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TOOELE CHEMICAL AGENT DISPOSAL FACILITY (TOCDF)

LEWISITE COMPREHENSIVE PERFORMANCE TEST PLAN

FOR THE

AREA 10 LIQUID INCINERATOR

(Fulfilling Requirements of the RCRA Title V and MACT Regulations)

Revision 0

January 4 2010

URS
EG&G Division

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EXECUTIVE SUMMARY

The Tooele Chemical Agent Disposal Facility (TOCDF) was designed and built for the United States (U.S.) Army to destroy the chemical agent munitions stockpile at the Deseret Chemical Depot (DCD), located 20 miles south of Tooele, Utah. EG&G Defense Materials, Inc. (EG&G) operates the TOCDF under contract to the Army through the Chemical Materials Agency (CMA).

The U.S. Environmental Protection Agency (EPA) identification number for the TOCDF is UT5210090002. The facility operates under a Resource Conservation and Recovery Act (RCRA) Part B Permit issued pursuant to the delegation of the State of Utah Department of Environmental Quality (DEQ) Division of Solid and Hazardous Waste (DSHW) under the Utah Administrative Code Section 315. In addition, the TOCDF also operates under a Title V Air Permit administrated by the State of Utah DEQ Division of Air Quality (DAQ). Under the requirements of these permits, the incinerator system must demonstrate the ability to effectively treat any hazardous wastes such that human health and the environment are protected.

This plan addresses the testing to be conducted for a new incinerator, the Area 10 Liquid Incinerator (ATLIC), to demonstrate the arsenic feed rate associated with a Lewisite feed rate of 300 lb/hr. The Lewisite Comprehensive Performance Test (LCPT) will be conducted at the same operating conditions as the ATLIC Surrogate Trial Burn (STB), but with Lewisite as the feed rather than Agent GA. Lewisite has higher arsenic, ash, and mercury feed rates. This test will demonstrate these increased feed rates of arsenic, ash, and mercury to fulfill the air permit requirements of 40 Code of Federal Regulation (CFR) 63, Subpart EEE [i.e., Hazardous Waste Combustors (HWC) Maximum Achievable Control Technology (MACT) regulations]. A Destruction and Removal Efficiency (DRE) for the ATLIC was demonstrated with chlorobenzene as part of the ATLIC STB, and therefore, there is no reason to demonstrate another DRE. Test results will demonstrate compliance with the MACT arsenic, mercury, and particulate matter emission concentration limits that are specified in the HWC Final Replacement Standards for New Sources that were published in the Federal Register October 12, 2005, and finalized in October 2008.

The LCPT will be conducted at the same operating conditions as the ATLIC STB, and will collect exhaust gas samples for particulate matter, hydrogen chloride, chlorine, metals, polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans, and nitrogen oxides. This LCPT will demonstrate that the higher arsenic, ash, and mercury feed rates do not impact the ability of the ATLIC to meet the regulatory limits.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACAMS	Automatic Continuous Air Monitoring System
AHU	Air Handling Unit
ASTM	ASTM International
ATB	Agent Trial Burn
ATLIC	Area 10 Liquid Incinerator
AWFCO	Automatic Waste Feed Cutoff
BMS	Burner Management System
Brine	Wet Scrubber Recirculation Brine
CAL	Chemical Assessment Laboratory
CEMS	Continuous Emission Monitoring System
CFR	Code of Federal Regulations
CMA	Chemical Materials Agency
CON	Control Room
CPT	Comprehensive Performance Test
DAAMS	Depot Area Air Monitoring Systems
DAQ	Department of Environmental Quality (State of Utah) Division of Air Quality
DCD	Deseret Chemical Depot
DEQ	State of Utah Department of Environmental Quality
DFS	Deactivation Furnace System
DI	Deionized (as in demineralized water)
DRE	Destruction and Removal Efficiency
DSHW	State of Utah Department of Environmental Quality Division of Solid and Hazardous Waste
EG&G	EG&G Defense Materials Inc
EPA	U.S. Environmental Protection Agency
E-stop	Emergency Stop
ETL	Extreme Temperature Limit
FCS	Facility Control System
FSSS	Flame Safety Shutdown System
GC	Gas Chromatograph
GC/MS	Gas Chromatograph/Mass Spectrometer
HAP	Hazardous Air Pollutant
HEPA	High Efficiency Particulate Air
HHRA	Human Health Risk Assessment
HRGC/HRMS	High Resolution Gas Chromatograph/High Resolution Mass Spectrometer
HVAC	Heating, Ventilation, and Cooling

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

HWC	Hazardous Waste Combustor
HRA	Hourly Rolling Average
IC	Ion Chromatography
ICP/MS	Inductively Coupled Plasma/Mass Spectrometry
ID	Induced Draft
LCPT	Lewisite CPT
LIC	Liquid Incinerator
LOQ	Limit of Quantitation
MACT	Maximum Achievable Control Technology
MEB	Mass and Energy Balances
MPF	Metal Parts Furnace
MRE	Metals Removal Efficiency
NDIR	Non Dispersive Infrared
NOC	Notifications of Compliance
NRT	Near Real Time
PAC	Powdered Activated Carbon
PAS	Pollution Abatement System
PCC	Primary Combustion Chamber
P&ID	Piping and Instrument Diagram
PLC	Programmable Logic Controller
PM	Particulate Matter
POHC	Principal Organic Hazardous Constituent
PST	Performance Specification Test
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QP	Quality Plant Sample
R315	Utah Administrative Code Section 315
RCRA	Resource Conservation and Recovery Act
SCC	Secondary Combustion Chamber
SDS	Spent Decontamination System
SOP	Standard Operating Procedure
Spent Decon	Spent Decontamination Solution
STB	Surrogate Trial Burn
SVOC	Semi Volatile Organic Compound
SW 846	Test Methods for Evaluating Solid Waste 3rd Edition including Update IV USEPA SW 846 December 1996

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

TC	Ton Container
TEL LOP	Tooele Laboratory Operating Procedure
TEQ	Toxic Equivalent Concentration
TOCDF	Tooele Chemical Agent Disposal Facility
TOX	Toxic Cubicle
TSCA	Toxic Substances Control Act
TSDF	Treatment Storage and Disposal Facility
UPS	Uninterruptible Power Supply
US	United States
VFD	Variable Frequency Drive
VOC	Volatile Organic Compound
VSL	Vapor Screening Limit
WCL	Waste Control Limit
XSD	Halogen Specific Detector

LIST OF UNITS AND MEASUREMENTS

acfm	actual cubic feet per minute
Btu/hr	British thermal units per hour
Btu/lb	British thermal units per pound
cP	centiPoise
cfm	cubic feet per minute
°C	degree centigrade
°F	degree Fahrenheit
dscf	dry standard cubic foot
dscfm	dry standard cubic feet per minute
dscm	dry standard cubic meter
ft	foot
ft³	cubic foot
g	gram
g/sec	grams per second
gal	gallon
gpm	gallons per minute
gr/dscf	grains per dry standard cubic foot (1 atmosphere, 68°F)
hp	horsepower
inHg	inches of mercury
inWC	inches of water column
l	liter
l/m	liters per minute
lb	pounds
µg	microgram
m³	cubic meter
mg	milligram
ml	milliliter
N	Normal
ng	nanogram
ppb	parts per billion
ppm	parts per million
ppmdv	parts per million on a dry volume basis
lb/hr	pounds per hour
psi	pounds per square inch
psig	pounds per square inch gauge
scfm	standard cubic feet per minute
ΔP	*pitot velocity pressure*
Wt%	weight percent

LIST OF CHEMICAL SYMBOLS AND FORMULAS

Agent GA	Ethyl N,N-dimethyl phosphoroamidocyanidate
Al	aluminum
Ag	silver
As	arsenic
B	boron
Ba	barium
Be	beryllium
Cd	cadmium
Cl	chloride
Cl	chlorine
CO	carbon dioxide
CO	carbon monoxide
Cr	chromium
Co	cobalt
Cu	copper
EDT	ethanedithiol
HNO	nitric acid
Hg	mercury
HCl	hydrogen chloride
HO	hydrogen peroxide
Lewisite	(2-chlorovinyl) dichloroarsine
$KMnO_4$	potassium permanganate
Mn	manganese
NaOH	sodium hydroxide
H_2SO_4	sulfuric acid
Ni	nickel
NO	nitrogen oxides
O	oxygen
Pb	lead
PCBs	polychlorinated biphenyls
PCDD	polychlorinated dibenzo-p-dioxin
PCDF	polychlorinated dibenzofurans
Sb	antimony
Se	selenium
Sn	tin
TCDD	tetrachlorodibenzo-p-dioxin
Tl	thallium
V	vanadium
Zn	zinc

LIST OF IDENTIFICATION CODES FOR LIQUID INCINERATOR INSTRUMENTS MONITORING REGULATED OPERATING PARAMETERS

815 TIC 8471	Primary Chamber Exhaust Gas Temperature
807 FIT 8450	Primary Chamber Agent Feed Rate Hourly Rolling Average
822 PI 8410	Agent Atomizing Air Pressure
815 TIC 8570	Secondary Chamber Temperature
815 TIT 8571	Secondary Chamber Exhaust Gas Temperature
829 FIT 8521	Secondary Chamber SDS Feed Rate Hourly Rolling Average
822 PI 8511	Spent Decon Atomizing Air Pressure
819 FIT 9824	Venturi Scrubber Brine Feed Hourly Rolling Average
819 PI 8961	Quench Brine Delivery Pressure
819 FIT 8921	Brine Flow to Scrubber Tower #1 Hourly Rolling Average
819 FIT 8922	Brine Flow to Scrubber Tower #2 Hourly Rolling Average
819 FIT 8923	Brine Flow to Scrubber Tower #3 Hourly Rolling Average
819 PDI 8911	Scrubber #1 Pressure Drop
819 PDI 8912	Scrubber #2 Pressure Drop
819 PDI 8913	Scrubber #3 Pressure Drop
819 PI 8982	Scrubber Brine Pump Pressure
819 FI 8924	Brine to Venturi Scrubber Flow
819 AI 8983	Scrubber Brine Density 12 hr Rolling Average
819 AIT 8982	Brine pH Hourly Rolling Average
819 PDI 8915	Venturi Exhaust Gas Pressure Drop
819 PI 8956	Venturi Pump Pressure
819 TIT 8941	Baghouse Inlet Temperature
819 PDIT 8956	Baghouse Differential Pressure
819 AI 8983	Carbon Injection Feed Weight
819 WI 8957	Carbon Injection Feed Weight
819 FI 8954	Carbon Injection Air Flow
819 PDI 8941 .8942	Carbon Filter Differential Pressure
819 TI 8959	Carbon Filter Inlet Temperature
819 FIT 8954	Carbon Injection Feed
819 FI 8952	Exhaust Gas Flow Rate (Unit Production Rate)
819 AIT 8502	Blower Exhaust CO Concentration
819 AAI 8301	Blower Exhaust Gas O2
819 AIC 917	Venturi Sump pH HRA
819 AI 8927	Venturi Sump Density 12 hr Rolling Average

1.0 INTRODUCTION

The Tooele Chemical Agent Disposal Facility (TOCDF) is a hazardous waste disposal facility that was designed and built for the United States (U.S.) Army for the destruction of the chemical agent munitions stockpile at the Deseret Chemical Depot (DCD), located 20 miles south of Tooele, Utah. EG&G Defense Materials, Inc. (EG&G) operates the TOCDF under contract to the Army through the Chemical Materials Agency (CMA). The TOCDF is designed to dispose of chemical Agents GB, VX, and mustard (H series), drained munitions, contaminated refuse, bulk containers, liquid wastes, explosives, and propellant components. The planned DCD facility closure necessitates the destruction of the final remains of the nerve agent GA and blister agent Lewisite to complete the destruction of chemical agents in storage at DCD. The destruction of these additional chemical agents has been contracted to EG&G by the CMA, and these disposal activities will be conducted in the DCD Area 10 in a newly constructed facility.

The U.S. Environmental Protection Agency (EPA) identification number for the TOCDF is UT5210090002. The facility operates under a Resource Conservation and Recovery Act (RCRA) Part B Permit issued pursuant to the delegation of the State of Utah Department of Environmental Quality (DEQ) Division of Solid & Hazardous Waste (DSHW) under the Utah Administrative Code Section 315-8 (R315). The TOCDF also operates under a Title V Air Permit administrated by the State of Utah DEQ Division of Air Quality (DAQ). These permits are being modified to include processing Agent GA and Lewisite in the new incineration facility. To fulfill the RCRA requirements, a trial burn will be conducted to demonstrate the newly installed liquid incinerator (LIC) ability to effectively treat any hazardous waste such that human health and the environment are protected. A Comprehensive Performance Test (CPT) will fulfill the Title V and Hazardous Waste Combustors (HWC) Maximum Achievable Control Technology (MACT) requirements. The EPA promulgated Replacement HWC MACT Standards for HWCs on 12 October 2005, and they were finalized in October 2008.

This plan describes the fifth incinerator system that TOCDF operates to dispose of the chemical agents stored at DCD. The five incinerators include the two liquid incinerators (LIC 1 and LIC 2), the Metal Parts Furnace (MPF), the Deactivation Furnace System (DFS), and the new Area 10 Liquid Incinerator (ATLIC). Agent Trial Burns (ATBs) have been conducted in the other incinerator systems at the beginning of each new campaign, and similar testing will be conducted in the ATLIC before processing Agent GA and Lewisite. The ATLIC Lewisite Comprehensive Performance Test (LCPT) will demonstrate the processing of increased concentrations of arsenic, ash, and mercury present in Lewisite. This plan also serves as the notification that TOCDF plans to conduct a CPT for Lewisite wastes treated in the ATLIC. The feed rates, exhaust gas flow rates, and combustion chamber temperatures demonstrated during the ATLIC Surrogate Trial Burn (STB) will be used to set limits and operating parameters to conduct the LCPT. The LCPT will establish new arsenic, ash, and mercury feed rates.

The ATLIC will consist of a small scale liquid incinerator approximately one third the size of the existing TOCDF LICs. In order to remain compliant with all state and federal air rules and regulations while processing these remaining agents, a Pollution Abatement System (PAS) with enhanced capabilities to that of the existing PAS at TOCDF will be constructed to control air emissions. The new PAS will have additional capabilities for mercury and arsenic removal because Lewisite TCs have a high amount of mercury and arsenic in the agents. Agent GA monitoring on the ATLIC and PAS will be with Automatic Continuous Air Monitoring Systems (ACAMS) and Depot Area Air Monitoring Systems (DAAMS), while the Lewisite will be monitored with four MINICAMS® with two different columns. The incinerator will undergo performance testing as required by the HWC MACT regulations to demonstrate compliance with the National Emission Standards for Hazardous Air Pollutants as seen in Title 40 Code of Federal Regulations, Part 63, Subpart EEE (40 CFR 63.1219) for new sources.

The ton containers (TCs) to be processed at the ATLIC include 4 TCs containing approximately 4,000 pounds (lb) of Agent GA (Ethyl N,N-dimethylphosphoroamidocyanidate) and 10 TCs containing approximately 26,000 lb of Lewisite [(2-chlorovinyl) dichloroarsine] currently being stored at the DCD. In order to destroy these TCs without impacting the completion schedule in regards to the Chemical Weapons Convention treaty, a new facility will be constructed in Area 10 that will work in parallel with TOCDF. There are also 10 TCs (known as "Transparency Tons") that were found to be empty with low concentrations of Volatile Organic Compounds (VOCs) in the headspace of the TCs. The Transparency Tons do not contain any appreciable materials, and the liquid levels were so low that samples could not be obtained. The Transparency Tons may have contained Lewisite at one time.

This LCPT plan will describe how TOCDF will:

- Demonstrate with the use of Lewisite that arsenic wastes can be destroyed in accordance with the MACT requirements outlined in 40 CFR 26[illegible] 1219.

- Use sampling and analysis methods from Test Methods for Evaluating Solid Waste (SW-846) (1), 40 CFR 60, Appendix A (2), and Tooele Laboratory Operating Procedures (TEL LOPs) to demonstrate that the emissions from the ATLIC meet the required standards.

A separate Continuous Emissions Monitoring System (CEMS) performance evaluation is conducted annually for the ATLIC. CEMS is directed by Attachment 20 to the TOCDF RCRA Permit (3). The LCPT Plan was developed using the EPA guidance in the "Hazardous Waste Combustion Unit Permitting Manual" (4). In addition, this plan is submitted as a RCRA Permit modification for the treatment of Lewisite in the ATLIC. Regulatory reference citations are given as appropriate throughout this LCPT plan.

1.1 LEWISITE COMPREHENSIVE PERFORMANCE TEST PLAN ORGANIZATION

This plan is a stand-alone document to allow a separate review from that of the modifications to the TOCDF permits. The plan describes the operating conditions for the testing and the samples to be collected as part of the LCPT. The Quality Assurance Project Plan (QAPP) (Appendix A) describes the sampling and analyses to be conducted. Appendix B contains the ATLIC Shakedown Plan for the period prior to the LCPT. The Mass and Energy Balances (MEBs) are found in Appendix C. The Automatic Waste Feed Cutoffs (AWFCOs) are summarized in separate tables for the ATLIC in Appendix D. A summary of the Agent GA and Lewisite characterization data can be found in Supporting Information to the Permit Modification. Attachment 3 and Attachment 4 contains the referenced drawings for the ATLIC.

This introduction provides an overview of the plan, including:

- Process descriptions
- Waste feed descriptions
- LCPT objectives
- LCPT approach
- LCPT sampling and analyses protocols, and
- Expected final permit conditions resulting from the LCPT

1.2 FACILITY INFORMATION

The TOCDF is located in EPA Region 8. The TOCDF EPA Identification Number is UT5210090002, which is also the DSHW RCRA Permit number. The DCD Title V Operating Permit Number is 4500071001.

The LCPT points of contact are:

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Mr. Larry Williams, TOCDF Test Director
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1.3 WASTE TREATMENT SYSTEM PROCESS AND FEED DESCRIPTIONS

The ATLIC is located in DCD Area 10 and its operation is not affected by other operations taking place at TOCDF. An overview of the facility is provided in the Supporting Information to the Permit Modification, Attachment 4, Facility Site Plan, Drawing TF-16 C-2. The Lewisite will be drained from TCs and pumped directly to the agent collection tank. The ATLIC has a Primary Combustion Chamber (PCC) for agent incineration followed by a Secondary Combustion Chamber (SCC). The SCC primarily incinerates spent decontamination solution (spent decon) but also provides additional residence time for PCC exhaust gases. Exhaust gases from the SCC are then routed to the PAS for removal of air pollutants. Brief descriptions of the major discrete components follow, and a detailed system description is provided in Section 2 of this plan.

1.3.1 Waste Handling and Storage

The demilitarization process begins with the transport of the TCs from their storage site at DCD Area 10 to the ATLIC for processing. Ton containers are moved from Area 10 storage igloos and then placed in a glove box. The Lewisite drained from the TCs is pumped to the agent collection tank. Any residual Lewisite in the TCs is destroyed by addition of nitric acid to the TC and rotating the mixture for a predetermined time. The TC is then rinsed three times with water, and the final water rinse is sampled and analyzed for Lewisite. If the agent concentration is below the Waste Control Limit (WCL) of 200 parts per billion (ppb), the TC will be examined and sent to a Subtitle C Treatment Storage and Disposal Facility (TSDF). If the agent concentration is above the WCL, then the acid and water rinses are repeated until the Lewisite concentration in the final water rinse is below the WCL.

During the demilitarization process, the facility generates spent decon, which is captured by the Spent Decontamination System (SDS) and stored in the SDS collection tank until processed in the SCC. Each tank is sampled after it has been filled and analyzed for Lewisite and the Human Health Risk Assessment (HHRA) metals. If the Lewisite concentration is less than the WCL, the spent decon is treated in the SCC or shipped off site to a Subtitle C TSDF.

Acid gases and particulate matter generated during combustion are removed from the exhaust gases by the Wet Scrubber Recirculation Brine (Brine) in the PAS. The Brine removed from the PAS is stored in tanks until it is shipped off site to a Subtitle C TSDF.

1.3.2 Liquid Incinerator System

The ATLIC was custom designed and hence has no model designation. The ATLIC will be comprised of a two chamber refractory lined furnace and associated subsystems. The PCC is designed to treat the Lewisite, while the SCC is designed to process spent decon.

The ATLIC is controlled by the Facility Control System (FCS), which is responsible for safely and efficiently monitoring and controlling the process systems, process support systems, and control systems that are located within the ATLIC. The FCS is composed of microprocessor based electronic controllers with the primary function of assisting operations personnel in the safe startup, monitoring, control, data logging, alarming, and planned shutdown of the facility. The FCS system will consist of hardware and system software and development tools for system control, data collection, data storage, report generation, and programming. Operation of the FCS will be conducted from a central Control Room (CCRN) located near the ATLIC.

The PCC hot face is lined with SR 90 alumina brick. The PCC temperature is maintained by a 5 million British thermal units/hour (Btu/hr) natural gas fired burner allowing a maximum Lewisite feed rates of approximately 500 pounds per hour (lb/hr). A liquid waste nozzle is mounted next to the burner and angled towards the burner such that material is fed through the waste nozzle mix with the hot burner gases. The PCC temperature is maintained at a setpoint of 2,550 °F for processing all wastes. The ATLIC will operate with a minimum of 2 seconds overall system gas residence time through the PCC and SCC (the exhaust duct leading to the PAS from the SCC is not included). There will be an adjustable speed induced draft (ID) fan associated with the ATLIC. The ID fan using negative pressure will move the exhaust gases from the PCC directly into the SCC and on through the PAS for scrubbing and filtration. The exhaust gases will then exit the PAS, enter the fan, and exit the exhaust stack into the atmosphere.

The SCC hot face is lined with Ruby SR Brick and the temperature is maintained by a 1.1 million Btu/hr natural gas fired burner. The gases entering the secondary chamber from the primary chamber are cooled by injection of water or spent decon through two air atomized nozzles located next to the burner. The nozzles are capable of flows up to 2 gpm. The nominal flow rate through the nozzles during normal operations will be 0.8 gpm. The SCC is maintained at a setpoint of approximately 1,850 °F for processing all wastes.

An enclosure will be added to Igloo 1639 in Area 10 to house the new incinerator and associated PAS. Utilities required by the ATLIC include fuel gas, electric power, plant air, process water and instrument air. See Attachment 4 for a detailed drawing that includes both chambers of the ATLIC and the PAS.

1.3.3 Pollution Abatement System

The PAS is designed to cool the exhaust gas exiting the SCC at approximately 2,000 °F to approximately 70 °F at the exit of the condenser/absorber, then it is heated to 180 °F before going through the baghouse and carbon filter. The PAS will remove pollutants such as particulate matter, acid gases, and metals from the exhaust gas to below regulatory standards prior to being released to the atmosphere. Additional filtration for mercury removal is also part of the PAS design. The PAS will be in operation at all times that the ATLIC is operating, including start up and at idle with no waste in the furnace.

The PAS equipment consists of a quench tower, a series of packed bed scrubber, a Brine chiller, a high energy venturi scrubber with a manually adjusted throat, a moisture separator, an electric gas reheater, a powdered activated carbon (PAC) injection system, a baghouse, a sulfur impregnated carbon filter system, an induced draft fan, and an exhaust stack. A description of each piece of equipment and their function in the PAS can be found in Section 2.10.

1.4 WASTES TO BE TREATED

The State of Utah has defined chemical agents as acutely hazardous and identified them as P999 (i.e., chemical agent wastes) along with any items contaminated by chemical agent. However, the ATLIC will not produce or handle any liquids containing polychlorinated biphenyls (PCBs) that would be regulated under the Toxic Substances Control Act (TSCA) or treat any waste materials with dioxin waste codes (i.e., F020, F021, F022, F023, F026, or F027). The wastes to be treated for Lewisite operations are Lewisite agent, which is summarized in Table 1.1, and spent decon, summarized in Table 1.2.

The ATLIC will destroy the Lewisite and spent decon through high temperature incineration. The PCC is designed to treat Lewisite while the SCC is designed to process spent decon. The compounds present in the Lewisite TCSs are consistent with munitions grade Lewisite. Lewisite is manufactured by the catalyzed reaction of arsenic trichloride ($AsCl_3$) with acetylene. Table 1.1 summarizes the compounds identified by analyses as part of a study conducted in 2009 (6). The compounds identified were Lewisite compounds in the series of L1 [(2-chlorovinyl) dichloroarsine], which averaged 76.9 Wt%, L2 [*bis*(2-chlorovinyl) chloroarsine], which averaged 14.9 Wt%, and L3 [*tris*(2-chlorovinyl) arsine], which averaged 0.7 area percent. The L1 and L2 were analyzed by formation of a derivative with ethanethiol and then analysis using GC/FID and the concentrations estimated as the area percent. The non-derivatized samples were analyzed by GC/MS where the L3 and arsenic trichloride were estimated from the area percent of the chromatogram. In addition to the Lewisite compounds, the starting material, arsenic trichloride, was identified and the concentration estimated at 1.3 area percent. These four compounds represented 95.8 percent of the Lewisite agent with other unidentified impurities making up the balance.

TABLE 1-1 LEWISITE CHARACTERIZATION SUMMARY

	Average	Standard Deviation	Maximum Value	Minimum Value
Compounds (Area %)				
(2 Chlorovinyl) dichloroarsine (Lewisite L1)	76.9	2.1	80.4	74.3
bis (2 Chlorovinyl) chloroarsine (Lewisite L2)	14.9	1.0	16.4	13.0
tris (2 Chlorovinyl)arsine (Lewisite L3)	0.73	0.14	0.99	ND
AsCl	1.3	0.34	1.9	ND
Metals				
Aluminum (mg/kg)	34.3	4.25	44	29.8
Antimony (mg/kg)	313	16.0	338	292
Arsenic (Wt%)	**32.1**	**1.11**	**33.5**	**30.5**
Barium (mg/kg)	0.376	0.11	0.59	0.16
Beryllium (mg/kg)	< 0.06	ND	0.10	0.05
Boron (mg/kg)	98.1	11.0	113	78.8
Cadmium (mg/kg)	0.06	ND	0.10	0.05
Chromium (mg/kg)	1.34	0.15	1.59	1.17
Cobalt (mg/kg)	< 0.05	ND	0.05	0.05
Copper (mg/kg)	0.94	0.85	2.35	0.26
Lead (mg/kg)	0.32	0.20	0.87	0.18
Manganese (mg/kg)	0.18	0.07	0.35	0.11
Mercury (mg/kg)	192	136	528	48.4
Nickel (mg/kg)	0.22	0.25	0.84	0.06
Selenium (mg/kg)	< 0.68	2.00	6.36	0.05
Silver (mg/kg)	0.14	0.08	0.35	0.1
Thallium (mg/kg)	0.05	ND	< 0.05	0.05
Tin (mg/kg)	< 0.39	0.26	0.95	< 0.25
Vanadium (mg/kg)	14.1	1.6	16.9	11.8
Zinc (mg/kg)	44.4	13.2	72	30.8

TABLE 1 2 SPENT DECON CHARACTERIZATION SUMMARY [a]

Parameter	Average	Maximum	Minimum
VOCs (mg/L)	ND	ND	ND
SVOCs (mg/L)	ND	ND	ND
PCBs (µg/L)	1 56	1 89	0 80
PCDDs/PCDFs (pg/L) [b]	35 6	43 4	22 4
TOC (g/L)	1 39	1 66	0 69
pH	12 7	12 9	12 6
TSS (g/L)	1 28	4 69	0 032
TDS (g/L)	11 7	15 7	8 36
Aluminum (mg/L)	2 0	ND	ND
Antimony (mg/L)	0 050	ND	ND
Arsenic (mg/L)	< 0 050	ND	ND
Barium (mg/L)	0 12	ND	ND
Beryllium (mg/L)	0 050	ND	ND
Boron (mg/L)	2 5	ND	ND
Cadmium (mg/L)	0 050	ND	ND
Chromium (mg/L)	0 12	ND	ND
Cobalt (mg/L)	0 12	ND	ND
Copper (mg/L)	0 15	0 17	< 0 12
Lead (mg/L)	0 27	0 35	0 15
Manganese (mg/L)	0 12	ND	ND
Mercury (mg/L)	0 0024	0 0031	0 0018
Nickel (mg/L)	0 19	0 24	0 12
Selenium (mg/L)	0 050	ND	ND
Silver (mg/L)	0 12	ND	ND
Thallium (mg/L)	0 025	ND	ND
Tin (mg/L)	0 50	ND	ND
Vanadium (mg/L)	< 0 12	ND	ND
Zinc (mg/L)	1 53	1 90	0 91

Notes

[a] Data taken from the LLC HD ATB Report

[b] PCDD/PCDF concentrations are in Toxic Equivalent Concentrations to 2 3 7 8 TCDD

VOC = Volatile Organic Compound SVOC = Semi Volatile Organic Compounds

PCBs = Polychlorinated Biphenyls TOC = Total Organic Carbon

Lewisite will be fed to the ATLIC during the shakedown period and the LCPT and the details for the Lewisite are discussed in Sections 5.1.1 and 5.3. The arsenic in the Lewisite accounts for 52 Wt% of the feed. This high feed rate of arsenic will establish the maximum arsenic feed rate during the LCPT.

The Destruction and Removal Efficiency (DRE) established by the ATLIC STB is the only demonstration of the ATLIC DRE necessary to meet the requirements of the regulations. The established chlorobenzene DRE will allow the ATLIC to process Agent GA and Lewisite wastes based on the EPA guidance that ranks chemicals by their thermal stability (5). Since the ATLIC STB demonstrated a DRE for chlorobenzene (which is a Class I compound) any Class I compound or lower can be safely processed by the incinerator. Table 1.1 shows the composition of the Lewisite in the TCS. This table shows that the demonstration of DRE by the chlorobenzene in the STB was a conservative demonstration for the actual compounds treated by the normal operations of the ATLIC.

Spent decon will be composed of a combination of sodium hydroxide used to decontaminate equipment and surfactants used to decontaminate personnel. It will be treated in the SCC and will vary in concentration, but will always be below 5 % organic compound concentrations. Spent decon will have a Lewisite concentration less than the WCL before it can be treated in the SCC. Table 1.2 summarized the composition of the spent decon.

1.5 LEWISITE COMPREHENSIVE PERFORMANCE TEST OBJECTIVE

The objective of the LCPT is to demonstrate that the increase in arsenic, ash, and mercury feed rates does not have an adverse effect on the ATLIC compliance status because the PAS controls these emissions within the regulatory limits. This objective is supported by demonstrating:

- Control of carbon monoxide (CO) emissions to ≤ 100 parts per million dry volume (ppmdv) corrected to 7 % oxygen (@ 7 % O$_2$) on an Hourly Rolling Average (HRA) basis.

- That PM emissions are ≤ 0.0016 grains dry standard cubic foot (gr/dscf) @ 7 % O$_2$ (MACT limit).

- That the combined halogen emissions [hydrogen chloride (HCl) and chlorine (Cl_2)] are ≤ 21 ppm (MACT) expressed as HCl equivalents, dry basis @ 7 % O$_2$.

- That the polychlorinated dibenzo-p-dioxin (PCDD) and polychlorinated dibenzofuran (PCDF) emissions are ≤ 0.20 nanograms/dscm (ng/dscm) 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) Toxic Equivalent Concentration (TEQ) @ 7 % O$_2$.

- That the mercury emissions are ≤ 8.1 µg/dscm @ 7 % O$_2$ (MACT limit).

- That the semi volatile metals emissions (lead and cadmium) are < 10 µg/dsem @ 7 % O (MACT limit)

- That the low volatility metals emissions (arsenic beryllium and chromium) are 23 µg/dsem @ 7 % O_2 (MACT limit)

- The emission rate of nitrogen oxides (NO_x)

1.6 LEWISITE COMPREHENSIVE PERFORMANCE TEST APPROACH

The LCPT will take the universal approach outlined in the EPA Guidance (5). The universal approach establishes one set of permit conditions or limits applicable to all feed materials. This approach will treat Lewisite agent and spent decon in the ATLIC while confining incinerator operation to a well defined set of operating limits or an operating envelope. It is anticipated that Lewisite and spent decon will be processed simultaneously during Lewisite treatment. Maximum waste feed rates for each stream will be demonstrated during the ATLIC STB. The incinerator operator will thus have the flexibility to deal with combinations of both wastes while controlling the overall combustion process within specific limits (including combustion chamber temperature, exhaust gas flow rates, and waste feed rates).

The ATLIC is operated as a steady state incinerator. The LCPT will be conducted at one test condition within the envelope established by the ATLIC STB. The ATLIC temperatures will be maintained within the limits listed in Appendix D. The combustion airflows in the system vary over a small range, and system pressures are maintained negative relative to the ATLIC furnace rooms. The arsenic concentration in Table 1.1 will set the metals feed rate for Lewisite processing. Operation of the PAS follows the furnace, hence fluctuations in the PAS parameters will be limited. Brine pH is controlled at a pH > 7 to remove the acid gases from the exhaust gases, and Brine flows are controlled to maintain PAS component liquid levels and temperatures.

1.7 LCPT SAMPLING AND ANALYTICAL PROTOCOLS

Detailed discussions of the sampling and analysis procedures are provided in the QAPP (Appendix A). The structure of the LCPT is based on the previously stated objective in Section 1.5. The exhaust gas sampling and analytical methods to be used to quantify specific LCPT parameters are taken from SW 846 (1), 40 CFR 60, Appendix A (2), and TOCDF Procedures. These methods are as described below.

- A CEMS will monitor for CO, O_2, and NO_x on a continuous basis. The CO concentration will be used to demonstrate control of Products of Incomplete Combustion

- EPA Methods 1 and 2 (2) will determine traverse sampling locations and flow rates
- EPA Method 3A (2) will determine carbon dioxide (CO_2) concentrations using a CEMS supplied by the sampling subcontractor
- Each isokinetic sampling train will determine the moisture content of the exhaust gas
- EPA Method 5/26 (2) will determine the PM emissions and halogen (HCl and Cl_2) emissions
- EPA Method 29 (2) will determine the metals emissions
- SW 846 Method 0023A (1) will determine PCDD/PCDF emissions

1.8 FINAL PERMIT LIMITS

New permit operating conditions will not be set as a result of the LCPT with the exception of the feed rates of arsenic, cadmium, and mercury. The permit operating conditions to be set by the AFEC STB are summarized in Appendix D. Process parameters are divided into Group A, B and C parameters as directed in EPA guidance documents. Group A and B parameters will be established on the basis of AFEC STB results. Group C parameters are established on the basis of regulatory guidance, process design/safety considerations, or vendor recommendations.

Group A parameters will be continuously monitored process parameters which will be tied to AWFCOs. Group B parameters do not require continuous monitoring and will not be interlocked with the AWFCO system, however, detailed operating records will be maintained to demonstrate compliance with permitted operating conditions. Some Group C parameters will be continuously monitored and interlocked with the AWFCO system.

During the shakedown period, the AWFCO settings for Group A and interlocked Group C parameters will be those listed in Appendix D. During the LCPT, the interlocks for these Group A and C parameters will remain operational at the limits noted in Appendix D.

2.0 DETAILED ENGINEERING DESCRIPTION OF THE ATLIC

This plan discusses the requirements of 40 CFR 63.1206(b)(5)(B) to conduct a trial burn and this section discusses the current engineering configuration of the ATLIC as required by 40 CFR 270.62(b)(2)(ii). The operating parameters to be included in the final permits will be established by the ATLIC STB and LCPT. Engineering changes that might be encountered during shakedown would necessitate revisions to this LCPT plan; any such changes would be coordinated with the DAQ and DSHW.

The ATLIC engineering drawings and specifications were prepared by EG&G. Selected Piping and Instrument Diagrams (P&IDs) and equipment arrangements are provided in Supplemental Information to the Permit Modification, Attachment 4. Drawings EG-22-F-8201, Sheet 1, and EG-22-F-8202, Sheet 1, show a simplified process flow diagram (see Attachment 4).

2.1 PRIMARY COMBUSTION CHAMBER

The ATLIC is a controlled air, direct fired, liquid injection incinerator with a PCC and a SCC. The vessels are refractory lined with the PCC designed to incinerate chemical agents drained from bulk containers, and the SCC designed to process spent decon and ensure destruction of agent. The ATLIC is designed so that the waste feed is pumped at a continuous, uniform rate to the PCC. The agent feed is mixed with combustion air and is dispersed into the chamber with an air atomizing nozzle. Supplemental fuel (natural gas) is used for temperature control within the PCC.

The PCC will be a horizontal refractory lined steel cylinder that is 12.5 feet (ft) in length and will have a diameter of 5.5 ft. It will be comprised of refractory that is a high alumina corrosive resistant SR90 Brick. One end of the chamber will be flanged and sealed with a flat steel plate, which can be removed for refractory repair. A single burner assembly and waste feed injection nozzle will be mounted to the chamber end plate.

Combustion air will be introduced to the burner assembly through a wind box, which will enter into the primary chamber. As part of the burner assembly, a 5 million Btu/hr natural gas fueled burner will be used to ensure a stable flame pattern within the PCC and to control chamber temperature, which is maintained between 2,550°F and 2,850°F. Natural gas will be fed to the PCC burner at rates between 49 and 150 lb/hr (see the MEB in Appendix C).

Thermocouples at the exit of the PCC will measure the PCC exit gas temperature. The temperatures will be transmitted to the Programmable Logic Control (PLC) for temperature control. The natural gas supplied to the primary chamber burner assembly will be modulated to maintain the primary chamber exit gas temperature at the setpoint.

Lewisite agent will be supplied to the PCC by an agent feed system consisting of a waste feed injection nozzle. Agent will be dispersed into the burner flame through the air atomizing feed nozzle. Plant air is used to atomize the agent fed through the PCC liquid injection nozzles. The waste feed nozzle will be capable of processing neat agent. Processing rates for the furnace will be established during the ATLIC STB.

The furnace pressure will be maintained below the pressure in the ATLIC room at a nominal -5.0 to -7.0 inches water column (inWC). The furnace pressure will be varied by modulating the speed of the ID fan to maintain the pressure control setpoint. Pressure instruments measure the furnace and room pressures, and will be transmitted to a PLC pressure controller.

2.2 SECONDARY COMBUSTION CHAMBER

Exhaust gases from the PCC enter directly into the SCC. The SCC is a horizontal refractory lined steel cylinder that is 12 ft in length and has a diameter of approximately 4 ft. The refractory will be the same as that used in the TOCDF LICs and proven effective in corrosive resistant Ruby Brick with Ruby bond mortar. A flanged inlet in the side and toward one end of the chamber provides an inlet for the exhaust gases to the SCC. The ends of the chamber will be flanged and sealed with flat steel plates that can be removed for refractory repair. A single burner assembly and two liquid injection nozzles will be mounted to the SCC inlet plate.

Combustion air will be introduced to the burner assembly through the wind box, which will enter into the SCC. A 1 million Btu/hr natural gas fueled burner will be used to ensure a stable flame pattern within the SCC and to control chamber temperature. Natural gas will be fed to the SCC burner at rates between 16 and 50 lb/hr.

Thermocouples at the exit of the of the SCC measure the ATLIC exit gas temperature, and then the temperatures are transmitted to the PLC for temperature control. Either the fuel supplied to the burner or the water/spent decon supplied to the liquid injection nozzles will be modulated to maintain the SCC chamber exit gas temperature at the setpoint.

The SCC will operate at temperatures between 1,850 °F and 2,000 °F. Either spent decon generated from facility maintenance activities and the rinsing and decontamination of LICs or process water is introduced through two liquid atomizing nozzles [with nominal flow rates during normal operations of 0.8 gallons per minute (gpm)] to lower temperature of the gas as it enters the SCC. The spent decon or water evaporates and destroys any organic compounds contained in them. Spent decon will be supplied only if all process conditions are met, while process water will be used at all other times. The process water flow rate is limited by the control code to a minimum of 215 lb/hr for cooling of the liquid injection nozzles. Plant air is used to atomize the SDS or water fed to the SCC liquid injection nozzles.

The ATLIC SCC exhausts through a refractory lined duct to the PAS. The overall system gas residence time is a minimum of 3.0 seconds through the primary and secondary chambers. The exhaust duct is not included in the residence time calculation.

The furnace pressure is maintained below the pressure in the ATLIC room. The ATLIC pressure is maintained at a nominal -3.0 to -7.0 inWC. The furnace pressure is varied by modulating the speed of the ID fan to maintain the pressure control setpoint. Pressure instruments measure the furnace and room pressures and will be transmitted to a PLC pressure control.

2.3 DESCRIPTION OF THE WASTE FEED NOZZLES AND GAS BURNERS

A natural gas fueled burner is used to ensure a stable flame pattern within the PCC and to control chamber temperature. The PCC temperature is maintained by a 3 million Btu/hr natural gas fired burner. An air atomizing waste feed nozzle is mounted next to the burner and angled towards the burner such that material fed through the waste nozzle mix with the hot burner gases. The operating temperature of the PCC is maintained at a setpoint of approximately 2,700 °F.

The ATLIC combustion air blower provides combustion air through a supply duct to both the PCC and SCC burner assemblies. The air flow volume will be measured to the PCC and SCC burners by an orifice plate in the combustion air duct. A flow control valve in the combustion air supply duct to each furnace chamber burner maintains the desired flow to the burners. The combustion air flow will be set proportional to the fuel flow during furnace ramp up and ramp down. During normal operations, the combustion air flow will be maintained at a constant rate to provide excess air in both chambers for combustion during agent and waste processing to ensure complete destruction of agent and organic compounds.

The SCC temperature is maintained by a 1.5 million Btu/hr natural gas fired burner at a setpoint of approximately 2,000 °F. Exhaust gases from the PCC enter directly into the SCC. Spent decon or water is introduced into the SCC through air atomized nozzles located next to the burner to lower the temperature of the gas as it enters the secondary chamber. The nozzles are capable of flows up to 2 gpm. The nominal flow rate through the nozzles during normal operations will be 0.8 gpm. The spent decon/water evaporates, providing cooling, and any organic residue burns. A natural gas fueled burner is used to ensure a stable temperature within the secondary chamber.

2.4 DESCRIPTION OF THE AUXILIARY FUEL SYSTEM

Natural gas is fired to heat both the PCC and the SCC to the proper operating temperatures prior to feeding Lewisite agent or spent decon. It is supplied to the PCC through a line to the burner system and supplements the injected chemicals to maintain the desired combustion temperatures. Natural gas is supplied to the SCC through a line to the burner to provide supplemental heating during periods of high spent decon feed rates to offset the cooling provided by the spent decon. A pressure regulator reduces the fuel supply pressure to the burners. The fuel flow rate will be

measured by an orifice plate and regulated by a flow control valve and controller. Both burners are equipped with independent monitors, controls, interlocks, and fail safe devices required by the National Fire Protection Association.

A flame safety shutdown system (FSSS) ensures safe operation of the burners. The FSSS is located in the burner management system (BMS) panel and connects to the furnace controls through a PLC. The BMS controls all furnace burner operations through its connections to the PLC.

2.5 TON CONTAINER RINSE AND DRAIN SYSTEM

Glove boxes have been used in the past to sample for types and amounts of agent in munitions. The ATLIC TC rinse and drain system will consist of two separate glove boxes that will allow draining Agent GA and Lewisite TCs of their liquid agent. There will also be a decontamination process that will allow rinsing and draining of the TCs. At the completion of the TC rinsing and draining operations, the glove boxes will be removed from the ATLIC Processing Bay to make room for the TC cutting machine, which will cut the decontaminated TCs in half to allow inspection prior to shipment to a Subtitle C TSDF. Agent GA and Lewisite processing through this rinse and drain system will occur separately depending on the current agent campaign.

The glove boxes are sealed environmental enclosures that prevent the escape of agent vapors to the ambient air within the ATLIC Processing Bay. The pressure within the sealed glove box is maintained negative relative to the ATLIC Processing Bay pressure by ducting that connects the glove box to the ATLIC Heating, Ventilation, and Cooling (HVAC) filter system.

Both glove boxes will contain agent drain systems with a roller and drive assembly to assist operators in getting the maximum amount of agent from the TCs. The valves within each glove box can be arranged to transfer the contents of each TC to the ATLIC PCC, the Agent Collection Tank, the SDS collection tank, or the hazardous waste storage tank. The valve located outside each glove box can be arranged to fill TCs drained of their agent with decontamination solution (spent decon), nitric acid solution, or water. The outside valve can also add regulated air to enhance the draining process by air priming the TC and/or clearing the eductor tubes of the TC. The agent filled TCs will be brought from storage in Area 10 to the processing area and placed on a transfer table. The TCs will then be placed individually into glove boxes.

2.5.1 Agent GA TC Rinse and Drain System

The Agent GA will be drained and fed directly from the TC to the PCC. The Agent GA TCs are processed by placing a TC into the glove box and rotating it so that the two fill and drain valves are aligned vertically. A process air line is attached to the upper valve and a drain line is attached to the lower valve. The connections are made using specially designed shutoff quick connect couplers. The valves are then opened and the air added to the TC through the top valve both prevents a vacuum from forming in the TC as the agent is removed and provides additional

pressure to assist in agent draining. If a plugged drain and fill valve is encountered, the same air line can be used to unplug the valve. If the valve cannot be unplugged using compressed air, a drain lance can be inserted into the TC by removing one of the "blow out" plugs that are located on the opposite end of the TC from the drain and fill valves.

Once emptied of its agent fill, the Agent GA TC is filled with a NaOH solution. Sufficient solution is added to fill the TC more than half way. The TC is then rotated for a predetermined period of time. The rotation of the TC ensures that the solution contacts all the TC's interior surfaces. The spent decon solution is drained from the TC to the SDS collection tank. The TC is then filled half full with water and is rotated for a specified time to allow the rinse to contact the TC interior. This water rinse is repeated a total of three times with the rinse collected in the SDS collection tank. A sample is collected from the final water rinse and analyzed for Agent GA concentration. If the agent concentration is below the WCL (20 ppb for Agent GA), then the TCs are stored until they can be cut in half and examined for solids and transferred to an off site Subtitle C TSDF. If the agent concentration is above the WCL, then the NaOH and water rinses are continued until the Agent GA concentration is < the WCL. The spent decon and water generated from rinsing the Agent GA TCs are transferred to the SDS collection tank and treated in the ATLIC SCC.

2.5.2 Lewisite TC Rinse and Drain System

Lewisite TCs are prepared for draining in a similar manner to the Agent GA TCs; the difference is the agent drained is sent to a storage tank, and the solution used to decontaminate the TC interior is a 5.0 mole/liter [mol/l (M)] nitric acid solution.

The Lewisite is drained from the TCs and transferred to the agent tank where it is mixed and sampled prior to being fed to the PCC. Once drained, the Lewisite TCs are filled more than halfway with a 5 M nitric acid solution and the TC is then rotated for a specified time. The resulting nitric acid rinse is transferred to hazardous waste tank, also located in the TOX, where it is held until the Lewisite concentration has decreased below the WCL of 200 ppb. It is then shipped off site to a Subtitle C TSDF.

Once the nitric acid is drained from the TCs, they are filled more than halfway with water, rotated, and then drained. This rinse is repeated three times, and a sample is collected from the final water rinse, which is analyzed for Lewisite concentration. If the Lewisite concentration is less than the WCL of 200 ppb, the TC is stored until it can be cut in half and examined for solids and then shipped to an off site Subtitle C TSDF. If the Lewisite concentration is greater than the WCL, the nitric acid and water rinses are continued until the Lewisite concentration in the last water rinse is < WCL. The water rinses are transferred to the SDS collection tank and treated in the SCC.

2.5.3 Transparency TCs Decontamination System

In a 2009 study (5), the Transparency TCs were found to be empty. The Transparency TCs that are determined to be contaminated with Lewisite through samples collection and analyses or through headspace monitoring results are processed the same as Lewisite TCs. The Transparency TCs will be filled over half way with a M nitric acid and rotated for a specified time. The acid will then be drained and transferred to a hazardous waste tank where it is analyzed for Lewisite and treated with nitric acid if necessary to lower the Lewisite concentration below the WCL. It is then shipped off site to a Subtitle C TSDF. The TCs will then be filled over half full with water and rotated for a specified time. The rinse will be drained to the SDS collection tank. This rinse process will be repeated a total of three times, and a sample will be collected from the final water rinse which is analyzed for Lewisite concentration. If the Lewisite concentration is less than the WCL, the TC is stored until it can be cut in half and examined for solids before being shipped to an off site Subtitle C TSDF. If the Lewisite concentration is greater than the WCL, the nitric acid and water rinses are continued until the Lewisite concentration in the last water rinse is < the WCL. The water rinses are transferred to the SDS collection tank and treated in the SCC.

2.6 DESCRIPTION OF THE WASTE FEED SYSTEMS

Three types of waste materials are fed to the ATF/C: Agent GA or Lewisite are fed to the PCC and spent decon is fed to the SCC.

2.6.1 PCC Feed System

Pumps will be used to remove the surrogate mixture, Agent GA or Lewisite from the TCs in the glovebboxes. The feed pumps are positive displacement pumps with variable speed controls. Two pumps are mounted to a single skid with one being the primary and the other acting as a back up. Either pump may be used as the primary supply pump. The second pump will be used as an online standby pump that can be started at any time by the CCON operator if the primary pump fails. In the case of the surrogate mixture and Agent GA, the pumps will direct the material to the PCC, while the Lewisite is sent to an agent tank.

Lewisite will be pumped via one of two Lewisite feed pumps to the ATF/C agent feed nozzle. The Lewisite feed pumps are positive displacement rotary gear pumps. Two pumps are mounted to a single skid, one the primary and the other acting as a backup. Either pump may be used as the primary supply pump. The second pump will be used as an online standby pump that can be started at any time by the CCON operator if the primary pump fails. All waste feed pumps are located in the Toxic Area.

Waste feed from the pumps will be routed through a series of control valves and instruments to the waste injection nozzle on the PCC. The waste injection nozzle is purged with compressed air

and water following completion of waste feed. The compressed air and water supply for purge of the waste feed nozzle is located on the control valve and instrument piping skid and are not connected to any outside supply. The control valve and instrument piping skid is located in the ATTIC room.

Duplex basket strainers will be provided at the inlet of each set of feed pumps. The strainers will remove any debris from the supply fluid that may cause damage to the supply pumps. A differential pressure sensor monitored by the control room will indicate plugging of the strainers. The duplex design of the strainers allows online switching from one basket to another, making the offline basket available for cleaning or change out without interrupting processing.

A control valve and instrumentation skid will be supplied for field installation between the discharge of the waste feed pumps and the inlet of the waste feed nozzle. All waste feed piping with control valves and instrumentation required for safe operation of the system will be supplied on the control valve and instrumentation skid. A self contained supply of compressed air and acetic acid to be used for purging the waste feed nozzle will be supplied on the control valve and instrumentation skid.

2.6.2 SCC Feed System

Spent decon will be pumped via one of two SDS feed pumps to the two SCC spent decon/water supply nozzles. The SDS feed pumps are positive displacement rotary gear pumps. Two pumps are mounted to a single skid with one being the primary and the other acting as a backup. Either pump may be used as the primary supply pump. Both pumps are sized to supply the required flow of spent decon to the spent decon/water supply nozzles. Only one pump will operate at a time with the second pump acting as an online standby, brought online by the CON operator if the primary pump cannot maintain the required operating parameters. The SDS feed pumps are located in the Tank Farm. A control valve on the discharge line of the pumps regulates discharge pressure by circulating excess spent decon back to the supply.

Duplex basket strainers will be provided at the inlet of the feed pumps. The strainers will remove any debris from the supply fluid that may cause damage to the supply pumps. A differential pressure sensor monitored by the control room will indicate plugging of the strainers. The duplex design of the strainers allows online switching from one basket to another, making the offline basket available for cleaning or change out without interrupting processing.

The SDS feed piping with control valves and instrumentation required for safe operation of the system will be pre-assembled (control valve and instrumentation skid) and supplied for field installation between the discharge of the SDS feed pumps and the inlet of the spent decon/water injection nozzles. The pre-assembled control valve and instrumentation skid will have a supply connection for process water.

2.7 HEATING, VENTILATION AND COOLING SYSTEM

The HVAC system has a vital role in the safe operation of the ATLIC. The purpose of the HVAC system is to provide safe operating environments for personnel and equipment by conditioning the air, capturing any volatilized agents and preventing their release by conveying them to a filter system that will remove the agents from the air. The HVAC system will provide two streams of conditioned air. One stream provides conditioned air to the igloo that houses the glove box area, the two airlocks, and the TOX area. The second stream provides conditioned air to the ATLIC room. The HVAC system is configured in a cascading fashion so that any captured contamination flows from areas of less probability of contamination to areas of higher probability of contamination. The two streams will utilize 100% outside air with no circulation air capability.

There will be two air handling units (AHUs) that will provide the air to the ATLIC room and to the glove box area. The AHUs are both natural gas fired, and both of them are rated at less than 5 million Btu/hr. Because these sources are considered insignificant sources due to their size they are not required to be permitted individually [i.e., no Emission Point Numbers are associated with them].

Air from the glove boxes and the ATLIC room will be routed from a common discharge duct to the HVAC filter system. The filter system consists of three filter units with a combined rating of about 9,000 cfm. Two filters units will be online during normal operations, while the third filter unit will be used as a spare. The air is drawn through the filters by an ID fan downstream of the filters at the exhaust end of the filter assembly. Each filter unit will consist of a particulate filter, a High Efficiency Particulate Air (HEPA) filter, three carbon adsorption filters, and a final HEPA filter. The exhaust air from the filters will be ducted to a 40 ft filter stack, which will discharge to the atmosphere. Agent monitoring is conducted on the HVAC carbon filter exhaust stack using AC AMS and DAAMS for Agent GA, and MINIC AMS® for Lewisite.

Each filter unit is equipped with differential pressure sensors to measure the pressure drop across the filter banks. A change in the pressure differential between the inlet and outlet of a particulate filter or HEPA filter bank is a good indicator of the condition of the filters, so the pressure differential readings are monitored during operation of the filter unit to ensure that the banks are not clogged and are functioning properly. Airflow through the filter system is controlled by dampers within the ducts or by motor speed controllers on the filter fan motors.

An exhaust fan will be provided for each filtration unit and will be connected to a manifold downstream of the filters. In the event of loss of flow through an online filter, the back up filter unit will be started automatically, opening the inlet and discharge dampers simultaneously at start. When a filter change is required, the back up filter will be brought online manually. Instrumentation will be provided to monitor and control the airflow through the filter system. Differential pressure or airflow gauges or alarms will be used to verify proper ventilation conditions throughout the facility.

2.8 DESCRIPTION OF THE AUTOMATIC WASTE FEED CUTOFF SYSTEM

The primary function of the AWFCO system interlocks is to prevent feeding hazardous waste if incineration conditions are outside the permit limits. The interlock system will automatically stop the Lewisite agent and spent decon feed and prevent restart until the incinerator is at proper operating conditions and the interlock is manually reset. When an AWFCO is activated, the process controller immediately increases natural gas feed to the PCC and switches from spent decon feed to process water in the SCC. This maintains PCC and SCC temperatures until all wastes and waste residues exit the combustion chambers. Any residual agent in the PCC will be completely combusted by the residual heat in the PCC and the SCC.

The AWFCO setpoints and the basis for their activation will be the same as required in the established RCRA Permit and/or the HWC MACT Notifications of Compliance (NOCs). Tables specifying the process control instruments that will be interlocked with the AWFCO system and their setpoints can be found in Appendix D. The DAQ and DSHW will be notified seven days in advance of the first AWFCO test before the Lewisite agent is burned in the system. The AWFCO system will be tested every 30 days. A discussion of the ATLIC AWFCO parameters follows:

- PCC Exhaust Gas Temperature – The PCC gas temperature is monitored continuously at the exit of the PCC by a thermocouple and temperature indicating transmitter 815-TIT-8471. Lewisite and spent decon feeds are stopped if the exit gas temperature falls below the low temperature setpoint on a HRA basis or rises above the high temperature setpoint on an instantaneous basis.

- SCC Exhaust Gas Temperature – The temperature of the SCC exhaust gas is monitored continuously in the crossover duct by a thermocouple and temperature indicating transmitter 815-TIT-8571. This location is selected because the volume created by the section of the crossover duct extending from the SCC is included in the overall incinerator internal volume used to calculate residence time. Lewisite and spent decon feeds are stopped if the exit gas temperature falls below the low temperature setpoint on a HRA basis or rises above the high temperature setpoint on an instantaneous basis.

- Lewisite Feed Rate – The Lewisite agent is pumped from the storage tanks to the PCC. The agent flow rate is continuously measured by a mass flow meter and flow indicating transmitters that are in series: 815-FIT-8450. The AWFCO setpoint used to stop agent and spent decon feed is based on the HRA waste feed rate.

- Spent Decon Feed Rate – Spent decon is pumped from an SDS tank to the SCC. The spent decon flow rate to the SCC is measured continuously by a flow meter and flow indicating transmitter 815-FIT-8521. The AWFCO setpoint used to stop spent decon and agent feed is based on the HRA spent decon feed rate.

- Agent Atomizing Air Pressure – A minimum air pressure is required to ensure complete atomization of the agent as it enters the combustion chamber. The PCC atomizing air pressure is measured continuously by 822 PSL 8410. Waste feeds to the ATLIC will be stopped if the atomizing air pressure falls below the setpoint.

- Spent Decon Atomizing Air Pressure – A minimum air pressure is required to ensure complete atomization of spent decon as it enters the SCC. This parameter is controlled by use of pressure regulators and pressure switch 822 PSL 8511. Agent and spent decon feeds are stopped if the spent decon atomizing air pressure falls below the setpoint of the pressure switch.

- Water Flow to the Venturi Scrubber – The water flow to the venturi scrubber is continuously monitored by flow sensor and flow indicating transmitter 819 FIT 8924. Adequate water flow to the venturi scrubber is essential for proper scrubbing of the exhaust gases. Waste feeds to the ATLIC are stopped if the measured value falls below the setpoint on a HRA basis.

- Venturi Scrubber Differential Pressure – The differential pressure across the venturi scrubber is continuously monitored by pressure differential indicating transmitter 819 PDIT 8915. Waste feeds are stopped if the measured value falls below the setpoint on a HRA basis.

- Brine Flow Rate to the Scrubber Towers – Brine is added to the top of the packed bed scrubber by pumping fluid through distribution trays over the top of the pall rings. There are three scrubber towers. The Brine flow rate to the packed bed scrubber sprays is continuously monitored by flow sensor and flow indicating transmitter 819 FIT 8921 (Tower #1), 819 FIT 8922 (Tower #2), 819 FIT 8923 (Tower #3). Waste feed is stopped if the flow rate to the packed bed scrubber sprays falls below the setpoint on a HRA basis.

- Brine pH – The Brine pH is monitored continuously by pH probes and analyzer indicating transmitters 819 AIT 8952A, B, and C to ensure the Brine remains alkaline. One probe is active at a time and provides the input to the PLC. Waste feeds are stopped if the measured value falls below the setpoint on a HRA basis.

- Scrubber Tower Bed Differential Pressure – The pressure differential of the scrubber towers are monitored continuously by 819 PDIT 8911 (Tower #1), 819 PDIT 8912 (Tower #2), and 819 PDIT 8913 (Tower #3). Waste feeds are stopped if the measured value falls below the setpoint on an HRA basis.

- Carbon Injection Feed – The feed rate of carbon to the baghouse will be monitored continuously by 819 FIT 8934. Waste feeds are stopped if the measured value falls below the setpoint on an HRA basis.

- Baghouse Differential Pressure – The pressure differential across the baghouse is monitored continuously by 819 PDIT 8956. Waste feeds are stopped if the measured value falls below the setpoint on an HRA basis.

- Carbon Filter Differential Pressure – The pressure differential across the carbon filter is monitored continuously by 819 PDIT 8941/8942. Waste feeds are stopped if the measured value falls below the setpoint on an HRA basis.

- Exhaust Gas Flow Rate – The exhaust gas flow is monitored continuously at the exit of the PAS with an annubar flow meter and recorded by 819 FI 8952. Waste feeds are stopped if the measured value falls below the setpoint on an HRA basis.

- Blower Exhaust CO Concentration – The CO concentration is continuously measured at the ID fan discharge by CO CEMS and recorded by the FCS as 819 AIT 8302. The CO AWFCO will stop waste feeds to the ATLIC if the HRA CO concentration exceeds the permitted value corrected to 7 % O_2 dry basis. The O_2 correction factor will be calculated using the following equation:

$$CO_c = CO_m \frac{14}{(21 - O_m)}$$

where:

CO_c	=	the exhaust gas CO concentration corrected to 7 % O_2 dry basis
CO_m	=	the measured exhaust gas CO concentration dry basis
O_m	=	the measured exhaust gas O_2 concentration dry basis

- Blower Exhaust Gas O_2 Concentration – The O_2 concentrations are monitored continuously at the ID fan discharge by O_2 CEMS recorded by the FCS as 819 AIT 8301. If O_2 concentrations fall below the minimum setpoint or rise above the maximum, waste feeds to the ATLIC are stopped.

- ATLIC Stack Exhaust Gas Agent Concentration – Lewisite will be monitored during the LCPI and these AWFCOs will be activated for the Lewisite shutdown and CPI. The agent concentrations in the exhaust gases at the stack are continuously monitored. The operation of the MINICAMS® in use during the LCPI will be controlled according to Attachment 22 of the TOCDF RCRA Permit (7). The agent monitoring requires six MINICAMS® monitors for Lewisite (TLN 709 series). The MINICAMS® monitors will be organized in two sets, and each set will have a GC column that will elute compounds in an order different from the other set. Two MINICAMS® from each set will monitor the exhaust gas continuously, while one MINICAMS® from each set will be in standby. The two MINICAMS® from each set that are monitoring the exhaust gas will be sequenced so one is sampling while the other is in the desorb and analysis mode. Waste

feed to all incinerators is stopped if any of the online MINICAMS® measures a concentration of Lewisite in the exhaust gas that equals or exceeds the setpoint

The ATLIC control system is designed to minimize AWFCOs and ensure that the system is in compliance. When an instrument fails, it usually will go out of range, which creates an alarm to the process control system to alert the operator of the problem. The FCS monitors critical functions and gives advanced warnings, using pre-alarms where possible, which indicates that an alarm condition is developing. Advanced warnings give operators time to take corrective actions before operations necessitate an AWFCO.

The measurement devices that initiate AWFCOs are calibrated and maintained on a regular basis as directed by TOCDF procedures. Most instruments are calibrated on a 180 day schedule. The pH meters (819-AIT-8952 (819-AIT-8917)) are calibrated on a weekly basis. The CEMS are checked on a daily basis and undergo an annual Performance Specification Test (PST).

2.9 EXHAUST GAS MONITORING EQUIPMENT

Exhaust gases from the ATLIC are monitored with CEMS on a continuous basis for CO, O_2, and NO_x. Agent monitoring systems located in the duct monitor for Lewisite from the time Lewisite is introduced into the system. For these parameters, an AWFCO will be activated when the instruments detect conditions beyond the setpoints. Outputs from these monitors are sent to PLCs which display the results in the CON, calculate rolling averages, and archive the data for future reference.

A separate CEMS is used to monitor the exhaust gas concentrations of CO, O_2, and NO_x. The CEMS will meet all of the performance specifications detailed in 40 CFR 60, Appendix B, Performance Specifications (PS). Permanently installed CEMS probes will be located in the ATLIC stack. The probes supply exhaust gas to the analyzers dedicated to monitoring the ATLIC exhaust gas. The primary functions of the CEMS are to continuously measure, display, and record the gas concentrations in the ATLIC stack. Output from the CEMS will activate alarms and interrupt waste feed when preset values are exceeded. The CEMS will remotely display gas compositions and CEMS operational status. The ATLIC CEMS instrumentation is located in a climate controlled monitoring room, which is located next to the stack.

The PLC stores data to provide remote data recording of CEMS operations at the CON. All analog and digital input/output signals will be conditioned properly to reduce noise and isolate signals from voltage transients. The control system displays and records the uncorrected and rolling averages for the gas concentrations, which are updated at least every 15 seconds. The PLC activates alarms and initiates an AWFCO when high CO or low O_2 concentrations are detected in the exhaust gas or when the control system experiences a loss of analyzer signal.

The exhaust gas sample enters the CEMS through a probe assembly located in the stack. The sample is then drawn through a heated line to the sample conditioning system where it is prepared for analysis in the analyzers.

2.9.1 Carbon Monoxide Monitors

The CO analyzer is identified as 819 ALT 8502 and it will be a non dispersive infrared (NDIR) analyzer as described in 40 CFR 60, Appendix A, Method 10 (2). The analyzers are calibrated on two ranges according to the CEMS Monitoring Plan, Attachment 20 (3), within the expected concentration ranges for the incinerator. These calibrations include analyses of a zero gas and a span calibration gas. The CO monitor sends a reading to a PLC every 15 seconds. The readings are averaged over one minute by the PLC, which then calculates an HRA from the one minute averages. The averages are sent to the DCS. The 40 CFR 60, Appendix B, Performance Specification 4B (8) is used to evaluate the CO CEMS performance and determine if the CO CEMS meets the calibration drift requirements. The CO CEMS initiates an AWFCO when the analyzer detects CO concentrations higher than the setpoint. If the CO monitor fails, an AWFCO will be initiated.

The NDIR analyzer's specifications are:

- Range: 0-200, 0-5,000 ppm
- Accuracy: ± 1 % of full scale
- Drift: ≤ 1 % of full scale per week
- Reproducibility: 0.5 % of reading, and
- Response time: ≤ 60 seconds

The CO CEMS is drift checked daily. Gases of 0 to 2 % and 60 to 90 % of instrument span are used to drift check the CO analyzer. Calibration gases are injected into the sampling system at the duct. Gases will be injected by opening the valve on each certified gas standard cylinder to allow the reference gas to flow under pressure to the sample probe. The reference gas is drawn through the sample transport, sample conditioning, and sample delivery system and is analyzed in the same manner as an exhaust gas sample. Calibration results are stored and printed through the DCS. The concentrations of the reference gases span the expected concentrations of the exhaust gas. The span gas calibrations are considered a verification of the quality of the CEMS data.

2.9.2 Oxygen Monitors

The O_2 analyzer is identified as 819-AIT-8301 and it will be a paramagnetic O_2 analyzer. The analyzer is calibrated according to the CEMS Monitoring Plan, Attachment 20 to the TOC DF RCRA Permit (5) using a zero gas and span calibration gases. The 40 CFR 60, Appendix B Performance Specification 4B (8) is used to evaluate the O_2 CEMS.

The O_2 analyzer's specifications are:

- Range: 0-25 Volume %
- Accuracy: ±1% O_2
- Drift: Less than 0.5 % of span
- Reproducibility: ± 0.2 % of measured value; and
- Response time: ≤2 minutes

The O_2 CEMS is drift checked daily using a two point method. Gases of 0 to 2 % and 60 to 90 % of instrument span are used to drift check the O_2 analyzers. Calibration gases are injected into the sampling system at the duct. Gases will be injected by opening the valve on each certified gas standard cylinder to allow the reference gas to flow under pressure to the sample probe. The reference gas is drawn through the sample transport, sample conditioning, and sample delivery system and is analyzed in the same manner as an exhaust gas sample. Calibration results are stored and printed through the DCS. The concentrations of the reference gases span the expected exhaust gas concentrations. The span gas calibrations are considered a verification of the quality of the CEMS data.

2.9.3 NO$_x$ Monitors

The NO$_x$ analyzer is identified as 819-AIT-8304 with a span of 0 to 1,000 ppmv. The analyzer is calibrated according to the CEMS Monitoring Plan, Attachment 20 to the TOC DF RCRA Permit (5) using a zero gas and span calibration gases. The 40 CFR 60, Appendix B Performance Specification 2 (8) is used to evaluate the NO$_x$ CEMS.

The NO$_x$ analyzer's specifications are:

- Range: 0 to 1,000 ppmv
- Accuracy: ± 20 % of Reference Material
- Drift: Less than 2.5 % of span

- Reproducibility: ± 0.2% of measured value; and

- Response time: < 2 minutes

The NO_x CEMS is checked for drift checked daily using a two point calibration method. Gases of 0 to 2 % and 60 to 90 % of instrument span are used to drift check the NO_x analyzer. Calibration gases are injected into the sampling system at the duct. Gases will be injected by opening the valve on each certified gas standard cylinder to allow the reference gas to flow under pressure to the sample probe. The reference gas is drawn through the sample transport, sample conditioning, and sample delivery system and is analyzed in the same manner as an exhaust gas sample. Calibration results are stored and printed through the FCS. The concentrations of the reference gases span the expected exhaust gas concentrations. The span gas calibrations are considered a verification of the quality of the CEMS data.

2.9.4 Agent Monitoring Systems

Operations of the agent monitoring systems are discussed in Attachment 22 to the TOCDF RCRA Permit (7) and in Appendix A. Lewisite concentrations in the plant and in the exhaust gas are monitored using MINICAMS®. The MINICAMS® a Near Real Time (NRT) monitoring system provide a continuous record of compliance in regards to the Lewisite emission standards. These systems have undergone extensive testing and evaluation under both simulated and actual field conditions. Testing and evaluation of the Lewisite monitoring systems will be provided to the DAQ and the DSHW prior to the shakedown period. Operations of the MINICAMS® are controlled by LOPs.

The Lewisite monitoring methods utilize a derivatization step at the sample collection inlet tube to eliminate the problems associated with the instability of Lewisite during sampling and analysis. Ethanedithiol (EDT) is added to the gas stream at the distal end of the sample probe and allowed to react with Lewisite to form (2-chlorovinyl) arsonic acid, which is volatile and can be easily transported to the pre-concentration tube. The MINICAMS® uses a gas chromatograph (GC) with a halogen specific detector (XSD™) for the detection of Lewisite. The Lewisite concentration is confirmed with two different MINICAMS® that have different columns resulting in different retention properties for the Lewisite derivative. To confirm the Lewisite concentration, the derivative must be detected on both MINICAMS®.

2.10 POLLUTION ABATEMENT SYSTEM

The PAS is designed to cool the exhaust gas exiting the ATLIC at approximately 2,000 °F to approximately 185 °F at the Quench Tower exit; the gas is then cooled further by the packed bed scrubbers. The PAS removes pollutants consisting of particulate matter (PM), acid gases, and metals from the exhaust gas to below regulatory standards prior to being released to the atmosphere. Additional filtration for mercury removal is also part of the PAS design. The PAS

will be in operation at all times that the ATLIC is operating including startup and at idle with no waste in the furnace

The PAS equipment consists of a quench tower a packed bed scrubber a Brine chiller a high energy venturi scrubber a moisture separator an electric gas reheater a PAC injection system a baghouse a sulfur impregnated carbon filter system an induced draft fan and an exhaust stack A description of each piece of equipment and their function in the PAS follows

2 10 1 Quench Tower

The quench tower is a vertical cylindrical vessel containing two water spray nozzles it is also equipped with a caustic wall wash system The counter flow quench tower is utilized to rapidly cool the exhaust gases as they exit the SCC The exhaust gases enter the quench tower and flow down through the spray created by the upward facing water spray nozzle Evaporation of the water cools the exhaust gas to approximately 185 °F (i e saturation temperature) A process water line supplies water to the quench spray nozzle A flow control valve and flow controller varies water flow to the quench nozzle to maintain quench outlet gas temperature to a setpoint of approximately 185 F The quench walls are wetted for elimination of particulate buildup and partial cooling of the vessel by addition of caustic around the top perimeter of the vessel Exhaust gas and excess liquid then exit the bottom of the quench tower The exhaust gas flows to the inlet of the packed bed scrubber

The quench tower has a second spray nozzle that is installed immediately downstream of the main spray nozzle The nozzle is connected to the emergency process water supply system which is activated if there is loss of power The emergency process water supply system supplies water for cooling the exhaust gas entering the quench tower If the quench tower exhaust temperature ever reached 250 F a high high temperature switch would initiate a furnace shutdown in order to prevent downstream equipment damage due to high temperatures

2 10 2 Packed Bed Scrubber System/Brine Chiller System

Cooled and saturated combustion exhaust gases exit the Quench Tower and enter the packed bed scrubber system The packed bed scrubber system consists of three packed bed towers an integral liquid sump a supply pump a heat exchanger and a scrubber liquor chiller system The three packed towers are vertical cylindrical vessels with a bed of packing and a Brine distribution system that are connected in series so that the exhaust gas enters each vessel at the bottom and exits at the top The exhaust gas temperature is reduced through contact with the cooled liquid condensing moisture and absorbing any acid gases The packed towers utilize direct contact cooling with the Brine to remove PM and acid gases The Brine in the packed bed scrubber train reacts with the acid gases present in the combustion exhaust gas stream and the Brine is pH controlled to > 7 0 using 18 Wt% NaOH solution A baffle in the sump prevents the gas from moving to other sections of the sump The gas flows upward through the packed towers and is brought in contact with the Brine The packed towers provide a large surface area and are structured to provide good contact between the exhaust gas and Brine Acid gases and other

water soluble compounds are removed by the Brine to form neutral salts. The Brine exits the bottom of the packed towers and drains to the common sump.

Brine is continuously drained from the common sump by the Brine circulation pump. The circulation pump moves Brine from the sump through an air cooled liquid cooler and chiller heat exchanger to the Brine injection nozzles located at the top of each packed tower. The air cooled exchanger is a packaged unit that cools the liquid by forcing ambient air over heat exchanger coils using a set of electrically driven fans. The chiller heat exchanger is a packaged unit that cools the liquid by circulating chilled liquid over heat exchanger coils. The coolers operate continuously during operation of the LIC PAS. The cooling of the Brine to the packed bed vessels allows for removal of heat transferred to the liquid by contact with the exhaust gas and allows for improved arsenic removal.

The Brine pH in the sump is continuously monitored by three pH monitors and maintained within normal operating values by addition of 18 % NaOH solution. The pH meters send a signal to the controller that varies caustic flow to the sump to maintain Brine pH at the setpoint. To prevent the uncontrolled addition of caustic to the scrubber sump if neither clean liquor pump is running, the caustic control valve is driven closed.

The liquid level within the scrubber sump is also continuously monitored and maintained within normal operating levels. Depending on the level alarm, different controls will be initiated (e.g. furnace waste stop feed, removal of scrubber liquid from the sump, or addition of water). Process water is supplied to the quench tower/packed tower sump to make up for the water that is lost through evaporation and the Brine blowdown. The Brine blowdown will be taken off site via tanker trucks.

Flow meters, flow controllers, and control valves maintain the Brine flow to the packed towers at a constant rate. This rate is set by the operator to optimize the gas to liquid ratio for better removal of the pollutants.

2.10.3 High Energy Venturi Scrubber/ Moisture Separator

The exhaust gas from the packed towers enters the venturi scrubber, where the scrubber uses a high energy design with a fixed throat to help accelerate the exhaust gas as it enters the throat of the venturi. Water is atomized and injected into the accelerated exhaust gas through a nozzle at high pressure. The high pressure atomization and extreme turbulence in the venturi throat provides the conditions to remove small particulate at high efficiency rates. The exhaust gas exits the venturi scrubber and enters the moisture separator.

The moisture separator is sized to slow the velocity of the gas, which allows the particulate laden fluid to separate from the gas stream and fall into the venturi sump. The exhaust gas flows upward to the separator discharge where there is a chevron type entrainment separator located at the top of the separation chamber to ensure against the loss of liquid droplets from the separator.

2.10.4 Electric Reheater

The combustion exhaust gas stream exits the venturi scrubber moisture separator saturated with water vapor (100 % relative humidity) and enters the electric reheater where it is heated to a temperature of at least 30 °F above the estimated dew point temperature of the exhaust gas stream. The reheater consists of electric heating elements that extend into a section of the exhaust duct between the exit moisture separator and the inlet of the baghouse. Thermocouples in the exhaust duct downstream of the heating unit monitor the exhaust gas temperature and provide a signal to the heater control to maintain the outlet gas temperature at the setpoint. The operating setpoint for the reheater temperature controller is set in the PLC by the ATLIC CON operator. The exhaust gas temperature is raised to ensure that the relative humidity of the exhaust gas is below 100 %. There is an alarm that will turn off and lock out the reheater while generating a stop waste feed for the furnace if the exhaust gas temperature downstream of the reheater exceeds a preset high temperature limit.

2.10.5 Powdered Activated Carbon Injection System

The exhaust gas continues to flow downstream from the reheater where it is injected with PAC through a nozzle for removal of mercury and trace organic compounds. The PAC injection system consists of a storage unit, rotary feeders, a variable speed volumetric feeder, and a high pressure transport blower/eductor. The feed system is located beneath the storage unit and is fed into a feed hopper. A volumetric feeder mounted on a weigh scale meters the PAC to an eductor while it is introduced into the transport air stream. The transport air is provided by a high pressure transport blower.

The rate of PAC feed to the system is continuously calculated from the change in weight of the feeder. The feed rate calculation is reset when a fill cycle of the feeder is initiated. The flow sensor is located at the injection nozzle to verify that PAC is being fed to the system at all times.

2.10.6 Baghouse

The PAC injected exhaust gas flows directly into a baghouse comprised of a number of vertically mounted filter bags. The exhaust gas enters the baghouse and travels through the filter bags and then exit the baghouse. Particulate matter contained in the exhaust gas is removed as it passes through the filters and remains on the outside of the filter bags. The filter bags are cleaned sequentially with compressed air. The entire cleaning cycle is automatically initiated based on the pressure differential or elapsed time. Particulate material dislodged from the filter bags falls into a hopper below the bags. The baghouse hopper is sloped to a center discharge equipped with a rotary airlock feeder.

The PM is periodically removed from the baghouse hopper based on a signal from a level sensor located in the hopper or a specified time interval. The baghouse discharge rotary airlock/feeder starts from a control signal and runs for a specified period of time, discharging the collected PM

from the baghouse hopper. The PM discharged from the baghouse rotary feeder falls into a containment bin that is periodically removed for landfill disposal according to permit requirements. A flexible joint connects the baghouse discharge rotary feeder to the collection bin for containment of the discharged particulate. The base of the baghouse is enclosed for containment of any fugitive dust. The enclosure around the base of the baghouse is equipped with accessible doors that allow positioning empty containment bins beneath the baghouse discharge and removing filled containment bins.

2.10.7 Carbon Filter System

The filtered combustion exhaust gas stream exits the baghouse and enters the carbon filter system where trace organic vapors, PM, and mercury are removed from the exhaust gas. The carbon system consists of two redundant filter beds where one bed is online during normal operations and the second filter bed is used during emergency or maintenance operations.

Each carbon filter bed consists of a pre-filter followed by a HEPA filter, an activated carbon bed and a second HEPA filter. The differential pressure across the carbon bed will be continuously monitored to detect filter plugging. The carbon is impregnated with sulfur to remove mercury. The mercury removal efficiency of the carbon bed is approximately 99.99%.

2.10.8 ID Fan

An ID Fan is associated with the PAS and is sized to provide the motive force required to move the exhaust gas stream through the complete PAS. The ID fan also consists of a single stage Fan with variable frequency drive (VFD) that modulates the speed of the fan so it can be controlled and furnace pressure can be maintained at a slightly negative pressure. The ID Fan is provided with a variable position damper located downstream of the fan. The fan discharges to the exhaust stack. Pressure will be monitored using MINICAMS® in the duct between the ID Fan and the exhaust stack.

2.10.9 Exhaust Stack

The combustion exhaust gas stream exits the ID Fan and enters the exhaust stack. The exhaust stack is 40 feet in height and includes flanged ports installed 90° from each other around the circumference of the horizontal duct leading to the exhaust stack for exhaust gas emission sampling and the CEMS equipment. The exhaust gas emissions will be continuously monitored in the stack using CEMS for the presence of CO, O_2, and NO.

2.11 CONSTRUCTION MATERIALS

The construction materials for the incinerator system components are listed in Table 2-1.

TABLE 2 1 LIQUID INCINERATOR CONTRUCTION MATERIALS

COMPONENT	CONSTRUCTION MATERIAL
Primary Combustion Chamber	SR90 Refractory lined (aluminum silicate up to 52 % crystalline silica up to 52 %) carbon steel
Combustion Air Blower	Carbon steel
Secondary Combustion Chamber	Ruby SR refractory lined (alumina up to 50 % amorphous silica up to 40 %) carbon steel
Quench Tower	Upper Section – AL6XN aluminum Lower Section – Type 316 Stainless Steel
Packed Bed Scrubber Tower	Type 316 Stainless Steel
Venturi Scrubber	Type 316 Stainless Steel
Induced Draft Fan	Carbon steel housing
Packed Bed Scrubber Pump	Type 316 Stainless Steel
Scrubber Blowdown Pump	Type 316 Stainless Steel
Moisture Separator	Type 316 Stainless Steel
Electric Re Heater	Type 316 Stainless Steel
Baghouse	Type 316 Stainless Steel
Carbon Filter Unit	Type 316 Stainless Steel
Discharge Stack	Fiberglass reinforced plastic

2 12 LOCATION AND DESCRIPTION OF TEMPERATURE PRESSURE AND FLOW INDICATING AND CONTROL DEVICES

This section provides a general description of the FCS temperature pressure flow and other instrumentation necessary to ensure compliance with all permit conditions A discussion of the major controls of the ATHC is also provided The locations of the process control instruments are shown on the drawings provided in Attachment 4 to the Permit Modification which also shows the instruments that are used to monitor plant operations and record data for the Facility operating record and the preparation of the LCPT report A list of the alarm settings for key process monitoring equipment is found in Appendix D

Control of equipment is provided through the FCS from the Area 10 CCN All motors have a Hand Off Auto or Local Off Remote Hand Station and emergency stop (E stop) pushbutton located physically near the motor Each hand station is connected to a Simocode motor

controller that monitors motor current, controls starting and stopping of the motor it is connected to, and relays all hand station activity and motor status (including motor current) to the FCS. The ID fan has an e-stop as the only local form of control, and manual control is from the front panel of the VFD or through the FCS.

The proper operation of this monitoring and control equipment is necessary to ensure consistent compliance with all permit conditions and safe, efficient operation of the ATLIC. Although all process monitoring instrumentation receives periodic maintenance, equipment critical to compliance with permit operating conditions receives additional attention. Key issues associated with these instruments include:

- Continuing and preventive maintenance;
- Verification of instrument calibration; and
- Verification of AWFCO integrity.

The preventive maintenance program is supported by information received from daily and periodic inspections of the process equipment. Instrument calibration and preventive maintenance are performed following the procedures and frequencies shown in Table 2.2. A description of the most significant control loops follows.

2.12.1 Facility Control System

The primary function of the FCS is to safely and efficiently monitor and control the process systems, process support systems, and control systems that are located within the Facility. The FCS is composed of microprocessor-based electronic controllers with the primary function of [illegible] operations performed in the [illegible] starting, monitoring, control, data logging, alarming, and planned shutdown of the Facility. Operation of the FCS will be conducted from a CON located in proximity to the ATLIC.

The FCS is composed of manufacturer's standard hardware, systems software, and firmware that will be configured to meet individual systems control requirements. The FCS system will consist of hardware including operator and engineering workstations that provide data collection, data storage, report generation, and programming capabilities. The FCS requires electric power and an Uninterruptible Power Supply capable of sustaining the system should a substantial primary power interruption occur. A configurable real time and historical data collection package will provide the functions of trending, logging, and reporting. The system will back up historical data to removable media for long term historical data storage. Data archiving will be provided for all data types. There will be a primary and backup domain server for the FCS network in accordance with the specification(s) of the chosen equipment.

TABLE 2.2 INSTRUMENT CALIBRATION FREQUENCY

Item No	Tag Number	Process Data Description	Calibration Frequency (days)
1	815 FIT 8450	Agent Feed Rate	180
2	822 PSL 8410	Agent Atomizing Air Pressure	180
3	815 TIT 8471	Primary Chamber Temperature	180
4	815 FIT 8521	Spent Decon Feed Rate	180
5	822 PSL 8511	Spent Decon Atomizing Air Pressure	180
6	815 TIT 8571	Secondary Chamber Temperature	180
7	819 FIT 89[illegible]2	Exhaust Gas Flow Rate (Unit Production Rate)	180
8	819 PI 8982	Scrubber Delivery Pressure	180
9	819 FIT 8921	Brine Flow to Scrubber Tower #1	180
10	819 FIT 8922	Brine Flow to Scrubber Tower #2	180
11	819 FIT 892[illegible]	Brine Flow to Scrubber Tower #3	180
12	819 PDIT 8911	Scrubber #1 Pressure Drop	360
13	819 PDIT 8912	Scrubber #2 Pressure Drop	360
14	819 PDIT 891[illegible]	Scrubber #3 Pressure Drop	60
15	819 FIT 8924	Brine to Venturi Scrubber Flow	180
16	819 PDIT 8918	Venturi Exhaust Gas Pressure Drop	60
17	819 AIT 892[illegible]A 819 AIT 892[illegible]B 819 AIT 892[illegible]C	Scrubber Brine pH	7
18	819 AIT 8938	Brine Specific Gravity	180
19	819 AIT 8917A 819 AIT 8917B 819 AIT 8917C	Venturi Sump pH	7
20	819 AIT 89[illegible]7	Venturi Sump Specific Gravity	7[illegible]
21	819 TIT 89[illegible]	Baghouse Inlet Temperature	180
22	819 PDIT 8936	Baghouse Pressure Drop	360
23	819 WIT 893[illegible]	Carbon Injection Feed Weight	180
24	819 FIT 8934	Carbon Injection Air Flow	180
25	819 PDIT 8941 8942	Carbon Filter Pressure Drop	60
26	819 TIT 89[illegible]9	Carbon Filter Inlet Temperature	180
27	819 AIT 8[illegible]02	Blower Exhaust CO Concentration	Daily
28a	819 AIT 8[illegible]01	Blower Exhaust Gas O2 Low	Daily
28b	819 AIT 8[illegible]01	Blower Exhaust Gas O2 High	Daily
29a	TFN 708AK	Stack Exhaust Agent GA	Every 4 hr
29b	TFN 708BK	Stack Exhaust Agent GA	Every 4 hr
29c	TFN 708CK	Stack Exhaust Agent GA	Every 4 hr
30a	TFN 709AI	Stack Exhaust Lewisite	Every 4 hr
30b	TFN 709BI	Stack Exhaust Lewisite	Every 4 hr
30c	TFN 709CI	Stack Exhaust Lewisite	Every 4 hr
30d	TFN 709DI	Stack Exhaust Lewisite	Every 4 hr

The FCS has a centralized control console including closed circuit television monitors (for observing operations at various locations) and locally mounted PLCs. Most processing and sequencing operations are controlled automatically through the PLCs. Interlocks are provided to prevent improper facility operation. These interlocks are monitored and continuous checking is undertaken to determine any failure to complete a programmed step. The FCS logs abnormal conditions, operator entries into the system, and starting and stopping of equipment with the time of occurrence. The control system provides continuous automatic control of the incineration process. In monitoring critical functions, the process control system gives advanced warnings using pre-alarms where possible, indicating that an alarm condition is developing, which warns operators in time to take corrective action.

The application software will control process functions, manipulate data, maintain configuration control, do graphic displays, conduct alarm management, data logging, trending, report generation, system diagnostics, and instrument maintenance management.

2.12.2 PCC Agent Feed Rate Control

The agent flow to the PCC feed nozzle will be monitored constantly by means of mass flow meter 807-FT-8450 on the agent feed lines. Their measurements are totaled by 807-FQI-8450 and the result compared to setpoint by 807-FIC-8450. The 807-FIC-8450 then drives a variable speed motor for the agent pump 807-HX-8695 to the appropriate speed for the desired flow.

2.12.3 PCC Pressure Control

The differential pressure between the ATLIC furnace room and the PCC is monitored constantly by means of pressure transmitter 815-PIT-8470 mounted near the top of the PCC. Pressure controller 815-PIC-8470 sends signal to 819-HS-8015 located on the motor of the ATLIC ID fan. The 815-PIC-8470 then modulates the ID fan motor to maintain the PCC about 0.5 inWC negative relative to the ATLIC furnace room. High-High PCC pressure switch 815-PSHH-8470 actuates alarm switch 815-PAHH-8470. A continuous record of the PCC pressure is maintained by the FCS through 815-PIC-8470.

2.12.4 PCC Exhaust Gas Temperature and Burner Controls

During normal operation, modulating the natural gas flow rate to the PCC burner provides control of the PCC exhaust gas temperature. Temperature controller 815-TIC-8471 controls the PCC burner gas rate by modulating control valve 818-FV-8445 to maintain PCC exhaust gas temperature. The burner has a 10 to 1 turndown ratio. A low-low PCC exhaust gas temperature transmitter 815-TT-8471 actuates alarm 815-TALL-8471 and an AWFCO if the PCC exhaust temperature falls below the low temperature setpoint. High temperature is sensed by 815-TT-8471 and will actuate an alarm and an AWFCO if the temperature rises above the high temperature setpoint. A continuous record of the temperatures is maintained by the FCS.

2.12.5 SCC Exhaust Gas Temperature and Burner Control

The SCC temperature will be maintained by measuring the SCC exhaust gas temperature in the duct exiting the SCC. The SCC exhaust gas temperature controller 815-TIC-8571 modulates the process water valve and/or fuel gas valve depending on whether SDS or process water is being used as a quenching medium in the SCC. Low-low temperature alarm 815-TAL-8571 and high temperature alarm 815-TAH-8571 actuate alarms and AWFCOs if the SCC exhaust gas temperature falls below the minimum temperature setpoint or rises above the maximum temperature setpoint.

Temperature control in the SCC is accomplished in two ways. When not processing spent decon, the chamber temperature is maintained by modulating the burner firing rate and the amount of water cooling in the chamber. The burner firing rate is modulated down to the low fire limit and the water spray is modulated open to quench the high temperature exhaust gas from the primary chamber. When the SCC is processing spent decon, the burner firing rate is modulated to maintain the temperature setpoint, and the spent decon feed rate is held constant.

2.12.6 SCC Spent Decon Waste Feed Control

The flow of spent decon to the SCC is monitored constantly by means of flow meter 829-FF-8521 on the common spent decon water spray line. After signal processing by 829-FIC-8521 the spent decon feed rate is transmitted to the FCS to maintain a continuous record. Flow indicating controller 829-FIC-8521 also controls flow valve 829-FV-8521 to the SCC spray nozzle. A high flow rate alarm 829-FAH-8521 will actuate an AWFCO if the feed rate exceeds the setpoint on a HRA basis.

2.12.7 Quench Brine Flow

The Brine flow to the quench tower sprays is measured by means of magnetic flow meter 819-FI-8980. A flow controller valve varies water flow to the quench nozzle to maintain quench outlet gas temperature at the setpoint.

2.12.8 Venturi Scrubber Water Flow

Water is sprayed radially and tangentially into the venturi scrubber. The water flow rate is measured by the magnetic flow meter 819-FI-8924. Water flow data rate provided to the FCS for continuous process monitoring. Low flow alarm 819-FAL-8924 actuates an AWFCO if flow falls below the setpoint on a HRA basis.

2.12.9 Brine pH

The Brine pH is monitored by means of three pH analyzers 819-AIT-8952A, 8952B, and 8952C. Indicating controller 819-AIC-8952 activates 819-HS-8907 to adjust the addition of caustic to

maintain the desired pH and provides input to the FCS for continuous process monitoring. Low pH alarm 819 PHL 8952 actuates an AWFCO if the pH falls below the setpoint on an HRA basis.

2.12.10 Venturi Scrubber Differential Pressure

Pressure indicator 819 PI 8915 measures the differential pressure across the venturi scrubber. Indicating controller 819 PDI 8915 provides input to the FCS for process monitoring. The same PDI provides high and low differential pressure alarms 819 PDAH 8915 and 819 PDAL 8915. An AWFCO is initiated if the differential pressure falls below the setpoint on an HRA basis.

2.12.11 Scrubber Tower Sump Level Control

The Brine sump level is measured by level indicating transmitter 819 LIT 8951. Indicating controller 819 LIC 8951 provides input to the FCS for continuous level monitoring. The same indicating controller provides high and low level alarms 819 LAH 8951 and 819 LAL 8951 respectively. It also controls the level in the brine sump by opening a solenoid valve 819 HV 8951 to adjust the quantity of process water added to the sump. If a low low level is detected, low low level alarm 819 LALL 8951 will be activated. If a high high level is detected, alarm 819 LAHH 8951 will be activated. If either the low and low low level alarms or the high and high high level alarms are simultaneously activated, the waste feed is stopped and the PCC and SCC burners will automatically shutdown. Additionally, if 819 LAHH 8951 is activated, all liquid inputs to the scrubber sump are isolated.

2.12.12 Baghouse Pressure Drop

Prior to entering the baghouse, the exhaust stream is injected with carbon to remove H_2 and trace organic compounds. The exhaust gas enters the baghouse below the filter bags and travels upward, passing through the filters and exits from the top of the baghouse. Differential pressure indicating transmitter 819 PDIT 8936 senses the pressure drop, while providing continuous pressure drop input to the FCS and alarms when the pressure drop increases or decreases to unacceptable values. An AWFCO is initiated if the differential pressure falls below the setpoint on an HRA basis. The filter bags are cleaned sequentially with compressed air. The entire cleaning cycle is automatically initiated based on pressure differential or elapsed time. The particulate material dislodged from the filter bags fall into a hopper below the bags. The hopper is sloped to a center discharge that leads to a containment bin in an enclosure to control fugitive dust.

2.12.13 Carbon Filter System Differential Pressure

The differential pressure across the carbon filter will be continuously monitored using 819 PDT 8941 and 819 PDT 8942 to detect filter plugging. An AWFCO is initiated if the differential pressure falls below the setpoint on a HRA basis.

2.12.14 ATLIC Exhaust Gas Oxygen Concentration

The ATLIC exhaust gas O_2 concentrations are measured continuously by O_2 analyzer 819-AIT-8301. If the O_2 concentration is below the preset low-low level setpoint, alarms 819-AAL-8301 are activated, and a RCRA AWFCO is initiated. If the O_2 concentrations are above the high-high level setpoint, alarms 819-AAH-8301 are activated, and an AWFCO is initiated.

2.12.15 ATLIC Exhaust Gas Carbon Monoxide Concentration

The ATLIC exhaust gas CO concentrations are measured continuously by CO analyzer 819-AIT-8302. This analyzer displays results locally and provides continuous CO data to PLCs. The PLCs calculate a one minute average. The PLC also calculates an HRA corrected to 7% O_2 dry volume, which is compared to the RCRA limit of 100 ppmdv. If the CO concentrations are above the limit, the alarms indicated by 819-AAH-8302 are activated, and an AWFCO is initiated. The averages are stored by the FCS.

2.12.16 ATLIC Exhaust Gas Flow Rate

Exhaust gas flow rates for the ATLIC are measured with an annubar flow meter 819-FIT-8902. The flow meter is installed in the exhaust duct located prior to the ID Fan to measure the volumetric flow rate. The annubar measures a differential pressure. The pressure difference is measured and converted to a flow rate. The FCS records the value and generates an HRA. If the HRA setpoint is exceeded, an AWFCO is initiated, and audio and visual alarms are activated.

2.12.17 Uninterruptable Power Supply System

The UPS, along with the generators, will provide backup power and allow for automatic transfer to critical process equipment as well as health and safety systems, e.g., HVAC systems. The generator backup distribution system will supply power to the UPS as well as essential power in the case of temporary loss of utility power.

2.13 INCINERATION SYSTEM STARTUP PROCEDURES

This section discusses the startup procedures as required by 40 CFR 270.62(b)(2)(xiii). The ATLIC is brought to full operating condition while firing natural gas before any hazardous wastes are introduced into the PCC or SCC. Full operating condition means that combustion temperatures are above the minimum for feeding waste, the ATLIC PAS is operational, the ATLIC is under vacuum, and the unit is in compliance with all regulatory limits. The start up sequence is performed in reverse order of the direction that waste feed and combustion products pass through the system, i.e., the PAS is started first, and the waste feed systems started last. Before any of the ATLIC processing equipment can be started, all utilities and control systems must be operational. The typical time required for startup from a cold system is about 36 hours.

A test of the AWFCO system will be performed before agent is fed to the system and the DAQ and DSHW will be notified 7 days in advance of the test

A summary of the ATLIC startup procedures is presented below

2.13.1 Startup of the Liquid Incinerator Pollution Abatement System

The sequential steps for successful startup of the ATLIC PAS are outlined below

Perform the following steps as applicable

1. Check that the caustic valves are lined up to provide pH control
2. Confirm that the scrubber tower sump levels are within acceptable limits
3. Verify that the MINICAMS® are on line
4. Verify that the agent concentration in the furnace room is less than the setpoint
5. Verify that there are no fuel gas leaks in the ATLIC Primary Room
6. Verify that there are no fuel gas leaks in the ATLIC Secondary Room
7. Start the Brine pump. Adjust flow rates as necessary and confirm the availability of the spare pumps
8. Start the venturi scrubber pump
9. Start the exhaust blower

2.13.2 Startup of the PCC/SCC

The sequential steps for successful startup of the SCC are outlined below

1. Verify that all valve lineups have been completed
2. Verify that the secondary chamber spent decon process water feed flow controller, secondary chamber feed isolation valve, and secondary chamber atomizing air valve are in their correct positions per the furnace Standard Operating Procedure (SOP)
3. Start the combustion air blower
4. Initiate a furnace system purge
   a. Primary and secondary combustion air valves go to high fire position
   b. The system purge timer starts
   c. Primary and secondary combustion air valves go to low fire position following completion of purge
5. The CCON operator initiates the burner light off sequence

NOTE: Both the primary and secondary burners will light at the same time. Both burners will lock out and the system purged must be re initiated if either burner fails to light. A system purge is not required for a burner re light if the primary chamber temperature is above 1,400 °F

   a. All fuel gas valve and running interlocks are verified
   b. The primary and secondary burner igniters are energized

c The main gas control valves open
d The igniters are turned off 10 seconds after the main gas control valves open
e The primary and secondary burner flame scanners sense flame presence and continue to monitor the flame strength. The burners will be locked out if the flame strength signal is not maintained and the primary chamber temperature is below 1400°F
f The CON operator verifies primary and secondary burner light off on the control screen from the BMS

6 Water flow to the secondary chamber is initiated when the temperature in the secondary chamber exhaust duct reaches 1500°F

2.1.3.3 Initiation of Primary Waste Feed

Waste feed to the primary chamber may be initiated by the CON operator if the furnace is at operating temperature and all feed permissives have been met. The CON operator proceeds as follows to initiate primary waste feed:

1 Verify that all waste feed permissives are met
   a Primary chamber temperature is between 2,550°F and 2,850°F
   b Secondary chamber temperature is between 1,850°F and 2,200°F
   c Toxic Area is normal
   d ATLIC PAS is normal
   e The primary waste holding tank is above low level
   f Control system is operating within normal conditions
   g There are no process alarms active
   h No stop feed conditions are active
2 Insert a setpoint into the primary combustion air flow controller for processing Lewisite. Verify that the combustion air flow increases to setpoint. Allow primary chamber temperature to stabilize to the setpoint
4 Set the primary waste feed flow rate for waste being processed (see section 1.2)
5 Open the primary waste holding tank discharge valve from the control screen
6 Place feed mode in AUTO (primary waste feed pump starts)
7 Initiate PRIMARY WASTE FEED from the control screen

2.1.3.4 Initiation of Spent Decon Feed

Spent decon feed to the SCC may be initiated by the CON operator if the furnace is at operating temperature and all feed permissives have been met. The operator initiates SDS feed by:

1 Verifying that all spent decon feed permissives are met
   a Secondary chamber temperature is between 1,850°F and 2,200°F
   b ATLIC PAS is normal
   c Open interlocks for SDS tank drain valve are satisfied
   d Control system is operating within normal conditions
   e There are no process alarms active

1 No stop feed conditions are active
2 Opening the SDS tank outlet valve
3 Enabling the DECON FEED mode
4 Placing the DECON FEED mode to AUTO
5 Verifying that the spent decon feed pump starts
6 Verifying that the spent decon feed valve opens and the process water feed valve closes
7 Setting the spent decon flow rate setpoint

2.14 EMERGENCY/PLANNED SHUTDOWNS

The CON operator will be able to initiate an emergency shutdown of the ATLIC system by actuating the e-stop button in the CON. The CON e-stop shuts down the PCC and SCC burners, stops the combustion air blower, drives all valves to their safe position, stops primary waste feed and stops spent decon feed. The quench sprays and the ID fan will continue operation.

There will also be an e-stop on the BMS panel in case an outside operator needs to initiate an emergency shutdown. The BMS e-stop shuts down the PCC and SCC burners, stops primary waste feed, stops SDS feed, and shuts down the fuel gas supply to the furnace.

In case of a planned shutdown, a water/air purge system will be used to clean all waste types from the segment of the PCC waste feed piping and waste feed nozzle. It is designed to protect personnel in protective gear from exposure to waste feed materials when working on the feed piping.

Water followed by compressed air will be introduced downstream of the first waste feed block valve to flow through the feed piping to the primary waste feed nozzle into the PCC. The system will have a minimum capacity to purge three volumes of water and compressed air through the feed piping and nozzle. The purge forces feed material remaining in the piping into the PCC following a stop feed. The purge will be actuated prior to a planned furnace shutdown and while the PCC is still at operating temperatures.

Plant air will be supplied to the waste feed line downstream of the second feed block valve. The air purge will be used whenever primary waste feed is stopped. The flush will be independent of the purge air line except for the common connection to the waste feed line.

3.0 SAMPLING AND ANALYSIS PROCEDURES

The sampling and analysis objectives for the LCPT are to demonstrate

- That increased arsenic, ash, and mercury feed rates do not have an adverse affect on the ATLIC compliance status because the PAS controls these emissions within the regulatory limit
- Control of CO emissions by maintaining the CO concentration at < 100 ppm @ 7% O on a HRA basis
- Control of PM emissions by showing that the concentration is < 0.0016 gr/dscf @ 7% O (MACT limits)
- That the Lewisite emissions were not detected
- That the metals used in the HHRA emission rates are in compliance with the MACT limits
- That the PCDD/PCDF emissions are < 0.20 ng 2,3,7,8-TCDD TEQ/dscm @ 7% O
- Control of NO_x emissions on an HRA basis
- That the halogen emissions (HCl and Cl_2) are < 21 ppmdv @ 7% O expressed as HCl equivalents

The sampling and analysis procedures included in this section were selected to accomplish the objectives discussed above. Detailed information on the sampling and analysis methods are provided in Appendix A and reference to it will be made to prevent duplication of text. The PCDD and PCDF data are being collected to demonstrate compliance with the MACT limits.

3.1 SAMPLING LOCATIONS

Samples collected for the LCPT will be divided into exhaust gas samples, process stream samples, and Lewisite agent samples. The exhaust gas samples will be collected after the ATLIC ID fan as detailed in Table 3-1. The parameters to be measured at this location include CO, O_2, NO_x, Lewisite, metals emissions, PCDDs/PCDFs, PM, Cl_2, and HCl. The exhaust gas sampling ports used for the sampling methods for the ATLIC are shown in Drawing FG-22-D-8211 in Attachment 4 to the Permit Modification.

TABLE 3-1 LIQUID INCINERATOR EXHAUST GAS SAMPLING SUMMARY

SAMPLING TRAIN	ANALYSES PERFORMED	LOCATION	PURPOSE
Method 1	Traverse Points	Each Port	Report Information
Method 2	Exhaust Gas Velocity	Isokinetic Trains	Report Information
Each Isokinetic Train	Exhaust Gas Moisture	Isokinetic Trains	Report Information
Method 0023A	PCDDs and PCDFs	Environmental Monitoring Ports in ATLIC Exhaust Stack	Report Information
Method 5/26	PM, HCl and Cl	Environmental Monitoring Ports in ATLIC Exhaust Stack	Report Information
Method 29	HTRA Metals	Environmental Monitoring Ports in ATLIC Exhaust Stack	Report Information
MINICAMS®	Lewisite	ATLIC Exhaust Duct ACAMS Port	AWFCOs & Report Information
CEMS	O_2, CO, NO	ATLIC Exhaust Duct CEMS Port	AWFCOs & Report Information
CEMS	CO_2, O_2	ATLIC Exhaust Duct CEMS Port	Report Information

The other sampling locations are matrix specific. A grab sample of spent decon is taken from a valve on the SDS tank. The Brine samples will be taken via taps on the side of the PAS sump. The Lewisite agent feed will be sampled from a valve in the lines used to circulate agent to mix the contents of the tank.

3.2 SAMPLING METHODS

The Brine samples for each run will be collected during the last 60 minutes of the run. The spent decon samples will be collected before testing to allow the spent decon to be analyzed for Lewisite before being processed. The Lewisite agent samples will be collected in a separate entry into the Toxic Area before the test as a safety precaution. The DAQ and DSHW representatives will be notified of times when process samples will be collected, when leak checks of sampling trains and pitot tubes will be conducted, and when sample recovery begins.

Liquid process samples will be collected according to ASTM International Method D3370 (9) by attaching a sample line to the tap and flushing the sample line. The resulting flush will be managed in accordance with applicable EPA and DSHW regulations. According to this method the sample line is inserted into the sample container, and the tap is opened to fill the sample bottles. Separate sub-sample bottles are used for each sample. The selected method ensures that the actual material collected is representative of the stream.

The agent tank will be filled with Lewisite before beginning a run. Circulation pumps allow the Lewisite agent to be removed from the tank and then returned to achieve a homogeneous mixture. The tank contents will be mixed for 30 minutes before beginning feed or collection of the feed sample. Mixing the contents of the tank before sampling makes it unnecessary to collect composite samples. Once the tank contents are mixed, the valve on the circulation line can be opened and a sample collected.

The exhaust gas will be monitored as outlined in Table 3-1 using CEMS and selected EPA methods sampling trains. The ATLIC CEMS will collect data on the CO_2, O_2, and NO_x exhaust gas concentrations. (The ATLIC CEMS are discussed in Section 2.9.) The sampling subcontractor's CEMS will monitor O_2 and CO_2 to allow calculation of the exhaust gas molecular weight. Certification and calibration data for the sampling subcontractor's CEMS will be available after the sampling subcontractor has arrived on site and set up the instrumentation.

The EPA methods for sampling the exhaust gas will be taken from SW-846 (1) and 40 CFR 60 (2). These methods are:

- A combination of Method 5 and Method 26A (2), which will collect samples for PM, CEs and HCl emissions.
- Method 0023A (1), which will be used to collect samples for PCDDs/PCDFs.

- A Method 29 sampling train (2) which will collect samples for metals emissions

- The ATLIC CEMS (3) which will sample for O_2, CO and NO

- The sampling subcontractor's CEMS which will use Method 3A to sample for O_2 and CO (2)

3.3 ANALYSIS METHODS

Summaries of these analysis methods are included in this section for completeness; detailed descriptions of the analysis methods are located in the QAPP (Appendix A, Section 9).

Metals present in the Lewisite are analyzed by acid digesting the sample by Method TE LOP 584 and then analyzing the digested sample by Method TE LOP 557.

Appendix A lists the specific organic compounds (target analytes) and metals to be analyzed as well as the methods of analysis. The process stream samples will be analyzed by the following methods:

- Method 8260B (1) which will be used to analyze samples for VOCs

- Method 8270D (1) which will be used to analyze samples for SVOCs

- Method 8290 (1) which will be used to determine PCDD/PCDF concentrations

- Methods 6020 and 7470A (1) which will determine metals concentrations

Samples of the exhaust gas will be collected using three sampling trains and the TOCDF CEMS and the sampling subcontractor CEMS. The collected samples will be analyzed using the following methods:

- Method 5 (2) which will be used to analyze PM

- Method 9057 (1) which will be used to measure halogen concentrations

- Method 0023A/8290 (1) which will be used to determine concentrations of PCDDs/PCDFs

- Methods 6020A and 7470A (1) which will be used to analyze metals emission samples

4.0 LEWISITE COMPREHENSIVE PERFORMANCE TEST SCHEDULE

The LCPT is scheduled for the third quarter of 2010. The submittal of this plan will serve as the official 60 day MACT notice required for CPT plans. The DAQ and DSHW will be notified at least 30 days in advance of the actual LCPT date.

The LCPT will begin after TOCDF has: received approval of the LCPT Plan; successfully completed construction of the plant; successfully completed shakedown of the incinerator; and completed the ATLIC STB. The LCPT should span about 5 days: 1 day for setup, 3 days of testing, and 1 day for cleanup. However, the ATLIC must achieve steady state conditions by 2:00 PM on any test day or the run will be cancelled for that day. The exhaust gas samples will be collected for four hours with 25 % of the sampling time spent in each of 4 sampling ports.

The LCPT will consist of one test condition with three replicate sampling runs. One run per day is planned. Actual sampling time during each sampling run will last about 6 hours. The ATLIC will be fed Lewisite at least 15 minutes before each sampling run to establish steady operation at process test conditions. This, combined with sample train port changes, will cause total test time each day to be about 6 hours. Assuming minimal interruption of ATLIC operation during this test, the incinerator is expected to operate for 6 or more hours per day for 3 days.

5.0 LEWISITE COMPREHENSIVE PERFORMANCE TEST PROTOCOLS

The LCPT will consist of three replicate runs performed at one set of operating conditions. The Lewisite used for this test will not be spiked with metals because the arsenic and mercury in the Lewisite represents the maximum arsenic and mercury feed rates. The following subsections will discuss the waste to be burned, the test operating conditions, waste feed rates, and total waste to be processed.

5.1 WASTE CHARACTERIZATION

Two waste streams will be treated during the LCPT: Lewisite agent and spent decon. Table 5-1 summarizes the physical properties of Lewisite. The TOCDF does not produce or handle any liquids containing PCBs that would be regulated under TSCA and does not treat any waste materials with dioxin waste codes (i.e., F020, F021, F022, F023, F026, or F027).

5.1.1 Lewisite Agent Waste Feed

The liquid waste stream fed to the PCC will be Lewisite agent drained from TCs. A representative sample of the Lewisite agent will be collected for each run unless more than one run is conducted from the same tank of Lewisite. The samples will be analyzed for HHRA metals.

The compounds present in the Lewisite TCs are consistent with munitions grade Lewisite (see Table 1-1). Lewisite is manufactured by the catalyzed reaction of arsenic trichloride (AsCl$_3$) with acetylene. Table 1-1 summarizes the compounds identified and the majority of the compounds were Lewisite compounds in the series of L-1 [(2-chlorovinyl) dichloroarsine], which averaged 76.9 Wt%; L-2 [*bis*(2-chlorovinyl) chloroarsine], which averaged 14.9 Wt%; and L-3 [*tris*(2-chlorovinyl) arsine], which averaged 0.75 Wt%. These three compounds represented 92.5 Wt% of the Lewisite agent with other impurities being inorganic arsenic compounds such as AsCl$_3$.

5.1.2 Spent Decontamination Solution Waste Feed

Spent decon will be fed into the SCC during each run. Any organic compounds present will be mainly the oxidation products of Lewisite, and concentrations of organic compounds are anticipated to be less than 5%. Table 1-2 summarizes the anticipated composition of spent decon to be used in the LCPT. In the case where spent decon is not available for use, a solution of NaOH with a minimum concentration of 1% will be used for spent decon.

TABLE 5-1 LEWISITE PROPERTIES

PROPERTY	LEWISITE AGENT
Chemical Name	(2-chlorovinyl) dichloroarsine
Chemical Formula	$C_2H_2AsCl_3$
Chemical Abstract Service Identification	CAS 541-25-3
Molecular Weight (g/mole)	207.32
Weight Percent Chlorine	51.3
Vapor Specific Gravity	7.1
Liquid Density @ 20 °C (g/cc)	1.8795
Liquid Specific Gravity @ 20 °C	1.891
Freezing Point (°F)	48 to 29
Boiling Point (°F)	585
Flash Point (°F)	None
Vapor Pressure @ 25 °C (mmHg)	0.46
Viscosity @ 68 °F (centistokes)	2.257
Color	Colorless to Brownish
Odor	Like Geraniums Very little odor when pure
Solubility	Readily soluble in common organic solvents, oils, and chemical warfare agents
Higher Heating Value (Btu/lb)	5,000
Physical State	Viscous Liquid

5.2 DRE DISCUSSION

The ATLIC STB demonstrated DREs for chlorobenzene, and since this test does not change any of the DRE OPLs from that test, there is no regulatory requirement to re-establish a DRE. Also, the regulations in 40 CFR 63, Subpart EEE, specify that the DRE be established during the initial CPT, any further DRE demonstration is unnecessary under the MACT regulations. Furthermore, the chlorobenzene DREs will be ≥ 99.99 %, which show that the DRE goals for the system were met, so further measurement of DREs is not required by the HWC MACT regulations. The Lewisite emissions will be measured, but the Lewisite DRE will not be determined.

5.3 TEST PROTOCOL AND OPERATING CONDITIONS

The LCPT will be conducted to demonstrate that the increase in arsenic, ash, and mercury feed rates does not have an adverse affect on the ATLIC compliance status because the PAS controls these emissions within the regulatory limits. The LCPT will be conducted at one operating condition that will be within the operating limits established by the ATLIC STB. The arsenic and mercury concentrations in the Lewisite will produce a "worst case" for metals content to cover the highest anticipated metals concentrations in the Lewisite and spent decon. Table 1-1 summarizes the composition of the Lewisite agent. It is possible that the amount of spent decon needed for three successful runs will exceed the supply. If this is the case, a minimum 10 % NaOH solution will be used for spent decon feed to the SCC.

Tables in Appendix D show the Target Group A operating parameters for the LCPT condition. Samples collected will support the data needs required for the RCRA Permit, the Title V Air Permit, and the HWC MACT emission limits. Values for these parameters were established by the ATLIC STB and will not be changed for the LCPT.

The LCPT will be performed under the following operating conditions:

- Maximum Lewisite feed rate to the PCC of 500 lb/hr
- Arsenic fed to the PCC at a maximum concentration of [illegible] Wt% which results in an arsenic feed rate of 100 lb/hr
- Maximum spent decon feed rate to the SCC of 450 lb/hr
- Minimum PCC temperatures in the range of 2,500 °F to 2,850 °F
- Minimum SCC temperatures in the range of 1,800 °F to 2,200 °F
- The residence time through the PCC, SCC, and duct work to the quench tower ≥ 2 sec as described in Sections 2.1 and 2.2

- The O_2 concentration maintained above 3 %
- The CO concentration below 100 ppm @ 7 % O_2
- Pressure drop across the venturi ≥ 30 inWC
- Normal quench tower and venturi scrubber Brine flows and minimum Brine pH
- Exhaust Gas flow rate within the limits set by the ATHC STB

5.4 COMBUSTION TEMPERATURE RANGES

The anticipated PCC temperatures for the ECPT will be between 2,500 °F and 2,850 °F. These temperatures are from the AWFCO tables located in Appendix D. Experience with the HCs indicates that the temperatures vary within this temperature range. The SCC temperature will be between 1,800 °F and 2,200 °F, which are the AWFCO limits from the tables located in Appendix D. Minimum temperature limits will be established by the ATHC STB and maximum temperatures are set by the manufacturer's FFT.

5.5 WASTE FEED RATES AND QUANTITIES OF WASTES TO BE BURNED

The feed materials will be Lewisite agent and spent decon. The Lewisite feed rates for the ECPT will be up to 500 lb/hr and the spent decon feed rates will be up to 450 lb/hr. The ECPT will require the Lewisite and spent decon to be fed to the ATHC for a minimum of 18 hours. The Lewisite quantity burned during the ECPT will be approximately 9,925 lb based on a feed rate of 500 lb/hr. The quantity of spent decon processed during the ECPT will be about 8,886 lb based on a feed rate of 450 lb/hr. Allowing a 25 % safety factor, the consumption of test feed materials is expected to be about 7,400 lb of Lewisite agent and 11,000 lb of spent decon. The anticipated usage rates are summarized in Table 5.2. Metals feed rates will be determined by analyses of the Lewisite samples and the spent decon samples.

The ATHC will reach equilibrium at test conditions with Lewisite and spent decon supplemented by natural gas about 15 minutes before the start of each sampling run. A surplus of Lewisite and spent decon will be on hand in case operational problems require a longer testing period. After each performance run is completed, the feed materials remaining may be processed through the ATHC.

TABLE 5 2 WASTE FEED REQUIREMENTS

Activity	Lewisite Agent Required (lb)	Spent Decon Required (lb)
Ramp up 20 min	100	150
Steady State Operations 15 min	75	112
Exhaust Gas Sampling 6 hr	1 800	2 700
Total per Performance Run	1 975	2 962
Total for Three Performance Runs	5 925	8 886

5 6 EXHAUST GAS VELOCITY INDICATOR

Exhaust gas flow rates for the ATLIC are measured with an annubar flow meter installed in the exhaust duct located before the ID Fan. The annubar is positioned in the center of the pipe to increase the velocity of the exhaust flow which creates a differential pressure. The pressure difference is measured and converted to a flow rate. The ATLIC FCS records the value and generates an HRA. If the HRA setpoint is exceeded the FCS causes a stop feed and an alarm. A maximum exhaust gas velocity will be established by the ATLIC STB.

5 7 AUXILIARY FUEL

Natural gas will be used as required to maintain temperatures in both the PCC and SCC. Natural gas also is used as a pilot burner fuel for both the PCC and the SCC. The average composition of the natural gas from December 2008 usage showed that the Higher Heating Value averaged 1 046 Btu/ft³ and the methane concentration averaged 94 5 %.

5.8 WASTE FEED ASH CONTENT

Ash generated during the LCPT will potentially come from the arsenic in the Lewisite and the solids from the spent decon. Based on the arsenic concentrations from Table 1.1, the Lewisite will be the major contributor to the ash generated during Lewisite processing and was estimated at 150 lb/hr. The spent decon ash feed rate was estimated at 5.5 lb/hr from the total suspended solids and total dissolved solids from the LIC HD ATB spent decon analyses, which are summarized in Table 1.2. An estimated total ash feed rate of 155.5 lb/hr was calculated from the maximum values from the ash feed rate data.

Ash particles exiting the SCC will be collected by the Brine baghouse, carbon filter beds, or measured in the ATLIC stack. No spiking of the waste feeds will be done to generate ash or PM.

5.9 ORGANIC CHLORINE CONTENT OF THE WASTE FEED

Lewisite contains organic chlorine and inorganic chlorine. The HCl and Cl emissions measured will be a product of both sources since the Lewisite will be oxidized to As_2O_3 and the inorganic chlorine will be converted to HCl. The chlorine feed rate for an average composition of the Lewisite is 159.9 lb/hr based on the feed rate of Lewisite of 400 lb/hr and the percentage of chlorine from the compounds listed in Table 1.1. Concentrations of HCl and Cl in the ATLIC emissions will be sampled using Method 26 (2) and analyzed by Method 9057 (1). Details are given in the QAPP (Appendix A).

5.10 METALS FEED RATES

The metals fed to the ATLIC will be dominated by the arsenic in the Lewisite. Table [illegible] shows the estimated metals feed rates and the estimated metals emission rates associated with the LCPT. The arsenic concentration is so high that it was considered in a two step process. The arsenic removal efficiency was measured during the LIC HD ATB at 99.99989 %. This Metals Removal Efficiency (MRE) was applied to the arsenic emissions and then an additional 99.0 % was applied for additional removal by the baghouse and the carbon filters, resulting in an arsenic concentration in the exhaust gas that is estimated to be below the MACT concentration limit of 23 µg/dscm. This concentration demonstrates a conservative estimate of the arsenic concentrations; this shows that the arsenic concentration will not be a threat to human health or the environment. Conducting the LCPT and processing Lewisite should not prove to be an environmental threat. Metals emissions will be sampled using Method 29 (2). Sampling and analysis details for metals emissions are given in the QAPP (Appendix A).

TABLE 5.3 LCPT ESTIMATED METALS EMISSION RATES

Agent Feed Rate	500 lb/hr	
Exhaust Gas Flow Rate	0.54 dscfm	
Exhaust Gas O_2 Conc	8.8 %	Total Metal
MAXIMUM FEED CONCENTRATIONS		**Feed Rate**
Arsenic Conc	320,000 ppm	96.00 lb/hr
Chromium Conc	1.6 ppm	0.00048 lb/hr
Lead Conc	0.87 ppm	0.00026 lb/hr
Mercury Conc	528 ppm	0.16 lb/hr
Zinc Conc	72 ppm	0.022 lb/hr

EXHAUST GAS CONCENTRATIONS				HHRA	MACT
	LIC HD ATB MRI %	Emission Rate g/sec	Conc @7% O_2 µg/dscm	Emission Rate g/sec	Conc @7% O_2 µg/dscm
Arsenic	99.99989	1.55E-05	54.653		
Arsenic Filters	99.0	1.55E-07	0.546	2.54E-05	
Chromium	99.97770	1.59E-08	0.0562	5.57E-06	
Lead	99.99960	1.52E-09	0.005	5.55E-05	
Mercury	99.99	2.00E-06	5.2	5.26E-08	8.1
Zinc	99.965	9.55E-07	2.48	2.65E-04	
Semi Volatile Metals			0.005		10
Low Volatility Metals			0.38		23

Notes

The MACT Limit for Semi Volatile Metals is the combination of Pb + Cd = 10 µg/dscm

The MACT Limit for Low Volatility Metals is the combination of As + Be + Cr = 23 µg/dscm

The MRI values were taken from the LIC HD ATB Data

5.11 POLLUTION CONTROL EQUIPMENT OPERATIONS

Operation of the pollution control equipment is provided in this section as required by 40 CFR 270.62(b)(2)(vi). The anticipated operating conditions for the PAS are the same as the operating conditions established by the ATLIC STB and are summarized in Appendix D. Fluctuations in PAS temperatures, flow rates, pressures, pH, and density will occur during this test. These normal variations will be reported in the final LCPT Report. Standard operating conditions for the pollution control equipment are described in Section 2.10.

5.12 SHUTDOWN PROCEDURES

The shutdown procedures to be observed during the LCPT are discussed in this section as required by 40 CFR 270.62(b)(2)(vii). The AWFCOs for Group A are continuously monitored and interlocked. Group C parameters, which are monitored and interlocked, will be in operation during this test. In addition, the system's operation will be monitored closely by the system operators. If the operation of the system should deviate significantly from the desired range of operation or become unsafe, the operators will manually shut off waste feeds to the system. The AWFCO system and parameters for shutting down the waste feeds are described in Section 2.8.

Sampling will be stopped if an AWFCO is activated during the LCPT. Should the AWFCO condition persist for 2 hours, the run would be aborted. A run will also be aborted if more than three AWFCOs occur during one traverse of the four hour sampling trains. If the DAQ and DSHW representatives approve continuing a run after either of the above conditions is reached, the approval will be documented and included in the deviation discussions in the final report.

It may be necessary to shut down the ATLIC and PAS completely in the event of a major equipment or system failure. A shutdown of this type will be performed in strict accordance with the facility's standard operating procedures. Shutdown will be the reverse of the startup process and are discussed in Section 2.14.

Subsystems will be shut down in the following order:

1. ATLIC PCC and SCC
2. PAS, and
3. Utilities

Sampling will be stopped if a power failure occurs during a run. Waste feeds to the system will be stopped, but other operating parameters will be maintained to minimize emissions. Combustion air will continue to be supplied as the ID Fan spins down.

5.13 INCINERATOR PERFORMANCE

Incinerator performance is discussed in this section as required by 40 CFR 270.62(a). The TOCDF believes that the conditions specified in Section 5.3 for the test will be adequate to meet the performance standards of 40 CFR 264.343 while firing the Lewisite and spent decon because:

- TOCDF experience with the ATLIC burning chlorobenzene and tetrachloroethene fulfilled the need for the demonstration of the DRE.
- TOCDF experience with the LICs burning mustard under similar operating conditions suggests that the HCl and PM emissions will be less than their performance standards.
- The operating conditions will be within the envelope established by the ATLIC STB.
- The ATLIC and PAS are tightly controlled by PLCs and AWFCO systems whenever hazardous waste is being fed to the ATLIC.
- The ATLIC PAS includes design features to provide additional insurance that the arsenic will be removed by the three packed bed scrubbers using chilled brine, the baghouse, and the HEPA filters of the carbon filter module.

6.0 LEWISITE SHAKEDOWN PROCEDURES

Once the approval of this plan is received from the appropriate regulatory agencies, shakedown will commence as described in Section 6.2. During the shakedown period, the entire system will be thoroughly tested to verify that it performs in a safe, consistent, and predictable manner when processing Lewisite.

Shakedown testing will proceed in accordance with the TCPF Shakedown Plan (see Appendix B). This shakedown plan defines all activities, methodologies, shakedown criteria, and compliance actions associated with the testing of the system. As stated in the shakedown plan, operating conditions will be maintained within the envelope of anticipated final operating limits (defined in Appendix D) throughout the shakedown period. These limits on operating conditions are based on good engineering practice, and over 13 years of experience processing Agents GB, VX, and mustard in the TOCDF LICs. Operating limits will comply with the requirements of 40 CFR 270.62(a)(1). Proposed operating conditions are preliminary, and final values will be confirmed or modified as shakedown progresses.

Hazardous wastes will not be fed to the system at any time unless the conditions discussed above are satisfied. The flow of hazardous waste to the incinerator will be stopped if operating conditions deviate from the established limits. The AWFCO system, described in Section 2.8, will be in operation at all times during the incineration of hazardous wastes, and the settings during shakedown will be those specified in Appendix D. Individual AWFCOs for those parameters that may cause total incinerator shutdown (such as auxiliary fuel burners or ID Fan) may be bypassed momentarily during routine calibrations. Those calibrations that require the AWFCO to be bypassed will not be conducted when waste is in the furnace.

6.1 STARTUP PROCEDURES

The startup periods for the ATLIC will heat the PCC and SCC with natural gas until operating conditions have been reached. Temperatures will be held at operating conditions for 48 hours to verify that all systems are operating correctly. During this 48 hour period, operation of the PAS and CEMS will be verified, and the AWFCO system will be tested to verify that all AWFCOs are operational. The systems will then be declared ready for operation and the shakedown period will begin. The DAQ and DSHW will be notified of the AWFCO test seven days in advance.

6.2 ATLIC SHAKEDOWN

The objectives of the shakedown are to

- Demonstrate that the ATLIC can safely treat Lewisite at 300 lb/hr
- Familiarize the operators with the operation of the ATLIC when processing Lewisite
- Verify that all systems function properly
- Verify that the agent feed ramp up rate is suitable for Lewisite
- Verify that the spent decon feed ramp up rate is suitable for NaOH solutions
- Evaluate the ATLIC operating conditions when processing Lewisite
- Evaluate the impact on the SCC of simultaneously processing Lewisite and spent decon

The TOCDF will provide the DAQ and DSHW with notice before introducing Lewisite into the system. The Lewisite will be introduced into the ATLIC in accordance with 40 CFR 264.344(c)(1) to bring the unit to a point of operational readiness for the LCPT. This phase will take two to four weeks and consist of up to 144 hours of Lewisite processing or 7,500 lb of Lewisite or the volume of three TCs, whichever is less. If TOCDF determines that more time is necessary to ensure operational readiness before the test, an extension will be requested.

The shakedown period will involve a series of tests as described in the shakedown plan (see Appendix B). The TOCDF may request final modifications to the LCPT Plan based on data obtained during the shakedown period. If such changes are necessary, they will be coordinated with the DAQ and the DSHW.

6.3 POST LCPT BURN OPERATION

The interim period between completion of the LCPT and receipt of final approval from DSHW for full operating authority could be several months. During this time, TOCDF intends to continue operating the ATLIC on a full time basis under all federal requirements per 40 CFR 264, 266, and 270. The ATLIC will not be operated until the preliminary data have been provided to DSHW, then the ATLIC operation will be restarted using Lewisite with the approval of the preliminary data by the Executive Secretary. The TOCDF expects the ATLIC to operate during this period within the operating envelope defined and demonstrated by the LCPT, with the exceptions of the waste feed rates. Waste feed rates shall be limited to 50 % of the average rates demonstrated during the LCPT until the Lewisite has been destroyed.

The ATLIC inspection plan will be followed to look for fugitive emissions leaks and associated equipment spills and signs of tampering per 40 CFR 264.347(b). All appropriate operating records will be maintained for documentation of operations.

The AWFCO system and associated alarms as described in Section 2.8 will function any time hazardous waste is in the combustion zone of the incinerator. The AWFCOs will be tested according to the established schedule. Test methods for the AWFCOs will remain unchanged from the methods specified in the RCRA and air permits.

6.4 INCINERATOR PERFORMANCE

TOCDF believes that the conditions specified in Section 6.0 for the startup, shakedown, LCPT and post LCPT operation will be adequate to meet the performance standards of 40 CFR 264.343 while processing Lewisite agent and spent decon because:

- TOCDF experience with the LICs burning mustard and spent decon under similar operating conditions suggests that the HCl and Cl2 emissions will be < 21 ppm and the PM emissions concentrations will be less than 0.0016 gr/dscf. These estimated emissions are within the performance standards.

- TOCDF experience with the LICs during incineration of Agents GB, VX and mustard spiked with metals resulted in metals emissions that did not pose a threat to human health or the environment.

- The range of operating conditions planned for the shakedown and post LCPT periods are within the design envelope of the ATLIC and PAS (refer to the Appendix C MEBs) as established by the ATLIC SEB.

- The ATLIC and PAS will be tightly controlled by the PLCs and the AWFCO systems will be operational at all times during the shakedown and post LCPT periods.

In addition, meeting the performance standards of 40 CFR 264.343 and limiting metals emissions rates to values less than those used in the 2005 DCD HHRA (see Table 5.2) ensures protection of human health and the environment.

7.0 LEWISITE COMPREHENSIVE PERORMANCE TEST RESULTS

The results of the LCPT will be submitted to DAQ and DSHW in the report format used in prior ATB reports. The operating data will be summarized, the Lewisite emissions, PM emissions and metals emissions will be reported, and the supporting laboratory data and data verification will be submitted.

The TOCDF will submit the LCPT Report within 90 days after completion of the test. The report will be certified in accordance with the requirements of 40 CFR 270.62(b)(7-9). It should be noted that all data will be submitted for all analyses conducted, including the data from any failed runs.

8.0 REFERENCES

(1) ***Test Methods for Evaluating Solid Waste, Physical/Chemical Methods***, 3rd Edition including Update III, USEPA, SW-846, December 1996

(2) Title 40, ***Code of Federal Regulations***, Part 60, Appendix A, Test Methods

(3) Attachment 20 to the TOCDF Permit, ***CEMS Monitoring Plan***, EG&G Defense Materials, Inc., CDRL-06

(4) ***Hazardous Waste Combustion Unit Permitting Manual, Component 1***, How to Review A Trial Burn Plan, U.S. EPA Region 6, Center for Combustion Science and Engineering, 1998

(5) ***Guidance on Setting Permit Conditions and Reporting Trial Burn Results***, EPA 625/6-89/019, January 1989

(6) ***Final Report for Ton Container Sample Analysis***, T.A. Mullox, K. Whittington, B. Filley, B. Goodwin, Hazardous Materials Research Center, Battelle, Columbus, Ohio, October 2, 2009

(7) Attachment 22 to the TOCDF RCRA Permit, ***Agent Monitoring Plan***, EG&G Defense Materials, Inc., TOCDF, CDRL-25

(8) Title 40, ***Code of Federal Regulations***, Part 60, Appendix B, Performance Specification

(9) Standard Practices for Sampling Water from Closed Conduits, ***ASTM D 3370-95a*** (Reapproved 1999), ASTM International, West Conshohocken, Pennsylvania

LEWISITE COMPREHENSIVE PERFORMANCE TEST PLAN

FOR THE

AREA 10 LIQUID INCINERATOR

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

Revision 0

January 4, 2010

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

TOOELE CHEMICAL AGENT DISPOSAL FACILITY

Facility EPA ID Number UT5210090002

Prepared for Tooele Chemical Agent Disposal Facility
11600 Stark Road
Tooele, UT 84074

Revision No
0

Date
January 4, 2010

1.0 TITLE PAGE

1.1 Project Title

LEWISITE COMPREHENSIVE PERFORMANCE TEST FOR THE
AREA 10 LIQUID INCINERATOR
QUALITY ASSURANCE PROJECT PLAN

1.2 Expected Trial Burn Dates: September 2010

1.3 Project Approvals

Thaddeus Ryba, CMA Project Manager	**Date**
Gary McCloskey, EG&G DMI General Manager	**Date**
Craig M. Young, Ph.D., EG&G DMI Project Specialist	**Date**
Subcontractor Quality Assurance Director	**Date**

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LIST OF ACRONYMNS AND ABBREVIATIONS

ACA	Absolute Calibration Audit
ASTM	ASTM International
ATB	Agent Trial Burn
ATLIC	Area 10 Liquid Incinerator
AWFCO	Automatic Waste Feed Cutoff
Brine	Wet Scrubber Recirculation Brine
CAL	Chemical Assessment Laboratory
CAR	Contract Administrative Representative
CC	Correlation Coefficient
CCV	Continuing Calibration Verification
CEMS	Continuous Emission Monitoring System
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COC	Chain of Custody
CPT	Comprehensive Performance Test
CVAAS	Cold Vapor Atomic Absorption Spectroscopy
DAQ	State of Utah Department of Environmental Quality Division of Air Quality
DEQ	State of Utah Department of Environmental Quality
DCD	Deseret Chemical Depot
DES	Detoxification Furnace System
DI	Deionized Gas in deionized water
DQO	Data Quality Objective
DRE	Destruction and Removal Efficiency
DSHW	State of Utah Department of Environmental Quality Division of Solid and Hazardous Waste
EG&G	EG&G Defense Materials Inc
EPA	U.S. Environmental Protection Agency
FCS	Facility Control System
GC	Gas Chromatograph
GC/MS	Gas Chromatograph/Mass Spectrometer
HHRA	Human Health Risk Assessment
HRGC/HRMS	High Resolution Gas Chromatograph/High Resolution Mass Spectrometer
HWC	Hazardous Waste Combustor
IC	Ion Chromatograph
ICP/MS	Inductively Coupled Plasma/Mass Spectrometer
ICV	Initial Calibration Verification
LIC	Liquid Incinerator

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

LCPT	Lewisite Comprehensive Performance Test
LCS	Laboratory Control Sample
LOQ	Limit of Quantitation
MACT	Maximum Achievable Control Technology
MDL	Method Detection Limit
MPF	Metal Parts Furnace
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NIST	National Institute for Standards and Technology
NRT	Near Real Time
PCC	Primary Combustion Chamber
PM	Particulate Matter
POHC	Principal Organic Hazardous Constituent
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
%R	Percent Recovery
RATA	Relative Accuracy Test Audit
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
RRF	Relative Response Factor
RSD	Relative Standard Deviation
SCC	Secondary Combustion Chamber
SEL	Source Emission Level
SOP	Standard Operating Procedure
Spent decon	Spent Decontamination Solution
STB	Surrogate Trial Burn
STC	Sampling Team Coordinator
STEL	Short Term Exposure Limit
SVOC	Semi Volatile Organic Compounds
SW 846	Test Methods for Evaluating Solid Waste 3rd Edition including Update III USEPA SW 846 December 1996
TEL OP	Tooele Laboratory Operating Procedure
TOCDF	Tooele Chemical Agent Disposal Facility
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound
XSD	Halogen Specific Detector

LIST OF UNITS AND MEASUREMENTS

acfm	actual cubic feet per minute
amu	atomic mass unit
cfm	cubic feet per minute
°C	degree centigrade
°F	degree Fahrenheit
dscf	dry standard cubic foot
dscfm	dry standard cubic feet per minute
dscm	dry standard cubic meter
dsl	dry standard liter
ft	foot
g	gram
g/sec	grams per second
gal	gallon
gpm	gallons per minute
gr/dscf	grains per dry standard cubic foot (1 atmosphere, 68 °F)
ΔH	average pressure differential across orifice meter
inHg	inches of mercury
inWC	inches of water column
kg	kilogram
L	liter
L/min	liters per minute
μg	microgram
m	cubic meter
mg	milligram
mg/L	milligrams per liter
mg/kg	milligrams per kilogram
min	minute
ml	milliliter
ml/min	milliliters per minute
N	Normal
ng	nanogram
ppb	parts per billion
ppm	parts per million
ppmdv	parts per million on a dry volume basis
lb/hr	pounds per hour
psig	pounds per square inch gauge
ΔP	pitot velocity pressure
Wt%	weight percent
Y	dry gas meter calibration factor

LIST OF CHEMICAL SYMBOLS AND FORMULAS

Agent GA	Ethyl N,N dimethyl phosphoroamidocyanidate
Al	aluminum
Ag	silver
As	arsenic
B	boron
Ba	barium
BFB	4 bromofluorobenzene
Be	beryllium
Cd	cadmium
Cl	chlorine
CO_2	carbon dioxide
CO	carbon monoxide
Co	cobalt
Cr	chromium
Cu	copper
DFTPP	decafluorotriphenylphosphine
EDT	ethanedithiol
HNO_3	nitric acid
Hg	mercury
HCl	hydrogen chloride
H_2O_2	hydrogen peroxide
$KMnO_4$	potassium permanganate
Mn	manganese
NaOH	sodium hydroxide
$Na_2S_2O_3$	sodium thiosulfate
H_2SO_4	sulfuric acid
Ni	nickel
O_2	oxygen
Pb	lead
PCDD	polychlorinated dibenzo p dioxin
PCDF	polychlorinated dibenzofuran
Sb	antimony
Se	selenium
Sn	tin
TCDD	tetrachlorodibenzo p dioxin
Tl	thallium
V	vanadium
Zn	zinc

3.0 PROJECT DESCRIPTION

The Tooele Chemical Agent Disposal Facility (TOCDF) was designed and built for the U.S. Army as a hazardous waste incinerator facility for the destruction of the chemical munitions stockpile at the Deseret Chemical Depot (DCD) which is 20 miles south of Tooele, Utah. The incinerator system is designed to dispose of chemical agents (GB, VX, HD series mustard) drained munitions, contaminated refuse, bulk containers, liquid wastes, explosives, and propellant components. The closing of the DCD necessitates the destruction of Agent GA and the blister agent Lewisite to complete the destruction of chemical agents in storage. Destruction of these additional chemical agents has been contracted to EG&G Defense Materials, Inc. (EG&G), to be conducted in DCD Area 10 in a newly constructed facility.

The TOCDF operates under a Resource Conservation and Recovery Act (RCRA) permit issued pursuant to delegation by the State of Utah Department of Environmental Quality (DEQ) Division of Solid and Hazardous Waste (DSHW) under the Utah Administrative Code Section 315. The TOCDF also operates under a Title V Permit from the State of Utah DEQ Division of Air Quality (DAQ). Emissions from the TOCDF incinerators are regulated under the joint authority of the Clean Air Act and RCRA. The TOCDF Environmental Protection Agency (EPA) identification number is UT5210090002. Under the requirements of the TOCDF RCRA Permit, the incinerator system must demonstrate an ability to effectively treat any hazardous waste such that human health and the environment are protected, and the Maximum Achievable Control Technology (MACT) rule has set the performance standards that incinerators must meet.

This plan describes the new Area 10 Liquid Incinerator (ATLIC), the fifth incinerator system that TOCDF operates to dispose of the chemical agents stored at DCD. The TOCDF incinerator systems include two Liquid Incinerators (LIC 1 and LIC 2), the Metal Parts Furnace (MPF), and the Deactivation Furnace System (DFS). The systems are designed to meet the Hazardous Waste Combustor (HWC) MACT regulation performance requirements, which are found in Title 40 of the Code of Federal Regulations, Part 63, Subpart EEE (40 CFR 63, EEE). Combined Agent Trial Burns (ATBs) and Comprehensive Performance Tests (CPT) have been conducted in the other incinerator systems at the beginning of each new campaign, and similar testing will be conducted in the ATLIC for processing Agent GA and Lewisite.

This plan will describe how TOCDF intends to use Lewisite agent to demonstrate incineration of high concentrations of arsenic in a Lewisite Comprehensive Performance Test (LCPT) in the ATLIC. This plan also serves as the notification that TOCDF plans to conduct the LCPT. The feed rates, flows and temperatures demonstrated during the LCPT will be within the envelope established by the ATLIC Surrogate Trial Burn (STB) conducted prior to Lewisite processing.

This Quality Assurance Project Plan (QAPP) describes the sampling and analytical activities that will be performed by the sampling subcontractor and laboratory during the LCPT. The QAPP was developed using methods from SW-846 (1) and guidance from EPA Region 6 (2). EG&G is responsible for operating TOCDF and conducting testing. EG&G is the principal data

user and decision maker for the LCPT but will subcontract the sampling and analyses portions of this LCPT. This subcontracted support will include gas sampling, Brine samples collection transportation of samples to the laboratory, sample analyses, Quality Assurance/ Quality Control (QA/QC) associated with these tasks, and reporting of the results. The subcontractor will provide in process approvals with final acceptance and approval by EG&G. EG&G will be responsible for the collection of certain monitoring information, the collection and analysis of feed samples, the collection of system operating data, and preparation of the final report.

The exhaust gas will be tested for the following substances during the LCPT:

- Lewisite
- Oxygen (O_2), carbon monoxide (CO), nitrogen oxides (NO_x) and carbon dioxide (CO_2)
- Particulate matter (PM)
- Hydrogen chloride (HCl) and chlorine (Cl_2) also referred to as the halogens
- Metals, and
- Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDDs/PCDFs)

A percent Destruction and Removal Efficiency (% DRE) will not be demonstrated because the ATEIC STB demonstrated a DRE for a Class I compound which fulfills the requirement.

The exhaust gas will be analyzed for the elements used in the Human Health Risk Assessment (HHRA): aluminum (Al), antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), boron (B), cadmium (Cd), chromium (Cr), cobalt (Co), copper (Cu), lead (Pb), manganese (Mn), mercury (Hg), nickel (Ni), selenium (Se), silver (Ag_2), thallium (Tl), tin (Sn), vanadium (V), and zinc (Zn).

Samples of the Lewisite agent feed will be analyzed for HHRA metals. Samples of the wet scrubber recirculation brine (Brine) and spent decontamination solution (spent decon) will be analyzed for Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), PCDDs/PCDFs, and HHRA metals.

Scheduling for the project is found in the LCPT plan and will be updated as necessary. An example of a daily sample run schedule is in Section 6.0. Data Quality Objectives (DQOs) for each method are found in Annex A to this QAPP. Individual project and quality records are identified in this QAPP. Examples of the Calibration Data Sheets, Isokinetic Run Sheets, and Chain of Custody (COC) Records are found in Annex B. Annex C contains resumes of the key individuals for this project and the DAQ and DSHW will be updated when any changes occur.

4.0 PROJECT ORGANIZATION

The LCPT organization is summarized in Figure A-4-1. This organization has three groups that work together for the successful completion of the LCPT. One group is the EG&G organization, the second is the Battelle Chemical Assessment Laboratory (CAL), and the third is the sampling and analysis subcontractors. This project management structure anticipates the direct, personal responsibility for each task and provides the mechanism for review and corrective action. The direct supervisory line of responsibility also provides for flexibility and timely action to correct problems. The EG&G Test Director has the overall responsibility for this LCPT, and as such, is the point of contact between EG&G Operations and the LCPT organization. The EG&G Contract Administrative Representative (CAR) will interface with the subcontractor organization and the CAL. Annex C contains copies of the resumes of the key individuals involved in the LCPT. If any subcontractors for the LCPT change, resumes for the new subcontractor's key individuals will be provided to DAQ and DSHW.

4.1 TEST DIRECTOR AND CONTRACT ADMINISTRATIVE REPRESENTATIVE

The Test Director is an employee of EG&G and has the overall responsibility for the conduct of the LCPT. The Test Director will also serve as the CAR and has the responsibility of oversight of the subcontractors to ensure that they perform as directed by the QAPP and their contract. The CAR coordinates the activities of EG&G monitoring personnel, CAL personnel, and the sampling subcontractor. In addition, the Test Director will coordinate the information to be provided in the final LCPT Report. The duties of the Test Director include:

- Ensuring that the feed is prepared for the LCPT
- Establishing the system operating parameters as described in the LCPT plan
- Determining when Operations is ready to begin the performance run
- Notifying the sampling subcontractor to begin sampling
- Determining whether the performance run is acceptable from an EG&G perspective

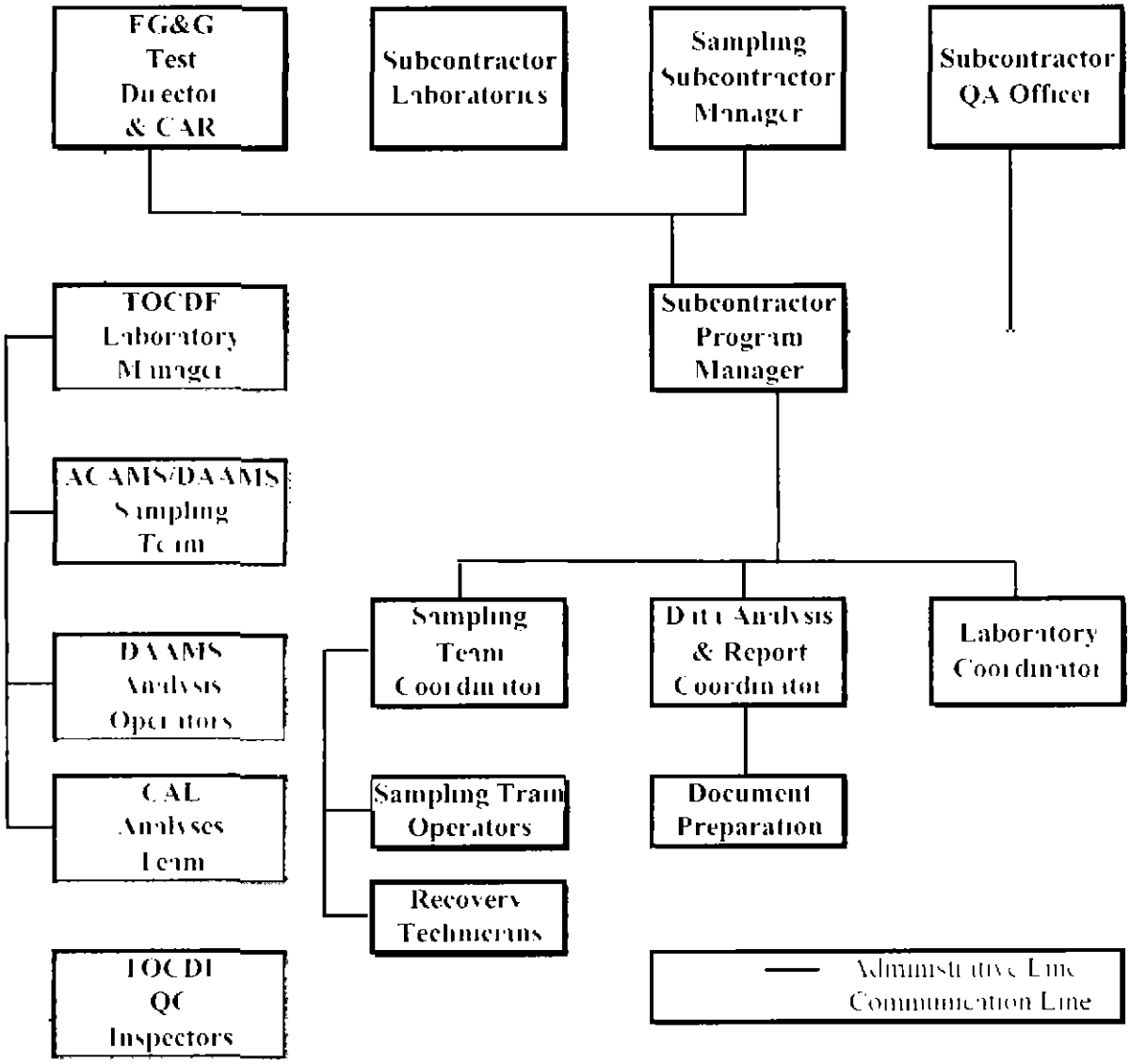

FIGURE A 4 1 ATLIC LCPT ORGANIZATION CHART

4.2 TOCDF LABORATORY MANAGER

The TOCDF Laboratory Manager is a Battelle employee who manages both the Monitoring Group and the CAL. The Monitoring Group has the responsibility for monitoring agent emission using the MINICAMS® for automated continuous agent monitoring and the Continuous Emission Monitoring System (CEMS) monitoring for CO, O_2, and NO_x. The CAL has the responsibility for the agent screening analyses, Lewisite agent analyses, and the Battelle QC Inspectors. The Laboratory Manager is specifically responsible for:

- Tracking samples through the CAL

  Archiving the analytical data generated by the CAL

  Providing the QC performed in support of the agent related analyses

4.3 SUBCONTRACTOR PROGRAM MANAGER

The Subcontractor Program Manager is an employee of the subcontracted sampling firm. The Subcontractor Program Manager is responsible for:

  Committing the subcontractor resources to the project

  Resolving problems if they occur

  Ensuring that the subcontracting firm complies with the QAPP and the contract with EG&G

  Providing the detailed planning of the sample collection efforts in coordination with the CAR

4.4 SAMPLING SUBCONTRACTOR QUALITY ASSURANCE OFFICER

The Sampling Subcontractor QA Officer manages the QA/QC for the project. He reports to the Sampling Subcontractor Management and is responsible for:

- Overseeing the overall QA/QC for the sampling subcontractor portion of the LCPT
- Assisting in the development of the data evaluation report for the LCPT
- Enforcing the protocols of the QAPP

- Observing all on site activities to ensure that the QAPP is followed
- Coordinating with the Sampling Team Coordinator (STC) on observation of field sample collecting

4.5 SAMPLING TEAM COORDINATOR

The STC is a sampling subcontractor employee who is responsible for

Managing on site work by subcontractor employees

Completing the data collection for lab analyses gas sampling data emission calculations and results reporting

Delivering samples to the laboratory

Overseeing the required sampling

Directly supervising the gas sampling teams providing
- Equipment
- Transportation
- Set up
- Calibration
- Sample train operations
- Pre and post test leak checks
- Isokinetic checks and
- Gas sample recovery

The CAR will be available to coordinate with the STC including discussing changes in any sampling or analytical procedures

4.6 SUBCONTRACTOR SAMPLING TEAM MEMBERS

These team members are sampling contractor employees Each team will include a team leader and technician The leader will be responsible for operation of the testing equipment QA/QC and record keeping for the assigned train The team leader reports any irregularities to the STC and the STC will report any sampling problems to the EG&G CAR and the Subcontractor Program Manager

4 7 SUBCONTRACT LABORATORIES

The subcontracted laboratories will verify and document that the incoming field samples match the COC and analysis request forms They will be responsible for tracking the samples through the laboratory and performing the appropriate tasks to meet QC requirements outlined in the QAPP In addition the laboratories will be responsible for archiving the laboratory data that they generate

5.0 QUALITY ASSURANCE AND QUALITY CONTROL OBJECTIVES

The overall objective of the measurement data for the LCPT is to demonstrate the removal of arsenic, cadmium, and mercury from the exhaust gas by the PAS. This will be demonstrated by collecting PM and metals emissions samples at the ATLIC exhaust stack. To assess the quality of the data, a series of DQOs have been set for each method used for the analysis of samples collected during this LCPT. The DQOs, summarized in Annex A, will be used to evaluate the data generated during the LCPT. These criteria identify the target precision and accuracy limits that are used to assess the DQO. Annex A was developed using the criteria from the Region 6 guidance (2), EPA QA/G-5 (3), the QA/QC Handbook (4), and SW-846 (1).

The Sampling Subcontractor QA Officer will review the LCPT field data. A complete assessment of the DQOs will be included in the LCPT report. The data quality will be discussed with regard to the planned data acceptance criteria and the overall project objectives. Data that are outside the QC limits will be evaluated to determine their impact on defining system performance. A discussion of this evaluation will be included in the LCPT report. Several procedures will be used for monitoring the precision and accuracy objectives of the analytical program. These procedures include:

- Sampling and analytical activities that will follow standard referenced procedures whenever possible.
- Calibration standards, internal standards, laboratory control standards, and surrogate compounds that will be high purity, commercially available materials.
- Analytical instruments that will be calibrated per the reference method requirements prior to sample analysis to demonstrate that accurate performance levels are being met.
- Data precision and accuracy assessed by evaluating the results from the analysis of internal standards, laboratory blanks, calibration check standards, reagent blanks, method blanks, field and trip blanks, duplicate samples, and matrix or surrogate spiked samples.

Sections 6.0 and 10.0 describe the project specific QC sample types that will be analyzed, and list the sampling and analytical methods to which they will be applied. When analytical QC procedures reveal that a measurement error has exceeded the target criterion, the source of the deviation will be identified, and corrective action will be taken as described in Annex A. If data fall outside the acceptable range of precision and accuracy, even after corrective action has been taken, those data points will be flagged and discussed specifically in the data validation report. Alternative procedures (either sampling or analytical) will be considered and recommended to the CAR when necessary. Any changes or additions will be submitted to the DAQ and DSHW for approval as soon as the need is identified.

5.1 EVALUATION OF PRECISION

Estimates of precision are different for each method and method specific precision DQOs are listed by method in Annex A. Estimates of variability levels for replicate measurements of the same parameters are expressed in terms of Relative Percent Difference (RPD) for duplicate samples and as Relative Standard Deviation (RSD) when three or more data points are being compared. Section 15.1 discusses how the estimates of method precision will be calculated.

Some analyses require the evaluation of a larger data set, in which case precision will be reported as RSD. Examples of large data sets that will be used to evaluate precision include surrogate spikes for VOC determinations. When the analytical results approach the detection limit, precision often is affected adversely because of the enhanced uncertainty of determinations at the lower end of the method applicability. For those determinations near the method detection limit, the precision estimates that are outside the target DQOs will be flagged as estimated measurements. In cases where duplicates are performed, and one result is less than the Limit of Quantitation (LOQ), the average will be calculated using the LOQ, the result reported will be flagged to explain that the precision was not calculated. Precision data will be calculated and presented in the data validation report.

Calculation of the precision for each analysis will be based on different criteria outlined in the QA/QC Handbook (4) and the analytical methods. The precision for the halogen samples will be determined by the RPD calculated from the analysis of the Matrix Spikes and Matrix Spike Duplicates (MS/MSD). The MS/MSD will be used because the field samples have a history of very low concentrations. Precision for the metals emission samples will be based on the RPD of the Laboratory Control Sample (LCS) and duplicate analyses of one emission sample. Precision data for metals in the process samples will be based on MS/MSD and duplicate samples. The estimate for precision for the CEMS data will be as required by the CEMS Monitoring Plan in Attachment 20 to the TOCDF permit (5) for the ATEC CEMS and 40 CFR 60, Appendix A methods for the sampling subcontractor CEMS.

5.2 EVALUATION OF ACCURACY

Accuracy will be expressed as a percent recovery (%R) for each method. The standard used to measure the %R is method dependent (see tables in Annex A). Additional audit samples may be submitted by DSHW and will act as an independent measure of accuracy. Analysis of an LCS will be assessed as a measure of accuracy; matrix effects on accuracy will be assessed using MS/MSD. A combination of LCS and MS/MSD analyses will be used to evaluate the accuracy of most analysis methods. An evaluation of the accuracy of organic compound analyses that use a gas chromatograph/mass spectrometer (GC/MS) will include the recovery of surrogate compounds spiked into each sample. Section 13.0 provides the accuracy calculations. Accuracy data will be presented in the data validation report.

Calculation of the accuracy for each analysis will be based on different criteria taken from the QA/QC Handbook (4) and the analytical methods. Determinations of accuracy calculations will be as follows:

For halogen samples, by the %R calculated from the analysis of the MS/MSD.

For metals emission samples, based on the analysis of the LCS.

For PCDD/PCDF analyses, taken from the LCS data.

For the CEMS, as directed by Attachment 20 (5). (The TOCDF CEMS are certified on an annual basis. This certification involves the measurement of calibration drift, response time, calibration error, and accuracy as measured against a known standard gas.)

5.3 EVALUATION OF COMPLETENESS

Data completeness represents the percentage of valid data collected from a measurement system as compared to the total amount expected to be obtained under optimal or normal conditions. The completeness DQO for the CCPT will be to obtain representative results for all analytical parameters while operating the unit at the desired test specifications for a total of three test runs. The completeness DQO (100 percent completeness) will be met if valid test runs are obtained. Samples resulting from runs that are judged to be invalid based on field indicators of incinerator performance (or aborted runs) will not be submitted to the laboratory for analysis and are not considered to be a part of the sample completeness objective. Sampling runs will be repeated until three runs are successfully completed. The impact of any occurrence of sample loss will be assessed against the objective of obtaining valid runs and will be discussed in the CCPT Report.

5.4 DETECTION AND REPORTING LIMITS

The laboratories will prepare Method Detection Limit (MDL) and LOQs for parameters to be analyzed for the CCPT using the laboratory's standard operating procedures and the analytical methods referenced in this document. These limits will be compared to the actual analytical results in the final report. Analytes not detected in the analyses will be reported as less than (<) the LOQ. Analytes detected with a concentration between the MDL and the LOQ will be qualified as an estimate and reported. The laboratory conducting the analysis will determine the MDLs and LOQs. The LOQs for the CCPT parameters are included in Annex A.

5 5 REPRESENTATIVENESS AND COMPARABILITY

Representativeness is defined as the degree to which data accurately and precisely represent a characteristic of a population parameter variations at a sampling point process condition or an environmental condition Comparability is defined as expressing the confidence with which one data set can be compared to another as discussed in EPA QA/G 5 (5)

The usefulness of the data is contingent upon meeting the criteria for representativeness and comparability Wherever possible reference methods and standard sampling procedures will be used The representativeness DQO is that all measurements be representative of the media and operation being evaluated The detailed requirements for each parameter given in their respective methods will be followed to ensure representative sampling

The comparability DQO is that all data resulting from sampling and analysis be comparable with other representative measurements made by the sampling subcontractor or another organization on this or similar processes operating under similar conditions The use of published sampling and analytical methods and standard reporting units will aid in ensuring the comparability of the data

6.0 SAMPLING AND MONITORING PROCEDURES

The ATLIC must demonstrate an ability to effectively remove arsenic, ash, and mercury from the combustion gases such that human health and the environment are protected. The HWC MACT Limits establish the criteria against which applications for permits must be measured. The LCPT will demonstrate that the ATLIC operating parameters meet the required performance standards. The data obtained during this LCPT will demonstrate compliance with these regulations by demonstrating the arsenic, PM, and mercury concentrations meet the MACT limits.

This section describes the process and exhaust gas sampling procedures to be performed and the equipment to be used during the LCPT. The sample types, sampling locations, and sample collection procedures will also be discussed. The sampling subcontractor will utilize EPA approved sampling methods, if available, for the selected analytes. Any proposed modifications to approved methods or procedures will be presented to the DAQ and DSHW for approval prior to implementation and will be documented in the final report.

Standard sampling equipment that meets EPA guidance will be used to collect the exhaust gas and process samples. *An independent peer review is not included as part of this scope of work.* A final readiness review will be performed by the subcontractor to ensure that the subcontractor has the appropriate manpower, equipment, and training in place before the start of the LCPT.

6.1 PRE-SAMPLING ACTIVITIES

Many pre-sampling activities need to be completed before sampling can begin. These tasks include equipment calibration, glassware preparation, sample media preparation, team meetings, equipment packing and shipment, equipment setup, and finalization of all the miscellaneous details leading up to the coordinated initiation of the sampling program.

6.1.1 Calibration of Process Monitoring Equipment

Calibration of the process control instruments is required on a regular basis. The calibration status of the ATLIC process control instruments at the time of the LCPT will be included in the LCPT Report. The calibration frequency for the process control instruments is summarized in Table 2-2 of the LCPT plan.

6.1.2 Sampling Equipment Calibration

Section 8.0 discusses the calibration procedures for the sampling equipment.

6.1.3 Glassware Preparation

The only consumables used in the LCPT sampling will be the sample bottles and the reagents used in the impingers and for recovery of the samples. The sample containers will be purchased pre-cleaned to meet EPA criteria for clean containers per specific container type and purpose; a certificate will be provided with the containers to document compliance with these specifications. Sample train glassware and sample containers require specialized cleaning to avoid sample contamination from the collection containers or sampling equipment. Cleaning procedures for the sample train glassware are summarized below.

> Method 5/26A glassware and containers: hot water rinse, hot soapy water wash, water rinse, deionized (DI) water rinse, acetone rinse, and air dry.
> Method 0023A glassware and containers: hot soapy water wash, water rinse, DI water rinse, 400 °C heating for two hours, methylene chloride rinse, toluene rinse, and rinse with acetone and methylene chloride.
> Method 29 glassware and containers: hot water rinse, hot soapy water wash, water rinse, 10 percent nitric acid soak, DI water rinse, acetone rinse, and air dry.

6.1.4 Sample Media Preparation

Reagents used in the laboratory are normally of analytical reagent grade or higher purity. Reagents will be labeled with the date received and the date opened. Reagent purity will be checked by collection of the appropriate blanks. All filters will be desiccated and properly tare weighed prior to use.

The XAD-2® traps and filters will be supplied to the sampling subcontractor by the laboratory just prior to the field effort. The XAD-2® resin traps will be cleaned and conditioned as directed in the methods. A High Resolution Gas Chromatograph/High Resolution Mass Spectrometer (HRGC/HRMS) analysis of each batch of XAD-2® resin will be provided before use as a QA/QC step to ensure that the resin is contaminant free.

6.1.5 Additional Pre-Sampling Activities

Prior to mobilization of the field program, a sample team meeting will be held to designate responsibilities to each team member for the LCPT. Assignments will be made based on individual experience and the relative importance of the assigned task. Site setup will be the final pre-sampling activity. This task involves positioning the sampling equipment in the sampling area. During setup, preliminary measurements will be taken to determine exhaust gas moisture and flow rate. Preliminary exhaust gas moisture will be determined in accordance with EPA Method 4 (6), and preliminary flow rate measurements will be conducted using Methods 1 and 2 (6). These data will be used to calculate the appropriate nozzle size and sample flow rate to be used to accomplish isokinetic sampling.

6.2 FIELD QUALITY CONTROL ACTIVITIES

The QC checks for the process data collection and sampling aspects of this program will include but are not limited to

- Using standardized forms and field notebooks to ensure completeness traceability and comparibility of the process information and samples collected
- Field checking standardized forms to ensure accuracy and completeness
- Strictly adhering to the sample traceability procedures outlined in Section 7.2.1
- Submitting field biased blanks
- Leak checking sample trains before and during port change and after sample collection

6.2.1 Reagent Blanks

Reagent blanks will be prepared by collecting reagents used in the sampling and recovery of the exhaust gas samples. Reagent blanks are defined as samples of the reagent source water solvents solutions and other media used for sample collection. Samples of 0.1 Normal (N) sulfuric acid (H_2SO_4) 0.1 N sodium hydroxide (NaOH) acetone probe rinse solvent and the particulate filter will be collected for the Method 5/26A trains. The following samples will be collected for the Method 29 train: 0.1 N nitric acid (HNO_3) probe rinse solution particulate filter 5 percent HNO_3 and 10 percent hydrogen peroxide (H_2O_2) impinger solution 4 percent potassium permanganate ($KMnO_4$) and 10 percent H_2SO_4 and 8 N HCl

The following reagent blanks will be collected for the Method 0023A trains: acetone methylene chloride and toluene solvent rinses particulate filter and DI impinger water. Each reagent blank will be analyzed for the same analytical parameters as the actual LCPT samples. The results from the analyses of these blanks will be used to demonstrate that these solvents solutions and filters are not potential sources of background contamination for sample collection and recovery.

6.2.2 Field Blanks

Field blank samples will be collected during the LCPT to provide a QC check on sample handling during the sample collection process. The field blank will be a sampling train assembled in the field leak checked left stand for the sample time and then recovered as other trains. *Field blank samples will be placed in appropriately cleaned and sized sample containers* in the field and handled in the same way as actual field samples and analyzed by the same methods as the samples. The DAQ and DSHW will be notified when the field blanks will be collected to allow them the opportunity to observe.

6.2.3 Field Duplicates

Duplicate samples of the Lewisite agent Brine and spent decon will be collected during one performance run as a QC step.

6.3 EXHAUST GAS SAMPLING

The exhaust gas sampling will be conducted by EG&G and a sampling subcontractor. The sampling will take place in the ATLIC exhaust stack. Lewisite monitoring and monitoring for CO, O_2, and NO_x with the ATLIC CEMS will be conducted by EG&G. The sampling subcontractor will sample for PM, HCl, Cl, metals, and PCDDs/PCDFs. An exhaust gas molecular weight will be calculated from the subcontractor CEMS data or by manual reference methods.

Sampling will begin when the incinerator has reached steady state operations on waste feed, and a run will not be started after 2:00 p.m. The Test Director or a designated representative will authorize the STC to begin sampling. Sampling will be stopped if the waste feed is stopped. To restart sampling, the Lewisite agent feed will be burned for 15 minutes, and if operating parameters are steady, sampling will be restarted.

Sampling train problems will be analyzed on site by the STC and the Test Director. If it can be shown that the samples collected are not significantly biased, and the results are valid, the run will continue. If the decision is made to abort a performance run, the entire set of samples collected for that run will not be analyzed. If any corrective action is required during the field sampling portion of a program, these actions will be reported to the STC prior to the sampling crew demobilizing from the field. If the STC determines that a run should be repeated, he makes the determination at that point and communicates this requirement to the Test Director. These problems, and their resolution will be discussed with the DAQ and DSHW representatives.

Exhaust gas sampling procedures, and frequencies to be used during this ICPT are summarized in Table A-6-1. Sampling port locations for each train are shown in Drawing EG-22-D-S211 in Attachment 4 to the Permit Modification. Three sampling trains will be used in four different ports in the stack, and the exhaust gas samples will be collected over a four hour period. Other parameters will be determined using CEMS, as shown in Table A-6-1. Leak checks of the sample trains will be conducted in accordance with the protocol in each method prior to sampling, during port change, and at the conclusion of sample collection. The DAQ and DSHW will have the option of observing the leak checks.

The three trains and constituents to be sampled are:

Method 5-26A (6) for PM, HCl, and Cl

Method 29 (6) for HHRA metals, and

Method 0023A (1) for PCDDs/PCDFs

TABLE A 6 1 EXHAUST GAS SAMPLING SUMMARY

Sampling Train	Analyses Performed	Sampling Method Reference	Number Of Samples Collected during the LCPT (3 Runs)
Method 1	Traverse Points	40 CFR 60 Appendix A	1
Method 2	Duct Velocity	40 CFR 60 Appendix A	With each isokinetic train
Isokinetic Trains	Exhaust Gas Moisture	40 CFR 60 Appendix A	With each isokinetic train
Method 5/26A	PM, HCl, and Cl	40 CFR 60 Appendix A	3 sample sets & 1 field blank
Method 29	HHRA Metals	40 CFR 60 Appendix A	3 sample sets & 1 field blank
Method 0023A	PCDDs/PCDFs	SW 846 Method 0023A	3 sample sets & 1 field blank
CEMS	O_2, CO, and NO	Attachment 20 (5)	Continuously
CEMS	CO and O_2	40 CFR 60 Appendix A	Continuously

The Lewisite monitoring techniques operated by LG&G are the automated Near Real Time (NRT) Lewisite monitors with the MINICAMS®. The Lewisite concentration is confirmed with two different MINICAMS® that have different columns that result in different retention properties for the Lewisite derivative. To confirm the Lewisite concentration, the derivative must be detected on both MINICAMS®.

6.3.1 Lewisite Monitoring Methods

Overall operation of the agent monitoring systems is discussed in the TOCDF Agent Monitoring Plan [Attachment 22 to the TOCDF permit (7)]. These systems have undergone extensive testing and evaluation under both simulated and actual field conditions, and the U.S. Army has provided all of this information to the EPA and the DSHW.

Lewisite concentrations in the plant and in the exhaust gas are monitored using MINICAMS® (a NRT monitor). Operation of these systems is controlled by Tooele Laboratory Operating Procedures (TEL OPs). The Lewisite monitoring methods utilize a derivatization step at the sample collection inlet (distal end) to eliminate the problems associated with the instability of Lewisite during sampling and analysis. Ethanedithiol (EDT) is added to the gas stream at the distal end of the sample probe and allowed to react with Lewisite to form (2-chlorovinyl) arsonic acid which is volatile and can be easily transported to the pre-concentration tube. The MINICAMS® uses a gas chromatograph (GC) with a Halogen Specific Detector (XSD™) for the detection of the Lewisite derivative. The Lewisite concentration is confirmed with two different MINICAMS® that have different columns that result in different retention properties for the Lewisite derivative. To confirm the Lewisite concentration, the derivative must be detected on both MINICAMS®.

The precision and accuracy of each monitoring system is determined through actual on site testing after the equipment has been installed These data are used to establish QC bounds calibration and challenge frequencies and procedures These challenge frequencies and procedures are then delineated in a QC plan for each system

MINICAMS® is the commercial trademarked name for an automated system for the sampling and analyses of chemical compounds The MINICAMS® utilized for Lewisite monitoring employs a solid sorbent for agent collection and thermal desorption to an automated GC/XSD™ that is sensitive and selective to compounds containing halogens Each MINICAMS® requires a carrier gas (nitrogen) for chromatography separation compressed air power source and data recorder The design is based on operational MINICAMS® meeting the baseline acceptance criteria requirements in the Programmatic LMQAP or equivalent QC

The MINICAMS® system will be utilized in all Lewisite process areas where continuous monitoring for Lewisite is required to protect the health and safety of plant workers and for decontamination certification The MINICAMS® will also be employed for process monitoring activities There are several MINICAMS® units that will not be used for personnel safety monitoring and will not be connected to the Facility Control System (FCS) or ChromNet These units will be used to monitor and clear various materials buildings and equipment for disposal entry or future use of equipment and will be portable Lewisite NRT monitoring requires dedicated sampling lines that cannot be shared for multiple agent or confirmation monitoring

Lewisite is detected by the MINICAMS® at the Short Term Exposure Limit (STEL) (low level) set by the U.S. Surgeon General for unmasked workers and the Source Emission Limit (SEL) level Operation of the MINICAMS® is covered by LF LOP 524 The agents monitored by the MINICAMS® will be in accordance with Attachment 22 (7)

The MINICAMS® represents state of the art instrumentation for the detection and quantification of chemical agents in both workplace and furnace exhaust gas environments These two environments are substantially different in their composition and potential interferences

The MINICAMS® cycle time is divided into a sample collection period and a desorption and analysis period To provide continuous monitoring of the exhaust gas during the LCPT there will be four MINICAMS® online and two backups at the ATLIC stack These MINICAMS will be divided into two sets Two different columns will be used in the two sets to allow different elution orders to the Lewisite derivative to allow the Lewisite concentration to be verified The instruments will be cycled so one MINICAMS® group will have a MINICAMS sample the gas at each location while the second MINICAMS® in that group is in the desorb/analysis mode The cycling of the ATLIC MINICAMS® will be verified on an hourly basis by the MINICAMS® operators One MINICAMS® of each group will be held in reserve to be used if a MINICAMS® fails

The MINICAMS® collects the sample and then thermally desorbs the (2-chlorovinyl) arsonic acid into the GC column that separates the organic compounds and detects the Lewisite derivative when it leaves the column using the XSD™. The XSD™ is a thermionic device that uses a platinum cathode treated with an alkali to detect halogens released by the combustion of the compound in a reactor assembly.

Lewisite is monitored on a continuous basis to ensure that chemical agents are not emitted to the environment. An AWFCO will be initiated if a MINICAMS® alarm occurs in the ATLIC stack. There are two scenarios of alarm:

- A MINICAMS® malfunction – A technician responds and determines that the MINICAMS® is malfunctioning. When the malfunction is resolved, feed resumes. Agent feed will resume upon verification that the MINICAMS® malfunctioned.

- A MINICAMS® alarm with possible agent present in the ATLIC stack – Technicians respond to the alarm and determine whether both MINICAMS® groups detected Lewisite. If Lewisite is not confirmed by being detected by both MINICAMS groups, feed will resume, and sampling will resume when the MINICAMS® false alarm is resolved. If both MINICAMS groups detect Lewisite, feed will not resume. Prior to re-initiating waste feed to the incinerator, PG&G and the U.S. Army will determine the cause and develop a course of action to prevent recurrence.

The evaluation and testing program for these units in the field is rigorous. The precision and accuracy data are generated while sampling actual exhaust gases during non-agent operations. The LOQ of the MINICAMS® at the SEL level is 0.005 mg/m³ for Lewisite. The testing and evaluation in all agent modes have been completed. The monitors met the 95% confidence level for ± 25 % accuracy. The MINICAMS® Lewisite cycle time is estimated to be fifteen minutes.

6.3.2 Method 1 to Determine Duct Traverse Sampling Points

The number and location of the exhaust gas sampling points will be determined according to the procedures outlined in EPA Method 1 – Sample and Velocity Traverses for Stationary Sources (6). The sampling locations and the number of sampling traverse points must meet the criteria specified in EPA Method 1.

6.3.3 Method 2 to Determine Exhaust Gas Velocity and Volumetric Flow Rate

The exhaust gas velocity and volumetric flow rate will be determined using EPA Method 2 – Determination of Stack Gas Velocity and Volumetric Flow (Type S Pitot tube) (6). Velocity measurements will be made using Type S pitot tubes, which will be calibrated by conforming to the geometric specifications outlined in Method 2 or in a wind tunnel against a standard pitot. The differential pressures will be measured with fluid manometers, and the gas temperatures will be measured with chromel-alumel thermocouples equipped with digital readouts.

6.3.4 Exhaust Gas Moisture Content

The exhaust gas moisture content will be determined in conjunction with each isokinetic sampling train as directed in Method 5 (6). The impingers will be connected in series and will contain reagents as described in the following sections. The impingers will be placed in an ice bath to condense the moisture in the exhaust gas sample. Any moisture that is not condensed in the impingers is captured in the silica gel. Moisture will be determined from impingers' weights.

6.3.5 Combined Method 5/26A for Particulate Matter and Halogens

A combined train will be used to determine concentrations of PM, HCl, and Cl_2. Sample collection will be conducted as directed by Method 5 (6). A quartz fiber or Teflon® mat filter will be used. The filter will be weighed before sampling and after desiccating as directed in Method 5. Nozzles, probe liners, and filter holders will be rinsed thoroughly prior to testing. Samples will be collected for a minimum of four hours.

The impinger configurations used in the train are:

- Impinger 1: Condensate impinger containing 50 mL of 0.1 N H_2SO_4
- Impingers 2 and 3: Greenburg Smith impingers containing 100 mL of 0.1 N H_2SO_4
- Impingers 4 and 5: Modified Greenburg Smith impingers containing 100 mL of 0.1 N NaOH
- Impinger 6: Modified Greenburg Smith impinger containing silica gel

The sample is withdrawn isokinetically from the exhaust gas, while the temperature of the sample probe and the filter housing are maintained at 248 ± 25 °F. The sampling runs will be performed within ± 10% of isokinetic conditions. The probe rinse and the material collected in the filter housing will be used to determine the PM emissions. This method does not require the sample fractions to be cooled.

An ion chromatograph (IC) will be used to analyze the impinger solutions. The HCl emissions will be determined from the analysis of the H_2SO_4 impinger solutions, and the Cl_2 emissions are determined from the analysis of the NaOH impingers. Chlorine is absorbed by the basic solution and disassociates to form sodium chloride and sodium hypochlorite (NaOCl). The sample recovery of the NaOH impingers will include the addition of sodium thiosulfate ($Na_2S_2O_3$) to reduce any NaOCl to chloride ion. This will result in 2 moles of chloride ion for each mole of Cl_2 present in the exhaust gas sample.

Reagent blanks will be analyzed. The field blank will be collected as directed by the method and the recovered field blank samples will be analyzed the same as for the other trains.

6.3.6 Method 0023A for PCDDs/PCDFs

Method 0023A (1) will be used to sample the exhaust gas for PCDDs/PCDFs during each performance run. The Method 0023A sample train will collect exhaust gas for four hours. The minimum sample volume collected will be 120 dry standard cubic feet (dscf). Exhaust gas is extracted isokinetically through ports in the ATLIC exhaust stack using a heated borosilicate glass lined probe. Sampling train connections are made with Teflon® and glass. The PM is removed by a glass fiber filter housed in a glass filter holder maintained at 248 °F (± 25 °F). For removal of the organic compounds, the sample gas passes through a water cooled condenser and XAD 2® sorbent trap, which are arranged in a manner that allows the condensate to drain vertically through the XAD 2® trap. The gas temperature at the entrance to the resin trap will be maintained below 68 °F. A chilled impinger train is used to remove water from the exhaust gas, and a dry gas meter will be used to measure the sample gas volume.

Recovery of the Method 0023A samples and assembly of the sample trains will be conducted in a dust controlled environment of mobile laboratories. The samples will be processed for analysis within the holding time requirements described in Section 7.0.

Blanks of each solvent lot used will be saved for potential analysis. A field blank will be prepared and recovered as directed by the method. The field blank will be leak checked and then allowed to sit for the sampling time of the train. The recovered samples will be shipped to the laboratory and analyzed in the same manner as the recovered samples from the other trains.

After sample collection, the recovered sample fractions will be cooled at ≤ 4 °C until they are shipped to the laboratory for analysis. Samples received at the laboratory will be combined into two sample fractions for analysis. One fraction will contain the probe rinse and the filter extract with surrogates added to the filter. The second fraction will contain the XAD 2® extract and the back half rinse with field surrogates added to the XAD 2® resin before sampling.

6.3.7 Method 29 for Metals

Metal emissions will be sampled using EPA Method 29 (6). The set up, pretest preparations, and leak check procedures are the same as outlined in Method 5 (6). Nozzles, probe liners, and filter holders will be rinsed thoroughly prior to testing. Samples will be collected for a minimum of four hours.

Impinger configurations are:

- Impinger 1: Empty modified Greenburg Smith to serve as a knockout.
- Impinger 2: Modified Greenburg Smith containing 100 mL of 5% HNO_3 and 10% H_2O_2.

- Impinger 3 Greenburg Smith containing 100 mL of 5% HNO_3/10% H_2O
- Impinger 4 Empty modified Greenburg Smith
- Impingers 5 and 6 Modified Greenburg Smith containing 100 mL each of 4% $KMnO_4$ and 10% H_2SO_4
- Impinger 7 Modified Greenburg Smith containing silica gel

The sample train will be recovered as directed by Method 29 (6). The front half of the train is rinsed with 0.1 N HNO_3 including the probe nozzle, probe liner, and front half of the filter holder into a tared sample bottle. When the rinse is complete, the bottle is capped and the rinse weight recorded on the field sample recovery sheet. Then 100 mL of acid is placed in a second wash bottle and used to rinse the back half of the filter housing, the transfer line, and the first three impingers. These rinses are added to the impinger contents, the bottles capped, and the weight of acid used in the rinse recorded on the field sample recovery sheet. The fourth impinger will be recovered separately with a 0.1 N nitric acid rinse. Impingers 5 and 6 will be rinsed with $KMnO_4$ impinger solution, and DI water. These rinses will be combined with the collected impinger catch from these two impingers, which are then rinsed with 8 N HCl; this rinse is kept separate.

Six sample fractions will be analyzed from the Method 29 train. The front half fraction consists of the acid digestion of the filter and the rinse of the probe, nozzle, and filter holder front half. The back half fraction consists of the contents of the first three impingers and their rinses along with the rinse of the back half of the filter holder. These two fractions will be analyzed for the HHRV metals. Impinger 4 and its rinse will be analyzed for mercury only; impingers 5 and 6 and their rinses will be analyzed for mercury only, and the acid rinse of impingers 5 and 6 will also be analyzed separately for mercury only as well. The sample fractions are acid solutions and the acid will preserve the samples. Method 29 (6) does not require cooling the samples therefore, the samples will be shipped without cooling.

The reagent blanks will be prepared as directed by Method 29. Analyze the reagent blanks to determine if significant amounts of metals are added through the reagents. The reagent blank will be used to make the corrections as called for in Sections 12.6 and 12.7 of EPA Method 29. A field blank will be prepared with the same components as a regular train and recovered using the same reagent amounts. The field blank will be leak checked and then allowed to sit for the sampling time. Recovered samples will be analyzed using the same methods as field samples.

6.3.8 Continuous Emissions Monitoring

The CEMS operated by LG&G as part of the environmental permits will be used to monitor the CO, O_2, and NO_x concentrations. The operation, calibration procedures, and preventive maintenance procedures for the CEMS are described in Attachment 20 (2), which also describes specific locations, sampling frequencies, and the specific types of instrumentation for each

monitoring station. Attachment 20 of the TOCDF RCRA Permit (5) describes the monitoring system that is used to provide continuous operational control of the ATLIC and to meet the requirements listed in the RCRA Permit and Title V Permit. A Relative Accuracy Test Audit (RATA) will be conducted prior to the LCPT as directed by the HWC MACT regulations.

The CO, O_2 and NO_x CEMS data will be recorded continuously during each test. The sampling ports for the monitors are located in the ATLIC stack. The CO concentration will be determined using monitor 819 AIT 8302 and the O_2 concentration will be determined with monitor 819 AIT 8301. The NO_x concentration will be determined using monitor 819 AIT 8304. These monitors will be checked against reference standards daily at a minimum. Zero and span checks will be considered a verification of the CEMS data quality. If the zero and span checks indicate unacceptable CEMS results for accuracy and precision, then the monitor will be recalibrated according to the manufacturer's specifications. The FCS will record the CEMS data, which will be used for O_2 corrections.

The CEMS are certified by on-site testing and calibrations according to the guidelines delineated in a quality control plan and laboratory operating procedure for each CEMS. In addition to the initial certification, an Absolute Calibration Audit (ACA) will be conducted quarterly as directed by the HWC MACT regulations. The QC plans, including bounds, calibration frequency, and procedures are discussed in Attachment 20 (5).

Additional parameters will also be monitored using CEMS operated by the sampling subcontractor or through manual methods involving an integrated sample. These CEMS will be used to monitor for CO_2 and O_2. The subcontractor will report the data from each of the monitors. An exhaust gas molecular weight will be calculated from the subcontractor CEMS data or by manual reference methods. Each individual CEMS will be calibrated as directed in the respective methods.

6.4 PROCESS SAMPLING

Table A-6-2 lists the sample streams, analyses to be performed, sampling method, sampling frequencies, and sample volumes. The process samples will be collected using ASTM International (ASTM) methods. Liquid samples will be collected from taps provided for sample collection. Field duplicates of the Brine, spent decon, and Lewisite agent samples will be collected during one run.

TABLE A 6 2 PROCESS SAMPLES TO BE COLLECTED

Sample Stream	Analyses Performed	Sampling Method	Sampling Frequency	Sample Volume
Wet Scrubber Recirculation Brine	Lewisite pH HHRA Metals VOCs SVOCs PCDDs/PCDFs	Tap ASTM Method D5370	One Sample per Run	Three 40 mL VOA vials one 250 mL one 500 mL and two 1 L bottles
Spent Decon Solution	Lewisite pH HHRA Metals VOCs SVOCs PCDDs PCDFs	Tap ASTM Method D5370	One Sample per Run	Three 40 mL VOA vials one 250 mL one 500 mL and two 1 L bottles
Lewisite Agent *	HHRA Metals agent purity organic impurities	Tap ASTM Method D5370	One Sample per Run	One 5 mL bottles

* One run will have a duplicate set of samples collected

6 4 1 Process Stream Sampling Locations

Process streams sampled as part of the LCPT include the Lewisite agent feed spent decon and Brine Lewisite agent samples will be collected from a valve in the feed lines after the tank contents have been mixed A grab sample of spent decon is taken from the SDS collection tank The contents of the SDS tank will be mixed before collection of the sample The spent decon samples are collected before the run begins to allow the contents to be agent screened before the spent decon is processed If additional NaOH or other material is added to the SDS tank then new samples will be collected

The Brine samples will be taken via taps on the discharge of the pump used to move the Brine Samples of the Lewisite agent will be collected from taps on the liquid delivery system at a location that will prevent fluctuations in the delivery pressure or flow of the solution

6 4 2 Tap Sampling Method

Liquid process samples will be collected using the method described by the ASTM Method D5370 (7) The sample will be collected by attaching a sample line to the tap and flushing the sample line The flush will be managed in accordance with applicable EPA and DSHW regulations The sample line is inserted into the sample container and the tap is opened so that the sample bottle is filled This sampling flow reduces the loss of volatile compounds from the sampling container prior to closing the container This method ensures that the actual material

collected is representative of the stream. Separate sub sample bottles are used for each sample. Brine samples will be collected during the final 60 minutes of the run and other samples will be collected throughout the run. The spent decon samples will be collected before the runs to allow the sample to be analyzed before processing the spent decon.

6.5 PROCESS MONITORING EQUIPMENT

Process electronic data output will be monitored carefully by incinerator operators to maintain steady state operating conditions during the LCPT. Process monitoring equipment will be inspected and calibrated periodically. EG&G will be responsible for collecting operations data, the permit required monitoring information, and system operating data in accordance with Standard Operating Procedures (SOPs). The process data to be collected includes:

- Primary Combustion Chamber (PCC) exhaust gas temperature and PCC pressure
- Secondary Combustion Chamber (SCC) exhaust gas temperature and SCC exhaust gas delta pressure
- Feed rate
- Quench brine pressure and Brine pH
- Quench exhaust gas temperature
- Venturi delta pressure and Venturi Brine flow
- Brine flow to packed bed scrubbers and Brine pressure, and
- CO concentration and O_2 concentration

6.6 POST SAMPLING ACTIVITIES

Any wastes generated during sample collection will be handled in a safe manner. Liquid wastes will be placed in appropriately sized containers at a satellite collection point.

7.0 SAMPLE HANDLING, TRACEABILITY, AND HOLDING TIMES

This section describes the sample preservation methods holding times field documentation and *shipping requirements Exhaust gas samples and Brine samples will be collected by the* sampling subcontractor Lewisite agent samples and spent decon samples will be collected by EG&G operations personnel who will label and transport the samples to the CAL for Lewisite analysis and transfer the required samples to the sampling subcontractor

7.1 SAMPLE PRESERVATION AND HOLDING TIMES

Requirements for preserving samples and holding times were taken from Table 3-1 in SW-846 (1) and the QC Handbook (4) and are shown in Table A-7-1 The sampling and packaging technicians will preserve the samples as directed by Table A-7-1 Samples requiring cooling will be maintained at 2-4 C until shipped in a cooler packed with ice and sample temperatures will be monitored upon receipt at the laboratory The Method 29 train samples will be in acid solutions from the sample recovery and additional acid will not be added for preservation Holding times will be monitored by keeping track of the time following sample collection Samples will be delivered or shipped to the laboratory as necessary to meet the holding times for the sample analyses

7.2 DOCUMENTATION

The following subsections present the requirements for labeling maintaining the COC and handling environmental samples Recording information necessary for reconstruction of the sampling event will be discussed Entries made on the following documents will use the error correction protocol of drawing one line through the error then initialing and dating the change Documentation will be made available to the DAQ and DSHW upon request

7.2.1 Sample Labels

Sample labels are necessary to prevent misidentification of samples Therefore the samples collected by the sampling subcontractor will be labeled following a designated code system developed by the STC for this project Samples will be sealed and the volume of the sample marked The data from each sample run will be recorded on a run sheet during each performance run and after each run the data will be checked for completeness The sampling subcontractor will then complete the appropriate COC forms to be sent to the laboratory

TABLE A 7 1 SAMPLE PRESERVATION AND HOLDING TIMES

Parameter	Preservation	Holding Time
Process Streams (Residue)		
Metals	Cool (≤ 4 °C) pH < 2 Unpreserved	6 months (28 day Hg) 28 days (14 days Hg)
VOCs	Cool (≤ 4 °C)	14 days
SVOCs	Cool (≤ 4 °C)	Extract 14 days Analyze 40 days
PCDDs/PCDFs	Cool (≤ 4 °C)	Extract 30 days Analyze 45 days
Exhaust Gas		
Method 5 PM	None Required	28 days
Method 26A – Sulfuric Acid Solutions	No Additional Required	28 days
Method 26A – Sodium Hydroxide Solutions	2 mL of 0.5 M H_2SO_4	28 days
Method 29	No Additional Required	28 days
Method 0023A	Cool (≤ 4 °C)	Extract 30 days Analyze 45 days

Gummed paper labels or tags will be used to identify the samples The labels will include at least the following information

- A sample number including a sample code that distinguishes field samples duplicates or blanks where appropriate
- A signature or the initials of the sample collector
- The date and time of collection
- The incinerator designator and trial run number
- The type of preservative used or None as applicable

Labels will be affixed to sample containers prior to or at the time of sampling However the labels will be filled out at the time of sample collection

7.2.2 Sample Seals

Sample seals are used to detect improper handling of samples from the time of sample collection through the time of analysis. Items such as gummed paper seals and custody tape will be used for this purpose. Signed and dated seals will be attached so that they must be broken to open either the individual sample containers or shipping containers. Seals will be affixed to containers before the samples leave the custody of the sampling personnel.

7.2.3 Chain of Custody Forms

The purpose of COC procedures is to document the identity of the sample and its handling from collection through all transfers of custody. To establish the documentation necessary to trace sample possession from the time of collection, a COC record must be filled out and accompany every sample or group of individually identified samples.

A designated field technician will take custody, sign the COC forms, and deliver the samples to the laboratory. The field technician will sign the appropriate forms relinquishing custody, and the laboratory representative will sign the form indicating that they have taken custody of the samples. Examples of the sampling subcontractor's COC forms and other sampling documentation can be found in Annex B.

When a sample arrives at the laboratory, an individual with the COC authority who is trained in the laboratory sample receiving and control methods will take custody of the samples. The sample coolers will be opened by the sample custodian or designee and logged into the master sample log. A laboratory internal COC form will be completed, and the sample will be placed in locked storage. Laboratory analysts will sign out samples prior to analysis. The sample custodian will use a standard form to record the location of the sample and any transfers of the sample to analytical personnel. The laboratory sample custodian will keep the form until the project is complete. The forms will then be transferred to the Document Control Center with the project file.

The COC for the sampling trains will be established when the sampling crew take possession of the sample train components. Either the entire sampling crew handling the train or just one person may be listed on the train COC. The person recording the data will sign the COC for the sample when it reaches the sampling location. The person or persons transporting the sampling train to the sample recovery laboratory will sign the COC. When the sample train reaches the recovery laboratory, the laboratory chemist will check in the sample fractions, and sign the COC when the fractions are all received. In addition, the chemist will then begin a new COC when the fractions have been correctly recovered, labeled, and sealed.

The COC for the process samples will be filled out at the end of each performance run. Before that point, the samples will remain in the possession of the person collecting the samples. The samples may be secured in a cooler with the COC taped to the cooler until the performance run is completed. The samples will be secure because sample collection takes place in a high

security area Personnel in the area must have a security clearance or be escorted by a security cleared person before they are allowed within the double fenced area Only authorized personnel are allowed into the areas where the samples are held until shipment to the laboratory Each person who has custody of the samples must sign the COC form which must contain the following information

- The sample identification number
- The date and time of sample collection
- The signature or initials of the sample collector
- The matrix type
- The number of containers
- The signatures of persons in the COC and
- The date and time of each change in custody

7.3 SAMPLE TRANSPORT TO THE LABORATORY

Samples will be packaged and shipped according to U.S. Department of Transportation and EPA regulations and delivered to the laboratory so that the requested analyses can be performed within the specified allowable holding time The samples will be accompanied by the COC record and a sample analysis request form The request form will list the variables to be analyzed by the laboratory and the total number and types of samples shipped for analysis Authorized laboratory personnel will acknowledge receipt of shipment by signing and dating the COC form and returning a copy to the Sampling Subcontractor QA Officer

8.0 SPECIFIC CALIBRATION PROCEDURES AND FREQUENCY

This section contains information and details pertaining to the calibration of both the process monitoring systems and the exhaust gas sampling equipment

8.1 PROCESS MONITORING EQUIPMENT CALIBRATION

Process control instruments are calibrated on a regular basis as directed in the Instrument Calibration Plan (8). The calibration status of the LIC process control instruments at the time of the LCPT will be summarized in the final report. The calibrations will be conducted in accordance with the manufacturer's instructions. The monitoring equipment calibrated will be specified in the Appendix D tables [ATLIC Automatic Waste Feed Cutoff (AWFCO) tables]. These instruments include

The PCC temperature transmitters

The SCC temperature transmitters

The venturi differential pressure

- The brine flow meter and

The pH meters

Most of these instruments are on a regular schedule of calibration of every 180 to 360 days. The pH meters are on a weekly schedule for calibration. Temperature transmitters are calibrated every 90 days. The monitoring equipment calibrated is specified in the above mentioned tables in Appendix D.

8.2 EXHAUST GAS SAMPLING EQUIPMENT

The sampling subcontractor will calibrate the field sampling equipment before the LCPT and verify the calibration afterwards. When the STC arrives on site they will provide copies of the calibration data to EG&G. The subcontractor will maintain an up to date list of sampling equipment including serial numbers and pertinent calibration data. Posttest calibrations and equipment checks will be provided to EG&G before the subcontractor removes the equipment from the site. Calibration procedures will follow guidelines provided by EPA (9).

The calibrations and checks will be performed as directed below

- Probe Nozzles Using a micrometer measure the inside diameter of the nozzle to the nearest 0.001 inch (0.025 mm) Make measurements at three separate places across the diameter and obtain the average of the measurements The maximum difference should not exceed 0.004 inch (0.1 mm) Inspect for damage after sampling

  Pitot Tubes Measure for appropriate spacing and dimensions or calibrate in a wind tunnel The rejection criteria are provided on the calibration sheet Inspect for damage after sampling

  Thermocouples Verify against a mercury in glass thermometer at three points including the anticipated measurement range Acceptance limits are impingers ± 2 F dry gas meter ± 5.4 F and duct ± 1.5 percent of the duct temperature

  Dry Gas Meters Calibrate in accordance with EPA Method 5 (6) Acceptance criteria pre test Yc ± 5 percent of the calculated average Y

  Balance Service and certify annually by the manufacturer Prior to obtaining first weights confirm accuracy by placing a known S type weight on the balance Balances will be used for weighing the impingers and samples before sending them to the laboratory

8.3 CALIBRATION OF CONTINUOUS EMISSION MONITORING SYSTEMS

System checks will be performed on each of the CEMS analyzers (CO, O2 and NOx) on a daily basis Detailed information on the calibration of the CEMS is available in Attachment 20 to the TOCDF RCRA Permit (5) The CO CEMS are zero span checked daily as directed by Attachment 20 (5) The O2 CEMS are zero span checked on a daily basis as directed by Attachment 20 (5) The CEMS operated by the sampling subcontractor will be calibrated before the LCPT and checked on a daily basis Criteria for the daily check of the sampling subcontractor CEMS are summarized in Table A 8 1

TABLE A 8 1 SUMMARY OF CEMS PERFORMANCE CHECK REQUIREMENTS

Criteria	Oxygen[a]	Carbon Dioxide[1]
Calibration Drift (precision)	≤ 0.5% reference	≤ 0.5% reference
Calibration Error (accuracy)	≤ 0.5% value	≤ 0.5% of span
Response Time	≤ 2.0 min	≤ 2.0 min
Bias	≤ 2% of span	≤ 2% of span
Interference	≤ 2% of span	≤ 2% of span

Note N/A = Not Applicable

[a] 40 CFR 266 Appendix IX Section 2.1
[1] 40 CFR 60 Appendix B Performance Specification 3
[2] 40 CFR 60 Appendix B Performance Specification 2
[3] 40 CFR 266 Appendix IX Section 2

9.0 ANALYTICAL OBJECTIVES AND PROCEDURES

This section describes the analytical procedures to be used to analyze the samples collected during the LCPT. The analytical methods to be used include GC/MS, HRGC/HRMS, IC, Inductively Coupled Plasma/Mass Spectrometer (ICP/MS) and Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The QA procedures for this will follow the basic guidelines given in the methods or the QA/QC Handbook (4). Should a failure in the analytical system occur, the laboratory will notify EG&G immediately. Any corrective actions will be as directed by Annex A and EG&G. Table A 9.1 presents a summary of the analytical methods to be used.

The laboratories will prepare the sorbents (XAD-2®) for gas sampling, prepare the QC samples and analyze the samples. Laboratory QC samples will include method blanks, blank spikes (as calibration checks and LCS), matrix spikes, and replicates. These will be performed as required by the methods or at least one round of samples per batch and one round every twenty samples. The field blank will be a sampling train assembled in the field, leak checked, let stand for the sample time, and then recovered as other trains. Table A 9.2 lists the expected number of field samples, field blanks, and trip blanks to be analyzed.

Table A 9.2 assumes the following for:

Method 002/5A samples – One set of samples per run plus one field blank per LCPT. Analyses will be for PCDDs/PCDFs.

Method 29 samples – One set of samples per run plus one field blank per LCPT. Analyses will be for the HHRA metals.

Method 5/26A samples – One set of samples per run plus one field blank per LCPT. Analyses will be for PM, HCl, and Cl.

Liquid Samples – the Brine samples will be collected during the final 60 minutes of the run. A spent decon sample will be collected for each run, but it may be collected before the run to allow analyses to be conducted before the run. One duplicate set of Brine and spent decon samples will be collected during one run. The liquid samples will be analyzed for total HHRA metals, VOCs, SVOCs, and PCDDs/PCDFs.

Lewisite Agent Samples – An agent sample will be collected for each run and analyzed for HHRA metals.

TABLE A 9 1 ANALYTICAL METHODS

Parameter	Matrix	Preparation	Analysis Method
PCDDs/PCDFs	XAD 2/2 filter rinsate	Method 0023A	Method 0023A/8290A
Particulate Matter (PM)	Filter/rinse	Method 5	Method 5
HCl and Cl	Impinger solutions	Method 26A	Method 9057
HHRA Metals	Filter rinse impinger solution	Method 29	Methods 6010A and 7470A
HHRA Metals	Lewisite Agent	HL-LOP-584	HL-LOP-587
Lewisite	Brine and spent decon	HL-LOP-572	HL-LOP-577
VOCs	Brine and spent decon	Method 5030B	Method 8260B
SVOCs	Brine and spent decon	Method 3510C	Method 8270D
PCDDs/PCDFs	Brine and spent decon	Method 8290A	Method 8290A
HHRA Metals	Brine and spent decon	Method 3010A 3015A 7470A	Method 6020A/7470A

TABLE A 9 2 NUMBER OF SAMPLES

Sample	LCPT	Field Duplicate	Field Blank
Method 0023A	5	0	1
Method 5 26A	5	0	1
Method 29	5	0	1
Wet Scrubber Recirculation Brine	5	1	0
Spent Decon	5	1	0
Lewisite agent	5	1	0

Method blanks blank spikes matrix spikes and replicates will be performed according to the methods

9.1 ANALYSIS METHODS FOR PROCESS STREAM SAMPLES

Process samples collected include Brine and spent decon The process streams will be sampled each run

9.1.1 Lewisite Analysis Method

Samples of the Brine and spent decon must be screened for Lewisite before the samples can leave the facility The method used for this analysis is TT TOP 572 which uses chloroform to extract the agent An aliquot of the extract is injected into a LC MS where the agent is separated from any other compounds and the mass spectra of the organic compounds is used to quantitate the compounds

9.1.2 pH Analysis

The pH of Brine samples and spent decon samples will be determined with a pH probe and pH meter using TT TOP 574 The pH probe and meter are calibrated using appropriate standards then the pH probe is rinsed dried and placed in the solution to be analyzed The pH reading is recorded and the probe is removed from the solution rinsed with distilled or DI water and dried The probe is then ready for the next measurement

9.1.3 Inorganic Analysis Methods

The process samples inorganic analyses are limited to the metals present in the samples Mercury will be analyzed by SW 846 Methods 7470A (L) which uses CVAAS The remaining HHRA metals are analyzed by ICP/MS The methods are described below

<u>SW 846 Method 7470A (liquids) Manual Cold Vapor Atomic Absorption Technique</u> A representative portion of the sample is digested with acids potassium permanganate and potassium persulfate Mercury ions are reduced to metallic mercury and stripped from the aqueous solution with a gas stream The mercury vapors are then directed into the path of an atomic absorption spectrometer Quantitation is achieved by comparison of sample component responses to the responses of external standards

<u>SW 846 Method 6020A – ICP/MS</u> The metals concentrations in the process samples will be determined by ICP/MS (The most recent version of the method will be used) A representative portion of the sample is digested with nitric acid and the sample digest is aspirated into the nebulizer of the ICP/MS The sample mist enters the plasma the plasma converts the sample to an atomic vapor and the mass spectrometer separates the elements by mass The masses detected are used to quantitate the elements present by comparing sample responses to the responses of internal standards

9.1.4 Organic Compound Analysis Methods

Brine and spent decon samples will be analyzed for VOCs (8260B) SVOCs (8270D) and PCDDs/PCDFs (8290A) using the most recent versions of the methods These methods are described below and their performance will be evaluated using the criteria listed in the QA/QC tables found in Annex A

- SW 846 Method 8260B Volatile Organic Compounds by GC/MS A representative portion of the liquid samples is introduced into a purge device using SW 846 Method 5030B (1) The liquid is purged with an inert gas and the volatile compounds are collected on a sorbent trap The trap is then heated and backflushed to desorb the compounds into the GC/MS The sample is then analyzed for the Target Analyte List shown in Table A 9 3 using SW 846 Method 8260B (1) Quantitation is achieved by comparison of sample component responses to the responses of internal standards

- SW 846 Method 8270D Semi Volatile Organic Compounds by GC/MS Aqueous samples have a representative aliquot of the sample extracted by SW 846 Method 3510B (1) using methylene chloride and then concentrated to a known volume Aliquots of the extracts are analyzed by SW 846 Method 8270D (1) using GC MS Quantitation is achieved by comparison of sample component responses to the responses of internal standards Table A 9 4 lists the target analytes for the total SVOC analyses

- SW 846 Method 8290A – PCDDs/PCDFs by HRGC HRMS A representative sample is extracted with toluene the extract is then concentrated to a known volume and the extract is subjected to a series of cleanup steps The sample is then evaporated to a small volume and diluted to a known volume An aliquot of the cleaned extract is then injected into a HRGC/HRMS and the compounds quantitated against internal standards as directed by SW 846 Method 8290A

TABLE A 9 3 TOTAL VOC TARGET ANALYTE LIST FOR PROCESS SAMPLES

1	Acetone	29	1 2 Dichloropropane
2	Benzene	30	1 3 Dichloropropane
3	Bromobenzene	31	2 2 Dichloropropane
4	Bromochloromethane	32	1 1 Dichloropropene
5	Bromodichloromethane	33	*cis* 1 3 Dichloropropylene
6	Bromomethane	34	*trans* 1 3 Dichloropropylene
7	2 Butanone	35	1 4 Dioxane
8	Carbon Disulfide	36	Ethylbenzene
9	Carbon tetrachloride	37	n Hexane
10	Chlorobenzene	38	2 Hexanone
11	2 Chloro 1 3 butadiene	39	Iodomethane
12	Chlorodibromomethane	40	Methylene chloride
13	Chloroethane	41	Methyl isobutyl ketone
14	Chloroform	42	n Propylbenzene
15	2 Chloroethyl vinyl ether	43	Styrene
16	Chloromethane	44	1 1 1 2 Tetrachloroethane
17	2 Chlorotoluene	45	1 1 2 2 Tetrachloroethane
18	4 Chlorotoluene	46	Tetrachloroethylene
19	Cumene (isopropylbenzene)	47	Toluene
20	1 2 Dibromoethane	48	Tribromomethane (Bromoform)
21	Dibromomethane	49	1 1 1 Trichloroethane
22	*trans* 1 4 Dichloro 2 butene	50	1 1 2 Trichloroethane
23	Dichlorodifluoromethane	51	Trichloroethylene
24	1 1 Dichloroethane	52	Trichlorofluoromethane
25	1 2 Dichloroethane	53	1 2 3 Trichloropropane
26	1 1 Dichloroethylene	54	1 1 2 Trichloro 1 2 2 trifluoroethane
27	*cis* 1 2 Dichloroethylene	55	Vinyl chloride
28	*trans* 1 2 Dichloroethylene	56	Xylenes(o m p)

TABLE A 9 4 TOTAL SVOC TARGET ANALYTE LIST FOR PROCESS SAMPLES

1	Acenaphthylene	35	1 4 Dinitrobenzene
2	Acenaphthene	36	4 6 Dinitro o cresol
3	Acetophenone	37	2 4 Dinitrophenol
4	Aniline	38	2 4 Dinitrotoluene
5	Anthracene	39	2 6 Dinitrotoluene
6	Benz(a)anthracene	40	Di n octyl phthalate
7	Benzo(b)fluoranthene	41	Diphenylamine
8	Benzo(k)fluoranthene	42	Fluoranthene
9	Benzo(g h i)perylene	43	Fluorene
10	Benzo(a)pyrene	44	Hexachlorobenzene
11	4 Bromophenyl phenyl ether	45	Hexachlorobutadiene
12	Butyl benzyl phthalate	46	Hexachlorocyclopentadiene
13	p Chloroaniline	47	Hexachloroethane
14	Chlorobenzilate	48	Indeno(1 2 3 c d)pyrene
15	*Bis* (2 Chloroethoxy)methane	49	Naphthalene
16	*Bis* (2 Chloroethyl)ether	50	2 Naphthylamine
17	*Bis* (2 Chloroisopropyl) ether	51	2 Nitroaniline
18	4 Chloro 3 methylphenol	52	4 Nitroaniline
19	2 Chloronaphthalene	53	Nitrobenzene
20	2 Chlorophenol	54	2 Nitrophenol
21	Chrysene	55	4 Nitrophenol
22	o Cresol	56	Pentachlorobenzene
23	m Cresol	57	Pentachloroethane
24	p Cresol	58	Pentachloronitrobenzene
25	Dibenz(a h)anthracene	59	Pentachlorophenol
26	m Dichlorobenzene	60	Phenanthrene
27	o Dichlorobenzene	61	Phenol
28	p Dichlorobenzene	62	Pyrene
29	2 4 Dichlorophenol	63	1 2 4 5 Tetrachlorobenzene
30	2 6 Dichlorophenol	64	2 3 4 6 Tetrachlorophenol
31	Diethyl phthalate	65	1 2 4 Trichlorobenzene
32	2 4 Dimethyl phenol	66	2 4 5 Trichlorophenol
33	Dimethyl phthalate	67	2 4 6 Trichlorophenol
34	Di n butyl phthalate		

9.2 ANALYSIS METHODS FOR LEWISITE AGENT SAMPLES

Lewisite agent samples collected are analyzed for HHRA metals. Inorganic arsenic in the samples will be determined by Method TE LOP 584. The HHRA metals present in the Lewisite agent are analyzed by ICP/MS using TE LOP 557. The agent samples are prepared for analysis using TE LOP 584 by digesting an aliquot of Lewisite agent in a combination of hydrochloric acid and nitric acid and then heating in a microwave oven. The digested sample is then diluted to a known volume and analyzed by aspirating the solution into the plasma which produces an atomic vapor. The mass spectrometer separates the elements in the vapor by their mass. The elements are quantitated against internal standards.

9.3 ANALYSIS METHODS FOR EXHAUST GAS SAMPLES

9.3.1 Analysis of Method 0023A Samples for PCDDs/PCDFs

The filter, XAD 2® resin, and the impinger rinses will be extracted with toluene and evaporated to a known volume. Then, the extract will be subjected to a series of cleanup procedures to remove interferences. The final extract will be analyzed for PCDDs/PCDFs using Methods 0023A/8290 (1). An aliquot of the cleaned extract is injected into a HRGC/HRMS and quantitation is achieved by comparison to internal standards.

The Method 0023A train is recovered into four containers that are subsequently combined into two fractions. Surrogates are spiked onto the XAD 2® resin before the samples are collected for the back half fraction. Surrogates for the front half fraction are spiked onto the filter just before the filter is placed in the extraction thimble. The front half fraction internal standards are spiked onto the filter after it has been placed in the extraction thimble. The back half fraction internal standards are spiked onto the XAD 2® resin after the resin has been transferred to the extraction device. Method 0023A/8290 (1) specifies the following standards:

STANDARD	COMPOUNDS
Surrogate Standards	$^{13}C_{12}$ 2,3,7,8-TCDD $^{13}C_{12}$ 1,2,3,4,7,8-HxCDD $^{13}C_{12}$ 2,3,4,7,8-PeCDF $^{13}C_{12}$ 1,2,3,4,7,8-HxCDF, $^{13}C_{12}$ 1,2,3,4,7,8,9-HpCDF
Internal Standards	$^{13}C_{12}$ 2,3,7,8-TCDD, $^{13}C_{12}$ 1,2,3,7,8-PeCDD $^{13}C_{12}$ 1,2,3,6,7,8-HxCDD $^{13}C_{12}$ 1,2,3,4,6,7,8-HpCDD, $^{13}C_{12}$ OCDD $^{13}C_{12}$ 2,3,7,8-TCDF $^{13}C_{12}$ 1,2,3,7,8-PeCDF, $^{13}C_{12}$ 1,2,3,6,7,8-HxCDF $^{13}C_{12}$ 1,2,3,4,6,7,8-HpCDF

Table A 9 6 shows the target analyte list for this method Performance of the method will be evaluated using the criteria listed in the QA/QC tables found in Annex A

TABLE A 9 5 PCDD/PCDF TARGET ANALYTE LIST

Polychlorinated Dibenzo P Dioxins	Polychlorinated Dibenzofurans
2 3 7 8 TCDD	2 3 7 8 TCDF
Total TCDDs	Total TCDFs
1 2 3 7 8 PeCDD	1 2 3 7 8 PeCDF
Total PeCDDs	2 3 4 7 8 PeCDF
1 2 3 4 7 8 HxCDD	Total PeCDFs
1 2 3 6 7 8 HxCDD	1 2 3 4 7 8 HxCDF
1 2 3 7 8 9 HxCDD	1 2 3 6 7 8 HxCDF
Total HxCDDs	2 3 4 6 7 8 HxCDF
1 2 3 4 6 7 8 HpCDD	1 2 3 7 8 9 HxCDF
Total HpCDDs	Total HxCDFs
Octachlorodibenzo p dioxin	1 2 3 4 6 7 8 HpCDF
	1 2 3 4 7 8 9 HpCDF
	Total HpCDFs
	Octachlorodibenzofuran

9.3.2 Analysis of Metals Emissions

The Method 29 samples will be analyzed for the HHRA metals and are listed in Table A-9-7. The samples will be prepared as described in Method 29 (6). Mercury will be analyzed by CVAAS using Method 7470A. The remaining elements will be analyzed by ICP/MS using SW-846 Method 6020A (1), which was modified by the addition of tin and vanadium to the analyte list.

- SW-846 Method 7470A (liquids) – Manual Cold Vapor Atomic Absorption Technique
  A representative portion of the sample is digested with acids, potassium permanganate and potassium persulfate. Mercury ions are reduced to metallic mercury and stripped from the aqueous solution with a gas stream. The mercury vapors are then directed into the path of an atomic absorption spectrometer. Quantitation is achieved by comparison of sample component responses to the responses of external standards.

- SW-846 Method 6020 – ICP/MS. Metals concentrations in the Method 29 samples will be determined by ICP/MS. (The most recent version of the method will be used.). A representative portion of the sample is digested with nitric acid and the sample digest is aspirated into the nebulizer of the ICP/MS. The sample mist enters the plasma; the plasma converts the sample to an atomic vapor, and the mass spectrometer separates the elements by mass. The masses detected are used to quantitate the elements present. Quantitation is achieved by comparison of sample responses to the responses of internal standards.

Performance of the method will be evaluated using the criteria listed in the QA/QC tables found in Annex A.

9.3.3 Analysis of Halogen Emissions

The analysis of HCl and Cl2 in the exhaust gas impinger samples will be performed by IC using Method 9057 (1). This method separates the anions by ion chromatography and the eluting anions are detected. The HCl emissions are determined from the analysis of the sulfuric acid impingers, and Cl2 emissions are determined from the analysis of the NaOH impinger samples using IC. Concentrations are calculated based on external calibration standards. Performance of the method will be evaluated using the criteria listed in the QA/QC tables found in Annex A.

9.3.4 Particulate Matter Analysis

The probe rinse and the filter of the combined Method 5/26A (6) train will be used to determine the PM concentrations. The probe rinse and filter will be dried and desiccated to a constant weight as directed in Method 5 (6).

TABLE A 9 6 METHOD 29 TARGET ANALYTE LIST

Analyte	Analyte
Aluminum	Lead
Antimony	Manganese
Arsenic	Mercury
Barium	Nickel
Beryllium	Selenium
Boron	Silver
Cadmium	Thallium
Chromium	Tin
Cobalt	Vanadium
Copper	Zinc

10.0 SPECIFIC LABORATORY QUALITY CONTROL CHECKS

The QC checks are performed to ensure the collection of representative samples and the generation of valid analytical results on these samples. The project participants will perform QC checks throughout the program. The laboratories will utilize EPA approved analytical methods for those analytes that have methods available. The QC samples analyzed will include method blanks, duplicate samples, LCS, and MS/MSD. Table A-9-2 lists the field blanks to be collected.

Reagents used in the laboratory are normally of analytical reagent grade or higher purity; each lot of acid or solvent used is checked for acceptability prior to laboratory use. All reagents are labeled with the date received and the date opened. The quality of the laboratory DI water is routinely checked. The glassware used in the sampling and analysis procedures are precleaned according to the method requirements. Standard laboratory practices for laboratory cleanliness, personnel training, and other general requirements will be used, and the results of these QC procedures will be included in the final report.

10.1 METHOD BLANKS

Method blanks contain all the reagents used in the preparation and analysis of samples and are processed through the entire analytical scheme to assess any spurious contamination that might arise from reagents, glassware, and other sources. The QC criteria for method blanks are shown in Annex A by individual method.

10.2 LABORATORY CONTROL SAMPLES

The LCSs are samples generated from analyte spikes into a neutral matrix prepared independently from the calibration concentrates. The LCSs are used to establish that an instrument or procedure is in control. The LCSs are normally carried through the entire sample preparation and analysis procedure. The QC criteria for the LCS are listed in Annex A by analysis method.

10.3 DUPLICATE ANALYSES

Duplicate sample analysis will be used to evaluate the variance in a particular applied analytical method. Field duplicate samples will be collected for the Lewisite agent, Brine, and spent decon samples during one performance run. Samples analyzed by CVAAS will be analyzed in duplicate as specified in the method. Duplicate analyses will be performed on the halogen samples analyzed by IC. One of the metals emission samples will also be analyzed in duplicate as a measure of the precision of the analysis method.

10.4 MATRIX SPIKE SAMPLES

Matrix spikes are samples spiked with the analyte of interest and then analyzed to determine a %R. It is anticipated that these analyses would assess the behavior of actual analyses in individual program samples during the entire preparative and analysis scheme. Matrix spike analysis will be conducted to evaluate accuracy and general matrix recovery. An MS/MSD will be prepared from the process water, Brine, and spent decon samples. The QC criteria for %R and RPD are shown in Annex A for each method.

10.5 SURROGATE SPIKES

Surrogate spikes will be used for GC/MS analysis methods as an indicator of the general accuracy of sample preparation and analysis. The QC criteria for surrogate spike recoveries are listed in Annex A by analysis method. The following surrogate compounds will be used for VOC analyses: toluene d_8, bromofluorobenzene, and 1,2-dichloroethane d_4. The following surrogate compounds will be used for analysis of SVOCs: nitrobenzene d_5, 2-fluorobiphenyl, terphenyl d_{14}, phenol d_6, 2-fluorophenol, and 2,4,6-tribromophenol. Surrogate spikes will also be used for Method 8290 for PCDD/PCDF analyses.

10.6 ANALYTICAL INSTRUMENT CALIBRATION

The analytical instrumentation used in the laboratory for analysis of LCPL samples will undergo several performance checks. An initial calibration curve will be analyzed before performing any samples analyses to compute linearity of response to concentration of known amounts of the analytes of interest. The initial calibration for some methods will use a calculated Correlation Coefficient (CC) to demonstrate acceptability of the calibration. On a daily basis a continuing calibration check will be analyzed before any samples are run for that day. If acceptance criteria as specified in the appropriate analytical methods for initial or continuing calibrations are not met, sample analysis will not proceed until the analytical problem has been rectified and the criteria have been met. Linearity checks will be used to verify that response has not shifted significantly from the most recent calibration. Some methods will use an Initial Calibration Verification (ICV) to demonstrate that the calibration was accurate, and Continuing Calibration Verification (CCV) will be used to ensure that the calibration is still representative. A summary of the calibration procedures and frequency for the laboratory instruments to be used for this project is provided in Table A-10.1. The instrument initial calibration procedures and acceptance criteria will be those established in the analytical method and listed in Annex A. Internal standards will be analyzed to evaluate instrument and method performance. The QC criteria for the internal standards are listed in Annex A by analysis method.

TABLE A 10-1 CALIBRATION PROCEDURES FOR ANALYTICAL METHODS

Method	Analytical Equipment	Calibration Curve	Calibration Checks	Target Criteria
7470A	CVAAS	Calibration blank and [illegible] standard [illegible]	CCV every 10 samples and at the end of the run sequence	CCV ± 10% of known value
6020A	ICP-MS	Calibration blank and one standard	CCV every 10 samples and at the end of the run sequence	CCV ± 10% of known value
8260B	GC-MS	Five point calibration	CCC every 12 hour tune period	Drift ≤ 20%
8270D	GC-MS	Five point calibration	Verified every 12 hour tune period	Variability of average RRF of ≤30% RSD
8290	HRGC/HRMS	Five point calibration	Verified every 12 hour tune period	Variability of average RRF of ≤30% RSD
Method 5	Analytical Balance	NIST traceable weights	Beginning and end of day	Self taring
9057	Ion Chromatograph	Four point calibration giving a CC [illegible]	CCV every 10 samples and at the end of the sequence	CCV ± 10% of known value

Notes
CCC = Calibration Check Compound
RRF = Relative Response Factor
NIST = National Institute for Standards and Technology

11.0 DATA REPORTING, DATA REVIEW, AND DATA REDUCTION

Reporting the data generated during an LCPT is an important part of the overall project. This section describes and discusses the components of reporting, reviewing, and reducing the collected LCPT data.

11.1 DATA REPORTING

The data reporting process will discuss the analytical data packages, review of the data generated for this LCPT, and the final LCPT Report.

11.1.1 Analytical Data Packages

Data reported from subcontract commercial laboratories will be required to be similar to the format used by the EPA Contract Laboratory Program (CLP). This format will include a case narrative section, Analytical Data Summary Sheets, QC Sample Results, the COC forms, and raw data organized by analytical method. Complete data packages are included so that an independent verification of the final analytical results can be conducted. These data packages are stand-alone deliverables that include the instrument raw data, parameter specific QC documentation, calibration and calibration check performance, and instrumentation performance information. The case narrative will:

- Describe the data package and identify project specific information;
- Discuss any pertinent information concerning data quality and any difficulties or analytical anomalies encountered in the analyses;
- Provide a cross reference listing of the field sample and laboratory sample identities;
- Discuss information on achieving DQOs or project specific objectives.

The Analytical Data Summary Sheets will contain a summary of the analytical results and the key QC data. A separate sheet will be provided with the results for each sample. These data will include the results, recovery of any surrogate materials, date sampled, and analysis date, which will allow confirmation of meeting the QC and holding time requirements. Summary sheets for the analysis of the QC samples will follow the sample results sheets.

Copies of the COC forms are also a part of the data package. These copies are submitted with the samples, and copies of any internal COC forms used to track the samples through the different analyses in the laboratory.

Raw data will be included in the Analytical Data Packages. This raw data will include chromatograms for those methods generating them, blank data, sample preparation sheets, copies of sequence files, and calibration data. The raw data will be organized by analysis method, and enough data will be supplied to allow recreation of the sample analysis event.

11.1.2 Analytical Data Format

The data that will be reported as "not detected" will use the LOQ for the lower reporting limit. Analytes detected with a concentration between the MDL and the LOQ will be qualified as an estimate and reported. The LOQ is the same as the reporting limit used by some laboratories. The LOQ will be defined as the quantitation level that corresponds to the lowest level at which the entire analytical system gives reliable signals and an acceptable calibration point or low level matrix spike. Each compound or element is assigned a LOQ that is contingent upon the behavior of the compound or element during analysis. Changes to extraction protocol, amount of sample prepared, or dilution applied to the sample can raise or lower the LOQ.

The analytical results for PCDDs/PCDFs are quantitated differently. They are quantitated using an isotope dilution method. Each sample is spiked with an isotopically labeled surrogate for each target compound. On a sample by sample basis, the recovery of each surrogate is determined, then the analytical result is normalized to the recovery of the corresponding surrogate compound. In this manner, the LOQ for each sample and each compound can vary as the surrogate recovery varies. This isotope dilution method is considered to be the most accurate quantitation method available for these analyses.

Sample analysis results will be reported by the laboratory in matrix specific units. Results will be reported for all sample analyte parameters required for this LCPT as listed in Table 3.9.1. The laboratory will assign qualifiers to the results, when necessary, based on guidelines found in the analytical method, CLP, or in this QAPP. Qualifiers appearing on the analytical summary sheets are defined on that specific sheet. Data presented in tables in the LCPT Report will note any data qualifiers.

11.1.3 LCPT Report

An LCPT Report will be prepared and submitted to the DAQ and DSHW. EG&G will complete the LCPT report as outlined in Section 8.0 of the LCPT plan. The report will compare the LCPT results to the RCRA Permit, Title V permit, and MACT Limits.

The LCPT Report will also contain:

- Daily run summaries
- A summary of incinerator operating parameter data and associated limits

A summary of sampling and analytical methods used and any deviations from referenced methods

Analysis results, protocols, and quantitative gas analyses

CEMS data emission averages and calculations

A compilation and evaluation of analytical calibration data and QA/QC data, and identification of problems encountered and the solutions implemented

Copies of calibration data, chromatograms, and other raw data

Audit cylinder results calculated in parts per billion (ppb)

Examples of all calculations, sampling train data, concentrations, and emission rates for all gases and particulate samples collected

A QA/QC Report will be submitted to the EG&G CAR and included in the LCPI Report as an appendix. Additionally, each formal data deliverable will contain a summary of QA/QC activities. This summary will include:

Estimates of precision, accuracy, and completeness of reported data

Reports of performance and system audits

Any quality problems found

Any corrective actions taken

11.2 DATA REVIEW

The STC will review the field sampling data to determine the representativeness of the samples, maintenance and cleanliness of sampling equipment, and the adherence to the approved written sample collection procedure. All field data will be recorded on prepared forms, and the data sheets will be reviewed at the end of each run by the STC and the Sampling Subcontractor QA Officer to ensure that each sheet is properly completed. The gas sampling data will be reduced on site to verify isokinetic sampling rates. Furthermore, the sampling subcontractor's software for determining sample volumes and isokinetic sampling rates will be checked for accuracy against an independent program, and any differences resolved before inclusion in the final report.

The analyst generating the data will review the laboratory data then the analyst's supervisor will review the data The laboratory QC personnel will further review the data per the laboratory procedure before the project report is prepared by the Subcontractor Laboratory Project Manager When the analytical data are submitted to the sampling subcontractor the data will again be reviewed before it is used to prepare the LCPT Report This review process will confirm that the data are usable for an assessment of incinerator performance

11.2.1 Data Validation

Data validation is the process of accepting or rejecting data on the basis of established criteria Analytical and sampling data will be validated by the LCPT subcontractor QC personnel using criteria outlined in this QAPP The subcontractor QC personnel will use validation methods and criteria appropriate to the type of data even data judged to be outlying or spurious value The persons validating the data will have sufficient knowledge (i e at least one year of experience in data validation) of the sampling and analytical methods to identify questionable values and deviations from criteria specified in the methods and the QAPP

The results from the field and laboratory method blanks replicate samples and internal QC samples will be used to further validate analytical results Analytical results on the field blanks and replicate samples also are valuable for validation of sample collection The QA QC personnel will review all laboratory and sampling raw data to verify calculated results presented consistency duplicate sample analysis spike recoveries tests for outliers and transmittal errors The criteria that will be used to evaluate the field sampling data include

- Use of approved test procedures
- Proper operation of the process being tested
- Use of properly operating and calibrated equipment
- Use of proper forms for recording data including identification numbers for each nozzle probe and dry gas meter
- Leak checks conducted before tests during port changes and after tests
- Use of reagents that have conformed to QC specified criteria
- Maintenance of proper traceability

The criteria used to evaluate analytical data include

- Use of approved analytical procedures
- Use of properly operating and calibrated instrumentation

Precision and accuracy should be comparable to that achieved in previous analytical programs and consistent with the DQOs listed in Annex A

See Section 10.0 for the anticipated minimum number of QC samples The %R of each matrix will be calculated as shown in Section 13.0 Inorganic data will be evaluated using the general methods outlined in the EPA CLP guidelines for inorganic data (10) using the criteria from Annex A The organic data will be evaluated using the general methods outline in the EPA CLP guidelines for low level organic data (11) The PCDD/PCDF data will be evaluated using the general methods outline in the EPA guidelines for dioxin data (12) These evaluations will be included in the QA report which will be an appendix to the final report

11.2.2 Identification and Treatment of Outliers

Any point that deviates from others in its set of measurements will be investigated however the suspected outlier will be recorded and retained in the data while it is under investigation One or both of the following tests will be used to identify outliers

Dixon's test for extreme observations which is a computed procedure for determining whether a single very large or very small value is consistent with the data set

The one tailed t test for difference

If more than one outlier is suspected in the same data set other statistical sources will be consulted and the most appropriate test of the hypothesis will be used and documented

Those persons involved in the analysis and data reduction will be consulted if a data outlier is suspected as they may be able to add some insight to the evaluation of the suspect data This evaluation may provide an experimental basis for the outlier to determine its effect on the conclusions Two data sets may be reported – one including and one excluding the outlier

11.3 DATA REDUCTION

Specific QC measures will be used to ensure the generation of reliable data from sampling and analysis activities Proper collection and organization of accurate information followed by clear and concise reporting of the data is a primary goal in all projects

11.3.1 Field Data Reduction

Annex B contains the standardized data sheets that are representative of those used to record gas sampling data. Raw sampling data will be reduced on a daily basis and will be reviewed in the field by the STC and the sampling team leader. Isokinetic sampling rates and sample volumes will be reported daily. Any errors or discrepancies will be noted in a field notebook. The sampling team leader has the authority to institute corrective actions in the field, and the STC will also be consulted for resolution if the situation warrants. At a minimum, the Sampling Subcontractor QA Officer and the I G&G CAR will be apprised of all deviations from the standard protocol.

11.3.2 Laboratory Analyses Data Reduction

Analytical results will be reduced to concentration units specified by the analytical procedure and using the equations given in the analytical procedures. Results will be reported on an as received basis. If the units are not specified, then units for data will be used as follows:

Liquid samples will be reported in units of milligram per liter (mg/L).

Excavated agent sample results will be reported in weight percent (Wt%) for the organic compounds and milligrams/kilogram (mg/kg) for the metals results with arsenic results reported in Wt%.

- Gas samples will be reported on a mass per dry standard cubic unit of measure except for the halogen emissions and results from the CEMS, which are reported in parts per million (ppm).

- Oxygen and carbon dioxide data will be reported in volume percent.

Audit cylinder analysis results will be reported in parts per billion (ppb).

11.3.3 Blank Corrected Data

Results from the metals emissions train will be blank corrected as instructed in Method 29 (6). A separate blank correction will be made for the front half and the back half. The raw data will also be reported. The other data developed for this LCPT will not be blank corrected.

11.4 EXHAUST GAS SAMPLE TRAINS TOTAL CALCULATIONS

The calculation of the train total of an analyte is the sum of two or more fractions of train components. Analytes not detected in the analysis will be reported as < LOQ. Analytes with concentrations between the MDL and the LOQ will be qualified as estimated and reported. The summation for the total will use the LOQ value for those analytes not detected and the reported values for those analytes detected including values between the MDL and LOQ. Totals including LOQ and qualified data will have a < flag added to the reported total. When the analyte is not detected in any of the fractions, the LOQ value for each fraction will be summed for the total and the results flagged with an ND to indicate the analyte was not detected.

Calculations will be carried out to at least one decimal place beyond that of the acquired data and should be rounded after final calculations to three significant figures for each analyte for a train total. Rounding of numbers should conform to procedures found in ASTM SE 10 (1,5).

12.0 ROUTINE MAINTENANCE PROCEDURES AND SCHEDULES

The sampling subcontractor will follow an orderly program of positive action to prevent the failure of equipment or instruments during use. This preventative maintenance and careful calibration helps to ensure accurate measurements from field and laboratory instruments.

All equipment that is scheduled for field use will be cleaned and checked prior to calibration. Once the equipment has been calibrated, sample trains are assembled and leak checked to reduce problems in the field. An adequate supply of spare parts will be available in the field to minimize any downtime caused by equipment failure.

The TOCDF CEMS are operated and maintained in accordance with Attachment 20 to the TOCDF RCRA Permit (5). Maintenance is performed on a regularly scheduled basis prior to use in the field and includes, but is not limited to: purging of sample lines, checking pump oil and belts, cleaning rotometers or other sample flow monitoring devices, and checking sample capillaries and mirrors. Routine maintenance procedures are critical for ensuring the continuous trouble-free operation of the CEMS in adverse environments.

The sampling subcontractor will maintain their CEMS in accordance with the specific methods and manufacturer specifications. Sample lines will be inspected daily to ensure no leaks or other problems occur. The subcontractor laboratories will maintain their instrumentation in accordance with the instrument manufacturer specifications and appropriate methods. In addition, the laboratories will maintain a stock of replacement parts to minimize downtime resulting from foreseeable breakage or typical consumption.

13.0 ASSESSMENT PROCEDURES FOR ACCURACY PRECISION AND COMPLETENESS

The QA/QC criteria for the analyses of samples for this project are presented in Annex A. Annex A contains criteria for method calibrations, data accuracy, and precision of data. Each method has a set of criteria to meet, and the methods of calculating the evaluation criteria are discussed in this section.

13.1 PRECISION

Precision is defined as the degree of mutual agreement among individual measurements made under prescribed conditions. Precision will use two different measurements depending on the number of data points being considered. Two data points will have the RPD calculated, three or more data points will use the RSD as a measure of the precision. Criteria for precision for each method have been included in Annex A.

Precision will be calculated for laboratory duplicate analysis using the following two equations:

1) $RPD = [(X_1 - X_2)/(X_1 + X_2)] \times 100$

Where RPD = Relative Percent Difference
X_1 = Highest Analytical Result
X_2 = Lowest Analytical Result

2) RSD = (standard deviation/average value) x 100

Calculation of the precision for each analysis will be based on different criteria taken from the QA/QC Handbook (4) and the analytical methods. The precision for the halogen samples will be determined by the RPD calculated from the analysis of the MS/MSD. The MS/MSD will be used because the field samples have a history of very low concentrations. The precision of the SMVOC samples will be based on the RSD calculated from the analysis of the LCS, and the results of the LCS analyses will be used because of the historically low concentrations found in field samples. Precision for the metals emission samples will be based on the RPD of the LCS and duplicate analyses of one emission sample. Precision data for metals in the process samples will be based on analyses of MS/MSD and duplicate samples.

13.2 ACCURACY

Accuracy is the degree of agreement between a measurement and an accepted reference or true value. The accuracy of the LCPT data will be determined from analysis of samples spiked with a known concentration. The number of spiked samples and the spiking levels will be designated by the respective methods. Accuracy DQOs for each method are in Annex A.

The formula used to assess the accuracy of the LCS is

$$\%R = (Q_{LCS} / Q_{Kc}) \times 100$$

Where %R = Percent Recovery
Q_{LCS} = Quantity of Analyte Found in the LCS
Q_{Kc} = Known Concentration of the LCS

The formula used to assess the accuracy of the MS/MSD samples is

$$\%R = [(Q - Q) / Q] \times 100$$

Where %R = Percent Recovery
Q = Quantity of Analyte Found in the Spike Sample
Q = Quantity of Analyte Found in the Unspiked Sample
Q = Quantity of Added Spike

Calculation of the accuracy for each analysis will be based on different criteria taken from the QA/QC Handbook (4) and the analytical methods. Determination of accuracy for samples will be determined by the

%R calculated from the analysis of the MS/MSD for the halogen samples

%R calculated from the analysis of the LCS for the SMVOC samples

Analysis of the LCS for the accuracy of the metals emission samples

Analysis of the LCS for the PCDD/PCDF samples

%R from the analysis of the LCS and MS/MSD for the SVOC analyses in the process samples

13.3 COMPLETENESS

Completeness is defined as the amount of valid data for an LCPT compared to the amount that was expected to be obtained under optimal conditions. The completeness objective here is to have 100 percent of the data valid for three performance runs for the LCPT (i.e., acceptable results must be obtained for three performance runs). The completeness objective for the entire monitoring project is to obtain 75 percent minimum amount of data needed to complete the statistical design [see QA/QC Handbook (4)].

Completeness will be reported as the percentage of all measurements judged to be valid, and every attempt will be made to ensure that the data to be generated is valid. If data appear questionable based on circumstances observed during the field sampling, additional runs will be completed as soon as the system can be reset to ensure three successful performance runs are completed. Furthermore, in reality, some samples may be lost in laboratory accidents, and some results may be qualified based on laboratory QC procedures.

The following formula will be used to calculate percent completeness:

$$C = (V/T) \times 100\%$$

Where C = Percent Completeness
V = Number of Measurements Judged Valid
T = Total Number of Planned Measurements

14.0 AUDIT PROCEDURES, CORRECTIVE ACTION, AND QUALITY ASSURANCE REPORTING

The LCPT QA program will comply with EPA and state requirements for audits which include performance and system audits as independent checks on the quality of data obtained from sampling analysis and data gathering activities The procedures and techniques in place will ensure that the audit is representative of the measurement processes during normal operations Either type of these two audits may show the need for corrective action

14.1 PERFORMANCE AUDITS

A performance audit checks the performance or accuracy of the measurements being made The sampling and analysis segments of the project are checked in a performance audit Sampling performance audits will be accomplished through observation of the sampling operations by the regulatory agency representative and the Sampling Subcontractor QA Officer For this purpose an audit cylinder or spiked audit samples may be supplied by the DSHW during the LCPT In the event an audit cylinder is supplied it will be sampled and analyzed in the same manner as the field samples If spiked samples are supplied it will be extracted and analyzed according to the same methods used for the field samples

14.2 SYSTEM AUDITS

A system audit involves observation by a third contractor or regulatory agency to ascertain that the work is being performed in accordance with the methods specified in this QAPP

14.2.1 Field Audit

The Sampling Subcontractor QA Officer will observe all activities to ensure that the QAPP is being followed and that sample COCs are accurate before sample shipment The Sampling Subcontractor QA Officer will report any discrepancies to the STC complete an LCPT QA check list maintain a log of discrepancies for the STC and the QA Director and attend performance run meetings

Representatives from the DSHW are expected to be on site to observe all sampling activities The point of contact for federal and state environmental regulatory agencies staff during the LCPT will be the Test Director or his designee

During each performance run the sampling subcontractor performs a system audit which consists of an inspection and review of the total sampling system including

Setting up a pretest leak check of the sampling trains

Isokinetic sampling check (if required)

Final leak checks of the sampling train

Sample recovery

Results of the leak checks are noted on the field data sheets while the remaining item checks are documented on the audit checklist. When necessary, audit samples are analyzed along with the test samples.

14.2.2 Laboratory Audit

The Test Director will direct that an audit of each laboratory be conducted to ascertain that work is performed in accordance with the methods specified in the QAPP. Auditors will be selected from the EG&G Environmental Department, TOCDF QC Inspectors, or the sampling subcontractor's QC Department.

14.3 CORRECTIVE ACTION

The need for corrective action will occur when a circumstance arises that adversely affects the quality of the data output. In most instances, the personnel conducting the field work and the laboratory analysis are in the best position to recognize problems that will affect data quality. Variances on their part can detect minor instrument changes, drifts, or malfunctions that can then be corrected, thus preventing a major breakdown of the system. They will be in the best position to decide upon the proper corrective action and to initiate it immediately, thus minimizing data loss. Therefore, the field sampling and laboratory analysis personnel will have the prime responsibility for recognizing the need for a nonconformance report. The personnel identifying or originating a nonconformance report will document each nonconformance. For this purpose, a variance log, a testing procedure record, a notice of equipment calibration failure, results of laboratory analysis QC tests, an audit report, an internal memorandum, or a letter will be used as appropriate.

15.0 REFERENCES

(1) ***Test Methods for Evaluating Solid Waste Physical/Chemical Methods*** 3rd Edition including Update III USEPA SW 846 December 1996

(2) ***Hazardous Waste Combustion Unit Permitting Manual Component 2*** How to Review A Quality Assurance Project Plan U S EPA Region 6 Center for Combustion Science and Engineering January 1998

(3) ***EPA Guidance for Quality Assurance Project Plans*** EPA QA/G 5 December 2002

(4) ***Handbook Quality Assurance/Quality Control (QA/QC) Procedures for Hazardous Waste Incineration*** EPA/625/6 89/023 January 1990

(5) **Attachment 20 to the TOCDF RCRA Permit** ***CEMS Monitoring Plan*** EG&G Defense Materials Inc TOCDF ***CDRL 06***

(6) Title 40 ***Code of Federal Regulations*** Part 60 Appendix A Test Methods

(7) ASTM International Method D5270 Standard Practices for Sampling Water from Closed Conduits

(8) **Attachment 6 to the TOCDF RCRA Permit** INSTRUMENT CALIBRATION PLAN EG&G Defense Materials Inc TOCDF

(9) ***Quality Assurance Handbook for Air Pollution Measurement Systems Volume III Stationary Source Specific Methods*** EPA 600/4 77 027b

(10) ***USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Review*** EPA 540 R 04 004 October 2004

(11) ***USEPA Contract Laboratory Program National Functional Guidelines for Low Concentration Organic Data Review*** EPA 540 R 00 006 June 2001

(12) ***USEPA Analytical Operations/Data Quality Center National Functional Guidelines for Chlorinated Dioxin/Furan Data Review*** EPA 540 R 02 003 August 2002

(13) American Society for Testing and Materials ASTM SI 10 International System of Units

LEWISITE COMPREHENSIVE PERFORMANCE TEST PLAN

FOR THE

AREA 10 LIQUID INCINERATOR

APPENDIX A

ANNEX A

QA/QC OBJECTIVES FOR ANALYTICAL METHODS

REVISION 0

January 4, 2010

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1.0 INTRODUCTION

QA/QC OBJECTIVES FOR ANALYTICAL METHODS

These Quality Assurance/Quality Control (QA/QC) objectives are prepared based on the input from the laboratories performing the analyses for the Area 10 Liquid Incinerator (ATLIC) Lewisite Comprehensive Performance Test (LCPT). The objectives were developed from the guidance provided in the EPA reference methods (1, 2, 3), EPA Guidance for Quality Assurance Project Plans (4), each laboratory QA program, and guidance in the EPA QA/QC Handbook (5). The DSHW will be notified of any changes to these tables when they occur.

2.0 PCDDs/PCDFs SAMPLING AND ANALYSIS METHODS

2.1 Summary QA/QC Criteria for Dioxins by Method 0023A/8290

QUALITY PARAMETER	METHOD/ FREQUENCY	CRITERIA	CORRECTIVE ACTION
Initial Calibration (ICAL)	Five point calibration initially and as required	Single RSD ≤ 25 except for OCDD [illegible]	Evaluate system Recalibrate
Continuing Calibration (CCAL)	Midpoint standard at start of each 12 hour sequence	Deviations ≤ 25 from avg RRF (ICAL) except for OCDD [illegible]	Evaluate system Reanalyze CCAL Recalibrate as necessary
Reagent Blank	1 per batch	≤ 5 X LOQ	Reanalyze and/or qualify
Field Blank	1 per ATB	≤ 5 X LOQ	Reanalyze and/or qualify
Method Blank	1 per batch	≤ 5 X LOQ	Reanalyze and/or qualify
Window Defining Mix (WDM) Column Performance Standard Mixture (CPSM)	Once per 12 hours prior to sample analysis	Elute first retention times. CPSM must have ≥ [illegible] valley resolution for 1,3,7,8-TCDD	Reclean and [illegible] Evaluate system Perform maintenance Reanalyze WDM/CPSM
Method Blanks	1 per analytical batch	≤ LOQ except for OCDD at ≤ 5 X LOQ	Reanalyze if appropriate Assess impact on data Process archive sample if necessary
LCS	1 per analytical batch	[illegible] 140 [illegible] analytes	Reprocess and reanalyze Assess impact on data Process archive sample if necessary
[illegible]	[illegible]	[illegible]	[illegible] Assess impact on data and qualify
Internal Standards	Every sample	[illegible] through the [illegible] [illegible] for heptad and octa isomers	Check chromatogram for interference Check instrument and [illegible] if necessary Check standards [illegible] process archive sample Assess impact on data and qualify
Audit Sample	As Supplied	[illegible]	
Holding Time		30 Days Extraction 45 Days Analysis	

Notes The term LOQ refers to the Laboratory Standard Reporting Limit
RSD = Relative Standard Deviation OCDF = Octachlorodibenzofuran RRF = Relative Response Factor
D = Percent Difference TCDD = Tetrachlorodibenzo-p-dioxin OCDD = Octachlorodibenzo-p-dioxin

TOCDF

TOCDF/ICA = R[illegible]
Ap[illegible]
[illegible]

2.2 Summary QA/QC Criteria for Dioxins by Method 8290

QUALITY PARAMETER	METHOD/ FREQUENCY	CRITERIA	CORRECTIVE ACTION
ICAL	Five point calibration Initially and as required	Int Std RSD ≤ 30 Natives RSD ≤ 20 %	Evaluate system Recalibrate
CCAL	Midpoint Standard at Start of Each 12 hour sequence	% D of IS ≤ 30 % from avg RRF (ICAL) %D of natives ≤ 20 % from avg RRF (ICAL)	Evaluate system Reanalyze CCAL Recalibrate as necessary
WDM CPSM	Once per 12 hours prior to sample analysis	Used to set retention times CPSM must have ≤ 25 % valley resolution for 2,3,7,8 TCDD	Readjust windows Evaluate system Perform maintenance Reanalyze WDM CPSM
Method Blanks	1 per analytical batch	< LOQ except for OCDD @ < 5 X LOQ	Reanalyze Assess impact on data
LCS	1 per analytical batch	60 to 140 % for target analytes	Review internal standards Assess impact on data Reextract and or reanalyze as necessary
MS/MSD	1 per ATB	60 to 140 % recovery for target analytes RPD ≤ 20%	Review LCS Assess impact on data Narrate
Internal Standard	Every sample	40 to [illegible] for tetra through hexa isomers 25 to 150 % for hepta and octa isomers	[illegible] interference Check instrument and reanalyze Check signal to noise at 10:1 or extract Assess impact on data and narrate
Holding Time		30 Days Extraction 45 Days Analysis	

Note The term LOQ refers to the Laboratory Standard Reporting Limit

2.3 Limit of Quantitation for PCDDs/PCDFs

COMPOUND	METHOD 0023A/8290 (pg/Fraction)	METHOD 8290 (ng/L)
2,3,7,8-TCDF	5	0.005
1,2,3,7,8-PeCDF	25	0.025
2,3,4,7,8-PeCDF	25	0.025
1,2,3,4,7,8-HxCDF	25	0.025
1,2,3,6,7,8-HxCDF	25	0.025
1,2,3,7,8,9-HxCDF	25	0.025
2,3,4,6,7,8-HxCDF	25	0.02
1,2,3,4,6,7,8-HpCDF	25	0.025
1,2,3,4,7,8,9-HpCDF	25	0.025
OCDF	50	0.050
2,3,7,8-TCDD	5	0.005
1,2,3,7,8-PeCDD	25	0.025
1,2,3,4,7,8-HxCDD	25	0.025
1,2,3,6,7,8-HxCDD	25	0.025
1,2,3,7,8,9-HxCDD	25	0.025
1,2,3,4,6,7,8-HpCDD	25	0.025
OCDD	50	0.050

3.0 HALIDE EMISSIONS

Summary QA/QC Criteria for Hydrogen Chloride and Chlorine (9057)

QUALITY PARAMETER	METHOD/ FREQUENCY	CRITERIA	CORRECTIVE ACTION
Method Blank	1 per analytical batch	< LOQ	Reanalyze Assess impact on data Narrate
Field Blank	1 per SWDT	< Low standard	Narrate
Initial Calibration	4 point calibration and a blank Initial/as required	Correlation coefficient ≥ 0.995	Evaluate system Recalibrate
Continuing Calibration	Midpoint standard every 10 samples and at end of sequence	90 to 110 %	Evaluate system Repeat calibration check Recalibrate Reanalyze affected samples
Precision/ Accuracy	LCS per batch	90 to 110 %	Check calculations Reanalyze Assess impact on data Narrate
	MS/MSD per batch	85 to 115 %R RPD ≤ 25 %	Check calculations If RPD is in control accept data and narrate. If RPD is out of control reanalyze
Audit Sample	As provided	90 to 110 %	Check calculations Reanalyze and Narrate
LOQ	Hydrogen Chloride Chlorine	1.0 mg/train 1.0 mg/train	
Holding Time		28 days	

Note The Firm LOQ refers to the Laboratory's standard Reporting Limit

4.0 METHOD 6020A ICP/MS

4.1 Summary QA/QC Criteria

QUALITY PARAMETER	METHOD/ FREQUENCY	CRITERIA	CORRECTIVE ACTION
Instrument Tune	Daily prior to calibration and sample analysis	Mass resolution ≤ 1.0 amu @ 10% peak height Mass calib. ± 0.1 amu	Retune instrument Repeat tune solution and analysis
Initial Calibration	Blank and at least one standard	ICV ± 10% of expected value	Evaluate and reanalyze ICV Recalibrate
Calibration Blank	After ICV and CCV	< LOQ	Clean system. Rerun Reanalyze affected samples
CCV	Every 10 samples and end of run sequence	± 10% of expected value	Reanalyze CCV Recalibrate Reanalyze samples
Method Blank	1 per analytical batch	< LOQ	Reanalyze Recalibrate if necessary
Internal Standard	Each sample	30 to 150% IR	Reanalyze and dilute
Duplicate Control Sample (DCS)	1 per analytical batch	75 to 125% IR RPD ≤ 25%	Check calculations Assess impact on data Reextract and reanalyze as necessary
MS/MSD *	1 per analytical batch	75 to 125% IR RPD ≤ 25%	Check calculations Reanalyze Assess impact on data
Duplicate Analyses	1 per analytical batch	RPD ≤ 20%	Check calculations Reanalyze Assess impact on data
Holding Time		180 Days to analysis	

Note amu = atomic mass unit
ICV = Initial Calibration Verification
CCV = Continuing Calibration Verification
* For all matrices the QC samples per batch include a DCS only (no MS/MSD).

4 2 Method 6020 LOQs

ELEMENT	Metal Emissions, LOQ (µg/Sample)	Aqueous Samples, LOQ (mg/L)
Aluminum	7.5	1.0
Antimony	0.30	0.050
Arsenic	0.50	0.050
Barium	0.15	0.025
Beryllium	0.15	0.025
Boron	7.5	1.0
Cadmium	0.15	0.025
Chromium	0.30	0.050
Cobalt	0.15	0.025
Copper	0.50	0.050
Lead	0.15	0.025
Manganese	0.15	0.025
Nickel	0.30	0.050
Selenium	0.45	0.050
Silver	0.15	0.025
Thallium	0.15	0.025
Tin	1.5	0.25
Vanadium	1.5	0.25
Zinc	0.75	0.12

5.0 MERCURY ANALYSIS METHODS (7470A)

Summary QA/QC Criteria
SW 846 Methods 7470A, Mercury by Cold Vapor AAS

QUALITY PARAMETER	METHOD/ FREQUENCY	CRITERIA	CORRECTIVE ACTION
Initial Calibration	Blank and five standards Daily before analysis	Corr. Coefficient ≥ 0.995	Evaluate system Recalibrate
Calibration Blank	After ICV and each CCV	< LOQ	Rerun Clean system Reanalyze affected samples
ICV	After calibration	80 to 120 %	Reanalyze ICV Recalibrate
CCV	Every 10 samples and end of run sequence	80 to 120 %	Reanalyze Recalibrate Reanalyze affected samples
Method Blank	1 per analytical batch	< LOQ	Reanalyze Recalibrate if necessary Reanalyze
LCS	1 per analytical batch	80 to 120	Check calculations Reextract and reanalyze as necessary Assess impact on data Narrate
MS/MSD	1 per analytical batch (1 in 20 samples)	[illegible] to 125	Check calculations Evaluate LCS Assess impact on data
Spiked Samples MS on one EH fraction	1 per analytical batch	75 to 125 %	Check calculations Reanalyze Assess impact on data
LOQ	Multiple Metals 1 in Aqueous Samples	0.2 µg/ fraction 0.0002 mg/L	
Holding Time		14 days See Table A-7-1	

Note The term LOQ refers to the Laboratory's standard Reporting Limit

6.0 VOLATILE ORGANIC COMPOUNDS IN PROCESS SAMPLES (8260B)

6.1 Summary of QC and Calibration Criterion for Method 8260B (Aqueous)

QUALITY PARAMETER	METHOD/ FREQUENCY	CRITERIA	CORRECTIVE ACTION
Method Blank	1 per analytical batch	LOQ[1]	Reanalyze. Assess impact on data. Narrate
Instrument Tune	Every 12 hours	Refer to method	Retune instrument. Repeat BFB analysis
Initial Calibration Five point	SPCC RRF	0.10 Chloromethane 0.10 1,1 DCA 0.10 Bromoform 0.30 Chlorobenzene 0.50 1,1,2,2 TCA	Evaluate system. Recalibrate
	CCC	RSD ≤ 30%	
	Compounds ≤ 15% RSD	Average RF or 80% of the compounds meet the criteria	
Continuing Calibration	SPCC RRF	Same as initial	Evaluate system. Repeat calibration check
	CCC	30% drift	Recalibrate. Reanalyze affected samples
	Every 12 hours	RSD ≤ 30% for non CCCs	Evaluate system. Repeat calibration check
Internal Standards	RRT	± 0.50 or 30 seconds	Check sensitivity of system. Reanalyze standard
	Recovery	50 to 200% R	
Precision Accuracy	LCS, MS/MSD per batch. Surrogates	Historical Lab data (See Table 7.2)	Check calculation. Reanalyze. Assess impact on data. Narrate
Holding Time		14 days	

Note The term LOQ refers to the Laboratory's standard Reporting Limit.

[1] Except for common lab contaminants (methylene chloride, acetone, and 2-butanone) may be reported with qualifiers if the concentration of the analyte is less than five times the LOQ. Such actions must be addressed in the case narrative.

Allowance for up to 6 target analytes ≤ 50%.

6 2 Control Limits for Process Samples by Method 8260B

	COMPOUND	ACCURACY (% RECOVERY)	PRECISION RPD
LCS			
	1 1 Dichloroethene	66 to 130	NA
	Benzene	77 to 121	NA
	Trichloroethene	75 to 116	NA
	Toluene	78 to 120	NA
	Chlorobenzene	80 to 120	NA
MS/MSD			
	1 1 Dichloroethene	66 to 130	22
	Benzene	77 to 121	21
	Trichloroethene	75 to 116	24
	Toluene	78 to 120	25
	Chlorobenzene	80 to 120	20
Surrogates			
	1 2 Dichloroethane d4	64 to 139	NA
	Toluene d8	72 to 128	NA
	4 Bromofluorobenzene	66 to 121	NA

Notes Historical limits for the method are reported here Current established limits will be used for the evaluation of the data as required by SW 846 (1)
NA = Not Applicable

7.0 SEMI VOLATILE ORGANIC COMPOUNDS IN PROCESS SAMPLES

7.1 Summary of SVOC QC and Calibration Criterion for Method 8270C

QUALITY PARAMETER	METHOD/ FREQUENCY	CRITERIA	CORRECTIVE ACTION
Method Blank	1 per analytical batch	LOQ *	Reanalyze Assess data. Narrate
Instrument Tune	Every 12 hours initially and as required	As per 8270C	Retune instrument Repeat DFTPP analysis
Initial Calibration Five point	SPCC RRF	≥ 0.050	Evaluate system Recalibrate
	CCC	RSD ≤ 30 %	
	Compounds ≤ 15% RSD	Average RF at 80 % of the compounds meet the criteria	
Continuing Calibration	SPCC RRF	Same as initial	Evaluate system Repeat calibration check
	CCC	RSD ≤ 20	Recalibrate Reanalyze affected samples
Internal Standards	RRT	± 30 seconds	Check sensitivity of system Reanalyze standard
	Accuracy	50 to 200 % R	
Precision Accuracy	LCS/MS/MSD per batch Surrogates	Historical Lab data (See Table 8.2)	Check calculations Reanalyze Assess data. Narrate
LOQ		0.050 mg/L to 0.[illegible] mg/L	
Holding Time		Extraction = 14 days Analysis = 40 days	

Note The term LOQ refers to the laboratory's standard Reporting Limit.

Except for common lab contaminants. Dilutions may be reported with qualifiers if the concentration exceeds the method specifically mandated LOQ. Such exceptions must be addressed in the case narrative.

7.2 Historical Control Limits for Method 8270C for Semi Volatile Organic Compounds in Aqueous Samples

	COMPOUND	%R AQUEOUS
LCS	Acenaphthene	62 to 105
	4 Chloro 3 methylphenol	60 to 100
	2 Chlorophenol	48 to 102
	1 4 Dichlorobenzene	51 to 91
	2 4 Dinitrotoluene	60 to 115
	4 Nitrophenol	18 to 63
	N nitroso di n propylamine	61 to 105
	Pentachlorophenol	35 to 118
	Phenol	16 to 56
	Pyrene	47 to 126
	1 2 4 Trichlorobenzene	57 to 97

	COMPOUND	%R AQUEOUS	RPD AQ
MS/MSD	Acenaphthene	59 to 105	15
	4 Chloro 3 methylphenol	60 to 100	26
	2 Chlorophenol	48 to 102	34
	1 4 Dichlorobenzene	51 to 91	29
	2 4 Dinitrotoluene	60 to 115	26
	4 Nitrophenol	18 to 63	67
	N nitroso di n propylamine	61 to 105	26
	Pentachlorophenol	35 to 118	39
	Phenol	16 to 56	71
	Pyrene	47 to 126	36
	1 2 4 Trichlorobenzene	57 to 97	27
Surrogates	2 Chlorophenol d_4	25 to 101	NA
	1 2 Dichlorobenzene d_4	49 to 99	NA
	2 Fluorobiphenyl	47 to 106	NA
	2 Fluorophenol	10 to 70	NA
	Nitrobenzene d	50 to 102	NA
	Phenol d	10 to 47	NA
	Terphenyl d_{14}	40 to 125	NA
	2 4 6 Tribromophenol	21 to 127	NA

Note Historical limits for the method are reported here. Current established limits will be used for the evaluation of the data as required by SW 846 (1)

8.0 AGENT PURITY ANALYSES DQOs (TE LOP 584)

Quality Parameter	Method/ Frequency	Criteria	Corrective Action
Initial Calibration	Average RF	RSD ≤ 25 %	Evaluate system Recalibrate
Instrument Tune	Every 12 hours	As per SW 846 Method 8270C	Retune instrument Repeat DFTPP analysis
Continuing Calibration Check (CCC)	Every 12 hours	RRF ± 5 % of Initial RRF	Evaluate system Repeat CCC If second CCC fails Recalibrate Reanalyze affected samples
Internal Standard	RRT	RRF ± 15 % of Reference Solution	Evaluate system Evaluate integration Reanalyze standard diluent
Duplicate Laboratory Samples	RPD	RPD _ 10 %	Reanalyze duplicate samples and narrate
Duplicate Field Samples	RPD	RPD _ 35 %	Reanalyze duplicate samples and narrate
LOQ	L1 L2 L3	10.0 Wt% 1.0 A% 1.0 V%	NA
Holding Time	NA	30 days	Contact Environmental office

Notes L1 = [illegible]
L2 = *Bis*(2-chloroethyl)-[illegible]
L3 = *Bis*(2-chloroethyl)-[illegible]

9.0 METHOD TE-I OP 557 ICP/MS DQOs

Quality Parameter	Method/ Frequency	Criteria	Corrective Action
Instrument Tune	Daily prior to calibration and sample analysis	Mass resolution < 1.0 amu @ 10% peak height. Mass calib. ± 0.1 amu	Retune instrument. Repeat tune solution and analysis
Initial Calibration	Blank and at least one standard	ICV ± 10% of expected value	Evaluate and reanalyze ICV. Recalibrate
Calibration Blank	After ICV and CCV	PQL	Clean system. Rerun. Reanalyze affected samples
CCV	Every 10 samples and end of run sequence	± 10% of expected value	Reanalyze CCV. Recalibrate. Reanalyze samples
Method Blank	1 per analytical batch	PQL	Reanalyze. Recalibrate as necessary
Internal Standard	1 each sample	70-130% Recovery	Reanalyze and or dilute
LCS	1 per analytical batch	75% to 125% Recovery. RPD ≤ 25%	Check calculations. Assess impact on data. Reextract and reanalyze as necessary. Narrate
MS/MSD	1 set per analytical batch	As, Cd, Cr, Hg, Se: 75-125% R. RPD ≤ [illegible]. Other elements: 50-150% R. RPD ≤ 50%	Assess impact on data. Narrate
Duplicate Analyses	1 per analytical batch	RPD ≤ 25%	Check calculations. Reanalyze. Assess impact on data
Holding Time	NA	180 days to analysis	Contact client

Note: amu = atomic mass unit
ICV = Initial Calibration Verification
CCV = Continuing Calibration Verification

10.0 REFERENCES

(1) ***Test Methods for Evaluating Solid Waste Physical/Chemical Methods*** 3rd Edition including Update III USEPA SW 846 December 1996

(2) Title 40 ***Code of Federal Regulations*** Part 60 Appendix A Test Methods

(3) Title 40 ***Code of Federal Regulations*** Part 136 Appendix A Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater

(4) ***EPA Requirements for Quality Assurance Project Plans*** EPA QA/R-5 November 1999

(5) ***Handbook Quality Assurance/Quality Control (QA/QC) Procedures for Hazardous Waste Incineration*** EPA/625/6-89/021 January 1990

LEWISITE COMPREHENSIVE PERFORMANCE TEST PLAN

FOR THE

AREA 10 LIQUID INCINERATOR

APPENDIX A

ANNEX B

EXAMPLE DATA FORMS

REVISION 0

January 4, 2010

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URS

Chain of Custody Record

Samples from Multi Metals Sampling Trains

Page ____ of ____

Project									
Site	TOCDF								
Project Number									
Prepared by									
Sample ID Code	**Sample Matrix**	Date/Time	Metals by ICPMS SW 846 Method 6020	Mercury by CVAA SW 846 Method 7470A		Hold	MS/MSD	Shipping Container Number	Comments

Remarks Provide results in total micrograms per sample Raw data package required Samples will be analyzed fro the following metals Al Sb As Ba Be B Cd Cr Co Cu Pb Mn Hg Ni P Se Ag Tl Sn V and Zn

Relinquished by	Date	Time	Relinquished by	Date	Time	Relinquished by	Date	Time
Received by	Date	Time	Received by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Relinquished by	Date	Time	Relinquished by	Date	Time
Received by	Date	Time	Received by	Date	Time	Received by	Date	Time

Received for Laboratory by	Date	Time	Airbill No	Opened by	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks

Sample Type - **PM/HCl/Cl_2 (Methods 5/0050)**	Start Time	Condition	Page of
Plant Name - TOCDF	End Time	Run	Sampling Train Leak Rate (ft^3 @ in Hg)
Project Number --	Duration (min)	Operator	Initial @
Date	PTCF	Nozzle ID	Final @
Location (Source) MPF	DGMCF	Nozzle Dia (in)	Pitot Tube ID
Duct Dimension(s)	Console No	Kf	Pitot Tube Leak Check
Elevation (relative to Barometer) (ft)		ΔH@	Initial (+) ( )
		Bar Press (in Hg)	Final (+) ( )
Nozzle Calib		Stat Press (in H_2O)	Filter No

Point	Clock Time	Dry Gas Vol (ft^3)	ΔP (in H_2O)	ΔH (in H_2O)	Temperature (°F)						Vacuum (in Hg)	
					Stack	Probe	Filter	Imp Exit	DGM In	DGM Out		

Comments

Project No _____

Operator Initials _____

PM/HCl/Cl_2

EPA Method 5

SW-846 Method 0050

Run No _____

Condition no _____

Date _____

Moisture Determination

Imp No	Contents	Volume (mL)	Configuration	Final Wt (g)	Initial Wt (g)	=	Net Gain (g)
1	0.1 N H_2SO_4	50	KO			=	
2	0.1 N H_2SO_4	100	GS			=	
3	0.1 N H_2SO_4	100	GS			=	
4	0.1 N NaOH	100	Mod			=	
5	0.1 N NaOH	100	Mod			=	
6	Silica Gel	~ 300g	Mod			=	
				Total Net Gain (g)		=	

Sample Log

Sample ID Number	No of Sample Containers	Description
TOCDF MPF Stk ____ M5 PNR		Probe and Nozzle Rinse
TOCDF MPF Stk ____ M5 Filt		Filter
TOCDF MPF Stk ____ M0050 AcdImp		Acid Impinger Catch
TOCDF MPF Stk ____ M0050 AlkImp		Alkaline Impinger Catch

Sample Recovery Checklist

AT LOCATION

_____ Rinse and brush probe and nozzle three times with acetone into PNR bottle

_____ Rinse the transfer line three times with water into the Acid Impinger (AcdImp) bottle

IN LABORATORY

_____ Separate filter holder and place filter in clean pre rinsed glass petri dish Complete filter (Filt) sample label

_____ Rinse front half of filter holder with acetone into PNR bottle Complete probe and nozzle rinse (PNR) sample label

_____ Rinse back half of filter holder with deionized water into the Acid Impinger (AcdImp) bottle

_____ Disassemble sample train wipe off excess water and weigh each impinger Record the final weights in the Moisture Determination section

_____ Pour contents of 1st, 2nd and 3rd (containing acid) impingers into the Acid impinger catch bottle(s) Rinse impingers and connecting glassware with deionized water into the same bottle(s) Complete Acid Impinger (AcdImp) Sample Label

_____ Pour the contents of the 5th and 6th impingers (containing NaOH) into the alkaline impinger catch bottle(s) Rinse impingers and connecting glassware with deionized water into the same bottle(s) Complete alkaline impinger (AlkImp) sample label

_____ Log samples into logbook and store appropriately

Sample Type – **Multi Metals (Method 29)**	Start Time	Condition	Page of
Plant Name – TOCDF	End Time	Run	Sampling Train Leak Rate (ft^3 @ in Hg)
Project Number –	Duration (min)	Operator	Initial @
Date	PTCF	Nozzle ID	Final @
Location (Source) – MPF	DGMCF	Nozzle Dia (in)	Pitot Tube ID
Duct Dimension(s)	Console No	Kt	Pitot Tube Leak Check
Elevation (relative to Barometer) (ft)		ΔH@	Initial (+) ( )
Nozzle Calib _____ _____ _____		Bar Press (in Hg)	Final (+) ( )
		Stat Press (in H_2O)	Filter No

Point	Clock Time	Dry Gas Vol (ft^3)	ΔP (in H_2O)	ΔH (in H_2O)	Temperature (°F)						Vacuum (in Hg)	
					Stack	Probe	Filter	Imp Exit	DGM In	DGM Out		

Comments

Project No _____

Operator Initials _____

Multi-Metals
EPA Method 29

Run No _____

Condition no _____

Date _____

Moisture Determination

Imp No	Contents	Volume (mL)	Configuration	Final Wt (g)	Initial Wt (g)	=	Net Gain (g)
1			K/O			-	
2	Nitric/Peroxide	100	Mod			=	
3	Nitric/Peroxide	100	GS			=	
4			Mod			=	
5	$KMnO_4$ Soln	100	Mod			=	
6	$KMnO_4$ Soln	100	Mod			=	
7	Silica Gel	~ 300g	Mod				
				Total Net Gain (g)		-	

Sample Log

Sample ID Number	No of Sample Containers	Description
TOCDF STDT Stk ___ M29 PNR		Probe and Nozzle Rinse
TOCDF STDT Stk ___ M29 Filt		Filter
TOCDF STDT Stk ___ M29 NI A		Nitric Impinger – A
TOCDF STDT Stk ___ M29 NI B		Nitric Impinger B
TOCDF STDT Stk ___ M29 EIR		Empty Impinger Rinse
TOCDF STDT Stk ___ M29 Perm		Permanganate Impinger
TOCDF STDT Stk ___ M29 HClRns		HCl Rinse of Permanganate Impinger

Sample Recovery Checklist

AT LOCATION

_____ Rinse and brush probe and nozzle with 0.1 N nitric acid into PNR bottle Note – use teflon brush

_____ Rinse the transfer line three times with 0.1 N nitric acid into NI bottle

IN LABORATORY

_____ Separate filter holder and place filter in clean petri dish Complete Filt sample label

_____ Rinse front half of filter holder with 0.1 N nitric acid into PNR bottle Complete PNR sample label Note Exactly 100 mL of 0.1 N nitric acid will be used in the PNR rinse

_____ Disassemble sample train wipe off excess water and weigh each impinger Record the final weights in the Moisture Determination section

_____ Pour contents of first 3 impingers into the Nitric/peroxide impinger (NI) catch bottle(s) Rinse the impingers and connecting glassware with 0.1 N nitric acid into the NI bottle(s) Rinse the back half of the filter holder with 0.1 N nitric acid into the sample bottle as well Complete the NI sample label(s) Note exactly 250 mL of 0.1 N nitric acid will be used in the NI rinse

_____ Rinse the 4th (initially empty) impinger with 100 mL 0.1 N nitric acid into the empty impinger rinse (EIR) bottle Complete EIR sample label

_____ Pour the contents of the 5th and 6th impingers (permanganate impingers) into the permanganate impinger catch bottle (Perm) Rinse with 100 ml of permanganate solution and then 100 mL DI water Complete Perm sample label

_____ Rinse the permanganate impingers with a total of 25 mL of 8 N HCl Rinse the permanganate impingers with 200 mL DI water Complete HClRns sample label (Note this is not required if there is no visible solid residue)

_____ Log samples into logbook and store appropriately

Sample Type – **PCDD/PCDF (Method 0023A)**	Start Time	Condition	Page of
Plant Name – TOCDF	End Time	Run	Sampling Train Leak Rate (ft³ @ in Hg)
Project Number –	Duration (min)	Operator	Initial @
Date	PTCF	Nozzle ID	Final @
Location (Source) MPF	DGMCF	Nozzle Dia (in)	Pitot Tube ID
Duct Dimension(s)	Console No	Kf	Pitot Tube Leak Check
Stack Elevation (relative to Barometer)		ΔH@	Initial (+) ( )
		Bar Press (in Hg)	Final (+) ( )
Nozzle Calib		Stat Press (in H_2O)	Filter No

Point	Clock Time	Dry Gas vol (ft³)	ΔP (in H_2O)	ΔH (in H_2O)	Temperature (°F)								Vacuum (in Hg)
					Stack	Probe	Filter	Ht Trc Exit	XAD Inlet	Imp Exit	DGM In	DGM Out	

Comments

Project No _____

Operator Initials _____

Dioxins and Furans

SW-846 – Method 0023A

Run No _____

Condition no _____

Date _____

Moisture Determination

Impinger No	Contents	Volume (mL)	Configuration	Final Wt (g)	Initial Wt (g)	Net Gain (g)
1			K/O		=	
2	H_2O	100	G/S		=	
3	H_2O	100	Mod		=	
4	Silica Gel	~ 300g	Mod		=	
5					=	
6					=	
				Total Net Gain (g) =		

Sample Log

Sample ID Number	No of Sample Containers	Description
TOCDF MPF Stk ___ M0023A PNR		Probe and Nozzle Rinse
TOCDF MPF Stk ___ M0023A Filt		Filter
TOCDF MPF Stk ___ M0023A CR		Condenser Rinse
TOCDF MPF Stk ___ M0023A XAD		XAD

Sample Recovery Checklist

AT LOCATION

_____ Rinse and brush the probe liner and nozzle into the PNR bottle three times with acetone twice with methylene chloride and twice with toluene

_____ Rinse transfer line three times with acetone twice with methylene chloride twice with toluene into CR bottle

IN LABORATORY

_____ Separate filter holder and place filter in clean pre rinsed glass petri dish Complete Filt sample label

_____ Seal XAD trap ends Complete XAD sample label

_____ Rinse front half of filter holder into PNR bottle three times with acetone twice with methylene chloride twice with toluene Complete PNR sample label

_____ Disassemble sample train wipe off excess water and weigh each impinger Record the final weights in the Moisture Determination section DISCARD the impinger solution

_____ Rinse the back half of the filter holder all connecting glassware and the coil condenser three times with acetone twice with methylene chloride and twice with toluene Complete the CR sample label

_____ Log samples into logbook and place in refrigerator or ice chest

URS Source Sampling Temperature Readout Calibration Form
Per Reference _____

Operator _____
Date _____

Readout ID Number _____
Thermometer ID Number _____
Voltage Generator ID Number _____

Temperature Readout Calibration	
Thermometer (F)	Temperature Readout (F) (after adjustment)
_____	_____

Temperature Readout Calibration Check

Channel	Voltage (mV)	Temperature (F)			Channel	Voltage (mV)	Temperature (F)		
		Theoretical	Observed	Difference[1]			Theoretical	Observed	Difference
1	0 0	32			5	1 0	10		
	1 0	77				0 0	32		
	3 0	165				1 0	77		
	7 0	341				2 0	121		
	15 0	692				3 0	165		
2	0 0	32			6	1 0	10		
	3 0	165				0 0	32		
	4 0	208				1 0	77		
	5 0	251				2 0	121		
	7 0	341				3 0	165		
3	0 0	32			7	1 0	10		
	3 0	165				0 0	32		
	4 0	208				1 0	77		
	5 0	251				2 0	121		
	7 0	341				3 0	165		
4	1 0	10							
	0 0	32							
	1 0	77							
	2 0	121							
	3 0	165							

[1] Acceptable difference is ±5 F for temperatures below 1000 F and ±10 F for temperatures above 1000 F

Five-Point Dry Gas Meter Calibration Form
(Against Critical Orifice)

Console ID _____ Date _____ Signature _____

			Run 1A	Run 1B	Run 2A	Run 2B	Run 3A	Run 3B	Run 4A	Run 4B	Run 5A	Run 5B
Critical Orifice	Identification Number											
	K Factor											
Subject DGM	DGM Initial Reading (ft^3)											
	DGM Final Reading (ft^3)											
	Temperature (°F)	Inlet Initial										
		Outlet Initial										
		Inlet Final										
		Outlet Final										
Test Time (minutes)												
Orifice Manometer ΔH (" H_2O)												
Barometric Pressure (" Hg)												
Ambient Temperature (F)												
Pump Vacuum (" Hg)												

Notes

Revision Date 01/13/2004

Three-Point Dry Gas Meter Calibration Form
(Against Critical Orifice)

Console ID _____ Date _____ Signature _____

				Run 1A	Run 1B	Run 2A	Run 2B	Run 3A	Run 3B
DGM Calibration	Critical Orifice		Identification Number						
			K Factor						
	Subject DGM		DGM Initial Reading (ft^3)						
			DGM Final Reading (ft^3)						
		Temperature (°F)	Inlet Initial						
			Outlet Initial						
			Inlet Final						
			Outlet Final						
			Test Time (minutes)						
			Orifice Manometer, ΔH (" H_2O)						
			Barometric Pressure (" Hg)						
			Ambient Temperature (°F)						
			Pump Vacuum (" Hg)						

Temperature Readout Calibration	Check the readout against a NIST Thermometer		Check the readout linearity (one channel only)			
	NIST Thermometer ID _____		Voltage Supply ID _____		Channel No _____	
	Thermometer Reading (°F)		Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
	Readout Reading (°F)		0	32		
			1	77		
			3	165		
			7	341		
			15	692		

Revision Data 01/13/2004

VOST Console DGM & Thermocouple Calibration Form

DGM Calibration	
Console ID	Operator Signature
Nominal Orifice Flow Rate	Date

			Run 1	Run 2	Run 3
Orifice Information	ID Number				
	K Factor				
DGM being Calibrated	Vol (L)	Initial			
		Final			
	$T_{m\,i}$ (F)	Inlet Initial			
		Outlet Initial			
		Inlet Final			
		Outlet Final			
	Meter Pressure (H O))				
Test Conditions	Pump Vacuum (Hg)				
	P i Hg)				
	T (F)				
	Test Duration (min)				

Thermocouple Calibration	
Thermometer ID	Voltage Supply ID

Temperature Readout Accu acy		
Thermometer Reading (F)	Temperature Readout	
	Channel No	Temperature (F)

Temperature Readout Linearity			
Channel No	Voltage	Theoretical Temp (F)	Observed Temp (F)
	0	32	
	1	77	
	3	165	
	7	341	
	15	692	

Modified 12 January 2004

S-Type Pitot Tube Inspection Sheet

Inspector _____ **Date** _____ **Pitot ID** _____

General Pitot Tube Alignment	End View Side View Transverse Tube Axis Longitudinal Tube Axis A B Face Plane Side Plan Side Plan D_t P_B P_A A = _____ D = _____	$0.188 \le D_t \le 0.375$? _____ (y/n) $1.05 \le \frac{A}{2D} \le 1.50$? _____ (y/n)	
Misalignment	Transverse Tube Axis A B α_1 α_2 α_1 = _____ α = _____	$\alpha_1 \le 10$? _____ (y/n) $\alpha \le 10$? _____ (y/n)	
	Flow B A Longitudinal Tube Axis β_1 β_2 β_1 = _____ β = _____	$\beta_1 \le 5$? _____ (y/n) $\beta_2 \le 5$? _____ (y/n)	
	γ Z A B θ W γ = _____ Z = A tan(γ) = _____ θ = _____ W = A tan(θ) = _____	$Z \le 0.125$? _____ (y/n) $W \le 0.031$? _____ (y/n)	
Acceptability for Use **(Circle Selection)**	If all answers are y this pitot tube is available for use and could be assigned a correction factor of 0.84	If all answers except the first (D_t) are y this pitot tube is available for use but needs to be calibrated using a wind tunnel	Any other situation the pitot tube must be removed from service

Pitot Tube Calibration Data Sheet

Pitot Tube Identification Number _____ **Date** _____

Calibrated by _____

Run No	"A" Side Calibration			Deviation $C_{p(s)}$ – Avg C_p
	ΔP_{std} (in water)	ΔP_s (in water)	$C_{p(s)}$	
1				
2				
3				
Average $C_{p(s)}$ (Side A)				

Run No	"B" Side Calibration			Deviation $C_{p(s)}$ – Avg C_p
	ΔP_{std} (in water)	ΔP_s (in water)	$C_{p(s)}$	
1				
2				
3				
Average $C_{p(s)}$ (Side B)				

$$C_{p(s)} = Cp(std) \times \sqrt{\frac{\Delta P_{std}}{\Delta P_s}} \qquad Cp(std) = 0.99$$

$$\text{Average Deviation} = \sigma_{Cp(s)} = \sum_{i=1}^{3} \left(\frac{C_{p(s)} - C_{p(s)ii}}{3} \right) \qquad \text{Must be} \leq 0.01$$

$$\text{Difference} = \left| \text{Average } C_{p(s)a} - \text{Average } Cp(s)b \right| \qquad \text{Must be} \leq 0.01$$

Portable Barometer Calibration Data Sheet

Portable Barometer Identification _____

Date _____

Operator _____

Laboratory barometer reading (reference) (in Hg)	
Portable barometer reading after correction (in Hg)	
Difference between reference and portable after correction (in Hg)	
Is the difference ≤±0 1 in Hg (yes/no)	

BALANCE CALIBRATION

Balance ID _____ **Date** _____

Initial Calibration	Calibration Weight		Operator
	ID #	Mass	

Linearity Check	Calibration Weight		Balance Reading	Acceptable Range
	ID #	Mass		
		100		99 9 100 1
		200		199 8 200 2
		500		499 5 500 5
		1000		999 - 1001

	Calibration Weight	Balance Reading
Calibration of Student Weights		
Student Weight Set ID _____		

FIELD BALANCE CALIBRATION

Balance ID _____ **Date** _____

Operator _____

	Student Calibration Weight [a]	Actual Mass (from Annual Calibration)	Balance Reading	Difference	Percent Difference [b]
Calibration Check of Balance Using Student Weights **Student Weight Set ID** _____					

Use only calibration weights greater than 20 g

The acceptance criteria for percent difference is ±0.5%. This is calculated using this equation

$$\text{Percent Difference} = \frac{\text{balance reading} - \text{actual mass}}{\text{actual mass}} \cdot 100$$

Sensitivity Check [c]

Primary Weight (1000 g Class 1 Calibration Weight)	Balance Reading A	Secondary Weight (1 g Class 1 Calibration Weight)	Balance Reading B	Balance Reading of Secondary Weight (Balance Reading B – Balance Reading A)	% of Secondary Weight [d]

In order to complete the sensitivity check of the field balance a weight greater than or equal to 1000 g is placed on the balance and the balance reading is recorded. Then a second weight less than or equal to 1 g is also placed on the balance. This second balance reading is recorded.

[d] The acceptance criteria for the sensitivity check is 85-115% of the secondary weight. This is calculated using this equation

$$\% \text{ of Secondary Weight} = \frac{\text{Balance reading B} - \text{Balance Reading A}}{\text{Secondary Weight}} \cdot 100$$

URS CEMS Operation Log

Project	Page of
Project Number	Operator
Source	Date

Time	Activity	Analyzer Response					

Project	Page of
Project Number	Operator
Source	Date

Calibration Gases

Component(s)	Concentration(s)	Cylinder ID

Indicate multi component standards appropriately

Instrument Identification

Analyte	Manufacturer	Model Number	Serial Number

Method Performance Checks

Activity	Method	Criterion	Okay (initials)
Span Selection	6C 7E 3A	Emission limit >30 % of span	
		Emission level always below 100 % of span	
	25A	Span 1.5-2.5 times the emission limit	
		If no emission limit span 1.5-2.5 times expected level	
Calibration Gas Selection	6C 7E 3A	Protocol gas 40-60 % and 80-100 % of span	
		Zero grade nitrogen	
	25A	Protocol gas 25-35 % 45-55 % and 60/90 % of span	
		Zero grade Air	
Calibration Error	6C 7E 3A	Span gas within ±2 % of span	
		Mid range gas within ±2 % of span	
		Zero gas within ±2 % of span	
	25A	Low range gas within 5 % of certified value	
		Mid range gas within 5 % of certified value	
		Span gas within 5 % of certified value	
System Bias Check	6C 7E 3A	Selected gas within ±5 % reading during calibration error	
	25A	Not Applicable	
Post Test Calibration Drift Check	6C 7E 3A	Selected gas reading within ±3 % of span of previous reading	
		Zero gas within ±3 % of span of previous reading	
	25A	Selected gas reading within ±3 % of span of previous reading	
		Zero gas within ±3 % of span of previous reading	

Hourly Drift Check (M25A only)

	Okay (initials)					
	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6
Selected gas reading within ±3 % of span of previous reading						
Zero gas within ±3 % of span of previous reading						

LEWISITE COMPREHENSIVE PERFORMANCE TEST PLAN

FOR THE

AREA 10 LIQUID INCINERATOR

APPENDIX A

ANNEX C

RESUMES OF KEY INDIVIDUALS

REVISION 0

January 4, 2010

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URS CORPORATION KEY PERSONNEL RESUMES

Michael Fuchs

Eugene Youngerman PhD

D Chris Weber

Margaret Jephson

Adam Blunk

Kevin McGinn

George Lipinski PE

Walter Lin

Carl Galloway

Steven Hall

Robert Woytek

Blake Yarbrough

David Maxwell

G Jose Arellano

Derek Bullek

Nathan Reichardt

Thomas Brido

Andrew Hodgson

Vaughn Kashuba

URS CORPORATION KEY PERSONNEL RESUMES

MICHAEL FUCHS
Project Manager

Mr. Michael Fuchs is a Project Manager in the Measurements Group in the URS Austin, Texas office. Mr. Fuchs began his career performing source testing and has now managed projects while continuing to provide hands-on participation. Mr. Fuchs primarily manages projects related to the treatment of hazardous waste (primarily combustion), emissions measurements including source testing, and regulatory compliance (RCRA, TSCA, and HWC MACT) for hazardous waste combustion facilities. He actively participates in those projects by preparing test plans and QAPPs, supervising trial burns and related projects, and preparing reports and regulatory filings. Mr. Fuchs manages the trial burns and related projects at TOCDF as well as managing similar projects for industrial clients. He has a Bachelor's degree in Chemistry from Southwest Texas State University at San Marcos.

EUGENE YOUNGERMAN, Ph.D.
Senior Project Chemist/ Quality Officer

Dr. Eugene Youngerman has worked on trial burns and incinerator performance tests since 1987. Roles have included field lead, process sampler, project manager, QA/QC coordinator, and laboratory coordinator. He has experience in permitting and testing activities of hazardous waste incinerators, as well as other source testing directed toward process characterization or regulatory compliance. He has over nine years experience in this area including document preparation, test protocol design and preparation, plan implementation, and interpretation and reporting of sampling, analysis, and QA/QC results. He has served as Project Director on major sampling and analysis programs for RCRA and TSCA pre-trial burn tests and trial burns. Dr. Youngerman has several publications relating to his experience on various projects and holds a Bachelor's degree in Chemistry from the Massachusetts Institute of Technology at Cambridge and a Master's and Doctorate in Chemistry, both from the University of California at San Diego.

D. CHRISTOPHER WEBER
Scientist

Mr. D. Christopher Weber is a Scientist in the Measurements Group in the URS Austin, Texas office. His primary focus is on projects dealing with emissions measurement in the chemical, demilitarization, power, petrochemical, semiconductor, pharmaceutical, cement, and various manufacturing industries. He has gained experience with combustion, petrochemical, and other industrial processes through participation in numerous efforts designed to permit and characterize processes or pollution control devices. Mr. Weber has a Bachelor's degree in Biology from Vanderbilt University at Nashville, Tennessee.

MARGARET JEPHSON

Scientist

Ms. Margaret Jephson is a Scientist in the Measurements Group for the URS Austin, Texas office. She has worked for the Measurements Group since 2000, and her areas of expertise include air regulatory compliance support and trial burn testing and reporting. Her role in various projects is primarily that of Field Team Lead, leading the field aspect of emissions testing projects and working with clients to help them fulfill their compliance needs. Ms. Jephson has worked as a Field Team Lead for VX and mustard agent trial burns at TOCDF. In addition, she has also been responsible for preparing test plans, compiling test results, and preparing formal reports for submittal to regulatory agencies. Ms. Jephson holds a Bachelor of Science in Chemistry from Southwestern University at Georgetown, Texas.

ADAM BLANK

Scientist

Mr. Adam Blank primarily focuses on technical and measurement support of projects characterizing emissions from combustion sources. Over his career at URS, Mr. Blank has participated in a number of projects supporting HWC MACT and RCRA trial burns. He has worked with multiple hazardous waste combustion units and clients, including commercial and process units, and a chemical weapons demilitarization facility. He has experience with test design, project planning and execution, and test reporting in numerous efforts designed to permit and characterize emissions from processes or pollution control devices. Mr. Blank holds a Bachelor's degree in Bio Psychology from Tufts University at Boston, Massachusetts.

KEVIN McGINN

Senior Scientist

Mr. Kevin McGinn has 14 years experience in the field of air quality, specializing in emission measurement. As a Senior Scientist, he has supervised field teams, written test reports, and performed quality assurance duties for projects in the waste incineration and petrochemical industries. As a Program Manager, he has managed projects in the chemical demilitarization, waste incineration, cement production, and chemical industries. Mr. McGinn holds a Bachelor's degree in Chemistry from McGill University at Montreal, Quebec, Canada.

GEORGE LIPINSKI, Professional Engineer (PE)

Senior Project Manager

Mr. George Lipinski is a chemical engineer with 24 years of experience in environmental engineering. As a consultant, he has managed projects in the waste management, chemical, pharmaceutical, electric utility, and independent power production industries. His experience includes a variety of environmental programs in air quality, hazardous waste, solid waste, and water quality. Mr. Lipinski has specialized experience in the fields of air quality, combustion, incineration, and waste management. In addition, he has authored a number of papers and

presentations related to hazardous waste and wood fuel combustion. Mr. Lipinski is a registered PE and holds a Bachelor's in Chemical Engineering from the University of Texas at Austin.

WALTER LIN
Senior Scientist

Mr. Walter Lin develops and manages trial burn and performance test programs for thermal treatment systems including incinerators, Boiler and Industrial Furnace (BIF) units, and non-traditional thermal treatment processes. In addition, Mr. Lin prepares trial burn plans to provide Comprehensive Performance Testing that demonstrates compliance with applicable regulations and gathers data for site-specific risk assessments. He holds a Bachelor's in Chemistry from University of North Carolina at Wilmington.

CARL GALLOWAY
Senior Sampling Technician

Mr. Galloway has participated in trial burn sampling activities since 1989, performing isokinetic sampling, VOST (0030 and 0031), CEMS operation, train preparation, process sampling, gas chromatography (M18 and 0040), and sample shipping. He has experience with sampling and analysis of FGD and SCR systems, including nitrogen oxides (M7D), sulfur dioxide and sulfuric acid (M6, NCASI 8A), ammonia (CTM027, and other variants), plus other related process measurements, including reduced sulfur species (M11, M15, M16). Mr. Galloway holds a Bachelor's in Biology from the University of Texas at Austin.

STEVEN HALL
Senior Scientist

Mr. Steven Hall has over 14 years of experience conducting emission measurements at criteria and air toxics sources. As a Senior Scientist, he has supervised field teams, written test reports and plans, and performed quality assurance duties for projects in the power, oil and gas, semiconductor, cement, and petrochemical industries. Mr. Hall specializes in the field of air quality measurements by Fourier Transform Infrared Spectroscopy (FTIR). He holds a Bachelor's in Chemistry from the University of Illinois.

ROBERT WOYTEK
Technician/Laboratory Manager

Mr. Robert Woytek has been involved in numerous trial burn efforts throughout his 18 year career with URS. His experience ranges from isokinetic train preparation and recovery to isokinetic train sample collection. Mr. Woytek is also responsible for maintenance, calibration and inspection of the URS sampling equipment and NIST Traceable calibration equipment. He studied Biology at Austin Community College at Austin, Texas.

BLAKE YARBROUGH
Scientist

Mr. Blake Yarbrough is a Project Chemist primarily focusing on technical and measurement support of projects dealing with characterizing emissions from combustion sources. In almost two years at URS, Mr. Yarbrough has participated in a number of projects supporting HWC MACT and RCRA trial burns. He has worked with multiple hazardous waste combustion units and clients, including commercial and process units, and a chemical weapons demilitarization facility. He has experience with project planning, execution, and reporting, designed to permit and characterize emissions from processes or pollution control devices. Mr. Yarbrough holds a Bachelor's in Chemistry from Texas A&M University at College Station.

DAVE MAXWELL
Senior Scientist

Mr. David Maxwell is an analytical chemist with 25 years experience in the characterization of chemical and industrial processes, and the management of source emissions testing, ambient air monitoring, and environmental analysis programs. His project experience specially is the testing of existing, and development of new, fossil fuel technologies, the development and application of chemical measurement methods, and the analysis of combustion process, air, and emissions from hazardous waste incineration and other combustion systems. Mr. Maxwell is recognized for possessing a fundamentally strong analytical chemistry background and the following professional skills:

- Management and technical direction of industrial and environmental sampling and analytical projects, including sample collection and recovery;
- Development of sampling and analytical solutions to complex industrial process and environmental applications;
- Preparation of written project and quality assurance plans, project reports, technical papers and presentations; and
- Evaluation and interpretation of analytical results and quality control data.

In addition, Mr. Maxwell holds a Bachelor's degree in Chemistry from the University of Southern California at Los Angeles.

GERMAN JOSE ARELLANO
Analytical Chemist

Mr. German Jose Arellano is a Master's level analytical chemist possessing a strong background in laboratory and field sampling operations with over five years of experience in the chemical industry and knowledge of various U.S. EPA environmental protocols. He commands a comprehensive knowledge of chemical and scientific processes with an emphasis in mass spectrometry and FT-IR, as well as other spectroscopic and chromatographic techniques. Mr. Arellano holds a Bachelor's degree in Chemistry from the University of Texas at Austin and a Master's degree in Analytical Chemistry from the University of Wisconsin at Madison.

DEREK BALLEK
Scientist

Mr. Derek Ballek gained trial burn sampling experience at the TOCDF during MPF and LIC agent trial burns in January 2007. As part of the sampling team, Mr. Ballek ran various sampling trains and aided in sample recovery. In addition to these trial burns, Mr. Ballek has provided sampling during several mini-burns. He holds a Bachelor's degree in Chemistry from the University of Texas at Austin.

NATHAN REICHARDT
Environmental Scientist

Mr. Nathan Reichardt is an Environmental Scientist in the URS Austin, Texas office. He specializes in the fields of ambient air monitoring, simultaneous TO-15 sampling (three canisters), data management, and odor control. He is experienced in using U.S. EPA Method 17, simultaneous method 26 (two trains), and Ontario Hydro sampling (two trains). Mr. Reichardt holds a Bachelor's degree in Environmental Science from West Texas A&M University at Canyon.

THOMAS BRADO
Field Technician

Mr. Thomas Brado has a variety of experience performing source and ambient monitoring on private commercial and government facilities. His field experience has involved a variety of simple to complex systems, each with their own challenges. Testing at government installations has included the Naval Air Warfare Center China Lake, United States Army Dugway Proving Grounds, and trial burns at Tooele Chemical Agent Disposal Facility. Mr. Brado holds a Bachelor's degree in Justice from the University of Alaska at Fairbanks.

ANDREW HODGSON
Project Scientist

Mr. Andrew Hodgson is a Project Scientist in the URS Measurements Group. In addition to his extensive experience in ambient air monitoring, he has performed isokinetic stack emissions sampling per U.S. EPA methods on various projects, and he has assisted on trial burns at the TOCDF facility. Mr. Hodgson holds a Bachelor's degree in Environmental Science from Lehigh University at Bethlehem, Pennsylvania.

VAUGHN KASHUBA
Field Technician

Mr. Vaughn Kashuba has three years experience in emissions measurement. As a field technician, he has supervised testing locations, written test reports, and performed quality assurance duties for sampling data. He holds a Bachelor's degree in History and Sociology from the University of North Carolina at Greensboro.

TESTAMERICA KEY PERSONNEL RESUMES

Robert Hrabak

Karla S. Buechler

Douglas Weir

Steven D. Rogers

David Allameh

Robert Weidenfeld

TESTAMERICA KEY PERSONNEL RESUMES

ROBERT HRABAK
Operations Manager

Mr. Robert Hrabak has over 20 years experience in the environmental industry with over 16 years in various managerial positions. He is responsible for monitoring workflow, increasing efficiency and productivity of all operational groups in the laboratory. He assures completion and follow through on day to day operations in all departments. These day to day operational responsibilities include client satisfaction, financial management, human resources, health and safety program compliance and quality assurance plan compliance. Mr. Hrabak has specialized in the area of the Advanced Technology Group, focusing on dioxins and specialty chemicals. His extensive technical knowledge in these areas and excellent organizational skills made him the ideal choice to manage these projects in the laboratory. Mr. Hrabak holds a Bachelor's degree in Biological Sciences from the University of California at Davis.

KARLA S. BUECHLER
Laboratory Manager

Ms. Karla Buechler has over 20 years experience in the environmental industry with over 13 years in various managerial positions. In addition, she has eight years of hands on experience with pesticide extraction and GC. In her current role she oversees the overall operation of the West Sacramento Laboratory. Ms. Buechler holds a Bachelor's degree in Biochemistry from the University of California at Davis.

DOUGLAS WEIR
Quality Assurance Manager

Dr. Douglas Weir directs and monitors quality assurance activities at the West Sacramento Facility. He is responsible for reports to management, client concerns, project plan review, lab performance review, and review of procedures that will ensure the production of data of a defined quality. He is responsible for performing the systems and method audits of the laboratory. He has over 19 years experience in the environmental laboratory industry, which includes experience in high and low resolution GC/MS, GC/ECD, HPLC, UV/visible spectroscopy, and magnetic resonance. He has authored method standard operating procedures, Quality Assurance Plans, project/cost proposals, and 30 scientific papers. He is conversant with a wide variety of U.S. EPA methodologies including SW846 organic and inorganic methods, series 500 and 600 methods for drinking water and wastewater, methods 1613B, 1614, 1668A, 1625, 1656, 8290, and 8280A. Dr. Weir has a Bachelor's degree in Chemistry and a Doctorate in Physical Chemistry, both from Queen's University at Kingston, Ontario, Canada.

STEVEN D ROGERS
Volatile Organics Analysis Department Manager

Mr Steven Rogers has over 22 years of management and bench level experience He is currently managing the Volatile Organics Analysis department He provides technical expertise in all organics areas of the lab Mr Rogers holds a Bachelor s in Biochemistry/Biophysics from Oregon State University at Corvallis

DAVID ALLAMEH
GC/HPLC/LCMS Department Manager

Mr David Allameh has over 19 years of experience in environmental analyses He is responsible for the groups performing petroleum hydrocarbon methods and HPLC methods 8310 and 8330 He coordinates instrument maintenance data review analyst training updating of SOPs as well as scheduling sample analysis He held technical and supervisory positions at environmental testing laboratories prior to joining TestAmerica He applies his experience to both government and commercial customers providing them with high quality data meeting the specified data quality objectives Mr Allameh holds a Bachelor s in Engineering from United States International University at San Diego

ROBERT WEIDENFELD
Project Manager Trial Burn Coordinator

Mr Robert Weidenfeld brings over 20 years experience to the project manager position specializing in both source and ambient air monitoring programs In this role he functions as the interface between the client and the laboratory ensuring that QAPP and sampling programs plans are properly implemented In addition Mr Weidenfeld is the primary laboratory project manager for the Army Chemical Demilitarization program managing and coordinating work from Tooele Umatilla Pine Bluff and Anniston Mr Weidenfeld holds a Bachelor s degree in Agricultural Management from the University of California at Berkeley

LEWISITE CPT

FOR THE

AREA 10 LIQUID INCINERATOR

APPENDIX B

ATLIC SHAKEDOWN PLAN

REVISION 0

January 4, 2010

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LIC SHAKEDOWN PLAN

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1.0 INTRODUCTION

The Tooele Chemical Agent Disposal Facility (TOCDF) was designed and built as a hazardous waste disposal facility for the U.S. Army. The TOCDF is designed to dispose of chemical Agents GB, VX, and mustard (H series), drained munitions, contaminated refuse, bulk containers, liquid wastes, explosive, and propellant components, which are a part of the chemical agent stockpile at the Deseret Chemical Depot (DCD). The DCD is located 20 miles south of Tooele, Utah. EG&G Defense Materials, Inc. (EG&G) operates the TOCDF under contract to the U.S. Army through the Chemical Materials Agency (CMA).

The TOCDF consists of five different Hazardous Waste Incinerators that are currently processing the DCD mustard stockpile. The TOCDF incinerator will complete the processing of the DCD mustard stockpile in mid to late 2011.

EG&G also will operate the Area 10 Liquid Incinerator (ATLIC), which is located within the DCD chemical munitions storage area that is adjacent to the TOCDF. The ATLIC is being designed and constructed to process the 4 ton containers (TCs) of Agent GA, the 10 TCs of Lewisite, and the up to 10 TCs referred to as "Transparency" TCs, some of which previously contained Lewisite.

The ATLIC Shakedown Period will begin after approvals for the CPT Plan are received from the State of Utah Department of Environmental Quality (DEQ), Division of Solid and Hazardous Waste (DSHW) and Division of Air Quality (DAQ). The wastes that will be processed during the Shakedown Period are Lewisite and spent decontamination solution (spent decon) comprised of a sodium hydroxide solution and Lewisite ton container (TC) water rinses.

The ATLIC includes a primary combustion chamber (PCC) followed by a secondary combustion chamber (SCC). Exhaust gas from the SCC is routed to the Pollution Abatement System (PAS), which consists of a quench tower followed by a series of low energy packed bed scrubbers, leading to a high energy venturi scrubber, moisture separator, exhaust gas reheater, baghouse, fixed bed carbon filter, and finally an induced draft (ID) fan.

By the time the ATLIC is ready to begin processing Lewisite, an STB will have been successfully completed. Therefore, the incinerator will have demonstrated its ability to process Principle Organic Hazardous Constituents (POHCs) more difficult to destroy than those contained in Lewisite. The ATLIC Lewisite Comprehensive Performance Test (LCPT) is being conducted to demonstrate the ability of the incinerator to control the arsenic and mercury emissions resulting from the incineration of Lewisite. Lewisite contains much higher concentrations of these metals and ash than the waste feeds that the ATLIC will have previously incinerated.

Therefore the objectives of the ATLIC LCPT Shakedown are to

Demonstrate that the ATLIC can successfully control ash arsenic and mercury emissions to an exhaust gas concentration less than the federal and state hazardous waste incinerator performance standards while processing Lewisite *This will be accomplished by performing a Mini Burn during the shakedown* period when exhaust samples will be taken and analyzed for metals

Familiarize the operators with the actions and process steps necessary to process Lewisite The most notable process steps that are different between Lewisite processing and GA processing are 1) Lewisite is transferred from the TC to a storage tank before being fed to the ATLIC while GA is fed directly from the TC to the incinerator and 2) emptied Lewisite TCs are rinsed out with 3 Molar (M) nitric acid while GA TCs are rinsed with 18 % sodium hydroxide solution

Evaluate the ATLIC operating conditions relative to regulated ATLIC Operating Parameter Limits (OPLs) and waste feed rates

Evaluate the impact on the PCC and SCC while simultaneously processing Lewisite and spent decon)

2.0 PREPARATORY ACTIVITIES

The ATLIC will only process Agent GA, Lewisite, and Transparency TCs. There are 4 GA TCs, 10 Lewisite TCs, and up to 10 Transparency TCs; the Transparency TCs are empty and do not contain any liquids or solids. In addition, the ATLIC agent campaigns will be short compared to the TOCDF agent campaigns.

The CMA requires that agent and munition specific Operational Readiness Reviews (ORRs) be conducted prior to the start of actual operations. During an ORR, all related procedures are reviewed and tested, and operators execute the procedures while ORR Team Members observe their actions. Agent draining and transfer operations are simulated using ethylene glycol or water. The procedures are further reviewed to ensure that environmental regulatory requirements are incorporated into the procedures.

Issues arising during the ORR are required to be closed according to a timetable and prior to the start of hazardous waste operations.

Because Agent GA will be fed shortly after the completion of the Surrogate Trial Burn (STB) (i.e., upon approval by the Executive Secretary of ATLIC STB preliminary data) and because the GA Campaign is so brief (about 5 days), the function and operation of the GA and Lewisite agent monitoring systems and associated procedures will be included in the ORR. The ORR findings associated with the agent monitoring systems may not necessarily be closed prior to the start of hazardous waste operations associated with feeding the Surrogate Cocktail to the ATLIC; however, findings associated with a specific chemical agent will be closed prior to processing that agent.

The Lewisite ORR will include evaluations of only those aspects of Lewisite processing that are different from GA processing, since common aspects between GA and Lewisite processing will have been evaluated during the initial ORR.

3.0 GENERAL SHAKEDOWN ACTIVITIES

The DSHW will be provided with a 2 week notice before Lewisite feed begins

The duration and quantity of waste feed allowed during the ATLIC LCPT Shakedown Period is specified in Module VI of the TOCDF RCRA Permit and is 144 hours and 7,500 lb of Lewisite or the volume of three TCs, whichever is less. By the time the ATLIC is ready to process Lewisite, it will have already undergone the STB Shakedown Period and associated STB and processed the four Agent GA ton containers

The TOCDF may request final modifications to the ATLIC STB Plan based on Shakedown Period operational experience. Any changes to the test plan will be coordinated with DSHW

Collection and analysis of samples during the shakedown period will follow the Waste Analysis Plan

4.0 LIC SHAKEDOWN ACTIVITIES

Lewisite feed to the ATLIC Primary Combustion Chamber (PCC) will be incrementally ramped up with each increment being a greater percentage of the approved LCPT Plan feed rate limit. At each feed increment, the feed rate will be held for a sufficient period of time to evaluate the stability of each of the regulated operating parameter values. For each regulated operating parameter, if the process value does not exceed the associated Operating Parameter Limit (OPL), the feed increment will be increased.

If OPLs are being approached relative to the magnitude of the waste feed rate adjustments to the incineration process will be made and an evaluation of the affects of the adjustments made will be performed before the feed increment is increased again. The Lewisite feed rate to the ATLIC will be increased in this manner until the maximum feed rate is attained.

Although all the regulated Operating Parameters must be within the operational envelope created by the OPLs (i.e., Automatic Waste Feed Cutoff setpoints) for Lewisite waste feed, the pertinent regulated Operating Parameters are:

- PCC Exhaust Gas Temperature
- SCC Exhaust Gas Temperature
- Packed Bed Scrubber Solution pH
- Venturi Scrubber Differential Pressure
- Exhaust Gas Flow Rate
- Exhaust Gas CO Concentration, and
- Exhaust Gas O_2 Concentration.

In addition to those listed above, during times when metal spikes or spiking solutions are fed with the Surrogate, the pertinent regulated Operating Parameters are:

- Pre-Baghouse Exhaust Gas Temperature
- Baghouse Differential Pressure, and
- Fixed Bed Carbon Filter Differential Pressure.

Once the maximum sustainable Lewisite feed rate has been determined and demonstrated, the same procedure will be used to determine the maximum sustainable spent decon feed rate. Note that TOCDF intends to simultaneously feed wastes (i.e., Lewisite and spent decon) to the PCC and SCC, respectively.

5.0 POST ATLIC STB ACTIVITIES

Following completion of the ATLIC LCPT Lewisite processing will be discontinued. Spent decon feed will continue at half the rate demonstrated during the LCPT. Lewisite feed will resume at half the rate demonstrated during the LCPT upon submittal of the preliminary data to the DSHW and DAQ and increased to 75 % of the demonstrated rates upon approval of the preliminary data by agencies previously referenced.

Limiting the ATLIC waste feed of only spent decon to half the rate immediately following LCPT completion ensures compliance with the federal and state hazardous waste incinerator performance standards because the spent decon will have much lower metals and organic concentrations than the waste previously processed and for which exhaust gas sample results are available.

Resuming Lewisite feed at half the rate demonstrated during the LCPT upon submission of preliminary data ensures compliance with the federal and state hazardous waste incinerator performance standards because TOCDF will have reviewed the data prior to its submission and from that review will be able to determine if the results support the resumption of Lewisite waste feed.

TOOELE CHEMICAL AGENT DISPOSAL FACILITY (TOCDF)

LEWISITE COMPREHENSIVE PERFORMANCE TEST PLAN

FOR THE

AREA 10 LIQUID INCINERATOR

APPENDIX C

MASS AND ENERGY BALANCES FOR ATLIC LEWISITE CPT AND EXHAUST GAS RESIDENCE TIME CALCULATIONS

REVISION 0

January 4, 2010

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Table C-2 ATLIC Exhaust Gas Residence Time Calculation for Lewisite Maximum Feed C-5

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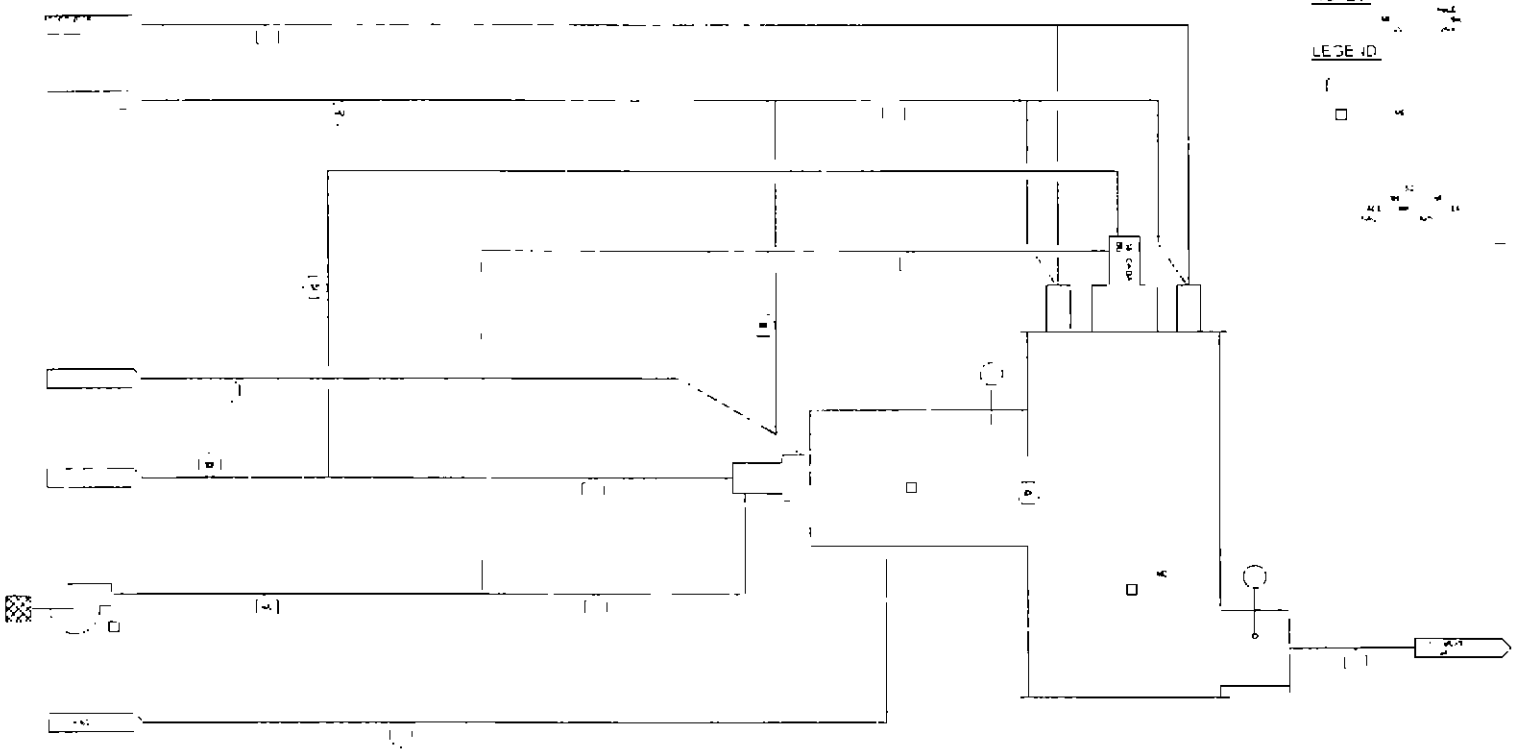
REFERENCE DRAWING

NOTES

LEGEND



REGISTERED PROFESSIONAL ENGINEER

Contractor Reserve Engineering LLC

EG&G

CHEMICAL STOCKPILE DISPOSAL PROGRAM
AREA 10
AREA 10 LIQUID INCINERATOR (ALIC)
LIC SURROGATE TRIAL BURN PROCESS FLOW DIAGRAM

EG-22 F-8220

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NOTES

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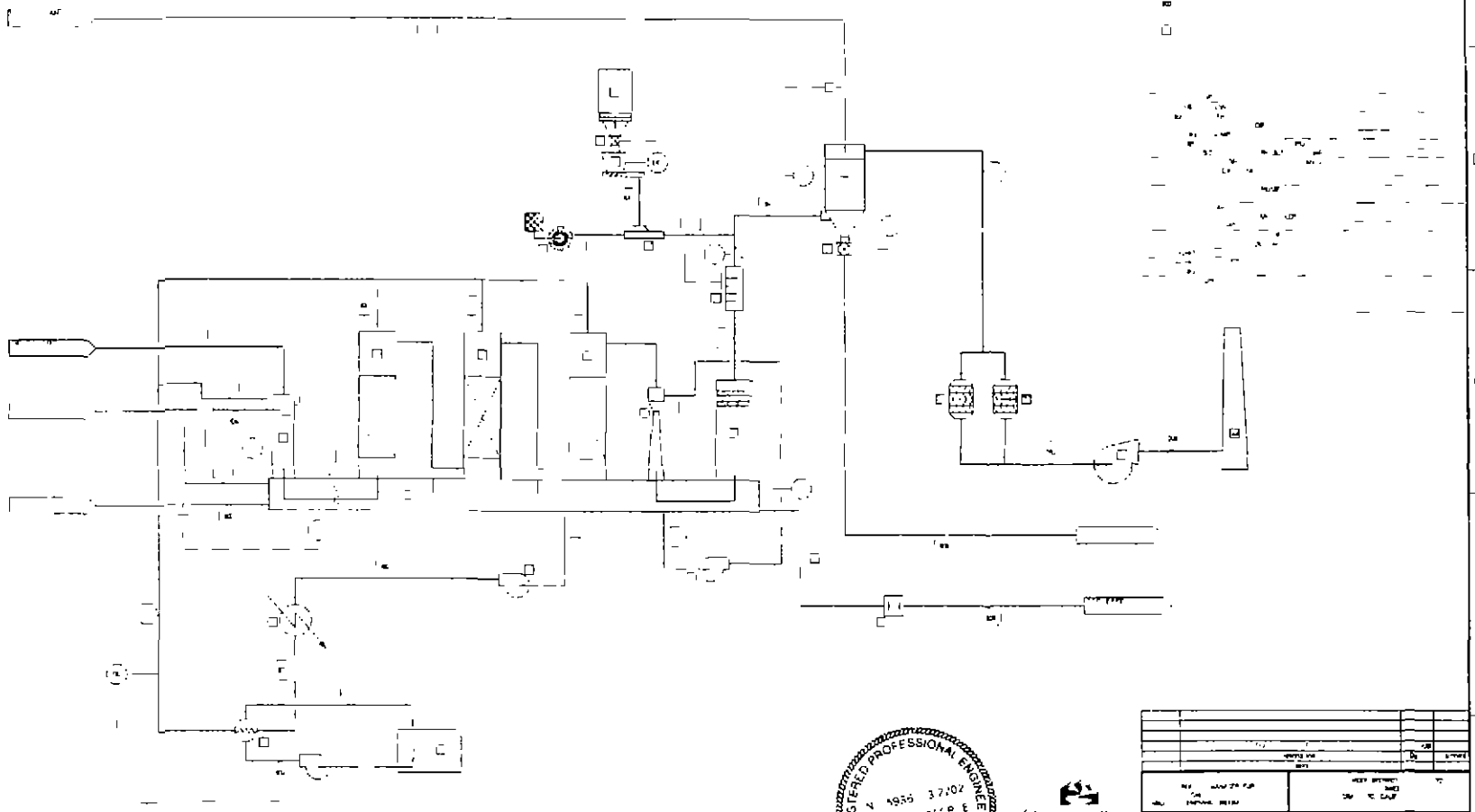

REGISTERED PROFESSIONAL ENGINEER
STATE OF UTAH
1/09/01

EG&G

CHEMICAL STOCKPILE DISPOSAL PROGRAM
AREA
AREA 0 LIQUID INCINERATOR (ATLIC)
PAS SURROGATE TRIAL BURN PROCESS FLOW DIAGRAM

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REFERENCE DRAWINGS

NOTE

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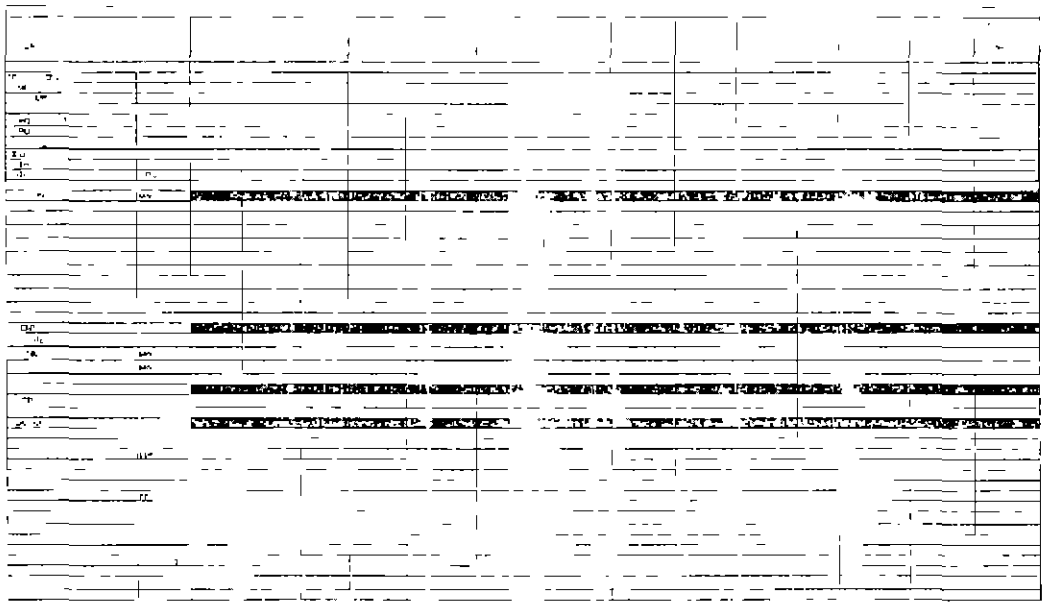

REGISTERED PROFESSIONAL ENGINEER
STATE OF UTAH
11 09 09

EG&G

CHEMICAL STOCKPILE DISPOSAL PROGRAM
AREA 1
AREA 10 LIQUID INCINERATOR (ATLIC)
LIC PROCESS FLOW DIAGRAM

EG-22 F-0201

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REFERENCE DRAWINGS

NONE

REGISTERED PROFESSIONAL ENGINEER

EG&G

CHEMICAL STOCKPILE DISPOSAL PROGRAM
AREA 10
AREA LIQUID INCINERATOR (ATLIC)
PAS PROCESS FLOW DIAGRAM

ED-22 1 8202

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TABLE C 2 ATLIC EXHAUST GAS RESIDENCE TIME CALCULATION for LEWISITE MAXIMUM FEED

Section Description	A Length (ft)	B Diameter (ft)	C C=(B/2)^2 3.14159 X Sectional Area (ft²)	D D=A C Section Volume (ft³)	E Gas Flow Rate[1] (ft³/min)	F F=D 60 / E Residence Time (sec)
Primary Combustion Chamber (PCC)	11.29	3.50	9.62	108.62	3.529	1.85
Secondary Combustion Chamber (SCC)[1]	1 88	92	12.07	191.59	3.989	2.88
Totals ⇒				**300**		**4.73**

a Dimensions are taken from LIC refractory installation drawings which are available onsite for review
b Exhaust gas flow rates from the Heat and Material Balance are found in Appendix C for the Maximum Operating Condition
c The length or height of the LIC PCC is measured from the centerline of the burner to the centerline of the exhaust duct
d The length or height of the LIC SCC is measured from the centerline of the inlet duct to the centerline of the exhaust duct

TOOELE CHEMICAL AGENT DISPOSAL FACILITY (TOCDF)

LEWISITE COMPREHENSIVE PERFORMANCE TEST PLAN

FOR THE

AREA 10 LIQUID INCINERATORS

APPENDIX D

AUTOMATIC WASTE FEED CUTOFF TABLES AND OPERATING CONDITION TARGET VALUE TABLES FOR AREA 10 LIQUID INCINERATOR

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January 4, 2010

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Table D-1 ATLIC LIQUID INCINERATOR AUTOMATIC WASTE FEED CUTOFF			
Item Number	Tag Number	Process Data Description	Setpoint[b]
[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]

Table D-1
ATLIC LIQUID INCINERATOR
AUTOMATIC WASTE FEED CUTOFF

Item Number	Tag Number	Process Data Description	Setpoint[b]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
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