv dry	21
Particulate matter	gr/dscf	0.0016
Carbon monoxide	ppmv dry	100
Hydrocarbons	ppmv dry	10

1 Emission standards corrected to seven percent oxygen.

New sources are required to comply with these standards upon startup of hazardous waste operations and must demonstrate compliance with them via a CPT within 12 months from this startup date. Before conducting the CPT, HSAAP will operate the system according to a Documentation of Compliance (DOC), which will establish operating parameter limits (OPLs) that, based on good engineering judgment, should ensure compliance with the emission standards.

Currently, the date for startup of the furnace is unknown, as substantial permitting efforts must be completed before even commencing construction. Two permitting actions must be completed before beginning construction of the units:

- HSAAP must obtain a Class 3 modification of their existing RCRA permit to add the new unit. HSAAP anticipates submitting this modification request in early Fall 2021. The Tennessee Department of Environment and Conservation (TDEC) must review that modification request and issue a revised Permit.
- HSAAP must complete a New Source Review (NSR) application to construct a new air emission source. HSAAP also anticipates submitting this application in early Fall 2021. TDEC must also review this application and issue the NSR construction permit.

Based on prior experience, these permitting processes are expected to take 12 months to complete. If this occurs and the construction project is awarded by the 3rd quarter of government Fiscal Year 2021, construction of the new unit would be expected to commence in Fall 2022. The actual construction and commissioning processes are expected to take another 12 to 15 months, with hazardous waste operations beginning at the conclusion of this period. Therefore, it is likely that the CPT described herein will not be commenced until 2024. To encourage public participation in the permitting process, the public will be made aware of the various permitting milestones and will receive notice prior to the CPT commencing. A final CPT plan will be submitted to TDEC one year prior to the planned start of the CPT and will be provided for public review 60 days before the start of the CPT.

1.5 Comprehensive Performance Test Overview

The CPT for the flashing furnace will be designed to demonstrate compliance with the HWC NESHAP Final Replacement Standards and to establish the OPLs required by 40 CFR § 63.1209 when the furnace operates in incineration mode. One test condition will be performed to demonstrate compliance with the DRE standard and the HC, D/F, PM, SVM, LVM, and HCl/Cl_2 emission standards. HSAAP will utilize the performance test waiver for mercury provided in 40 CFR § 63.1207(m); therefore, no emissions testing will be conducted for mercury during the CPT.

The CPT test condition will be designed to represent the extreme range of normal operations, consistent with the requirements of 40 CFR § 63.1207(g). During the test, the flashing furnace will process batches with the maximum load of hazardous waste. The afterburner will be operated at the minimum combustion chamber temperature, the APC system will be operated at worst-case conditions, and the stack gas flow rate will be maximized. Loadings of regulated constituents (*e.g.,* metals, chlorine, and ash) will also be elevated or maximized.

This CPT will be coordinated by a firm skilled in the coordination and direction of complex environmental testing efforts under the direction of facility personnel. Coterie Environmental LLC (Coterie) was responsible for development of the test protocol. Coterie or another firm that is similarly qualified will implement the protocol and will oversee the furnace operations and stack sampling activities during the test program. A qualified stack sampling firm will conduct all emissions sampling for the CPT. The collected stack gas samples will be sent to qualified commercial laboratories and collected waste samples will be analyzed in-house by HSAAP's explosives laboratory. Additional information on the project team roles and responsibilities will be provided in the quality assurance project plan (QAPP) provided with the final CPT Plan.

Prior to the CPT, HSAAP will perform a continuous monitoring systems (CMS) performance evaluation test (PET). The goal of the CMS PET will be to demonstrate that the CMS associated with the furnace are operating in compliance with the standards presented in the HWC NESHAP and in the NESHAP General Provisions contained in 40 CFR §§ 63.1 through 63.15. As described in 40 CFR §§ 63.8(c)(2) and 63.8(c)(3), all CMS used in accordance with the HWC NESHAP shall be installed so that representative measurements of emissions or process parameters can be obtained. During the CMS PET, HSAAP will verify that each CMS is correctly installed, calibrated, and operational. Once all instruments for the system have been selected and the manufacturer and model numbers are identified, a CMS PET plan will be prepared that details the performance evaluations planned for each.

As stated earlier, HSAAP does not know when the CPT will be conducted, as that date is subject to permitting and construction schedules. As these activities progress, the public will receive proper notification. Once the CPT is completed, the CPT report will be submitted within 90 days.

1.6 Operating Parameter Limits Overview

HSAAP intends to demonstrate compliance with the HWC NESHAP Final Replacement Standards and to establish OPLs during the CPT that apply to the flashing furnace system when it operates in incineration mode. 40 CFR § 63.1209 lists the OPLs that must be established to demonstrate compliance with each HWC NESHAP emission standard. The target OPLs are summarized in Table 1-2 and are discussed in detail in Section 2. The target OPLs will be established as hourly rolling averages (HRAs) or 12-hour rolling averages (12-hr RAs) and will apply at all times that the furnace operates in incineration mode. Note that at this early stage, the target OPLs listed are very preliminary and subject to final review and recommendation by the selected vendor(s). The final CPT plan submitted to TDEC will provide a complete list of OPLs matching the final, as-built plans for the system. While the actual OPLs are not expected to change, the target values for them likely will.

TABLE 1-2
TARGET OPERATING PARAMETER LIMITS FOR INCINERATION MODE

OPERATING PARAMETER	APPLICABLE EMISSION STANDARD	REGULATORY CITATION [1]	AVERAGING PERIOD	TARGETS
Minimum afterburner temperature	HC [2], DRE, D/F	(a)(7), (j)(1), (k)(2)	HRA	1,700°F
Maximum total hazardous waste feed rate [3]	HC, DRE, D/F	(a)(7), (j)(3), (k)(4)	HRA	5 lb/batch
Maximum mercury feed rate [4]	Mercury	(l)(1)(i)	12-hr RA	0.000045 lb/hr
Maximum ash feed rate [4]	PM	(m)(3)	12-hr RA	75 lb/hr
Maximum semivolatile metals feed rate [4]	SVM	(n)(2)(ii)	12-hr RA	0.020 lb/hr
Maximum low volatile metals feed rate [4]	SVM	(n)(2)(ii)	12-hr RA	0.020 lb/hr
Maximum chlorine/chloride feed rate [4]	SVM, LVM, HCl/Cl_2	(n)(4), (o)(1)(i)	12-hr RA	15 lb/hr
Maximum baghouse inlet temperature	D/F, SVM, LVM	(k)(1), (n)(1)	HRA	450°F
Maximum scrubber water conductivity	PM, SVM, LVM	(m)(1)(B)(1)(i), (n)(3)	HRA	250 mS/cm
Minimum scrubber pressure drop	HCl/Cl_2	(l)(2), (o)(3)(ii)	HRA	0.5 in. w.c.
Minimum scrubber liquid pH	HCl/Cl_2	(o)(3)(iv)	HRA	6.0
Minimum scrubber liquid flow rate	HCl/Cl_2	(o)(3)(v)	HRA	100 gpm
Minimum SCR inlet temperature	D/F	(k)(8)(i)	HRA	350°F
Maximum catalyst life	D/F	(k)(8)(ii)	---	16,000 hours
Maximum SCR inlet temperature	D/F	(k)(8)(iv)	HRA	750°F
Maximum HEPA pressure drop	PM, SVM, LVM	(m)(1)(iv), (n)(3)	HRA	6.0 in. w.c.
Minimum stack gas velocity	Mercury	63.1207(m)	HRA	10 fps
Maximum stack gas velocity	HC, DRE, D/F, PM, SVM, LVM, HCl/Cl_2	(a)(7), (j)(2), (k)(3), (m)(2), (n)(5), (o)(2)	HRA	60 fps
Maximum stack gas carbon monoxide concentration	HC, DRE	(a)(7), (j)(4)	HRA	100 ppmv dry
Maximum flashing furnace pressure	Fugitive emissions	(p)	Instantaneous[5]	< Atmospheric

1 40 CFR Part 63 Section 1209 unless specified otherwise.

2 40 CFR § 63.1209(a)(7) requires that OPLs established to demonstrate compliance with DRE also be used to demonstrate compliance with the HC emission standard.

3 The feed to the flashing furnace is made up of a combination of non-hazardous and hazardous waste. Under the HWC NEHSAP, a total feed rate limit is only required on the hazardous fraction. As noted below, total pollutant loadings are regulated from all waste streams (hazardous and non-hazardous).

4 Per the HWC NESHAP, the limits on pollutant loading reflect the contribution from all hazardous and non-hazardous waste streams.

5 To accommodate temporary pressure fluctuations that are expected with the processing of explosive wastes, a 10-second delay will be applied to this OPL

Instead of complying with the OPLs normally required for control of mercury emissions, HSAAP will utilize the performance test waiver of 40 CFR § 63.1207(m). With the performance test waiver, facilities take no credit for pollutant removal in the incineration system. If the performance test waiver is used, no OPLs other than the maximum mercury feed rate limit and the minimum stack gas velocity limit are required to demonstrate compliance with the emission standard(s).

1.7 Waiver of Current Operating Parameter Limits for Testing Purposes

The CPT condition has been designed to demonstrate the extreme range of normal conditions, which is consistent with the requirements of 40 CFR § 63.1207(g). Some of the proposed targets for the condition will likely be set at or just the OPLs outlined in HSAAP's DOC. 40 CFR § 63.1206(c) allows operation outside of the DOC limits while conducting performance tests. In addition, 40 CFR § 63.1207(h) waives the OPLs established in the DOC pursuant to 40 CFR § 63.1209 for the purposes of pretesting before a CPT for an aggregate time not to exceed 720 hours of operation (renewable at the discretion of the Administrator), provided that the test is conducted under an approved test plan or that the results of the pretesting are recorded.

1.8 Reference Documents

Reference documents that have been used in developing this plan include the following:

- ASTM International (ASTM), *Annual Book of ASTM Standards*, latest annual edition;
- USEPA, *Final Technical Support Document for HWC MACT Standards, Volume IV: Compliance with the HWC MACT Standards*, July 1999;
- USEPA, *Guidance on Setting Permit Conditions and Reporting Trial Burn Results*, January 1989;
- USEPA, National Emission Standards for Hazardous Air Pollutants from Hazardous Waste Combustors, 40 CFR Part 63, Subpart EEE, September 30, 1999, and as amended through October 28, 2008;
- USEPA, New Source Performance Standards, Test Methods and Procedures, Appendix A, 40 CFR Part 60;
- USEPA, New Source Performance Standards, Performance Specifications, Appendix B, 40 CFR Part 60; and
- USEPA, *Test Methods for Evaluating Solid Wastes Physical/Chemical Methods, Third Edition*, 1986 and updates (SW-846).

1.9 Comprehensive Performance Test Plan Organization

This plan has been prepared following the regulations codified in 40 CFR § 63.1207(f). The remaining sections of the plan provide the following information:

- Section 2 presents a discussion on the target OPLs for the flashing furnace system;
- Section 3 presents information on the furnace feedstreams;
- Section 4 presents a detailed engineering description of the flashing furnace system;

- Section 5 presents a description of the system's CMS;
- Section 6 presents a description of the test operating conditions; and
- Section 7 presents a summary of the test sampling and analysis protocol.

Table 1-3 provides a cross-reference table to use in comparing the CPT plan to HWC NESHAP requirements.

TABLE 1-3
DOCUMENT CROSS-REFERENCE TABLE

40 CFR 63	REQUIREMENT	LOCATION IN DOCUMENT
7(c)(2)(i)	A test program summary, the test schedule, data quality objectives, and both an internal and external quality assurance program	Section 1.5, Table 6-7, and Appendix A
7(c)(2)(ii)	An internal QA program, including the activities planned by routine operators and analysts to provide an assessment of test data precision	Appendix A
7(c)(2)(iii)	An external QA program, including: application of plans for a test method performance audit (PA) during the performance test, and systems audits that include the opportunity for onsite evaluation by the Administrator of instrument calibration, data validation, sample logging, and documentation of quality control data and field maintenance activities	Appendix A
7(c)(2)(v)	Additional relevant information requested after submittal of the site-specific test plan	None requested
1207(f)(1)(i)	An analysis of each feedstream, including hazardous waste, other fuels, and industrial furnace feedstocks, as fired, that includes heating value, levels of SVM, chromium, mercury, and total chlorine (organic and inorganic), and viscosity or a description of the physical form of the feedstream	Section 3
1207(f)(1)(ii)	For organic HAPs an identification of such organic HAPs that are present in each hazardous waste feedstream, an approximate quantification of such identified organic HAPs in the hazardous waste feedstreams, and a description of blending procedures, if applicable, prior to firing the hazardous waste feedstream, including a detailed analysis of the materials prior to blending, and blending ratios	Section 3
1207(f)(1)(iii)	A detailed engineering description of the hazardous waste combustor, including: manufacturer's name, model number, and type of the hazardous waste combustor, maximum design capacity in appropriate units, a description of the feed system for each feedstream, the capacity of each feed system, a description of automatic hazardous waste feed cutoff system(s), a description of the design, operation, and maintenance practices for any APC system, and a description of the design, operation, and maintenance practices of any stack gas monitoring and pollution control monitoring systems	Section 4
1207(f)(1)(iv)	A detailed description of sampling and monitoring procedures including sampling and monitoring locations in the system, the equipment to be used, sampling and monitoring frequency, and planned analytical procedures for sample analysis	Section 7 and Appendix A
1207(f)(1)(v)	A detailed test schedule for each hazardous waste for which the performance test is planned, including date(s), duration, quantity of hazardous waste to be burned, and other relevant factors	Tables 6-6 and 6-7

TABLE 1-3 (CONTINUED)
DOCUMENT CROSS-REFERENCE TABLE

40 CFR 63	REQUIREMENT	LOCATION IN DOCUMENT
1207(f)(1)(vi)	A detailed test protocol, including, for each hazardous waste identified, the ranges of hazardous waste feed rate for each feed system, and, as appropriate, the feed rates of other fuels and feedstocks, and any other relevant parameters that may affect the ability of the hazardous waste combustor to meet the emission standards	Table 6-1
1207(f)(1)(vii)	A description of, and planned operating conditions for, any emission control equipment that will be used	Section 4 and Table 6-1
1207(f)(1)(viii)	Procedures for rapidly stopping the hazardous waste feed and controlling emissions in the event of an equipment malfunction	Sections 5.3 and 5.4
1207(f)(1)(ix)	A determination of the hazardous waste residence time	Section 4.12
1207(f)(1)(x)	If using metals feed rate extrapolation: A description of the extrapolation methodology and rationale for how the approach ensures compliance with the emission standards, documentation of the historical range of normal metals feed rates for each feedstream, and documentation that the level of spiking recommended during the CPT will mask sampling and analysis imprecision and inaccuracy to the extent that the extrapolated feed rate limits adequately assure compliance with the emission standards	Section 6.4
1207(f)(1)(xi)	If you do not continuously monitor regulated constituents in natural gas, process air feedstreams, and feedstreams from vapor recovery systems: documentation of the expected levels of regulated constituents in those feedstreams	Sections 3.8
1207(f)(1)(xii)	Documentation justifying the duration of system conditioning required to ensure the combustor has achieved steady-state operations under performance test operating conditions	Section 6.7
1207(f)(1)(xiii)	For cement kilns with in-line raw mills using emissions averaging: notification of your intent to use emissions averaging and the information required by the emission averaging provision	Not applicable
1207(f)(1)(xiv)	For preheater or preheater/precalciner cement kilns with dual stacks using emissions averaging: notification of your intent to use emissions averaging and the information required by the emission averaging provision	Not applicable
1207(f)(1)(xv)	If using Method 23 for D/F: information on whether D/F were detected at levels substantially below the emission standard in previous testing, and whether previous Method 0023 analyses detected low levels of D/F in the front half of the sampling train	Not applicable
1207(f)(1)(xvi)	If utilizing performance test waivers for mercury, SVM, chromium, or HCl/Cl_2 emission standards: information on the feed rate and flue gas flow rate monitors and demonstration of the maximum theoretical emission concentration calculation	Section 6.3 and Appendix B
1207(f)(1)(xvii)	If using a surrogate for measuring or monitoring flue gas flow rate: document that the surrogate adequately correlates with gas flow rate	Not applicable

TABLE 1-3 (CONTINUED)
DOCUMENT CROSS-REFERENCE TABLE

40 CFR 63	REQUIREMENT	LOCATION IN DOCUMENT
1207(f)(1)(xviii)	If requesting approval of an alternative monitoring request: an application to request alternative monitoring containing the following information (if not submitted prior to the CPT plan) - data or information justifying the request for an alternative monitoring requirement, a description of the proposed alternative monitoring requirement, including the operating parameter to be monitored, the monitoring approach/technique, the averaging period for the limit, and how the limit is to be calculated, and data or information documenting that the alternative monitoring requirement would provide equivalent or better assurance of compliance with the relevant emission standard, or that it is the monitoring requirement that best assures compliance with the standard and that is technically and economically practicable	Section 2.2
1207(f)(1)(xix)	Documentation of the combustion chamber temperature measurement location	Section 2.3.1
1207(f)(1)(xx)	If the source is equipped with activated carbon injection: the specifications for minimum carrier fluid flow rate or pressure drop, key parameters that affect carbon adsorption, and the operating limits you establish for those parameters based on the carbon used during the CPT (if the brand and type of carbon used during the CPT is specified and used in subsequent operations)	Not applicable
1207(f)(1)(xxi)	If the source is equipped with a carbon bed system and the brand and type of carbon used during the CPT is not specified and will not necessarily be used in subsequent operations: key parameters that affect carbon adsorption, and the operating limits you establish for those parameters based on the carbon used during the CPT	Not applicable
1207(f)(1)(xxii)	If feeding D/F inhibitor into the combustion system: key parameters that affect the effectiveness of the inhibitor, and the operating limits you establish for those parameters based on the inhibitor fed during the CPT (if you elect not to specify and use the brand and type of inhibitor used during the CPT)	Not applicable
1207(f)(1)(xxiii)	If the source is equipped with a wet scrubber and solids content will be monitored manually but not hourly as required: support of an alternative monitoring frequency	Not applicable
1207(f)(1)(xxiv)	If the source is equipped with a particulate matter control device other than a wet scrubber, baghouse, or electrostatic precipitator: documentation to support the OPLs for the control device, and support for the use of manufacturer specifications (if applicable)	Section 2.3.16
1207(f)(1)(xxv)	If the source is equipped with a dry scrubber to control HCl/Cl_2: key parameters that affect adsorption, and the limits established for those parameters based on the sorbent used during the CPT (if you elect not to specify and use the brand and type of sorbent used during the CPT)	Not applicable
1207(f)(1)(xxvi)	For purposes of calculating SVM, LVM, mercury, total chlorine (organic and inorganic), and ash feed rate limits: a description of how feedstream analytical results will be handled if they are reported as "non-detect"	Section 3.9
1207(f)(1)(xxvii)	Such other information as the Administrator reasonably finds necessary to determine whether to approve the performance test plan	None requested

1.10 Document Revision History

The original version of this plan was prepared as a draft and provided to the public as part of the NIC process in September 2021. The nature and date of any future revisions will be summarized below.

Table 1-4
Document Revision History

Revision	Date	Description of Changes
0	September 2021	Draft CPT Plan for Notice of Intent to Comply
1		
2		

2.0 OPERATING PARAMETER LIMITS

The HWC NESHAP requires facilities to monitor various process parameters to demonstrate continued compliance with the HWC NESHAP standards. The allowable limits for most of the operating parameters are determined from the results of the CPT. 40 CFR § 63.1209 specifies the OPLs that must be determined to demonstrate compliance with each emission standard of the HWC NESHAP. These OPLs must be complied with at all times that the furnace is operating in incineration mode; when the furnace is operating in decontamination mode, the HWC NESHAP OPLs are not applicable provided that HSAAP documents the transition to decon-mode and complies with all otherwise applicable requirements, including any non-HWC NESHAP operating limits or emissions standard required by TDEC in the unit's operating permit.

Each operating parameter established under 40 CFR 63.1209 must be monitored continuously using a CMS. Rolling average calculations for each OPL are only calculated from data collected when the furnace is in incineration mode. When the furnace transitions back to incineration mode from decon-mode, HSAAP uses the start anew approach described in 40 CFR 63.1209(q)(2)(ii) for calculating rolling averages.

2.1 REQUIRED OPERATING PARAMETER LIMITS

To determine the operating parameters that must be monitored during incineration mode to comply with the HWC NESHAP, each component of the flashing furnace system was reviewed. Parameters, such as temperature, waste feed rates, flue gas flow rate, and operation of the waste firing system, will be monitored for the combustion zone of the furnace. The APC train consists of a baghouse for PM, SVM, and LVM control, and a packed-bed wet scrubber for PM, mercury, and HCl/Cl_2 control. In addition, an SCR is provided for control of D/F and nitrogen oxides (NOx) from the process. An SNCR system is also provided as an alternative to the SCR for NOx control when the unit is operating as a traditional decontamination oven (decon-mode). However, the SNCR is not required for HWC NESHAP compliance; therefore, no OPLs are proposed for it in this test plan.

Table 2-1 presents the OPLs required by the HWC NESHAP. These OPLs are established as HRAs and 12-hr RAs. The OPLs presented in the table are not the actual OPLs that HSAAP has established for the flashing furnace system. Actual OPLs depend on site-specific operating conditions and may differ due to approved alternative monitoring and waiver requests. Alternative monitoring and waiver requests for the flashing furnace system are presented in Section 2.2. The actual OPLs for the furnace are presented in Section 2.3.

TABLE 2-1
REQUIRED OPERATING PARAMETER LIMITS

STANDARD	REQUIRED OPERATING PARAMETER LIMIT	REGULATORY CITATION [1]	AVERAGING PERIOD	METHOD TO DETERMINE LIMIT
Destruction and removal efficiency and hydrocarbons	Minimum combustion chamber temperature	(a)(7), (j)(1)	HRA	Average of the CPT run averages
	Maximum flue gas flow rate or production rate	(a)(7), (j)(2)	HRA	Average of the maximum HRAs for each CPT run
	Maximum total hazardous waste feed rate for each feed location	(a)(7), (j)(3)	HRA	Average of the maximum HRAs for each CPT run
	Operation of the waste firing system	(a)(7), (j)(4)	To be determined	To be determined
Dioxins and furans	Maximum flue gas temperature at the inlet to the dry particulate matter control device	(k)(1)(i)	HRA	Average of the CPT run averages
	Minimum combustion chamber temperature	(k)(2)	HRA	Average of the CPT run averages
	Maximum flue gas flow rate or production rate	(k)(3)	HRA	Average of the maximum HRAs for each CPT run
	Maximum total hazardous waste feed rate for each feed location	(k)(4)	HRA	Average of the maximum HRAs for each CPT run
	Maximum pumpable hazardous waste feed rate for each feed location	(k)(4)	HRA	Average of the maximum HRAs for each CPT run
	Minimum flue gas temperature at the catalyst entrance	(k)(8)(i)	HRA	Average of the CPT run averages
	Maximum catalyst life (time-in-use)	(k)(8)(ii)	---	Manufacturer's specifications
	Catalyst replacement specifications	(k)(8)(iii)	---	Manufacturer's specifications
	Maximum flue gas temperature at the catalyst entrance	(k)(8)(iv)	HRA	Manufacturer's specifications
Mercury	Maximum mercury feed rate	(l)(1)(i)	12-hr RA	Average of the CPT run averages
	Minimum scrubber pressure drop	(l)(2)	HRA	Manufacturer's specifications
	Minimum scrubber liquid feed pressure	(l)(2)	HRA	Manufacturer's specifications
	Minimum scrubber liquid to gas ratio or minimum liquid flow rate and maximum flue gas flow rate	(l)(2)	HRA	Average of the CPT run averages

TABLE 2-1 (CONTINUED)
REQUIRED OPERATING PARAMETER LIMITS

STANDARD	REQUIRED OPERATING PARAMETER LIMIT	REGULATORY CITATION [1]	AVERAGING PERIOD	METHOD TO DETERMINE LIMIT
Particulate matter	Maximum scrubber water solids content or minimum scrubber blowdown rate and minimum scrubber tank volume or liquid level	(m)(1)(i)(B)	12-hr RA (solids content) or HRA (blowdown and tank volume)	Average of the CPT run averages
	Control device limits for the HEPA	(m)(1)(iv)	HRA	CPT demonstrations or manufacturer recommendations
	Maximum flue gas flow rate or production rate	(m)(2)	HRA	Average of the maximum HRAs for each CPT test run
	Maximum ash feed rate	(m)(3)	12-hr RA	Average of the CPT run averages
Semivolatile metals	Maximum flue gas temperature at the inlet to the dry particulate matter control device	(n)(1)	HRA	Average of the CPT run averages
	Maximum semivolatile metals feed rate	(n)(2)(ii)	12-hr RA	Average of the CPT run averages
	Maximum scrubber water solids content or minimum scrubber blowdown rate and minimum scrubber tank volume or liquid level	(n)(3)	12-hr RA (solids content) or HRA (blowdown and tank volume)	Average of the CPT run averages
	Control device limits for the HEPA	(n)(3)	HRA	CPT demonstrations or manufacturer recommendations
	Maximum chlorine feed rate	(n)(4)	12-hr RA	Average of the CPT run averages
	Maximum flue gas flow rate or production rate	(n)(5)	HRA	Average of the maximum HRAs for each CPT run
Low volatile metals	Maximum flue gas temperature at the inlet to the dry particulate matter control device	(n)(1)	HRA	Average of the CPT run averages
	Maximum low volatile metals feed rate	(n)(2)(ii)	12-hr RA	Average of the CPT run averages
	Maximum scrubber water solids content or minimum scrubber blowdown rate and minimum scrubber tank volume or liquid level	(n)(3)	12-hr RA (solids content) or HRA (blowdown and tank volume)	Average of the CPT run averages
	Control device limits for the HEPA	(n)(3)	HRA	CPT demonstrations or manufacturer recommendations
	Maximum chlorine feed rate	(n)(4)	12-hr RA	Average of the CPT run averages
	Maximum flue gas flow rate or production rate	(n)(5)	HRA	Average of the maximum HRAs for each CPT run

TABLE 2-1 (CONTINUED)
REQUIRED OPERATING PARAMETER LIMITS

STANDARD	REQUIRED OPERATING PARAMETER LIMIT	REGULATORY CITATION [1]	AVERAGING PERIOD	METHOD TO DETERMINE LIMIT
Hydrogen chloride and chlorine	Maximum chlorine feed rate	(o)(1)(i)	12-hr RA	Average of the CPT run averages
	Maximum flue gas flow rate or production rate	(o)(2)	HRA	Average of the maximum HRAs for each CPT run
	Minimum scrubber pressure drop	(o)(3)(ii)	HRA	Manufacturer's specifications
	Minimum scrubber liquid feed pressure	(o)(3)(iii)	HRA	Manufacturer's specifications
	Minimum scrubber liquid pH	(o)(3)(iv)	HRA	Average of the CPT run averages
	Minimum scrubber liquid to gas ratio or minimum liquid flow rate and maximum flue gas flow rate	(o)(3)(v)	HRA	Average of the CPT run averages

[1] 40 CFR Part 63 Section 1209

2.2 ALTERNATIVE MONITORING AND WAIVER REQUESTS

40 CFR § 63.1209(g) allows facilities to submit an application for approval of alternative monitoring requests to document compliance with an emission standard or to waive a monitoring requirement. This application must be submitted prior to or with the CPT plan. HSAAP intends to request to waive two of the HWC NESHAP required OPLs. Specifically, HSAAP is requesting to waive the following:

- Minimum combustion chamber temperature in the flashing furnace
- Minimum scrubber liquid feed pressure

The explanation and necessary supporting information for each request is provided below.

2.2.1 MINIMUM FLASHING FURNACE TEMPERATURE LIMIT

The flashing furnace is designed to safely ignite the explosive components in the waste materials being treated and render any residual materials, whether that be ash or treated non-combustible materials safe for disposal or reuse. This treated material condition is defined by the DoD as material documented as safe (MDAS). The critical parameter in ensuring the safety of this process is the temperature of the flashing furnace. The established temperature profile is established by the Department of Defense Explosive Safety Board (DDESB) or site-specific demonstrations that have demonstrated the temperature setting as "safe" and have shown it to render the treated items as MDAS. This temperature limit is not set to obtain any specific organic destruction goal but is instead set to ensure safe ignition of the explosive material. For regulatory purposes, the afterburner is provided to ensure the required destruction of the organic materials in the waste feed. As such, institution of a minimum temperature limit on the flashing furnace is not appropriate to achieve the HWC NESHAP DRE goals. Destruction of organics in the wastes will be ensured by maintaining the temperature of the afterburner above its minimum setpoint.

2.2.2 Minimum Scrubber Liquid Feed Pressure

USEPA established the minimum liquid feed pressure limit for low-energy wet scrubber designs such as spray towers, for which liquid feed atomization is critical to controlling acid gases. USEPA acknowledges that other low-energy wet scrubber designs, such as packed bed scrubbers, do not rely on atomization for control performance, and as such, a limit on the minimum liquid feed pressure to the scrubber nozzles may not be appropriate. Per these acknowledgments, HSAAP is requesting to waive the scrubber liquid feed pressure limit for the packed bed scrubber provided in the flashing furnace system.

2.3 Target Operating Parameter Limits

During the CPT, HSAAP will demonstrate compliance with the HWC NESHAP performance standards and will establish the required OPLs for the furnace when it operates in incineration mode. The CPT has been designed to demonstrate the performance of the furnace at conditions representative of the extreme range of normal conditions. The OPLs that HSAAP plans to demonstrate are discussed below and are summarized in Table 2-2. Some OPLs will be established during the CPT, and some OPLs will be established from manufacturer's recommendations.

Table 2-2
Target Operating Parameter Limits for Incineration Mode

Operating Parameter	Units	Target Limit
Minimum afterburner temperature	°F	1,700
Maximum total hazardous waste feed rate [1]	lb/batch	5
Maximum mercury feed rate [2]	lb/hr	0.000045
Maximum ash feed rate [2]	lb/hr	75
Maximum semivolatile metals feed rate [2]	lb/hr	0.020
Maximum low volatile metals feed rate [2]	lb/hr	0.020
Maximum chlorine feed rate [2]	lb/hr	15
Maximum baghouse inlet temperature	°F	450
Maximum scrubber water conductivity	mS/cm	250
Minimum scrubber pressure drop	in. w.c.	0.5
Minimum scrubber liquid pH	--	6.0
Minimum scrubber liquid flow rate	gpm	100
Minimum SCR inlet temperature	°F	350
Maximum catalyst life	--	16,000 hours
Maximum SCR inlet temperature	°F	750

TABLE 2-2 (CONTINUED)
TARGET OPERATING PARAMETER LIMITS FOR INCINERATION MODE

OPERATING PARAMETER	UNITS	TARGET LIMIT
Maximum HEPA pressure drop	in. w.c.	6.0
Minimum stack gas velocity	fps	10
Maximum stack gas velocity	fps	60
Maximum stack gas carbon monoxide concentration	ppmv, corrected to 7% oxygen	100
Maximum flashing furnace chamber pressure	in .w.c.	< Atmospheric

[1] The feed to the flashing furnace is made up of a combination of non-hazardous and hazardous waste. Under the HWC NEHSAP, a total feed rate limit is only required on the hazardous fraction. As noted below, total pollutant loadings are regulated from all waste streams (hazardous and non-hazardous).

[2] Per the HWC NESHAP, the limits on pollutant loading reflect the contribution from all hazardous and non-hazardous waste streams.

2.3.1 MINIMUM COMBUSTION CHAMBER TEMPERATURE

A minimum combustion chamber temperature limit must be established to demonstrate compliance with the HWC NESHAP HC, DRE, and D/F standards. 40 CFR §§ 63.1209(a)(7), (j)(1)(ii), and (k)(2)(ii) require that the minimum combustion chamber temperature OPL be determined using the average of the test run averages. Compliance with the minimum combustion chamber temperature OPL is demonstrated on an HRA basis.

The flashing furnace system is equipped with two combustion chambers in which temperature can be controlled to affect the combustion of wastes: the flashing furnace and the afterburner. As detailed in Section 2.2.1, the temperature of the flashing furnace is not set to obtain any specific organic destruction goal but is instead set to ensure safe ignition of the explosive material. As such, the institution of a minimum temperature limit on the flashing furnace is not appropriate to achieve the HWC NESHAP DRE goals. For regulatory purposes, the afterburner is provided to ensure the required destruction of the organic materials in the waste feed. Destruction of organics in the wastes will be ensured by maintaining the temperature of the afterburner above its minimum setpoint.

The temperature of the afterburner is measured at the exit of the chamber, before the combustion air recuperator. HSAAP intends to demonstrate compliance with the HC, DRE, and D/F standards and establish the minimum afterburner temperature during the CPT. The target value for the minimum afterburner temperature OPL is 1,700 degrees Fahrenheit (°F). More information on the afterburner temperature measurement device will be provided in the CMS PET plan after instrument selection is complete.

2.3.2 MAXIMUM TOTAL HAZARDOUS WASTE FEED RATE

A limit on the maximum total hazardous waste feed rate must be established for each location where hazardous waste is fed to demonstrate compliance with the HWC NESHAP HC, DRE, and D/F standards. 40 CFR §§ 63.1209(a)(7), (j)(3)(ii), and (k)(4)(ii) require that the maximum total hazardous waste feed rate OPL be determined using the average of the maximum HRAs for each test run. Compliance with the maximum total hazardous waste feed rate OPL is demonstrated on an HRA basis. When there are pumpable wastes fed to the HWC, a similar limit is also required for the pumpable waste feed. However, the flashing furnace does not have any pumpable waste feeds; therefore, this limit is not applicable.

Hazardous waste is processed into the flashing furnace with the non-hazardous waste on a batch basis, receiving a load of waste, processing it, evacuating the chamber, unloading the chamber, and then reloading the chamber with new wastes. HSAAP intends to establish the required hazardous waste feed limit to the flashing furnace as a limit on the total amount of hazardous waste in each batch. As discussed previously, the HWC NESHAP does not require a limit on the total amount of non-hazardous waste processed in the furnace; however, the pollutant contributions from both the hazardous and non-hazardous waste streams are limited as discussed below.

The weight of each batch of hazardous waste that is loaded into a cage or other fixture will be measured as it is loaded. When the cage is processed through the furnace, the control system will record the amount of hazardous waste in the batch being processed. This measured weight will be compared to the maximum batch size limitation demonstrated during the CPT. The target limit for total hazardous waste in each batch is 5 pounds. More information on the weight measurement device that will be utilized to measure the weight of hazardous waste will be provided in the CMS PET plan after instrument selection is complete.

2.3.3 MAXIMUM MERCURY FEED RATE

A limit on the maximum mercury feed rate must be established to demonstrate compliance with the mercury emission standard. 40 CFR § 63.1209(l)(1)(i) requires that the maximum mercury feed rate OPL be determined using the average of the test run averages. Compliance with the maximum mercury feed rate OPL is demonstrated on a 12-hr RA basis.

Due to the low level of mercury in the waste streams, HSAAP complies with the provisions of the performance test waiver of 40 CFR § 63.1207(m) for mercury. HSAAP has established a maximum mercury feed rate OPL of 0.000045 pounds per hour (lb/hr) and a minimum stack gas velocity OPL of 10 feet per second (fps). When employed together these OPLs ensure that the mercury maximum theoretical emission concentration (MTEC) does not exceed the emission standard. The minimum stack gas velocity limit was established from manufacturer's design recommendations. The maximum mercury feed rate limit was then back-calculated from the stack gas velocity limit and the mercury emission standard of 8.1 μg/dscm corrected to seven percent oxygen using the following equation:

$$FR_{\mathrm{Hg}} = \frac{\mathrm{ES_{Hg}} \times \mathrm{A_s} \times \mathrm{V_s} \times 528 \times 3{,}600 \times (1 - \mathrm{H_2O})}{35.315 \times 453{,}590{,}000 \times (\mathrm{T_s} + 460)} \times \frac{(21 - \mathrm{O_2})}{14}$$

where:

FR_{Hg}	=	Maximum mercury feed rate OPL (lb/hr)
ES_{Hg}	=	Mercury emission standard (8.1 μg/dscm, corrected to seven percent oxygen)
V_s	=	Minimum stack gas velocity limit (10 fps)
A_s	=	Area of the stack (5.58 square feet)
T_s	=	Stack gas temperature (360°F)
460	=	Conversion factor for °F to °R
528	=	Standard temperature (°R)
H_2O	=	water vapor fraction (0.16, based on design calculations)
3,600	=	Conversion factor for seconds to hours
35.315	=	Conversion factor for cubic meters to cubic feet
453,590,000	=	Conversion factor for pounds to micrograms
O_2	=	Stack gas oxygen content (9.62% vol dry, based on recent measurements)

HSAAP will comply with the minimum stack gas velocity OPL on an HRA basis. Like the total hazardous waste feed rate, the total mercury feed rate will be evaluated on a per batch basis; however, compliance with the limit will be on a 12-hour RA basis. The mercury feed rate will be calculated from waste analytical data, batch weights for each waste stream, and the duration of each batch's processing cycle. More information on the stack gas velocity and weight measurement devices used to comply with these OPLs will be provided in the CMS PET plan after instrument selection is complete.

2.3.4 Maximum Ash Feed Rate

A limit on the maximum ash feed rate must be established to demonstrate compliance with the PM emission standard. 40 CFR § 63.1209(m)(3) requires that the maximum ash feed rate OPL be determined using the average of the test run averages. Compliance with the maximum ash feed rate OPL is demonstrated on a 12-hr RA basis.

The total ash feed rate will be evaluated on a per batch basis; however, compliance with the limit will be on a 12-hour RA basis. The ash feed rate will be calculated from waste analytical data, batch weights for each waste stream, and the duration of each batch's processing cycle. The calculated feed rate will be compared to the ash feed rate limit demonstrated during the CPT. The target ash feed rate OPL is 75 lb/hr. More information on these measurement devices will be provided in the CMS PET plan after instrument selection is complete.

2.3.5 Maximum Semivolatile Metals Feed Rate

A limit on the maximum SVM feed rate must be established to demonstrate compliance with the SVM emission standard. 40 CFR § 63.1209(n)(2)(ii) requires that the maximum SVM feed rate OPL be determined using the average of the test run averages. Compliance with the maximum SVM feed rate OPL is demonstrated on a 12-hr RA basis.

The total SVM feed rate will be evaluated on a per batch basis; however, compliance with the limit will be on a 12-hour RA basis. The SVM feed rate will be calculated from waste analytical data, batch weights for each waste stream, and the duration of each batch's processing cycle. The calculated feed rate will be compared to the SVM feed rate limit demonstrated during the CPT. The total SVM feed rate to the incineration system will be established from CPT test demonstrations and the extrapolation methods described in Section 6.4. The target SVM feed rate OPL is 0.020 lb/hr. More information on the associated measurement devices will be provided in the CMS PET plan after instrument selection is complete.

2.3.6 Maximum Low Volatile Metals Feed Rate

A limit on the maximum LVM feed rate must be established to demonstrate compliance with the LVM emission standard. 40 CFR § 63.1209(n)(2)(ii) requires that the maximum LVM feed rate OPL be determined using the average of the test run averages. Compliance with the maximum LVM feed rate OPL is demonstrated on a 12-hr RA basis.

The total LVM feed rate will be evaluated on a per batch basis; however, compliance with the limit will be on a 12-hour RA basis. The LVM feed rate will be calculated from waste analytical data, batch weights for each waste stream, and the duration of each batch's processing cycle. The calculated feed rate will be compared to the LVM feed rate limit demonstrated during the CPT. The total LVM feed rate to the incineration system will be established from CPT test demonstrations and the extrapolation methods described in Section 6.4. The target LVM feed rate OPL is 0.020 lb/hr. More information on the associated measurement devices will be provided in the CMS PET plan after instrument selection is complete.

2.3.7 Maximum Chlorine/Chloride Feed Rate

A limit on the maximum total chlorine (chlorine/chloride) feed rate must be established to demonstrate compliance with the HWC NESHAP SVM, LVM, and HCl/Cl_2 standards. 40 CFR §§ 63.1209(n)(4) and (o)(1)(i) require that the maximum total chlorine feed rate OPL be determined using the average of the test run averages. Compliance with the maximum total chlorine feed rate OPL is demonstrated on a 12-hr RA basis.

The total chlorine feed rate will be evaluated on a per batch basis; however, compliance with the limit will be on a 12-hour RA basis. The chlorine feed rate will be calculated from waste analytical data, batch weights for each waste stream, and the duration of each batch's processing cycle. The calculated feed rate will be compared to the chlorine feed rate limit demonstrated during the CPT. The target chlorine feed rate OPL is 15 lb/hr. More information on the associated measurement devices will be provided in the CMS PET plan after instrument selection is complete.

2.3.8 Maximum Baghouse Inlet Temperature

A limit on the maximum temperature at the inlet to the dry particulate matter device must be established to demonstrate compliance with the HWC NESHAP D/F, SVM, and LVM standards.

40 CFR §§ 63.1209(k)(1)(i) and (n)(1) require that the maximum inlet temperature OPL be determined using the average of the test run averages. Compliance with the maximum inlet temperature OPL is demonstrated on an HRA basis.

HSAAP will establish a limit on the maximum baghouse inlet temperature during the CPT. The target value for the maximum baghouse inlet temperature OPL is 450°F. More information on the temperature measurement device used to measure the baghouse inlet temperature will be provided in the CMS PET plan after instrument selection is complete.

2.3.9 MINIMUM SCRUBBER PRESSURE DROP

A limit on minimum wet scrubber pressure drop must be established to demonstrate compliance with the HWC NESHAP HCl/Cl_2 standard. 40 CFR § 63.1209(o)(3)(ii) requires that the minimum pressure drop OPL be based on manufacturer's specifications. Compliance with the minimum wet scrubber pressure drop OPL is demonstrated on an HRA basis.

In accordance with 40 CFR § 63.1209(o)(3)(ii), the minimum wet scrubber pressure drop OPL will be established based on manufacturer's specifications. The manufacturer's recommendation for this OPL is 0.5 inches of water column (in. w.c.). More information on the pressure measurement device will be provided in the CMS PET plan after instrument selection is complete.

2.3.10 MINIMUM SCRUBBER LIQUID TO GAS RATIO

Limits on the minimum wet scrubber liquid to gas ratio or the minimum scrubber liquid flow rate and maximum flue gas flow rate must be established to demonstrate compliance with the HWC NESHAP HCl/Cl_2 standard. 40 CFR § 63.1209(o)(3)(v) requires that the OPLs be determined using the average of the test run averages. Compliance with these OPLs is demonstrated on an HRA basis.

HSAAP will monitor the scrubber liquid flow rate and flue gas flow rate (as stack gas velocity) to satisfy this requirement. HSAAP will establish limits on the minimum scrubber liquid flow rate and the maximum stack gas velocity during the CPT. The target value for the minimum scrubber liquid flow rate is 100 gallons per minute (gpm), and the target value for the maximum stack gas velocity is 60 fps. More information on the CMS used to measure the scrubber liquid flow rate and the flue gas flow rate will be provided in the CMS PET plan after instrument selection is complete.

2.3.11 MAXIMUM SCRUBBER WATER SOLIDS CONTENT

A limit on the maximum scrubber water solids content must be established to demonstrate compliance with the HWC NESHAP PM, SVM, and LVM standards. 40 CFR §§ 63.1209(m)(1)(i)(B)(1)(i) and (n)(3) require that the maximum solids content be determined using the average of the test run averages. The maximum solids content OPL is established on a 12-hr RA basis. HSAAP satisfies this requirement by continuously monitoring the conductivity of the scrubber water with a CMS—the higher the conductivity, the higher the scrubber water solids content. HSAAP will establish the required OPL as a maximum scrubber water conductivity limit and will comply with that limit on an HRA basis.

HSAAP will establish the maximum scrubber conductivity OPL during the CPT. The target value for the maximum conductivity OPL is 250 milliSiemens per centimeter (mS/cm). More information on the instrument used to measure the scrubber water conductivity will be provided in the CMS PET plan after instrument selection is complete.

2.3.12 Minimum Scrubber Liquid pH

A limit on minimum wet scrubber liquid pH must be established to demonstrate compliance with the HCl/Cl_2 emission standard. 40 CFR § 63.1209(o)(3)(iv) requires that the minimum wet scrubber liquid pH OPL be determined using the average of the test run averages. Compliance with the minimum wet scrubber liquid pH OPL is demonstrated on an HRA basis.

HSAAP will establish the minimum scrubber liquid pH OPL during the CPT. The target value for the minimum scrubber pH OPL is 6. More information on the pH measurement device will be provided in the CMS PET plan after instrument selection is complete.

2.3.13 Minimum SCR Inlet Temperature

A limit on the minimum SCR inlet temperature must be established to demonstrate compliance with the D/F emission standard. 40 CFR § 63.1209(k)(8)(i) requires that the minimum SCR inlet temperature be determined using the average of the test run averages. Compliance with the minimum SCR inlet temperature OPL is demonstrated on an HRA basis.

HSAAP will establish the minimum SCR inlet temperature OPL during the CPT. The target value for the minimum SCR inlet temperature OPL is 350°F. More information on the temperature measurement device used to measure the SCR inlet temperature will be provided in the CMS PET plan after instrument selection is complete.

2.3.14 Maximum Catalyst Life

A limit on the maximum catalyst life for the SCR catalyst must be established to demonstrate compliance with the D/F emission standard. 40 CFR § 63.1209(k)(8)(ii) requires that the maximum catalyst life be determined using manufacturer’s specifications.

In accordance with 40 CFR § 63.1209(k)(8)(ii), the maximum catalyst life will be established based on manufacturer’s specifications. The manufacturer’s recommendation for maximum catalyst life is 16,000 hours. Compliance with this limit will be recorded in the system’s operating log as any period of operation during which flue gases are passing through the SCR system. Before reaching the end of this period, HSAAP will replace the SCR catalyst with the same proprietary catalyst from Shell Catalysts & Technologies that was installed during the CPT. More details on the catalyst are provided in Section 4.0.

2.3.15 Maximum SCR Inlet Temperature

A limit on the maximum SCR inlet temperature must be established to demonstrate compliance with the D/F emission standard. 40 CFR § 63.1209(k)(8)(iv) requires that the maximum SCR inlet temperature

OPL be determined using manufacturer's specifications. Compliance with the maximum SCR inlet temperature OPL is demonstrated on an HRA basis.

In accordance with 40 CFR § 63.1209(k)(8)(iv), the maximum SCR inlet temperature OPL will be established based on manufacturer's specifications. The manufacturer's recommendation for the maximum SCR inlet temperature is 750°F. More information on the temperature measurement device will be provided in the CMS PET plan after instrument selection is complete.

2.3.16 Control Device Limits for the HEPA

As discussed earlier, 40 CFR §§ 63.1209(m)(1)(iv) and (n)(3) require that facilities establish control device limits for any particulate matter control device other than a baghouse, wet scrubber, or electrostatic precipitator. These control device limits are to be proposed in the CPT plan and established either during the CPT or from manufacturer recommendations.

The HEPA is used as a final polishing step in the PM control regime for the furnace's APC system. A HEPA filter is a passive system that reduces PM emissions as the flue gases pass through the HEPA's filter banks. The manufacturer recommends that a maximum pressure drop limit be established to indicate when the filters are plugged or dirty. HSAAP is proposing to use this recommended maximum pressure drop as the OPL for the HEPA. The recommended maximum pressure drop for the HEPA is 6 in. w.c. Compliance with the maximum pressure drop OPL will be demonstrated on an HRA basis. More information on the pressure measurement device used to measure the HEPA pressure drop will be provided in the CMS PET plan after instrument selection is complete.

2.3.17 Maximum Flue Gas Flow Rate or Production Rate

A limit on the maximum flue gas flow rate, maximum device production rate, or another appropriate indicator of gas residence time, must be established to demonstrate compliance with the HWC NESHAP HC, DRE, D/F, PM, SVM, LVM, and HCl/Cl_2 standards. 40 CFR §§ 63.1209(a)(7), (j)(2)(i), (k)(3)(i), (m)(2)(i), (n)(5)(i), and (o)(2)(i) require that the maximum flue gas flow rate or device production rate OPL be determined using the average of the maximum HRAs for each test run. Compliance with the maximum flue gas flow rate or production rate OPL is demonstrated on an HRA basis.

HSAAP monitors the stack gas velocity to comply with this requirement and will establish the maximum stack gas velocity OPL during the CPT. The target value for the maximum stack gas velocity OPL is 60 fps. More information on the flow measurement device used to measure the stack gas velocity will be provided in the CMS PET plan after instrument selection is complete.

2.3.18 Operation of Waste Firing System

40 CFR § 63.1209(j)(4) requires OPLs be established to ensure that good operation of each hazardous waste firing system is maintained. These OPLs help to ensure compliance with the HWC NESHAP HC and DRE standards.

HSAAP proposes to use the continuously measured stack CO concentrations to satisfy this requirement based on USEPA guidance. In order to continuously control CO emissions below the HWC NESHAP limit, facilities need to maintain good combustion design, operating, and maintenance practices (GCP-D/O/M). Without these practices, it is unlikely that CO emissions could be maintained below the HWC NESHAP standards. Therefore, by continuously monitoring CO emissions, HSAAP is ensuring that the waste firing system in the flashing furnace is being properly operated and that the USEPA recommended good combustion practices are being maintained. Additional monitoring of parameters related to these practices should not be necessary.

2.3.19 Control of Combustion System Leaks

40 CFR § 63.1209(p) requires facilities to control leaks from the combustion system by either sealing the combustion chamber or by maintaining a negative pressure (below atmospheric pressure) in the chamber.

HSAAP controls combustion system leaks from the flashing furnace by maintaining a negative pressure (< 0.0 in. w.c.) throughout the thermal treatment system. The maximum combustion chamber pressure OPL will be established as the maximum flashing furnace chamber pressure. To accommodate temporary pressure fluctuations that are expected with the processing of explosive wastes, a 10-second delay will be applied to the OPL; if the furnace chamber pressure remains above 0.0 in. w.c. for longer than 10 seconds, an OPL exceedance will be triggered.

3.0 FEEDSTREAM CHARACTERIZATION

In general, five different sources are responsible for generating the wastes treated in the flashing furnace: manufacturing operations and maintenance activities, product inventory management operations, laboratory operations, research and development (R&D) operations, and modernization or demolition projects. The wastes vary with changes in production orders and include both hazardous and non-hazardous waste streams. In general, the wastes generated from each of these five sources can be categorized as one of the following:

- Hazardous energetic and explosive wastes (HEW), including off-specification product or product intermediates;
- Non-hazardous combustible wastes (NHCW), consisting of various categories of material, such as plastic, personal protective equipment (PPE), rubber, cardboard, and wood that are potentially contaminated with explosives; and,
- Non-hazardous non-combustible wastes (NHNCW) from maintenance, demolition, and/or modernization projects, consisting of various categories of material such as metal, concrete, and dirt that are potentially contaminated with explosives.

Prior to treatment in the flashing furnace, the wastes are collected from temporary storage areas throughout the HSAAP and are brought to the material handling building (MHB). From the MHB, the wastes are staged into batches for processing through the flashing furnace.

For classification and characterization, the wastes are segregated first by the waste source, then by the main grouping (HEW, NHCW, and NHNCW), and then by one of the following subcategories for non-hazardous wastes:

- Contaminated wood
- Contaminated plastic wastes, including;
  - Contaminated bags, liners, and packaging materials
  - Contaminated PPE, including Tyvek® suits, gloves, *etc.*
  - Contaminated plastic wastes limited by a Tennessee ambient air quality standard (AAQS).
- Contaminated rubber wastes
- Contaminated cardboard
- Contaminated cotton and other items, including:
  - Contaminated filters and probe socks
  - Contaminated operation and spill cleanup residues
- Contaminated oil
- Specialty wastes

In some cases where the source of the material does not affect its composition, the non-hazardous wastes may only be segregated by the main grouping (NHCW/NHNCW) and then the subcategory.

3.1 MANUFACTURING WASTE

Hazardous explosive wastes and non-hazardous explosive-contaminated wastes are generated as part of the explosive and explosive formulation manufacturing operations at HSAAP. Such wastes may include:

- Explosive and explosive-contaminated wastes from production operations;
- Explosive-contaminated wastes from maintenance operations;
- Explosive wastes from settling tanks; and,
- Explosive and explosive-contaminated wastes from building clean-ups and maintenance activities.

In addition, explosive wastes are also generated from production area concrete sumps referred to as catch basins that collect process wastewater from explosives handling buildings and provide a mechanism for settling out of the explosive solids before the wastewater is sent to the industrial sewer. However, these wastes are not treated in the flashing furnace system.

The HEW component of this waste group is classified as hazardous due to the presence of the ignitability, reactivity, or toxicity characteristic, or because they are listed for a specific industrial sector. None of the HWC NESHAP regulated metals are utilized in the manufacture of these products and therefore they are not expected to be present in the waste stream other than trace amounts. In general, the organic hazardous air pollutant (HAP) content in the HEW is expected to be low.

Those explosive-contaminated wastes generated during manufacturing and maintenance operations include various categories of materials, such as spent filters and probe socks, operation and spill clean-up residues, such as rags and PPE, contaminated wooden pallets, and used equipment, such as rubber hoses, metal parts, and other small equipment that cannot meet the criteria for MDAS.

Table 3-1 provides a summary of the expected composition of these wastes. The primary difference between the chemical composition of the explosive-contaminated wastes and the HEW is the level of energetics or explosives. The ash content for the NHCW is also generally higher than that of the HEW due to the composition of the combustible solid wastes that are contaminated with explosives.

TABLE 3-1
MANUFACTURING WASTE

PARAMETER	HEW	NHCW [1]	NHNCW [1,2]
Ash	0 – 30 %	< 10 – 25 %	None
Total chlorine	< 1 %	1 – 10 %	400 – 700 ug/ft^2
Semivolatile metals:			
Cadmium	None	< 0.5 ppm	< 0.1 ug/ft^2
Lead	None	< 1 – 10 ppm	< 5 ug/ft^2
Low volatile metals:			
Arsenic	None	< 0.5 ppm	< 0.1 ug/ft^2
Beryllium	None	< 0.5 ppm	None
Chromium	Trace	20 – 120 ppm	< 5 ug/ft^2
Mercury	None	None	None
Hazardous air pollutants:			
Toluene	None	< 0.5 ppm	None

1 Data shown represents the range expected over the various groups that make up the NHCW and NHNWC categories.
2 Based on data collected from wipe samples of solid metal surfaces.

3.2 PRODUCT INVENTORY MANAGEMENT WASTE

Finished explosive products and product intermediates manufactured at HSAAP are managed in earth-covered, concrete magazines. Once manufactured, the ultimate goal for these products is distribution throughout the defense network or incorporation into other products. However, occasionally, the manufactured explosives are removed from the explosive product inventory because they are no longer needed, they cannot be reworked, recycled, or sold, or their stabilizer levels have declined such that they present a storage hazard. In these cases, the explosive products are removed from the magazine and classified as hazardous waste. A small portion of these wastes may be treated in the future flashing furnace system.

The HEW pulled from product inventory may be hazardous due to its ignitability, reactivity, or presence of chemicals for which a toxicity characteristic threshold has been established. None of the HWC NESHAP regulated metals are utilized in the manufacture of these products and therefore they are not expected to be present in the waste stream. In general, the organic HAP content in the HEW is expected to be low.

The non-hazardous fraction of these wastes includes the cardboard containers in which these wastes are stored, the liners used in the containers, and the wooden pallets on which they are stored. No NHNCW is expected to be sourced from product inventory waste.

Table 3-2 provides a summary of the expected composition of these wastes. Like the manufacturing wastes, the primary difference between the chemical composition of the NHCW and the HEW is the level of energetics or explosives. The ash content for the NHCW is also generally higher than that of the HEW due to the composition of the combustible solid wastes that are contaminated with explosives.

TABLE 3-2
PRODUCT INVENTORY MANAGEMENT WASTE

PARAMETER	HEW	NHCW [1]
Ash	0 – 30 %	1 – 10 %
Total chlorine	0 – 60 %	< 1%
Semivolatile metals: Cadmium Lead	 None None	 < 0.5 ppm < 1 – 5 ppm
Low volatile metals: Arsenic Beryllium Chromium	 None None None	 < 0.10 ppm < 0.10 ppm 1 – 10 ppm
Mercury	None	None
Hazardous air pollutants: Toluene	 None	 < 0.5 ppm

[1] Data shown represents the range expected over the various groups that make up the NHCW categories.

3.3 LABORATORY WASTE

HSAAP operates a laboratory that conducts quality control testing of formulated products, research for new explosives, or process ingredients and intermediates. During this process, hazardous explosive wastes and non-hazardous explosive-contaminated wastes may be generated as analyses are conducted or samples are discarded.

The portion of these samples that originates from end-product formulations or manufacturing wastes and residues are classified as hazardous wastes due to their ignitability and/or reactivity. In addition, the HEW generated in the lab may be toxic for one of several solvents used in the analytical processes. These solvents serve as a potential source of HAPs in the HEW from this source, as they may be found in the samples of HEW that have been processed through the lab.

The non-hazardous, explosive-contaminated fraction of these wastes includes largely contaminated PPE and respirator cartridges. By virtue of their use in the laboratory, these materials, which are contaminated with explosives, may also be contaminated with the solvents used in the laboratory.

Table 3-3 provides a summary of the expected composition of these wastes. The primary difference between the chemical composition of the explosive-contaminated wastes and the HEW is the level of energetic and explosive material. The ash content for the NHCW is generally higher than that of the HEW due to the composition of the combustible solid wastes that are contaminated with explosives.

Both types of waste may demonstrate varying levels of HAP contamination depending on the analytical process generating the waste.

TABLE 3-3
LABORATORY WASTE

PARAMETER	HEW	NHCW [1]	NHNCW [1]
Ash	0 – 30 %	< 10 – 15 %	None
Total chlorine	0 – 60 %	< 1 - 10%	Trace
Semivolatile metals:			
Cadmium	None	< 0.5 ppm	Trace
Lead	None	< 1 – 5 ppm	Trace
Low volatile metals:			
Arsenic	None	< 0.5 ppm	Trace
Beryllium	None	< 0.1 ppm	Trace
Chromium	Trace	< 1 – 5 ppm	Trace
Mercury	None	None	None
Hazardous air pollutants:			
Acetonitrile	< 200 ppm	< 200 ppm	Trace
Chloroform	< 200 ppm	< 200 ppm	Trace
1,2-Dichloroethane	< 200 ppm	< 200 ppm	Trace
Toluene	< 0.5 ppm	< 0.5 ppm	Trace
2,2,4-Trimethylpentane	< 200 ppm	< 200 ppm	Trace

[1] Data shown represents the range expected over the various groups that make up the NHCW and NHNWC categories.

3.4 RESEARCH AND DEVELOPMENT WASTE

The HSAAP R&D team conducts both laboratory-scale and pilot plant evaluations of manufacturing processes and techniques for existing or new explosive formulations. Some of the HEW, NHCW, and NHNCW from these R&D studies will be directed to the new flashing furnace.

The HEW from R&D operations may be hazardous for ignitability, reactivity, or a combination of toxicity codes. Before running R&D projects, the R&D team meets with the environmental team to discuss how to minimize waste generation and avoid excess material generation; efforts are made to generate only those quantities required to meet contractual requirements and/or demonstrate the viability of the operation. A variety of HAPs may be present in the R&D wastes from solvents or other chemicals used in the test processes.

The non-hazardous fraction of these wastes is similar to that fraction resulting from manufacturing operations and includes items such as spent filters and probe socks, operation and spill clean-up residues, such as rags and PPE, and used equipment, such as rubber hoses, metal parts, and other small equipment that cannot meet the criteria for MDAS.

Table 3-4 provides a summary of the expected composition of these wastes. In general, absent the type and level of HAPs that may be present in the R&D wastes, the characterization of these wastes is very similar to the HEW, NHCW, and NHNCW manufacturing wastes.

TABLE 3-4
RESEARCH AND DEVELOPMENT WASTE

PARAMETER	HEW	NHCW [1]	NHNCW [1,2]
Ash	0 – 30 %	< 10 – 25 %	None
Total chlorine	0 – 60 %	1 – 10 %	400 – 700 ug/ft^2
Semivolatile metals:			
Cadmium	None	< 0.5 ppm	< 0.1 ug/ft^2
Lead	None	< 1 – 10 ppm	< 5 ug/ft^2
Low volatile metals:			
Arsenic	None	< 0.5 ppm	< 0.1 ug/ft^2
Beryllium	None	< 0.5 ppm	None
Chromium	Trace	20 – 120 ppm	< 5 ug/ft^2
Mercury	None	None	None
Hazardous air pollutants:			
Acetonitrile	< 5,000 ppm	< 5,000 ppm	None
Dimethylformamide	< 5,000 ppm	< 5,000 ppm	None
Methanol	< 5,000 ppm	< 5,000 ppm	None
Methyl tert-butyl ether	< 5,00 ppm	< 5,000 ppm	None
Toluene	< 0.5 ppm	< 0.5 ppm	None

1 Data shown represents the range expected over the various groups that make up the NHCW and NHNWC categories.

3.5 MODERNIZATION AND DEMOLITION WASTES

In a continued effort to modernize the operations at HSAAP, multiple construction projects are being conducted throughout the facility. These modernization projects and the demolition activities associated with them generate non-hazardous explosive-contaminated wastes, such as contaminated wood, concrete, soil, gravel, and rock. In addition, PPE may be generated during these operations that are contaminated with explosives. No HEW is expected from these waste sources.

As these wastes are generated sporadically when specific modernization or demolition efforts are conducted, the characterization of them can vary significantly. Table 3-5 provides a snapshot of recent results for these streams. The data presented in the table is not necessarily representative of all such wastes that may be processed. Each project generating such waste will be evaluated for the potential contaminants that could be present and analyzed, as appropriate, for HWC NESHAP regulated constituents.

TABLE 3-5
MODERNIZATION AND DEMOLITION WASTE

PARAMETER	NHCW [1]	NHNCW [1,2]
Ash	< 10 – 15 %	None
Total chlorine	1 – 10 %	400 – 700 ug/ft^2
Semivolatile metals: Cadmium Lead	 < 0.5 ppm < 1 – 5 ppm	 < 0.1 ug/ft^2 or < 0.1 ppm < 5 ug/ft^2 or < 5 ppm
Low volatile metals: Arsenic Beryllium Chromium	 < 0.5 ppm < 0.1 ppm < 5 ppm	 < 0.1 ug/ft^2 < 0.5 ppm < 5 ug/ft^2 or < 30 ppm
Mercury	None	None
Hazardous air pollutants: Toluene	 < 0.5 ppm	 None

1 Data shown represents the range expected over the various groups that make up the NHCW categories.
2 Based on data collected from wipe samples of solid metal surfaces and digested samples of concrete and soil that were collected.

3.6 CONTAMINATED OIL

Occasionally, contaminated oil may be generated from maintenance operations at the facility. This oil may be added to NHCW loads in the flashing furnace. As most of the oil results from closed-loop systems, the potential for explosive contamination is low. However, other pollutants, such as regulated metals, may be present in the oil due to material wear and/or natural levels of these materials in the oil itself. Table 3-6 provides a summary of the expected composition of the oil. Much like the modernization waste stream, however, the composition of oil may vary substantially with the originating process.

TABLE 3-6
CONTAMINATED OIL

PARAMETER	OIL
Ash	< 0.5 %
Total chlorine	< 0.1 %
Semivolatile metals: Cadmium Lead	 None < 1 ppm
Low volatile metals: Arsenic Beryllium Chromium	 None None < 1 ppm
Mercury	None
Hazardous air pollutants: Toluene	 50 ppm

3.7 SPECIALTY WASTES

The specialty wastes processed in the flashing furnace are unique, rarely generated waste streams that require thermal destruction to ensure the explosive components in them are properly destroyed. These wastes are not routinely characterized; rather, they are analyzed before being processed in the flashing furnace. The wastes may include any of the HEW generated onsite or any combination of materials from the other wastes groups that may be contaminated with them.

3.8 NATURAL GAS

Natural gas serves as the primary fuel for the burners in the flashing furnace, the afterburner, and the in-duct reheat burner. The natural gas is not expected to contain any HWC NESHAP regulated constituents in greater than trace quantities. A certificate of analysis for the natural gas is maintained onsite.

3.9 WASTE ANALYSES AND HANDLING OF NON-DETECT DATA

During the CPT, the waste that is used in each batch will be sampled and analyzed. A representative sample of each type of waste will be collected for each run. The waste samples will be analyzed for HAP content, ash, total chlorine, and metals contents to calculate the POHC and constituent loadings for each batch. Any analytical results that are reported below detectable levels will be assumed to be at the full laboratory detection limit when determining batch loads during the CPT and when establishing the feed rate OPLs.

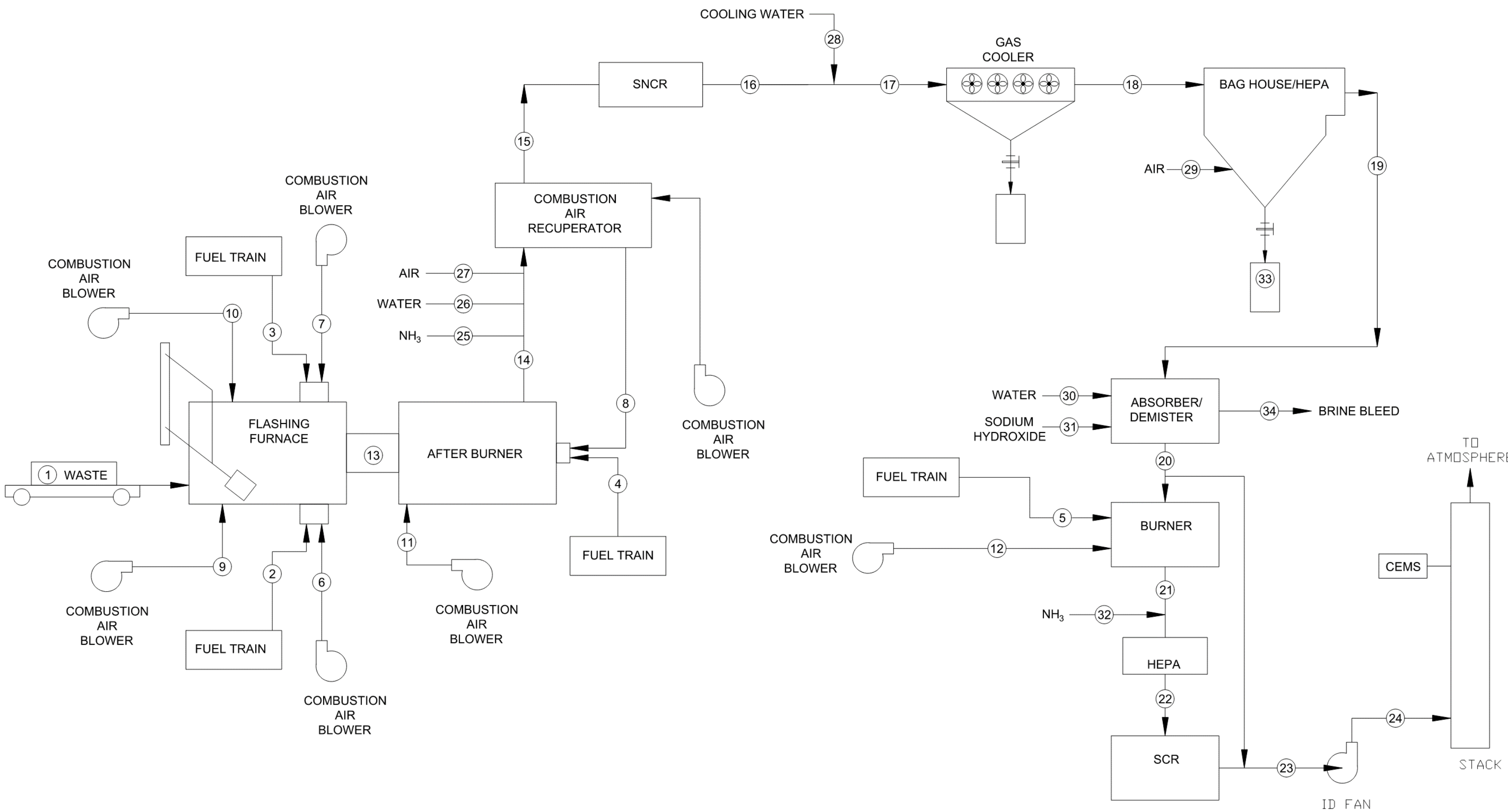
4.0 ENGINEERING DESCRIPTION

The new flashing furnace system includes a car-bottom style flashing chamber and a downstream afterburner that are used to thermally treat HEW and NHCW generated at HSAAP. In addition, the flashing furnace system will be used to thermally decontaminate NHNCW such as metal parts and concrete that are contaminated with energetic wastes. Downstream of the afterburner, a state-of-the-art APC system will ensure compliance with the HWC NESHAP emission standards.

Figure 4-1 provides a general overview of the entire flashing furnace process. HEW, NHCW, and NHNCW are generated throughout the HSAAP and are directed to the MHB. Once at the MHB, the material is sorted into the different waste streams and is staged for processing in the flashing furnace. When ready for processing, batches are transported to the flashing furnace where they are loaded onto the car bottom and into the flashing furnace. The combustion gases off-gases from the furnace flow into the high-temperature afterburner for organics destruction. From there, the off-gases enter the APC system, which includes a gas cooling system, a baghouse, a wet scrubber, a HEPA filter, and an SCR unit. An SNCR reduction injection system is also included downstream of the afterburner for use during traditional decontamination cycles (*e.g.,* contaminated metal flashing cycles). During these cycles, the flue gases will divert around the HEPA and SCR to avoid the duct reheat necessary for treatment in the SCR after wet scrubbing. Each of these pieces of APC equipment is intended to remove specific pollutants from the flue gas stream and was selected based on industry experience with similar systems.

In addition to the components listed above, each furnace is equipped with continuous process monitoring systems (CPMS), such as thermocouples, pressure transmitters, and continuous emissions monitoring systems (CEMS). These CMS help ensure unit operation within all regulatory and safety limits. Further discussion on the CMS is provided in Section 5.0.

FIGURE 4-1
GENERAL PROCESS OVERVIEW



4.1 MATERIAL HANDLING AND BATCH STAGING

The MHB is the primary location from which wastes for the flashing furnace are received and staged. Within the building, wastes are segregated and prepared into batches for treatment. When the operators are ready to load a batch for the flashing furnace, they remove the wastes from the temporary storage area and place them into containers for treatment, such as trays, strongboxes, and/or basket and tray assemblies that can withstand the high temperature conditions in the furnace. Batches of larger items may be prepared without a container. Once selected for processing, the prepared batch is transferred from the MHB to the flashing furnace, where it is loaded onto the furnace's car bottom. Once materials are loaded onto the car-bottom, and the operators have returned to the material handling building, the operator verifies all operating and safety conditions are satisfied, and then remotely directs the car-bottom to retract and the flashing furnace door to close.

4.2 FLASHING FURNACE

The flashing furnace is an insulated carbon steel, rectangular chamber, sized at approximately 27 long, 12 feet wide, and 13 feet high. The furnace is used to process both HEW, NHCW, and NHNCW, igniting all energetic and explosive material on the items and rendering any non-combustible items (*e.g.,* metals, concrete) or residuals safe for disposal as MDAS. Treatment in the flashing furnace is a fairly simple process. Once securely loaded onto the car bottom and into the chamber, the material is ignited with two natural gas-fired burners with a combined rating of 10.7 million British thermal units per hour (MMBtu/hr). Once the flame is established, the flashing furnace controls modulate the burner to achieve and maintain the minimum setpoint required to insure ignition of all energetic or explosive materials in the chamber for the required time necessary to declare the material MDAS. Combustion air to the furnace is supplied by two forced-draft blowers that are each rated at 1,000-cubic feet per minute (cfm), and auxiliary air for waste processing is supplied by two additional forced-draft blowers that are each rated at 1,750 cfm of airflow.

The main flashing furnace chamber is designed to provide safe ignition of all energetic and explosive materials in the batch and render any thermally-treated, non-combustible materials as MDAS. However, the flashing furnace chamber is not designed to fully oxidize these materials to carbon dioxide and water vapor. The temperatures of the chamber are targeted to meet DDESB criteria for MDAS, not to meet the HWC NESHAP DRE criteria. Upon exiting the flashing furnace, the flue gases flow to a downstream afterburner, which is designed to ensure complete combustion and 99.99 percent destruction of the organic HAPs in the waste feed.

After the waste has been treated in the flashing furnace, the burners are automatically shut down and a cool-down process is initiated. Once the cool-down temperature has been achieved, the operator remotely opens the flashing furnace door, extends the car bottom, and performs a remote visual inspection of the flashing furnace and the treated materials. Operators then utilize a forklift to unload the materials from the furnace's car-bottom for placement in the cooling area. Once cooled, the containers are transferred back to the MHB. Any ash residues remaining in the treatment pans are removed at the MHB and properly containerized for subsequent disposal.

4.3 Afterburner

From the flashing furnace, the flue gases flow to a downstream high temperature afterburner that operates at a minimum temperature of 1,700°F and is capable of heating the flue gases upwards of 1,832°F (1,000 degrees Celsius). The afterburner is an insulated rectangular, carbon steel chamber, sized at approximately 28.5 feet long by 10 feet wide, and 12.5 feet tall. The afterburner is heated with a single, natural gas burner rated at 16.4 MMBtu/hr and is designed to ensure the destruction of at least 99.99 percent of all organic HAPs in the waste. Combustion air is supplied by a forced draft blower that is designed to provide up to 2,400 cfm of combustion air. The afterburner is also equipped with a heat recuperator that is designed to preheat the incoming combustion air up to approximately 300°F using indirect heat exchange with the exhaust gases as they exit the afterburner.

4.4 Gas Cooler

From the afterburner, the flue gases pass through a rectangular gas cooler before they enter the downstream APC system. The gas cooler is sized at approximately 8 feet long, 6.5 feet wide, 31.5 feet high. The gas cooler uses cooling fans to reduce the temperature of the flue gas from the recuperator's outlet (1,100°F) to a temperature that is safe to enter the downstream APC system without the risk of equipment damage. In the event of a gas cooler malfunction that prevents it from achieving this cooling, the exhaust gases will be vented to the atmosphere before the baghouse to prevent equipment damage. To maintain clean heat transfer surfaces, the gas cooler is equipped with a pneumatically operated chain-sweep cleaning system. This cleaning system runs on a fixed-time cycle to prevent excess particulate buildup on the cooling tubes. Any particulate that is removed from the tubes is transferred via a sealed connection to a drum located at the bottom of the unit.

4.5 Baghouse

From the gas cooler, the flue gases enter the high-efficiency baghouse, where PM, SVM, and LVM are removed from the gas stream. The single compartment baghouse is sized at approximately 11 feet long, 13.5 feet wide, and 47 feet high, and is designed for a maximum inlet temperature of 500°F, with a nominal operating temperature of approximately 400°F. The baghouse is a pulse-jet style unit equipped with 240, polytetrafluoroethylene (PTFE) felt filter bags to provide a design air-to-cloth ratio of 2.6 to 1 at a design flow rate of approximately 9,500 standard cubic feet per minute (scfm). As flue gases flow through the filter bags from the outside to the inside, particles are collected on the outside of the bags. Inside each bag is a rigid wire cage that keeps the filter bag from collapsing while under vacuum. Upon exiting the bags, the gas passes through an integrated set of 12 HEPA filters located in the clean gas plenum before exiting the module through a ductwork connection. Downstream of the baghouse, a fabric filter leak detection device monitors the gas stream for relative particulate matter loadings to provide an indication of broken filter elements that would reduce the collection efficiency of the baghouse.

As the filter cake on the outer surface of the bags builds up, the pressure drop through the fabric filter increases. When the pressure drop reaches a programmed level, the pulse-jet cleaning cycle is automatically initiated. Each row of filter bags is pulsed with a burst of compressed air in a programmed sequence that sends a pressure wave down the interior of the filter bag, causing the bag to bulge slightly and the filter cake on the outside of the bag to be released. As the filter cake is released, it falls to the bottom conical hopper of the baghouse where it transfers via a sealed connection to a collection drum. The cleaning cycle continues to pulse the filter bags in sequential order until the baghouse pressure drop returns to a pre-set minimum.

4.6 Packed Bed Wet Scrubber

Upon exiting the baghouse, the flue gases flow into the packed bed wet scrubber, which uses a pH-controlled mixture of caustic and water to remove acid gases from the exhaust gas. The scrubber is approximately 21.5 feet tall, with a 5.5-foot diameter, and is provided with approximately 7 feet depth of ceramic packing. The bed of packing within the scrubber provides an increased surface area for the interaction of the water/caustic mixture and the flue gases, thus increasing the removal efficiency from that achieved by other types of low-energy wet scrubbers.

Between 100 and 200 gallons per minute (gpm) of water is supplied to the scrubber tower via a combination of recycled water flow from the scrubber sump and freshwater from the plant’s filtered water system. The freshwater is added to the scrubber water stream as necessary to help control the solids content of the scrubber water, as determined by measurements of the recycle stream’s conductivity. The freshwater addition also helps to make up for evaporative losses and to ensure compliance with the HWC NESHAP minimum scrubber water flow OPL. The scrubber water is pH-adjusted as necessary to maintain a minimum pH level via the addition of a 20 percent caustic solution. In addition to adding freshwater, a small blowdown stream is directed from the scrubber sump to the site’s industrial wastewater treatment plant to help control the solids content of the scrubber recycle stream.

4.7 HEPA Filter

Upon exiting the wet scrubber, the flue gasses are reheated from the 130°F scrubber outlet temperature to approximately 400°F by a 5.4 MMBtu/hr natural gas-fired burner located in the duct before the HEPA filter. The reheat is necessary to ensure that the flue gases are at the optimal temperature for treatment in the downstream SCR.

The HEPA filter provides a final polishing step for PM and metals and helps to prevent fouling of the catalyst in the downstream SCR. The HEPA filter is a passive system that reduces PM-based emissions as the flue gases pass through the HEPA’s filter banks. The HEPA filter box contains a bank of 12 filters, sized at 2 feet square by 11.5 inches thick. Each filter consists of an aluminum screen and a micro-glass fiber/acrylic resin binder filter. The pressure drop across the filters is monitored to ensure compliance with the HWC NESHAP OPL and to monitor for plugging or other buildups that would reduce the removal efficiency.

4.8 Selective Catalytic Reduction Unit

After the flue gases exit the HEPA filter, they pass into the SCR reaction zone, which is housed in a common housing as the HEPA and consists of an ammonia injection chamber and a bed of precious metal catalyst that is designed to remove NOx and D/F from the flue gas stream. The ammonia is injected upstream of the HEPA filter bank. The rate of ammonia injection is controlled via a feedback control loop from a NOx analyzer mounted at the stack. This control loop adjusts the ammonia injection rate to maintain the desired outlet NOx concentration; the D/F destruction efficiency is independent of the ammonia injection rate.

The SCR is a vertically mounted, rectangular chamber, sized at approximately 9 feet long, by 4.5 feet, wide, and 4.5 feet high. The SCR contains a 56-inch-deep bed of a proprietary catalyst from Shell Catalysts & Technologies (Shell) that is designed to achieve both high NOx and D/F removal at lower temperatures than most SCR systems. Key properties of the Shell catalyst include:

- High-activity, high-metals loaded titania/vanadia catalyst, with metal concentrations between 1 and 10 percent
- Unique tri-lobe shape with a density of between 56 and 65 pounds per cubic feet (lb/ft^3) and high surface area and porosity

The total catalyst volume within the chamber is approximately 200 cubic feet (ft^3). The chamber is externally insulated to help maintain the elevated temperature throughout the chamber and ensure the highest efficiency NOx and D/F reduction.

The operation of the SCR is controlled within the temperature limitations established under the HWC NESHAP. In addition, the catalyst used is subject to limitations on catalyst service time and replacement. The catalyst manufacturer recommends an ongoing program of catalyst screening and partial recharging to maintain catalyst activity. The manufacturer recommends replacement of the catalyst every 16,000 hours of SCR operation or when the outlet NOx concentrations or ammonia slip exceed manufacturer-recommended levels.

4.9 Selective Non-Catalytic Reduction Unit

When the flashing furnace is operating as a traditional decontamination oven, an SNCR will be used in place of the SCR for NOx treatment. The SNCR system does not provide any reduction of D/F emissions; however, these pollutants are not expected to be generated during traditional decontamination cycles.

The injection system for the SNCR will be located downstream of the afterburner. The ammonia injection rate at the SNCR will also be modulated by the in-stack NOx analyzer to maintain a target outlet concentration. When this operation is selected, the gases will divert around the HEPA and the SCR to avoid the duct reheat system, which will reduce the carbon dioxide emissions to the atmosphere generated from the natural gas reheat burner.

4.10 Induced Draft Fan

After exiting the SCR or SCR bypass line, the gases are pulled through the induced draft (ID) fan before they exit through the stack to the atmosphere. The ID fan serves as the motive force for flue gases through the entire system and is designed to move up to 11,218 standard cubic feet per minute (scfm) of flue gas at 450°F. The suction provided by this fan maintains a negative pressure throughout the entire thermal treatment system.

4.11 Exhaust Stack

The exhaust stack for the furnace system has been designed to provide adequate dispersion of the treated flue gases into the atmosphere. The 32-inch inner diameter, 75-foot-tall stack is also designed to allow the collection of stack gas samples for various compliance demonstrations. It is equipped with multiple sets of 90-degree sampling ports, each located at appropriate distances from upstream and downstream disturbances as required to meet USEPA Method 1 sampling criteria.

4.12 Hazardous Waste Residence Time

HWC NESHAP defines hazardous waste residence time as “the time elapsed from the cutoff of the flow of hazardous waste into the combustor (including, for example, the time required for liquids to flow from the cutoff valve into the combustor) until solid, liquid, and gaseous materials from the hazardous waste, excluding residues that may adhere to combustion chamber surfaces, exit the combustion chamber.” This hazardous waste residence time is not an indication of good combustion conditions. It is a regulatory term that is used to define when a unit is operating under a hazardous waste burning mode of operation. The hazardous waste residence time must be calculated, and the calculation must be included in performance test plans and the operating log.

The hazardous waste residence time for the flashing furnace system will vary depending on the materials that are being treated. For all of the incineration cycles, the batch processing time is approximately 65 minutes. This includes the time from the initial firing of the batch, through the specified energetic/explosive treatment cycle, and the cooling cycle, during which emissions continue to vent through the system. Traditional decontamination cycles for metals and concrete have a longer residence time, but that operating scenario is outside the scope of the HWC NESHAP. At all times that waste is in the chamber, from initial firing, through completion of the cool-down cycle, HSAAP will maintain compliance with the HWC NESHAP emission standards and operating requirements.

5.0 MONITORING

Monitoring equipment for the flashing furnace system includes systems for process control and stack gas analysis. This equipment enables the operators to maintain safe operations in compliance with the OPLs. This section of the plan provides an overview of the CMS associated with the furnace. These CMS are comprised of CPMS and CEMS. More information on the CMS can be found in the CMS PET plan, which will be developed and provided once the final instrument selection is complete.

5.1 CONTINUOUS PROCESS MONITORING SYSTEMS

40 CFR § 63.1209(b)(1) requires that a facility use CPMS to document compliance with the applicable HWC NESHAP OPLs. The CPMS must sample regulated operating parameters without interruption and must evaluate the detector's response at least once every 15 seconds. One-minute average (OMA) values are calculated and recorded for each regulated operating parameter, and the appropriate rolling average is calculated from the OMAs. Table 5-1 provides a summary of the CPMS. Further detail on equipment tag numbers and instrumentation types will be provided after the contracted vendor completes the designs for construction.

TABLE 5-1
SUMMARY OF CONTINUOUS PARAMETER MONITORING SYSTEMS

PROCESS VARIABLE	MEASUREMENT UNITS	OPERATING PARAMETER BASIS
Afterburner temperature	°F	HRA
Total hazardous waste feed rate	lb	Per batch
Baghouse inlet temperature	°F	HRA
Scrubber water conductivity	mS/cm	HRA
Scrubber pressure drop	in. w.c.	HRA
Scrubber liquid pH	pH	HRA
Scrubber liquid flow rate	gpm	HRA
SCR inlet temperature	°F	HRA
HEPA pressure drop	In. w.c.	HRA
Stack gas flow velocity	fps	HRA
Flashing furnace pressure	in. w.c.	Instantaneous

5.2 CONTINUOUS EMISSIONS MONITORING SYSTEMS

40 CFR § 63.1209(a)(1)(i) requires that a facility use CEMS to document compliance with the HWC NESHAP CO or HC emission standard. The facility is also required to use an oxygen CEMS to

continuously correct the CO or HC levels to seven percent oxygen. The facility has the option of monitoring either CO or HC. If a facility chooses to use an HC CEMS, they are not required to meet a CO emission standard. If a facility chooses to use a CO CEMS, they are required to demonstrate compliance with the HC emission standard during the DRE test runs of the CPT. HSAAP has chosen to continuously monitor CO emissions.

The HWC NESHAP requires compliance with Performance Specification 4B of 40 CFR Part 60, Appendix B, for CO and oxygen CEMS. This specification requires a dual-range CO monitor with span values of zero to 200 ppmv dry and zero to 3,000 ppmv dry. The HWC NESHAP also requires that any time an OMA CO value exceeds the 3,000 ppmv dry span, the OMA value must be recorded as 10,000 ppmv dry.

The CEMS chosen for the flashing furnace system will be selected to satisfy these performance requirements. In addition, the selected CEMS will be maintained using a specified maintenance routine, which includes:

- Routine maintenance;
- Daily auto calibrations;
- Quarterly Absolute Calibration Audits (ACAs); and
- Annual Relative Accuracy Test Audits (RATAs).

Any problems identified by the above tests will be remedied through corrective action measures specific to the problem encountered.

5.3 Automatic Waste Feed Cutoff System

40 CFR § 63.1206(c)(3) requires that a facility operate an HWC with a functioning system that immediately and automatically cuts off the hazardous waste feed when OPLs or emission standards are exceeded. An immediate and automatic cutoff is also required when the OMA of any CPMS exceeds the span value. Any malfunctions of the monitoring equipment or the automatic waste feed cutoff (AWFCO) system should also initiate an immediate and automatic cutoff of hazardous waste feed.

As it is not possible to stop a batch once processing of it is started, HSAAP will operate an AWFCO system for the flashing furnace that prohibits the feed of new batches to the furnace when unpermitted conditions are present. Each OPL will be tied into the AWFCO system, as will the span value of each instrument that monitors the OPL. Once the final instrument selection is complete, a complete list of all AWFCO trigger points will be included in this plan.

5.4 Emergency Shutdown System

The flashing furnace system is equipped with numerous safety systems that are engineered to help prevent emergency scenarios from occurring. However, like any equipment, it is expected that systems and components of these systems will fail at some point in time. As such, the flashing furnace control system is provided with a series of fail-safe measures that are designed to take the system to a safe state in the event of one of these failures. Under these emergency scenarios, the following actions may be triggered:

- Processing of waste batch may stop;
- The burners may shutdown;
- Air flow into the flashing furnace may be restricted; and,
- The emergency bypass stack downstream of the afterburner may open to protect the downstream APC equipment.

Not all of these actions will happen during every emergency and, in the case of bypassing the baghouse or SCR system, every effort will be made to prevent this failure response from happening. However, the primary goal in each of these situations is the protection of human health and equipment integrity, preventing a small incident from becoming a more catastrophic one.

6.0 COMPREHENSIVE PERFORMANCE TEST OPERATIONS

HSAAP intends to perform one test condition to demonstrate that the flashing furnace operates in conformance with the applicable HWC NESHAP performance standards. This section of the plan describes the operating conditions planned for the CPT. In addition, the preparation of materials to be fed during the testing, the amount of waste to be used, and a schedule for the testing are presented.

6.1 TEST DESCRIPTION

The CPT is designed to demonstrate operation of the flashing furnace at the extreme range of normal conditions, consistent with 40 CFR § 63.1207, while sampling the stack gas to evaluate compliance with the HWC NESHAP DRE, CO, HC, D/F, SVM, LVM, HCl/Cl_2, and PM standards. During the test, the afterburner temperature will be minimized, the hazardous waste loading in each batch will be maximized, and constituent batch loads will be elevated to near maximum levels. In addition, the APC will be operated under worst-case conditions. Table 6-1 provides a summary of the anticipated operating conditions for the CPT. All operating conditions presented in this plan are estimated values; the actual conditions observed during the test may vary slightly from these values.

TABLE 6-1
TARGET OPERATING CONDITIONS FOR THE CPT

OPERATING PARAMETER	UNITS	TARGET
Afterburner temperature	°F	1,700
Total hazardous waste feed rate [1]	lb/batch	5
Mercury feed rate [2]	lb/hr	< 0.000045
Ash feed rate [2]	lb/hr	75
Semivolatile metals feed rate [2,3]	lb/hr	0.020
Low volatile metals feed rate [2,3]	lb/hr	0.020
Chlorine feed rate [2]	lb/hr	15
Baghouse inlet temperature	°F	450
Scrubber water conductivity	mS/cm	250
Scrubber pressure drop	In. w.c.	> 0.5
Scrubber liquid pH	--	6.0
Scrubber liquid flow rate	gpm	100
SCR inlet temperature	°F	350
HEPA pressure drop	In. w.c.	< 6.0
Stack gas flow velocity	fps	60
Stack gas carbon monoxide concentration	ppmv, corrected to 7% oxygen	< 100

Table 6-1 (continued)
Target Operating Conditions for The CPT

Operating Parameter	Units	Target
Combustion chamber pressure in flashing furnace	in .w.c.	< Atmospheric
Estimated Stack Gas Conditions:		
Stack gas temperature	°F	360
Stack gas flow rate	dscfm	4,200
Stack gas oxygen concentration	% vol dry	12.3

1 The feed to the flashing furnace is made up of a combination of non-hazardous and hazardous waste. Under the HWC NEHSAP, a total feed rate limit is only required on the hazardous fraction. As noted below, total pollutant loadings are regulated from all waste streams (hazardous and non-hazardous).

2 Per the HWC NESHAP, the feed rates on regulated pollutants reflect the contribution from all hazardous and non-hazardous waste streams.

3 HSAAP intends to utilize feed rate extrapolation to set the final OPL for this parameter. The feed rate demonstrated during the CPT will be combined with the removal efficiency data generated during the test to establish the final OPL. See Section 6.3 for further details.

Stack gas samples will be collected during the CPT in triplicate sampling runs to demonstrate compliance with the DRE, HC, D/F, SVM, LVM, HCl/Cl_2, and PM standards. 40 CFR § 63.1209 requires that certain OPLs be established to demonstrate continuous compliance with these emission standards. The following OPLs will be based on the operating conditions demonstrated during the CPT:

- Minimum afterburner temperatures;
- Maximum total hazardous waste feed rate;
- Maximum ash, SVM, LVM, and chlorine feed rates;
- Maximum baghouse inlet temperature;
- Maximum scrubber water conductivity;
- Minimum scrubber liquid pH;
- Minimum scrubber liquid flow rate;
- Minimum SCR inlet temperature; and,
- Maximum stack gas velocity.

In addition, 40 CFR § 63.1207(g)(1) requires that certain conditions be satisfied during testing for some of the HWC NESHAP pollutants. Specifically:

- 40 CFR § 63.1207(g)(1)(A) requires that chlorine be fed at normal or higher levels during the D/F performance test;
- 40 CFR § 63.1207(g)(1)(B) requires that ash be fed at normal or higher levels during the SVM and LVM performance tests; and
- 40 CFR § 63.1207(g)(1)(C) requires that the baghouse be operated on its normal cleaning cycle during the PM, SVM, and LVM performance tests.

The feed rates of chlorine and ash will be maximized during the CPT. Therefore, the feed requirements of 40 CFR § 63.1207(g)(1) will be satisfied. Additionally, the baghouse will be set to clean when the differential pressure across it exceeds manufacturer recommendations, consistent with normal, daily operations.

6.2 PRINCIPAL ORGANIC HAZARDOUS CONSTITUENT

As provided in 40 CFR § 63.1219(c)(3)(ii), POHCs must be specified that are representative of the most difficult to destroy organic compounds in the hazardous waste feedstreams. The POHC must be chosen based on the degree of difficulty of incineration of the organic constituents in the waste. USEPA's primary ranking hierarchy was used as criteria in the selection of the POHC to ensure that the POHC chosen represents the widest range of compounds expected to be burned.

The POHC selection approach is based on the Thermal Stability Index (TSI) developed by Dellinger *et. al.*, at the University of Dayton Research Laboratory. This approach has been included in the USEPA's handbook *Guidance on Setting Permit Conditions and Reporting Trial Burn Results*. This ranking of compounds is based on their thermal stability, with the most stable being considered the most difficult to burn. The compounds are divided into seven classes. Compounds in Classes 1 and 2 are considered the most difficult to burn. Therefore, these compounds make acceptable POHCs.

In addition to the TSI ranking, POHC selection is influenced by other criteria as follows:

- Stability: The compound selected as POHC must be sufficiently stable and have a boiling point suitable for conventional stack sampling techniques; and
- Representative: The compound selected as a POHC must be representative of the types of constituents that the systems will typically handle.

HSAAP proposes to use naphthalene as the POHC for the CPT. Naphthalene is ranked in Class 1 of the TSI, as is the acetonitrile that is potentially present in some of the R&D and laboratory waste, and the 1,3,5-trichlorobenzene found in some of the product intermediate waste. Although naphthalene is not expected to be found in HSAAP's wastes, it is similar in its base chemical structure to the toluene used in many of HSAAP's product formulations. Unlike acetonitrile, naphthalene is solid, making it more suitable for spiking into flashing furnace batches during the CPT. Absent acetonitrile and 1,3,5-trichlorobenzene, many of the POHCs in HSAAP's wastes are, by their energetic nature, easy to destroy and are ranked in Class 2 or 4 of the TSI. Therefore, demonstrating DRE for naphthalene should provide an adequate demonstration for all potential organics present in the HSAAP wastes, including acetonitrile. The properties of naphthalene are summarized in Table 6-2.

TABLE 6-2
PROPERTIES OF THE SELECTED PRINCIPAL ORGANIC HAZARDOUS CONSTITUENT

PROPERTY	NAPHTHALENE
Formula	$C_{10}H_8$
Chemical Abstract Service	91-20-3
Molecular weight, lb/lbmol	128.17
Boiling point, °C	424
Thermal stability ranking [1]	Class 1, 5

[1] *Guidance on Setting Permit Conditions and Reporting Trial Burn Results - Volume II of the Hazardous Waste Incineration Guidance Series*

The amount of POHC detected in the stack gases will be used to determine the DRE for the furnace. DRE is defined in 40 CFR § 63.1219(c)(1)**.** DRE is determined for the POHC from the following equation:

$$DRE = \left[1 - \frac{W_{out}}{W_{in}}\right] \times 100$$

where:

W_{out} = Mass emission rate of the POHC present in exhaust emissions before release to the atmosphere; and

W_{in} = Mass feed rate of the same POHC in the waste feed.

The POHC must be supplied to the unit in sufficient quantity to be detectable in the stack gas. Each stack sampling method has a minimum detection limit. Using the most conservative approach for the test, any compound which is found to be present in the stack gas at quantities below the method minimum detection limit or that is undetected in the stack gases is assumed to be present at the minimum detection limit. Therefore, it is very important to ensure that there is an adequate quantity of POHC in the furnace feed to demonstrate the HWC NESHAP-required 99.99 percent DRE. To provide an ample margin of safety, the target DRE used for all POHC spiking calculations is set at 99.999 percent.

The required POHC feed rate is determined by back-calculating from the stack sampling method detection limits and the target DRE using the following equation, which is derived from the DRE equation in 40 CFR § 63.1219(c)(1):

$$W_{in} = W_{out} \times \left[\frac{100}{100 - DRE}\right]$$

Table 6-3 provides the POHC quantity that will be required for the CPT based on the typical detection limits achieved using an SW-846 Method 0010 sampling train.

TABLE 6-3
PRINCIPAL ORGANIC HAZARDOUS CONSTITUENT QUANTITY

PARAMETER	UNITS	NAPHTHALENE
Method detection limit	µg/dscf	0.00030
Estimated stack flow rate	dscfm	4,200
Emission rate required for detection	lb/hr	0.00000017
Target destruction and removal efficiency [1]	%	99.999
Required POHC feed rate	lb/hr	0.167
Target POHC feed rate	lb/hr	1

1 To ensure adequate POHC to demonstrate the 99.99 percent DRE required by the HWC NESHAP, one additional order of magnitude of removal (99.999 percent) is used as the target in establishing the POHC feed rate.

6.3 PERFORMANCE TEST WAIVER

HSAAP intends to continue to comply with the provisions of the performance test waiver of 40 CFR § 63.1207(m) for mercury. HSAAP has established a maximum mercury feed rate OPL and a minimum stack gas velocity OPL that ensure that the mercury MTEC remains below the emission standard at all times (See Section 2.3.3). No stack testing will be performed for mercury during the CPT.

6.4 METALS FEED RATE EXTRAPOLATION

HSAAP intends to utilize feed rate extrapolation to establish the SVM and LVM feed rate OPLs, as allowed by 40 CFR § 63.1209(n)(2)(vii). The metals feed rates and associated emission rates will be used to extrapolate to higher allowable feed rate OPLs. A linear extrapolation approach will be used. The following equation will be used for the extrapolation:

$$FR_{LIMIT} = FR_{CPT} \times \frac{ES}{EC_{CPT}}$$

where:

FR_{LIMIT} = Maximum allowable feed rate limit of SVM or LVM (lb/hr)

FR_{CPT} = Feed rate of SVM or LVM demonstrated during the CPT (lb/hr)

ES = HWC NESHAP standard for SVM or LVM (µg/dscm corrected to seven percent oxygen)

EC_{CPT} = Emission concentration of SVM or LVM demonstrated during the CPT (µg/dscm corrected to seven percent oxygen)

As discussed in the *Final Technical Support Document for HWC MACT Standards, Volume IV: Compliance with the HWC MACT Standards*, linear upward extrapolation can be conservatively used to allow for higher metals feed rate limits while continuing to ensure that the facility is within the emissions standards. This is because metals system removal efficiencies tend to stay the same or increase as the feed rate increases. This applies to all metal types and volatility groupings. Therefore, an extrapolated metals feed rate will most likely produce an actual emission rate that is lower than the predicted emission rate. A linear extrapolation should ensure that the emission standards will not be exceeded at the higher feed rates.

The target spiking rates were chosen to ensure that the CPT would provide a reasonable representation of the system removal efficiency for SVM and LVM and to minimize the effects of method detection limits on the extrapolation calculations. Table 6-4 presents the target metals feed rates and the expected extrapolated metals OPLs.

TABLE 6-4
METALS FEED RATE EXTRAPOLATION

METAL GROUP	UNITS	TARGET FEED RATE	EXTRAPOLATED LIMIT [1]
Semivolatile metals	lb/hr	0.011	0.020
Low volatile metals	lb/hr	0.011	0.020

[1] Estimated based on engineering design calculations. The actual OPL will be established based upon the emission demonstrations during the CPT. HSAAP will extrapolate the measured feed and emissions up to the HWC NESHAP emission limit as proposed above.

6.5 WASTE SPIKING

The waste streams will be spiked with surrogate materials to elevate the ash, chlorine, and metals loading into the flashing furnace system during the CPT and to provide the required POHC for the DRE demonstration. The following spiking materials will be used:

- Lead acetate trihydrate to increase the feed rate of SVM to the flashing furnace system and to allow for accurate extrapolation of the SVM feed rate OPL;
- Chromium powder to increase the feed rate of LVM to the flashing furnace system and to allow for accurate extrapolation of the LVM feed rate OPL;
- Potassium chloride to maximize the chlorine feed rate to the flashing furnace system;
- Titanium dioxide to provide the balance of ash needed to maximize the ash feed rate to the furnace; and,
- Naphthalene to provide the POHC for the DRE determination.

Table 6-5 provides an overview of the spiking materials that will be utilized and the constituent loadings targeted for each spiking material. The spiking materials will be fed with the batches in small packets that have been prepared and weighed before testing.

TABLE 6-5
WASTE SPIKING PLAN

SPIKING MATERIAL	SPIKING ELEMENT	ELEMENTAL SPIKING RATE (LB/HR)	EXPECTED ELEMENTAL CONC. (%WT)	TOTAL SPIKING RATE (LB/HR)
Lead acetate trihydrate	Semivolatile metals	0.011	54 percent	0.022 (10 g/hr)
	Ash	0.013	58 percent	
Chromium powder	Low volatile metals	0.011	100 percent	0.011 (5 g/hr)
	Ash	0.011	100 percent	
Potassium chloride	Chlorine	15	48 percent	31 lb/hr
	Ash	31	100 percent	
Titanium dioxide	Ash	20	100 percent	20 lb/hr
Naphthalene	Naphthalene	1	100 percent	1 lb/hr

6.6 TEST MATERIALS AND QUANTITIES

Table 6-6 summarizes the quantity of materials required to conduct the testing. Triplicate runs will be performed during the CPT. A total of 5 batches of material have been allotted for each test run, with each batch providing approximately 45 minutes' worth of sampling time after the 15-minute period required to reach steady-state conditions. In addition, an additional five batches of feed have been provided to allow enough material for one extra test run. Therefore, for the purpose of calculating spiking material quantities, a total of 20 hours has been used.

TABLE 6-6
TEST MATERIAL QUANTITIES

MATERIAL	TOTAL QUANTITY (POUNDS)
Hazardous explosive waste	100 pounds
Contaminated non-hazardous manufacturing wastes	11,200 pounds
Lead acetate trihydrate	0.5 pounds
Chromium powder	0.25 pounds
Potassium chloride	620 pounds
Titanium dioxide	400 pounds
Naphthalene	20 pounds

6.7 TEST SCHEDULE

The sampling effort will require four days to complete. During this period, sampling equipment and instruments will be prepared and calibrated, supplies will be brought on-site, and sampling locations will be prepared. Although the onsite activities will dictate the actual timing, a preliminary schedule is presented in Table 6-7.

HSAAP has allowed 15 minutes of run time to establish the steady-state conditions after the start of each 60-minute batch cycle, based on recommendations provided by the designer of record. This period reflects the time necessary to reach the desired treatment temperature in the flashing furnace. Approximately 30 minutes have been provided between each batch to unload the prior batch and load a new one. Between four and five batches will be required to complete each 180-minute test run. If the minimum required sampling time has not been satisfied at the end of the fourth batch, another batch will be initiated.

TABLE 6-7
TEST SCHEDULE

DAY	START	STOP	ACTIVITY
1	- - -	- - -	Set-up of sampling equipment and pre-test meetings
2	07:00	08:30	Prepare sampling equipment for CPT Run 1, and bring the system to target operating conditions
2	08:00	08:30	Load designated material in the flashing furnace for Run 1, Batch 1
2	08:30	08:45	Initiate treatment of Run 1, Batch 1, and establish steady-state
2	08:45	09:30	CPT Run 1, Part 1
2	09:30	10:00	Load designated material in the flashing furnace for Run 1, Batch 2
2	10:00	10:15	Initiate treatment of Run 1, Batch 2, and establish steady-state
2	10:15	11:00	CPT Run 1, Part 2
2	11:00	11:30	Load designated material in the flashing furnace for Run 1, Batch 3
2	11:30	11:45	Initiate treatment of Run 1, Batch 3, and establish steady-state
2	11:45	12:30	CPT Run 1, Part 3
2	12:30	13:00	Load designated material in the flashing furnace for Run 1, Batch 4
2	13:00	13:15	Initiate treatment of Run 1, Batch 4, and establish steady-state
2	13:15	14:00	CPT Run 1, Part 4
2	14:00	16:00	Stop waste processing and recover samples
3	07:00	08:30	Prepare sampling equipment for CPT Run 2, and bring the system to target operating conditions
3	08:00	08:30	Load designated material in the flashing furnace for Run 2, Batch 1
3	08:30	08:45	Initiate treatment of Run 2, Batch 1, and establish steady-state
3	08:45	09:30	CPT Run 2, Part 1
3	09:30	10:00	Load designated material in the flashing furnace for Run 2, Batch 2
3	10:00	10:15	Initiate treatment of Run 2, Batch 2, and establish steady-state
3	10:15	11:00	CPT Run 2, Part 2

TABLE 6-7 (CONTINUED)
TEST SCHEDULE

DAY	START	STOP	ACTIVITY
3	11:00	11:30	Load designated material in the flashing furnace for Run 2, Batch 3
3	11:30	11:45	Initiate treatment of Run 2, Batch 3, and establish steady-state
3	11:45	12:30	CPT Run 2, Part 3
3	12:30	13:00	Load designated material in the flashing furnace for Run 2, Batch 4
3	13:00	13:15	Initiate treatment of Run 2, Batch 4, and establish steady-state
3	13:15	14:00	CPT Run 2, Part 4
3	14:00	16:00	Stop waste processing and recover samples
4	07:00	08:30	Prepare sampling equipment for CPT Run 3, and bring the system to target operating conditions
4	08:00	08:30	Load designated material in the flashing furnace for Run 3, Batch 1
4	08:30	08:45	Initiate treatment of Run 3, Batch 1, and establish steady-state
4	08:45	09:30	CPT Run 3, Part 1
4	09:30	10:00	Load designated material in the flashing furnace for Run 3, Batch 2
4	10:00	10:15	Initiate treatment of Run 3, Batch 2, and establish steady-state
4	10:15	11:00	CPT Run 3, Part 2
4	11:00	11:30	Load designated material in the flashing furnace for Run 3, Batch 3
4	11:30	11:45	Initiate treatment of Run 3, Batch 3, and establish steady-state
4	11:45	12:30	CPT Run 3, Part 3
4	12:30	13:00	Load designated material in the flashing furnace for Run 3, Batch 4
4	13:00	13:15	Initiate treatment of Run 3, Batch 4, and establish steady-state
4	13:15	14:00	CPT Run 3, Part 4
4	14:00	16:00	Stop waste processing and recover samples

7.0 SAMPLING AND ANALYSIS PROTOCOL

Sampling and analysis performed during the CPT described in Section 6 will demonstrate the performance of the flashing furnace system with respect to the HWC NESHAP emission standards. The CPT will consist of one test condition made of up three replicate test runs. For each run, samples will be collected using procedures described in the QAPP found in Appendix A. Since most of the proposed methods are standard reference methods, only brief descriptions are presented. Sample holding times will be consistent with the analytical requirements for the methods used.

7.1 WASTE SAMPLING AND ANALYSIS

Several types of waste will be fed to the furnace for the CPT. HSAAP personnel will collect samples of the waste before it is loaded to the flashing furnace to provide an analysis of the waste composition for each run. Samples of the waste will be collected from the batches created for each test run. Composite samples will be created from each batch staged for inclusion in each test run, resulting in a total of three composite samples of each waste type for the CPT. Duplicate samples of each waste will be collected for one of the test runs to provide QA/QC of the waste sampling and analysis.

The samples will be collected following the procedures described in the feedstream analysis plan prepared according to 40 CFR § 63.1209(c)(2). For all parameters other than naphthalene, these samples will be analyzed onsite by the HSAAP laboratory. Splits of each composite sample will be sent to a nearby commercial laboratory for naphthalene analysis. The information obtained from these analyses will be used with the batch recipe data to determine the constituent feed rates during the CPT.

TABLE 7-1
WASTE PROPELLANT SAMPLING AND ANALYSIS

SAMPLING METHOD	SAMPLING FREQUENCY	ANALYTICAL PARAMETER	ANALYTICAL METHOD [1]	METHOD DESCRIPTION
Grab sampling	Before each test run	Ash	Site-specific method	Muffle furnace
		Arsenic, beryllium, cadmium, chromium, lead, and mercury	Site-specific method	Inductively coupled plasma, optical emission spectroscopy (ICP-OES)
		Total chlorine/chloride	Site-specific method	Bomb calorimetry, followed by ion chromatography (IC)
		Naphthalene	SW-846 Method 8270C [2]	High-resolution gas chromatography/mass spectrometry (HR-GC/MS)

1 All referenced procedures are included in the HSAAP laboratory standard operating procedures (SOPs). Specific procedure numbers will be issued when the SOPs are approved.

2 The naphthalene content of the hazardous explosive wastes will be determined using formulation data sheets rather than waste analysis, as it is not possible to ship the explosive wastes offsite, and the internal HSAAP laboratory does not have the capability for determining naphthalene.

7.2 Spiking Material Sampling and Analysis

The spiking materials will not be sampled and analyzed during the test. These will be pure materials purchased for testing. The supplier of the materials will certify the spiking materials' compositions with either a material safety data sheet or certificate of analysis.

7.3 Stack Gas Sampling and Analysis

The stack gas will be sampled for naphthalene, D/F, HC, CO, PM, HCl/Cl_2, SVM, and LVM emissions during the CPT. The following sampling methods will be used:

- USEPA Methods 1, 2, 3A, and 4 for determination of stack sampling traverse points, gas flow rate, composition, and moisture content;
- SW-846 Method 0010 for measurement of naphthalene;
- SW-846 Method 0023A for measurement of D/F emissions;
- USEPA Method 5 and USEPA Method 26A combined for measurement of PM and HCl/Cl_2 emissions;
- USEPA Method 29 for measurement of SVM and LVM emissions;
- USEPA Method 25A for measurement of HC concentrations in the stack gas; and
- The facility's CEMS for measurement of CO and oxygen concentrations in the stack gas.

Table 7-2 summarizes the stack gas samples to be taken, the parameters to be measured, and the frequency of measurement. A laboratory or collection of commercial laboratories will be selected to analyze the CPT air samples once the test program is closer to execution.

Table 7-2
Stack Gas Sampling and Analysis

Sampling Method [1]	Sampling Duration	Analytical Parameter	Analytical Method [1]	Method Description
USEPA Methods 1, 2, 3A, and 4	Not applicable	Traverse points, stack flow rate, gas composition, and moisture content	Not applicable	Not applicable
SW-846 Method 0010	3 hours (minimum)	Naphthalene	SW-846 Method 8270C	High-resolution gas chromatography and mass spectrometry (HRGC/MS)
SW-846 Method 0023A	3 hours (minimum)	Dioxins and furans	SW-846 Methods 0023A/8290B	HR GC/MS
USEPA Methods 5/26A	1 hour (minimum)	Particulate matter	USEPA Method 5	Gravimetric method
		Hydrogen chloride and chlorine	USEPA Method 26A	IC
USEPA Method 29	1 hours (minimum)	Arsenic, beryllium, cadmium, chromium, and lead	SW-846 Method 6010C	Inductively coupled plasma atomic emission spectrometry (ICP-AES)

TABLE 7-2 (CONTINUED)
STACK GAS SAMPLING AND ANALYSIS

SAMPLING METHOD [1]	SAMPLING DURATION	ANALYTICAL PARAMETER	ANALYTICAL METHOD [1]	METHOD DESCRIPTION
USEPA Method 25A	Continuous	Total hydrocarbons	USEPA Method 25A	Flame ionized CEMS
Facility CEMS (USEPA Performance Specification 4B)	Continuous	Carbon monoxide	Facility CEMS (USEPA Performance Specification 4B)	Non-dispersive infrared CEMS
Facility CEMS (USEPA Performance Specification 4B)	Continuous	Oxygen	Facility CEMS (USEPA Performance Specification 4B)	Paramagnetic CEMS

[1] SW-846 refers to Test Methods for Evaluating Solid Waste, Third Edition. USEPA Method refers to New Source Performance Standards, Test Methods, and Procedures, Appendix A, 40 CFR Part 60. USEPA Performance Specification refers to New Source Performance Standards, Performance Specifications, Appendix B, 40 CFR Part 60.

Appendix A:

QUALITY ASSURANCE PROJECT PLAN
(TO BE PROVIDED WITH FINAL SUBMISSION)

Appendix B:

CONTINUOUS MONITORING SYSTEMS PERFORMANCE EVALUATION TEST PLAN
(TO BE PROVIDED WITH FINAL SUBMISSION)