Umatilla Chemical Agent Disposal Facility

ATTACHMENT 14

HD AGENT RINSATE EMISSIONS DEMONSTRATION TEST PLAN FOR LIQUID INCINERATORS 1 AND 2

UMATILLA CHEMICAL AGENT DISPOSAL FACILITY
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Revision 3

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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HD RINSATE EMISSIONS DEMONSTRATION TEST PLAN FOR LIQUID INCINERATORS 1 AND 2

OVERVIEW

The Umatilla Chemical Agent Disposal Facility (UMCDF), United States Environmental Protection Agency (EPA) Identification Number ORQ 000 009 431, operates under a Resource Conservation and Recovery Act (RCRA) permit issued pursuant to Oregon Revised Statutes Chapter 466 and the Hazardous Waste Regulations promulgated there under by the Oregon Department of Environmental Quality (DEQ) in Chapter 340 of the Oregon Administrative Rules (OAR).

The UMCDF is subject to the Maximum Achievable Control Technology (MACT) regulation for Hazardous Waste Combustors (HWC) promulgated September 30, 1999, and the final replacement standards that became effective December 12, 2005. To demonstrate compliance with the HWC MACT, the UMCDF has satisfied the comprehensive performance testing (CPT) and continuous monitoring system evaluation requirements found in 40 Code of Federal Regulations (CFR) §63.1207 and in 40 CFR §63.7 (MACT General Provisions). Initial CPT requirements under the interim standards (i.e., the standards published in the Federal Register [FR] on February 13, 2002, 67 FR 6792) have been satisfied for the Liquid Incinerator 1 (LIC1) and the Liquid Incinerator 2 (LIC2). In accordance with 40 CFR §63.1207(d)(4), all subsequent periodic comprehensive performance testing and confirmatory testing requirements were waived under the interim standards. In accordance with 40 CFR §63.1207(c)(3), the UMCDF conducted a CPT on HD agent to demonstrate compliance with the standards under 40 CFR §63.1219 from April 29, 2010 through June 26, 2010. The data from these tests have been submitted to DEQ under separate cover.

The UMCDF conducted HD agent trial burns (ATB) required by the UMCDF Hazardous Waste Permit and HWC MACT. This plan has been developed to address emission testing that will occur for LIC1 and LIC2 to feed a mustard agent derivative waste stream, HD rinsate. As both LIC1 and LIC2 will be tested, the acronym “LIC” may be used throughout the plan to reference LIC1, LIC2, or both. The term "RCRA" is commonly used in the plan when referencing the UMCDF Hazardous Waste Permit requirements. The UMCDF will comply with the governing permit requirements of RCRA and the Clean Air Act that are in place at the time this emissions testing is conducted.

The purpose of this plan is to provide emissions data from feeding HD rinsate to the LIC. Prior to conducting the emissions test, an evaluation of the Continuous Monitoring System (CMS) will be performed. Documentation of the adequacy of the CMS will be submitted to the operating record at least 15 days prior to the start of the HD rinsate emissions demonstration test.

The permitted operating parameter limits (OPLs) in effect at the time of testing will be used to process HD agent rinsate. No changes to these OPLs are proposed. The feed rate for HD rinsate and any spent decontamination solution (SDS) will be in accordance with the current RCRA, Title V, and/or Notice of Compliance (NOC) feed rates and OPLs.

The continuous operation of the MPF is required to supply the HD rinsate for the LIC HD rinsate emissions test, therefore, the testing period will span approximately 20 days for both LICs.

The objectives for each LIC HD rinsate emissions demonstration test are as follows:

- Demonstrate that HD agent emissions are within the permitted emission rate.

- Demonstrate particulate matter emissions do not exceed 34.3 milligram/dry standard cubic meter (dscm) and/or 0.013 grains per dry standard cubic foot corrected to 7% oxygen.
- Demonstrate hydrogen chloride emissions do not exceed 1.91E-02 grams per second or 4 pounds per hour and 32 parts per million by volume (ppmv) corrected to 7% oxygen (hydrogen chloride and chlorine gas, combined emissions, expressed as chloride equivalents, dry basis).
- Demonstrate dioxin and furan emissions do not exceed 0.40 nanograms (ng) toxicity equivalence per dry standard cubic meter (dscm) corrected to 7% oxygen.
- Demonstrate the carbon monoxide level corrected to 7% oxygen does not exceed the 100 ppmv, dry basis over a rolling one-hour average (ROHA).
- Demonstrate total hydrocarbon emissions do not exceed 10 ppmv, dry basis, over a ROHA corrected to 7% oxygen and reported as propane.
- Demonstrate metals emission rates are in compliance.
- Demonstration that volatile and semivolatile products of incomplete combustion (PIC) produced during incineration of HD rinsate are within the permitted levels.
- Demonstrate maximum HD rinsate feed rates and process operating conditions to ensure compliance with emission limits and confirm operating conditions for the LIC.

Conduct an emission factor verification test for sulfur dioxide and oxides of nitrogen.

The purpose of each LIC HD rinsate emissions demonstration test is to demonstrate the objectives listed above. During each LIC HD emissions test, the incineration system will be operated to confirm system operating conditions.

Samples collected during each LIC HD emissions test will be analyzed using appropriate analytical methods and the results will be compared to the HWC MACT standards, the UMCDF Title V Permit, and the UMCDF Hazardous Waste Permit limits. The HD rinsate feed rate will be less than or equal to the existing HD agent feed rate and the OPLs will be those established as a result of the HD ATB/CPT conducted in 2010.

SECTION 1.0 THE LIC HD EMISSIONS DEMONSTRATION TEST PLAN

1.1. INTRODUCTION

The United States Army (Army) designed and built a hazardous waste treatment facility for the destruction of the chemical agent munition stockpile at the Umatilla Chemical Depot (UMCD). The UMCD, located in northeastern Oregon, stores and maintains chemical munitions for Department of Defense agencies. It is near Hermiston, Oregon, approximately ten miles southwest of the city of Umatilla. The Umatilla Chemical Agent Disposal Facility (UMCDF) is located within the UMCD and is designed to treat nerve agents (GB and VX), blister/mustard agent (HD), drained munitions, secondary waste, bulk containers, liquid wastes, energetics, and propellant components.

Public Law 99-145 (Department of Defense Authorization Act, 1986) as amended, directs the Department of Defense to destroy the United States' stockpile of unitary chemical agents and munitions. The Army is the custodian of the chemical stockpile for the Department of Defense and stores chemical agents and munitions at the UMCD. The destruction and elimination of the stockpile was accomplished by first separating the agents, energetic components, and (with the exception of two munitions) the munition hardware. The agents, energetic components, and munitions hardware/ton containers were then separately treated by incineration. HD chemical agent is drained from ton containers and the agent and containers are incinerated. Since the HD agent is over 60 years old, some of the once liquid HD has solidified. The Heel Transfer System (HTS) is used to spray high pressure (3,000 psi) water at 126^{o}F to mobilize the solid heel. The addition of high pressure hot water creates what is known as rinsate. The UMCDF previously processed rinsate through the Metal Parts Furnace (MPF) in a ton container; however this process will prolong the mustard campaign at UMCDF. Processing the HD rinsate in one or both of the two LICs would allow the HD campaign to complete in a timeframe consistent with the deadline imposed by the Chemical Weapons Convention.

The UMCDF operates under a hazardous waste permit issued pursuant to Oregon Revised Statutes Chapter 466 and the hazardous waste regulations in Chapter 340 of the Oregon Administrative Rules (OAR). The Oregon Department of Environmental Quality (DEQ) originally issued a hazardous waste permit for the UMCDF on February 12, 1997. The permit was subsequently reissued with a new United States Environmental Protection Agency (EPA) Identification Number, ORQ 000 009 431, on January 29, 1999 and again in 2005. Under the conditions of the UMCDF Hazardous Waste Permit, each incineration system must demonstrate the ability to effectively treat any permitted hazardous waste such that human health and the environment are protected. Section 3004 of RCRA (1976) requires the promulgation of performance standards that establish the levels of environmental protection that treatment, storage, and disposal facilities for hazardous waste must achieve, and mandates the criteria against which applications for permits must be measured. The UMCDF met these requirements with the completion of the HD ATB/CPT. An update to the Human Health Risk Assessment (HHRA) was performed following the HD ATB/CPT. The HHRA will also be updated based on the data from this rinsate emissions demonstration test.

The UMCDF consists of four incineration systems. The four incinerators are: the two Liquid Incinerators (LIC), the Metal Parts Furnace (MPF), and the Deactivation Furnace System (DFS). The four incinerators, which are equipped individually with a wet pollution abatement system (PAS), share a common stack (PAS-STAK-102). The MPF and both of the LICs completed an HD ATB/CPT in summer 2010. The DFS will not be operated during the HD campaign.

Washington Demilitarization Company, LLC (WDC), the UMCDF systems contractor (SC), has the responsibility for operating the UMCDF and executing each LIC HD rinsate emissions demonstration test

(EDT). The SC will use a field sampling subcontractor (FSS) to perform emissions sampling, packaging, transportation of samples to the laboratory, sample analysis, and reporting of the results. The quality assurance/quality control (QA/QC) associated with these tasks is outlined in the UMCDF Quality Assurance Project Plan (QAPjP) found as Appendix A to this document.

For each LIC, HD rinsate emission testing will consist of a single condition and will be conducted at normal conditions at the lower temperature range. A minimum of three valid runs will be completed. The lower temperatures create a worst-case condition for organic emissions and the formation of products of incomplete combustion (PIC). If any run is not executed under steady-state conditions or if data is lost or compromised in any way, the run may be terminated or invalidated. An additional run to replace the suspect run may be executed. The UMCDF test director, with concurrence of UMCDF project management, and concurrence of the DEQ representative, will make a determination as to whether an additional run will be performed.

This UMCDF LIC HD rinsate emission demonstration test plan describes each LIC system, as well as the operating conditions and instrumentation that will be used to demonstrate the LIC1and LIC2 HD rinsate emission test objectives. The QAPjP (Appendix A) is included to provide an overview of the sampling effort by the FSS to collect samples and deliver them to the analytical laboratories. The QAPjP also contains specified QA/QC requirements for the sampling and laboratory analysis activities performed by the FSS; documents the precision, accuracy, representativeness, completeness, and comparability objectives for the data set

The purpose of the LIC1and LIC2 HD rinsate emissions demonstration test is to realize the objectives presented in the Overview section of this plan. During each LIC HD rinsate emissions test, the system will be operated to confirm applicable furnace operating conditions while maintaining HD emissions below the permitted limit. The LIC primary and secondary chamber exhaust gas temperatures will be maintained at the low end of normal setpoint during the HD rinsate emissions testing and the LIC PAS will be operated at a less than optimal efficiency rate to provide an environment less suitable to remove pollutants. The pH of the brine will be maintained at the lower end of the permitted range.

Normal system data will be collected in addition to the specific sampling and analysis conducted to demonstrate the objectives of the LIC HD rinsate emissions testing. To confirm Air Contaminant Discharge and Title V Permit requirements, a sulfur dioxide and oxides of nitrogen emission factor will be documented during each LIC HD rinsate emissions test. Table 1-1 provides a summary of the exhaust gas sampling for the LIC HD rinsate emissions demonstration tests. For more detailed information regarding sampling and analytical methods, refer to Table A-1 in Appendix A. EPA Methods 1, 2, 3, and 4 (40 CFR §60, Appendix A) will be used to determine exhaust gas flow rates, gas composition, and moisture. Documentation of non-cyclonic flow conditions at the isokinetic sampling location will be conducted before commencing the first run of each LIC HD rinsate emissions test. Carbon monoxide and oxygen concentrations will be determined by permanent facility monitors. The oxygen data collected via continuous emission monitoring system (CEMS) will be in accordance with 40 CFR §60, Appendix B, Performance Specification 4B, and used to correct all data, including particulate matter data for compliance with the HWC MACT particulate matter standard. The FSS will determine carbon dioxide and oxygen concentrations using EPA Method 3B which will be used to determine flue gas molecular weight and compile all particulate matter data corrections to 7% oxygen, for compliance with the RCRA particulate matter standard.

TABLE 1-1. LIC HD RINSATE EMISSIONS DEMONSTRATION TEST EXHAUST GAS SAMPLING SUMMARY

Sampling Train [e]	Target Analyte/Group
EPA Method 5/26A	Hydrogen chloride, chlorine, hydrogen fluoride, and particulate matter [f]
EPA Method 29	Metals
SW-846 Method 0010	Semivolatile organic compounds - PICs
SW-846 Method 0010	Total unspeciated semivolatile and nonvolatile organic compounds
SW-846 Method 0023A	Dioxins, furans, and PCBs
SW-846 Method 0031	Volatile organic compounds - PICs
SW-846 Method 0040	Total unspeciated volatile organic compounds
EPA Method 3B	Carbon dioxide and oxygen [a]
Facility CEMS	Carbon monoxide [b]
Facility CEMS	Oxygen [c]
EPA Method 7E	Nitrogen oxides
EPA Method 25A	Total hydrocarbons [d]
EPA Method 6C	Sulfur dioxide
Agent Monitoring	LIC ACAMS/DAAMS are on line as specified by permits

Notes:

[a] EPA Method 3B will be utilized to determine the flue gas molecular weight and to correct the particulate matter data to 7% oxygen, for compliance with the UMCDF Hazardous Waste Permit particulate matter standard, as applicable.

[b] Carbon monoxide emissions will be collected using facility monitors operated such that the requirements of 40 CFR §60, Appendix B, Performance Specification 4B, are met.

[c] Oxygen emissions will be collected using facility monitors operated such that the requirements of 40 CFR §60, Appendix B, Performance Specification 4B, are met. This oxygen data will be utilized to correct all HWC MACT data to 7% oxygen, where such correction is required.

[d] Total hydrocarbons, as propane, will be collected using EPA Method 25A such that the requirements of 40 CFR §60, Appendix B, Performance Specification 8A are met.

[e] EPA Methods are from 40 CFR §60, Appendix A. SW-846 Methods are from “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,” EPA publication SW-846.

[f] Particulate matter is measured in accordance with Method 5 as described in Method 26A in conformance with the Title V Operating Permit.

Abbreviations:

CEMS continuous emissions monitoring system
EPA United States Environmental Protection Agency
PCB polychlorinated biphenyls
PIC products of incomplete combustion
UMCDF Umatilla Chemical Agent Disposal Facility

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SECTION 2.0 DETAILED ENGINEERING DESCRIPTION OF THE LIQUID INCINERATOR SYSTEMS

2.1. PROCESS DESCRIPTION

There are two similar liquid incinerators (LIC1 and LIC2) at the UMCDF. This section presents the process description for either LIC. Both LICs are expected to be available during the HD campaign. The furnaces are identical in design; however, the instrument numbering system is unique to each furnace. When specific instrument identification numbers (tag numbers) are referenced, the LIC1 identification number is generally listed before the LIC2 identification number.

Each LIC is a two-chambered, refractory-lined incinerator specifically designed to incinerate agents GB, VX, and HD from munitions and bulk items. In addition, other liquid wastes generated on-site, such as SDS, will also be incinerated. During the LIC1and LIC2 HD rinsate emissions demonstration tests, the selected LIC will process HD rinsate in the primary combustion chamber and process water and/or SDS in the secondary combustion chamber.

Each LIC consists of three major components:

- Primary combustion chamber (PCC)
- Secondary combustion chamber (SCC)
- PAS

Figure 2-1 presents a simplified process flow diagram for a LIC. The process flow diagram for the LIC PAS is shown in Figure 2-2, and Figure 2-3 shows the process flow diagram for the LIC PAS Filter System (PFS). Table 2-1 provides a summary of the engineering description for the LICs. Detailed drawings and equipment information for the process are maintained in the on-site operating record. Tables 2-2 and 2-3 are included to indicate the range of operation of the existing permits at the time the rinsate emission test will be performed. These tables contain the proposed OPLs from the HD ATB/CPT. Tables 2-2 and 2-3 may need to be updated once the OPL permit modification based on the HD ATB/CPT has been approved by DEQ. Tables 2-4 and 2-5 indicate the range of the instruments monitoring each OPL. Tables 2-4 and 2-5 may need to be updated once the OPL permit modification has been approved by DEQ. Tables 2-6 through 2-8 show the residence time of the range of mustard to rinsate ratio that may be processed during the emissions demonstration test.

In normal waste processing operations, various support systems sustain operation of the LICs. In addition to support systems such as air, hydraulics, and water, the support systems that are necessary include:

- Heating, ventilating, and air conditioning (HVAC) system
- Agent Collection System (ACS)
- SDS tank system
- Rinsate tank system
- Container Handling Building/Unpack Area
- Bulk Drain Station (BDS)
- Heel Transfer System (HTS)

2.1.1. Heating, Ventilating, and Air Conditioning System

The HVAC system ventilates the Munitions Demilitarization Building (MDB). The system is designed to bring in outside air and distribute it through various rooms. The air is moved from the least toxic to the most toxic areas and then through the MDB HVAC carbon filters before it is discharged to the atmosphere. This approach reduces any fugitive emissions from operations inside the MDB.

The MDB is divided into areas defined by categories. These categories are based on the anticipated type and degree of agent contamination as follows:

Category A	Toxic process area under negative pressure; routine contamination with either agent liquid or vapor; a high hazard area.
Category A/B	An A/B area meets all design criteria for an A area, but in typical service acts as a B area (i.e., only a vapor agent hazard is present), but under some circumstances, a liquid agent hazard may be present, hence the need for design to meet the A area requirements.
Category B	Toxic process area under negative pressure, high probability of agent vapor contamination resulting from routine operations; a high hazard area.
Category C	Work area under negative pressure and subject to inadvertent vapor contamination; a negligible hazard area.
Category D	Work area under ambient pressure that will not be subject to contamination; a negligible hazard area. These areas will be adjacent to or open to the out-of-doors.
Category E	Work area under positive pressure that will not be subject to contamination; a negligible hazard area.

All category A, A/B, B, and C areas are provided with appropriate ventilation systems to: (1) collect and monitor ventilation air from the work area that may contain agent vapors prior to being exhausted to the ambient air, (2) provide mixing of air that is essential for monitoring work areas with chemical agent detection devices, and (3) provide a negative pressure within the work areas to eliminate uncontrolled release of chemical agent vapors. Specific areas of the MDB are kept under negative pressure in such a way that the areas with the highest potential for contamination are at a greater negative pressure than the lower contamination level areas. This cascade ventilation system approach ensures that the air always flows from cleaner areas to the more contaminated ones. The air is collected from the more contaminated areas and is routed through a filter system before being exhausted to the atmosphere via a stack common to all the filter units. The ventilation filter system uses a series of filter units; each unit contains a filter train and a motor/blower. The filter train consists of pre-filters, high-efficiency particulate air (HEPA) filters, six banks of activated carbon filters, and a second bank of HEPA filters. Each filter bank is provided with gauges to indicate pressure drop across the filters. Chemical agent sampling ports are provided between selected banks of carbon filters and before the exhaust stack. Category E areas are positive pressure with carbon-filtered supply air.

2.1.2. Agent Collection System

The ACS includes components related to agent draining and agent storage and feed. During ton container processing, the ton containers are punched and drained at the BDS. A drain tube is inserted into the ton container and the agent is drained by an air-operated pump to the agent holding tank. The amount drained is determined by load cells at the BDS.

Two agent holding tanks (ACS-TANK-101 and ACS-TANK-102) and incinerator feed pumps (ACS-PUMP-101/102) are located within the Toxic Cubicle (TOX). A third agent holding tank (ACS-TANK-108) is located in the SDS room. These tanks and pumps are remotely monitored and controlled from the Control Room (CON). The working volumes (high-level alarm volume) of tanks ACS-TANK-101, ACS-TANK-102, and ACS-TANK-108 are 500 gallons, 1,020 gallons, and 1,851 gallons, respectively.

During agent operations in a LIC, the agent is pumped into the PCC where it is thermally destroyed. The amount of liquid agent treated in the PCC is quantified using two flow meters in series to ensure compliance with the maximum permitted feed rate limit. The agent feed rate is recorded as the average of the two flow meter readings. The metals concentrations measured in the ACS tank are multiplied by the flow meter readings to document the metal feed rates. The programmable logic controller (PLC) is programmed with an alarm and interlock to automatically ramp down agent feed when the two flow meters deviate at a predetermined level. The agent is periodically sampled in accordance with Attachment 2 (Waste Analysis Plan) [WAP]) of the Hazardous Waste Permit to determine the concentration of individual compounds in the feed. This sampling occurs as part of normal operations. Procedures are in place to minimize and control spills from the tanks.

2.1.3. Spent Decontamination Solution Collection/Storage Tank System and Rinsate Tanks

Decontamination solution will be an aqueous-based mixture of sodium hydroxide or other decontamination solution used to neutralize agent contamination on equipment, materials, or personal protective equipment. The decontamination solution is sprayed on the contaminated area, and then rinsed with water. The SDS is collected in a dedicated system.

The SDS is collected in a network of sumps and pumps covering areas where personnel, equipment, and materials are decontaminated. This sump/pump network collects the SDS and rinse water from the decontamination and wash-down of agent-contaminated equipment or personnel. The sumps have pumps and level sensors. The pump discharge piping is arranged to segregate the SDS piping from each of the classified areas (Categories A, A/B, B, or C) so that a failure of any check valve only allows liquid from the same category room to mix. These separate headers are routed to the SDS holding tank system (SDS-TANK-101 and SDS-TANK-102) in the SDS room, where SDS is stored for future treatment in the SCC of LIC1 or LIC2. The two SDS holding tanks are 2,300-gallon tanks with a maximum allowable capacity of 2,168 gallons (high-high level alarm) each. During agent operations, spill tanks are maintained in reserve for contingency purposes. The spill tanks are located in the Munitions Processing Bay (MPB).

During the LIC HD rinsate emissions demonstration testing, liquid from the SDS tanks will be processed in the SCC of the LIC being tested. It will be necessary to accumulate nine (9) hours of liquid in the SDS tanks to conduct a single test run. This is equivalent to approximately 18,000 pounds of liquid (or approximately 2,020 gallons). Therefore, accumulation of one tank batch is required to conduct a single test run. If insufficient SDS exists, process water will be added to the sump and pumped to the SDS tank to allow for completion of each HD rinsate emissions demonstration test run.

The rinsate will be stored in two dedicated tanks, RCS-TANK-101A/B. Each tank has a maximum capacity of 610 gallons and a working capacity of 412 gallons. For the HD rinsate emissions demonstration test, both tanks will be filled to the maximum capacity to ensure nine (9) hours of testing. The rinsate tanks are filled from the HTS pumps 9201 and 9101. To ensure 9,000 lbs of rinsate is available per run, both RCS tanks will be filled to a level below the high high level. Each tank will be sampled for metals prior to commencing a run of the HD rinsate emission test.

2.1.4. Container Handling Building/Unpack Area

The Container Handling Building receives bulk items in enhanced on-site containers (EONC) from the UMCD storage area. The purpose of the Unpack Area is to provide an area within the UMCDF to remove items from the EONCs and prepare the item for the demilitarization process. Ton containers have experienced some pressure build up, ranging from zero to 220 pounds per square inch at the Tooele Chemical Agent Disposal Facility (TOCDF). A depressurization glove box is installed in the unpack area to allow for the release of pressure from each ton container prior to that ton container being placed into a ton container cradle for movement through the MDB and to the MPF. The venting operations from the ton containers will be routed through a carbon filtration system prior to exhausting to the atmosphere.

2.1.5. Bulk Drain Station/Heel Transfer System

The BDS will be used to drain agent from ton containers. The ton container will first be weighed as part of the agent drain verification process at the BDS. It will then be punched, and a drain tube inserted into the casing. The agent will be drained via a pump that transfers the blister agent to the ACS tanks. The load cells on the conveyor will be used to weigh the mass remaining in the ton container. The ton container will be weighed to quantify the remaining weight of HD in the ton container. If the amount that is not drainable (called a heel), is greater than 40 pounds, then the Heel Transfer System (HTS) will be used to spray high pressure hot water into the ton container which will mobilize a portion of the heel to allow for a transfer of the material to the rinsate tanks or to another ton container. Either before or after any HTS operation, two additional holes will be punched in the ton container for a total of three holes. These holes allow for venting of HD inside the ton container during MPF processing.

The UMCDF examined the possibility of treating the water addition to the ton as liquid HD or as SDS that could be fed to the LICs. The Hazardous Waste Permit limit for HD in the SDS is 200 parts per billion (ppb) as enumerated in Section 2.1.2 of the WAP. Given that the ton container had, nominally, 1,700 pounds or 170 gallons of distilled mustard added, the probability of the contents with hot water added, exceeding 200 ppb is very high. Thus, the HTS liquid was not considered as a possible SDS candidate. Modeling of HD in the SDS was completed in 1995 by Maumee Research and Engineering in a report entitled "LIC/SDS Agent Concentration Study," (see the reference materials submitted as part of PMR UMCDF-09-003-MISC(3), *HD Agent Trial Burn Plan*) and the study concluded that the SDS HD rate could be higher than 200 ppb provided good mixing and evaporation occurred. A second study by Selas Fluid Processing Corporation ("Process Study for EG&G Defense Materials Inc. for TOCDF Facility in Tooele, Utah," August 2003) (see reference materials submitted as part of the HD ATB plan PMR) determined that the organic content to the SCC should be no more than 10% to ensure the temperature and air flow through the furnace remain at permitted limits. Higher organic contents would require a larger induced draft fan and a different burner should higher organic loading be required. Should those improvements be made, the residence time would be negatively impacted. Thus, the primary limiting factor to HD in the LIC SCC is the existing permit limit.

The UMCDF also examined the possibility of putting the HTS liquid into an existing ACS tank and feeding the material to the primary chamber. The liquid effluent from the initial stage of hot water spraying was highly acidic with the pH less than 1. (See "Cleanout and Decontamination of a Mustard Agent Ton Container," June 1997, page 6-2 in the reference materials submitted as part of the HD ATB plan Permit Modification Request (PMR)). The material of construction of the ACS system is mild carbon steel which is not compatible with highly acidic material. The conclusion is that a new rinsate tank system should be installed that is compatible with the HD rinsate. The RCS tank system has been submitted to ODEQ as a permit modification. Secondly, the mixture of water and HD may impact the flame scanners on the Burner Management System (BMS). The BMS measures flame strength; if water is injected, the flame scanners may not detect a flame, the BMS senses loss of flame strength and will shut down the burner to avoid any build up of natural gas in the combustion zone. When operating the furnace at a temperature above the auto-ignition temperature of 1400°F, the build up of natural gas cannot occur. The BMS has been studied and engineering has concluded that the flame scanners automatic waste feed cut off can be taken off-line during rinsate processing when the combustion chamber is above the auto-ignition temperature specified by the National Fire Protection Association (NFPA) temperature standard for ovens and furnaces (NFPA-86). Thus, the impediment to feeding HD rinsate to the PCC has been studied and the issue can be overcome to include the cutoff of auxiliary fuel at above the auto ignition temperature as the minimum permitted temperature in the primary chamber or 2604°F for LIC1 and 2627°F for LIC2. Lastly, the exterior shell of the primary chamber is carbon steel which is lined with high alumina refractory to protect the steel shell. The primary chamber is lined with Thermal Ceramics SR-90 between the alumina refractory and the steel shell. The SR-90 is well suited for high temperatures and is resistant to thermal shock. To overcome this concern, Harbison-Walker, the refractory manufacturer, performed a test of high acidic mixture on the refractory. The study indicated that the current refractory in the LIC primary can withstand acid attack from HD rinsate. Since the three reasons previously offered in the HD Agent Trial Burn Plan as to why rinsate had to be processed in the MPF have been overcome, the HD rinsate is proposed to be processed in the LICs.

The UMCDF is permitted to process rinsate in a ton container through the MPF. While that permit provision will remain in place, the HD rinsate processing will also be to the LIC primary chamber.

2.2. TON CONTAINER PROCESSING

The UMCDF will use HD rinsate drained from ton containers to facilitate the LIC HD rinsate emission testing. The ton containers will be removed from the UMCD and transported to the UMCDF for treatment. The ton containers will be conveyed to the BDS/HTS in the MPB. The BDSs will punch and drain the HD in the ton container. The HD will be pumped to the ACS storage tanks pending subsequent treatment in the LIC. Any heel remaining in the ton container will be sent to the HTS for high pressure hot water addition. The rinsate will be pumped from the ton container to the RCS. After the BDS/HTS operations are completed, the ton containers are conveyed to the MPF for treatment.

2.3. AGENT FEED SYSTEMS

The agent feed system is designed with positive displacement pumps (ACS-PUMP-101/102/108) that will be remotely controlled. The agent is fed via the agent feed line with the automatic waste feed cut-off (AWFCO) system described in Section 2.14.1 in effect. The agent feed system is maintained in an engineering-controlled environment.

2.4. PRIMARY COMBUSTION CHAMBER

During HD operations, agent stored in the ACS tanks will be pumped at a continuous rate through a duplex strainer designed to remove large particles that may harm the agent feed pump or plug the PCC feed lines. Prior to entering the PCC, the agent feed stream will be dispersed into the burner block through an atomizing nozzle and mixed rapidly at a high temperature with combustion air and/or natural gas. This rapid mixing of the agent with air and/or natural gas at a high temperature will provide a short and stable flame pattern within the burner block. For the HD rinsate feed, rinsate stored in the rinsate tanks will be pumped at a continuous rate through a filter system designed to remove large particles that may harm the rinsate feed pump or plug the PCC feed lines. Prior to entering the PCC, the HD rinsate feed stream will be dispersed into the burner block through an atomizing nozzle and mixed rapidly at a high temperature with combustion air and/or natural gas.

The PCC is a refractory-lined cylinder with natural gas as the supplemental fuel. The high-temperature AWFCO and the low-temperature AWFCO will be in accordance with the current permitted values. During typical operations, supplemental fuel, waste, and atomizing air enter the chamber via the burner nozzle and are ignited. Combustion air is supplied through a wind box by a combustion air blower. Atomizing air is supplied from the plant air system.

The PCC is maintained at a negative internal operating pressure with respect to the room (which is maintained at a negative pressure with respect to the atmosphere) by regulating the flow rate of the exhaust blower located downstream of the PAS. A high-pressure pre-alarm alerts the operator of a potential upset condition. The room that houses the PCC is also maintained at a negative pressure with respect to the atmosphere by the flow rates of the PCC combustion air blower and by regulating the HVAC system.

During normal operations, the HD agent liquid waste can supply sufficient heat to maintain design temperature. However, supplemental fuel is added to ensure a stable flame pattern within the PCC and to maintain design temperatures when the waste feed rate is not at the design level. For HD rinsate operations, the system is designed to have supplemental fuel added as required to sustain minimum temperature.

2.5. SECONDARY COMBUSTION CHAMBER (AFTERBURNER)

The SCC or afterburner is a refractory-lined cylindrical enclosure that provides additional time at temperature for the gases leaving the PCC. Process water is normally introduced into the SCC to provide temperature control. The secondary combustion chamber can be used to destroy SDS regardless of what is being processed in the primary chamber. Even when agent is not being processed in the PCC, the SCC is used to destroy organic constituents in the SDS, which may be fed at a rate of up to the maximum rate allowed by the permit. In addition to SDS, the UMCDF is permitted to process personnel maintenance building and laboratory aqueous liquid wastes, UMCD liquid waste, and agent-contaminated hydraulic fluids and lubricating oils and SDS in the SCC. SDS is the largest waste stream both by volume and weight, fed to the SCC; hence, it will be fed during the HD rinsate emissions demonstration testing simultaneously with HD rinsate being fed to the PCC. SDS is sprayed through an atomizing nozzle at the top of the SCC (i.e., the normal flame zone of the secondary chamber) to cool exhaust gases.
The atomized solution mixes with the exhaust gases from the PCC, resulting in destruction of organics and evaporation of residual water. Process water is used for cooling if no SDS is available and/or when agent is being processed in the primary chamber. A SCC burner is used to maintain operating temperature during normal operations and when output from the PCC is limited. Combustion air from the SCC room is used, as necessary, to maintain excess air conditions in the SCC.

The UMCDF demonstrated DRE on SDS during the surrogate trial burns (STB) on each LIC. The LIC1 STB, completed in February 2003, fed 2,007 pounds/hr of SDS spiked with 2.85 pounds/hr of 1,2,4-trichlorobenzene (a Class 1 Principal Organic Hazardous Constituent [POHC]), and 5.33 pounds/hr of tetrachloroethylene (a Class 2 POHC) into the SCC. A DRE greater than 99.9999% was achieved for each POHC. The LIC2 STB, completed in August 2004, had an SDS feed rate of 2,040 pounds/hr spiked with 3.0 pounds/hr of 1,2,4-trichlorobenzene and 5.6 pounds/hr of tetrachloroethylene into the SCC. A DRE greater than 99.9999% DRE was achieved on material more difficult to incinerate than HD (a Class 4 POHC). The STB DRE results are valid to demonstrate HD destruction in the SDS feed.

The SCC will be maintained at a negative internal operating pressure with respect to the room (which is maintained at a negative pressure with respect to the atmosphere) by regulating the flow rate of the exhaust blower located downstream of the PAS. A high-pressure pre-alarm is provided to alert the operator of a potential upset condition.

Slag generated from incinerating the SDS will collect on the bottom of the SCC. The LICs were designed with slag removal systems to remove the slag through the use of a drill, slide gate, conveyors, hydraulic lifts, and a transfer conveyor. During the LIC HD rinsate emissions demonstration test, the heater and slide gate will not be operational.

2.6. LIC POLLUTION ABATEMENT SYSTEM

The flue gas from the SCC is ducted to the PAS. The PAS for each LIC consists of a quench tower, a venturi scrubber, scrubber tower, clean liquor air coolers, mist eliminator vessel, the gas reheat system, a carbon filter system, associated pumps and blowers, and an exhaust stack. During the HD campaign, the exhaust stack will combine treated flue gas from the LICs and MPF. The PAS configuration for each LIC is shown on Figure 2-2. The purpose of the PAS is to cool and scrub the acid exhaust gases and capture the fine particulate matter produced by the combustion process.

The absorption of acid pollutants into the brine in the venturi and the packed bed scrubbers results in a buildup of acidic components, lowering the pH. Caustic is added in response to the falling pH, resulting in an increase of sodium salts and thus an increase in density. Brine pH is maintained in a slightly alkaline pH range. High-density brine is transferred to the brine surge tanks located at the Brine Reduction Area (BRA). The density controller maintains the brine density at levels consistent with the solubility of the salts produced. Either make-up water from the recovered water tank or process water may be added to maintain packed bed scrubber sump level control to make up for evaporative losses and to replace purged brine. If the level in the scrubber tower bottom sump is high, excess water may be transferred to the brine surge tanks.

2.6.1. Quench Tower

Flue gas from the SCC enters a quench tower where it is cooled and saturated by spraying the gas with quench brine (recirculated brine, process water, or recovered water) from multiple spray nozzles. Water evaporates into the gas, cooling the gas to its dew point. Brine is sprayed into the tower at a flow rate that provides at least three times the maximum required evaporative load. The cooled and saturated flue gas from the quench tower passes to the venturi scrubber through an overhead duct, while the excess brine flows by gravity to the scrubber tower sump.

The quench tower is designed to provide sufficient residence time for heat transfer to occur by evaporation of water from spray droplets. The heat transfer area is the interfacial area between liquid and gas. Smaller droplets have a larger interfacial area for a given volume of liquid, and consequently provide faster water evaporation and heat transfer. The required residence time and quench tower volume is based on conservative estimates of droplet sizes. The nozzles are sized with a large free passage to minimize nozzle clogging. If salt deposition clogs some orifices, the remaining nozzles will still spray sufficient brine. The temperature at the quench tower outlet is monitored and, in the event of very high temperatures indicating insufficient quench, additional emergency sprays of process water are activated.

The quench brine pump is paired for preventive and repair maintenance, so that operations will continue in the event that one pump fails. The tower is constructed of Hastelloy (Alloy UNS-N10276) to resist corrosion and high temperature of the inlet gases.

2.6.2. Venturi Scrubber

The flue gas from the quench tower enters a venturi scrubber where quench brine from the scrubber tower sump will be used to remove particulate from the flue gas. The venturi scrubber has a variable throat that is controlled to maintain a constant pressure drop across the venturi scrubber. The nozzles for introduction of alkali brine are tangentially mounted. Particulate matter larger than about one-half micron is collected in the throat by the brine. Sufficient brine flow is maintained to ensure efficient collection of particulate matter. Gaseous pollutants are also absorbed by the brine. The venturi is constructed of Hastelloy (Alloy UNS-N10276) to resist corrosion.

2.6.3. Packed Bed Scrubber

The two-phase effluent (flue gas and liquid) from the venturi scrubber enters a packed bed scrubber tower near the bottom of the tower. The scrubber tower is designed to separate the entering liquid and gas, absorb pollutants from the gas, and eliminate large entrained liquid droplets from the overhead gas. Upon entering the tower, the liquid collects in the tower sump while the gas rises through the orifices of the reservoir tray. The swirling action of the gas aids in removal of entrained brine. A reservoir/orifice tray separates the scrubbing solution (clean liquor) for the packed bed scrubber from the sump liquid (quench brine) to prevent ash and particulate in the sump liquid from clogging the packed bed.

The reservoir tray has chimneys with sufficient flow area to limit the gas velocity. Multiple chimneys are used to aid in distributing the gas evenly across the packed bed scrubber. Crowned caps above the chimney top prevent liquid from falling directly from the packed bed scrubber to the scrubber sump. The reservoir tray is sloped, with the pump suction line at the lowest point, to prevent solids from collecting on the tray. The packed bed scrubber provides liquid-gas contact and is packed to a predetermined height in the scrubber. A distributor ensures even distribution of clean liquor across the bed. The packed bed height is adequate to absorb pollutants to meet the applicable emission standards.

As the gas passes through the packed bed, it contacts the alkaline clean liquor solution that absorbs the acidic gases and forms salts. The clean liquor solution percolates through the packed bed and falls to the reservoir tray. From there it is pumped out and passed through the clean liquor air coolers. The clean liquor air coolers cool the clean liquor to approximately 120^{o}F. The cooled clean liquor is recycled back to the top of the packed bed.

The rate of recirculation is controlled to ensure an adequate contact time between the clean liquor and flue gas at the expected maximum gas flow rate. Caustic is added to the clean liquor to maintain a basic pH, and process water may be added to adjust the density. Excess clean liquor overflows the chimneys and falls into the scrubber tower sump. Flue gas rising from the packed bed passes through a bank of mist eliminator pads in the top of the scrubber tower that coalesces and collects liquid droplets entrained in the gas. The liquid collected in the scrubber tower mist eliminator drains to the scrubber reservoir/chimney tray. Nozzles located under the mist eliminator pad intermittently wash away particulates with process water.

2.6.4. Mist Eliminator

Flue gas from the scrubber tower enters the bottom of a mist eliminator vessel and passes through the mist eliminator candles to the top of the tower. The mist eliminator candles remove fine mists formed when the exhaust gas is cooled with clean liquor. A significant amount of metal oxides and water droplets are also removed. Liquid accumulates in the vessel bottom pumped to the scrubber tower sump.

The LICs have a spare mist eliminator vessel for use during emergencies or maintenance. This spare mist eliminator vessel supports operations while mist eliminator candles are being replaced.

2.6.5. Gas Reheat System

Flue gas from the mist eliminator vessel is ducted to an in-line gas heater. The reheater is a natural gas-fired heater with approximately 201,600 British thermal units (Btu) per hour of heating capacity. The purpose of the reheater is to raise the flue gas temperature above its dew point and thereby reduce the amount of condensation in the carbon filters.

2.6.6. Carbon Filter System

During normal operations, after being reheated, the flue gas enters a carbon filter unit. The carbon filter unit is equipped with a bank of prefilters, two banks of HEPA filters, and four carbon banks in parallel. Each carbon bank consists of two carbon beds in series. When the flue gas enters the carbon filter unit, it flows sequentially through a bank of prefilters, a bank of HEPA filters, a carbon bank (i.e., two carbon beds in series), and a bank of HEPA filters before exiting the unit. Figure 2-4 shows the configuration of a carbon filter system. Figure 2-5 depicts the flow of flue gas through a carbon filter unit.

It is the intent to use the common spare filter when maintenance is being performed on a filter unit that services the LIC. When it is necessary to operate the common spare, the inlet and outlet dampers to the appropriate filter unit will be opened, and the inlet and outlet dampers to the filter unit being taken off line will be closed. Damper position switches allow the operator and control system to know which filter units are in use and which are in standby. Section 2.18 of this plan provides a description of the carbon loaded into each filter.

2.6.7. Exhaust Blower

From the carbon filter unit, the flue gas passes to an exhaust blower. The exhaust blower provides draft through the LIC and the LIC PAS. A variable-speed drive and/or inlet damper allows control of the draft to maintain a negative pressure within the LIC system and to maintain gas movement through the PAS. The exhaust blower discharges the process gas to the atmosphere via the common stack.

2.7. MANUFACTURER'S NAME, MODEL NUMBER, AND CAPACITY

The LICs were specifically developed by T-Thermal, Inc. for the Chemical Stockpile Disposal Program. Therefore, there is no model number designation due to the unique requirements and corresponding design.

The total capacity of the burner for each PCC is approximately 14 million Btu per hour. The capacity of the burner for each SCC is approximately 7 million Btu per hour.

2.8. TYPE OF INCINERATOR

Each PCC is a refractory-lined cylinder with a high-efficiency, high-temperature natural gas burner and pilot ignition that incinerates liquid agent by maintaining a nominal temperature of 2,700^{o}F. Each PCC burner has a total heat duty of 14 million Btu per hour and a minimum turndown ratio of 10:1 on the agents specified. The HD rinsate is fed through the PCC burner assembly.

Each SCC is a refractory-lined cylinder with an atomizing nozzle located at the top of the chamber and a single burner block located on the side. Each SCC burner, which has a 4:1 turndown ratio, completes the incineration of the flue gas from the PCC and also vaporizes and incinerates potential liquid organic waste present in the SDS by maintaining a nominal internal chamber temperature of approximately 2,000°F.

2.9. LINEAR DIMENSIONS OF THE INCINERATOR

Each PCC is a refractory-lined cylinder with a 52-inch inside diameter and is 11 feet, 6 inches high. Each SCC is a refractory-lined cylinder with a 70-inch inside diameter and is 10 feet, 6 inches high. The calculated cross-sectional area of each PCC is approximately 14.7 square feet with a volume of 170 cubic feet. The calculated cross-sectional area of each SCC is approximately 26.7 square feet with a volume of 281 cubic feet. The approximate volume of the refractory-lined ducting between each SCC and each quench tower is 462 cubic feet based on a 38-1/8 inch inside diameter ducting with an approximate run of 58.3 feet.

2.10. DESIGN RANGE OF WASTE VISCOSITY

The T-Thermal LV-14 Vortex burner is able to successfully burn heavy oil with kinematic viscosities that range up to 10,000 Saybolt universal seconds (SUS). The viscosity of the HD is approximately 38 SUS. The specific gravity of HD rinsate is approximately four (4) centipoise which is equivalent to 38 SUS.

2.11. DESIGN RANGE OF ATOMIZATION AIR PRESSURE

The PCC atomizing air pressure setpoint is 55 pounds per square inch for agent feed and HD rinsate.

2.12. DESCRIPTION OF THE SUPPLEMENTAL FUEL SYSTEM

The auxiliary fuel for the PCC and SCC will be natural gas. Natural gas will be used for burner ignition in both the PCC and SCC. In the PCC, natural gas will be used for initial heating of the chamber at a rate compatible with the refractory liner. Once the PCC reaches operating temperature and waste feed begins, natural gas will be co-fired with the liquid waste to ensure a stable flame. In the SCC, natural gas will be used for initial heating of the chamber.

2.13. CAPACITY OF PRIME MOVER

2.13.1. Exhaust Blower

The exhaust blower for each LIC system is a two-stage induced-draft fan that draws flue gas through the LIC and LIC PAS and delivers it to the stack. The blowers have a design capacity of 9,220 actual cubic feet per minute of process gas when operating at a nominal differential pressure of 126 inches of water column.

2.13.2. Combustion Air Blowers

The flow of combustion air into the burner blocks is held constant and the fuel gas flow is modulated to maintain the chamber temperature. The PCC and SCC combustion air blowers are single-inlet, single-width centrifugal type blowers with design capacities of 3,100 and 1,400 cubic feet per minute, differential pressures of 52 and 46 inches of water column, and a horsepower rating of 50 and 25, respectively.

The combustion air blower for the PFS gas reheater is a centrifugal fan with design capacity of 42 standard cubic feet per minute, differential pressures of 42 inches of water column, and is rated at one (1) horsepower.

2.14. SAFETY FEATURES

2.14.1. Description of the Automatic Waste Feed Cut-Off Systems

Instrumentation monitors process conditions; provides data for ensuring compliance with regulatory requirements; ensures appropriate process response and control; and ensures operational flexibility, safety interlocking, and shutdown features. The AWFCO system is designed to shut off the agent feed valves and agent pumps and switch the SDS to process water. The AWFCO system is also designed to shut off the HD rinsate feed valves and HD rinsate pumps. Agent feed, HD rinsate feed, SDS feed, and supplemental fuel feed are automatically shut off under certain conditions. Waste feed is not restarted until the parameters causing the feed cut-off or lockout are restored and other conditions are within permitted limits.

A centralized automatic control system is used with a centralized control console, including closed-circuit television monitors for observing operations at various locations and locally mounted PLCs. Processing and sequencing operations are controlled automatically through the PLCs. Interlocks are monitored and continuous checking is undertaken to determine any lack of completion of a programmed step.
All abnormal conditions, operator entries into the system, and starting and stopping of equipment are logged with the time of occurrence by the Process Data Acquisition and Recording (PDAR) system.
The control system provides continuous automatic control of the incineration process. System interaction by the operator is limited to initiation of process systems or correction of abnormal conditions.
In monitoring critical functions, the automatic control system gives advanced warnings of alarms where possible, indicating that an alarm condition is developing and warning operators in time to take corrective action. Interlocks are provided to respond to various conditions. Shutdown is immediate or staged.

Agent and/or HD rinsate is fed to the PCC through pipeline 3/4"-AG-201/202-AE and valves 13-XV-761A/B or 13-XV-134A/B. If the AWFCO system is activated, then the BMS subroutine of the process control computer stops sending a signal to the solenoid valves 13-XY-761A/B or 13-XV-134A/B, and these valves close. The spring return in the actuator for 13-XV-761A/B or 13-XV-134A/B closes the valves (which stops feed of the agent or HD rinsate). Total elapsed time for shutoff of feed from the time the signal is sent is approximately one (1) second.

SDS is fed to the LIC SCC through pipeline 1"-SD-473/474-P and valves 13-XV-762A/ 766/102A/99. If the AWFCO system is activated, then the BMS subroutine of the process control computer stops sending a signal to the solenoid valves 13-XY-762A/-766/102A/99. The air supply to these valves then shuts off. These valves switch position to take process water instead of SDS. The spring return in the actuator closes the valve. Total elapsed time for shutoff of SDS feed from the time the signal is sent is approximately one (1) second.

These steps accomplish AWFCOs in response to monitored parameters being outside control limits. Natural gas continues to be fed to the LIC to maintain combustion until all monitored parameters are again within control limits and waste feed can be restarted.

Because all of the incinerators and their respective automatic shutoff systems are independent, self-contained units, operational problems or events that cause immediate shutdown in one incinerator will not affect the continued safe operation of the others.

The natural gas burners have a flame safeguard system that prevents or stops the flow of natural gas to the burner nozzle if any one of the following situations occurs:

- Flame is detected during pre-ignition
- Pilot fails to ignite
- Burner fails to ignite
- Loss of burner flame after ignition for HD agent only

The 2003 edition of National Fire Protection Association Code 86, Section 7.4.1.5, allows afterburner relight without purging the incinerator chamber if the chamber temperature is above the auto-ignition temperature of 1,400°F.

During the surrogate, GB agent, VX agent, and HD agent ramp up and trial burn periods, the installed flame detector was demonstrated to be reliable during the transition from natural gas to liquid waste feed. If there is a shutdown of either the PCC or SCC natural gas burner, there will be an automatic shutdown of all waste feed streams.

The AWFCO system and its associated alarms are tested weekly for systems that are in operation.

2.14.2. Description of Additional Safety Devices

All powered equipment has been reviewed and power sources have been characterized as critical, essential, or utility. Critical loads (e.g., PDAR, control consoles, ACAMS [Automatic Continuous Air Monitoring System]) are powered by uninterruptible power supply panel boards and do not experience an interruption in power if off-site power is lost. Essential loads (e.g., extension heaters, airlock doors) are required for safe shutdown of the facility, but can tolerate an interruption in power while being loaded on an on-site emergency diesel generator. Utility loads (e.g., combustion air blowers, fuel oil pumps) are those not required if off-site power is lost and are not powered by the on-site emergency diesel generator.

The firing chambers have high-high temperature switches that provide extreme temperature limit protection. Actuation of this system shuts down the agent feed, HD rinsate feed and SDS feed (which switches over to water), stops the fuel oil purge, and locks out the burners.

2.15. STACK GAS MONITORING AND POLLUTION CONTROL EQUIPMENT

The UMCDF is equipped with CEMS for carbon monoxide and oxygen and with an agent monitoring system (AMS) for the campaign agent.

2.15.1. Continuous Emission Monitoring System

The UMCDF CEMS QA/QC Plan describes the operation and maintenance of the CEMS.

The CEMS continuously monitor the exhaust gas from the incinerators/furnaces and PAS for carbon monoxide and oxygen. The CEMS that sample the exhaust gas between the induced-draft fan and the common stack provide data to cause an AWFCO to the respective furnace system. These monitors consist of a pair of carbon monoxide and a pair of oxygen analyzers that are configured for redundant monitoring systems (primary and backup) that can be independently calibrated and maintained.
The carbon monoxide analyzers are ProCal Analytics, Ltd., Model 210 L.R. The oxygen analyzers are COSA Instrument Corporation Model ZRM-ZTB. Each analyzer is certified in accordance with the

UMCDF CEMS Certification Test Plan. Either of the redundant analyzers can be used as the analyzer of record for reporting purposes.

The CEMS will be operated in a manner that ensures that the exhaust gas is continuously monitored. Although there are two sets of CEMS monitoring the exhaust gas, only one set will be designated the "monitors of record." When the "monitors of record" require maintenance activity, the second set of CEMS will be placed on line and designated the "monitors of record." The designated "monitors of record" will activate the AWFCO system if the concentrations exceed permitted limits. In order to increase the operational life of each unit, the CEMS are periodically purged as needed. This purge may occur as often as once per day during hazardous waste operations. Since there are backup CEMS, the purge cycle and calibration of each monitor is offset to allow uninterrupted recording of the monitored parameter.

For each LIC, oxygen and carbon monoxide will be monitored between the induced-draft fans and the common stack by CEMS. The CEMS are on-line whenever the induced draft fan is operating, that is, when there is exhaust gas flow through the PAS.

2.15.2. Agent Monitoring System

There are two systems that comprise the AMS. ACAMS are used to give a continuous readout of the concentration of agent. The ACAMS that sample the exhaust gas between the induced-draft fan and the common stack, at the common stack, and prior to the PFS provide data to cause an AWFCO to the respective furnace system. The Depot Area Air Monitoring System (DAAMS) collects agent on a sorbent that is later analyzed in the UMCDF laboratory to provide historical information regarding agent concentration.

The common stack is equipped with a "staggered" ACAMS configuration to allow for continuous sampling of the exhaust gas. During hazardous waste treatment operations, two of the three ACAMS must be monitoring the exhaust gas in a "staggered" sampling configuration. AWFCO interlocks are programmed as follows to ensure the "staggered" sampling configuration is in place during hazardous waste feed operations:

- When there are less than two ACAMS on line monitoring the common stack
- When the two ACAMS on line are not in the "staggered" sampling configuration
- When either of the two on-line ACAMS activates a malfunction alarm and the standby ACAMS cannot be brought on line to provide for continuous sampling of the exhaust gas.

The following subsections provide a more detailed description of the various agent monitoring devices and address monitoring of HD.

2.15.2.1. Automatic Continuous Air Monitoring System

The ACAMS are near-real-time monitors. ACAMS will provide data for AWFCOs for the LIC HD rinsate emissions demonstration test monitor at the allowable stack concentration (ASC). With the addition of a stack sampling apparatus, ACAMS may be used to monitor stack gases.

The ACAMS were chosen as one of the primary stack monitors because the instrumentation is proven technology for the detection and quantification of agents in both workplace and stack environments. The ACAMS is interfaced to the stack using a stack sampling apparatus to condition the stack gas before it contacts the solid sorbent in the ACAMS. The purpose of the stack sampling apparatus is to lower the dew point of the stack gas to a point where condensation does not occur within the ACAMS.

Testing and evaluation in all chemical agent modes has been completed. All monitors meet the 95% confidence level for ±25% accuracy as required by the Department of Health and Human Services.

HD airborne exposure limit:	ASC
HD sensitivity:	0.03 mg/m^3
HD response time:	5 minutes

Because it is a chromatographic system, the ACAMS is susceptible to analytical interferences. Any detected value that cannot be clearly interpreted as being an interferent or malfunction must be treated as a positive response until refuted.

The PLC for the furnaces will be programmed to utilize the oxygen analyzers located downstream of the induced-draft fans to correct ACAMS (before the PFS and downstream of the induced-draft fans) readings to 7% oxygen. The ACAMS readings will not be corrected to 7% oxygen if the CEMS oxygen concentration is less than or equal to 7% or if the ACAMS value is below 0.2 ASC. The ACAMS that sample the exhaust gas between the induced-draft fan and the common stack, at the common stack, and before the PFS provide data to cause an AWFCO to the respective furnace system. ACAMS are not used to provide information for the HHRA; however, the HHRA does use the permitted HD emission limit for ACAMS.

An ACAMS alarm during the HD rinsate emissions demonstration test will in general abort the run if it disrupts the feed timing due to the length of time required to refute an ACAMS alarm. Other ACAMS alarms that are not related to the LICs may not affect the HD rinsate emissions demonstration test (e.g., an ACAMS alarm in the MDB).

2.15.2.2. Depot Area Air Monitoring System

The DAAMS that provide data for the LIC HD rinsate emissions demonstration test detect to below the ASC. The technique can be used to monitor stack gases with a stack sampling apparatus to lower the stack gas dew point to prevent condensation in the sampling train. For the EDT, all DAAMS that are used in normal plant operations will be on-line along with the ACAMS.

The DAAMS analysis consists of gas chromatographic (GC) separation followed by simultaneous detection with a flame photometric detector (FPD) and mass spectrometer (MS). All approved laboratory procedures are available for use for the agent monitoring DAAMS.

Nozzle and Burner Design

The agent and rinsate nozzle, the SDS nozzle, and the auxiliary fuel air atomized burner (PCC and SCC) were supplied by T-Thermal. Agent or rinsate is introduced into a LIC through a LV-14 vortex burner having a heat duty capacity of 14 million Btu per hour. The burner assembly consists of a wind box, injector, and combustion area. The combustion air is introduced through the wind box. The auxiliary fuel and/or agent/rinsate are introduced through the injector assembly and are contacted by the impinging atomization air. Atomization takes place external to the nozzle tip. The spray mixes with high-velocity, spinning flow combustion air and enters the combustion area. The combustion process is nearly complete before the combustion gases exit the burner combustion area into the SCC.

The HV-645 burner in the SCC is rated at 7 million Btu per hour. The SCC burner uses combustion air to atomize the natural gas auxiliary fuel, which is burned with no less than 20% excess air.

The combustion burner is mounted in the side near the bottom of the PCC. The PCC burner combines a natural gas pilot for ignition, multi-fuel nozzle, an air atomizer, and combustion air. A burner is mounted in the side near the top of the SCC and combines a natural gas pilot for ignition, dual-fuel nozzle, and combustion air. The conventional, air-atomized burners are T-Thermal's Model LV-14 in the PCC and Model HV-645 in the SCC. The nozzle and burners are integrated as a single unit with a single model number.

Materials of Construction

Information regarding materials of construction for the LICs is listed in Table 2-1. The table provides information on both the shell and linings.

2.16. LOCATION AND DESCRIPTION OF TEMPERATURE, PRESSURE, AND FLOW-INDICATING AND CONTROL DEVICES

The locations of the indicating and control devices are shown on the piping and instrument diagrams included in the operating record maintained on site.

2.16.1. Liquid Incinerator Controls and Indicators

The temperature of each LIC is monitored at numerous locations to provide redundancy and reliable information on operating conditions. Thermocouples are typically equipped with one element.

The feed rate of agent fed to each LIC is measured by 13-FT-127 A/B or 731A/B. A redundant measure of the agent feed rate will be available by monitoring the level in tanks ACS-TANK-101, -102, and -108 with a calibration graph (pump speed versus volume) of the positive-displacement pumps. The feed rate of HD rinsate fed to each LIC is measured by 13-FE-9894A/B. A redundant measure of the rinsate feed rate will be available by monitoring the level in RCS-TANK-101A/B. The feed rate of spent decontamination solution to the SCC is monitored by 13-FIC-102/763. The feed rate of SDS is controlled by flow control valve 13-FV-102/763. A redundant measure of the SDS feed rate is available by monitoring the level of SDS with 11-LIT-20 (SDS-TANK-101), or 11-LIT-30 (SDS-TANK-102).

The flow rates for the combustion air blowers to the PCC and SCC are measured by 13-FIT-42/743 and 13-FIT-50/788, respectively. The pressure inside each LIC is monitored by 13-PIT-52/706 on the PCC and by 13-PIT-59/896 on the SCC. Flue gas flow rates for LIC are determined in different manners. For LIC1, flue gas flow rate is indicated by differential pressure transmitter 13-PDIT-854 operating across a venturi installed in the exhaust gas duct that discharges to the quench tower. The venturi measures differential pressure and triggers an AWFCO at the permitted setpoint. For LIC2, flue gas flow rate is calculated using data from permit-regulated instruments. The data includes the flow rate of combustion air and fuel gas to the primary and secondary chamber along with the waste feed rate, both agent or rinsate, to the primary chamber and the process water/SDS feed rate to the secondary chamber. The inputs are converted to moles per minute and summed. The ideal gas law is used to convert the sum of the molar flow rates to an exhaust gas flow rate. The calculated flue gas flow rate activates the AWFCO system when the maximum permitted setpoints are reached or exceeded. The current setpoints are shown in Table 2-2. A PLC permissive will be installed to ensure that when rinsate is selected, the flow rate is based on rinsate, not agent, feed. The calculation for rinsate feed indicates a 1% difference in flow between 100% HD (agent feed) and 100% water (worst case rinsate feed).

2.16.2. Liquid Incinerator Pollution Abatement System

The process water and brine entering the quench tower are monitored during quench tower operations. Process water or recovered water from PAS-TANK-103 is used for makeup water in the PAS. The pressure of the solutions entering the quench tower is monitored by 24-PI-100/838. The flow rate of the makeup water and brine in the quench tower is monitored by 24-FIC-84/827. The level of the brine at the bottom of the quench tower is monitored by 24-LIT-132/810.

The temperature of the flue gas entering the venturi scrubber is monitored by 24-TE-397/816. The differential pressure across the venturi scrubber is indicated and transmitted to the central controller by 24-PDIT-90/814, which then regulates the venturi by transmitting a signal to 24-PDIC-90/814. Pressure and flow rate of the brine delivered to the venturi are monitored by 24-PI-90/815 and 24-FIC-88/828, respectively.

The differential pressure across the mist eliminator pad and the packed bed in the scrubber tower is monitored and transmitted to the PLC by 24-PDIT-82/823 and 24-PDIT-108/822, respectively. The temperature of the clean liquor prior to entering the scrubber tower is indicated by 24-TE-299/276. The level of clean liquor present at the reservoir tray is measured by 24-LIT-113/824. The density, pH, pressure, and flow rate of the clean liquor entering the packed bed are monitored by 24-DE-117/826 and 24-AI-116A/B; 832A/B, 114-PIT-329/170, and 24-FIC-112/825, respectively. The clean liquor pH system is equipped with two analyzers (A/B). Only one analyzer controls the clean liquor pH loop, while the other analyzer serves as a backup. Typically, the pH analyzer is switched periodically to allow for flushing of the instrument. The level of brine within the scrubber tower sump is indicated and transmitted to the central controller by 24-LIC-115/818.

The clean liquor inlet temperature to the clean liquor air coolers is indicated by 114-TI-241/281. The differential pressure across the clean liquor air coolers is monitored and transmitted to the PLC by 114-PDIT-252/633 and 114-PDIT-253/617, respectively.

The differential pressure across the mist eliminator vessel, the spent process water level, and pH exiting the bottom of the vessel are monitored.

The temperature of the flue gas exiting the in-line reheater burner is measured by 114-TE-459/749. The exiting temperature is controlled by varying the firing rate of the burner.

The temperature of the flue gas prior to entering the filter unit is monitored by 114-TE-518/418.

114-PDIT-454/436 (A through I) internally indicate and transmit to the central controller differential pressures at the following locations in each carbon filter unit: across the prefilter, across the initial HEPA filter, across the final HEPA air filter, across each primary carbon filter bed, across the set of secondary carbon beds, and across the entire filter.

The final monitoring occurs within and after the exhaust blower. The temperature of the blower motors is measured by 24-TE-980/976(A through F) and 24-TE-58/711(A through F). After the flue gas has passed through the exhaust blower, it is monitored for carbon monoxide by 24-AIT-78A/B; 716A/B and by 24-AIT-210A/B; 717A/B for oxygen. In addition to upstream of the PFS, the common stack and downstream of the exhaust blower are also monitored for agent (GB, VX, and/or HD) by an ACAMS during agent operations.

2.17. PRINCIPAL ORGANIC HAZARDOUS CONSTITUENT SELECTION

The LIC HD ATB/CPTs used HD as a POHC. HD was selected as a POHC because demonstration of a DRE of 99.9999% for HD is required by the UMCDF Hazardous Waste Permit and a DRE of 99.9999% is required by the Title V operating permit. Monochlorobenzene was spiked into the agent feed line at a sufficient rate to determine 99.99% DRE for mustard impurities. The DRE for both HD and monochlorobenzene for each LIC was met during the HD ATB/CPT conducted in 2010.

The UMCDF demonstrated DRE on SDS during the STB on each LIC. The LIC1 STB, completed in February 2003, fed 2,007 pounds/hr of SDS spiked with 2.85 pounds/hr of 1,2,4-trichlorobenzene (a Class 1 POHC), and 5.33 pounds/hr of tetrachloroethylene (a Class 2 POHC) into the SCC. A DRE greater than 99.9999% was achieved for each POHC. The LIC2 STB, completed in August 2004, had an SDS feed rate of 2,040 pounds/hr spiked with 3.0 pounds/hr of 1,2,4-trichlorobenzene and 5.6 pounds/hr of tetrachloroethylene into the SCC. A DRE greater than 99.9999% DRE was achieved on material more difficult to incinerate than HD (a Class 4 POHC). The STB DRE results are valid to demonstrate HD destruction in the SDS feed. Since DRE is a one-time demonstration, the HD ATB/CPT DRE is valid to use for the HD rinsate emission demonstration test.

2.18. CARBON SPECIFICATION

The carbon beds of the primary LICs PFS units (i.e., PFS-109 and PFS-209) are loaded with sulfur impregnated carbon. Sulfur impregnated carbon is loaded in the spare (PFS-113). All carbon is supplied by the manufacturer of the PFS, Ionex. The carbon supplied by Ionex conforms to Specification 15987 and the specifications indicated in the NOC.

2.19. SYSTEM STEADY-STATE AND HAZARDOUS WASTE RESIDENCE TIME

Steady-state operation is defined as the condition in which the following combustion parameters do not vary significantly:

- Combustion temperature for the PCC and the SCC
- Combustion gas volumetric flow rate
- Waste feed rate
- Carbon monoxide concentration

Additionally, once steady-state operation is achieved in the combustion chambers, sufficient time must be allowed for the PAS to reach steady-state conditions. This will ensure that the gas sampled in the exhaust duct represents a steady-state operation for the entire system. Therefore, gas residence times through the system are calculated and compared against the gas volume changes through the system.

Based on experience developed during the ramp up and execution of the LIC STB, the LIC GB ATBs, the LIC1 and 2 VX ATB, and the LIC 1 and 2 HD ATB/CPT, 15 minutes is adequate time for the system to achieve steady-state operation. The exhaust gas residence times for the various pieces of equipment and ducts are provided in Tables 2-6, 2-7, 2-8 and 2-9. These residence times were determined using LIC HD rinsate mass and energy balances. The total system residence time of 101.36 seconds indicates 8.9 complete volume changes will occur within the 15-minute estimate for the conditioning period.
This number of complete volume changes ensures values of the measured process parameters are consistent with combustion conditions in the furnace and, further, indicates the likelihood that steady-state conditions have been achieved. Only one or two volume changes should be adequate to achieve

steady-state operation at the exhaust duct sampling location after steady-state operation has been achieved in the combustion chambers.

For LIC, the hazardous waste residence time is defined as the time elapsed from cutoff of the flow of hazardous waste into the primary combustion chamber until solid (excluding slag), liquid, and gaseous materials from the hazardous waste enter the common stack. In conformance with 40 CFR §63.1206(b)(11), this hazardous waste residence time is calculated as 101.36 seconds as shown on Table 2-6 through Table 2-8. Slag is collected in the slag pit at the bottom of the PCC and is periodically removed. The steady state conditions allow the emissions sampling crew to maintain the isokinetic sampling trains at the required 100% isokinetic, plus or minus 10% as defined in each sampling method, e.g., Methods 0010, 0023, 26, 29. Once full feed rate is established, the gas flow from the rinsate and SDS feed is calculated to reach the sampling location in 101.36 seconds. When sampling starts fifteen minutes after full feed rate has been achieved, it ensures the sampling contractor can both maintain isokinetic sampling and measure the emissions from the actual feed of rinsate and SDS.

TABLE 2-1. LIC ENGINEERING DESCRIPTION

<table>
<tr><th rowspan="2">Category</th><th colspan="2">Description</th></tr>
<tr><th>Primary Combustion Chamber</th><th>Secondary Combustion Chamber</th></tr>
<tr><td>Name of manufacturer</td><td>T-Thermal Company
no model number; custom fabricated</td><td>T-Thermal Company
no model number; custom fabricated</td></tr>
<tr><td>Type</td><td>Vertical, up-fired
Liquid wastes only</td><td>Vertical, down-fired
Liquid wastes only</td></tr>
<tr><td>Dimensions</td><td>52” diameter x 11’-6” height
Cross-sectional area: 14.7 square feet
Volume: 170 cubic feet</td><td>70” diameter x 10’-6” height
Cross-sectional area: 26.7 square feet
Volume: 281 cubic feet</td></tr>
<tr><td>Materials</td><td>Fabricated carbon steel with 9” thick refractory brick with 9” thick refractory insulation</td><td>Fabricated carbon steel with 9” thick refractory brick with 4.5” thick refractory insulation</td></tr>
<tr><td>Burner</td><td><u>Burner</u>:
(1) Side-mounted near bottom
T-Thermal LV-14 Vortex:
natural gas pilot;
14 million Btu per hour
<u>Includes</u>:
• Fuel/agent injector assembly
• Impinging atomizing air external to nozzle tip
• High-velocity spinning flow combustion air from wind box
• Combustion area external to nozzle
• 65% excess air at operating temp.</td><td><u>Burner</u>:
(1) Side-mounted near top -
T-Thermal HV-645:
natural gas pilot;
7 million Btu per hour
<u>Utilizes</u>:
• Combustion air for atomizing
• 20% minimum excess air</td></tr>
<tr><td>Auxiliary Fuel</td><td colspan="2">• Natural gas (pilot and burner)</td></tr>
<tr><td>Prime Mover</td><td colspan="2"><u>Two-stage induced-draft fans</u>: Robinson 78” x 1-3/8” RB-1806
• Design capacity: 9,220 actual cubic feet per minute flue gas at a nominal differential pressure of 126 inches water column
• Material: 316L SS hub, 316 SS, A240 alloy 255 wheel, epoxy-coated carbon steel fan
• Motors: 250 horsepower each</td></tr>
<tr><td>Combustion Air Blowers</td><td colspan="2"><u>PCC combustion air blowers:</u> single-inlet, single-width centrifugal type
• Design capacity: 3,100 standard cubic feet per minute at a nominal differential pressure of 52 inches water column
• Material: carbon steel
• Motor: 50 horsepower
<u>SCC combustion air blowers</u>: Single-inlet, single-width centrifugal type
• Design capacity: 1,400 standard cubic feet per minute at a nominal differential pressure of 46 inches water column
• Material: carbon steel
• Motor: 25 horsepower
<u>PFS reheater combustion air blowers</u>: centrifugal type
• Design capacity: 100 standard cubic feet per minute at a nominal differential pressure of 15 inches water column
Motor: 1 horsepower</td></tr>
</table>

TABLE 2-1. LIC ENGINEERING DESCRIPTION

Category	Description	
	Primary Combustion Chamber	**Secondary Combustion Chamber**
Quench Tower	Cylindrical vessel with spray nozzles • Dimensions: 6'-0" inner diameter x 40'-0" tangent to tangent • Design pressure: 15 psig and full vacuum • Design temperature: 1250^{o}F • Nozzles: spaced on three levels - 8 brine (3/8" BETE, TF164FC) and 4 emergency (1/2" (BETE, TF24FC) • Quench media: brine, process water, and/or water from recovery tank (makeup water) • Materials: Hastelloy C, Alloy UNS-N10276 • Exhaust duct to scrubber: Hastelloy C, alloy UNS-N10276	
Venturi Scrubber	Design pressure: 15 psig and full vacuum • Design temperature: 250^{o}F • Variable throat, range 5-50 inches water column • Scrubbing media: caustic brine (pH approximately 8.0) • Materials: Hastelloy C, alloy UNS-N10276	
Packed Bed Scrubber	Cylindrical vessel, four sections: sump, reservoir/chimney tray, packed bed, mist eliminator pad • Dimensions: 5'-6" inside diameter x 40'-0" tangent to tangent • Design pressure: 15 psig and full vacuum • Design temperature: 250^{o}F • Packing: 10-foot height • Gas velocity: 35 feet per second • Differential pressure: 1-10 inches water column • Scrubbing media: clean liquor (pH approximately 8.0) • Exhaust duct: carbon steel • Materials: Hastelloy C, alloy UNS-N10276	
Clean Liquor Air Coolers	• Heat duty: 15.1 million Btu per hour • Design pressure: 125 psig • Design temperature: 215^{o}F • Materials: carbon steel (stress relieved) • Motor: 30 horsepower each	
Mist Eliminator Vessel	• Dimensions: 11'-0" inner diameter x 31'-0" bottom tangent • Design pressure: 5 psig and -6 psig • Design temperature: 200^{o}F • Cylindrical vessel with high-efficiency candle filters • Candles: 2' diameter x 20' height • Materials: fiber-reinforced plastic vessel, with ultraviolet absorbers; polyester candles • Inlet duct, isolation valve to vessel: carbon steel lined	
Gas Reheater	In-line gas burner • Heat duty: 201,600 Btu per hour	
Carbon Filter Unit	Design capacity: 12,000 actual cubic feet per minute • Components: prefilter bank, upstream HEPA filter bank, four parallel carbon banks (each consisting of two carbon beds in series), downstream HEPA filter bank • Housing material: 2205 duplex stainless steel	

Abbreviations:

%	percent
’	foot (feet)
”	inch(es)
°F	degrees Fahrenheit
Btu	British thermal units
HEPA	high efficiency particulate air
LPG	liquefied petroleum gas
PFS	Pollution Abatement System (PAS) Filter System
psig	pounds per square inch gauge
SS	stainless steel

TABLE 2-2: LIC1 OPERATING SETPOINTS

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Ranges	Basis
LIC-01 LIC(M)-1	Primary chamber pressure high-high	13-PSHH-233	-0.25 in. w.c. instantaneous	-0.25 in. w.c.	-0.25 to -18.00 in w.c.	Maintain furnace pressure lower than ambient pressure [40 CFR 1206(c)(5)(i)(B)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-02	Primary chamber exhaust temperature high-high	13-TAHH-610	—	2,761°F	2,500 – 2,900°F	Waste feed combustion temperature limits [40 CFR 264.345].
LIC(M)-2	Primary chamber exhaust temperature high-high	13-TAHH-610	2,761°F instantaneous	—	2,500 – 2,900°F	Established to limit metal volatilization [40 CFR 63.1209(g)(2)].
LIC-03	Primary chamber exhaust temperature low-low (instantaneous)	13-TSLL-610	—	2,604°F	2,500 – 2,900°F	Waste feed combustion temperature limits [40 CFR 264.345].
LIC(M)-3	Primary chamber exhaust temperature low-low (instantaneous)	13-TSLL-610	2,604°F instantaneous	—	2,500 – 2,900°F	Established as short-term limit on PIC[40 CFR 63.1209(g)(2)].
LIC(M)-4	Primary chamber exhaust temperature low-low (ROHA)	13-TALL-43	2,696°F ROHA	—	2,500 – 2,900°F	Control destruction removal efficiency (DRE), dioxins, and furans [63.1209(j)(1) and 63.1209(k)(2)].
LIC-04 LIC(M)-5	Spent decontamination solution feed pressure low	13-PSL-51	45 psig instantaneous	45 psig	> 45 psig	DRE [40 CFR 63.1209(j)(3)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-05 LIC(M)-6	Agent feed pressure low-low	13-PALL-113	5 psig (when feed>500 lbs/hr) instantaneous	5 psig (when feed rate >500 lb/hr)	> 5 psi (when feed rate >500 lb/hr)	Control dioxins and furans [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-06	Secondary chamber exhaust temperature low-low (instantaneous)	13-TSLL-129	—	1,827°F	1,800 – 2,002°F	Operating requirements, waste feed combustion temperature limits [40 CFR 264.345].
LIC(M)-7	Secondary chamber exhaust temperature low-low (instantaneous)	13-TSLL-129	1827°F instantaneous	1,827°F	1,800 – 2,002°F	Established as short-term limit on PIC [40 CFR 63.1209(g)(2)].
LIC(M)-8	Secondary chamber exhaust temperature low-low (ROHA)	13-TALL-129A	1,838°F ROHA	—	1,800 – 2,002°F	Control DRE, dioxins and furans [40 CFR 63.1209(j)(1) and 40 CFR 63.1209(k)(2)].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Ranges	Basis
LIC-07	Secondary chamber exhaust temperature high-high	13-TAHH-129	—	2,002°F	1,800 – 2,002°F	Operating requirements, waste feed combustion temperature limits [40 CFR 264.345].
LIC(M)-9	Secondary chamber exhaust temperature high-high	13-TAHH-129	2,002°F instantaneous	—	1,800 – 2,002°F	Established to limit metal volatilization [40 CFR 63.1209(g)(2)].
LIC-08 LIC(M)-10	Combustion air to secondary chamber burner pressure low-low	13-PSLL-200	30 in. w.c. instantaneous	30 in. w.c.	> 30 in. w.c.	Manufacturers recommendation [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-09	Secondary chamber exhaust pressure differential high (instantaneous)	13-PDAHH-854	—	1.1 in. w.c.	< 1.29 in. w.c.	Operating requirements, combustion gas velocity [40 CFR 264.345].
LIC(M)-11	Secondary chamber exhaust pressure differential high (instantaneous)	13-PDAHH-854	1.1 in. w.c. instantaneous	1.1 in. w.c.	< 1.29 in. w.c.	Established as a short-term limit PIC [40 CFR 63.1209(g)(2)].
LIC(M)-12	Secondary chamber exhaust pressure differential high (ROHA)	13-PDAH-854A	1.08 in. w.c. ROHA	1.08 in. w.c.	< 1.29 in. w.c.	Established as a short-term limit PIC, DRE, dioxins and furans, mercury, particulate matter, semivolatile and low-volatile metals, hydrogen chloride and chlorine gas [40 CFR 63.1209(j)(2), (k)(3), (l)(2), (m)(1)(i)(C), (m)(2), (n)(3), (n)(5), (o)(2), (o)(3)(v)].
LIC-10 LIC(M)-13	Agent feed rate high-high based on a ROHA	13-FAHH-127	1,286 HD/lb/hr ROHA 46.3lbs HD/2-minute rolling average	1,286 HD lb/hr	< 1,335 lb/hr < 48.1 lbs/ 2 minutes	Control mercury and particulate matter [40 CFR 63.1209(l)(1) and (m)(3)], operating requirements, waste feed rate [40 CFR 264.345].
LIC-11 LIC(M)-14	Process water/SDS feed rate high-high based on a ROHA	13-FAHH-102C	2,107 lb/hr ROHA 75.9 lbs/ 2 minute (2-minute rolling average)	2,107 lb/hr maximum; to be adjusted lower periodically or as necessary to comply with final metals and chlorine limitations	< 2,200 lb/hr < 79.2 lbs/ 2 minutes	Control semivolatile metals, low-volatile metals, hydrogen chloride, and chlorine gas [40 CFR 63.1209(n)(2), (n)(4), (o)(1)], Operating requirements, waste feed rate [40 CFR 264.345].
LIC-12 LIC(M)-15	Carbon monoxide (CO) concentration in PFS exhaust gas high-high	24-AAHH-78C	100 ppmv ROHA	100 ppm corrected to 7% oxygen, dry basis based on a ROHA	< 100 ppm CO < 38% water	Control CO and oxygen hydrocarbons, [40 CFR 63.1209(a)(1)(i) and (a)(7)], operating requirements, CO level in stack exhaust [40 CFR 264.345].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Ranges	Basis
LIC-13 LIC(M)-16	Primary atomizing air pressure low-low	13-PSLL-127C	55 psig instantaneous	55 psig	> 55 psig	Manufacturers recommendation [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-14 LIC(M)-17	Secondary atomizing air pressure low	13-PSL-58	65 psig instantaneous	65 psig	> 65 psig	Manufacturers recommendation [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-15	Venturi scrubber pressure drop low-low (instantaneous)	24-PDALL-90	—	25 in. w.c.	> 20 in. w.c.	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-18	Venturi scrubber pressure drop low-low (instantaneous)	24-PDALL-90	25 in. w.c. instantaneous	—	> 20 in. w.c.	Established as a short-term limit on PIC, mercury, particulate matter, semivolatile and low-volatile metals, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (m)(1)(i)(A), (n)(3), (o)(3)(i)].
LIC(M)-19	Venturi scrubber pressure drop low-low (ROHA)	24-PDALL-90A	Reserved	—	> 20 in. w.c.	Established as a short-term limit PIC, mercury, particulate matter, semivolatile and low-volatile metals, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (m)(1)(i)(A), (n)(3), (o)(3)(i)].
LIC-16	Clean liquor flow rate to scrubber tower low-low (instantaneous)	24-FALL-112	—	642 gpm	> 630 gpm	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-20	Clean liquor flow rate to scrubber tower low-low (instantaneous)	24-FALL-112	642 gpm instantaneous	—	> 630 gpm	Control mercury, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (o)(3)(v)].
LIC(M)-21	Clean liquor flow rate to scrubber tower low-low (ROHA)	24-FALL-112A	Reserved	—	> 630 gpm	Control mercury, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (o)(3)(v)].
LIC-17	Agent emission high-high based on instantaneous measurement	MON-ACAM-163	—	0.03 mg/m^3 HD	< 1.0 ASC	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-18	Agent emission high-high based on instantaneous measurement at common stack Continuous agent monitoring at the common stack	MON-ACAM-129 MON-ACAM-223 MON-ACAM-225	—	0.03 mg/m^3 HD	< 1.0 ASC	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Ranges	Basis
LIC-19	All brine surge tanks 101, 102, 201, 202 unavailable	23-LSHH-02/06/702/706	—	Unavailable is when level high-high at 18 feet-3 in. or tank is selected for feed to the BRA	<18 feet-3 in. in available tank	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-20	Clean liquor to scrubber tower pH low-low (instantaneous)	24-AALL-116	—	8.0 pH units	> 7.0 pH units	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-22	Clean liquor to scrubber tower pH low-low (instantaneous)	24-AALL-116	8.0 pH units instantaneous	8.0	> 7.0 pH units	Establish short-term limit on control of acid gases including hydrogen chloride and chlorine gas [40 CFR 63.1209(g)(2), (o)(3)(iv)].
LIC(M)-23	Clean liquor to scrubber tower pH low-low (ROHA)	24-AALL-116A/B	Reserved	—	> 7.0 pH units	Establish short-term limit on control of acid gases including hydrogen chloride and chlorine gas [40 CFR 63.1209(g)(2), (o)(3)(iv)].
LIC-21 LIC(M)-24	Clean liquor to scrubber tower Pressure low-low (instantaneous)	114-PALL-329	15 psig instantaneous	15 psig	> 15 psig	Manufacturer's recommendation to control mercury, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (o)(3)(iii)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-22	Quench tower exhaust gas temperature high-high	24-TSHH-89	—	225°F	< 225°F	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-23	Quench brine to venturi scrubber flow rate low-low (instantaneous)	24-FALL-88	—	125 gpm	> 120 gpm	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-25	Quench brine to venturi scrubber flow rate low-low (instantaneous)	24-FALL-88	125 gpm instantaneous	—	> 120 gpm	Control particulate matter, semivolatile and low-volatile metals, [40 CFR 63.1209(m)(1)(i)(C) and (n)(3)].
LIC(M)-26	Quench brine to venturi scrubber flow rate low-low (ROHA)	24-FALL-88A	Reserved	—	> 120 gpm	Control particulate matter, semivolatile and low-volatile metals, [40 CFR 63.1209(m)(1)(i)(C) and (n)(3)].
LIC-24	Brine density high-high (instantaneous)	24-DAHH-83	—	1.1 sgu	< 1.2 sgu	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-27	Brine density high-high (instantaneous)	24-DAHH-83	1.1 sgu instantaneous	—	< 1.2 sgu	Establish short-term limit on control of particulate emissions [40 CFR 63.1209(g)(2)].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Ranges	Basis
LIC(M)-28	Brine density high-high (12-HRA)	24-DAHH-83A	Reserved	—	< 1.2 sgu	Control particulate matter, semivolatile and low-volatile metals, [40 CFR 63.1209(m)(1)(i)(B)(2) and (n)(3)].
LIC-25	Scrubber tower sump liquid level high-high	24-LSHH-115	—	86 in. above bottom tangent line	< 86 in. above bottom tangent line	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-26	Oxygen concentration in PFS exhaust gas high-high (instantaneous)	24-AAHH-210A/210B	—	13% corrected to a dry basis	5.9% - 13% corrected to a dry basis	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-27 LIC(M)-29	Oxygen concentration in PFS exhaust gas low-low (instantaneous)	24-AALL-210C	5.9% 2-minute rolling average	5.9% corrected to a dry basis	5.9% - 13% corrected to a dry basis	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345]. [40 CFR §63.1209(j)(4)]
LIC-28 LIC(M)-30	Secondary chamber pressure high-high	13-PSHH-888	-0.25 in. w.c. instantaneous	-0.25 in. w.c.	-0.25 to -18.0 in. w.c.	Maintain lower than ambient pressure [40 CFR 1206(c)(5)(i)(B) and 1209(p)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-29	Scrubber tower sump level low-low	24-LSLL-115	—	50 in. above bottom tangent line	> 50 in. above bottom tangent line	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-30 [a] LIC(M)-31[a]	Flame loss in primary chamber burner for HD agent only	13-BSLL-912	Flame loss instantaneous	Flame loss	Flame on	No flame loss, control DRE [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-31 LIC(M)-32	Flame loss in secondary chamber burner	13-BSLL-909	Flame loss instantaneous	Flame loss	Flame on	No flame loss, control DRE [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-32	Slag discharge gate not closed	13-ZS-367B	—	Not closed	Closed	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-33	Slag discharge gate not closed	13-ZS-367B	Slag gate open (closure of slag gate is Title V permit) instantaneous	—	Closed	Slag gate must be closed [40 CFR 63.1209(j)(2)].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Ranges	Basis
LIC-33 LIC(M)-34	Prefilter differential pressure high-high	114-PDAHH-454A/436A/487A	4.0 in. w.c. instantaneous	4.0 in. w.c.	0.1 - 4.0 in. w.c.	Manufacturers recommendation, establish protection of carbon filter [40 CFR 63.1209(g)(2)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-34 LIC(M)-35	HEPA filter differential pressure high-high	114-PDAHH-454B/454H/436B/436H/487B/487H	3.0 in. w.c. instantaneous	3.0 in. w.c.	0.15 - 3.0 in. w.c.	Manufacturer's recommendation, establish protection of carbon filter [40 CFR 63.1209(g)(2)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-35 LIC(M)-36	Temperature of gas to carbon filter system high-high	114-TSHH-533 (instantaneous)	180°F (instantaneous) 167°F (ROHA)	180°F (instantaneous)	< 180°F (instantaneous)	Manufacturer's recommendation Establish protection of carbon filter, control dioxins and furans, mercury, semivolatile and low-volatile metals, hydrogen chloride and chlorine gas [40 CFR 63.1209(g)(2), (k)(1), (k)(7)(ii), (l)(4), (n)(1)]. Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-36	Moisture of gas to carbon filter system (either A or B or the average of the two measurements) high-high	114-MAHH-534A/B (instantaneous) 114-MAHH-534C (ROHA)	—	80% RH (instantaneous) 55% RH (ROHA)	< 80% RH (instantaneous) <55% RH (ROHA)	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-37	Moisture of gas to carbon filter system (either A or B or the average of the two measurements) high-high	114-MAHH-534A/B	80% RH instantaneous 55% RH ROHA	—	< 80% RH (instantaneous) <55% RH (ROHA)	Manufacturer's recommendation Establish protection of carbon filter. [40 CFR 63.1209(g)(2)]
LIC-37	Carbon filter bypass valve not closed	114-ZS-550B	—	Not closed	Closed	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-38	Minimum quench brine pH (ROHA)	24-AALL-91A/B	8.0 pH units ROHA	—	> 7.0 pH units ROHA	Establish short-term limit on control of acid gases, hydrogen chloride and chlorine gas [40 CFR 63.1209(g)(2), (o)(3)(iv)].
LIC(M)-39	Minimum packed bed pressure drop	24-PDALL-108A	0.30 in. w.c. ROHA	—	> 0.3 in. w.c. ROHA	Manufacturer's recommendation, control mercury, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2) and (o)(3)(ii)].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Ranges	Basis
LIC(M)-40	Clean liquor maximum specific gravity	24-DAHH-117A	1.03 sgu 12-hour rolling average	—	<1.03 sgu 12-hour rolling average	Control particulate matter, semivolatile and low-volatile metals, [40 CFR 63.1209(m)(1)(i)(B)(2) and (n)(3)].
LIC-38 LIC(M)-41	Maximum differential pressure across the mist eliminator	24-PDAHH-147/164	20 in. w.c. instantaneous	20 in. w.c.	< 20 in. w.c.	Manufacturer's recommendation [40 CFR 63.1209(g)(2)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-39	Agent emission high-high based on instantaneous measurement upstream of the PFS unit	MON-ACAM-354/356/357	—	0.03 mg/m^3 HD	<1.0 ASC	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-40	Relative humidity in PFS exhaust gas high-high	114-MAHH-109/209/113	—	55% RH (30-minute rolling average)	< 55% RH (30-minute rolling average)	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-41	Moisture in any furnace PAS	024-MAH-078A/B,-027A/B, -669A/B, -716 A/B		38% moisture (volume)	>38% moisture by volume	Operating requirements specified in the permit necessary to ensure required performance standards [40CFR264.345]
LIC(M)-42	Prefilter minimum pressure drop	114-PDALL-454A/436A/487A	0.1 in. w.c. 2-minute rolling average	—	0.1 - 4.0 in. w.c. (2-minute rolling average)	Manufacturer's recommendation [40 CFR 63.1209(g)(2)].
LIC(M)-43	Carbon filter inlet and outlet HEPA filter maximum pressure drop	114-PDALL-454B/454H/436B/436H/487B/487H	0.15 in. w.c. (instantaneous)	—	0.15 - 3.0 in. w.c. (instantaneous)	Manufacturer's recommendation [40 CFR 63.1209(g)(2)].

[a] Waste feed cut-off parameter for loss of flame does not apply to HD Rinsate feed to the LIC.

%	percent	ACAM	automatic continuous air monitor	AWFCO	automatic waste feed cut-off	DAHH	density alarm high-high
>	greater than	acfm	actual cubic feet per minute	BRA	Brine Reduction Area	FAHH	flow alarm high-high
ºF	degree(s) Fahrenheit	ASC	allowable stack concentration	BSLL	burner flame switch low-low	FALL	flow alarm low-low
AAHH	analyzer alarm high-high	ATB	agent trial burn	CO	carbon monoxide	gpm	gallon(s) per minute
AALL	analyzer alarm low-low						

TABLE 2-3: LIC2 OPERATING SETPOINTS

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Range	Basis
LIC-01 LIC(M)-1	Primary chamber pressure high-high	13-PSHH-845	-0.25 in. w.c. instantaneous	-0.25 in. w.c.	-0.25 to -18.00 in. w.c.	Maintain furnace pressure lower than ambient pressure [40 CFR 1206(c)(5)(i)(B)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-02	Primary chamber exhaust temperature high-high	13-TAHH-710	—	2,768°F	2,500 – 2,900°F	Waste feed combustion temperature limits [40 CFR 264.345].
LIC(M)-2	Primary chamber exhaust temperature high-high	13-TAHH-710	2,768°F instantaneous	—	2,500 – 2,900°F	Established to limit metal volatilization [40 CFR 63.1209(g)(2)].
LIC-03	Primary chamber exhaust temperature low-low (instantaneous)	13-TSLL-710	—	2,627°F	2,500 – 2,900°F	Waste feed combustion temperature limits [40 CFR 264.345].
LIC(M)-3	Primary chamber exhaust temperature low-low (instantaneous)	13-TSLL-710	2,627°F instantaneous	—	2,500 – 2,900°F	Established as short-term limit on PIC [40 CFR 63.1209(g)(2)].
LIC(M)-4	Primary chamber exhaust temperature low-low (ROHA)	13-TALL-752A	2,711°F ROHA	—	2,500 – 2,900°F	Control DRE, dioxins and furans [63.1209(j)(1) and 63.1209(k)(2)].
LIC-04 LIC(M)-5	Spent decontamination solution feed pressure low	13-PSL-765	45 psig instantaneous	45 psig	> 45 psig	DRE [40 CFR 63.1209(j)(3)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-05 LIC(M)-6	Agent feed pressure low-low	13-PALL-761	5 psig (when feed>500 lb/hr) instantaneous	5 psig (when feed rate >500 lb/hr)	> 5 psig (when feed rate >500 lb/hr)	Control dioxins and furans [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-06	Secondary chamber exhaust temperature low-low (instantaneous)	13-TSLL-782	—	1,833°F	1,800 – 2,002°F	Operating requirements, waste feed combustion temperature limits [40 CFR 264.345].
LIC(M)-7	Secondary chamber exhaust temperature low-low (instantaneous)	13-TSLL-782A	1,833°F instantaneous	—	1,800 – 2,002°F	Established as short-term limit on PIC [40 CFR 63.1209(g)(2)].
LIC(M)-8	Secondary chamber exhaust temperature low-low (ROHA)	13-TALL-782	1,842°F ROHA	—	1,800 – 2,002°F	Control DRE, dioxins and furans [40 CFR 63.1209(j)(1) and 40 CFR 63.1209(k)(2)].
LIC-07	Secondary chamber exhaust temperature high-high	13-TAHH-782	—	2,008°F	1,800 – 2,002°F	Operating requirements, waste feed combustion temperature limits [40 CFR 264.345].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Range	Basis
LIC(M)-9	Secondary chamber exhaust temperature high-high	13-TAHH-782	2,008°F instantaneous	—	1,800 – 2,002°F	Established to limit metal volatilization [40 CFR 63.1209(g)(2)].
LIC-08 LIC(M)-10	Combustion air to secondary chamber burner pressure low-low	13-PSLL-795	30 in. w.c. instantaneous	30 in. w.c.	> 30 in. w.c.	Manufacturers recommendation [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-09	Secondary chamber exhaust pressure differential high (instantaneous)	13-FAHH-855 (calculated)	—	18,720acfm	< 25,000 acfm	Operating requirements, combustion gas velocity [40 CFR 264.345].
LIC(M)-11	Secondary chamber exhaust pressure differential high (instantaneous)	13-FAHH-855	18,720 acfm instantaneous	—	< 25,000 acfm	Established as a short-term limit on PIC [40 CFR 63.1209(g)(2)].
LIC(M)-12	Secondary chamber exhaust pressure differential high (ROHA)	13-FAHH-855A (calculated)	18,700 acfm ROHA	—	< 25,000 acfm	Established as a short-term limit on PIC, DRE, dioxins and furans, mercury, particulate matter, semivolatile and low-volatile metals, hydrogen chloride and chlorine gas [40 CFR 63.1209(j)(2), (k)(3), (l)(2), (m)(1)(i)(C), (m)(2), (n)(3), (n)(5), (o)(2), (o)(3)(v)].
LIC-10 LIC(M)-13	Agent feed rate high-high based on a ROHA	13-FAHH-731	1,313 lb HD/hr ROHA 47.3 lbs HD/2 minutes (2-minute rolling average)	HD 1,313 lb/hr	< 1,335 lb/hr < 48.1 lbs/ 2 minutes	Control mercury and particulate matter [40 CFR 63.1209(l)(1) and (m)(3)], operating requirements, waste feed rate [40 CFR 264.345].
LIC-11 LIC(M)-14	Process water/SDS feed rate high-high based on a ROHA	13-FAHH-763C	2,082 lb/hr ROHA 74.9 lbs/2 minute (2-minute rolling average)	2,082 lb/hr maximum; to be adjusted lower periodically or as necessary to comply with final metals and chlorine limitations	< 2,200 lb/hr < 79.2 lbs/ 2 minutes	Control semivolatile metals, low-volatile metals, hydrogen chloride, and chlorine gas [40 CFR 63.1209(n)(2), (n)(4), (o)(1)], operating requirements, waste feed rate [40 CFR 264.345].
LIC-12 LIC(M)-15	CO concentration in PFS exhaust gas high-high	24-AAHH-716C	100 ppmv ROHA	100 ppm corrected to 7% oxygen, dry basis based on a ROHA	< 100 ppm CO < 38% water	Control CO and oxygen hydrocarbons, [40 CFR 63.1209(a)(1)(i) and (a)(7)], operating requirements, CO level in stack exhaust [40 CFR 264.345].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Range	Basis
LIC-13 LIC(M)-16	Primary atomizing air pressure low-low	13-PSLL-737C	55 psig instantaneous	55 psig	> 55 psig	Manufacturer's recommendation [40 CFR 63.1209(j)(4)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-14 LIC(M)-17	Secondary atomizing air pressure low	13-PSL-809	65 psig instantaneous	65 psig	> 65 psig	Manufacturer's recommendation [40 CFR 63.1209(j)(4)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-15	Venturi scrubber pressure drop low-low (instantaneous)	24-PDALL-814	—	24 in. w.c.	> 20 in. w.c.	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-18	Venturi scrubber pressure drop low-low (instantaneous)	24-PDALL-814	24 in. w.c. instantaneous	—	> 20 in. w.c.	Established as a short-term limit on PIC, mercury, particulate matter, semivolatile and low-volatile metals, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (m)(1)(i)(A), (n)(3), (o)(3)(i)].
LIC(M)-19	Venturi scrubber pressure drop low-low (ROHA)	24-PDALL-814A	Reserved	—	> 20 in. w.c.	Established as a short-term limit on PIC, mercury, particulate matter, semivolatile and low-volatile metals, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (m)(1)(i)(A), (n)(3), (o)(3)(i)].
LIC-16	Clean liquor flow rate to scrubber tower low-low (instantaneous)	24-FALL-825	—	647 gpm	> 630 gpm	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-20	Clean liquor flow rate to scrubber tower low-low (instantaneous)	24-FALL-825	647 gpm instantaneous	—	> 630 gpm	Control mercury, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (o)(3)(v)].
LIC(M)-21	Clean liquor flow rate to scrubber tower low-low (ROHA)	24-FALL-825A	Reserved	—	> 630 gpm	Control mercury, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (o)(3)(v)].
LIC-17	Agent emission high-high based on instantaneous measurement	MON-ACAM-134	—	0.03 mg/m^3 HD	< 1.0 ASC	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Range	Basis
LIC-18	Agent emission high-high based on instantaneous measurement at common stack Continuous agent monitoring at the common stack	MON-ACAM-129 MON-ACAM-223 MON-ACAM-225	—	0.03 mg/m^3 HD	< 1.0 ASC	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-19	All brine surge tanks 101, 102, 201, 202 unavailable	23-LSHH-02/06/702/706	—	Unavailable is when level high-high at 18 feet-3 in. or tank is selected for feed to the BRA	< 18 feet-3 in. in available tank	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-20	Clean liquor to scrubber tower pH low-low (instantaneous)	24-AALL-832	—	8.0 pH units	> 7.0 pH units	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-22	Clean liquor to scrubber tower pH low-low (instantaneous)	24-AALL-832	8.0 pH units instantaneous	—	> 7.0 pH units	Establish short-term limit on control of acid gases including hydrogen chloride and chlorine gas [40 CFR 63.1209(g)(2), (o)(3)(iv)].
LIC(M)-23	Clean liquor to scrubber tower pH low-low (ROHA)	24-AALL-832A/B	Reserved	—	> 7.0 pH units	Establish short-term limit on control of acid gases including hydrogen chloride and chlorine gas [40 CFR 63.1209(g)(2), (o)(3)(iv)].
LIC-21 LIC(M)-24	Clean liquor to scrubber tower Pressure low-low (instantaneous)	114-PALL-170	15 psig instantaneous	15 psig	> 15 psig	Manufacturers recommendation to control mercury, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2), (o)(3)(iii)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-22	Quench tower exhaust gas temperature high-high	24-TSHH-800	—	225°F	< 225°F	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-23	Quench brine to venturi scrubber flow rate low-low (instantaneous)	24-FALL-828	—	127 gpm	> 120 gpm	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-25	Quench brine to venturi scrubber flow rate low-low (instantaneous)	24-FALL-828	127 gpm instantaneous	—	> 120 gpm	Control particulate matter, semivolatile and low-volatile metals, [40 CFR 63.1209(m)(1)(i)(C) and (n)(3)].
LIC(M)-26	Quench brine to venturi scrubber flow rate low-low (ROHA)	24-FALL-828A	Reserved	—	> 120 gpm	Control particulate matter, semivolatile and low-volatile metals, [40 CFR 63.1209(m)(1)(i)(C) and (n)(3)].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Range	Basis
LIC-24	Brine density high-high (instantaneous)	24-DAHH-835	—	1.09 sgu	< 1.2 sgu	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-27	Brine density high-high (instantaneous)	24-DAHH-835	1.09 sgu instantaneous	—	< 1.2 sgu	Establish short-term limit on control of particulate emissions [40 CFR 63.1209(g)(2)].
LIC(M)-28	Brine density high-high (12-HRA)	24-DAHH-835A	Reserved	—	< 1.2 sgu	Control particulate matter, semivolatile and low-volatile metals, [40 CFR 63.1209(m)(1)(i)(B)(2) and (n)(3)].
LIC-25	Scrubber tower sump liquid level high-high	24-LSHH-818	—	86 in. above bottom tangent line	< 86 in. above bottom tangent line	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-26	Oxygen concentration in PFS exhaust gas high-high (instantaneous)	24-AAHH-717A/717B	—	13% corrected to a dry basis	5.9% - 13% corrected to a dry basis	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-27 LIC(M)-29	Oxygen concentration in PFS exhaust gas low-low (instantaneous)	24-AALL-717C	5.5% 2-minute rolling average	5.5% corrected to a dry basis	5.9% - 13% corrected to a dry basis	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345] [40 CFR §63.1209(j)(4)]
LIC-28 LIC(M)-30	Secondary chamber pressure high-high	13-PSHH-896	-0.25 in. w.c. instantaneous	-0.25 in. w.c.	-0.25 to -18.0 in. w.c.	Maintain lower than ambient pressure [40 CFR 1206(c)(5)(i)(B) and 1209(p)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-29	Scrubber tower sump level low-low	24-LSLL-818	—	50 in. above bottom tangent line	> 50 in. above bottom tangent line	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-30 [a] LIC(M)-31[a]	Flame loss in primary chamber burner	13-BSLL-908	Flame loss instantaneous	Flame loss	Flame on	No flame loss, control DRE [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-31 LIC(M)-32	Flame loss in secondary chamber burner	13-BSLL-913	Flame loss instantaneous	Flame loss	Flame on	No flame loss, control DRE [40 CFR 63.1209(j)(4)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-32	Slag discharge gate not closed	13-ZS-567B	—	Not closed	Closed	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-33	Slag discharge gate not closed	13-ZS-567B	Slag gate open instantaneous	—	Closed	Slag gate must be closed [40 CFR 63.1209(j)(2)].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Range	Basis
LIC-33 LIC(M)-34	Prefilter differential pressure high-high	114-PDAHH-436A/487A/454A	4.0 in. w.c. instantaneous	4.0 in. w.c.	0.1 - 4.0 in. w.c.	Manufacturer's recommendation, establish protection of carbon filter [40 CFR 63.1209(g)(2)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-34 LIC(M)-35	HEPA filter differential pressure high-high	114-PDAHH-436B/436H/487B/487H/454B/454H	3.0 in. w.c. instantaneous	3.0 in. w.c.	0.15 - 3.0 in. w.c.	Manufacturer's recommendation, establish protection of carbon filter [40 CFR 63.1209(g)(2)], operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-35 LIC(M)-36	Temperature of gas to carbon filter system high-high	114-TSHH-433 (instantaneous)	180°F (instantaneous) 163°F ROHA	180°F (instantaneous)	< 180°F (instantaneous)	Manufacturer's recommendation Establish protection of carbon filter, control dioxins and furans, mercury, semivolatile and low-volatile metals, hydrogen chloride and chlorine gas [40 CFR 63.1209(g)(2), (k)(1), (k)(7)(ii), (l)(4), (n)(1)]. Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-36	Moisture of gas to carbon filter system (either A or B or the average of the two measurements) high-high	114-MAHH-434A/B (instantaneous) 114-MAHH-434C (ROHA)	—	80% RH (instantaneous) 55% RH (ROHA)	< 80% RH instantaneous < 55% RH ROHA	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-37	Moisture of gas to carbon filter system (either A or B or the average of the two measurements) high-high	114-MAHH-434A/B	80% RH (instantaneous) 55% RH (ROHA)	—	< 80% RH (instantaneous) < 55% RH (ROHA)	Manufacturer's recommendation Establish protection of carbon filter. [40 CFR 63.1209(g)(2)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-37	Carbon filter bypass valve not closed	114-ZS-450B	—	Not closed	Closed	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC(M)-38	Minimum quench brine pH (ROHA)	24-AALL-831A/B	8.1 pH units ROHA	—	> 7.0 pH units ROHA	Establish short-term limit on control of acid gases, hydrogen chloride and chlorine gas [40 CFR 63.1209(g)(2), (o)(3)(iv)].
LIC(M)-39	Minimum packed bed pressure drop	24-PDALL-822A	0.30 in. w.c. ROHA	—	> 0.3 in. w.c. ROHA	Manufacturers recommendation, control mercury, hydrogen chloride and chlorine gas [40 CFR 63.1209(l)(2) and (o)(3)(ii)].

Item Number	Process Data Description	Tag Number	Proposed Title V Permit Limits	Proposed RCRA Permit Limits	Operating Range	Basis
LIC(M)-40	Clean liquor maximum specific gravity	24-DAHH-826A	1.03 sgu 12-hr rolling average	—	<1.03 sgu 12-hr rolling average	Control particulate matter, semivolatile and low-volatile metals, [40 CFR 63.1209(m)(1)(i)(B)(2) and (n)(3)].
LIC-38 LIC(M)-41	Maximum differential pressure across the mist eliminator	24-PDAHH-867/164	20 in .w.c. instantaneous	20 in. w.c.	< 20 in. w.c.	Manufacturer's recommendation [40 CFR 63.1209(g)(2)], Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-39	Agent emission high-high based on instantaneous measurement upstream of the PFS unit	MON-ACAM-354/356/357	—	0.03 mg/m^3 HD	<1.0 ASC	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-40	Relative humidity in PFS exhaust gas high-high	114-MAHH-109/209/113	—	55% RH (30-minute rolling average)	< 55% RH (30-minute rolling average)	Operating requirements specified in the permit necessary to ensure required performance standards [40 CFR 264.345].
LIC-41	Moisture in any furnace PAS	024-MAH-078A/B,-207A/B,-669A/B,-716A/B		38% moisture (volume)		Operating requirements specified in the permit necessary to ensure required performance standards [40CFR264.345]
LIC(M)-42	Prefilter minimum pressure drop	114-PDALL-436A/487A/454A	0.1 in. w.c. (2-minute rolling average)	—	0.1 - 4.0 in. w.c. (2-minute rolling average)	Manufacturer's recommendation [40 CFR 63.1209(g)(2)].
LIC(M)-43	Carbon filter inlet and outlet HEPA filter maximum pressure drop	114-PDALL-436B/436H/487B/487H/454B/454H	0.15 in. w.c. (instantaneous)	—	0.15 - 3.0 in. w.c. (instantaneous)	Manufacturer's recommendation [40 CFR 63.1209(g)(2)].

[a] Waste feed cut-off parameter for loss of flame does not apply to HD Rinsate feed to the LIC.

%	percent
>	greater than
ºF	degree(s) Fahrenheit
AAHH	analyzer alarm high-high
AALL	analyzer alarm low-low
ACAM	automatic continuous air monitor
acfm	actual cubic feet per minute
ASC	allowable stack concentration
ATB	agent trial burn
AWFCO	automatic waste feed cut-off
BRA	Brine Reduction Area
BSLL	burner flame switch low-low
CO	carbon monoxide
DAHH	density alarm high-high
FAHH	flow alarm high-high
FALL	flow alarm low-low
gpm	gallon(s) per minute

TABLE 2-4. LIC1 SYSTEM INSTRUMENT AND PROCESS PARAMETER[A]

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency
1 [c]	Fuel gas to primary chamber LIC-FURN-101 13-FIT-120	Orifice Plate and D/P Cell	In-line	0-267 scfm	±8 scfm	Inst. Calib. Para 2.4 (180 days)
2 [b,c,d]	Chemical Agent from TOX to LIC-FURN-101 13-FT-127A/B	Mass Flow Meter Vibrating U-Tube Type	In-line	0-1,500 lb/hr	±7.5 lb/hr	Inst. Calib. Para. 2.4 (180 days)
3 [c]	Combustion Air to LIC-FURN-101 13-FIT-42	Annubar and D/P Cell	In-line	0-3,400 scfm	±136 scfm	Inst. Calib. Para 2.4 (180 days)
4 [b,c,d]	SDS to Secondary Chamber LIC-FURN-102 13-FIT-102	Mass Flow Meter Vibrating U-tube	In-line	0-2,250 lb/hr	±20 lb/hr	Inst. Calib. Para. 2.4 (180 days)
5 [c]	Fuel Gas to Secondary Chamber LIC-FURN-102 13-FIT-70	Orifice Plate and D/P Cell	In-line	0-150 scfm	±5 scfm	Inst. Calib. Para 2.4 (180 days)
6[c]	Combustion Air to LIC-FURN-102 13-FIT-50	Annubar and D/P Cell	In-line	0-1,400 scfm	±50 scfm	Inst. Calib. Para. 2.4 (180 days)
7[b,c,d]	Primary Chamber LIC-FURN-101 Pressure 13-PIT-52	Diaphragm	Incinerator	-20 to +5 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para. 2.3 (180 days)
8 [b,c,d]	Primary Chamber LIC-FURN-101 Flue Gas Temperature 13-TIT-43	Thermocouple	In-line	212-3,000°F	±20°F	Inst. Calib. Para. 2.5 (180 days)
9 [b,c,d]	Secondary Chamber LIC-FURN-102 Flue Gas Temperature 13-TIT-129	Thermocouple	In-line	32-2,400°F	±15°F	Inst. Calib. Para. 2.5 (180 days)
10	Secondary Chamber LIC-FURN-102 Pressure 13-PIT-59	Diaphragm	Incinerator	-20 to +5 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para. 2.3 (180 days)
11 [b,c,d]	Secondary Chamber LIC-FURN-102 Exhaust Gas Flow Rate 13-PDIT-854	Modified Venturi and D/P Cell	In-line	-2 to 1.75 in w.c.	±0.1 in. w.c.	Inst. Calib. Para. 2.4 (180 days)
12	Intentionally left blank					
13	Intentionally left blank					
14	Intentionally left blank					
15	Intentionally left blank					
16 [b,c,d]	Quench Tower PAS-TOWR-104 Exhaust Gas Temperature high-high 24-TSHH-89	Filled System	In-line	95-250°F	±5°F	Inst. Calib. Para. 2.5 (180 days)
17 [b,c,d]	LIC Quench Brine Density 24-DIT-83	Magnetically Vibrated Tube	PAS-PUMP-111/112/211/212 Discharge	0.95-1.25 sgu	±0.03 sgu	Inst. Calib. Para. 2.7 (180 days)
18	Intentionally left blank					
19 [b,c,d]	Quench Brine Flow to Venturi Scrubber PAS-SEPA-103 24-FIT-88	Electromagnetic Flow meter	In-line	0-150 gpm	±5.0 gpm	Inst. Calib. Para. 2.4 (365 days)

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency
20 [b,c,d]	Clean Liquor Flow to Scrubber Tower Sprays 24-FIT-112	Electromagnetic Flow meter	In-line	0-1,000 gpm	±10 gpm	Inst. Calib. Para. 2.4 (180 days)
21 [c,e]	Quench Tower PAS-TOWR-104 Level 24-LIT-132	Guided Wave Radar Transmitter	Vessel	-3 to 9 inches	±0.25 inches	Inst. Calib. Para 2.6 (180 days)
22	Intentionally left blank					
23	Intentionally left blank					
24	Intentionally left blank					
25 [b,c,d]	Venturi Scrubber Differential Pressure 24-PDIT-90	D/P Cell	Venturi Scrubber	0-50 in. w.c.	±0.5 in. w.c.	Inst. Calib. Para. 2.4 (180 days)
26 [b,c,d]	Brine From Scrubber Tower PAS-SCRB-103 pH 24-AIT-91 A/B	Electrodes	PAS-PUMP-111/112	0-13 pH units	±0.8 pH unit	Inst. Calib. Para. 2.7 (7/30 days) [k]
27 [c]	Clean Liquor pH 24-AIT-116 A/B	Electrode	PFS-PUMP-134/135 Discharge to Suction	0-13 pH units	±0.8 pH unit	Inst. Calib. Para. 2.7 (7/30 days) [k]
28 [c]	Clean Liquor Density 24-DIT-117	Magnetically Vibrated Tube	PFS-PUMP-134/135 Discharge to Suction	0.95-1.25 sgu	± 0.03 sgu	Inst. Calib. Para 2.4 (180 days)
29 [c,g]	Mist Eliminator Water pH 24-AIT-657/658	Electrodes	PAS-PUMP-131/136 Discharge to Suction	0-13 pH units	±0.8 pH unit	Inst. Calib. Para. 2.7 (7/30 days) [k]
30 [c,l]	Mist Eliminator PAS-DMIS-101/102 Differential Pressure 24-PDIT-147/164	D/P Cell	Vessel	0-30 in. w.c.	±0.3 in. w.c.	Inst. Calib. Para 2.4 (180 days)
31 [b,c,d]	Exhaust Blower PAS-BLOW-104 Exhaust Gas carbon monoxide 24-AIT-78C	Infrared cell analyzer	Blower Exhaust Line (In-situ)	0-200 and 0-3,000 ppm	±6 ppm low range ±90 ppm high range	Inst. Calib. Para. 1.1 and 1.2 (daily)
32 [c,h]	Exhaust Blower PAS-BLOW-104 Exhaust Gas oxygen 24-AIT-210C	Zirconium oxide cell analyzer	Blower Exhaust Line (In-situ)	0-25%	±0.5%	Inst. Calib. Para. 1.1 and 1.2 (daily)
33 [b,c,d]	Exhaust Blower PAS BLOW-104 Exhaust Gas Agent MON-ACAM-163	Gas chromatography	Blower Exhaust Line (Extractive)	See Permit App. Att. D-2	See Permit App. Att. D-2	See Permit App. Att. D-2
34 [b,c,d]	Brine Surge Tanks 101,102,201,202 Level 23-LT-03/07/703/707	Ultrasonic Level Transmitter	Brine Surge Tanks	0- 225 inches	±3 inches	Inst. Calib. Para. 2.6 (180 days)
35	Scrubber Tower Brine Pressure 24-PIT-100	D/P Cell	In-line	0-150 psig	±1.5 psig	Inst. Calib. Para. 2.3 (180 days)
36	Process Water/SDS Pressure Low 13-PSL-51	Diaphragm	In-line	0-100 psig	±2.0 psig	Inst. Calib. Para. 2.3 (180 days)
37	Combustion Air to Secondary Chamber burner pressure low-low 13-PSLL-200	Diaphragm	In-line	2.5-45 in. w.c.	±1.0 in. w.c.	Inst. Calib. Para. 2.3 (180 days)
38	Atomizing Air Pressure low-low 13-PSLL-127C	Diaphragm	In-line	12-100 psig	±2.0 psig	Inst. Calib. Para. 2.3 (180 days)

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency
39	Brine Surge Tanks level high-high 23-LSHH-702/706/02/06	Admittance-Type Level Switches	Brine Surge Tanks	On/Off	±0.75 inches	Inst. Calib. Para. 2.6 (180 days)
40 [b,c,d]	Secondary Chamber LIC-FURN-102 pressure high-high 13 PSHH-888	Diaphragm	Incinerator	-0.55 to -0.15 in. w.c.	±0.05 in. w.c.	Inst. Calib. Para. 2.3 (365 days)
41	Presence of Flame Primary Chamber 13-BSLL-912 HD	Flame Detector	Burner	N/A	N/A	Inst. Calib. Para 2.8
42	Presence of Flame Secondary Chamber 13-BSLL-909	Flame Detector	Burner	N/A	N/A	Inst. Calib. Para 2.8
43 [b,c]	Prefilter Differential Pressure 114-PDIT-454A/436A/ 487A	D/P Cell	Prefilter	0-6 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para 2.4 (180 days)
44 [b,c]	HEPA Filter Differential Pressure 114-PDIT-454B/454H/ 436B/436H/487B/487H	D/P Cell	HEPA Filter	0-6 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para 2.4 (180 days)
45 [b,c]	Temperature of gas to carbon filter system 114-TIT-518	Resistance Temperature Detector	In-line	0-250°F	±3°F	Inst. Calib. Para. 2.5 (180 days)
46 [b,c]	Moisture of gas to carbon filter system 114-MIT-534A/B	Humidity Sensor	In-line	0-90% RH	±3.5% RH	Inst. Calib. Para. 2.7 (180 days)
47 [b,c,d]	Stack PAS-STAK-102 exhaust gas agent MON-ACAM-129/223/225	Gas chromatography	Stack (extractive)	See Permit App. Att. D-2	See Permit App. Att. D-2	See Permit App. Att. D-2
48 [m]	PFS inlet gas agent monitor MON-ACAM- 354/356/357	Gas chromatography	Gas Reheater Outlet (extractive)	See Permit App. Att. D-2	See Permit App. Att. D-2	See Permit App. Att. D-2
49 [b,c]	LIC-FURN-101 Exhaust Gas Temperature 13-TIT-610	Thermocouple	In-line	212-3000°F	±15°F	Inst. Calib. Para. 2.5 (365 days)
50 [b]	Primary Chamber Pressure 13-PSHH-233	Diaphragm	Incinerator	-0.55 to -0.15 in. w.c.	±0.05 in. w.c.	Inst. Calib. Para. 2.3 (180 days)
51 [b,c,i]	LIC-FURN-101 Agent Feed Pressure 13-PIT-113	Diaphragm	Incinerator	0-25 psig	±0.5 psig	Inst. Calib. Para. 2.3 (180 days)
52[b]	LIC-FURN- 102 Secondary Chamber Atomizing Air Pressure 13-PSL-058	Diaphragm	Incinerator	15-100 psig	±2.0 psig	Inst. Calib. Para. 2.3 (180 days)
53 [b]	PAS-SCRB-103 Scrubber Tower Sump Level high-high 24-LSHH-115	Magnetic Level Meter Switch	Vessel	Point Contact	±0.5 inch	Inst. Calib. Para. 2.6 (180 days)
54 [b]	PAS-SCRB-103 Scrubber Tower Sump Level low-low 24-LSLL-115	Magnetic Level Meter Switch	Vessel	Point Contact	±0.5 inch	Inst. Calib. Para. 2.6 (180 days)
55 [b,c]	PFS-PUMP-134/135 Clean Liquor Pump Discharge Pressure 114-PIT-329	Diaphragm	Pump Discharge Line	0-120 psig	±1 psig	Inst. Calib. Para. 2.3 (365 days)
56 [b]	PFS-BURN-101 Temperature of the Gas Entering the Carbon Filter System High-High 114-TSHH-533	Capillary Filled System	Reheater Discharge Line	95-250°F	±3.0°F	Inst. Calib. Para. 2.5 (180 days)
57	Intentionally left blank					
58	Intentionally left blank					

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency
59 [b,c]	Packed bed Scrubber Differential Pressure 24-PDIT-108 (ROHA)	D/P Cell	Scrubber Vessel	0-10 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para. 2.4 (180 days)
60 [b,c,j]	Relative Humidity in PFS Exhaust Gas based on Temperature 114-TIT-9810/9811/9815	Resistance Temperature Detector	In-line	50-200°F	±3% RH	Inst Calib. Para 2.5 (180 days)
61 [b,c]	PAS-DMIS-101/102 Flue Gas Discharge Temperature 24-TIT-9813/9814	Resistance Temperature Detector	In-line	50-200°F	±1°F	Inst. Calib. Para. 2.5 (180 days)

Notes:

[a] Process instrument calibration procedures and the oxygen and carbon monoxide analyzer calibration procedures are described in applicable facility plans and procedures. The information in this table is derived from the information in Table 7-1a of the Hazardous Waste Permit.

[b] Continuous monitoring.

[c] Continuous recording.

[d] Maintenance, at a minimum, in accordance with equipment manufacturer's recommendations.

[e] Hazardous waste treatment may continue during maintenance activities conducted in accordance with site-specific standing operating procedures, for a maximum of 24 hours after the failure of the instrument.

[f] During a waste feed cut-off event, the feed line pressure may reach the maximum instrument calibrated range limit.

[g] Hazardous waste treatment may continue during maintenance activities in accordance with site specific standing operating procedure, provided the mist eliminator water is not being transferred to the scrubber tower.

[h] The minimum limit is based on a two-minute rolling average.

[i] The pressure in the waste feed line may exceed the operating range specified upon initiation of feed to the furnace system.

[j] The relative humidity of the PFS exhaust gas is calculated using the PFS outlet temperature and the clean liquor return temperature. The calibrated instrument range applies to the temperature-indicating transmitter, and the operating range and instrument loop accuracy apply to the calculated relative humidity.

[k] Initially, upon placement of the instrument, or if the instrument is found out of tolerance, the instrument will be checked every seven (7) days until it stabilizes (instrument check indicates it is "in-tolerance" – no adjustments needed). After the instrument stabilizes, it will be checked on a 30-day basis until found out of tolerance or it is replaced.

[l] Daily trending will be conducted on the Mist Eliminator differential pressure to identify potential deterioration of the candles.

[m] These ACAMS readings are corrected to 7% oxygen as described in Section 2.13.2.1.

Abbreviations:

%	percent	MON	monitor
±	plus or minus	No.	number
°F	degree(s) Fahrenheit	N/A	not applicable
ACAM	automatic continuous air monitor	PAS	pollution abatement system
AIT	analysis indicating transmitter	PDIT	pressure differential indicating transmitter
App.	Hazardous Waste Permit Application	PFS	Pollution Abatement System (PAS) Filter System
BLOW	blower	PIT	pressure indicating transmitter
BSLL	burner flame switch low-low	ppm	part(s) per million
D/P	differential pressure	PSHH	pressure switch high-high
DIT	density indicating transmitter	psig	pound(s) per square inch gauge
DMIS	mist eliminator	PSL	pressure switch low
FIT	flow indicating transmitter	PSLL	pressure switch low-low
FT	flow transmitter	RH	relative humidity
FURN	furnace	ROHA	rolling one-hour average
gpm	gallon(s) per minute	scfm	standard cubic feet per minute
HEPA	high efficiency particulate air	SCRB	scrubber
in. w.c.	inch(es) water column	SDS	spent decontamination solution

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency

lb/hr	pound(s) per hour	SEPA	separator
LIC	Liquid Incinerator	sgu	specific gravity units
LIT	level indicating transmitter	STAK	stack
LSHH	level switch high-high	TIT	temperature indicating transmitter
LSLL	level switch low-low	TOWR	tower
LT	level transmitter	TOX	Toxic Cubicle
MIT	moisture indicating transmitter	TSHH	temperature switch high-high

TABLE 2-5. LIC2 SYSTEM INSTRUMENT AND PROCESS PARAMETERS [a]

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency
1 [c]	Fuel Gas to Primary Chamber LIC-FURN-201 13-FIT-749	Orifice Plate and D/P Cell	In-line	0-267 scfm	±8 scfm	Inst. Calib. Para 2.4 (180 days)
2 [b,c,d]	Chemical Agent from TOX to LIC-FURN-201 13-FT-731A/B	Mass Flow meter Vibrating U-Tube Type	In-line	0-1,500 lb/hr	±7.5 lb/hr	Inst. Calib. Para. 2.4 (180 days)
3 [c]	Combustion Air to LIC-FURN-201 13-FIT-743	Annubar and D/P Cell	In-line	0-3,400 scfm	±136 scfm	Inst. Calib. Para 2.4 (180 days)
4 [b,c,d]	SDS to Secondary Chamber LIC-FURN-202 13-FIT-763	Mass Flow meter Vibrating U-tube	In-line	0-2,250 lb/hr	±20 lb/hr	Inst. Calib. Para. 2.4 (180 days)
5 [c]	Fuel Gas to Secondary Chamber LIC-FURN-202 13-FIT-787	Orifice Plate and D/P Cell	In-line	0-150 scfm	±5 scfm	Inst. Calib. Para. 2.4 (180 days)
6 [c]	Combustion Air to LIC-FURN-202 13-FIT-788	Annubar and D/P Cell	In-line	0-1,400 scfm	±50 scfm	Inst. Calib. Para. 2.4 (180 days)
7 [b,c,d]	Primary Chamber LIC-FURN-201 Pressure 13-PIT-706	Diaphragm	Incinerator	-20 to +5 in. w.c.	±0.1 in. w.c	Inst. Calib. Para. 2.3 (180 days)
8 [b,c,d]	Primary Chamber LIC-FURN-201 Flue Gas Temperature 13-TIT-752	Thermocouple	In-line	212-3,000°F	±20°F	Inst. Calib. Para. 2.5 (180 days)
9 [b,c,d]	Secondary Chamber LIC-FURN-202 Flue Gas Temperature 13-TIT-782	Thermocouple	In-line	32-2,400°F	±15°F	Inst. Calib. Para. 2.5 (180 days)
10	Secondary Chamber LIC-FURN-202 Pressure 13-PIT-703	Diaphragm	Incinerator	-20 to +5 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para. 2.3 (180 days)
11 [b,c,d,l]	Secondary Chamber LIC-FURN-202 Calculated Flue Gas Flow Rate 13-FIT-855	N/A	N/A	N/A	N/A	N/A
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13	Intentionally left blank					
14	Intentionally left blank					
15	Intentionally left blank					

TABLE 2-5. LIC2 SYSTEM INSTRUMENT AND PROCESS PARAMETERS [a]

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency
16 [b,c,d]	Quench Tower PAS-TOWR-204 Exhaust Gas Temperature high-high 24-TSHH-800	Filled System	In-line	95-250°F	±5°F	Inst. Calib. Para. 2.5 (180 days)
17 [b,c,d]	LIC Quench Brine Density 24-DIT-835	Magnetically Vibrated Tube	PAS-PUMP-211/212 Discharge	0.95-1.25 sgu	±0.03 sgu	Inst. Calib. Para. 2.7 (180 days)
18	Intentionally left blank					
19 [b,c,d]	Quench Brine Flow to Venturi Scrubber PAS-SEPA-203 24-FIT-828	Electromagnetic Flow meter	In-line	0-150 gpm	±5.0 gpm	Inst. Calib. Para. 2.4 (365 days)
20 [b,c,d]	Clean Liquor Flow to Scrubber Tower Sprays 24-FIT-825	Electromagnetic Flow meter	In-line	0-1,000 gpm	±10 gpm	Inst. Calib. Para. 2.4 (180 days)
21 [c,e]	Quench Tower PAS-TOWR-204 Level 24-LIT-810	Guided Wave Radar Transmitter	Vessel	-3 to 9 inches	±0.25 inches	Inst. Calib. Para 2.6 (180 days)
22	Intentionally left blank					
23	Intentionally left blank					
24	Intentionally left blank					
25 [b,c,d]	Venturi Scrubber Differential Pressure 24-PDIT-814	D/P Cell	Venturi Scrubber	0-50 in. w.c.	±0.5 in. w.c.	Inst. Calib. Para. 2.4 (180 days)
26 [b,c,d]	Brine From Scrubber Tower PAS-SCRB-203 pH 24-AIT-831 A/B	Electrodes	PAS-PUMP-211/212	0-13 pH units	±0.8 pH unit	Inst. Calib. Para. 2.7 (7/30 days) [k]
27 [c]	Clean Liquor pH 24-AIT-832-A/B	Electrode	PFS-PUMP-234/235 Discharge to Suction	0-13 pH units	±0.8 pH unit	Inst. Calib. Para. 2.7 (7/30 days) [k]
28 [c]	Clean Liquor Density 24-DIT-826	Magnetically Vibrated Tube	PFS-PUMP 234/235 Discharge to Suction	0.95-1.25 sgu	±0.03 sgu	Inst. Calib. Para 2.4 (180 days)
29 [c,g]	Mist Eliminator Water pH 24-AIT-861/658	Electrodes	PAS-PUMP-136/222 Discharge to Suction	0-13 pH units	±0.8 pH unit	Inst. Calib. Para. 2.7 (7/30 days) [k]
30 [c]	Mist Eliminator PAS-DMIS-201/102 Differential Pressure 24-PDIT-867/164	D/P Cell	Vessel	0-30 in. w.c.	±0.3 in. w.c.	Inst. Calib. Para 2.4 (180 days)
31 [b,c,d]	Exhaust Blower PAS-BLOW-204 Exhaust Gas carbon monoxide 24-AIT-716C	Infrared Cell Analyzer	Blower Exhaust Line (In-situ)	0-200 and 0-3,000 ppm	±6 ppm low range ±90 ppm high range	Inst. Calib. Para. 1.1 and 1.2 (daily)
32 [c,h]	Exhaust Blower PAS-BLOW-204 Exhaust Gas oxygen 24-AIT-717A/717B	Zirconium Oxide Cell Analyzer	Blower Exhaust Line (In-situ)	0-25%	±0.5%	Inst. Calib. Para. 1.1 and 1.2 (daily)

TABLE 2-5. LIC2 SYSTEM INSTRUMENT AND PROCESS PARAMETERS [a]

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency
33 [b,c,d]	Exhaust Blower PAS-BLOW-204 Exhaust Gas Agent MON-ACAM-134	Gas chromatography	Blower Exhaust Line (Extractive)	See Permit App. Att. D-2	See Permit App. Att. D-2	See Permit App. Att. D-2
34 [b,c,d]	Brine Surge Tanks 101,102,201,202 Level 23-LT-03/07/703/707	Ultrasonic Level Transmitter	Brine Surge Tanks	0- 225 inches	±3 inches	Inst. Calib. Para. 2.6 (180 days)
35	Scrubber Tower Brine Pressure 24-PIT-838	D/P Cell	In-line	0-150 psig	±1.5 psig	Inst. Calib. Para. 2.3 (180 days)
36	Process Water/SDS Pressure Low 13-PSL-765	Diaphragm	In-line	0-100 psig	±2.0 psig	Inst. Calib. Para. 2.3 (180 days)
37	Combustion Air to Secondary Chamber Burner Pressure low-low 13-PSLL-795	Diaphragm	In-line	2.5-45 in. w.c.	±1.0 in. w.c.	Inst. Calib. Para. 2.3 (180 days)
38	Atomizing Air Pressure low-low 13-PSLL-737C	Diaphragm	In-line	12-100 psig	±2.0 psig	Inst. Calib. Para. 2.3 (180 days)
39	Brine Surge Tanks Level high-high 23-LSHH-702/706/02/06	Admittance-Type Level Switches	Brine Surge Tanks	On/Off	±0.75 inches	Inst. Calib. Para. 2.6 (180 days)
40 [b,c,d]	Secondary Chamber LIC-FURN-202 Pressure high-high 13-PSHH-896	Diaphragm	Incinerator	-0.55 to -0.15 in. w.c.	±0.05 in. w.c.	Inst. Calib. Para. 2.3 (365 days)
41	Presence of Flame Primary Chamber 13-BSLL-908 HD agent only	Flame Detector	Burner	N/A	N/A	Inst. Calib. Para 2.8
42	Presence of Flame Secondary Chamber 13-BSLL-913	Flame Detector	Burner	N/A	N/A	Inst. Calib. Para 2.8
43 [b,c]	Prefilter Differential Pressure 114-PDIT-436A/487A/454A	D/P Cell	Prefilter	0-6 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para 2.4 (180 days)
44 [b,c]	HEPA Filter Differential Pressure 114-PDIT-436B/436H/487B/487H/454B/454H	D/P Cell	HEPA Filter	0-6 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para 2.4 (180 days)
45 [b,c]	Temperature of gas to carbon filter system 114-TIT-418	Resistance Temperature Detector	In-line	0-250°F	±3°F	Inst. Calib. Para. 2.5 (180 days)
46 [b,c]	Moisture of gas to carbon filter system 114-MIT-434A/B	Humidity Sensor	In-line	0- 90% RH	±3.5% RH	Inst. Calib. Para. 2.7 (180 days)
47 [b,c,d]	Stack PAS-STAK-102 exhaust gas agent MON-ACAM-129/223/225	Gas chromatography	Stack (extractive)	See Permit App. Att. D-2	See Permit App. Att. D-2	See Permit App. Att. D-2
48	PFS inlet gas agent monitor MON-ACAM-354/356/357	Gas chromatography	Gas Reheater Outlet (extractive)	See Permit App. Att. D-2	See Permit App. Att. D-2	See Permit App. Att. D-2

TABLE 2-5. LIC2 SYSTEM INSTRUMENT AND PROCESS PARAMETERS [a]

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency
49 [b,c]	LIC-FURN-201 Exhaust Gas Temperature 13-TIT-710	Thermocouple	In-line	212-3000°F	±15°F	Inst. Calib. Para. 2.5 (365 days)
50 [b]	Primary Chamber Pressure 13-PSHH-845	Diaphragm	Incinerator	-0.55 to –0.15 in. w.c.	±0.05 in. w.c.	Inst. Calib. Para. 2.3 (180 days)
51 [b,c,i]	LIC-FURN-201 Agent Feed Pressure 13-PIT-761	Diaphragm	Incinerator	0-25 psig	±0.5 psig	Inst. Calib. Para. 2.3 (180 days)
52 [b]	LIC-FURN-202 Secondary Chamber Atomizing Air Pressure 13-PSL-809	Diaphragm	Incinerator	15-100 psig	±2.0 psig	Inst. Calib. Para. 2.3 (180 days)
53 [b]	PAS-SCRB-203 Scrubber Tower Sump Level high-high 24-LSHH-818	Magnetic Level Meter Switch	Vessel	Point Contact	±0.5 inch	Inst. Calib. Para. 2.6 (180 days)
54 [b]	PAS-SCRB-203 Scrubber Tower Sump Level low-low 24-LSLL-818	Magnetic Level Meter Switch	Vessel	Point Contact	±0.5 inch	Inst. Calib. Para. 2.6 (180 days)
55 [b,c]	PFS-PUMP-234/235 Clean Liquor Pump Discharge Pressure 114-PIT-170	Diaphragm	Pump Discharge Line	0-120 psig	±1 psig	Inst. Calib. Para. 2.3 (365 days)
56 [b]	PFS-BURN-102 Temperature of the Gas Entering the Carbon Filter System High-High 114-TSHH-433	Capillary Filled System	Reheater Discharge Line	95-250°F	±3.0°F	Inst. Calib. Para. 2.5 (180 days)
57	Intentionally left blank					
58	Intentionally left blank					
59 [b,c]	Packed bed Scrubber Differential Pressure 24-PDIT-822 (ROHA)	D/P Cell	Scrubber Vessel	0-10 in. w.c.	±0.1 in. w.c.	Inst. Calib. Para. 2.4 (180 days)
60 [b,c,i,j]	Relative Humidity in PFS Exhaust Gas Based on Temperature 114-TIT-9810/9811/9815	Resistance Temperature Detector	In-line	50-200°F	±3% RH	Inst Calib. Para 2.5 (180 days)
61 [b,c]	PAS-DMIS-201/102 Flue Gas Discharge Temperature 24-TIT-9817/9814	Resistance Temperature Detector	In-line	50-200°F	±1°F	Inst. Calib. Para. 2.5 (180 days)

TABLE 2-5. LIC2 SYSTEM INSTRUMENT AND PROCESS PARAMETERS [a]

Item No.	Control Parameter	Measuring Device	Location	Calibrated Instrument Range	Instrument Loop Accuracy	Calibration Frequency

Notes:

[a] Process instrument calibration procedures and the oxygen and carbon monoxide analyzer calibration procedures are described in applicable facility plans and procedures. The information in this table is derived from the information in Table 7-1b of the Hazardous Waste Permit.

[b] Continuous monitoring.

[c] Continuous recording.

[d] Maintenance, at a minimum, in accordance with equipment manufacturer's recommendations.

[e] Hazardous waste treatment may continue during maintenance activities conducted with site-specific standing operating procedures, for a maximum of 24 hours after the failure of the instrument.

[f] During a waste feed cut-off event, the feed line pressure may reach the maximum instrument calibrated range limit.

[g] Hazardous waste treatment may continue during maintenance activities in accordance with site-specific standing operating procedure, provided the mist eliminator water is not being transferred to the scrubber tower.

[h] The minimum limit is based on a two-minute rolling average.

[i] The pressure in the waste feed line may exceed the operating range specified upon initiation of feed to the furnace system.

[j] The relative humidity of the PFS exhaust gas is calculated using the PFS outlet temperature and the mist eliminator vessel outlet temperature. The calibrated instrument range applies to the temperature-indicating transmitter, and the operating range and instrument loop accuracy apply to the calculated relative humidity.

[k] Initially, upon replacement of the instrument, or if the instrument is found out of tolerance, the instrument will be checked every seven (7) days until it stabilizes (instrument check indicates it is "in-tolerance" – no adjustments needed). After the instrument stabilizes, it will be checked on a 30-day basis until found out of tolerance or it is replaced.

[l] The flue gas flow rate is calculated using data for parameters 1 through 6. The data are converted to molar flow rates and summed. The ideal gas law is used to convert the sum of the molar flow rates to a flue gas flow rate in actual cubic feet per minute.

Abbreviations:

%	percent	MON	monitor
±	plus or minus	No.	number
°F	degree(s) Fahrenheit	N/A	not applicable
ACAM	automatic continuous air monitor	PAS	Pollution Abatement System
AIT	analysis indicating transmitter	PDIT	pressure differential indicating transmitter
App.	Hazardous Waste Permit Application	PFS	Pollution Abatement System (PAS) Filter System
BLOW	blower	PIT	pressure indicating transmitter
BSLL	burner flame switch low-low	ppm	part(s) per million
D/P	differential pressure	PSHH	pressure switch high-high
DIT	density indicating transmitter	psig	pound(s) per square inch gauge
DMIS	mist eliminator	PSL	pressure switch low
FIT	flow indicating transmitter	PSLL	pressure switch low-low
FT	flow transmitter	RH	relative humidity
FURN	furnace	ROHA	rolling one-hour average
gpm	gallon(s) per minute	scfm	standard cubic feet per minute
HEPA	high efficiency particulate air	SCRB	scrubber
in. w.c.	inch(es) water column	SDS	spent decontamination solution
lb/hr	pound(s) per hour	SEPA	separator
LIC	Liquid Incinerator	sgu	specific gravity units
LIT	level indicating transmitter	STAK	stack
LSHH	level switch high-high	TIT	temperature indicating transmitter
LSLL	level switch low-low	TOWR	tower
LT	level transmitter	TOX	Toxic Cubicle
MIT	moisture indicating transmitter	TSHH	temperature switch high-high

LIC Mass Balance Calculated Values For:
Assumed feeding of Agent HD Rinsate breakdown products from Agent HD ton containers
==> <u>ASSUME</u> a ratio of pounds mass solid removed to pounds mass of water added of 1.0
Calculations performed by Continental Research & Engineering, 7/30/10

TABLE 2-6: LIC FLUE GAS RESIDENCE TIME CALCULATIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	LIC Primary Comb. Chamber	Crossover DUCT	Secondary Comb. Chamber	Exhaust DUCT	Quench Tower	DUCT: Quench Tower to Scrubber	Scrubber Tower	DUCT: Scrubber to Mist Elim. Vessel	Mist Elim. Vessel	DUCT: Mist Elim. Vessel to PFS Reheater	PFS Reheater & DUCT: Reheater to PFS Filter	PFS Filter	DUCT: PFS Filter to Blower	DUCT: Blower to Stack	SUM
Mass Flowrate, lb/hr	13,144	13,144	16,910	16,910	26,497	26,497	14,810	14,810	14,810	14,810	15,042	15,042	15,042	15,042	
Flowrate, lb-moles/hr	472	472	635	635	1,167	1,167	532	532	532	532	541	541	541	541	
Temperature, °F	2,700	2,700	2,000	2,000	187	187	125	125	125	125	160	160	160	255	
Pressure, psia	14.3	14.3	14.2	14.2	14.1	14.1	12.4	12.4	10.9	10.9	10.8	9.9	9.9	14.4	
Molecular Weight, lb/lb-mole	27.9	27.9	26.6	26.6	22.7	22.7	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	
ACFM	18,639	18,639	19,677	19,677	9,576	9,576	4,490	4,490	5,108	5,108	5,549	6,054	6,054	4,800	
Equipment Volume, ft^3	170.0	85.6	281.0	734.7	1,130.9	347.6	950.3	467.2	2,945.9	69.9	152.4	2,688.0	297.1	210.0	
Residence Time, sec.	0.55	0.28	0.86	2.24	7.09	2.18	12.70	6.24	34.60	0.82	1.65	26.64	2.94	2.63	101.41

<u>Abbreviations:</u>

°F	degree(s) Fahrenheit
ACFM	actual cubic feet per minute
ft^3	cubic feet
hr	hour
lbm	pounds-mass
lb-moles	pound-moles
P	pressure in psia
PFS	Pollution Abatement System Filter System
psia	pounds per square inch atmospheric
sec	second

LIC Mass Balance Calculated Values For:
Assumed feeding of Agent HD Rinsate breakdown products from Agent HD ton containers
==> ASSUME a ratio of pounds mass solid removed to pounds mass of water added of 1.3
Calculations performed by Continental Research & Engineering, 7/30/10

TABLE 2-7: LIC FLUE GAS RESIDENCE TIME CALCULATIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	LIC Primary Comb. Chamber	Crossover DUCT	Secondary Comb. Chamber	Exhaust DUCT	Quench Tower	DUCT: Quench Tower to Scrubber	Scrubber Tower	DUCT: Scrubber to Mist Elim. Vessel	Mist Elim. Vessel	DUCT: Mist Elim. Vessel to PFS Reheater	PFS Reheater & DUCT: Reheater to PFS Filter	PFS Filter	DUCT: PFS Filter to Blower	DUCT: Blower to Stack	SUM
Mass Flowrate, lb/hr	13,114	13,114	16,864	16,864	26,369	26,369	14,829	14,829	14,829	14,829	15,062	15,062	15,062	15,062	
Flowrate, lb-moles/hr	468	468	631	631	1,158	1,158	533	533	533	533	541	541	541	541	
Temperature, °F	2,700	2,700	2,000	2,000	187	187	125	125	125	125	160	160	160	255	
Pressure, psia	14.3	14.3	14.2	14.2	14.1	14.1	12.4	12.4	10.9	10.9	10.8	9.9	9.9	14.4	
Molecular Weight, lb/lb-mole	28.0	28.0	26.7	26.7	22.8	22.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	
ACFM	18,493	18,493	19,535	19,535	9,501	9,501	4,497	4,497	5,115	5,115	5,557	6,062	6,062	4,807	
Equipment Volume, ft^3	170.0	85.6	281.0	734.7	1,130.9	347.6	950.3	467.2	2,945.9	69.9	152.4	2,688.0	297.1	210.0	
Residence Time, sec.	0.55	0.28	0.86	2.26	7.14	2.20	12.68	6.23	34.55	0.82	1.65	26.60	2.94	2.62	101.38

Abbreviations:

°F	degree(s) Fahrenheit	P	pressure in psia
ACFM	actual cubic feet per minute	PFS	Pollution Abatement System Filter System
ft^3	cubic feet	psia	pounds per square inch atmospheric
hr	hour	sec	second
lbm	pounds-mass		
lb-moles	pound-moles		

LIC Mass Balance Calculated Values For:
Assumed feeding of Agent HD Rinsate breakdown products from Agent HD ton containers
==> ASSUME a ratio of pounds mass solid removed to pounds mass of water added of 1.8
Calculations performed by Continental Research & Engineering, 7/30/10

TABLE 2-8: LIC FLUE GAS RESIDENCE TIME CALCULATIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	LIC Primary Comb. Chamber	Crossover DUCT	Secondary Comb. Chamber	Exhaust DUCT	Quench Tower	DUCT: Quench Tower to Scrubber	Scrubber Tower	DUCT: Scrubber to Mist Elim. Vessel	Mist Elim. Vessel	DUCT: Mist Elim. Vessel to PFS Reheater	PFS Reheater & DUCT: Reheater to PFS Filter	PFS Filter	DUCT: PFS Filter to Blower	DUCT: Blower to Stack	SUM
Mass Flowrate, lb/hr	13,081	13,081	16,814	16,814	26,227	26,227	14,850	14,850	14,850	14,850	15,083	15,083	15,083	15,083	
Flowrate, lb-moles/hr	464	464	625	625	1,148	1,148	534	534	534	534	542	542	542	542	
Temperature, °F	2,700	2,700	2,000	2,000	187	187	125	125	125	125	160	160	160	255	
Pressure, psia	14.3	14.3	14.2	14.2	14.1	14.1	12.4	12.4	10.9	10.9	10.8	9.9	9.9	14.4	
Molecular Weight, lb/lb-mole	28.2	28.2	26.9	26.9	22.8	22.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	
ACFM	18,329	18,329	19,377	19,377	9,417	9,417	4,504	4,504	5,123	5,123	5,566	6,072	6,072	4,814	
Equipment Volume, ft^3	170.0	85.6	281.0	734.7	1,130.9	347.6	950.3	467.2	2,945.9	69.9	152.4	2,688.0	297.1	210.0	
Residence Time, sec.	0.56	0.28	0.87	2.28	7.21	2.21	12.66	6.22	34.50	0.82	1.64	26.56	2.94	2.62	101.36

Abbreviations:

°F	degree(s) Fahrenheit
ACFM	actual cubic feet per minute
ft^3	cubic feet
hr	hour
lbm	pounds-mass
lb-moles	pound-moles
P	pressure in psia
PFS	Pollution Abatement System Filter System
psia	pounds per square inch atmospheric
sec	second

LIC Mass Balance Calculated Values For:
Assumed feeding of Agent HD Rinsate breakdown products from Agent HD ton containers
==> <u>ASSUME</u> feed to the LIC is composed of 98 Weight % water and 2 Weight % Agent HD Rinsate breakdown products
Calculations performed by Continental Research & Engineering, 11/30/10

TABLE 2-9: LIC FLUE GAS RESIDENCE TIME CALCULATIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	LIC Primary Comb. Chamber	Crossover DUCT	Secondary Comb. Chamber	Exhaust DUCT	Quench Tower	DUCT: Quench Tower to Scrubber	Scrubber Tower	DUCT: Scrubber to Mist Elim. Vessel	Mist Elim. Vessel	DUCT: Mist Elim. Vessel to PFS Reheater	PFS Reheater & DUCT: Reheater to PFS Filter	PFS Filter	DUCT: PFS Filter to Blower	DUCT: Blower to Stack	SUM
Mass Flowrate, lbm/hr	13,225	13,225	17,019	17,019	26,762	26,762	15,257	15,257	15,257	15,257	15,490	15,490	15,490	15,490	
Flowrate, lb-moles/hr	482	482	647	647	1,188	1,188	549	549	549	549	558	558	558	558	
Temperature., °F	2,700	2,700	2,000	2,000	187	187	125	125	125	125	160	160	160	255	
Pressure, psia	14.3	14.3	14.2	14.2	14.1	14.1	12.4	12.4	10.9	10.9	10.8	9.9	9.9	14.4	
Molecular Weight, lb/lb-mole	27.5	27.5	26.3	26.3	22.5	22.5	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	
ACFM	19,039	19,039	20,038	20,038	9,742	9,742	4,632	4,632	5,270	5,270	5,722	6,242	6,242	4,950	
Equipment Volume, ft^3	170.0	85.6	281.0	734.7	1,130.9	347.6	950.3	467.2	2,945.9	69.9	152.4	2,688.0	297.1	210.0	
Residence Time, sec.	0.54	0.27	0.84	2.20	6.97	2.14	12.31	6.05	33.54	0.80	1.60	25.84	2.86	2.55	98.49

<u>Notes:</u>

<u>Abbreviations:</u>

°F	degree(s) Fahrenheit
ACFM	actual cubic feet per minute
ft^3	cubic feet
hr	hour
lbm	pounds-mass
lb-moles	pound-moles
P	pressure in psia
PFS	Pollution Abatement System Filter System
psia	pounds per square inch atmospheric
sec	second

FIGURE 2-1. SKETCH OF THE LIC PRIMARY AND SECONDARY COMBUSTION CHAMBERS

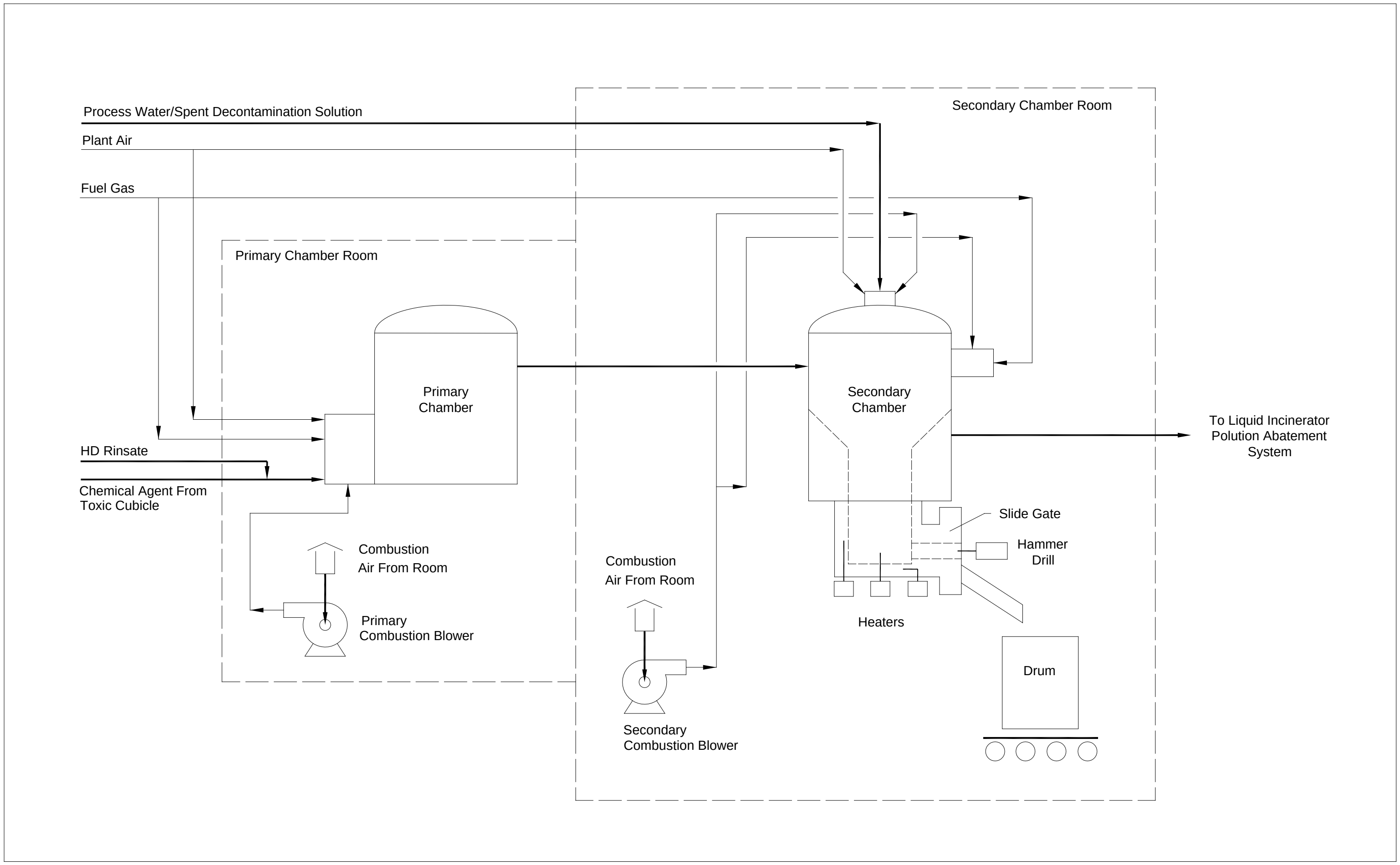


FIGURE 2-2. SCHEMATIC DIAGRAM OF THE LIC POLLUTION ABATEMENT SYSTEM

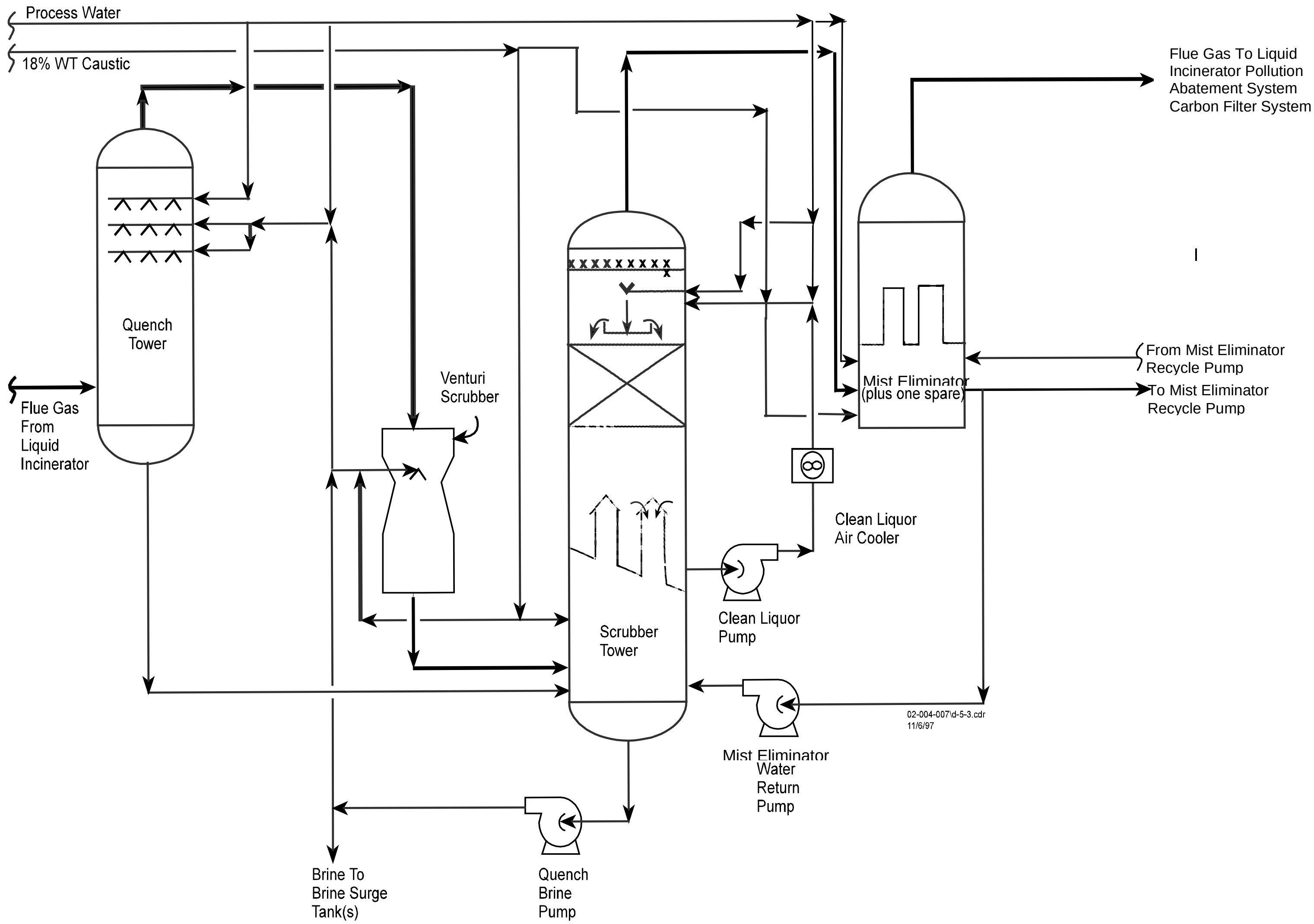


FIGURE 2-3. PROCESS FLOW DIAGRAM OF A PAS CARBON FILTER SYSTEM

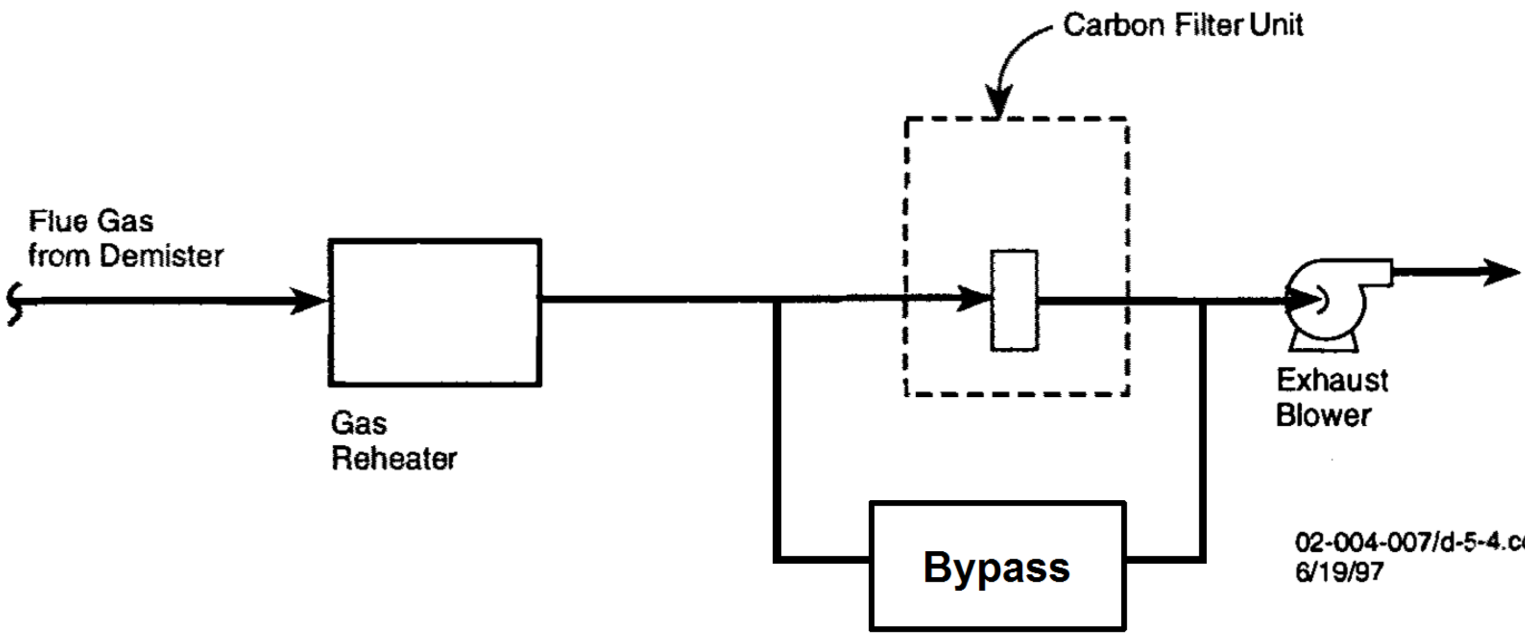
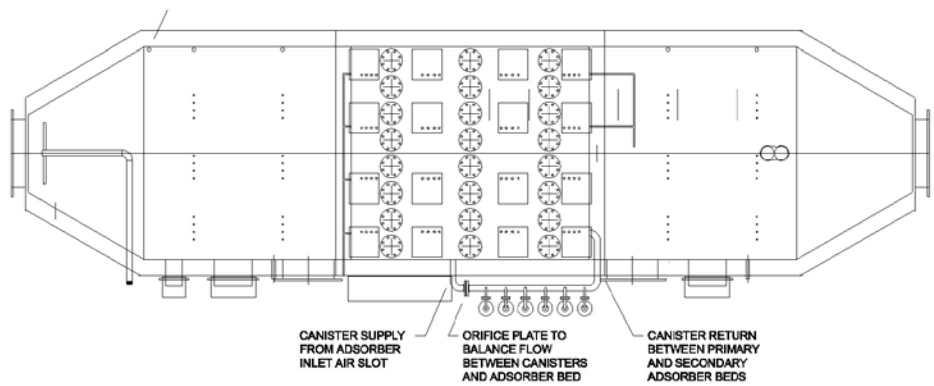


FIGURE 2-4. CONFIGURATION OF A PAS CARBON FILTER UNIT



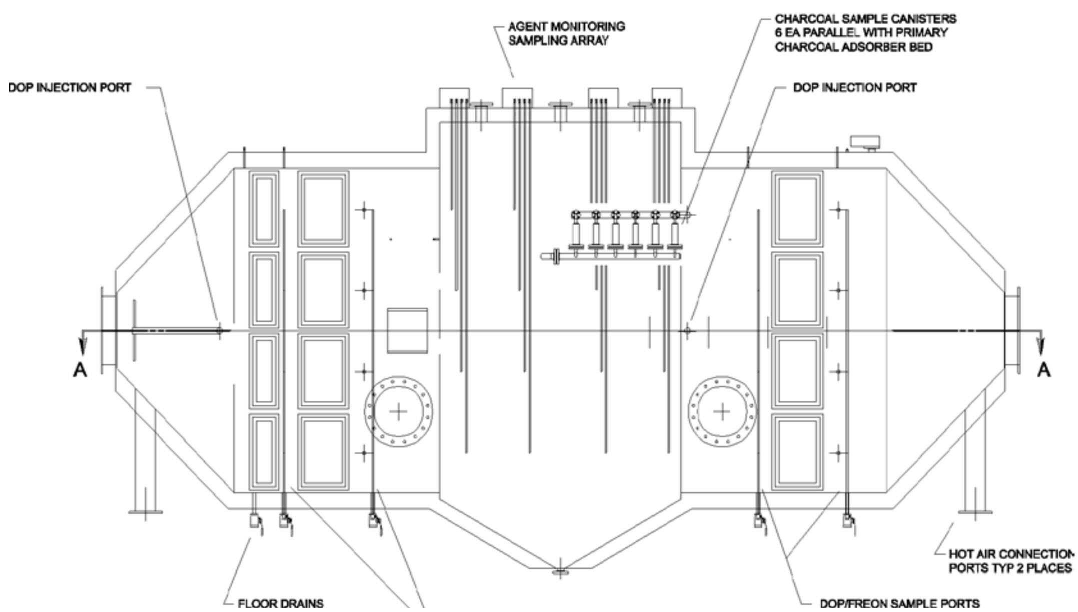
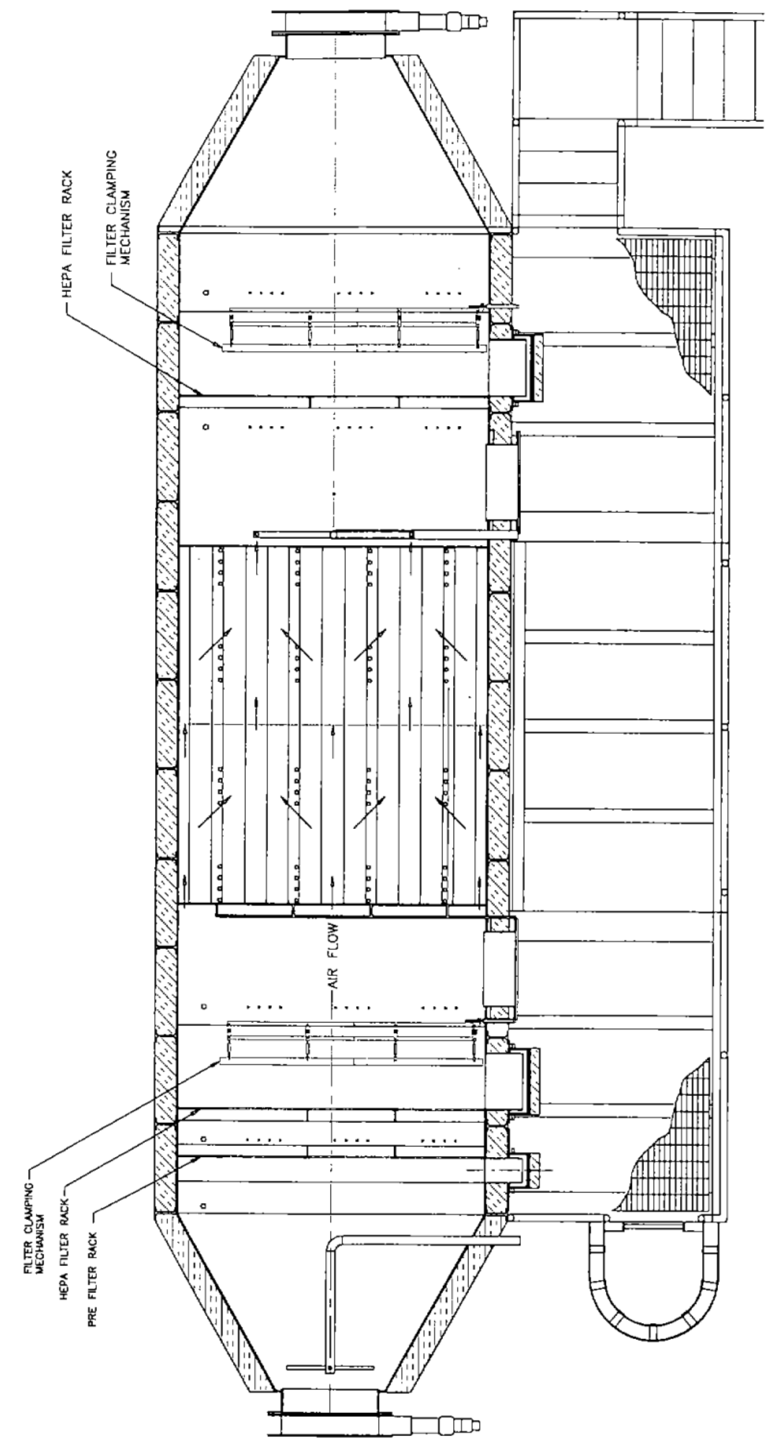


FIGURE 2-5. FLUE GAS FLOW THROUGH A CARBON FILTER UNIT



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SECTION 3.0 APPLICABLE PERFORMANCE STANDARDS

3.1. PERFORMANCE AND EMISSION STANDARDS

3.1.1. HWC MACT Performance and Emission Standards

Under 40 CFR §63.1219(a), existing HWC MACT sources must not discharge or cause combustion gases to be emitted into the atmosphere that contain the following (all corrected to 7% oxygen except DRE):

1. Dioxins and furans in excess of 0.40 nanograms toxicity equivalence per dry standard cubic meter
2. Mercury in excess of 130 micrograms per dry standard cubic meter
3. Lead and cadmium in excess of 230 micrograms per dry standard cubic meter
4. Arsenic, beryllium, and chromium in excess of 92 micrograms per dry standard cubic meter, combined emissions
5. Carbon monoxide in excess of 100 ppmv, over a rolling one-hour average (ROHA) (monitored continuously with a CEMS), dry basis and total hydrocarbons, not to exceed 10 ppmv, over a ROHA (monitored continuously with a CEMS), dry basis, and reported as propane
6. Hydrochloric acid and chlorine gas (total chlorine) in excess of 32 ppmv, combined emissions, expressed as a chloride equivalent, dry basis;
7. Particulate matter in excess of 0.013 grains per dry standard cubic foot

The standards listed above are the existing source replacement standards that became effective October 14, 2008.

3.1.2. UMCDF Hazardous Waste Permit Performance and Emission Standards

Performance and emission standards specified in the operating requirements of the UMCDF Hazardous Waste Permit (Condition VI.B.1) that must be maintained for the LICs include:

- A DRE of 99.9999% for HD which is a one time only demonstration and was demonstrated during the HD ATB/CPT. All HD air monitoring is on line during the EDT.
- A particulate emission limit of 34.3 milligrams per dry standard cubic meter (0.015 grains per dry standard cubic foot) corrected to 7% oxygen.
- Hydrochloric acid emissions not to exceed 1.91E-02 grams per second and less than 4 pounds per hour.
- A carbon monoxide emission limit, corrected to 7% oxygen, not to exceed 100 ppmv, dry basis, over a ROHA.
- An HD emission limit not to exceed 0.03 mg/m^3.
- Additional analyte emissions, identified in the UMCDF Hazardous Waste Permit, not to exceed the limits in Table 3-1. (Note that as discussed in the QAPjP [Appendix A], for several compounds, the UMCDF does not expect to be able to demonstrate compliance with the permitted emission rates as the detection limit required to demonstrate compliance is below the analytical method capability.)

3.2. EXHAUST GAS CONCENTRATIONS

The UMCDF demonstrated DRE during the HD ATB/CPT. DRE is a one time demonstration. On line ACAMS and DAAMS instrumentation will measure the HD agent emissions during the HD rinsate emissions demonstration test.

3.3. AUDIT SAMPLES

The UMCDF will use audit samples for dioxin/furan, semivolatile organics, volatile organics, metals, and chloride. Each audit sample will consist of a concentrate, full-volume, or other suitable material containing known concentrations of target analyte(s) provided by a commercial supplier of such materials. Control limits for the audit samples will be those established by the supplier.

3.4. SAMPLING FOR SULFUR DIOXIDE AND NITROGEN OXIDES

The UMCDF will sample the exhaust gas for sulfur dioxide and oxides of nitrogen to confirm emission factors. Sampling for sulfur dioxide and oxides of nitrogen will be in compliance with EPA Methods 6C and 7E, respectively.

TABLE 3-1. UMCDF HAZARDOUS WASTE PERMIT MAXIMUM ALLOWABLE EMISSION RATES FOR LIC

Constituent	CAS No.	LIC Allowable Emission Rates (grams/second)
ORGANICS		
TEQ 2,3,7,8-PCDFs [dioxin and furan congeners]	N/A	9.75E-10
1,1,2,2-Tetrachloroethane [a]	79-34-5	3.20E-06
1,1-Dichloroethane [a]	75-34-3	1.71E-06
2-Hexanone [a]	591-78-6	8.60E-06
Acetone	67-64-1	1.66E-01
Benzene	71-43-2	2.89E-04
Benzoic acid	65-85-0	5.40E-04
Benzyl alcohol	100-51-6	5.60E-03
Bis(2-ethylhexyl)phthalate	117-81-7	1.30E-03
Bromodichloromethane [a]	75-27-4	1.71E-06
Bromoform	75-22-2	1.59E-05
Carbon disulfide	75-15-0	3.25E-05
Carbon tetrachloride	56-23-5	1.10E-04
Chlorobenzene	106-90-7	8.35E-06
Chloroform	67-66-3	6.95E-05
Chloromethane	74-87-3	2.50E-03
m-Cresol	108-39-4	6.35E-04
o-Cresol	95-48-7	5.85E-04
p-Cresol	106-44-5	1.97E-04
Di(n)octyl phthalate	117-84-0	6.15E-05
Di-n-butyl phthalate	84-74-2	3.12E-05
Dibromochloromethane [a]	124-48-1	1.71E-06
(cis)1,3-Dichloropropene	542-75-6	8.10E-04
(trans)1,3-Dichloropropene [a]	542-75-6	1.71E-06
Diethyl phthalate	84-66-2	1.25E-04
Dimethyl phthalate	131-11-3	8.85E-04
Ethylbenzene	100-41-4	4.96E-06
Methyl chloroform	71-55-6	8.30E-05
Methyl ethyl ketone	78-93-3	5.90E-04
Methyl isobutyl ketone [a]	108-10-1	1.11E-05
Methylene chloride	75-09-2	1.88E-02
Naphthalene	91-20-3	3.12E-05
Propylene dichloride	78-87-5	9.40E-04
Styrene	100-42-5	2.82E-04
Tetrachloroethylene	127-18-4	5.75E-06
Toluene	106-88-3	1.06E-02
Vinyl acetate [a]	108-05-4	2.44E-06
Vinyl chloride	75-01-4	1.48E-05
Total xylene	1330-20-7	2.25E-05

TABLE 3-1. UMCDF HAZARDOUS WASTE PERMIT MAXIMUM ALLOWABLE EMISSION RATES FOR LIC

Constituent	CAS No.	LIC Allowable Emission Rates (grams/second)
METALS		
Antimony	7440-36-0	6.45E-05
Arsenic	7440-38-2	1.10E-04
Barium	7440-39-3	8.85E-05
Beryllium	7440-41-7	2.91E-05
Boron	7440-42-8	3.17E-03
Cadmium	7440-43-9	2.91E-05
Chromium	7440-47-3	2.91E-05
Cobalt	7440-48-4	3.64E-05
Copper	7440-50-8	3.64E-05
Lead	7439-2-1	1.52E-04
Manganese	7439-96-5	4.73E-03
Mercury	7440-97-6	3.10E-05
Nickel	7440-02-0	1.91E-04
Phosphorous	7440-14-0	2.05E-03
Selenium	7782-49-2	4.43E-05
Silver	7440-22-4	6.45E-05
Tin	7440-31-5	2.29E-04
Thallium	7440-28-0	2.91E-04
Vanadium	7440-62-2	4.43E-05
Zinc	7440-66-6	9.50E-04
ACID GASES		
Hydrogen chloride	7647-01-0	1.91E-02
Hydrogen fluoride	7664-39-3	5.25E-02
OTHER CONSTITUENTS		
Chlorine	7782-50-5	2.29E-02
Particulates	N/A	5.40E-02

Notes:

[a] Total train reporting limits may not be sufficiently low to demonstrate compliance with this permit limit considering the limitation on sample volume and analytical capabilities for the substantial target analyte list. To address this concern, the laboratory will report both the reporting limit and method detection limit. Method detection limit-derived emission limits may be reported for these analytes to provide the lowest possible emission limit.

Abbreviations:

CAS Chemical Abstracts Service
N/A not applicable

SECTION 4.0 DETAILED DESCRIPTION OF SAMPLING, ANALYSIS AND MONITORING PROCEDURES

Detailed explanations of EPA sampling methods, descriptions of pretest preparation, calibrations, sample collection, sample recovery, analysis, detailed method performance criteria, data reduction, validation, calculations, and quality control procedures are presented in the UMCDF HD Rinsate QAPjP (Appendix A).

4.1. EXHAUST GAS

The exhaust gas will be sampled in the flue gas duct between the LIC induced-draft fan and the common stack. Though the LICs, MPF, and DFS share a common stack, other furnaces may be operated during the LIC HD rinsate emissions demonstration test because the sampling location is under positive pressure in the exhaust duct, upstream of the common stack (where exhaust gases from the other incinerators are combined). The exhaust gases from the other furnace systems will have no effect on the LIC exhaust gas composition at the sampling locations selected. During the LIC HD rinsate emissions demonstration test, the ports shown in Figure A-1 and/or A-2 of the UMCDF HD rinsate emissions demonstration test QAPjP will be used for exhaust gas sampling. EPA Method 1 will be used to establish the required sampling points for the 12-point traverses. Only sampling locations that meet accepted standards for distance from flow disturbances will be used.

In addition to the normal setpoints, instrumentation, and data collection required to operate the incinerator and meet permit requirements, separate sampling and analysis of the exhaust gas will be performed to determine particulate matter, hydrochloric acid, chlorine, hydrogen fluoride, metals, dioxins and furans, PCBs, semivolatile and volatile PIC, total unspeciated organics, HD, total hydrocarbons as propane, sulfur dioxide, and nitrogen oxides.

Table A-1 of Appendix A shows the sampling trains and associated analytical parameters that will be collected during the LIC HD rinsate emissions demonstration test. Temporary reference CEMS will be on line for the duration of each run of the LIC HD rinsate emissions demonstration tests to determine total hydrocarbon, sulfur dioxide, and oxides of nitrogen emissions.

4.2. PROCESS SAMPLES

Samples of the HD rinsate feed to the primary chamber will be collected and analyzed for metals content prior to each run. Each sample will be collected from a designated RCS tank.

UMCDF standing operating procedure UM-0000-J-055 addresses collection of RCS tank samples. The metal method is discussed in the QAPjP describing that metals samples are prepared using SW-846 Method 3052 and analyzed using SW-846 Methods 6010B and 7470A.

Agent rinsate sample collection and analysis will be in accordance with facility procedures and are described in the QAPjP, Appendix A.

4.3. WASTES GENERATED DURING THE LIC HD RINSATE TESTS

Process waste generated during the LIC HD rinsate emissions demonstration test will be characterized in accordance with the UMCDF WAP. Brine samples are collected for each tank generated as well as monthly. A grab sample is collected from each brine tank and sampled for chemical agent. The sample is collected from a sample port located on the east side of each tank. Monthly, grab samples are collected and analyzed for total metals and Toxic Characteristic Leachate Procedure (TCLP) organics to support off-site disposal of the PAS brines. The sample is collected from the same sample port on the east side of each tank. The tank agitators are turned on at 70 inches. The brine tank is full at over 200 inches (212 inches). Thus, a sample is taken in accordance with UM-OP-019, “Request for Sample” on a tank that has been ”mixing” as 140 inches of brine are added to fill the tank.

4.4. TEST UPSET CRITERIA

The criteria for determining if a run is still valid if process or sampling interruptions occur is dependent on waste feed cutoff. If recovery from the waste feed cutoff can be done, and the amount of rinsate available is sufficient to resume waste processing, then testing will continue. All recorded data will be saved for historical purposes if a run is determined to be invalid.

SECTION 5.0 DEMONSTRATION TEST SCHEDULE

The execution of the LIC HD rinsate emissions demonstration test is contingent on completion of startup phases. With submission of this plan, the UMCDF currently plans to conduct the LIC HD rinsate emissions demonstration test in early 2011 for one LIC and approximately two months later for a second LIC.

Before each test, a daily test meeting will be scheduled to coordinate activities between the stack sampling personnel and Operations Department. The system will be brought to operating temperatures IAW UMCDF procedures and HD rinsate feed will be initiated. The feed rate will be increased until the planned feed rate is achieved and steady-state conditions are established (see Section 2.19). When the system is operating at steady state for at least 15 minutes, the stack sampling will begin. A daily post-test meeting may be held to review problems and plan the next day's activities.

5.1. SCHEDULE

The LIC HD rinsate emissions demonstration test will begin after the UMCDF has received the necessary approvals to construct the rinsate system, has successfully completed installation, and pretesting of the LIC system. In the submittal of the Rinsate PMR UMCDF-10-010-LIC(3) it was committed that the LIC HD rinsate emissions demonstration test plan would be submitted to the Department of Environmental Quality within 30 days. The final version of the HD rinsate emissions demonstration test plan will be issued prior to approval of the Rinsate PMR. Each LIC HD rinsate emissions demonstration test period will span approximately 10 days. This does not consider preparation days (up to 30 days) and cleanup days (three (3) days). Preparation may include the following activities:

- Review the daily schedule
- Discuss and resolve all outstanding issues with Operations Dept.
- Run blank sample trains
- Perform audits
- Conduct furnace preliminary runs
- Establish communications chain of command
- Prepare calibration packages
- Conduct oxygen and carbon monoxide relative accuracy test audit (RATA)

The anticipated daily sampling activity schedule is expected to commence about 0800 and conclude around 1400 hours. Sampling is expected to occur every other day to allow time to refill the RCS tanks and to sample the tanks. A daily pre-test meeting will be held to discuss the daily schedule, planned sampling activities, and any deviations to the EDT Plan that may be needed will be documented in the daily log and incorporated into the Final EDT Report.

The continuous operation of the MPF is required to supply the HD for the LIC HD rinsate emission testing. The MPF will operate under the operating parameter limits allowed by current permits.

The schedule, for example, for each LIC HD rinsate emission test is currently envisioned as follows:

- FSS to mobilize and set-up and conduct annual RATA
- Day 1 – Conduct preliminary measurements (EPA Methods 1 through 4, as required)
  Day 2 – Run 1
- Day 3 –RCS tank sampling and preparation
- Day 4 – Run 2

- Day 5 –RCS tank sampling and preparation
- Day 6 – Run 3
- Day 7 –RCS tank sampling and preparation
- Day 8 – Run 4
- Day 9 – Ship samples to the analytical laboratories and demobilize

Collection of samples from a fourth run is optional. Should four, or more, runs be sampled, it is expected that only three runs will be analyzed with the exception of certain samples that have short holding times between collection and analysis (e.g., field analysis of SW-846 Method 0040 bag samples, and SW-846 Method 0040 condensate samples). In the event more than three valid runs are collected, the determination as to which runs will be analyzed in their entirety will be made by the UMCDF trial burn manager/test director and Operations Manager. This determination will be made after considering: conformance of the run to the planned operating conditions, the number and length of any waste feed stoppages, sampling difficulties encountered, condition of the samples as received at the laboratory, and any nonconformances during sample preparation and/or analysis. These are not the only considerations and it is possible other factors may influence the determination as to which runs will be analyzed and reported.

5.2. DURATION

The LIC HD rinsate emissions demonstration test will consist of at least three valid runs. As the LIC HD rinsate emissions tests will be conducted using HD rinsate drained from ton containers to be processed in the MPF, the schedule is contingent upon successful draining operations. Each run will take approximately six (6) hours to complete. This includes four (4) hours of total sample collection time plus approximately two (2) hours for port changes and leak checks. It is expected that a total of nine (9) hours of LIC operation on HD rinsate feed will be required to complete each 6-hour run.

5.3. QUANTITY OF WASTE TO BE BURNED

The approximate quantity of HD rinsate required for each run is estimated to be 9,000 pounds, based on completing four (4) runs, nine (9) hours of LIC operation per run, a feed rate of about 1,000 pounds per hour, and a 25% contingency factor, the total rinsate needed for each LIC is 45,000 lbs.

SECTION 6.0 PROTOCOL FOR THE HD RINSATE EMISSIONS TEST

Each LIC has been designed for the unique service of incinerating agents. The test protocols are, therefore, structured to match the conditions that will occur during the incineration of the agents.

The EPA combustion strategy calls for a multi-end-point risk assessment using emissions measured at low temperature, while feeding real wastes representative of wastes normally burned at the UMCDF. The protocols for the various types of trial burns have been termed "parts" and are described below. Parts 1, 2, and 3 were previously completed during the LIC STBs, GB ATBs, and HD ATBs and are described below for reference. VX ATB testing has also been completed. The HD Rinsate Emissions Demonstration Test will not set any new OPLs; rather the LICs will operate from the OPLs established in the HD ATB/CPT.

Part 1. One of the STBs performed on each LIC was a LTT, designated Part 1, using a surrogate mixture fed into the PCC at low-temperature conditions to demonstrate that each furnace could achieve the required DRE. The LTT conditions were demonstrated in both the PCC and SCC for each LIC. The surrogate feed was a mixture of 1,2,4-trichlorobenzene and perchloroethylene. An ash agent, titanium dioxide, in an ethylene glycol solution, was also fed with the surrogate mixture.

The primary purpose of the LTT was to demonstrate the DRE capability for each LIC. Data was also collected to demonstrate compliance with performance standards for hydrochloric acid, particulate matter, and dioxin and furan emissions. The results of the STB LTT were used to establish certain operating limits for each LIC.

Part 2. One of the STBs performed on each LIC was a high-temperature test (HTT), designated as Part 2, using a surrogate mixture fed into the PCC at high-temperature conditions. The HTT conditions were demonstrated in both the PCC and SCC for each LIC. The permitted surrogate feed was a mixture of 1,2,4-trichlorobenzene and perchloroethylene. Metals and ash feed to the furnace was maximized by feeding a solution consisting of titanium dioxide, ethylene glycol, and metal oxides in addition to the surrogates.

The purpose of the STB HTT was to demonstrate the metal emission limitations for each LIC at HTT conditions. Data was also collected to demonstrate compliance with performance standards for hydrochloric acid, particulate matter, and dioxin and furan emissions at the high-temperature condition. DRE for the POHCs was not demonstrated during the STB HTT. The results of the STB HTT were used to establish certain operating limits for each LIC, including metals, chlorine, and particulate matter emissions rates in accordance with EPA guidance for establishing emission rates.

Part 3. The LIC GB ATBs were completed in July 2005 and May 2006, respectively. DRE capability was demonstrated and emissions data were captured for volatile and semivolatile compounds, particulate matter, metals, acid gases, dioxins/furans, and PCBs and were used in the post trial burn risk assessment. The LIC GB ATBs established certain specified operating parameters that were incorporated into the UMCDF Hazardous Waste Permit and HWC MACT NOC.

The LIC VX ATB was completed in January 2008 using a maximum agent feed rate of VX into the PCC at normal temperature conditions. 99.9999% DRE capability was demonstrated and emissions data were captured for dioxins/furans, metals, and total unspeciated volatile organics.

The results of the LIC VX ATB were used to establish feed rates for VX and confirm other operating limits.

The LIC HD ATBs were completed in May and June 2010. Emission sampling was completed for semivolatile and volatile organics, particulate matter, acid gases, metals, dioxins/furans, unspeciated total organic emissions, sulfur dioxide, nitrogen oxide, total hydrocarbons and PCB. All data was used in the HHRA to provide an update for HD processing. OPLs were established based on the HD ATB/CPT. The HD ATBs/CPTs for the LICs were required pursuant to 40 CFR 63.1200 to demonstrate compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Hazardous Waste Combustors (HWC) and the ATBs/CPTs also were required by the Hazardous Waste Permit, Module VI, to demonstrate that operations are protective of human health and the environment. The HD rinsate waste stream is under the HD campaign that was covered by the HD ATB/CPT. The rinsate feed limit is less than what was demonstrated for agent feed under the LIC HD ATB/CPT, and all other OPL will be in effect for this HD rinsate emissions demonstration test.

All parameters were established during the HD ATB/CPT. HD rinsate is not a new campaign, but rather a derivative of HD agent.

6.1. LIC HD RINSATE EMISSIONS DEMONSTRATION TEST

The LIC HD rinsate emissions demonstration test will involve flue gas emission sampling between the exhaust blower and common stack at the low end of the LIC operating temperatures with the maximum permitted feed rates obtainable. This will demonstrate compliance with the applicable performance standards.

The physical properties and feed rate of the HD rinsate to be incinerated during the LIC HD are described in the PMR, Tank Assessment section. Expected concentrations of metals found in the HD rinsate to be incinerated are within the permitted metal feed rates for each LIC. The UMCDF will sample the RCS tanks in accordance with the WAP and will have UMCDF-specific metal data that will be used to demonstrate compliance with the metal feed rates. The rinsate fed to the MPF during the HD ATB/CPT, Condition 2, is the same waste stream now being fed to the LICs. The metal feed rates and metal emissions from the MPF processing rinsate were within the permitted emission rates.

6.2. WASTE FEED METHODOLOGY

HD rinsate will be removed from ton containers by draining operations. The drained HD rinsate will be collected in the RCS tanks until enough is available to perform the LIC HD rinsate emission demonstration test run, or essentially two full RCS tanks.

6.3. AGENT RINSATE CHARACTERIZATION

The HD rinsate was characterized in the PMR UMCDF-10-010-LIC (3). The rinsate was also characterized on a ton container by ton container basis in the MPF HD ATB/CPT Final Report. Rinsate is also described in the Tank Assessment portion in this PMR.

SECTION 7.0 DESCRIPTION AND PLANNED OPERATING CONDITIONS FOR PROCESS CONTROL EQUIPMENT

Following the LIC STBs, GB ATBs, and/or the HD ATB/CPT the following parameters were established:

- Maximum combustion chamber temperature (PCC and SCC)
- Maximum density of clean liquor to the scrubber tower
- Maximum flue gas flow rate in SCC exhaust
- Maximum process water/SDS feed rate
- Maximum quench brine density
- Maximum surrogate feed rate
- Minimum brine pH
- Minimum combustion chamber temperature (PCC and SCC)
- Minimum differential pressure across the venturi scrubber
- Minimum flow rate of clean liquor to the scrubber tower
- Minimum flow rate of quench brine to the venturi scrubber
- Minimum oxygen concentration in the PFS exhaust gas
- Minimum pH of clean liquor to the scrubber tower

The information developed from the LIC STBs, GB ATB, VX ATB and HD ATB was used to calculate, establish, or otherwise confirm the limits for these parameters for normal operations of the LIC.

The facility also proved the following parameters using surrogate materials.

- Maximum ash feed rate
- Maximum chlorine feed rate
- Maximum metals feed rates
- Maximum total heat input
- Minimum POHC incinerability (Class 1).

7.1. KEY PROCESS AND POLLUTION ABATEMENT SYSTEM PARAMETERS

The key process and PAS parameters that will be monitored during the LIC HD rinsate emission test are identified in Tables 2-2 and 2-3. This table lists the instruments and associated setpoints that will activate the AWFCO system for LIC.

The exhaust gases entering the common stack from each LIC are continuously monitored and analyzed for carbon monoxide and oxygen by on-line instrumentation.

The process operating data will be recorded for the duration of each run. The PDAR system automatically records and saves the data. Alarm and interlock matrices identify the programmed actions that are taken when a specific alarm activates. All alarms are recorded by the PDAR system. The PDAR system is a critical device and is connected to the critical power system. The critical power system can supply full load for a minimum of 45 minutes. The critical power system draws from the substation power or, alternately, in case of substation failure, from the emergency generator. The measurements will be averaged for each run and the calculations will be performed on the average values. Plant operators continuously monitor the control systems and will notify the UMCDF test director if operating conditions are outside the acceptable limits. Determination whether a run will continue will depend upon a number of factors; operation out of acceptable limits does not constitute automatic cancellation of a run. The operators' initial response after notifying required personnel (e.g., CON Supervisor), is to attempt to rectify the situation (i.e., bring the parameter back into acceptable operating range). The situation will be reviewed regarding what the parameter is, how far and how long it was outside of original established limits, potential affect on future system operation, and potential affect on test objectives.

7.2. COMBUSTION TEMPERATURE RANGES

During the LIC HD rinsate emissions demonstration test, the PCC will be operated at a temperature that is not less than the permitted minimum temperature for each LIC and not greater than 2,761°F and 2,768°F for LIC1 and LIC2, respectively, and the SCC will be operated at a temperature that is not less than minimum temperature for each LIC and not greater than 2,002°F and 2,008°F for LIC1 and LIC2, respectively, in accordance with existing permit requirements.

7.3. COMBUSTION GAS VELOCITY

During the LIC HD rinsate emissions demonstration test, the total residence time in the PCC, the duct between the PCC, the SCC, and the duct into the quench tower is approximately 3.99 seconds, as shown in Table 2-6. During the LIC HD rinsate emission demonstration test, the combustion gas velocity will be continuously monitored and recorded.

SECTION 8.0 SHUTDOWN PROCEDURES

8.1. AUTOMATIC WASTE FEED CUT-OFF SYSTEM

The control systems for each LIC are designed to cut-off waste feed to the PCC and SCC in the event that operating conditions deviate from the normal limits. Setpoints which, when exceeded, activate the AWFCO system to control emissions in the event of a system malfunction are detailed in Tables 2-2 and 2-3. All HD rinsate emissions demonstration testing will be done within the existing permitted OPL.

In the event of a major equipment or system failure, it may be necessary to shut down the combustion chambers and PAS completely. A shutdown of this type will be performed in accordance with facility SOPs.

When there is a waste feed cut-off or an unplanned shutdown (e.g., caused by a power failure), stoppage of the hazardous waste feed is approximately one second. The manufacturer of the furnaces, T-Thermal, has determined that each LIC is sufficiently insulated and will maintain sufficient temperature to ensure complete combustion of residual materials in the affected unit. The same design has been proven effective at the TOCDF, Anniston Chemical Agent Disposal Facility, Pine Bluff Chemical Agent Disposal Facility, and Johnston Atoll Chemical Agent Disposal System.

A detailed description of the impacts and plans to recover sampling activities in the event of an unplanned interruption of system operations are provided in the QAPjP (Appendix A).

The proper procedures for shutting down waste feed, either LIC, and the associated PAS during the LIC HD rinsate emission demonstration test are provided in SOPs located in the operating record and the CON.

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SECTION 9.0 NEW INCINERATOR CONDITIONS

The UMCDF performed instrument debugging, instrument calibration, alarm and interlock testing, and related preliminary systems testing before startup on the auxiliary fuel and surrogate testing. Having successfully completed the LIC STBs, the LIC GB ATBs, the LIC1 and LIC2 VX ATB, and the LIC HD ATBs, the UMCDF has completed Parts 1, 2, and 3 of the trial burn program for the LICs.

Startup activities as described in Section 9.1 are complete. During the startup period, each system was thoroughly evaluated to verify that the entire system conforms to design requirements and performs in a safe, consistent, and predictable manner. Ramping of feed for the LIC HD rinsate emission test will be conducted as described in Section 9.2 and Table 9-1. Preliminary systems, startup, and ramp up testing will proceed in accordance with the established facility operating procedures. The UMCDF operating conditions will be maintained within the permitted operating conditions. These limits on operating conditions have been established based on demonstrated results from the LIC STBs and ATBs.

During the ramp up period, HD rinsate will not be fed to the system unless the conditions described above are satisfied. The flow of HD rinsate to the LIC will be stopped if operating conditions deviate from the established limits. An AWFCO system, described in Section 8.1 will be in operation at all times during the incineration of HD rinsate. AWFCO settings during the emission test for the LICs are those specified in Tables 2-2 and 2-3.

9.1. STARTUP

Prior to the LIC STBs, the startup phase for each incinerator was completed. The startup phase was used to test the subsystems of each LIC, as appropriate, without the introduction of actual hazardous wastes into the incineration systems. Startup was performed using natural gas. During the final startup test, the natural gas burners in each LIC furnace were fired to cure the refractory and check out the prime air mover and system instrumentation under actual temperatures and pressure. The UMCDF operated each incinerator for a period of time with simulant chemicals that are not regulated as hazardous wastes (e.g., ethylene glycol, diethylene glycol, and diethylene glycol dimethyl ether). This test period was used to tune the controllers and test the incinerator, the feed system, the safety shutdown systems, the process interlocks, and the AWFCO system.

LIC1 and LIC2 completed successful STBs in February 2003 and August 2004, respectively, with high chlorine, metal, and ash feed. LIC1 and LIC2 completed GB ATBs in July 2005 and June 2006, respectively. The LIC1 VX ATB was completed in January 2008. The LIC HD ATBs completed in June 2010. The LICs are prepared for continued testing through the LIC HD rinsate phase.

9.2. RAMP UP

Prior to feeding rinsate to LIC2, a test will be conducted of feeding process water (PRW) from the RCS tanks through to the LIC primary. The test will be conducted up to full feed rate in the primary chamber and full feed rate of SDS/PRW in the secondary chamber. A flow check will be conducted at the refractory venturi by the FSS using a manual sampling probe. This all water test will bound the rinsate feed vis-à-vis the residence time compared to the residence time of only HD in the HD ATB. After the initial startup and continued testing discussed in Section 9.1, the ramp up period that occurs prior to the LIC1 or LIC2 HD rinsate emissions demonstration test will consist of the installation, testing the system, and finally commence with the introduction of HD rinsate to the LICs. The commissioning period will commence with a slow ramp up of HD rinsate feed to a LIC, with the feed being increased over days to full rate. The ramp up will be done in accordance with UMCDF SOP for ensuring readiness of personnel and equipment, PL-097. Ramp up is used to identify any system differences that may result from the HD rinsate feed. During ramp up operations, sufficient latitude is available to identify these differences and take corrective actions to either correct the situation or find another approach to achieve the objectives of the LIC HD rinsate emissions demonstration test. Ramp up will also provide real-time information to verify the incineration system is capable of processing HD rinsate while maintaining the necessary levels of safety and protection of the environment.

The principal objective of the ramp up period is to prepare the incineration system to safely process the HD rinsate feed that will establish loading comparable to the HD campaign at the UMCDF. The HD emissions demonstration test will commence after the ramp up is complete and objective evidence exists that the HD rinsate emissions test can be completed at the design feed rate of approximately 1,000 lb/hr. Once the facility has maintained this feed rate on consecutive processing days, then the FSS will be notified to mobilize to conduct the testing.

To ensure that all four operation's shifts have had an opportunity to process rinsate, a three week period, minimum, is required for each LIC. The ramp up plan done in accordance with PL-097, requires a shift to begin initial processing at 25%, progress to 50%, then 75%, and finally 100%. A minimum of four hours of sustained operations on feed rates of 25% and 50% are required prior to that shift progressing to eight hour sustained operation at the 75% and 100% feed rates. It is anticipated that approximately 150,000 lbs of rinsate in each LIC will be processed during ramp up. A ramp up consuming 350 operational hours is expected.

9.3. LIC POST-HD RINSATE TEST OPERATIONS

The post-LIC HD rinsate operations are governed by the conditions listed in the UMCDF Hazardous Waste Permit and the HWC MACT standards for existing sources found in 40 CFR §63.1219(a). Upon completion of the LIC HD rinsate emissions demonstration test, each LIC remains subject to the conditions in Permit Module VI and the Title V Operating Permit requirements.

9.4. INCINERATOR PERFORMANCE

The results of the LIC STBs, the LIC GB ATBs, the LIC1/2 VX ATB, and the LIC HD ATB indicate the permitted emission limits for metals will not be exceeded, and control of each LIC by the CON operators and AWFCO systems is adequate.

9.5. LIC HD RINSATE EMISSION TEST RESULTS

All data collected from the HD Rinsate Emissions Demonstration Test will be compiled in tabular form, submitted to DEQ and entered into the operating record. A preliminary and Final EDT Report will be prepared using the HD ATB/CPT reports as a template.

9.6. FINAL OPERATING LIMITS

No changes in the existing operating limits identified in Table 2-2 and 2-3 will be made as a result of the HD rinsate emissions demonstration test.

TABLE 9-1. PRELIMINARY LIC1 AND/OR LIC2 HD RINSATE RAMP UP AND TEST SCHEDULE [a]

Day	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Action	25% rate/shift	25% rate/shift	25% rate/shift	25% rate/shift	25% rate/shift	25% rate/shift	25% rate/shift
Day	**8**	**9**	**10**	**11-15**	**16**	**17**	**18**
Action	50% rate/shift	50% rate/shift	50% rate/shift	50% rate shift	75/90% rate/day	75/90% rate/day	75/90% rate/day
Day	**19-24**	**25-30**	**Test Period**	**Test Period**	**Test Period**	**Test Period**	**Test Period**
Action	75/90% rate/day	RATA window /100% rate/day	Methods 1-4 [b]	Run 1	Run 2	Run 3	Run 4

[a] The preliminary schedule is subject to change based on operational experience and facility requirements.

[b] EPA Methods are from 40 CFR §60, Appendix A.

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SECTION 10.0 QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

The UMCDF HD rinsate emissions demonstration test [QAPjP] documents the precision, accuracy, representativeness, completeness, and comparability objectives for the sampling and analysis conducted specifically to support this testing program. This QAPjP also describes the project organization and responsibilities, quality assurance objectives, sample custody requirements, calibration procedures, and other procedures and requirements specific to the performance of emissions testing.

The UMCDF QAPjP HD rinsate emission test has not been written to address the quality assurance and quality control requirements for facility activities that are not specific to the LIC HD rinsate emissions test. Operation and maintenance of the CMS (including the CEMS) are examples of such activities. The quality assurance and quality control requirements for the CMS are described in facility plans and procedures which are part of the operating record.

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