FOCUS

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November 15, 2023

Brent Luebbe
Permitting and Engineering Division
Nebraska Department of Environment and Energy
245 Fallbrook Boulevard
Lincoln, Nebraska 68509

Reference: Unit 2 CPT Plan
Clean Harbors Environmental Services, Inc.
2247 South Highway 71
Kimball, Nebraska 69145
NED 981 723 513

Dear Mr. Luebbe,

On behalf of Clean Harbors Environmental Services, Inc. (CHESI), Focus Environmental, Inc. (Focus) is authorized to submit the attached Comprehensive Performance Test (CPT) Plan for the new Train 2 Incineration System (Train 2) located at the CHESI facility in Kimball, Nebraska. Unit 2 construction is underway and operation is expected to begin third or fourth calendar quarter 2024. CHESI expects to conduct the CPT in fourth calendar quarter 2024 or first calendar quarter 2025. This CPT Plan is being submitted one year in advance of the expected test date as required by 40 CFR §63.1207(e)(1).

If you have any questions or comments, please contact Alyssa King at (308) 235-8212 or king.alyssa@cleanharbors.com, or me at (865) 271-7776 or cemcbride@focusenv.com.

Sincerely,

Chris E. McBride, PE
Consultant

cc: Alyssa King - CHESI (with enclosure)
Eric Gorman- U.S. EPA Region 7 (with enclosure)
Greg Lang-NDEE Monitoring and Remediation (with enclosure)

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November 15, 2023

Eric Gorman, PG
Branch Chief- LCRD/ROAG
U.S. EPA Region 7
11201 Renner Boulevard
Lenexa, Kansas 66219

Reference: Unit 2 CPT Plan
Clean Harbors Environmental Services, Inc.
2247 South Highway 71
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COMPREHENSIVE PERFORMANCE TEST PLAN
CLEAN HARBORS ENVIRONMENTAL SERVICES, INC.
TRAIN 2 INCINERATION SYSTEM
AIR QUALITY CONSTRUCTION PERMIT CP23-003
EPA ID NED 981 723 513

PREPARED FOR:

CleanHarbors ENVIRONMENTAL SERVICES®

CLEAN HARBORS ENVIRONMENTAL SERVICES, INC.
2247 SOUTH HIGHWAY 71
KIMBALL, NE 69145

NOVEMBER 2023, REVISION 0
FOCUS PROJECT NO. P-001551

PREPARED BY:

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AWFCO	automatic waste feed cutoff
BMS	burner management system
CAAA	Clean Air Act Amendments
CEM	continuous emission monitor
CEMS	continuous emissions monitoring system
CFR	Code of Federal Regulations
CMS	continuous process monitoring systems
CPMS	continuous monitoring systems
CPT	comprehensive performance test
DCB	dichlorobenzene
DRE	destruction and removal efficiency
dP	differential pressure
g/s	grams per second
HC	hydrocarbon (total)
HWC	Hazardous Waste Combustors
ID	induced draft or internal diameter (based on context used)
inwc	inches water column (pressure or vacuum)
lb/hr	pounds per hour
LVM	low volatile metals
MACT	Maximum Achievable Control Technology
NDEE	Nebraska Department of Environment and Energy
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOC	Notification of Compliance
NO_X	nitrogen oxides
ODCB	ortho-dichlorobenzene
PET	performance evaluation test
PETP	performance evaluation test plan
PM	particulate matter
psi	pounds per square inch (pressure)
psig	pounds per square inch gauge (pressure)
POHC	principal organic hazardous constituent
QAPP	quality assurance project plan
RCRA	Resource Conservation Recovery Act
SAM	shredder/auger machine

SCC	secondary combustion chamber
SRE	system removal efficiency
SO_2	sulfur dioxide
SVM	semivolatile metals
TCB	trichlorobenzene
THC	total hydrocarbon
TSDF	treatment, storage, and disposal facility
WMDS	waste material data sheet
VFD	variable frequency drive

1.0 INTRODUCTION

This comprehensive performance test (CPT) plan is being submitted by Clean Harbors Environmental Services, Inc. (CHESI) for the new Train 2 Incineration System (Train 2) located at the CHESI's Kimball, Nebraska, facility. Train 2 is subject to the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Hazardous Waste Combustors (HWC) codified at Title 40 Code of Federal Regulations (CFR) Part 63, Subpart EEE. This test program will be the initial CPT for Train 2. The new system is expected to become operable by third or fourth quarter 2024. The Air Quality Construction Permit CP23-003 requires the performance test to be conducted within sixty (60) days after first reaching the maximum capacity, but not more than 180 days after the start-up of operations, for which CHESI defines start-up to be the date at which the facility first begins routine operation after commissioning of all feed systems on hazardous waste has been completed.

As required by [40 CFR §63.1207(e)(1)], this CPT Plan is being submitted at least one year in advance of the expected test date. In accordance with the 40 CFR §63.1207(e)(1)(i)(B), the CPT Plan, Quality Assurance Project Plan (QAPP), and Continuous Monitoring System Performance Evaluation Test Plan (CMS PETP) will be made available to the public for review at least 60 days prior to the CPT start date. This plan describes the testing to be conducted to demonstrate compliance with the HWC NESHAP performance and emissions for new incinerators promulgated at 40 CFR §63.1219 on October 12, 2005 and as amended through April 14, 2008.

1.1 FACILITY OVERVIEW

CHESI operates a hazardous waste treatment, storage, and disposal facility (TSDF) located south of Kimball, Nebraska. The commercial function of the facility is to thermally treat (incinerate) hazardous and non-regulated materials, rendering the residue ash acceptable for disposal at regulated Subtitle C landfills. The facility currently operates a fluidized bed incineration system (Train 1) at this location. The new Train 2 Incineration System is a rotary kiln equipped with a secondary combustion chamber (SCC) and associated air pollution control (APC) system. The facility identification and contact person are:

Facility Name:	Clean Harbors Environmental Services, Inc.
Physical Address:	2247 South Highway 71 Kimball, NE 69145
EPA ID Number:	NED 981 723 513
Facility Contact:	Alyssa King, Environmental Compliance Manager
Telephone No.:	(308) 235-8212
E-mail:	king.alyssa@cleanharbors.com.

1.2 HAZARDOUS WASTE COMBUSTOR OVERVIEW

The new Train 2 Incineration System consists of a rotary kiln, a SCC, a gas conditioning system, and an APC system. Wastes are processed in the rotary kiln and the SCC. Gases from the thermal treatment are routed to a spray dryer (to lower gas temperature) and then to the first baghouse. The gases upon exiting the first baghouse enter a saturator (to lower gas temperature further), and then flow through two parallel condenser columns. The gases are then reheated, activated carbon is injected, and further treated in a second baghouse. Upon exiting the second baghouse, the gases flow to a Selective Catalytic Reduction (SCR) De-NOx unit for nitrogen oxides (NO_X) removal before exiting through the stack.

1.3 REGULATORY OVERVIEW

The HWC NESHAP was promulgated under joint authority of the Clean Air Act Amendments of 1990 (CAAA) and Resource Conservation and Recovery Act (RCRA), and codified at 40 CFR Part 63, Subpart EEE. The Train 2 Incineration System is expected to begin operation in third quarter 2024. In accordance with 40 CFR §63.1206(a)(1)(ii)(B), Train 2 is subject to the HWC NESHAP emission standards for new source hazardous waste incinerators. The applicable performance and emission standards are summarized in Table 1-1 and described below:

- 40 CFR §63.1219(b)(1)(i) states that the new incinerator equipped with either a waste heat boiler or dry air pollution control system may not emit dioxins and furans (dioxin/furan) in excess of 0.11 nanograms TEQ (toxicity equivalence) per dry standard cubic meter (ng TEQ/dscm) corrected to seven (7) percent oxygen. In accordance with 40 CFR §63.1219(b)(1)(iii), a source equipped with a dry air pollution control system followed by a wet air pollution control system is considered to be a dry air pollution control system. The new incinerator is considered a dry system, as the first step in the APC system is baghouse No. 1, a dry system, which is then followed by the wet portion of the system (condenser columns), and then a second dry unit, namely baghouse No. 2.
- 40 CFR §63.1219(b)(2) states that the incinerator may not emit mercury in excess of 8.1 micrograms per dry standard cubic meter (µg/dscm) corrected to seven (7) percent oxygen.
- 40 CFR §63.1219(b)(3) states that the incinerator may not emit cadmium (Cd) and lead (Pb) combined, referred to as semivolatile metals (SVM), in excess of 10 µg/dscm corrected to seven (7) percent oxygen.
- 40 CFR §63.1219(b)(4) states that the incinerator may not emit arsenic (As), beryllium (Be), and chromium (Cr) combined, referred to as low volatile metals (LVM), in excess of 23 µg/dscm corrected to seven (7) percent oxygen.

- 40 CFR §63.1219(b)(5)(i) and (ii) states under (i) that the incinerator may not emit carbon monoxide (CO) in excess of 100 parts per million by volume (ppmv) over an hourly rolling average (HRA), dry basis, corrected to seven (7) percent oxygen. If the system operator elects to comply with the carbon monoxide standard rather than the total hydrocarbon standard under (b)(5)(ii), then total hydrocarbon emissions compliance must be documented during the destruction and removal efficiency (DRE) test runs do not exceed 10 ppmv over an hourly rolling average, dry basis, corrected to seven (7) percent oxygen, and reported as propane. Or, under (ii), the regulation requires that the incinerator may not emit total hydrocarbon in excess of 10 ppmv over an hourly rolling average, dry basis, corrected to seven (7) percent oxygen, and reported as propane. CHESI uses total hydrocarbon as the primary continuous monitoring parameter and uses carbon monoxide as the secondary continuous monitoring parameter when the total hydrocarbon continuous monitoring is not in service.
- 40 CFR §63.1219(b)(6) states that the incinerator may not emit hydrogen chloride and chlorine combined (HCl/Cl_2) in excess of 21 ppmv, expressed as a chloride (Cl) equivalent, dry basis and corrected to seven (7) percent oxygen.
- 40 CFR §63.1219(b)(7), except as provided by §63.1219(e), states that the incinerator may not emit particulate matter (PM) in excess of 0.0016 grains per dry standard cubic foot (gr/dscf) corrected to seven (7) percent oxygen.
- 40 CFR §63.1219(c)(1) requires a DRE of 99.99 percent for each designated principal organic hazardous constituent (POHC).

The HWC NESHAP at 40 CFR §63.1219(e)(3) provides alternative metals emission control requirements for incinerators that can be used in lieu of meeting the particulate matter (PM) standard. CHESI may elect to use this alternative method, which adds additional metals to the SVM and LVM lists of metals. These additional metals, namely, selenium (Se) added to the SVM list, and antimony (Sb), cobalt (Co), manganese (Mn), and nickel (Ni) added to the LVM list, will be included in the test program as part of the metals emissions testing and waste feed analyses described in this CPT Plan. These data will provide the needed emissions and waste feed data to establish feed rate limits for all metals included in the expanded SVM and LVM lists and to ensure compliance with the alternative metals emissions requirements should this alternative method be selected for use at the facility. If the alternative metals emission control requirements are enacted, the applicable PM emission standard reverts to the RCRA 40 CFR 264, Subpart O *Incinerators* limit of 0.08 gr/dscf [40 CFR §264.343(c)].

Table 1-1. New Incinerator Final Replacement Standards

Parameter	Units	Emission/Performance Standard
Dioxins and furans	ng TEQ/dscm [1]	0.11
Mercury	ug/dscm [1]	8.1
Semivolatile metals	ug/dscm [1]	10
Low volatile metals	ug/dscm [1]	23
Hydrogen chloride and chlorine	ppmv (dry) [1]	21
Particulate matter	gr/dscf [1]	0.0016
Carbon monoxide [2]	ppmv (dry) [1]	100
Total Hydrocarbon [2]	ppmv (dry) [1]	10
Destruction and removal efficiency	%	99.99

Notes:
[1] Emission standard corrected to seven (7) percent oxygen.
[2] CHESI will demonstrate both carbon monoxide (CO) and total hydrocarbon (THC) emissions during the CPT.

1.4 ADDITIONAL AIR QUALITY CONSTRUCTION PERMIT REQUIREMENTS

In addition to the HWC MACT performance and emissions standards, the Air Quality Construction Permit CP23-003 requires demonstration of compliance with emissions limits for sulfur dioxide (SO_2) of 8.90 lb/hr and nitrogen oxides (NO_x) of 32 tpy. Compliance with these emissions standards will be concurrently demonstrated during the CPT.

1.5 COMPREHENSIVE PERFORMANCE TEST OVERVIEW

This CPT is designed to demonstrate compliance of the Train 2 Incineration System with the emission limits for new sources of the HWC NESHAP at 40 CFR §63.1219(b) and to establish the operating parameter limits (OPLs) required by 40 CFR §63.1209. In addition to the HWC NESHAP compliance demonstrations, CHESI will perform emissions testing to comply with the additional parameters delineated in the Air Quality Construction Permit.

1.5.1 CPT SYSTEM OPERATION

One set of three test runs will be performed to demonstrate compliance with the HWC NESHAP and additional Air Quality Construction Permit incinerator emission limits, and establish the incineration system OPLs. This condition represents the extreme range of normal conditions, which is consistent with the requirements of 40 CFR §63.1207(g). This test condition will represent the maxima of operation for the waste feed system and waste feeds of constituents that generate emissions. This single test condition will establish system OPLs for maximum waste feed rates (total and pumpable) and constituent feed rates (chlorine, ash, LVM, SVM, and mercury). This condition will also represent the maximum/minimum operating criteria for the combustion and APC systems and will establish the applicable maximum/minimum OPLs.

The HWC NESHAP emissions limits are concentration-based (mass/volume). All concentrations measured will be corrected to seven (7) percent oxygen, dry basis in keeping with the HWC NESHAP standard. Air emissions data will be converted to pounds per hour (lb/hr) and tons per year (tpy) for those emissions limited on a mass/time basis in the Air Quality Construction Permit.

The total hydrocarbon (THC), carbon monoxide (CO), oxygen (O_2), sulfur dioxide (SO_2), and nitrogen oxides (NO_x) continuous emissions monitoring systems (CEMS) will be installed and certified as required by the regulations [annual relative accuracy test audit (RATA)] and quarterly cylinder gas audits (CGAs) [referred to as absolute calibration audits (ACAs) in the Appendix to the 40 CFR 63, Subpart EEE] . Oxygen and carbon dioxide will be monitored by the emissions sampling contractor using CEMS as part of the isokinetic sampling methods . Table 1-2 provides an overview of the planned emissions demonstrations.

Table 1-2. CPT Performance and Emissions Demonstrations Overview

HWC NESHAP Performance or Emissions Parameter	Sampling Method	Analysis Method
Dioxins and furans	SW-846 Method 0023A	SW-846 Method 8290A
Destruction and removal efficiency of 1,2-dichlorobenzene or 1,2,4-trichlorobenzene		SW-846 Method 8270D w/Selected Ion Monitoring (SIM)
Mercury	EPA Method 29	EPA Method 29 and SW-846 Method 6010C or 6020 for non-mercury metals and 7470A for mercury
Semivolatile metals		
Low volatile metals		
Particulate matter	EPA Method 5/26A	EPA Method 5
Hydrogen chloride and chlorine		SW-846 Method 9056A
Total Hydrocarbon	Installed CEMS Performance Specification 8A	Flame Ionization Detector (FID)
Carbon monoxide	Installed CEMS Performance Specification 4B	Gas Filter Correlation
Oxygen	EPA Method 3A and Performance Specification 4B	Paramagnetic
Carbon dioxide	EPA Method 3A	Non—Dispersive Infrared (NDIR)
Air Quality Construction Permit Emission Demonstration		
Sulfur dioxide	Installed CEMS Performance Specification 2	Ultraviolet Fluorescence
Nitrogen oxides	Installed CEMS Performance Specification 2	Chemiluminescence

1.5.2 CPT STAFFING

This CPT will be coordinated under the direction of CHESI personnel. CHESI will utilize the services of a testing consultant and contractors to perform the CPT. The testing consultant will be responsible for implementing the test protocol and overseeing the incineration system operations including waste feed preparation by CHESI, and the spiking and emissions sampling contractor activities. The waste feed samples will be collected by CHESI operators and laboratory staff. The selected spiking company will perform the metals and principal organic hazardous constituent (POHC) spiking during testing. The selected emissions testing company will perform the emissions sampling for the test program with oversight by the testing consultant. The waste feed samples will be analyzed by CHESI. Analysis of emissions, spiking material, and other process samples not analyzed by CHESI, will be performed by a qualified and accredited laboratory. Additional information on the project team roles and responsibilities is provided in the QAPP in Appendix A.

1.5.3 CPT PREPARATIONS

Prior to the CPT, CHESI will perform the CMS PET. The goal of the CMS PET is to demonstrate that the CMS associated with the incineration system is operating in compliance with the standards presented in the HWC NESHAP and in the NESHAP General Provisions contained in 40 CFR §63.1 through 63.15. As described in 40 CFR §§63.8(c)(2) and 63.8(c)(3), all CMS used in accordance with the HWC NESHAP shall be installed so that representative measurements of emission or process parameters can be obtained. During the CMS PET, CHESI will verify that each CMS is correctly installed, calibrated, and operational. The CMS PETP is included as Appendix B.

1.5.4 CPT SCHEDULE

Testing is anticipated fourth quarter 2024 or first quarter 2025. The testing, once commenced, is expected to take 5-7 days to complete. The CPT Report and Notification of Compliance (NOC) will be submitted within 90 days after completion of emission testing in accordance with the regulations 40 CFR §63.1207(j)(1) or an extension will be requested.

1.6 OPERATING PARAMETER LIMITS OVERVIEW

CHESI will demonstrate compliance with the performance standards of the HWC NESHAP for new incinerators and establish OPLs for the incineration system during the CPT. 40 CFR §63.1209 delineates the required OPLs that must be determined to demonstrate compliance with each emission standard of the HWC NESHAP. The OPLs that are applicable to the incineration system are summarized in Table 1-3 and are discussed in detail in Section 2. Most OPLs will be established as hourly rolling averages (HRAs) or 12-hour rolling averages (THRAs).

Table 1-3. Applicable Operating Parameter Limits Summary

Operating Parameter	Applicable Emission Standard	Regulatory Citation [1]	Averaging Period	CPT Target	Basis for Setting the Final OPL
OPLs based upon Performance Test Data					
Minimum kiln combustion temperature	CO, THC, DRE, dioxin/furan [2]	(a)(7), (j)(1), (k)(2)	HRA	1,400 ^{o}F	Average of the average temperatures
Minimum secondary combustion chamber temperature	CO, THC, DRE, dioxin/furan [2]	(a)(7), (j)(1), (k)(2)	HRA	1,800 ^{o}F	Average of the average temperatures
Maximum stack gas flow rate	CO, THC, DRE, dioxin/furan, PM, SVM, LVM, Hg, HCl/Cl_2 [2]	(a)(7), (j)(2), (k)(3), (m)(2), (n)(5), (o)(2)	HRA	100,000 acfm	Average of the maximum hourly rolling average flows
Maximum total hazardous waste feed rate to kiln	CO, THC, DRE, dioxin/furan [2]	(a)(7), (j)(3), (k)(4)	HRA	30,000 lb/hr	Average of the maximum hourly rolling average total feed rates
Maximum pumpable hazardous waste feed rate to kiln	CO, THC, DRE, dioxin/furan [2]	(a)(7), (j)(3), (k)(4)	HRA	7,000 lb/hr	Average of the maximum hourly rolling average pumpable feed rates
Maximum total hazardous waste feed rate to the secondary combustion chamber	CO, THC, DRE, dioxin/furan [2]	(a)(7), (j)(3), (k)(4)	HRA	20,000 lb/hr	Average of the maximum hourly rolling average total feed rates
Maximum total system mercury feed rate [4]	Mercury	(l)(1)(i)	THRA	0.15 lb/hr	Average of the average total feed rate to be extrapolated to the HWC MACT emissions standard
Maximum total system semivolatile metals feed rate [4]	SVM	(n)(2)(ii)	THRA	25 lb/hr	Average of the average total feed rate to be extrapolated to the HWC MACT emissions standard
Maximum total system low volatile metals feed rate [4]	LVM	(n)(2)(ii)	THRA	25 lb/hr	Average of the average total feed rate to be extrapolated to the HWC MACT emissions standard
Maximum total system pumpable low volatile metals feed rate [4]	LVM	(n)(2)(vi)	THRA	25 lb/hr	Average of the average pumpable feed rate to be extrapolated to the HWC MACT emissions standard
Maximum total system ash feed rate	PM	(m)(3)	THRA	12,000 lb/hr	Average of the average total feed rate

Table 1-3. Applicable Operating Parameter Limits Summary

Operating Parameter	Applicable Emission Standard	Regulatory Citation [1]	Averaging Period	CPT Target	Basis for Setting the Final OPL
Maximum total system chlorine feed rate	SVM, LVM, HCl/Cl_2	(n)(4), (o)(1)	THRA	2,000 lb/hr	Average of the average total feed rate
Minimum condenser columns liquid flow rate	HCl/Cl_2	(o)(3)(v),	HRA	3,500 gpm	Average of the average flows
Minimum condenser columns liquid pH	HCl/Cl_2	(o)(3(iv)	HRA	4.0	Average of the average pH
Maximum baghouse No. 2 inlet temperature	Dioxin/furan, SVM, LVM	(k)(1)(i), (n)(1)	HRA	325 °F	Average of the average temperatures
Minimum activated carbon feed rate	Dioxin/furan, mercury	(k)(6)(i), (l)(3)	HRA	20 lb/hr	Average of the average feed rates
Minimum activated carbon carrier fluid flow rate	Dioxin/furan, mercury	(k)(6)(ii), (l)(3)	HRA	60 scfm	Average of the average flows
OPLs based upon Regulatory Requirement					
Maximum stack carbon monoxide [2]	Carbon monoxide	1219(b)(5)(i)	HRA	<100 ppm @ 7% O_2, dry	Established regulatory requirement
Maximum stack hydrocarbon [2]	Total hydrocarbon	1219(b)(5)(ii)	HRA	<10 ppm @ 7% O_2, dry	Established regulatory requirement
Maximum kiln pressure	Fugitive emissions	(p)	Instant-aneous [3]	<Atmospheric [3]	Fixed Regulatory Requirement
Maximum secondary combustion chamber pressure	Fugitive emissions	(p)	Instant-aneous [3]	<Atmospheric [3]	Fixed Regulatory Requirement
OPLs based upon Manufacturer's Specification					
Minimum condenser columns liquid nozzle pressure	Mercury, HCl/Cl_2	(l)(2), (o)(3)(iii)	HRA	>7.0 psig[5]	Manufacturer's specification
Activated carbon specification	Dioxin/furan, mercury	(k)(6)(iii), (l)(3)	None	Darco Flue Gas Desulfurization (FGD®) 95% passing 325 mesh screen or equivalent	Manufacturer's Specification
Minimum burner gun atomizing fluid pressure	THC, DRE [2]	(a)(7), (j)(4)	HRA	>30 psig	Manufacturer's specification
Baghouse No. 2 bag leak detection system	Dioxin/furan, PM, SVM, LVM	1206(c)(8)	NA	Operational	Manufacturer's specification

Notes:
[1] 40 CFR Part 63 Section 1209 unless otherwise noted.
[2] 40 CFR §63.1209(a)(7) requires that OPLs established to demonstrate compliance with DRE also be used to demonstrate compliance with the carbon monoxide and total hydrocarbon emission standards.

Table 1-3. Applicable Operating Parameter Limits Summary

Operating Parameter	Applicable Emission Standard	Regulatory Citation [1]	Averaging Period	CPT Target	Basis for Setting the Final OPL

[3] Due to the nature of kiln operation, these instantaneous pressure limits are established with a one-second delay, which reflects instrument reaction time. Also, refer to Sections 2.2 and 2.3.20 of this CPT plan and the Alternative Monitoring Application (AMA) presented as Appendix C.
[4] Maximum metals feed rate limits are extrapolated values based on the ratio of test demonstrated emissions to the emissions standard times the test demonstrated feed rate.
[5] Also, refer to Sections 2.2 and 2.3.12 of this CPT plan and the Alternative Monitoring Application (AMA) presented as Appendix C.

1.7 WAIVER OF OPERATING LIMITS FOR THE COMPREHENSIVE PERFORMANCE TEST

The single CPT operating condition is designed to demonstrate the extreme range of normal operation, which is consistent with the requirements of 40 CFR §63.1207(g). 40 CFR §63.1207(h) states that current OPLs are waived during CPTs. For the purposes of the initial Train 2 CPT where OPLs have yet to be established, this waiver will include operating time outside the proposed CPT target values noted in Table 1-3 during pre-CPT shakedown, to reach steady-state prior to emissions testing, and during emissions testing. OPLs are waived for an aggregate time not to exceed 720 hours of operation [renewable at the discretion of the Nebraska Department of Environment and Energy (NDEE)] under an approved test plan or if the source records the results of the testing. CHESI will likely perform some pre-testing in advance of the CPT to evaluate waste feed, combustion system, and APC system operations, and stack flow rate to ensure that each device and the system as a whole can be operated at the extreme minimums or maximums under the test conditions required during this CPT.

With this CPT Plan and as described above, CHESI is requesting a 720-hour pre-CPT period to evaluate system operation while burning hazardous waste. These operating hours will be used in a sequence of short test periods (4 - 24 hours in length) rather than a single extended continuous period. Only a portion of the 720 hours are expected to be needed to perform the pre-CPT evaluations. CHESI believes the incineration system will continue to meet all HWC NESHAP and Air Quality Construction Permit emission standards during the pretesting based on the results of the testing other substantially similar systems owned and operated by CHESI. Testing may be performed with a 5-10% increase in stack flow rate, and thus will not change the combustion residence time significantly and will only have a small, if any, impact on the control efficiencies in the APC system devices. The carbon monoxide or total hydrocarbon emissions automatic waste feed cutoffs (AWFCOs) will still be enforced at 100 or 10 ppmdv @ 7% O_2 HRA, respectively, to ensure good combustion is occurring and emissions meet the standard.

1.8 REFERENCE DOCUMENTS

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

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

1.9 COMPREHENSIVE PERFORMANCE TEST PLAN ORGANIZATION

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

- Section 2 presents a discussion on the target OPLs for the incineration system;
- Section 3 presents information on the incineration system's feed streams;
- Section 4 presents a detailed engineering description of the incineration system;
- Section 5 presents a description of the incineration system's CMS;
- Section 6 presents a description of the test operating conditions;
- Section 7 presents a summary of the test sampling and analysis procedures;
- Appendix A Quality Assurance Project Plan
- Appendix B Continuous Monitoring Systems Performance Evaluation Test Plan
- Appendix C Alternative Monitoring Application
- Appendix D Process Flow Drawings.

2.0 OPERATING PARAMETER LIMITS

The HWC NESHAP requires facilities to monitor specific process parameters to demonstrate continuous compliance with the performance and emission standards. The allowable limits for most process parameters are determined from the results of the CPT. 40 CFR §63.1209 lists the required OPLs that are used to demonstrate compliance with each emission standard of the HWC NESHAP. These operating parameters are monitored using a continuous monitoring system (CMS).

2.1 REQUIRED OPERATING PARAMETER LIMITS

To determine the operating parameters that must be monitored to comply with the HWC NESHAP, each individual component of the incineration system was reviewed. Parameters, such as temperatures, waste feed rates, and operation of the waste firing system, are monitored for the combustion zones of the incinerator (kiln and SCC). The incinerator APC system consists of a spray dryer, baghouse No. 1, saturator, parallel condenser columns, gas reheat, activated carbon injection, baghouse No. 2, induced draft fan, SCR de-NOx control, and stack. Table 2-1 presents the OPLs listed in the HWC NESHAP by performance and emission standard category (DRE, dioxin/furan, PM, metals, and hydrogen chloride/chlorine). The OPLs are specified as HRAs, THRAs, or instantaneous limits.

Each component of the APC system is designed to be the primary control device for specific HWC NESHAP emission constituents. In accordance with 40 CFR §63.1219(b)(1)(iii), a source equipped with a dry APC system followed by a wet APC system is considered a dry APC system. Therefore, the Train 2 APC system is a dry system as defined by the HWC NESHAP.

The spray dryer, baghouse No. 1, and saturator are gas conditioning devices designed to lower the temperature and condition the combustion gas stream prior to entering the primary control device. The spray dryer lowers the temperature of the gas entering baghouse No. 1 and the saturator lowers the temperature of the gas before entering the parallel condenser columns. These gas conditioning devices do not have specific OPL requirements.

The low energy scrubbers like the condenser columns are control devices for hydrogen chloride and chlorine (HCl/Cl_2). Therefore, OPLs related to these constituents are established including minimum scrubber inlet water pH, minimum liquid feed pressure, minimum scrubber water flow rate, and maximum stack flow rate.

Baghouse No. 2 with carbon injection is a control device for emissions of PM, metals (LVM, SVM), mercury and dioxin/furan. Therefore, OPLs related to these constituents are established including maximum gas temperature at the inlet to baghouse No. 2, minimum activated carbon feed rate and carrier gas flow rate to baghouse No. 2, and maximum stack flow rate.

The OPLs presented in Table 2-1 follow 40 CFR §63.1209 of the HWC NESHAP which delineates operating limits by the types of combustion and APC system devices. Table 2-1 lists the OPLs applicable to the Train 2 Incineration System. OPLs listed in 40 CFR §63.1209 that are not applicable to the Train 2 Incineration System are also shown and the reason(s) they are not applicable. The reason(s) the OPLs are not applicable include:

1) they apply to other types of combustion units such as cement kilns, boilers, etc.; or
2) they apply to wet APC systems (this APC system is defined as a dry system) such as wet scrubbers for PM control or that have carbon injection to the wet scrubber inlet gases (this system injects carbon to the dry system prior to baghouse No. 2); etc.

Baghouse No. 2, with carbon injection, is the dry system control device for dioxin/furan, PM, LVM, SVM, and mercury. The wet scrubbers (condenser columns) are the control devices for HCl/Cl_2 and have OPLs set based on the requirements for HCl/Cl_2 [63.1209(o)] and for mercury, which references the HCl/Cl_2 scrubber OPLs [63.1209(l)(2) for mercury refers to 1209(o)(3) for HCl/Cl_2].

2.2 ALTERNATIVE MONITORING AND WAIVER REQUESTS

40 CFR §63.1209(g) allows facilities to submit an alternative monitoring application (AMA) to document compliance with an emission standard or to waive a monitoring requirement. The HWC NESHAP at 40 CFR §63.1209(g)(1)(iii)(A) requires the AMA be submitted prior to or in conjunction with the submittal of the CPT Plan. With this CPT Plan for the new Train 2 Incineration System, CHESI is applying for alternate monitoring for two specific operating parameters:

1) an alternative monitoring method for control of combustion leaks from the kiln and SCC as allowed at 40 CFR §63.1206(c)(5)(i)(C) which is equivalent to maintenance of combustion zone pressure lower than ambient, and
2) waiver from the use of pressure drop as an OPL for the low energy scrubbers.

The requested alternative monitoring approaches for control of combustion leaks and waiving of the pressure drop limit for low energy scrubbers must be approved by NDEE or USEPA Region 7. The Arkansas Department of Environmental Quality (ADEQ) approved this alternate monitoring approach for the substantially similar El Dorado, Arkansas facility. EPA Regions 6 and 8 have approved this alternative monitoring approach for the Deer Park, Texas and Aragonite, Utah rotary kiln systems, respectively. The AMA is presented in Appendix C.

2.3 TARGET OPERATING PARAMETER LIMITS

During the CPT, CHESI will demonstrate compliance with the performance and emission standards of the HWC NESHAP and will establish OPLs. The CPT has been designed to demonstrate performance of the incineration system at conditions representative of the extreme range of normal conditions (maximum/minimum). The OPLs that CHESI will demonstrate are discussed below and are summarized in Table 2-2. Most OPLs will be established during the CPT. Some OPLs related to operation of the combustion firing system (e.g., minimum atomizing air pressure), to activated carbon (carbon carrier flow rate and carbon specifications), and for condenser columns liquid feed pressure are established from manufacturer's recommendations and specifications in accordance with the regulations.

The target OPLs shown in Table 2-2 are estimates of the expected values based on operating experience and the previous CPTs of other substantially similar systems. The final OPLs will be based on the actual test results and operating values measured during the CPT. The deviation from these target values depends on the waste feed materials or surrogate waste materials available at the time of testing and the response of the equipment to operating at these extremes.

2.3.1 MINIMUM COMBUSTION CHAMBER TEMPERATURES

A limit on minimum combustion chamber temperature is established for each combustion chamber to demonstrate compliance with the total hydrocarbon and dioxin/furan emission standards, and the DRE performance standard. 40 CFR §§63.1209(a)(7), (j)(1), and (k)(2) require that the minimum combustion chamber temperature OPL(s) be determined using the average of the test run averages. The minimum combustion chamber temperature OPL(s) is established on an HRA basis.

Kiln temperature is monitored using three thermocouples located at the kiln gas discharge duct (duct between kiln and SCC). One of the thermocouples will always be on-line when hazardous waste is being fed to the kiln and will be the thermocouple used to trigger an AWFCO. The other two thermocouples provide backup systems. If the selected primary thermocouple goes out of range or fails, the system will be switched to one of the backup thermocouples. A minimum of one of the three thermocouples must be operational for waste to be fed to the kiln.

The SCC temperature is also monitored using three thermocouples located at the exit duct of the SCC. One of the thermocouples will always be on-line when hazardous waste is being fed to the kiln or SCC, and will be the thermocouple used to trigger an AWFCO. The other two thermocouples provide backup systems. If the selected primary thermocouple goes out of range or fails, the system will be switched to one of the backup thermocouples. A minimum of one of the three thermocouples must be operational for waste to be fed to the kiln or SCC.

Table 2-1. Required Operating Parameter Limits

Standard	Required Operating Parameter	Regulatory Citation [1]	Averaging Period	Method to Calculate Limit
Destruction and removal efficiency and total hydrocarbon	Minimum combustion chamber temperatures	(a)(7), (j)(1)	HRA	Average of the 3 test run averages
	Maximum flue gas flow rate or production rate (stack flow rate)	(a)(7), (j)(2)	HRA	Average of the maximum HRAs for each of the 3 test runs
	Maximum hazardous waste feed rates	(a)(7), (j)(3)	HRA	Average of the maximum HRAs for each of the 3 test runs
	Maximum pumpable hazardous waste feed rates	(a)(7), (j)(3)	HRA	Average of the maximum HRAs for each of the 3 test runs
	Operation of the waste firing system	(a)(7), (j)(4)	HRA	Manufacturer specifications /recommendations
Dioxins and furans	Maximum flue gas temperature at the inlet to the dry particulate matter control device (baghouse No. 2)	(k)(1)(i)	HRA	Average of the 3 test run averages
	Minimum combustion chamber temperatures	(k)(2)	HRA	Average of the 3 test run averages
	Maximum flue gas flow rate or production rate (stack flow rate)	(k)(3)	HRA	Average of the maximum HRAs for each of the 3 test runs
	Maximum hazardous waste feed rates	(k)(4)	HRA	Average of the maximum HRAs for each of the 3 test runs
	Maximum pumpable hazardous waste feed rates	(k)(4)	HRA	Average of the maximum HRAs for each of the 3 test runs
	Particulate matter operating limit reference under dioxin/furan refers to wet scrubber PM control units; not applicable to baghouse fabric filter systems. See PM later in this table.	(k)(5) refers to m(1)	Not applicable	Not applicable – system is a dry baghouse system – fabric filter; activated carbon fed to baghouse No. 2 not to wet scrubbers referenced to (m)(1)(i); (m)(1)(ii-iii) reserved; m(1)(iv) for other non-fabric filter systems
	Minimum activated carbon feed rate to baghouse No. 2	(k)(6)(i)	HRA	Average of the 3 test run averages
	Minimum activated carbon carrier fluid flow rate	(k)(6)(ii)	HRA	Manufacturer's specifications
	Carbon specifications	(k)(6)(iii)	Not applicable	Carbon key specifications
Dioxins and furans (cont'd)	Other carbon systems, catalytic oxidizers, inhibitors	(k)(7-9)	Not applicable	Carbon injected to baghouse No. 2; carbon bed, catalytic oxidizer, or inhibitor are not used for dioxin/furan control.

Table 2-1. Required Operating Parameter Limits

Standard	Required Operating Parameter	Regulatory Citation [1]	Averaging Period	Method to Calculate Limit
Mercury	Maximum mercury feed rate	(l)(1)(i)	THRA	Average of the 3 test run averages
	Extrapolation of feed rate levels for mercury	(l)(1)(v)	THRA	Extrapolation procedure described in CPT Plan; Section 6.5
	Minimum condenser columns pressure drop	(l)(2) refers to (o)(3)(ii)	Not applicable	Manufacturer's specification This OPL is proposed to be waived per the approved alternative monitoring application. [2]
	Minimum scrubber liquid feed pressure	(l)(2) refers to (o)(3)(iii)	HRA	Manufacturer's specification
	Minimum scrubber liquid to gas ratio or minimum liquid flow rate and maximum flue gas flow rate	(l)(2) refers to (o)(3)(iii and iv)	HRA	Average of the 3 test run averages
	Minimum activated carbon feed rate to baghouse No. 2	(l)(3) refers to (k)(6) under dioxin/furan	HRA	Average of the 3 test run averages
	Minimum activated carbon carrier fluid flow rate	(l)(3) refers to (k)(6) under dioxin/furan	HRA	Manufacturer's specifications
	Carbon specifications	(l)(3) refers to (k)(6) under dioxin/furan	Not applicable	Carbon key specifications
	Carbon bed	(l)(4)	Not applicable	Carbon bed is not used in the system
Particulate matter	Refers to wet systems where wet scrubbers are the control devices for PM; the PM control device is a dry control device, baghouse No. 2.	(m)(1)	Not applicable	(m)(1) is not applicable as the APC system is a dry baghouse system – fabric filter; PM control is by baghouse No. 2. (m)(1)(i) refers to PM control systems using wet scrubbers as the primary control. This system uses a baghouse for PM control.
	Maximum flue gas flow rate or production rate	(m)(2)	HRA	Average of the maximum HRAs for each of the 3 test runs
	Maximum ash feed rate	(m)(3)	THRA	Average of the 3 test run averages
	Bag leak detection system	1206(c)(8)	None	Must be operational
Semivolatile metals (SVM) and low volatile metals (LVM)	Maximum flue gas temperature at the inlet to the dry particulate matter control device	(n)(1)	HRA	Average of the 3 test run averages
	Maximum total SVM and total LVM feed rates	(n)(2)(i-ii)	THRA	Average of the 3 test run averages

Table 2-1. Required Operating Parameter Limits

Standard	Required Operating Parameter	Regulatory Citation [1]	Averaging Period	Method to Calculate Limit
Semivolatile metals (SVM) and low volatile metals (LVM) (cont'd)	Feed rates for cement kilns; light weight aggregate kilns; liquid fired boiler	(n)(2(iii-v)	Not applicable	Not applicable to an incineration system
	Maximum LVM feed rate from pumpable wastes	(n)(2)(vi)	THRA	Average of the 3 test run averages
	Extrapolation of feed rate levels for SVM and LVM	(n)(2)(vii)	THRA	Extrapolation procedure described in CPT Plan; Section 6.5
	For wet system scrubber control devices for PM; pressure drop, liquid and gas flow rate; solids levels in scrubber liquid; the PM control device is a dry system, baghouse No. 2; OPLs for the condenser columns are set based on control for HCl/Cl_2 and mercury as listed in the Table 1-3 under those HWC NESHAP constituents.	(n)(3) refers to PM (m)(1)	Not applicable	(m)(1) is not applicable as the APC system is a dry baghouse system – fabric filter; PM control is by baghouse No. 2. (m)(1)(i) refers to PM control systems using wet scrubbers as the primary control. This system uses a baghouse for PM and metals control.
	Maximum chlorine feed rate- see chlorine-chloride below at (o)(1)(i)	(n)(4)	THRA	Average of the 3 test run averages; established simultaneously with LVM/SVM test runs
	Maximum flue gas flow rate or production rate	(n)(5)	HRA	Average of the maximum HRAs for each of the 3 test runs
Hydrogen chloride and chlorine HCl/Cl_2	Maximum chlorine feed rate for incinerators	(o)(1)(i)	THRA	Average of the 3 test run averages
	Maximum chlorine feed rate for liquid fuel boilers	(o)(1)(ii)	Not applicable	Unit is an incinerator; not a liquid fired boiler
	Maximum flue gas flow rate or production rate	(o)(2)	HRA	Average of the maximum HRAs for each of the 3 test runs
	Minimum high energy scrubber pressure drop	(o)(3)(i)	Not applicable	Condenser columns are low energy – so not applicable
	Minimum low energy scrubber pressure drop	(o)(3)(ii)	Not applicable [2]	Manufacturer's specifications; This OPL is proposed to be waived per the approved alternative monitoring application. [2]
	Minimum scrubber liquid feed pressure	(o)(3)(iii)	HRA	Manufacturer's specifications
	Minimum scrubber liquid pH	(o)(3)(iv)	HRA	Average of the 3 test run averages

Table 2-1. Required Operating Parameter Limits

Standard	Required Operating Parameter	Regulatory Citation [1]	Averaging Period	Method to Calculate Limit
Hydrogen chloride and chlorine HCl/Cl_2 (cont'd)	Minimum scrubber liquid flow rate and maximum flue gas flow rate	(o)(3)(v)	HRA	Average of the 3 test run averages for liquid flow; average of the maximum HRAs for stack flow rate per (o)(2) above
Fugitive emissions	Maximum combustion chamber pressure	(p); also 63.1206(c)(5)(i)	Instant-aneous or other approved alternative control method [3]	By regulation; must be less than atmospheric pressure or controlled by alternative monitoring application means [63.1206(c)(5)(i)(C)][3]

Notes:
[1] 40 CFR §63.1209 unless otherwise noted.
[2] Refer to Sections 2.2 and 2.3.12 of this CPT plan and the Alternative Monitoring Application (AMA) presented as Appendix C.
[3] Refer to Sections 2.2 and 2.3.20 of this CPT plan and the Alternative Monitoring Application (AMA) presented as Appendix C.

CHESI will demonstrate compliance with the total hydrocarbon and dioxin/furan emission standards, and the DRE performance standard while minimizing kiln and SCC temperatures during the CPT. The target values for combustion temperatures are presented in Table 2-2. The combustion temperatures will be calculated based on the average of the average for the three (3) test runs, as specified in the regulations.

In accordance with 40 CFR §§63.1209(a)(7), (j)(1), and (k)(2), the specific locations of the thermocouples are shown in the process and instrumentation diagram (P&ID) drawings (370-02-206 and 380-02-206) in Appendix D.

2.3.2 MAXIMUM FLUE GAS FLOW RATE OR PRODUCTION RATE

A limit on maximum flue gas flow rate, maximum production rate, or another appropriate indicator of gas residence time, is established to demonstrate compliance with the total hydrocarbon, dioxin/furan, PM, SVM, LVM, mercury, and HCl/Cl_2 emission standards, and the DRE performance standard. 40 CFR §§63.1209(a)(7), (j)(2), (k)(3), (l)(2), (m)(2), (n)(5), and (o)(2) require that the maximum flue gas flow rate or production rate OPL be determined using the average of the maximum HRAs for the three test runs. The maximum flue gas flow rate or production rate OPL is established on an HRA basis. CHESI continuously monitors stack gas flow rate as the appropriate indicator of combustion air flow rate and residence time.

CHESI will demonstrate compliance with the total hydrocarbon, dioxin/furan, PM, SVM, LVM, mercury, and HCl/Cl_2 emission standards, and the DRE performance standard while operating at maximum stack flow rate during the CPT. The target value for stack flow rate is presented in Table 2-2. The stack gas flow rate will be maximized as required for total waste feeds (related to DRE and dioxin/furan) and when constituent waste feed rates for PM (ash is PM constituent parameter) and for SVM, LVM, mercury, chlorine/hydrogen chloride are being established. The stack flow rate will be calculated based on the average of the maximum HRA for the three (3) test runs, as specified in the regulations.

Table 2-2. Operating Parameter Limits

Operating Parameter	Units	Expected CPT Range	CPT Target Value	AWFCO Set Point During CPT
Minimum kiln combustion chamber temperature	°F	1,200-1,700	1,400	1,000
Minimum secondary combustion chamber temperature	°F	1,700-2,000	1,800	1,500
Maximum stack gas flow rate	acfm	85,000-105,000	100,000	110,000
Maximum total hazardous waste feed rate to the kiln	lb/hr	20,000-30,000	30,000	35,000
Maximum pumpable hazardous waste feed rate to the kiln	lb/hr	5,000-10,000	7,000	12,000
Maximum total hazardous waste feed rate to the secondary combustion chamber	lb/hr	12,000-22,000	20,000	25,000
Maximum total system mercury feed rate	lb/hr	0.15	0.15 (to be extrapolated)	1.0
Maximum total system semivolatile metals feed rate	lb/hr	20-30	25 (to be extrapolated)	50
Maximum total and pumpable system low volatile metals feed rate	lb/hr	20-30	25 (to be extrapolated)	50
Maximum total ash feed rate	lb/hr	10,000-15,000	12,000	20,000
Maximum total system chlorine feed rate	lb/hr	1,500-3,500	2,000	5,000
Minimum condenser columns liquid feed pressure	psig	8-12	>7.0	5.0
Minimum condenser columns liquid flow rate	gpm	3,000-4,000	3,500	2,500
Minimum condenser columns liquid pH	---	3.0-6.0	4.0	2.0
Maximum baghouse No. 2 inlet temperature	°F	250-350	325	500
Minimum activated carbon feed rate	lb/hr	15-25	20	10
Activated carbon specification	---	Darco Flue Gas Desulfurization (FGD®) 95% passing 325 mesh screen or equivalent [1]	N/A	N/A
OPLs based upon Manufacturer's Specifications				
Minimum atomizing fluid pressure [2]	psig	30	>30	20
Minimum activated carbon carrier fluid flow rate	scfm	40-80	60	30
OPLs based upon Regulatory Requirements				
Maximum kiln pressure	inwc	<Seal pressure [3]	<Seal pressure [3]	<Seal pressure [3]

Table 2-2. Operating Parameter Limits

Operating Parameter	Units	Expected CPT Range	CPT Target Value	AWFCO Set Point During CPT
Maximum secondary combustion chamber pressure	inwc	<Atmospheric pressure [3]	<Atmospheric pressure [3]	<Atmospheric pressure [3]
Maximum stack gas carbon monoxide	ppm @ 7% O_2, dry	100	<100	100
Maximum stack gas total hydrocarbon	ppm @ 7% O_2, dry	10	<10	10

Notes:

[1] Carbon specifications defined by carbon used during the CPT.

[2] Atomizing fluid pressure is being utilized as an indicator of good operations of the waste firing systems. OPL is based on manufacturer's specification and recommendation per regulation.

[3] Due to the nature of kiln operation, the instantaneous pressure limits are established with a one-second delay, which reflects instrument reaction time. Also refer to Sections 2.2 and 2.3.20 of this CPT plan and the Alternative Monitoring Application (AMA) presented as Appendix C.

2.3.3 MAXIMUM TOTAL HAZARDOUS WASTE FEED RATE

A limit on maximum total hazardous waste feed rate is established for the waste feed to each combustion chamber (kiln and SCC) to demonstrate compliance with the total hydrocarbon and dioxin/furan emission standards, and the DRE performance standard. 40 CFR §§63.1209(a)(7), (j)(3), and (k)(4) require that the maximum total hazardous waste feed rate OPL(s) be determined using the average of the maximum HRAs for each test run. The maximum total hazardous waste feed rate OPL(s) is established on an HRA basis.

CHESI will demonstrate compliance with the total hydrocarbon and dioxin/furan emission standards, and the DRE performance standard while maximizing the total waste feed rates to the kiln and SCC during the CPT. The target values for total hazardous waste feed rates are presented in Table 2-2. The kiln and SCC total waste feed rates will be calculated based on the averages of the maximum HRA values for the three (3) test runs, as specified in the regulations.

2.3.4 MAXIMUM PUMPABLE HAZARDOUS WASTE FEED RATE

A limit on maximum pumpable hazardous waste feed rate is established for the waste feed to each combustion unit to demonstrate compliance with the total hydrocarbon and dioxin/furan emission standards, and the DRE performance standard. 40 CFR §§63.1209(a)(7), (j)(3), and (k)(4) require that the maximum pumpable hazardous waste feed rate OPL(s) be determined using the average of the maximum HRAs for each test run. The maximum pumpable hazardous waste feed rate OPL(s) is established on an HRA basis.

CHESI will demonstrate compliance with the total hydrocarbon and dioxin/furan emission standards, and the DRE performance standard while maximizing the pumpable waste feed rates to the kiln and SCC during the CPT. The target values for kiln and SCC pumpable hazardous waste feed rates are presented in Table

2-2. CHESI feeds only pumpable hazardous waste streams to the SCC. Therefore, the SCC maximum pumpable hazardous waste feed rate OPL is the same as the maximum total hazardous waste feed rate OPL for this combustion chamber. The kiln and SCC pumpable feed rates will be calculated based on the averages of the maximum HRA values for the three (3) test runs, as specified in the regulations.

2.3.5 OPERATION OF WASTE FIRING SYSTEM

40 CFR §§63.1209(j)(4) requires operating parameters and limits be established to ensure good operation of each hazardous waste firing system is maintained. CHESI uses air as the atomizing media for liquid waste firing. Atomizing air pressures are used as indicators of proper operation of the waste firing systems. The minimum atomizing air pressure OPLs are established using manufacturer's specifications. The minimum atomizing air differential pressure OPLs are established on an HRA basis. The minimum atomizing air pressure OPLs for the kiln and SCC are 30 pounds per square inch (psig).

Each of the main burners (1 on the kiln; 2 on the SCC) has a Burner Management System (BMS) that monitors burner conditions to ensure good combustion. This automated system monitors parameters such as loss of flame, gas pilot conditions, BTU input of gas and fuel, and other related combustion parameters. These are primarily safety systems but also ensure good combustion practice is maintained. The BMS will alarm and shut down waste feeds if the burner flame is lost or if other parameters exceed set points established based on burner specifications and burner tuning during startup.

2.3.6 MAXIMUM TOTAL SYSTEM MERCURY FEED RATE

A limit on maximum total mercury feed rate is established to demonstrate compliance with the mercury emission standard. 40 CFR §63.1209(l)(1)(i) requires that the maximum mercury feed rate OPL be determined using the average of the test run averages. The maximum total mercury feed rate OPL is established on a THRA basis.

CHESI will demonstrate compliance with the mercury emission standard for the incineration system during the CPT. The maximum total mercury feed rate OPL will be determined by extrapolating from the average of the test run averages. The target mercury feed rate during the CPT is presented in Table 2-2. Mercury will be spiked to demonstrate the target value.

CHESI will use a straight-line extrapolation procedure based on the emission standard. Section 6.5 shows an example of the calculation procedure.

2.3.7 MAXIMUM ASH FEED RATE

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

CHESI will demonstrate compliance of the incineration system with the PM emission standard during the CPT when the kilns are at maximum solids waste feed rate. The target value for ash feed rate is presented in Table 2-2.

2.3.8 MAXIMUM TOTAL SYSTEM SEMIVOLATILE METALS FEED RATE

A limit on maximum total SVM feed rate is established to demonstrate compliance with the SVM emission standard. 40 CFR §§63.1209(n)(2)(ii) requires that the maximum total SVM feed rate OPL be determined using the average of the test run averages. The maximum total SVM feed rate OPL is established on a THRA basis.

CHESI will demonstrate compliance with the SVM and HCl/Cl_2 emission standards during the CPT. The target total SVM feed rate during the CPT is presented in Table 2-2. Lead will be spiked as the SVM to demonstrate the target value.

CHESI will use a straight-line extrapolation procedure based on the emission standard. Section 6.5 shows an example of the calculation procedure.

2.3.9 MAXIMUM TOTAL SYSTEM LOW VOLATILE METALS FEED RATE

A limit on maximum total LVM feed rate is established to demonstrate compliance with the LVM emission standard. 40 CFR §§63.1209(n)(2)(ii) requires that the maximum total LVM feed rate OPL be determined using the average of the test run averages. The maximum total LVM feed rate OPL is established on a THRA basis.

CHESI will demonstrate compliance with the LVM and HCl/Cl_2 emission standards during the CPT. The target total LVM feed rate during the CPT is presented in Table 2-2. Chromium will be spiked as the LVM to demonstrate the target value.

CHESI will use a straight-line extrapolation procedure based on the emission standard. Section 6.5 shows an example of the calculation procedure.

2.3.10 MAXIMUM LOW VOLATILITY METALS FEED RATE IN PUMPABLE FEED STREAMS

A maximum LVM feed rate OPL for all pumpable feed streams is established to demonstrate compliance with the LVM emission standard. 40 CFR §§63.1209(n)(2)(vi) requires that the maximum LVM feed rate OPL for pumpable wastes be determined using the average of the test run averages. The maximum LVM feed rate OPL for pumpable waste is established on a THRA basis.

CHESI will demonstrate compliance with the pumpable LVM and HCl/Cl_2 emission standards while maximizing the pumpable LVM feed during the CPT. The target pumpable LVM feed rate during the CPT is presented in Table 2-2. Chromium will be spiked to the liquid feed as the LVM to demonstrate the target value.

CHESI will use a straight-line extrapolation procedure based on the emission standard. Section 6.5 shows an example of the calculation procedure.

Note that CHESI intends to spike chromium only to the liquid waste feed such that the final total and pumpable LVM feed rate OPLs are expected to be nearly the same value. However, if there is significant detectable native LVM in the solid feeds to the kiln, credit will be taken for this LVM feed and separate OPLs for total and pumpable LVM will be established.

2.3.11 MAXIMUM TOTAL SYSTEM CHLORINE FEED RATE

A limit on maximum chlorine feed rate is established to demonstrate compliance with the SVM, LVM, and HCl/Cl_2 emission standards. 40 CFR §§63.1209(n)(4) and (o)(1)(i) require that the maximum chlorine feed rate OPL be determined using the average of the test run averages. The maximum chlorine feed rate OPL is established on a THRA basis.

CHESI will demonstrate compliance with the SVM, LVM, and HCl/Cl_2 emission standards while maximizing the total system chlorine feed rate during the CPT. The target value for total system chlorine feed and/or spiking rate is presented in Table 2-2.

2.3.12 MINIMUM LOW ENERGY CONDENSER COLUMNS PRESSURE DROP

A limit on minimum pressure drop, based on manufacturer's specifications, is established for the low energy scrubbers like the condenser columns to demonstrate compliance with the mercury and HCl/Cl_2 emission standards. 40 CFR §§63.1209(l)(2) and (o)(3)(ii) require that the minimum pressure drop OPL be based on the manufacturer's specification. The minimum low energy pressure drop OPL is established on an HRA basis.

CHESI is requesting OPLs be waived for the condenser columns as part of the Alternative Monitoring Application (see Appendix C). NDEE or USEPA Region 7 must approve this waiver request.

2.3.13 MINIMUM LOW ENERGY CONDENSER COLUMNS LIQUID FLOW RATE AND FEED PRESSURE

A limit on minimum liquid (water) flow rate is established for the scrubbers to demonstrate compliance with the mercury and HCl/Cl_2 emission standards. 40 CFR §§63.1209(l)(2) and (o)(3)(v) require that the minimum liquid flow rate OPL be determined using the average of the test run averages. The minimum scrubber water flow rate OPL is established on an HRA basis. CHESI will use the minimum scrubber water flow rate and maximum stack flow rate for OPLs for the scrubber as a measure of liquid to gas ratio, as provided under 40 CFR §§63.1209(o)(3)(v).

CHESI will demonstrate compliance with the mercury and HCl/Cl_2 emission standards during the CPT. The target value for minimum total condenser columns water flow rate during the CPT is presented in Table 2-2.

A limit on minimum liquid feed pressure, based on manufacturer's specifications, is established for the low energy scrubbers like the condenser columns to demonstrate compliance with the mercury and HCl/Cl_2 emission standards. A minimum liquid feed pressure based on the manufacturer's specifications is required under 40 CFR §§63.1209(o)(3)(iii). The minimum condenser columns liquid feed pressure OPL is established on an HRA basis.

CHESI will demonstrate compliance with the HCl/Cl_2 emission standard during the CPT. The expected minimum liquid feed pressure based on the manufacturer's specification is presented in Table 2-2.

2.3.14 MINIMUM LOW ENERGY CONDENSER COLUMNS LIQUID PH

A limit on minimum liquid pH is established for the inlet water to the condenser columns to demonstrate compliance with the HCl/Cl_2 emission standard. 40 CFR §§63.1209(o)(3)(iv) requires that the minimum liquid pH OPL be determined using the average of the test run averages. The minimum condenser columns inlet liquid pH OPL is established on an HRA basis.

CHESI will demonstrate compliance with the HCl/Cl_2 emission standard during the CPT. The target value for scrubber inlet water pH during the CPT is presented in Table 2-2.

2.3.15 BAGHOUSE No. 2 MAXIMUM INLET TEMPERATURE

A limit on maximum inlet temperature to a dry PM air pollution control device is established to demonstrate compliance with the dioxin/furan, SVM, and LVM emission standards. 40 CFR §§63.1209(k)(1)(i) and (n)(1) require that the maximum inlet temperature OPL be determined using the average of the test run averages. The maximum inlet temperature OPL is established on an HRA basis.

CHESI will demonstrate compliance with the dioxin/furan, SVM, and LVM emission standards during the CPT. The target value for baghouse No. 2 inlet temperature is presented in Table 2-2.

2.3.16 MINIMUM ACTIVATED CARBON FEED RATE

Activated carbon is injected into the gas stream ahead of baghouse No. 2 to remove dioxin/furan and mercury. Therefore, a limit on minimum activated carbon feed rate is established to demonstrate compliance with the dioxin/furan and mercury emission standards. 40 CFR §§63.1209(k)(6)(i) and (l)(3) require that the minimum activated carbon feed rate OPL be determined using the average of the test run averages. The minimum activated carbon feed rate OPL is established on an HRA basis.

CHESI will demonstrate compliance with the dioxin/furan and mercury emission standards during the CPT. The target value for activated carbon feed rate is presented in Table 2-2.

2.3.17 MINIMUM ACTIVATED CARBON CARRIER FLUID FLOW RATE

Activated carbon is injected into the gas stream ahead of baghouse No. 2 to remove dioxin/furan and mercury. A limit on minimum activated carbon carrier fluid flow rate, based on manufacturer's specifications, is established to demonstrate compliance with the dioxin/furan and mercury emission standards. 40 CFR §§63.1209(k)(6)(ii) and (l)(3) require that this OPL be established using manufacturer's specifications and not directly from CPT results. The minimum activated carbon carrier fluid flow rate OPL is established on an HRA basis.

CHESI will establish an OPL for minimum activated carbon carrier fluid flow rate based on the manufacturer's specification and operating experience gained during the startup and initial operation of the carbon injection system. The expected OPL is presented in Table 2-2.

2.3.18 ACTIVATED CARBON SPECIFICATIONS

Key activated carbon parameters that affect adsorption are established to demonstrate compliance with the dioxin/furan and mercury emission standards. 40 CFR §§63.1209(k)(6)(iii) and (l)(3) require that the activated carbon must have equivalent or better adsorption properties than the activated carbon used during the CPT. The activated carbon parameters that affect adsorption are sieve analysis and absorptivity. Sieve analysis is an important parameter in carbon effectiveness as an indication of particle size and surface area. The same activated carbon currently used in the existing fluidized bed incineration system (Train 1) is proposed for Train 2: Darco Flue Gas Desulfurization (FGD®) 95% passing 325 mesh screen or equivalent. This carbon specification will be incorporated into the Notification of Compliance (NOC) submitted after the CPT has been completed, along with the other established OPLs.

2.3.19 BAGHOUSE OPERATION

40 CFR §§63.1206(c)(8)(i)(A) requires that facilities equipped with a baghouse install and continuously operate a bag leak detection system. The bag leak detection system must be capable of continuously detecting and recording PM emissions at concentrations of 1.0 milligram per actual cubic meter (mg/acm). Additionally, the HWC NESHAP requires that the system be installed and operated in accordance with available written USEPA guidance, or, if no guidance is available, manufacturer's specifications. There are no additional specific numerical OPLs required for baghouses except for maximum inlet temperature, which is discussed in Section 2.3.15.

CHESI operates a bag leak detection system on baghouse No. 2 to comply with the HWC NESHAP requirements [40 CFR §63.1206(c)(8)]. The emission monitor is capable of detecting particles with diameters ranging from 0.3 micrometers (μm) and higher. The leak detection system can continuously detect and record particle emissions at concentrations of 0.5 mg/acm to 5,000 mg/acm. Installation and operation of the system is performed in accordance with manufacturer's recommendations and USEPA guidance on leak detection systems, Fabric Filter Bag Leak Detection Guidance, EPA-454/R-98-015 (USEPA, 1997). If a bag leak is detected, the system will activate an alarm at the operator control panel. The cell with suspected bag leak will be taken off-line and the bags inspected to find the leaking bag(s). After repair, the baghouse cell will placed back into service.

2.3.20 CONTROL OF COMBUSTION SYSTEM LEAKS

40 CFR §63.1209(p) requires facilities that control fugitive emissions by operating a system to control combustion leaks at 40 CFR §63.1206(c)(5) to continuously monitor pressure in the system. To comply with this requirement, CHESI continuously monitors pressure in the incineration system at the kiln seal shrouds (front wall and exit of kiln) and the SCC. The pressure at the kiln shrouds with the double seals is maintained above atmospheric pressure at all times to help control fugitive emissions. Pressure is also monitored continuously at the SCC. The pressure difference between the kiln shrouds and the SCC is compared and if the SCC pressure is higher than the shroud pressure, an AWFCO is initiated. The combustion system pressure is measured at two locations: 1) the kiln front wall, and 2) the entrance of the SCC. Either location provides an indication that draft is being maintained in the SCC and the upstream kiln combustion zones.

CHESI's alternative monitoring approach for the control of combustion leaks in accordance with 40 CFR §§63.1206(c)(5)(i)(C) is presented in the Alternative Monitoring Application (AMA) included as Appendix C. The alternative approach includes three OPLs that apply under various operating scenarios. The AMA includes the following specific language for the OPLs:

(1) CHESI will inject air into the kiln inlet and the outlet shrouds such that the difference between pressure in each shroud and the SCC will be at least 0.2 inches of water column;
(2) CHESI will measure pressures in the SCC and in both kiln shrouds on a continuous basis. The pressure differential OPL and AWFCO for each kiln shroud are set independent of each other;
(3) If at any time the pressure in the SCC is greater than the pressure of either of the kiln shrouds, the AWFCO will be triggered instantaneously;
(4) If the kiln shroud fan fails and the pressure in the SCC is greater than ambient pressure (0 inches water column) for a period of more than one second, an AWFCO will be triggered; and
(5) If the pressure in the SCC is greater than ambient pressure (0 inches of water column) but still less than the kiln shroud pressures for more than 10 seconds, an AWFCO is triggered.

The “instantaneous AWFCO” in all the above conditions means that the waste feed is cut off within one second of any pressure OPL exceedance, provided the pressure is measured on a continuous basis in the SCC and the kiln shrouds.

3.0 WASTE CHARACTERIZATION

With the placing into operation of the Train 2 Incineration System, CHESI will receive liquid, solid, and sludge wastes in bulk and non-bulk containers, as well as gas and aerosol wastes for treatment. These materials include spent solvents, waste oils, and a wide range of chlorinated hydrocarbon, including herbicides and insecticides. Some of the material includes dirt, residues, and contaminated water resulting from spills. Residues resulting from clean-up actions at other waste disposal sites are also received and treated at the site.

All wastes received at the facility are characterized by the generator and/or CHESI. CHESI creates a waste material data sheet (WMDS) that contains information on key physical and chemical characteristics and generator data. CHESI periodically evaluates the wastes to ensure that they are consistent with the WMDS. The generator must submit an analysis or updated profile of each waste stream at least annually or as designated by CHESI's waste treatment services manager.

The wastes that will treated in Train 2 at the Kimball facility can be grouped into two general categories:

- RCRA-regulated wastes; and
- Non-regulated wastes.

In addition, natural gas and other non-hazardous fuels are used as auxiliary fuels. The tank and solids processing building vent systems are be connected to the Train 2 Incineration System, which combusts any organic materials present in the vent gases.

3.1 RCRA-REGULATED WASTES

The RCRA-regulated wastes treated at the facility include liquids, solids, and containerized gases. If these wastes are not directly burned, they are stored in bulk tanks, storage pads, or permitted warehouse buildings.

The liquid wastes may include aqueous materials, oils, petroleum products, organic solvents, and other miscellaneous liquids. These wastes are accepted in bulk and non-bulk containers. The liquid wastes are pumped to tanks, directly incinerated, or transferred offsite for other treatment or disposal.

Solids processed in the incineration system may include contaminated soils, debris, sludges, spill cleanup materials, or other miscellaneous solid materials. These wastes may be packaged in bulk or non-bulk containers.

RCRA-regulated wastes processed at the facility also include gases, cylinders, and aerosol cans. Pressurized gases that are received in suitable tanker trucks, portable tanks, or containers may be processed by the kiln or the SCC. CHESI does not treat any gases that are classified as explosive.

3.2 NON-REGULATED WASTES

Non-regulated wastes treated at the facility include both solids and liquids. These wastes include off specification commodities and pharmaceuticals. In addition, CHESI treats household hazardous wastes from collection programs throughout the United States. These wastes may be packaged in bulk and non-bulk containers.

3.3 WASTE BLENDING

Technical staff directs the treatment of both liquid and solid materials within the facility. The technical staff designates storage areas and unloading destinations and establishes blending strategies. They also set up feed lots, which contain composition data for materials that are fed to the combustion system from feed tanks and feed hoppers. The composition data of feed lots are established using the composition data for the waste materials. Feed lots are transferred from storage tanks and receiving hoppers into feed tanks and feed hoppers, respectively.

Blends and associated feed lots are based on the actual and projected availability of feed materials in inventory. Feed lot information includes blending guidance for storage tanks and receiving hoppers, the feed lot identification number, and the applicable composition data (i.e., halogens, metals, etc.). Composition data of feed lots is based on actual analytical data from the analytical laboratory and is determined as follows:

- Liquid Feed Systems - Actual analytical data from the feed tanks typically is used for composition data. However, compositional data may be used to calculate the weighted average blend for the feed tank.
- Dry Solids Feed System - Composition data of the dry solids receiving hoppers is calculated using a weighted average blend of the materials transferred into the dry solids receiving hopper. Actual analytical data for the blending streams is used in the calculation.
- Wet Solids Feed System - Composition data of the wet solids receiving hopper is calculated using a weighted average blend of the materials transferred into the wet solids feed hopper. Actual analytical data for the blending streams is used in the calculation. Actual analytical data from the transport feed vessel, if applicable, is used for composition data. However, composition data of the transport feed vessel may be calculated using a weighted average from actual analytical data.

The use of weighted average blends to establish composition data for monitoring purposes develops data that can be used to control operation of the combustion system. All analytical results are entered into the incineration system distributed control system (DCS) prior to transferring material into the combustion system. Once feed lots have been established, material may not be added to the feed tanks or feed hoppers without updating the feed lot to ensure the correct analytical data are used.

3.4 WASTE CHARACTERISTICS

The waste streams are managed include liquid and solid feed materials received in bulk and non-bulk containers. The CHESI facility is permitted to accept a wide variety of characteristic and listed hazardous waste for storage and/or treatment. Appendix I of the RCRA Part 1 Permit provides a detailed compilation of all the USEPA hazardous waste codes that are permitted to be stored and treated at the CHESI facility.

Five general waste types are received from offsite generators and include the following:

- Dry Solids;
- Aqueous Liquids (Lean Water) (Viscous Feeds);
- Energetic (high Btu) Liquids (Non-viscous); and
- Direct Feed Liquids.

The following materials are not accepted for thermal treatment at the CHESI facility:

- Polychlorinated Biphenyls (PCBs) (equal to or greater than 50 ppm);
- Hazardous Waste Listed as F020, F021, F022, F023, F026, F027, and F028;
- Radioactive Waste Materials;
- Wastes that exhibit explosive characteristics as defined by 40 CFR 261.23(a)(6)-(8) or Division 1.1, 1.2 and 1.3 explosives;
- Shock Sensitive Waste Materials; and

CHESI may accept wastes that carry the waste code for an explosive compound, but have been commingled prior to arrival onsite such that the commingled waste does not exhibit explosive characteristics as defined by 40 CFR 261.23 (a) (6), (7), and (8) or Division 1.1, 1.2 and 1.3 explosives as defined by 49 CFR 173.50 (b). CHESI will not accept shock sensitive wastes.

The waste feed materials handled include a wide range of waste codes and hazardous constituents. Because of the potential wide range in materials handled, CHESI does not normally analyze the feed materials for hazardous air pollutants (HAPs) as defined by Section 112 of the Clean Air Act (CAA). However, a review of the HAP list indicates that all CAA HAPs could be processed except for the following:

- Asbestos;
- Chlorine (gaseous);
- PCBs;
- 2,3,7,8-TCDD; and
- Radionuclides.

3.5 AUXILIARY FUELS

Specification used oil, No. 2 diesel fuel, and natural gas are all supplemental fuels potentially used as auxiliary fuels. The liquid supplemental fuel is fed from a dedicated fuel tank in the tank farm. This material is used during startup and shutdown periods, and to maintain combustion temperatures while waste is not being fed. In addition, the liquid fuel may be used to supplement waste feed in order to maintain permitted temperatures. Based on the results of historical liquid fuel analyses, there are negligible amounts of regulated constituents in the liquid supplemental fuel. As such, monitoring the liquid supplemental fuel feed rate and accounting for the contribution of the regulated constituents is not necessary.

The natural gas supplemental fuel may also be used during system startup before introducing the liquid supplemental fuel to bring the combustion system to operating temperatures. The natural gas is expected to contain negligible amounts of regulated constituents. Therefore, monitoring the feed rate of the natural gas and accounting for the contribution of the regulated constituents is not necessary.

3.6 PROCESS VENT STREAMS

The normal organic loading from the process vent stream from the existing tank farm is estimated at 6 lb/hr at approximately 18,300 Btu/lb of organics. The total flow rate of this stream, including inert gas and air, is estimated to be 335 scfm. The heat release from these organics (110,000 Btu per hour) represents less than 0.1% of the Unit 2 total design heat release, therefore, has minimal effect on combustion system operation.

The process vent stream from the tank farm is expected to contain negligible amounts of regulated constituents (i.e., chlorine and metals). The process vent stream originates from the storage tanks at the facility, which are all typically maintained at ambient or slightly above ambient temperatures. Because the regulated metals are not appreciably volatile at such temperatures, negligible amounts of metals would be expected to be in this feed stream. As indicated above, the process vent stream does contain organics some of which may contain chlorine. To conservatively account for any chlorine that may be in the process vent stream, CHESI will assume that 50% of the organic loading consists of chlorine (i.e., 3 lb/hr). The demonstrated total chlorine feed rate limit from the CPT testing is expected to be 2,000 lb/hr. The conservatively estimated 3 lb/hr for this process vent stream is less than 0.15% of the expected maximum chlorine feed rate limit. The process vent stream is not expected to contain any regulated. Therefore, monitoring the process vent stream flow rate for demonstrating compliance with the HWC MACT feed rate limits is not required pursuant to 40 CFR 63.1209(c)(5).

Other process vent streams from solids systems are accounted for by the DCS in the solid material feed rate and composition data. Therefore, the contribution of ash, chlorine, and metals from this process vent stream is already being accounted when demonstrating compliance with the constituent feed rate limits.

3.7 AIR STREAMS

Air streams include combustion/fluidizing air, atomizing air, and overfire air. These air streams originate from the atmosphere and are not expected to contain any regulated constituents (i.e., chlorine and metals). Therefore, monitoring the air stream feed rates for demonstrating compliance with the HWC MACT feed rate limits is not required pursuant to 40 CFR 63.1209(c)(5).

3.8 WASTE BURN PLAN MANAGEMENT

The storage capacity at the site allows for blending of waste both directly (liquids using above-ground tanks, solids using in-ground tanks) and indirectly by staging and controlling the drum feed types and rates. The process of "burn planning" is used to establish these blends and feed rate parameters in various ways.

Incoming wastes are sampled and these samples are analyzed in the on-site laboratory. The data produced, which may be combined with data provided by the waste generator and CHESI's prior experience with the waste, is used to specify how the waste will be managed and fed to the incineration system. Wastes that are incompatible with other materials are fed directly to the incinerator in or from their original packages. Non-reactive wastes can be blended in various ways to optimize thermal and constituent feed capacity.

The burn planning process selects compatible waste solids. The drums, boxes, and roll-off bins selected are emptied directly into an in-ground mixing tank and/or can be processed through a shredder as part of the solids preparation process. The various solids are blended in the tank by mechanical agitation. The resulting solids blend is then placed on the skip hoist and moved to the front wall feed chute as bulk feed to the kiln. This blending allows the high thermal or constituent levels in any particular blend of waste to be mixed with other wastes that may be high in other constituents. The resulting blends provide a more consistent waste feed mix to the kiln and ensure compliance with system feed limits. The burn plan selection process centers on this compliance. Large batches of bulk waste blend will be made for combustion during the CPT.

Solid waste can also be processed in the Komar® shredder system. This system is designed to process drum, box, and other types of containers directly. The containers enter the Komar® shredder and after shredding the resultant waste mix is transferred to the kiln front wall feed chute. Containerized waste can also be fed directly to the kiln via the container direct feed system. Containers are lifted to the top of the kiln feed chute where they enter an air lock system which ultimately allows the containers to be dropped directly into the fed chute and into the kiln.

Liquids arriving in bulk or non-bulk containers are selected based on types waste (organic or aqueous based) and compatibly for mixing in tanks. Compatibility of the liquids is crucial to the selection process, to avoid short-term reactivity and longer-term reactivity issues such as slow polymerization of a mixture. Liquids can also be fed directly from tankers, dedicated tanks, or containers. These wastes are considered "direct burn" wastes and are not blended with other waste. There are several burn port locations on the kiln and afterburner that are used to feed these direct burn wastes. Some of the spiking materials (e.g., POHC or metals) fed during the CPT will be fed at one or more of the direct burn locations where highly chlorinated or high metals concentration liquids are fed directly to the incineration system during normal operation.

The flow of wastes fed through the various ports is monitored by direct measurement (mass flow meter) or loss-of-weight calculation scales (for weight determination). The burn planning process attempts to maintain maximum use of selected ports while staying within permit limits for total waste feed rates and constituent feed rates.

The waste mix on hand at the time of the CPT will undoubtedly not contain all the constituents at the proper concentrations to challenge all of the control systems. Therefore, the CPT will be executed using liquids and solids with additional spiking of metals (SVM-Pb, LVM-Cr, Hg, and/or Cl). Chlorinated spiking materials and ash may be spiked if needed to augment the levels present in the waste solids and liquids treated during the CPT.

3.9 CPT PROGRAM WASTE ANALYSES AND HANDLING OF NON-DETECT DATA

The waste processed during the CPT is expected to be similar to the types of waste described above. The actual waste feed plan (burn plan) will be set based on the waste material accumulated prior to the test and in inventory at the time of the test. The feed plan will maximize the waste feed rates to the kiln and SCC while also minimizing combustion temperatures as required.

Before and during the CPT, the waste streams to be fed to the incinerator will be sampled and analyzed per the sampling and analysis plan in Section 7. The waste streams will be analyzed for chlorine/chloride, metals, and ash content. All analytical results (ash, metals, and chlorine) for waste feeds that are reported below detectable levels will be assumed to be zero to provide a conservative calculation for feed rate OPL and system removal efficiency (SRE) where applicable.

Wastes will not be analyzed for the target POHC. The waste feeds will be assumed to contain no POHC and a zero (0) concentration will be assumed for POHC feed rate calculations in DRE determination.

4.0 ENGINEERING DESCRIPTION

The Train 2 Incineration System consists of a rotary kiln, a SCC, gas conditioning systems, and an APC system designed to meet the new source emission limits at 40 CFR §63.1219 of the HWC NESHAP rules and the Air Quality Construction Permit emission limits.

Wastes are fed to one of the primary feed locations: the rotary kiln and the SCC. The purpose of the rotary kiln is to process solid and liquid wastes before the resulting gases flow to the SCC. The gases generated in the kiln flow to the SCC for final thermal treatment. The slag or ash (inorganic and inert materials) remaining after treatment in the kiln are removed via a wet deslagger and ultimately the residues are sent to a hazardous waste (Subtitle C) landfill.

The SCC treats the combustion gas from the kiln and processes liquid and gaseous wastes. The SCC is designed to provide sufficient residence time and temperature to achieve the required DRE of 99.99% specified in the regulations. Auxiliary fuel, as natural gas, No. 2 fuel oil, or specification used oil, may be used to maintain combustion temperatures when there is insufficient heat content in the waste feeds.

Combustion (i.e., flue) gas from the SCC is routed through a spray dryer to lower gas temperature prior to the gas entering the first baghouse (baghouse No. 1). The spray dryer uses the recirculated condenser columns (brine water) for part of the water source. The spray dryer system evaporates the water. The removal of the dried salts in the baghouse No. 1 results in a zero discharge water system. The gas exits the baghouse and enters a saturator. The saturator rapidly cools the combustion gas and fully saturates and conditions the gas with water prior to entering the condenser columns (spray towers). The gas stream is split and passes into the two parallel condenser columns where the gas is further cooled, condensing some of the moisture carried with the gas. The condenser columns are the primary devices for scrubbing chlorine/chloride from the combustion gases. Sulfur dioxide is also removed in the condenser columns to ensure compliance with the Air Quality Construction Permit emission limit.

The gases from the two condenser columns are recombined and routed to a re-heater to raise the gas temperature above the dew point prior to entering the second baghouse (baghouse No. 2). Activated carbon is introduced into the gas prior to baghouse No. 2 for control of dioxin/furan and mercury. The second baghouse is the primary control for PM, LVM, and SVM to meet the emission limits for those parameters.

The treated combustion gas then passes through the induced draft (ID) fan and enters the SCR DeNOx system. The gas is heated and ammonia is injected prior to treatment by the catalyst. The SCR provides NOx destruction to meet the Air Quality Construction Permit requirements for NOx emissions. The gas exits the DeNOx unit and is discharged to the atmosphere through the stack. The continuous emission monitoring system (CEMS) monitors the stack gas for carbon monoxide (CO), total hydrocarbon (THC), oxygen (O_2), sulfur dioxide (SO_2), nitrogen oxides (NO_X), and moisture. Gas flow rate is also monitored continuously at the stack.

Figure 4-1 provides a schematic diagram of the incineration system. Appendix D presents Process Flow Drawings to show more detail and support the engineering description presented herein.

The main combustion burners (1 burner for the kiln and 2 burners for the SCC) have natural gas igniters and supplemental gas and auxiliary fuel burners for the purpose of initial heat-up and supplemental heat addition. Natural gas at utility supply pressure is metered, reduced to low pressure, controlled by an automatic flow control valve, and injected through the natural gas burners. Auxiliary fuel is pumped from tanks, and air-atomized in the burners. Waste liquids fed through guns in the burners are similarly atomized.

All the liquid feed lances [seven (7) for the kiln, with one (1) spare, and sixteen (16) for the SCC with one (1) spare] have atomizing air supplied to them ensure good combustion conditions. The waste liquid, sludge, or gaseous feeds through these lances are monitored for flow rate by either mass flow meters or scales. All lances and main combustion burner locations have feed control systems that are tied directly into the AWFCO system.

4.1 WASTE DELIVERY SYSTEMS

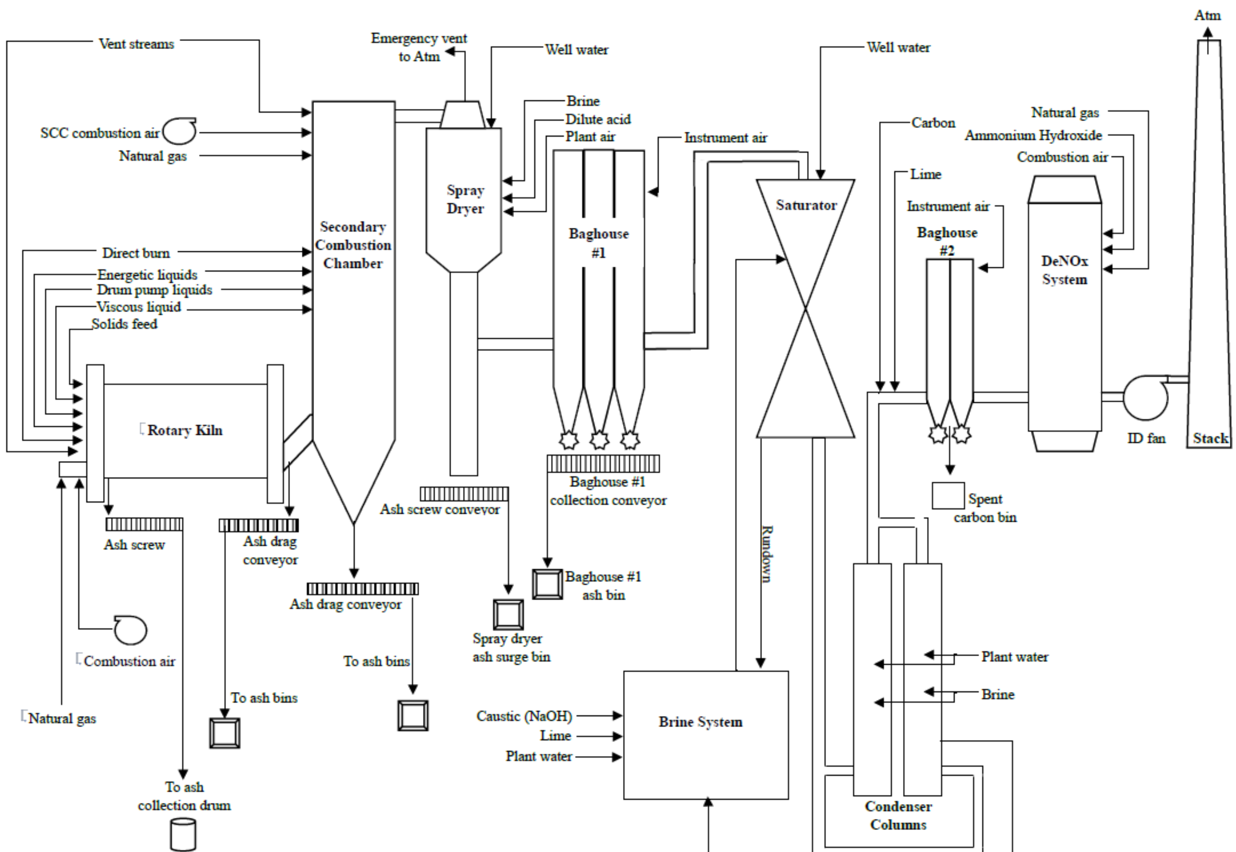
Wastes are fed to the kiln and the SCC. Solids, liquids, and pumpable sludges are fed to the kiln to volatilize and combust the organic components in the waste. The resulting gases flow to the SCC. In the SCC, the gases generated in the kiln are combusted along with liquid and gaseous waste fired through the SCC burners and feed lances. A description of each of these feed systems is provided below.

4.1.1 ROTARY KILN

Wastes may be fed to the rotary kiln by four (4) feed mechanisms: 1) the bulk feed system (skip hoist and conveyor); 2) the shredder/auger machine (SAM); 3) the container direct feed system; and 4) the sludge/liquid feed system. All solids (bulk, shred, and container direct feed) enter the kiln through the solids feed chute on the front of the kiln. Liquid feeds are piped to various burns/lances equipped with atomizing air. There is one (1) fuel burner with two (2) lances, and three (3) stand-alone lances on the kiln, and space allotted for a fourth lance.

Bulk feed is processed in the solids processing building, which has open top, in-ground tanks used to blend the solid wastes. Compatible solids waste from roll-off bins, end dumps (trucks), drums and other containers are placed in the blending tanks. The waste is then mixed to obtain a homogenous blend of solids waste. The blended waste is then fed via a skip hoist to the solids feed chute on the front of the kiln.

Figure 4-1. CHESI Incineration System Process Schematic



Drums and other containers can be processed in the shredder system. The solids containers are fed through an airlock to the nitrogen-purged shredder system. This system both shreds the solid wastes and then feeds them via an auger to the kiln front wall feed chute. The nitrogen purge system is designed to reduce the potential of fires in the feed system.

Containers filled with wastes are also fed directly through an airlock into the front wall drop chute where they enter the kiln. These wastes are delivered to the feed chute through a system of conveyors and elevators.

Pumpable wastes are processed through the main burner nozzles or liquid feed lances. Differential weight scales, mass flow meter, and/or pump speed are used to determine feed rates to the kiln.

Liquids are supplied to the kiln from feed tanks, direct burn lines for individual drums or containers, tankers, portable tanks, and/or cylinders. The feed lines are monitored and controlled by mass flow meters, interlocks, and control valves. Various types of pumps, including diaphragm pumps and other positive displacement pumps, and direct pressure on the tankers are used for direct burn scenarios.

The following ports are utilized on the kiln for waste feed:

Kiln Feed Ports		
Feed Chute	Slanted chute in front face of kiln, with air locks, to allow direct drop of containers; shredded waste; and bulk solids into kiln.	All Solids feeds
Combination Combustion Burner	Equipped with pilot, natural gas burner, and liquid guns for fuel oil, auxiliary fuel, and/or waste feed, each with separate controller	Liquid feed
Seven (7) burner/ lance ports	Two lances on kiln front wall burner and one stand-alone lance for feeding direct burn waste from tanks, tankers, plus two low and high BTU liquid lances, one spare location on the front wall for future use; One burner lance near the kiln discharge for feeding high or low BTU organic waste. The burner lances have one controller and each of the others has a separate controller	Liquid feeds

4.1.2 SECONDARY COMBUSTION CHAMBER

The SCC is equipped with two (2) main combustion burners with two (2) waste lance each, and twelve (12) waste injection lances used to feed liquid and gaseous wastes into the SCC and one (1) spare. The lances are mounted in the combustion chamber and located in the main burner level. Both the burner waste lances and the eight (8) injection lances are configured to fire liquid wastes into the SCC. The kiln exit gas enters near the bottom of the SCC below the waste injection lances.

Liquid wastes are fed to the SCC by pumps. Direct pressure on the tankers can also be used to feed direct burn waste to the SCC.

Cylinders are allowed to vaporize into the feed system depending upon the vapor pressure of the gas in the cylinder.

The feed ports for the SCC are summarized as follows:

SCC Feed Ports		
Two Combination Burners	Equipped with two liquid guns for fuel oil, auxiliary fuel and/or high-BTU waste feed from tanks or containers, plus a pilot and natural gas burner. Each burner has a separate controller.	Liquids feed
Twelve (12) Feed burner/lances	Twelve liquid burner lances for injection of liquid wastes from tanks, direct burn waste from tankers, and containers, and one spare. Each burner or lance has a separate controller.	Liquid/gas feeds

4.2 ROTARY KILN

Solids, containerized wastes and pumpable liquids and sludges are thermally treated in the rotary kiln and the resulting gases are routed to the SCC.

The kiln is a refractory lined, horizontal cylinder that is sloped slightly (4% slope; 2.29 degrees) toward the discharge end to promote movement of solids through the kiln. The approximately 39.2 foot long kiln has an inner diameter of 12.4 feet . The carbon steel cylinder is refractory lined with super duty firebrick to withstand the high temperatures in the kiln.

The kiln is equipped with a main burner that has a natural gas pilot, a main gas burner gun, and two additional guns for fuel oil, auxiliary fuel and/or waste liquids. In addition to the feed nozzle in the burner, pumpable wastes are fed to the kiln through liquid feed lances. Natural gas and other auxiliary fuels are fed to the burners during startup and shutdown and during normal operation to help maintain an adequate temperature for waste processing in the kiln.

Inert solids exit the kiln in the form of molten slag or a slag/ash combination. The exact form of the inert/inorganic slag/ash is a function of feed chemistry, i.e., the waste mix and the eutectic curve for the inert residues. The solids exit the back end of the kiln, dropping into a water bath “deslagger” which cools the solids, and provides a seal to preclude drawing air into this part of the unit.

4.3 SECONDARY COMBUSTION CHAMBER

Gases from the kiln, liquid wastes, and gaseous waste from cylinders (and other containers) are thermally treated in the SCC. The liquid wastes are injected into the chamber through lances in the two main combustion burners and through feed injection lances located below the burners. Gases from the kiln pass through a refractory lined duct, entering the combustion chamber below the injection guns.

The SCC is a vertically oriented, refractory-lined, carbon steel cylinder with a 22-foot inner diameter and length, and 67 ft 6-1/2 inches-foot inner height. The total chamber volume is calculated to be approximately 25,645 cubic feet.

The two SCC main burner burners are each rated for up to 45 MMBtu/hr thermal input. The burners are manufactured from carbon steel and are refractory lined. The feed lances in each burner are manufactured from Hastelloy. Each burner is equipped with four feed lances: a pilot gas lance, a natural gas lance, a fuel oil lance, and a waste feed lance. Auxiliary fuels can be fed to the burners during startup and shutdown and during normal operations to maintain desired combustion chamber temperatures.

A wet-ash drag conveyor is attached to the bottom of the SCC to process any ash and molten slag that falls through the refractory-lined chute. Once dropped through the chute, these materials are conducted to the drag conveyor, the bottom of which is submerged in water. The ash materials fall into the water, they solidify and are moved along the bottom of the compartment by drag-chain driven metal flights. The metal flights transfer the solidified ash up a dewatering incline through a discharge chute, where it is collected in a roll-off bin for disposal.

4.4 LOCATION OF COMBUSTION ZONE TEMPERATURE DEVICES

Kiln temperature is monitored using three thermocouples located in the kiln gas discharge duct (duct between kiln and SCC). The SCC temperature is monitored using three thermocouples located in the exit duct or roof of the SCC. In accordance with 40 §§CFR 63.1209(a)(7), (j)(1) and (k)(2), the specific locations of the thermocouples are shown in the P&ID drawings in Appendix D. Refer to drawings D-370-02-206 and D-380-02-206.

4.5 HOT DUCT AND EMERGENCY VENT

Combustion gases flow from the SCC into the hot duct. The duct is 10.3 feet in diameter. A relief emergency safety vent is located at the top of the hot duct, which activates to vent the system and is coordinated with the shutdown of waste feed under certain plant upset conditions. Under hot vented conditions there is a net inflow through all unsealed openings in the kiln. A small amount of natural gas or auxiliary fuel may be fired to continue the combustion process of solid waste material still located in the kiln during any cutoff of waste feed or shutdown.

4.6 SPRAY DRYER

The hot gases exit the top of the SCC and flow through a refractory lined hot duct to a spray dryer for gas conditioning prior to entering the first baghouse (baghouse No. 1). The spray dryer cools the hot combustion gases so they can be filtered in baghouse No. 1. Combustion gases are cooled by adiabatic evaporation of brine solution purged from the wet scrubbing system. This process design eliminates the need for process liquid disposal. Dried solids from the brine solution are collected by the screws at the bottom of the spray dryer, and conveyed via an ash conveyor system to roll-off boxes for off-site disposal. The evaporated water joins the combustion gas stream.

Combustion gases flow downward through the spray dryer. The dryer is 89 feet high. The internal diameter at the top entrance is 9.56 feet and the top thimble internal diameter is 15.5 feet and about 15.5 feet high. The main section varies in internal diameter 25 feet to 12.3 feet and is approximately 58.6 feet high. The dryer has a funnel-shaped bottom equipped with screw conveyors to discharge solids to roll-off boxes.

The spray dryer is equipped with twelve (12) spray nozzles. Four (4) nozzles spray into the top of the main section and eight (8) nozzles spray below those. The number of spray nozzles used varies with the heat content of the combustion gases. The spray nozzles are equipped with remotely activated valves that can be used to turn them on or off. The nozzles are high-pressure dual fluid nozzles.

Combustion gases typically exit the dryer at a temperature less than 450°F.

4.7 BAGHOUSE NO. 1

The conditioned gas from the spray dryer flows into the first baghouse. The insulated, carbon steel baghouse has six separate modules or cells. Each module contains 285 filter elements. The filter bags are felted Teflon bags. Each compartment contains approximately 893 square feet of filter area. The total filter area across all six cells is approximately 51,483 square feet. The baghouse carbon steel walls are insulated adequately to ensure that the gas is not cooled below the dew point temperature. This helps to prevent free water in the gas and decreases the plugging potential. The clean gas exiting the filter elements is collected in a clean air duct.

Periodic cleaning of the filter elements is accomplished with a pulsejet of dry air that flexes the elements and provides a temporary reverse gas flow. This combined flow dislodges the filter cake from the outside surface of the elements. While some cake buildup on the elements is preferred, periodic cake removal is necessary to retain the removal efficiency and to maintain the structural integrity of the filters. The frequency of the pulse cycle is determined based upon the pressure drop across each cell. When a pre-determined maximum level is reached, the pulsing cycle is activated.

Collected PM removed from the filter elements is discharged into inverted pyramid shaped hoppers at the base of each module. The cake falls by gravity out of the hopper into an ash conveyor system that carries the solid material to roll off boxes for off-site disposal.

4.8 SATURATOR

Gas from baghouse No. 1 enter the saturator where recycled water from the saturator run down tanks is sprayed into the hot gas stream to reduce the temperature to adiabatic saturation (approximately 180 to 195°F). Excess water that is not evaporated drains into the saturator run down tank, where it is neutralized, and then re-circulated to either the spray dryer or saturator. The purpose of the saturator is to cool the combustion gases from baghouse No. 1 while saturating the gas with moisture to improve the mass transfer rate in the parallel condenser columns. The saturator is 25.5 feet high and consists of a bottom cylindrical section approximately 9.2 feet internal diameter by 9 feet high. An inverted conical section is mounted on top of that. The throat area between the two sections is 62 inches in diameter. Approximately 800 to 1,200 gallons per minute of recirculated water is sprayed into the unit near the top through three (3) sets of spray nozzles that are aimed toward the center.

The spray nozzles generate fine droplets that provide a maximum surface area for evaporation. The water spray also serves to maintain a constant layer of water on the walls of the saturator above the saturator throat area. As the gas and water move down through the saturator, the walls narrow forming a throat section. When the gases pass through the throat section, the high turbulence causes the entrained water droplets to shear and form smaller droplets. This high turbulence, combined with a large droplet surface area, provides a very efficient transfer of water from the droplet into the gas stream. There are additional spray nozzles at the top of the saturator, which are connected to the plant fire water system and also to a gravity feed 2,500-gallon quench tank. This backup system is only used if there is a need to rapidly add additional water to the system, e.g., if a problem is encountered with the saturator feed pumps.

Two centrifugal pumps maintain water flow to the saturator. Each pump is driven by a 50-horsepower (hp) motor and can supply up to 1,200 gpm of water to the saturator.

The floor of the saturator is sloped so that liquids flow to the drain. These liquids are gravity transferred to the saturator rundown tanks equipped with agitators. Hydrated lime and/or caustic is added to the rundown water to neutralize any acid gas absorbed in the saturator and to raise the pH in the water prior to it being sent to the spray dryer or re-circulated to the saturator. The hydrated lime is supplied by the plant lime system and the caustic is provided by the caustic feed system. The rate of lime and/or caustic addition is adjusted as necessary to control the liquid pH. The liquid flow then enters the rundown tank where it resides long enough to allow neutralization to proceed to completion. Water from plant and process water supplies can be added to the rundown tank if needed. There is also a 50,000 gallon brine surge tank that can store brine water when evaporation of brine in the spray dryer is insufficient to maintain the zero discharge water system balance. Brine from the surge tank is returned to the saturator rundown tanks when the water balance in the system is such that the surge tank water can be managed in the spray dryer and saturator systems.

4.9 CONDENSER COLUMNS

Gases from the saturator split and flow into two parallel condenser columns where the gases are further cooled and moisture is condensed from the gas stream. The gases enter the 12 ft. diameter 47 ft. 9 in. tall columns and pass countercurrent to water sprays. The water sprays serve to further cool the gases and cause the moisture to condense from the gas stream.

The water from the condenser columns then drains into the condenser columns rundown tank system. The condenser columns rundown tank system consists of two 25,000-gallon agitated fiberglass tanks in series. Liquid from the first tank flows via an overflow line to the second condenser columns rundown tank. Caustic or lime is added to the water before it enters the second condenser columns rundown tank as needed to increase pH to maintain a minimum pH in the condenser columns inlet feed water. The flow from the second tank is pumped through plate and frame heat exchangers to cool the water before being sent back to the condenser columns. The cooling of the water before entering the condenser columns increases the cooling effect. The water is transferred through the system by three (3) pumps that are rated for up to 2,700 gpm of water flow. The pumps are driven by 150-hp motors.

Excess water in the condenser columns water recirculation loop flows by gravity from the second condenser columns rundown tank to the saturator rundown tank. This excess water is mixed with the saturator water, neutralized, and is used in the spray dryer where the water is evaporated.

The primary purpose of the condenser columns is to scrub chloride and sulfur oxides from the gas stream to meet the HWC NESHAP emission limit for chlorine/chloride and the Air Quality Construction Permit SO_2 emission limitation. The design of these types of spray towers has shown very high efficiency for removal of HCl/Cl_2 and SO_2.

4.10 REHEATER

Upon exiting the condenser columns, the gases pass through a reheat stage to elevate the temperature above the dew point. This is done using a natural gas fired burner, firing at a controlled rate directly into the gas stream. The reheating of the gas ensures that no condensation will occur in the downstream baghouse No. 2.

4.11 BAGHOUSE NO. 2

After reheating the gases from the condenser columns, activated carbon is injected into the gas flow prior to the gas entering baghouse No. 2. This second baghouse with carbon injection provides removal of any dioxin/furan present in the gas stream along with mercury removal. Baghouse No. 2 is the primary control device PM, SVM, and LVM. In addition to the injection of activated carbon, dry lime is injected into the gas stream as a pre-coat mechanism to help increase the coating on the filter elements. The insulated, stainless steel baghouse has four (4) separate modules or cells. Each module contains 270 filter elements. The total filter area across all four (4) cells is approximately 52,596 square feet. The baghouse walls are insulated adequately to ensure the gas is not cooled below the dew point temperature. This helps to prevent free water in the gas and decreases the plugging potential. The clean gas exiting the filter elements is collected in a clean air plenum. An exit nozzle on the plenum directs the gas via a stainless steel alloy duct to the induced draft fan.

Periodic cleaning of the filter elements is accomplished with a pulsejet of dry air that flexes the elements and provides a temporary reverse gas flow. This combined flow dislodges the filter cake from the outside surface of the elements. While some cake buildup on the elements is preferred, periodic cake removal is necessary to retain the removal efficiency and to maintain the structural integrity of the filters. The frequency of the pulse cycle is determined based upon the pressure drop across each cell. When a pre-determined maximum level is reached, the pulsing cycle is activated.

Collected PM removed from the filter elements is discharged into an inverted pyramid shaped hopper at the base of the module. The cake then falls by gravity out of the hopper into bins provided at the bottom of each hopper.

4.12 INDUCED DRAFT FAN

The induced draft (ID) fan is the prime gas mover for the system. Despite the length and complexity of the incineration system, the fan provides sufficient capacity to allow for maintenance of a negative pressure (draft) at the kiln and SCC. The Induced draft fan is manufactured from 2205 alloy and is rated for up to 120,000 acfm of air flow at 72 inwc. The fan is driven by a 1,750 hp motor. Flow control is provided by a variable frequency drive (VFD) or damper system. Cooling/lubricating oil is continuously circulated through the fan bearings to prevent overheating.

4.13 SCR DENO$_X$ UNIT

A Selective Catalytic Reduction (SCR) NOx removal system is the final unit operation in the APC system. To meet the Air Quality Construction Permit NOx emission limit, removal of NOx is needed when waste containing nitrogen is being thermally treated, as NOx is formed as part of the combustion process.

The DeNOx system is a patented clean side SCR system specifically designed to allow the removal of NOx from gases while using a minimal amount of energy to reheat the gases to the optimum catalyst reaction temperature of 550°F. The complete SCR tower is approximately 75 feet tall.

The exit gas from the induced draft fan flows into the bottom of the DeNOx system and enters a high efficiency heat exchanger (HEHE). The HEHE is a dual-stage counter flow plate-type recuperator. The heating surface consists of shaped plates, which are welded together and assembled into heat exchanger modules.

The inlet cooler gas and the hotter post treatment gas (after NO_x removal – outlet gas) flow between the plates in counter flow to one another, producing a smooth temperature curve and eliminating the typical diagonal profiles occurring in cross flow exchangers. The welded shaped plates guarantee a high thermal efficiency, while maintaining the gases separate from each other, ensuring uncontaminated and leak free operation. The inlet gas after leaving the heat exchanger at 500-510°F are heated further with additional heat supplied by a natural gas burner. The gas temperature is increased to approximately 550°F, the optimal temperature for the catalyst to operate. A 19% ammonia solution (NH_4OH) is injected at a controlled rate into the hot gas stream and homogenized with a static gas mixer near the top of the tower. The gas then turns through 180° bend (downward) and enters the SCR DeNOx catalyst where the NOx reacts with the ammonia and the catalyst to form water and nitrogen.

The hot clean gases then enter a high efficiency heat exchanger (HEHE) and heat the cooler inlet gases. The cooled clean gases then exit the bottom of the tower and enter the bottom of the separate stack. Compliance with the total hydrocarbon (THC) emission standard is monitored in the duct upstream of the DeNOx unit. .

4.14 STACK

Treated combustion gases exit the incineration system through the exhaust stack. The stack is a double walled steel stack which extends from ground level to an elevation of approximately 199 feet. The inner stainless steel flue is 5 feet 3 inches in diameter for the entire height of the stack. The outer shell is 11 feet in diameter from the ground to an elevation of approximately 88 feet. A transition section (at elevation 88 to 92 feet) is used to reduce the outer shell to a diameter of approximately 8 feet from elevation 92 feet to the top of the stack.

Three (3) sampling platforms are installed on the stack with sampling ports located on each level. The first sample platform level at 46 ft above the ground is designated primarily for installation and operation of continuous monitoring equipment (CEMS for CO, O_2, SO2, and NO_x, and for stack flow, opacity, moisture, temperature, and pressure measurements, etc.). The second and third levels (at elevation 62 and 78 feet) have sampling ports that are primarily designed for use for stack testing during performance tests such as this CPT. These sampling locations include sample ports that can be used for isokinetic and non-isokinetic sampling procedures.

4.15 HAZARDOUS WASTE RESIDENCE TIME

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

For systems with rotary kilns, the hazardous waste residence time will be controlled by the amount of time required for solid materials to exit the chamber, or the solids residence time. The time required for the liquid and gaseous materials to exit is very small in comparison (a few seconds versus several minutes). According to the USEPA handbook *Guidance on Setting Permit Conditions and Reporting Trial Burn Results*, the solids, or ash, residence time for a rotary kiln is calculated using the following formula:

$$\Theta = \frac{0.19 \times L}{N \times S \times D}$$

Where:

Θ = Solids Residence Time (minutes)

L = Kiln Length (meters)

D = Kiln Inside Diameter (meters)

N = Kiln Rotational Speed (revolutions per minute)

S = Kiln slope (meters/meter)

All factors except for rotational speed were inputted into the above equation to determine the site-specific equation for the residence time in the kiln.

KILN RESIDENCE TIME
Kiln Length = 11.9 meters (39.2 ft) Kiln Inside Diameter = 3.78 meters (12.4 ft) Kiln Slope = 0.04 (meter/meter) (2.29 degrees)
Θ = 14.95 / N
Minimum residence time of 15 minutes (1.0 rpm) Nominal residence time of 50 minutes (0.3 rpm) Maximum residence time of 150 minutes (0.1 rpm)

Of the factors included in the above equations, only the rotational speed of the kiln will vary during operations. CHESI varies the rotation speed of the kiln depending on the type of materials being incinerated. The rotational speed of kiln can vary from 0.1 to 1.0 revolutions per minute (rpm). The range of solids residence times then, are noted in the table above.

5.0 MONITORING

Monitoring equipment for the incineration system includes systems for process control and for stack gas analysis. This equipment enables the operators to maintain safe operation in compliance with the OPLs. This section provides an overview of the CMS associated with the incineration system. These CMS are comprised of continuous process monitoring systems (CPMS) and continuous emissions monitoring systems (CEMS). More information on the CMS can be found in the CMS PETP, which is included as Appendix B.

5.1 CONTINUOUS PROCESS MONITORING SYSTEMS

40 CFR §63.1209(b)(1) requires that a facility use CPMS to document continuous compliance with the applicable OPLs of the HWC NESHAP. The CPMS must sample regulated operating parameters without interruption and evaluate a detector response at least once every 15 seconds. One-minute average (OMA) values are calculated and recorded for each regulated operating parameter, and the appropriate rolling average is calculated from the OMA values. Table 5-1 provides a description of each CPMS including assigned tag numbers.

Some additional instruments are catalogued in the associated CMS PETP. Those not listed here typically shut down an individual burner or lance, not the system as a whole. These instruments include pressure transmitters at each flow meter that are connected to the atomizing fluid (air, generally) for that liquid waste flow and shut off that waste flow only if the atomizing fluid pressure drops below design requirements. Similarly, baghouse cell leak detectors isolate that cell if solids are detected in the gas exiting the cell. All these instruments (individual lance air pressure monitors and baghouse leak detectors) are detailed in the CMS PETP, which has been included with this CPT Plan.

Table 5-1. Continuous Process Monitoring Systems for the Train 2 Incineration System

INSTRUMENT TAG NUMBER	DESCRIPTION
370FT134	High BTU Blend Feed Main Kiln Burner 370BUR-400
370FT154	Lean Blend Feed Kiln Port 370BUR-401
370FT171	High BTU Blend Feed Kiln Port 370BUR-403
370FT414	Feed Kiln Port 370BUR-404
SP-130	Scale for Area 57A Container Feed to Kiln
SP-131	Scale for Area 57A Container Feed to Kiln
SP-132	Scale for Area 57B Container Feed to Kiln
SP-133	Scale for Area 61A Container Feed to Kiln
SP-134	Scale for Area 61B Container Feed to Kiln
SP-135	Scale for Area 61C Container Feed to Kiln

Table 5-1. Continuous Process Monitoring Systems for the Train 2 Incineration System

Instrument Tag Number	Description
SP-136	Scale for Area 61C Container Feed to Kiln
SP-137	Scale for Area 62 Container Feed to Kiln
SP-138	Scale for Area 62 Container Feed to Kiln
SP-139	Scale for Area 62 Container Feed to Kiln
390WT2304	Skip Hoist Bulk Feed to Kiln (Clamshell Weigh Cell)
380FT319	High Blend Feed SCC #1 Burner 380BUR-400
380FT357	High Blend Feed SCC #2 Burner 380BUR-401
380FT368	Lean Blend Feed to SCC Port 380BUR-402
380FT377	Tanker #1 Feed SCC Port 380BUR-403
380FT385	Tanker #2 Feed SCC Port 380BUR-404
380FT394	Tanker #3 Feed SCC Port 380BUR-405
380FT403	Tanker #4 Feed SCC Port 380BUR-406
380FT1416	Tanker #5 Feed SCC Port 380BUR-407
380FT1426	Energetic Waste Feed to 380BUR-408
380FT1435	Energetic Waste Feed to 380BUR-409
FIT-467/469/471	Aspirated Drum Waste Feed to 380BUR-410
370FT124	Natural Gas to Kiln Burner 370BUR-400
380FT282	Natural Gas to SCC #1 Burner 380BUR-400
380FT336	Natural Gas to SCC #2 Burner 380BUR-401
385Kiln-Pumpable-HRA	Kiln Pumpable Feed 1HRA
385Kiln-Non-Pumpable-HRA	Kiln Non-Pumpable Feed 1HRA
385Total-Kiln-Feed-HRA	Total Kiln Feed 1HRA
385SCC-Total and Pumpable-HRA	SCC Pumpable Feed 1HRA
385Total-Mercury-12HRA (Calculated[1])	Total Mercury Kiln & SCC 12HRA
385Total-Ash-12HRA (Calculated[1])	Total Ash Kiln & SCC 12HRA
385Total-SVM-12HRA (Calculated[1])	Total SVM Kiln & SCC 12HRA
385LVM-Pumpable-12HRA (Calculated[1])	LVM Pumpable Kiln & SCC 12HRA
385Total-LVM-12HRA (Calculated[1])	Total LVM Kiln & SCC 12HRA
385Total-Chlorine-12HRA (Calculated[1])	Total Chlorine Kiln & SCC 12HRA

Table 5-1. Continuous Process Monitoring Systems for the Train 2 Incineration System

INSTRUMENT TAG NUMBER	DESCRIPTION
370PIT190A	Kiln inlet shroud pressure
370PIT190B	Kiln exit shroud pressure
370PIT188	Kiln front wall pressure
370PIT201	SCC inlet pressure
370TY200	Kiln discharge temperature
380TY437	SCC outlet temperature
385PIT583	Condenser #1 385SCR-401 total fluid pressure
385PIT599	Condenser #2 385SCR-402 total fluid pressure
385FIT592	Condenser #1 liquid flow rate 385SCR-401
385FIT596	Condenser #2 liquid flow rate 385SCR-402
385AIT601A/B	pH Condenser Tank 385-403B pH A/B (condenser inlet feed water pH)
385WE-1593A/B	Activated carbon feed rate Baghouse #2
385FIT646	Activated carbon carrier flow rate Baghouse #2
385TIT1201A	Inlet temperature Baghouse #2
385AIT1212	Baghouse #2 broken bag detector
385DP718A-B	Baghouse #2 pressure differential
385AT787A/B/C	Stack Moisture
385AIT790A/B/C	Stack SO_2 (A, B, or C)
385AIT791A/B/C-HRA	Stack CO Online (A, B, or C) HRA (corrected to 7% O_2)
385AIT792A/B/C-HRA	Stack NOx (A, B, or C) 1-HRA
385AQ792E	Stack NOx Annual
385AIT793A/B/C	Stack O_2 unit online (A, B, or C)
385FIT794	Stack Flow Rate
385AIT795A/B	Stack Opacity (A or B)
385TIT796	Stack Temperature
385AIT797A/B/C	Stack THC (A, B, or C)
385PIT798	Stack Pressure
370PT139	Kiln liquid feed Lances 1 & 2 to Burner 370BUR-400 atomizing fluid pressure
370PT159	Kiln liquid feed Lance #1 370BUR-401 atomizing fluid pressure
370PIT176	Kiln liquid feed Lance #3 370BUR-403 atomizing fluid pressure
370PIT419	Kiln liquid feed lance #4 370BUR-404 atomizing fluid pressure
380PT302	SCC Burner No. 1 atomizing fluid pressure (380BUR400)
380PT345	SCC Burner No. 2 atomizing fluid pressure (380BUR401)
380PIT373	SCC Lance No. 3 atomizing fluid pressure (380BUR402)

Table 5-1. Continuous Process Monitoring Systems for the Train 2 Incineration System

INSTRUMENT TAG NUMBER	DESCRIPTION
380PIT382	SCC Lance No. 4 atomizing fluid pressure (380BUR403)
380PIT390	SCC Lance No. 5 atomizing fluid pressure (380BUR404)
380PIT399	SCC Lance No. 6 atomizing fluid pressure (380BUR405)
380PIT408	SCC Lance No. 7 atomizing fluid pressure (380BUR406)
380PIT1422	SCC Lance No. 8 atomizing fluid pressure (380BUR407)
380PIT1431	SCC Lance No. 9 atomizing fluid pressure (380BUR408)
380PIT1440	SCC Lance No. 10 atomizing fluid pressure (380BUR409)
385PD594-595	Condenser 401 pressure drop
385PD597-598	Condenser 402 pressure drop

[1] This process parameter is calculated from other monitored parameters.

5.2 CONTINUOUS EMISSIONS MONITORING SYSTEMS

40 CFR §63.1209(a)(1)(i) requires that a facility use CEMS to document compliance with the carbon monoxide (CO) or total hydrocarbon (THC) emission standards of the HWC NESHAP. The facility is also required to use an oxygen (O_2) CEMS to continuously correct the measured carbon monoxide or total hydrocarbon levels to seven (7) percent oxygen. The facility has the option of monitoring either carbon monoxide or total hydrocarbon. If a facility chooses to use a total hydrocarbon CEMS, they are not required to maintain a carbon monoxide CEMS, and vice versa. A facility is required to demonstrate compliance with both the carbon monoxide and total hydrocarbon standards during the DRE test runs of the CPT.

At this time, CHESI has chosen to continuously monitor both carbon monoxide and total hydrocarbon emissions from the stack. Both carbon monoxide and total hydrocarbon will be monitored in the stack gas by the stack testing company during the CPT. CHESI uses total hydrocarbon as the primary continuous monitoring parameter and carbon monoxide as the secondary continuous monitoring parameter when the total hydrocarbon continuous monitoring is not in service. The total hydrocarbon CEMS will be in operation and will be used to trigger an AWFCO should an exceedance occur during the test runs.

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

CHESI will utilize three gas filter correlation analyzers to continuously monitor carbon monoxide concentrations in the incineration system stack gas. The analyzers are a dual range design with a zero to 200 ppmv span value for the low range and a zero to 3,000 ppmv span value for the high range.

Three paramagnetic oxygen analyzers are used to correct emission concentrations to seven (7) percent oxygen. The analyzer has a span of zero to 25 percent oxygen, by volume, on a dry basis.

The HWC NESHAP requires compliance with Performance Specification 8A of 40 CFR Part 60, Appendix B, for total hydrocarbon CEMS. Three total hydrocarbon analyzers, with a zero to 100 ppmv range are also in operation.

The CEMS are maintained using a specified maintenance routine, which includes:

- Routine maintenance;
- Daily automatic or manual calibrations;
- Quarterly Absolute Calibration Audits (ACAs) [also referred to as Cylinder Gas Audits (CGAs)]; and
- Annual Relative Accuracy Test Audits (RATAs).

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

As part of the normal annual test requirements and in preparation for the CPT, a RATA of the CO and O_2 CEMS will be performed in the quarter the CPT is conducted to ensure that the instrumentation meets the HWC NESHAP requirements. Note: Performance Specification 8A does not specify performing RATA testing of THC CEMS, simply quarterly CGAs. The facility CEMs (THC, CO, and O_2) will be operated in the normal manner as required for the AWFCO (described below) and for compliance with HWC NESHAP. The SO_2 and NO_x CEMS will be operated in the normal manner to demonstrate compliance with the Air Quality Construction Permit.

5.3 AUTOMATIC WASTE FEED CUTOFF SYSTEM

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

CHESI operates an AWFCO system for the incineration system. Table 5-2 provides a list of each of the AWFCO-linked parameters. The limits noted in Table 5-2 are proposed as initial set points and are based on substantially similar systems owned and operated by CHESI. The final will be established based on the CPT results or manufacturer specification, except for carbon monoxide, total hydrocarbon, and combustion zone pressures, which are regulatory and alternative monitoring established limits. The distributive control system (DCS) is programmed to shut off all waste feed valves and conveyors to either individual feed ports, combustion units, or the entire system, as applicable, when a trigger limit is met, and to do the same when any of these instruments exceeds 100% of the instrument range.

Table 5-2. Automatic Waste Feed Cutoffs for the Train 2 Incineration System

PARAMETER	TRIGGER LIMIT [1]	AVERAGING PERIOD	REASON FOR CUTOFF
Minimum kiln combustion chamber temperature	1,400°F	HRA	Operating limit
Minimum SCC temperature	1,800 °F	HRA	Operating limit
Kiln inlet and exit shroud seal pressure	See alternative monitoring language [2]	Instantaneous	Regulatory alternative limit
SCC pressure	See alternative monitoring language [2]	Instantaneous	Regulatory alternative limit
Maximum stack gas flow rate	100,000 acfm	HRA	Operating limit
Maximum total hazardous waste feed rate to kiln	30,000 lb/hr	HRA	Operating limit
Maximum kiln pumpable waste feed rate	7,000 lb/hr	HRA	Operating limit
Maximum total hazardous waste feed rate to the SCC	20,000 lb/hr	HRA	Operating limit
Maximum total mercury feed rate	0.45 lb/hr[3]	THRA	Operating limit
Maximum total SVM feed rate	75 lb/hr[3]	THRA	Operating limit
Maximum total LVM feed rate	75 lb/hr[3]	THRA	Operating limit
Maximum pumpable LVM feed rate	75 lb/hr[3]	THRA	Operating limit
Maximum ash feed rate	12,000 lb/hr	THRA	Operating limit
Maximum chlorine feed rate	2,000 lb/hr	THRA	Operating limit
Minimum condenser liquid feed pressure	7.0 psig	HRA	Operating limit
Minimum condenser liquid flow rate	3,500 gpm	HRA	Operating limit
Minimum condenser feed water pH	4.0	HRA	Operating limit
Maximum baghouse No. 2 inlet temperature	325°F	HRA	Operating limit
Minimum activated carbon feed rate	20 lb/hr	HRA	Operating limit
Minimum activated carbon carrier fluid flow rate	60 scfm	HRA	Operating limit
Maximum stack carbon monoxide concentration	100 ppmv	HRA	Regulatory limit
Maximum stack total hydrocarbon concentration	10 ppmv	HRA	Regulatory limit
Minimum burner and liquid feed lances minimum atomizing fluid pressure	30 psig	HRA	Operating limit

Table 5-2. Automatic Waste Feed Cutoffs for the Train 2 Incineration System

PARAMETER	TRIGGER LIMIT [1]	AVERAGING PERIOD	REASON FOR CUTOFF

1 Anticipated AWFCO limits based on substantially similar units owned and operated by CHESI. The values presented in this table will be established as AWFCO set points until the CPT is conducted and the CPT report and NOC are submitted.

2 Alternative monitoring based on the unique double seal and pressurized shroud system is requested. The alternative monitoring includes three OPLs based on kiln shroud pressure, SCC pressure, and the difference between kiln shroud and SCC pressures. See Section 2.2 and Appendix C for more detail.

3 The value presented assumes a three-fold (3X) extrapolation of CPT target feed rate. The final limit will be an extrapolated value based on the CPT emissions results. Refer to Section 6.5 of this CPT plan for example extrapolation calculations.

5.4 EMERGENCY SHUTDOWN SYSTEM

Emergency shutdown features are included to protect the equipment in the event of a malfunction. An emergency shutdown will stop all waste and fuel feeds to the kiln, the SCC, and shutdown many system components when triggered by a monitor signal. These parameter limits have been set independently of regulatory test conditions. These limits are based on equipment design and operating specifications and are considered good operating practices.

The emergency shutdown system is always in operation and in conjunction with the AWFCO system will be in operation during the CPT.

6.0 COMPREHENSIVE PERFORMANCE TEST OPERATIONS

6.1 GENERAL

CHESI will perform the CPT as a single test condition to demonstrate the incineration system operates in conformance with the applicable HWC NESHAP emission standards at the operational extremes (maxima/minima) and to establish applicable OPLs. The single CPT operating condition will establish the OPLs while demonstrating compliance with the HWC NESHAP emission standards. OPLs will be based on the average of three test runs or the average of the maximum hourly rolling average of three test runs as required by the regulations. Tables 2-1 and 2-2 presented information on the OPLs that will be established and the basis for the calculations of maximum or minimum OPLs.

6.2 CPT OPERATING CONDITIONS

The CPT is designed to demonstrate operations of the incineration system with the kiln and SCC at maximum pumpable and total feed rates, and while operating at minimum combustion temperatures. The stack flow rate will be maximized yielding minimum gas residence time in the kiln and SCC. Maximum ash, chlorine, mercury, LVM and SVM feed rates will be demonstrated with all APC system devices at minimum/maximum operating conditions. CHESI will demonstrate compliance with the D/F, PM, chlorine/chloride, LVM, SVM, and mercury emission limits, and the DRE performance standard. In addition, carbon monoxide and total hydrocarbon emissions will be monitored to demonstrate compliance. Air Quality Construction Permit emission parameters concurrently measured during the CPT will include nitrogen oxides (NO_X) and sulfur dioxide (SO_2). Triplicate sampling runs will be performed for the CPT. The OPLs that will be established include:

- Minimum kiln temperature;
- Minimum SCC temperature;
- Maximum stack gas flow rate;
- Maximum total hazardous waste feed rate to kiln;
- Maximum pumpable hazardous waste feed rate to kiln;
- Maximum total hazardous waste feed to the SCC;
- Maximum total mercury feed rate;
- Maximum total SVM feed rate;
- Maximum total LVM feed rate;
- Maximum pumpable LVM feed rate;
- Maximum total chlorine feed rate;
- Maximum total ash feed rate;

- Minimum condenser columns water flow rate ;
- Minimum pH for condenser columns inlet water;
- Minimum activated carbon feed rate; and
- Maximum baghouse No. 2 inlet temperature.

40 CFR §63.1207(g)(1)(A) requires that CHESI feed normal or higher levels of chlorine during the dioxin/furan emission performance test. The chlorine feed rate will be maximized during the CPT when dioxin/furan is being tested and the maximum chlorine feed rate will be established. This chlorine feed rate meets the requirement of 40 CFR §63.1207(g)(1)(A).

40 CFR §63.1207(g)(1)(i)(B) requires that CHESI feed normal or higher levels of ash during the SVM and LVM performance tests. Ash content in the solids feed to the kiln will be maximized during the CPT and the maximum ash feed rate established. This ash feed rate meets the requirement of 40 CFR §63.1207(g)(1)(i)(B).

40 CFR §63.1207(g)(1)(C) requires that the PM control device undergoes normal (or more frequent) cleaning cycle during the PM, SVM, and LVM performance tests. Baghouse No. 2 is cleaned periodically with a pulsejet of dry air that flexes the bags and provides a temporary reverse gas flow. The pulsejet will be maintained at a normal frequency (normal pressure drop trigger setting) during the CPT. This meets the requirement of 40 CFR §63.1207(g)(1)(C).

40 CFR §63.1209(n)(4) requires that CHESI feed maximum levels of chlorine/chloride during the SVM and LVM performance tests. Liquid waste(s) with the high chlorine/chloride content will be identified and selected to maximize chlorine/chloride feed rate during the CPT and the maximum chlorine/chloride feed rate established. Alternatively, the chlorine feed rate target may be demonstrated or augmented via feeding purchased chlorinated organic chemical, e.g., perchloroethylene. This chlorine/chloride feed rate meets the requirement of 40 CFR §63.1209(n)(4).

A summary of the target operating conditions for CPT was provided in Table 2-2.

6.3 PRINCIPAL ORGANIC HAZARDOUS CONSTITUENT

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

The POHC selection approach is based on the Thermal Stability Index (TSI) developed by Dellinger, et. al., at the University of Dayton Research Laboratory. This approach has been included in the USEPA's handbook *Guidance on Setting Permit Conditions and Reporting Trial Burn Conditions*, Volume II of the Hazardous Waste Incineration Guidance Series (HWIGS), January 1989 (EPA 625/6-89/019). This ranking of compounds is based on their thermal stability under low oxygen conditions, with the most stable compounds being considered the most difficult to burn. The TSI compounds are divided into seven classes. Compounds in Class 1 are considered the most difficult to burn. Demonstrated ability to destroy a compound in a particular class presumes other compounds within the same and lower classes are destroyed at equal or greater efficiencies.

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

- Physical state: The POHC must be limited to those constituents that are liquids at ambient temperatures and pressures to facilitate POHC handling, metering, and quantification;
- Stability: The compound selected as POHC must be sufficiently stable and have a boiling point suitable for conventional stack sampling techniques;
- Representative: The compound selected must be representative of the types of constituents that the systems will typically handle; and
- Availability and cost: The compound selected as a POHC must be sufficiently available for purchase or formulation at a reasonable cost.

CHESI proposes using a Class 1 POHC to demonstrate DRE. The selected POHC is 1,2-dichlorobenzene (1,2-DCB) [also known as ortho-dichlorobenzene (ODCB)] or alternatively 1,2,4-trichlorobenzene (1,2,4-TCB). The actual Class 1 POHC to be used during the CPT will be based upon availability and ambient conditions at the time of the testing. 1,2-DCB and 1,2,4-TCB are ranked 25th and 28th, respectively in Class 1 of the TSI. USEPA guidance indicates that demonstration of DRE for a compound listed in Class 1 of the TSI is a sufficient demonstration for the most difficult to burn compounds. 1,2-DCB or 1,2,4-TCB meets all the criteria for a suitable POHC. To demonstrate DRE, 1,2-DCB or 1,2,4-TCB will be metered to the combustion system. 1,2-DCB or 1,2,4-TCB emissions will be measured using SW-846 Method 0023A concurrently with dioxin/furan emissions. The properties of the 1,2-DCB and 1,2,4-TCB are summarized in Table 6-1.

Table 6-1. Principal Organic Hazardous Constituent Properties

Property	1,2-dichlorobenzene	1,2,4-trichlorobenzene
Synonyms	ortho-dichlorobenzene or ODCB	None
Formula	$C_6H_4Cl_2$	$C_6H_3Cl_3$
Chemical Abstract Service	95-50-1	120-82-1
Molecular weight, lb/lbmol	147	181.5
Melting point, °C	-17	17
Boiling point, °C	180	214
Thermal stability ranking 1	Class 1, Rank 25	Class 1, Rank 28

6.4 PRINCIPAL ORGANIC HAZARDOUS CONSTITUENT FEED RATE

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

$$DRE = 1 - \frac{W_{OUT}}{W_{IN}} \times 100\%$$

where:

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

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

The POHC must be supplied to the unit in sufficient quantity to be detectable in the stack gas. Each stack sampling method has a minimum detection limit. Using the most conservative approach for the test, any compound which is not found to be present in the stack gas at the laboratory reporting limit (RL) and undetected at the method detection limit (MDL) in the stack gases will be assumed to be present at the RL. For any analysis reported as a “J” flagged value (estimated value between the MDL and RL), the analyte will be assumed to be present at the estimated value. Therefore, it is very important to ensure that there is adequate quantity of POHC in the incineration system feed to demonstrate the target 99.99 percent DRE. The required POHC feed rate is determined by back-calculating from the stack sampling RLs and the target DRE (99.99 percent) using the following equation, which is derived from the DRE equation in 40 CFR §63.1219(c)(1):

$$W_{IN} = W_{OUT} \times \frac{100}{100 - DRE}$$

Table 6-2 provides the calculated minimum POHC quantity for 1,2-DCB or 1,2,4-TCB required for the CPT based on demonstrating 99.99% DRE at the expected stack flow rate and laboratory RLs. The sum of the expected RLs for the three Method 0023A analysis fractions is 140 nanograms (ng). Assuming a minimum sampled volume of three (3) dry standard cubic meters (dscm), the in-stack detection limit is:

140 ng / 3.0 dscm = 46.7 ng/dscm, or

140 ng / 3.0 dscm * (1 dscm/35.31 dscf) = 1.32 ng/dscf

Assuming 100,000 standard cubic feet per minute (scfm) of stack flow at 50% moisture, the dry flow is 50,000 dscfm (or 50,000 dscfm /35.31 dscm/dscf = 1,416 dscm/min). The POHC mass emission rate at the RL is:

1.32 ng/dscf * 50,000 dscfm * (1 lb / 453.6E+09 ng) * 60 min/hr = 8.74 E-06 lb/hr

The minimum POHC feed rate to demonstrate 99.99% DRE at the in-stack detection is:

8.74 E-06 lb/hr / (1-0.9999) = 0.0874 lb/hr

With a safety factor of 100X, the POHC feed rate is a value that can be reasonably fed using a metering pump:

0.0874 lb/hr * 100 X = 8.74 lb/hr

During the CPT, the POHC feed rate target will be 8-10 lb/hr.

Table 6-2. Principal Organic Hazardous Constituent Quantity

Parameter	Units	Value
Sampling method	---	SW-846 Method 0010/0023A
Reporting limit	ng	20 (for Filter & Probe Rinses) + 100 (for XAD and Condenser Rinses) + 20 (condensate) = 140 ng Total
Sampled volume	dscm	3.00
Reporting limit	ng/dscm	46.7
	ng/dscf	1.32
Estimated stack flow rate	dscfm	50,000
	dscm/min	1,416
Target destruction and removal efficiency	%	99.99
Emission rate required for detection	lb/hr	8.74E-06
Minimum required POHC feed rate at DRE target	lb/hr	0.0874
Proposed POHC feed rate with 100X safety factor	lb/hr	8.74

Note: 1,2-DCB or 1,2,4-TCB detection levels are based on gas chromatograph/mass spectrometry (GC/MS) analysis by SW-846 Method 8270, with selected ion monitoring (SIM). Refer to Section 7.5.5 of Method 8270C or Section 11.5.5 of Method 8270D. The SIM analysis approach is comparable to isotope dilution high resolution GC/MS (HRGC/HRMS) approach normally used for dioxin/furan analysis. The SIM approach provides for detection limits 1-2 orders of magnitude lower than the normal GC/MS analysis. The SIM approach significantly reduces the 1,2-DCB or 1,2,4-TCB spiking rate necessary to effectively demonstrate DRE.

6.5 METALS FEED RATE EXTRAPOLATION OPL CALCULATIONS

6.5.1 OPL CALCULATIONS FOR MERCURY, SVM, LVM, CHLORINE, AND ASH

CHESI will utilize feed rate extrapolation to establish the mercury, SVM, and LVM feed rate OPLs for compliance with the emission standards, as allowed by 40 CFR §§63.1209(l)(1)(v) and (n)(2)(vii). CHESI will use a straight line calculation/extrapolation of the respective CPT-demonstrated metal feed rates multiplied by the ratio of the respective emission standards to the resulting emissions to determine the final mercury, SVM, and LVM feed rates limits. Extrapolation will use the actual feed rates for each constituent during the CPT based on the average of the three test runs.

The OPLs for total chlorine and ash are set at the actual total chlorine and ash feed rates in lb/hr demonstrated during the CPT while demonstrating the emission HCl/Cl_2 and PM standards are met. The actual total chlorine and ash feed rate limits are based on the average of the three tests runs and the OPLs are established as 12-hour rolling averages. The regulations do not allow for a calculation to increase total chlorine or ash above the actual feed rate demonstrated during the CPT. Therefore, the total chlorine and feed rate limits will be based on the actual average feed rates for the three test runs during the CPT.

The proposed extrapolation formulae for mercury, SVM, and LVM feed rate limits are:

$$FR_{LIMIT} = (FR_{CPT} \text{ X } ES) / EC_{CPT})$$

where:

FR_{LIMIT} = Maximum feed rate limit, lb/hr (OPL) 12 HRA

FR_{CPT} = Actual feed rate during the CPT lb/hr, average of the three test runs

ES = Emission standard (ug/dscm)

EC_{CPT} = Actual emission measured during the CPT (ug/dscm), average of the three test runs.

6.5.2 MERCURY EXTRAPOLATION EXAMPLE

Table 6-3 presents example CPT data for extrapolation of the mercury feed rate.

Table 6-3. Example Mercury Feed Rate and Emissions Data

Hg	Units	Run 1	Run 2	Run 3	Average
Total	lb/hr	0.158	0.159	0.142	0.153
Emissions	ug/dscm [1]	3.0	2.6	4.3	3.3
	lb/hr	3.8E-04	3.5E-04	5.5E-04	4.3E-04
SRE	%	99.76%	99.78%	99.61%	99.72%

Note:
[1] Corrected to seven (7) percent oxygen.

Using the example average mercury data from above:

FR_{CPT} = 0.153 lb/hr

EC_{CPT} = <3.3 ug/dscm

ES = 8.1 ug/dscm

FR_{LIMIT} (mercury feed rate limit) = (0.153 lb/hr) X (8.1/3.3) = 0.375 lb/hr

The total mercury feed rate limit is 0.38 lb/hr (12-HRA basis) using the SRE-based calculation.

6.5.3 SVM EXTRAPOLATION EXAMPLE

Table 6-4 presents example CPT data for extrapolation of the SVM feed rate.

Table 6-4. Example SVM Feed Rate and Emissions Data

SVM	Units	Run 1	Run 2	Run 3	Average
Total	lb/hr	24.2	24.5	24.7	24.5
Emissions	ug/dscm [1]	2.8	2.9	2.1	2.6
	lb/hr	3.6E-04	4.0E-04	2.7E-04	3.4E-04
SRE	%	99.9985%	99.9984%	99.9989%	99.9986%

Note:
[1] Corrected to seven (7) percent oxygen.

Using the average SVM data from above:

FR_{CPT} = 24.5 lb/hr

EC_{CPT} = <2.6 ug/dscm

ES = 10 ug/dscm

FR_{LIMIT} (SVM feed rate limit) = (24.5 lb/hr) X (10/2.6) = 94.1 lb/hr

So, the total system SVM feed rate limit is 94 lb/hr (12-HRA basis) using the SRE-based calculation.

6.5.4 LVM EXTRAPOLATION EXAMPLE

Table 6-5 presents example CPT data for extrapolation of the LVM feed rate.

Table 6-5. Example LVM Feed Rate and Emissions Data

LVM	Units	Run 1	Run 2	Run 3	Average
Total	lb/hr	28.2	35.5	34.3	32.7
Pumpable	lb/hr	21.1	27.0	26.2	24.8
Emissions	ug/dscm [1]	12.9	18.8	17.6	16.4
	lb/hr	1.6E-03	2.3E-03	2.2E-03	2.0E-03
Total SRE	%	99.9924%	99.9915%	99.9916%	99.9918%
Pumpable SRE	%	99.988%	99.988%	99.988%	99.988%

Note:
[1] Corrected to seven (7) percent oxygen.

Using the average LVM data from above:

FR_{CPT} = 32.7 lb/hr total LVM

EC_{CPT} = <16.4 ug/dscm

ES = 23 ug/dscm

FR_{LIMIT} (LVM feed rate limit) = (32.7 lb/hr) X (23/16.4) = 45.7 lb/hr

The total LVM feed rate limit is 46 lb/hr (12-HRA basis) using the SRE-based calculation.

FR_{CPT} = 24.8 lb/hr pumpable LVM

EC_{CPT} = <16.4 ug/dscm

ES = 23 ug/dscm

FR_{LIMIT} (LVM feed rate limit) = (24.8 lb/hr) X (23/16.4) = 34.7 lb/hr

The pumpable LVM feed rate limit is 35 lb/hr (12-HRA basis) using the SRE-based calculation.

6.6 WASTE SPIKING

6.6.1 SUMMARY OF SPIKING PROGRAM

To achieve the desired operating conditions for the CPT, CHESI will be required to spike the waste streams with known quantities of POHC, metals, and possibly chlorine. As necessary, spiking materials will be purchased and fed during the CPT by the following methods:

- 1,2-DCB or 1,2,4-TCB will be metered as a technical grade liquid to the rotary kiln and/or SCC to provide adequate POHC feed rate for the DRE determination;
- An aqueous mercury solution of either mercury II nitrate [$Hg(NO_3)_2$] or mercury II acetate [$Hg(C_2H_3O_2)_2$] will be metered to the rotary kiln and/or SCC during the CPT to allow for accurate extrapolation of the mercury feed rate OPL;
- An aqueous lead solution of lead II nitrate [$Pb(NO_3)_2$] will be metered to the rotary kiln and/or SCC during the CPT to allow for accurate extrapolation of the SVM feed rate OPL;
- A chromium solution of either sodium dichromate [$Na_2Cr_2O_7$] or chromium III nitrate [$Cr(NO_3)_3$] will be metered to the rotary kiln and/or SCC to increase the feed rate of LVM to the incineration system during the CPT to allow for accurate extrapolation of the LVM feed rate OPL; and
- If spiking of chlorine is deemed necessary, a chlorinated organic chemical (e.g., perchloroethylene) and/or chlorinated solution (e.g., aqueous HCl) will be metered to the rotary kiln and/or SCC to achieve sufficient chlorine feed rates.

These spiking materials will be purchased by CHESI. Vendor supplied “Certificate of Analysis” will be used for pure compounds and will be analyzed to provide evidence of percent purity if no COA is provided.. Table 6-6 summarizes the spiking planned for the CPT.

Table 6-6. POHC and Metals Spiking

Spiking Material	Spiking Element	Elemental Spiking	Expected Element	Total Spiking Rate	Total Spiking Time	Total Spiking
		(lb/hr)	(wt%)	(lb/hr)	(hours)	(lbs)
1,2-DCB or 1,2,4-TCB	POHC	8.7	100	8.7	24	209
Mercury solution	Mercury	0.15	0.010 [as $Hg(NO_3)_2$ Solution]	15	24	360
Lead solution	SVM	25	20 [as $Pb(NO_3)_2$ Solution]	100	24	2,400
Chromium solution	LVM	25	24.0 (as $Na_2Cr_2O_7$ solution)	104	24	2,500
Chlorine spike (if needed)	Chlorine	2,000	85.52 (as perchloroethylene	2,339	24	56,127

Expected quantities of each material are listed above and will be determined at the time of testing.

6.7 TEST MATERIALS AND QUANTITIES

Table 6-7 summarizes the estimated quantity of waste materials required to conduct the testing. Triplicate sampling runs will be performed. Sampling requires approximately 4-5 hours per test run. Allowing for ramp up to target operating conditions and one run contingency, 24 hours of waste feed materials will be planned for to execute the CPT program.

Table 6-7. Test Material Quantities

Material	Rate (lb/hr)	Ramp Up and Testing Hours	Total Material (lbs)
Non-pumpable hazardous waste to kiln	30,000	24	720,000
Pumpable hazardous waste to kiln	7,000	24	168,000
Pumpable hazardous waste to SCC	20,000	24	480,000
Chlorine spiking (if required)	2,000 (as net Cl)	24	48,000 (as net Cl)

6.8 TEST SCHEDULE

The general schedule of testing is summarized in Table 6-8.

The carbon monoxide and oxygen CEMS relative accuracy test audit (RATA) and total hydrocarbon CEMS cylinder gas audit (CGA) will be performed just prior to performing the CPT.

The entire sampling effort is expected to require a 5-7 days (one setup day, 3-4 sampling days, and one contingency day). Prior to the start of the sampling period, sampling equipment and instruments will be prepared and calibrated, supplies will be brought onsite, and sampling locations will be prepared.

Based on past experience, CHESI has allowed 1 -1 ½ hours of run time in order to establish the steady-state conditions before the start of the test runs. Steady-state is defined as a condition when the combustion chamber temperatures and CO and total hydrocarbon emissions remain stable with minimal fluctuation. . If there is significant fluctuation at the end of the hour, the test will not begin until steady-state conditions are achieved.

For metals and POHC metered to the liquid waste feed, solids residence time does not apply to achieving steady state for the spiking materials, but rather the time it takes for the gaseous products to pass through combustion chambers and the APC system. Time for gas flow with constituents present is less than one minute from the time a liquid enters the system and is passed through the APC system. The liquid spiking systems will be started and operational for a minimum of 15 minutes prior to performing any stack sampling.

Table 6-8. Test Schedule

Day	Start	Stop	Activity
30-60 days prior to the CPT			Conduct CPMS calibration checks.
Test Day 1	---	---	Test team mobilizes on sit and begins set-up of sampling and spiking equipment. Set up time will include pretest meetings
Test Day 2	---	---	Perform CO and O_2 CEMS RATA and CGA of THC CEMS
Test Day 3	06:00	09:00	Begin feeding designated materials (waste and spiking) at CPT target rates and establish steady-state operating conditions; starts the CPT period
	09:00	14:00	Run 1
	14:00	16:00	Recover samples from Run 1 and set-up of sampling equipment for Run 2; discontinue feeding CPT waste feed materials.
	15:00	15:30	Post-testing team leader meeting to discuss Run 1 operations and issues; plan any necessary adjustments for subsequent test runs.
	~16:00		Test team departs site for day.
Test Day 4	06:00	08:00	Begin feeding designated materials (waste and spiking) at CPT target rates and establish steady-state operating conditions; starts the CPT period
	08:00	13:00	Run 2
	13:00	15:00	Recover samples from Run 2 and set-up of sampling equipment for Run 3; continue feeding waste. Pause spiking until approximately 15 minutes before start of Run 3.
	15:00	20:00	Run 3
	20:00	21:00	Recover samples from Run 3; discontinue feeding CPT waste feed materials and spiking.
	~21:00		Test team departs site for day.
Test Day 5	07:00	12:00	Complete sample recovery. Recover sampling equipment. Sampling team demobilizes from site.
Test Day 6	Contingency Day 1		
Test Day 7	Contingency Day 2		

7.0 SAMPLING AND ANALYSIS

Sampling and analysis performed during the CPT described in Section 6.0 will demonstrate the performance of the incineration system with respect to the HWC NESHAP emission standards.

The CPT will consist of a single operating condition with three replicate test runs. The stack gas samples and waste feed samples will be collected using procedures summarized in this section and described further in the QAPP found in Appendix A. The sampling and analysis methods are standard reference methods, either USEPA methods as required by the regulations or ASTM procedures. Therefore, only brief descriptions are presented. The QAPP (Appendix A) has been prepared with direct input from the stack testing organization and the laboratories performing the work. Sample holding times will be consistent with the analytical requirements for the methods used.

7.1 PUMPABLE WASTE SAMPLING AND ANALYSIS

Pumpable waste samples (liquid wastes) will be collected during each run of each condition. Samples will be collected for each of the pumpable waste streams being burned during each run.

CHESI personnel will collect samples from taps located on the feed lines or at the feed tanks. The liquid waste sampling locations will be clearly labeled. The taps will be flushed initially before the samples are collected. At 30-minute intervals throughout each test run, approximately 250 milliliters (mL) of each pumpable waste stream will be collected. The grab samples collected for each waste stream will be composited for each run into respective one-gallon jars. At the conclusion of each run, each composite sample will be mixed, and aliquots for analysis prepared using amber glass sample jars. The samples will be isolated from sources of contamination during the sampling and compositing, and after preparation of the analysis aliquots.

The pumpable waste samples will be analyzed to characterize each waste stream and collect information required to develop OPLs. Higher heating value will be determined for general characterization of the waste streams. Native ash, chlorine, and metals (LVM, SVM, and mercury) concentrations will be determined to develop the feed rate OPLs.

The POHC (1,2-DCB or 1,2,4-TCB) will be metered to the rotary kiln and/or SCC. Pumpable waste streams will not be sampled and analyzed for POHC and will be assumed to have a zero (0) contribution for DRE calculations.

Table 7-1 summarizes the pumpable waste samples to be collected, the parameters to be measured, and the frequency of measurement.

Table 7-1. Pumpable Waste Sampling and Analytical Methods

Sampling Method	Sampling Frequency	Analytical Parameter	Analytical Method [1]
Tap sampling	Grab samples of each stream every 30 minutes during each test run used to build respective composite samples for analysis	Higher Heating Value (HHV)	ASTM Method D240
		Mercury	SW-846 Method 7470A or 7471B
		Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Lead, Manganese, Nickel, and Selenium	SW-846 Method 6010C or 6020
		Chlorine	SW-846 Methods 5050 and 9056A
		Ash content	ASTM Method D482
		Sulfur	ASTM D129

Notes:
[1] ASTM refers to *ASTM International*. SW-846 refers to *Test Methods for Evaluating Solid Waste*.

7.2 NON-PUMPABLE WASTE SAMPLING AND ANALYSIS

Bulk quantities of non-pumpable waste streams will be identified, isolated, and characterization samples obtained prior to the CPT. Non-pumpable material waste may be fed to the kiln in bulk or non-bulk containers. The containers for the CPT will be prepared from the characterized bulk material. CHESI proposes using soil as a high ash content, low heating value solid feed material surrogate. Composite samples of soil will be obtained for the characterization analyses. The composite samples will be based on a minimum of six (6) grab samples from the soil pile used to prepare the drums or boxes, and used in the bulk feed system.

The concentration in the composite sample will be used to represent the composition of the bulk materials or the non-bulk containers prepared from the same bulk materials. Higher heating value will be determined for general characterization of the non-pumpable waste. The non-pumpable waste samples will be analyzed to characterize the waste stream and collect information required to develop OPLs: ash, chlorine, and metals. Non-pumpable waste streams will not be sampled and analyzed for POHC and will be assumed to have a zero (0) contribution for DRE calculations.

Table 7-2 summarizes the pumpable waste samples to be taken, the parameters to be measured, and the frequency of measurement.

Table 7-2. Non-Pumpable Waste Sampling and Analytical Methods

Sampling Method	Sampling Frequency/ Duration	Analytical Parameter	Analytical Method [1]
Scoop or coliwasa sampling	Composite from a minimum of six (6) grab samples of the bulk material prior to drum/box packaging; or 10 percent of drums or boxes for each waste stream prior to CPT	Higher Heating Value (HHV)	ASTM Method D240
		Mercury	SW-846 Method 7470A or 7471B
		Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Lead, Manganese, Nickel, and Selenium	SW-846 Method 6010C or 6020
		Chlorine	SW-846 Methods 5050 and 9056A
		Ash content	ASTM Method D482
		Sulfur	ASTM D129

Notes:
[1] ASTM refers to *ASTM International*. SW-846 refers to *Test Methods for Evaluating Solid Waste*.

7.3 SPIKING MATERIAL SAMPLING AND ANALYSIS

Commercially prepared or technical grade spiking materials [POHC, mercury solution, lead solution, chromium solution, and chlorine solution] and used directly will not be sampled or analyzed if a Certificate of Analysis is provided. Laboratory analysis or assay provided by the suppliers will be used to determine the spiking materials' compositions and element feed rates.

For spiking materials prepared, e.g., prepared in totes via water dilution and agitation, by CHESI or its subcontractor(s) using materials purchased for testing, will be sampled and confirmation analyses performed. The more conservative of the prepared concentration or laboratory analyses will be used to determine the spiking liquids' compositions and element feed rates.

7.4 STACK GAS SAMPLING AND ANALYSIS

The stack gas will be sampled for dioxin/furan, PM, HCl/Cl_2, mercury, SVM, LVM, and POHC emissions for the HWC NESHAP compliance demonstrations. CEMS will be used to monitor total hydrocarbon, carbon monoxide, and oxygen concentrations in the stack gas. Stack gas will also be sampled for the Air Quality Construction Permit requirements using CEMS to monitor SO_2 and NOx. The following sampling methods will be used:

- USEPA Methods 1, 2, 3A, and 4 for determination of stack sampling traverse points, gas flow rate, composition, and moisture content;

- An USEPA Method 29 sampling train for measurement of mercury, SVM, and LVM emissions during the CPT ;
- An USEPA Method 5/26A for measurement of PM and HCl/Cl_2 emissions;
- An SW-846 Method 0010/0023A sampling train for measurement of dioxin/furan and 1,2-DCB or 1,2,4-TCB emissions;
- Installed CEMS, operated in accordance with Performance Specification (PS) 8A, to monitor the concentration of THC in the stack gas;
- Installed CEMS, operated in accordance with PS-4B, to monitor the concentrations of CO and O_2 in the stack gas; and
- Installed CEMS, operated in accordance with PS-2, to monitor the concentrations of SO_2 and NO_X in the stack gas.

Table 7-3 summarizes the stack gas samples to be taken, the parameters to be measured, and the frequency of measurement.

Table 7-3. Stack Gas Sampling and Analytical Methods

Sampling Method	Sampling Frequency/ Duration	Analytical Parameter	Analytical Method [1]
USEPA Methods 1, 2, 3A, and 4	Not applicable	Traverse points, stack flow, composition, and moisture	Not applicable; part of each isokinetic sampling method.
USEPA Method 5/26A	2 hours (minimum)	Particulate matter, hydrogen chloride, and chlorine	USEPA Method 5 for PM Method 26A and SW-846 9056A for chloride
USEPA Method 29	2 hours (minimum)	Antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, and selenium	SW-846 Methods 6010C or 6020 for non-mercury metals and 7470A for mercury
SW-846 Method 0023A	3 hours (minimum)	Dioxin/furan; 1,2-DCB or 1,2,4-TCB	SW-846 Methods 0023A/8290 (for DFs) and 8270 (for 1,2-DCB or 1,2,4-TCB)
Installed CEMS	Continuous	Total Hydrocarbon	40 CFR 60, Appendix B, Performance Specification (PS)8A
Installed CEMS	Continuous	Carbon monoxide and oxygen	40 CFR 60, Appendix B, PS-4B
Installed CEMS	Continuous	Sulfur dioxide	40 CFR 60, Appendix B, PS-2
Installed CEMS	Continuous	Nitrogen oxides	40 CFR 60, Appendix B, PS-2

Notes:
[1] SW-846 refers to *Test Methods for Evaluating Solid Waste*.
USEPA Method refers to N*ew Source Performance Standards, Test Methods and Procedures*, Appendix A, 40 CFR Part 60.

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN
FOR THE COMPREHENSIVE PERFORMANCE TEST
CLEAN HARBORS ENVIRONMENTAL SERVICES, INC.
TRAIN 2 INCINERATION SYSTEM
AIR QUALITY CONSTRUCTION PERMIT CP23-003
EPA ID NED 981 723 513

PREPARED FOR:

CLEAN HARBORS ENVIRONMENTAL SERVICES, INC.
2247 SOUTH HIGHWAY 71
KIMBALL, NE 69145

NOVEMBER 2023, REVISION 0
FOCUS PROJECT NO. P-001551

PREPARED BY:

FOCUS ENVIRONMENTAL INC.
4700 PAPERMILL DRIVE
KNOXVILLE, TENNESSEE 37909
(865) 694-7517
http://www.focusenv.com

SIGNATURE PAGE

Facility: Clean Harbors Environmental Services, Inc.

Test Title: Comprehensive Performance Test 2024

Expected Test Date: Fourth Calendar Quarter 2024 or First Calendar Quarter 2025

This quality assurance project plan (QAPP) has been developed for the comprehensive performance test (CPT) to be conducted for the Train 2 Incineration System located at the Clean Harbors Environmental Services, Inc. (CHESI), Kimball, Nebraska, facility. This QAPP has been distributed to and read by the signatories. By signing, the signatories agree to the appropriate information pertaining to their project responsibilities provided in the QAPP.

______________________________ ______________________
Clean Harbors Performance Test Manager Date
Alyssa King
Clean Harbors Environmental Services, Inc.

Notes: The individual(s) listed above: 1) have received, read, and agreed to the appropriate information pertaining to their project responsibilities listed and provided in this QAPP, and 2) agree that no testing methods have been modified except as may be indicated in the QAPP.

SIGNATURE PAGE

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______________________________	____________________
Performance Test Coordinator	Date

Notes: The individual(s) listed above: 1) have received, read, and agreed to the appropriate information pertaining to their project responsibilities listed and provided in this QAPP, and 2) agree that no testing methods have been modified except as may be indicated in the QAPP.

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______________________________	____________________
Laboratory Project Manager	Date

Notes: The individual(s) listed above: 1) have received, read, and agreed to the appropriate information pertaining to their project responsibilities listed and provided in this QAPP, and 2) agree that no testing methods have been modified except as may be indicated in the QAPP.

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___________________________________ _____________________

Clean Harbors On-Site Laboratory Manager Date

Notes: The individual(s) listed above: 1) have received, read, and agreed to the appropriate information pertaining to their project responsibilities listed and provided in this QAPP, and 2) agree that no testing methods have been modified except as may be indicated in the QAPP.

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______________________________	____________________
Stack Testing Field Team Leader	Date
______________________________	____________________
QA/QC Manager	Date

Notes: The individual(s) listed above: 1) have received, read, and agreed to the appropriate information pertaining to their project responsibilities listed and provided in this QAPP, and 2) agree that no testing methods have been modified except as may be indicated in the QAPP.

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List of Acronyms

ASTM	American Society for Testing and Materials
AWFCO	automatic waste feed cutoff
BTU	British thermal units
CEM	continuous emissions monitor
CEMS	continuous emissions monitoring system
CFR	Code of Federal Regulations
Cl_2	Chlorine
CMS	continuous monitoring systems
CO	carbon monoxide
CO_2	carbon dioxide
COC	chain of custody
CPT	comprehensive performance test
CCV	continuing calibration verification
DRE	destruction and removal efficiency
EPA	Environmental Protection Agency
%D	percent difference
DCB	dichlorobenzene
DF	dioxin/furan
DRE	destruction and removal efficiency
dscf	dry standard cubic feet
dscm	dry standard cubic meters
DUP	Duplicate
GC	gas chromatograph
GCMS	gas chromatograph mass spectrometry
H_2O_2	hydrogen peroxide
H_2SO_4	sulfuric acid
HC	hydrocarbons (as propane)
HCl	hydrogen chloride (gas), hydrochloric acid (aqueous)
HPLC	high performance liquid chromatography
HNO_3	nitric acid
HRGC	high resolution gas chromatograph mass spectrometry
HRMS	high resolution mass spectrometry
HWC	Hazardous Waste Combustor
IC	ion chromatography
ICAP	inductively coupled argon plasma
ICP	inductively coupled plasma
ICS	interference check sample
ICV	instrument calibration verification
$KMnO_4$	potassium permanganate
lb or lbs	Pounds
LCS	laboratory control standard

List of Acronyms

LCSD	laboratory control standard duplicate
LVM	low volatile metals
MACT	Maximum Achievable Control Technology
MS	matrix spike
MSD	matrix spike duplicate
NaOH	sodium hydroxide
NDEE	Nebraska Department of Environment and Energy
NESHAP	National Emission Standards for Hazardous Air Pollutants
NIOSH	National Institute of Occupational Safety and Health
NIST	National Institute of Standards and Technology
ND	non-detect
NOx	nitrogen oxides
O_2	Oxygen
ODCB	ortho-dichlorobenzene
OPL	operating parameter limit
PET	performance evaluation test
PETP	performance evaluation test plan
PM	particulate matter
POHC	principal organic hazardous constituent
RF	response factor
RPD	relative percent difference
RRF	relative response factors
RSD	relative standard deviation
S/N	signal to noise ratio
SPCC	system performance check compounds
SRE	system removal efficiency
QAPP	quality assurance project plan
QA	quality assurance
QC	quality control
SCC	secondary combustion chamber
SO_2	sulfur dioxide
SOP	standard operating procedure
SSASP	Stationary Source Audit Sample Program
SW-846	Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods
SVM	semivolatile metals
TCB	trichlorobenzene
TCDD	tetrachlorodibenzo-p-dioxin
THC	total hydrocarbons (as propane)
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

This quality assurance project plan (QAPP) is for the comprehensive performance test (CPT) of the new Train 2 Incineration System (Train 2) located at the Clean Harbors Environmental Services, Inc. (CHESI), Kimball, Nebraska, facility. Train 2 is subject to the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Hazardous Waste Combustors (HWCs) codified at Title 40 Code of Federal Regulations (CFR) Part 63, Subpart EEE. This test program will be the initial CPT for Train 2. The new system is expected to become operable by third or fourth calendar quarter 2024. The Air Quality Construction Permit CP23-003 requires the performance test to be conducted within sixty (60) days after first reaching the maximum capacity, but not more than 180 days after the start-up of operations, for which CHESI defines start-up to be the date at which the facility first begins routine operation after commissioning of all feed systems on hazardous waste has been completed,. This QAPP is intended to be used in conjunction with the CPT plan.

1.1 FACILITY OVERVIEW

CHESI operates a hazardous waste treatment, storage, and disposal facility (TSDF) located in an industrial area south of Kimball, Nebraska. The commercial function of the facility is to thermally treat (incinerate) hazardous and non-regulated materials, rendering the residue ash acceptable for disposal at regulated Subtitle C landfills. The facility currently operates a fluidized bed incineration system (Train 1) at this location. The new Train 2 Incineration System is a rotary kiln equipped with a secondary combustion chamber (SCC) and associated air pollution control (APC) system. The facility identification and contact person are:

Alyssa King
Environmental Compliance Manager
Clean Harbors Environmental Services, Inc.
2247 South Highway 71
Kimball, NE 69145
(308) 235-8212
king.alyssa@cleanharbors.com.

1.2 COMPREHENSIVE PERFORMANCE TEST OVERVIEW

The CPT is designed to demonstrate compliance with the final (replacement) emission standards of the HWC NESHAP for new incinerator systems (40 CFR § 63.1219) and to establish the operating parameter limits (OPLs) required by 40 CFR § 63.1209(j)-(p). In addition to the HWC NESHAP compliance demonstrations, CHESI will perform stack gas emissions testing to demonstrate compliance with the requirements of the Air Quality Construction Permit for the additional parameters of sulfur dioxide (SO_2) and nitrogen oxides (NOx). Table 1-1 summarizes the applicable emission standards.

The test program is designed as a single test condition to demonstrate compliance with the HWC NESHAP and Air Quality Construction Permit performance and emission standards, and establish the system OPLs. This condition represents the extreme range of normal conditions, which is consistent with the requirements of 40 CFR § 63.1207(g). Table 1-1 provides a summary of the planned sampling and analyses and associated regulatory citation(s).

This Quality Assurance Project Plan (QAPP) is the essential guidance document by which the CPT objectives will be demonstrated. This plan delineates the project-specific quality assurance/quality control (QA/QC) procedures that will be applied to this CPT program, while establishing detailed sampling and analytical quality indicators to demonstrate achievement of the CPT objectives. The QAPP defines the precision and accuracy criteria for the chemical and physical property measurements. The QAPP will be used in the field by the on-site sampling team to ensure the collection of all the required field data and samples that evaluate the project-specific objectives for demonstrating compliance with emission standards and establishing applicable OPLs.

The selected stack testing company and laboratory(ies) will be experienced in conducting the sampling and analyses per the methods described in this QAPP. The QAPP will be provided to the contractors for their review and understanding of their project responsibilities. The laboratories are requested to achieve the lowest detection limits possible for each of the methods included in this QAPP. All detection limits shall be presented in the laboratory reports for each analysis and analyte. No data results shall be reported as “ND” without a numerical value provided as the detection limit.

1.3 QUALITY ASSURANCE PROJECT PLAN ORGANIZATION

The organization of this QAPP follows the United States Environmental Protection Agency (USEPA) document entitled Preparation Aids for the Development of Category I Quality Assurance Project Plan. The QAPP will serve as an essential guidance by which the CPT will be performed. The QAPP defines the QA/QC procedures and establishes sampling and analytical quality indicators that will demonstrate achievement of the test objectives. Additionally, this QAPP defines precision and accuracy criteria for all the required measurements used to demonstrate the test data are of sufficient quality to demonstrate compliance. The remaining sections of the QAPP provide the following information:

- Section 2 presents information on the CPT project team;
- Section 3 describes the CPT sampling procedures;
- Section 4 presents sample handling and documentation information;
- Section 5 discusses analytical procedures;
- Section 6 presents the CPT data quality objectives;
- Section 7 discusses calibration procedures and preventative maintenance;

- Section 8 discusses data reduction, validation, and reporting procedures;
- Section 9 discusses QA reports; and
- Section 10 includes a list of reference documents for the QAPP.

Table 1-1. Comprehensive Performance Test Summary

Parameter	Sampling and Analysis Method	Emission Standard	Test Location	Regulatory Basis
Higher heating value	Grab/Composite sampling, ASTM Method D240	None	Waste	63.1207(f)(1)(i)(A)
Ash Content	Grab/Composite sampling, ASTM Method D482	Related to PM 0.0016 gr/dscf	Waste	63.1219(b)(7)
Mercury	Grab/Composite sampling, SW-846 Method 7470A or 7471B	Related to Hg 8.1 ug/dscm	Waste	63.1219(b)(2)
Cadmium and lead [and selenium for possible alternative PM compliance]	Grab/Composite sampling, SW-846 Method 6010B or C, or 6020	Related to SVM 10 ug/dscm	Waste	63.1219(b)(3)
Arsenic, beryllium, and chromium [and antimony, cobalt, manganese, and nickel for possible alternative PM compliance]	Grab/Composite sampling, SW-846 Method 6010B or C, or 6020	Related to LVM 23 ug/dscm	Waste	63.1219(b)(4)
Hydrogen Chloride/Chlorine (HCl/Cl_2)	Grab/Composite sampling, SW-846 Methods 5050 and 9056A	Related to Cl 21 ppmv (dry)	Waste	63.1219(b)(6)
1,2-dichlorobenzene or 1,2,4-trichlorobenzene, and dioxins/furans	SW-846 Method 0023A and 8270D (for 1,2-DCB or 1,2,4-TCB) and 8290A (for DFs)	DRE POHC 99.99%	Stack	63.1219(c)(1)
		0.11 ng TEQ/dscm	Stack	63.1219(b)(1)(ii)
Mercury	USEPA Method 29 and SW-846 Method 7470A	8.1 ug/dscm	Stack	63.1219(b)(2)
Cadmium and lead [and selenium for possible alternative PM compliance]	USEPA Method 29 and SW-846 Method 6010B or C, or 6020	10 ug/dscm	Stack	63.1219(b)(3)
Arsenic, beryllium, and chromium [and antimony, cobalt, manganese, and nickel for possible alternative PM compliance]	USEPA Method 29 and SW-846 Method 6010B or C, or 6020	23 ug/dscm	Stack	63.1219(b)(4)
Particulate matter	USEPA Method 5	0.0016 gr/dscf	Stack	63.1219(b)(7)

Table 1-1. Comprehensive Performance Test Summary

Parameter	Sampling and Analysis Method	Emission Standard	Test Location	Regulatory Basis
Hydrogen chloride and chlorine	USEPA Method 26A and SW-846 9056A	21 ppmv (dry)	Stack	63.1219(b)(6)
Carbon monoxide	40 CFR 60, Appendix B, Performance Specification 4B	100 ppmv dry	Stack	63.1219(b)(5)(i)
Hydrocarbons	40 CFR 60, Appendix B, Performance Specification 8A	10 ppmv dry	Stack	63.1219(b)(5)(ii)
Oxygen	40 CFR 60, Appendix B, Performance Specification 4B	None; CO and HC correction	Stack	63.1219(b)(5)(i), (ii)
Nitrogen oxides (NOx)	40 CFR 60, Appendix B, Performance Specification 2	32 tpy	Stack	Air Quality Construction Permit
Sulfur Dioxide (SO_2)	40 CFR 60, Appendix B, Performance Specification 2	8.9 lbs/hr	Stack	Air Quality Construction Permit

Note: Concentration based emission standards are corrected to seven percent oxygen (@ 7% O_2).

2.0 ORGANIZATION OF PERSONNEL, RESPONSIBILITIES, AND QUALIFICATIONS

The project team duties are summarized below. A project organization flow chart is provided in Figure 2-1. This QAPP will be distributed to all key personnel on the CPT project team.

2.1 PERFORMANCE TEST MANAGER

CHESI, through the Performance Test Manager, will:

- Report all feed rates and incineration system process parameters;
- Procure and/or prepare waste feeds;
- Operate the incineration system; and
- Collect waste feed samples.

2.2 PERFORMANCE TEST COORDINATOR

The Performance Test Coordinator is responsible for the execution of the CPT plan, QAPP, preparation of the final test report, and interpretation of the test results. During the test, the Performance Test Coordinator is responsible for the overall implementation of the test program. The Performance Test Coordinator will serve as the focal point between the CHESI Performance Test Manager, CHESI Production Manager, and the stack sampling and spiking contractors on testing related matters, and will coordinate activities among the various project team members. Specific Performance Test Coordinator responsibilities include:

- Ensuring compliance with the CPT plan and QAPP by all project team members
- Documenting testing activities in a field logbook
- Assisting the CHESI Performance Test Manager in interfacing with the regulatory observers and/or oversight of the contractors
- Providing coordination between the CHESI Performance Test Manager and the sampling and spiking teams, especially regarding decisions to start, stop, hold, or repeat sampling runs
- Monitoring the process equipment, process controls, process operations, data acquisition and recording systems, and sampling activities for compliance with the CPT plan and QAPP
- Providing field review of process operating logs, and completed sample collection sheets, stack sampling logs, and Chain of Custody and Request for Analysis (COC/RFA) forms
- Interfacing with the Laboratory Project Manager while emissions samples are being analyzed
- Interfacing with the CHESI On-Site Laboratory Manager while waste feed samples are being analyzed
- Interfacing with the other testing contractors while the stack sampling, spiking, and process operating are being reduced

- Reviewing and assessing the overall test results as to whether any test data are invalid or unusable
- Certifying the overall test results and the final test reports
- Preparing operating specifications for the system based on the results of the test.

2.3 QA/QC MANAGER

The stack sampling contractor QA/QC Manager responsibilities include the following:

- Reviewing the stack sampling and analytical reports for completeness and accuracy
- Conducting or coordinating any required audits of the sampling and analysis data reduction to ensure compliance with the CPT plan and QAPP
- Certifying the overall emissions sampling report.

2.4 PROCESS SAMPLING COORDINATOR

CHESI will appoint a Process Sampling Coordinator who will have responsibility for the collection and handling of the waste feed samples. This person has the following responsibilities:

- Controlling issuance of the waste feed sample containers, equipment, and documentation to the waste feed sampling team
- Coordinating the waste feed sample collection by the waste feed sampling team members
- Reviewing the waste feed sampling documentation prepared by the waste feed sampling team for completeness and accuracy
- Notifying the Performance Test Coordinator of all samples collected
- Securing the waste feed samples, ensuring that the samples' integrity and preservation during transfer to the on-site laboratory

2.5 SPIKING OPERATIONS

The CHESI personnel will have responsibility for the spiking the metals and POHC to the waste feed during the CPT. The spiking responsibilities include:

- Preparing the spiking equipment and materials
- Calibrating the spiking equipment
- Spiking the metals and POHC to the waste feed in accordance with the CPT plan
- Recording spiking system operating data
- Notifying the Performance Test Coordinator immediately of any difficulties or interruption of the spiking system operations during the test
- Reducing spiking data and performing feed rate calculations
- Preparing a draft and final report of the spiking activities.

Optionally, the metals and POHC spiking may be performed by a qualified contractor.

2.6 STACK SAMPLING TEAM LEADER

The Stack Sampling Team Leader will have overall responsibility for the collection and handling of the emissions related samples. The Stack Sampling Team Leader has the following responsibilities:

- Preparing and shipping stack sampling equipment and sampling media to the test site
- Preparing and calibrating stack sampling equipment
- Directing and/or participating in stack sampling activities
- Recording field test data required by the stack sampling methods
- Reviewing and approving stack sample collection sheets and stack sampling field data sheets
- Overseeing recovery of stack the sampling-related samples and preservation of those samples
- Notifying the Performance Test Coordinator of all samples collected
- Packaging the samples for integrity and preservation per the QAPP requirements during transport to the contract laboratory
- Shipping/transport of the stack gas samples to the contract laboratory
- Reducing the stack sampling data and performing all calculations and QA activities required by the stack sampling methods
- Preparing a draft and final report of stack sampling activities.

2.7 CHESI PROCESS OPERATIONS

The CHESI Process Operations will be responsible for the operation of the incineration system. Their duties will include:

- Maintaining the incineration system within specified CPT plan targets
- Maintaining logs of process data as required
- Assisting in the collection of waste feed samples
- Transferring to the Process Sampling Coordinator all waste feed samples collected

  Downloading and providing the one-minute average (OMA) and hourly rolling average (HRA) operating data to the Performance Test Coordinator in Microsoft Excel format.

2.8 LABORATORY PROJECT MANAGER

The contracted laboratory performing the emissions sample analyses will appoint a Laboratory Project Manager. This person will have overall responsibility for the analysis of the stack gas related samples. The Laboratory Project Manager has the following responsibilities:

- Receiving, verifying, and documenting the received field samples correspond to the sample chain of custody information
- Notifying the Performance Test Coordinator of any discrepancies or problems in the COC/RFA information, preservation, or sample condition
- Maintaining records of the incoming samples
- Tracking samples through receipt, processing, and analysis
- Designating QC samples for analysis during the project
- Verifying that the analytical procedures and associated QC are being followed as specified in the QAPP, the laboratory specific QA/QC plan, and the laboratory specific analytical standard operating procedures (SOPs)
- Reviewing sample analysis and associated QC data during analysis and determining if repeat analyses are needed
- Notifying the Performance Test Coordinator of any QC excursions during the preparation and analysis of the field samples or associated QC samples
- Preparing certified sample analysis results and associated QC in data packages
- Archiving analytical data
- Preparing a statement of the analysis activities for inclusion in the CPT report executive summary regarding if any of the test data are deemed invalid or unusable.

2.9 CHESI ON-SITE LABORATORY MANAGER

The CHESI on-site Laboratory Manager is well experienced in conducting waste analyses per the methods described in the QAPP. The CHESI Laboratory Manager will review the QAPP to understand the project responsibilities. The CHESI Laboratory Manager will be responsible for ensuring the waste feed samples are analyzed per the analytical methods specified in the QAPP. The CHESI Laboratory Manager will review the analytical data and associated QC to determine if additional samples or repeat analyses are needed. If there is any invalid or unusable data, these data will be identified in the laboratory reports.

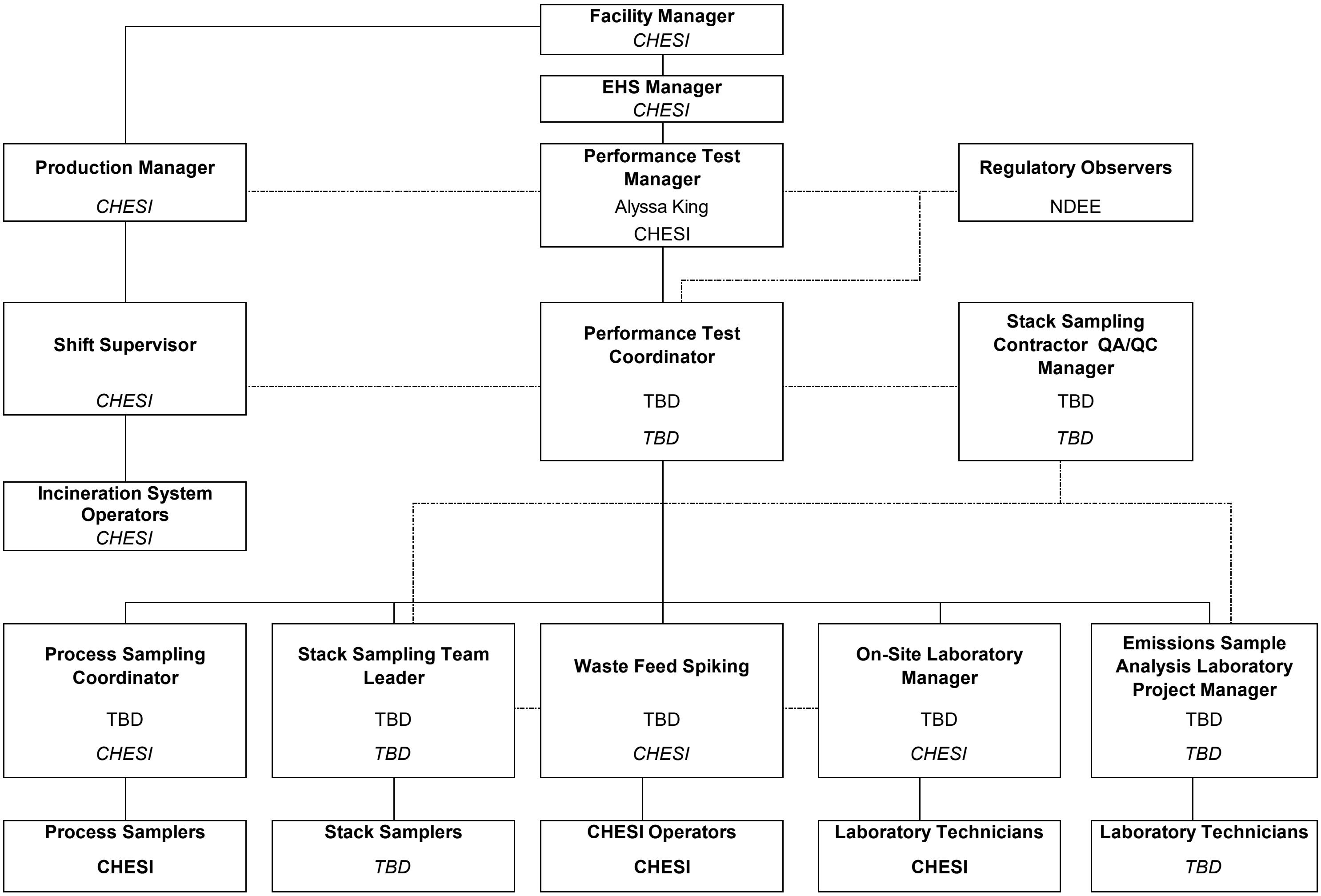


Figure 2-1. Project Organization

3.0 SAMPLING PROCEDURES

This section provides descriptions of the process and emissions sampling procedures to be performed during the CPT.

3.1 PUMPABLE WASTE SAMPLING AND ANALYSIS

Samples will be collected for each of the pumpable waste streams (e.g., energetic tank, lean water tank, direct burn trailers) being processed during the performance test.

CHESI personnel will collect samples from taps located in the feed lines or at the feed tanks. The liquid waste sampling locations will be identified before the CPT. The tap will be flushed initially (allowed to flow briefly) before the samples are collected.

Liquid waste as fed from bulk tanks will be sampled at 30-minute intervals throughout each test run with approximately 250 milliliters (mL) of each pumpable waste stream collected. (Note: For a same waste stream fed to multiple system locations, e.g., material fed from a single tank to the kiln and SCC burners, will be sampled at a single location.) The 30-minute grab samples collected for each respective waste stream will be transferred into respective one-gallon jars/jugs to create a composite sample for each stream during each test run. At the conclusion of each run, each sample will be mixed, and 250 or 500-mL aliquots for analysis will be poured into pre-labeled amber glass jars/bottles. The samples will be isolated from sources of contamination during the sampling and compositing actions, and after collection of aliquots for analysis. Liquid waste from direct burn trailers will be grab sampled only once when received.

The pumpable waste samples will be analyzed to characterize the waste stream and collect information required to develop OPLs. Higher heating value (Btu/lb) will be determined for general characterization of the waste streams. Ash, chlorine, and metals (LVM, SVM, and mercury) concentrations will be determined to develop the feed rate OPLs.

The POHC, 1,2-dichlorobenzene or 1,2,4-trichlorobenzene, will be metered to the SCC. The manufacturer's assay will be used for the purchased POHC to calculate the material feed rate. The waste streams will not be sampled and analyzed for the selected POHC and will be assumed to have a zero (0) concentration for DRE calculations. Table 3-1 summarizes the pumpable waste sampling procedures, the parameters to be measured, and the frequency of measurement.

Table 3-1. Pumpable Waste Sampling and Analytical Methods

Sampling Method	Sampling Frequency	Analytical Parameters	Analytical Method [1]
Tap sampling	Liquid waste from bulk tanks: Grab samples of each stream every 30 minutes during each test run used to build respective composite samples for analysis. Liquid waste from direct feed trailers: Grab sampled one time upon tanker receipt.	Higher heating value	ASTM Method D240
		Mercury	SW-846 Method 7470A or 7471B
		Antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, nickel, and selenium	SW-846 Method 6010B or C, or 6020
		Chlorine content	SW-846 Methods 5050 and 9056A
		Ash content	ASTM Method D482

Notes:
[1] ASTM refers to ASTM International. SW-846 refers to Test Methods for Evaluating Solid Waste, Third Edition.

3.2 NON-PUMPABLE WASTE SAMPLING AND ANALYSIS

Samples of the non-pumpable waste streams (solid waste material) will be obtained prior to the CPT. Non-pumpable material fed to the kiln may be in bulk or non-bulk containers. CHESI plans to use reburn ash or soil to provide a low heat content, high ash content, high density, worst-case solid feed material.

A composite sample from the bulk container used to prepare the drums or boxes will be analyzed. The composite sample will be based on a minimum of six (6) grab samples from various locations in the bulk container or batch of waste. The concentration in the composite sample will be used to represent the material prepared from that batch of bulk material. .

Bulk containers fed via the bulk feed system will be similarly sampled. A composite sample from each bulk bin based on a minimum of six (6) grab samples from various locations in the container will be used to characterize each bulk bin. The respective composite samples and analyses will be tracked by bin number. The sample analyses are programmed into distributive control system (DCS) as each bin is added to the bulk hopper and fed.

Table 3-2 summarizes the non-pumpable waste sampling procedures, the parameters to be measured, and the frequency of measurement.

Table 3-2. Non-Pumpable Waste Sampling and Analytical Methods

Sampling Method	Sampling Frequency	Analytical Parameters	Analytical Method [1]
Scoop or Coliwasa Sampling	Bulk solids or soil used to prepare containerized waste feeds: Composite from a minimum of six (6) grab samples of the bulk material from the bulk bin or soil pile prior to drum/box preparation. Bulk solids or soil fed via the bulk feed system: Composite from a minimum of six (6) grab samples of the bulk material from each bulk bin prior to CPT. Sample analyses are tracked by bin number and the analyses programmed into DCS as each bin is added to the bulk tank and fed.	Higher heating value (HHV)	ASTM Method D240
		Mercury	SW-846 Method 7470A or 7471B
		Antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, nickel, and selenium	SW-846 Method 6010B or C
		Chlorine content	SW-846 Methods 5050 and 9056A
		Ash content	ASTM Method D482

Notes:
[1] ASTM refers to ASTM International. SW-846 refers to Test Methods for Evaluating Solid Waste, Third Edition.

3.3 SPIKING MATERIAL SAMPLING PROCEDURES

The spiking materials (POHC, mercury solution, lead solution, chromium solution, and chlorine, solution) will not be sampled and analyzed during the test if a Certificate of Analysis is provided. These materials will be commercially purchased or prepared materials purchased for testing. Laboratory analysis by the suppliers (assay or certificate of analysis) will be used to determine the spiking material compositions. If the purchased materials are diluted prior to the test (e.g., metals diluted or dissolved in water for injection), the diluted material/solution will be sampled and analyzed to confirm the spiking concentration(s). Each batch (typically a tote) of solution will be sampled in advance of the test to confirm the concentration for spiking rate planning. If the selected POHC is obtained from anything other than purchased technical grade material, e.g., in a customer waste stream, the liquid waste will be grab sampled in accordance with the pumpable waste sampling procedure described earlier and analyzed for the semivolatile POHC content via SW-846 Method 8270D.

3.4 STACK GAS SAMPLING PROCEDURES

The stack gas sampling will follow the methods documented in 40 CFR Part 60, Appendix A (USEPA Methods) and Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition and updates (SW-846). Brief descriptions of these methods are provided in this section. Any modifications to the prescribed USEPA or SW-846 test methods are outlined in the sampling procedure descriptions below.

Pre-test and post-test leak checks will be performed for each sampling train, as required by the respective test methods. All sampling trains will be assembled and recovered in a mobile on-site laboratory to ensure a clean environment. Table 3-3 summarizes the emissions sampling procedures to be used during the CPT.

As shown in the table, multiple sampling trains will be operated during each test run. This will require careful coordination of the emissions sampling team's efforts. Adequate sampling ports are available to support this simultaneous sampling. The gas flow rate, composition, and moisture content data will be collected concurrent with the isokinetic sampling.

3.4.1 SAMPLING POINT DETERMINATION – USEPA METHOD 1

The number and location of the stack gas iso-kinetic sampling traverse points will be determined according to the procedures outlined in USEPA Method 1. Verification of absence of cyclonic flow will be conducted prior to testing by following the procedure described in USEPA Method 1. The cyclonic flow check will be performed once prior to the start of the CPT runs.

3.4.2 STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE – USEPA METHOD 2

The stack gas velocity and volumetric flow rate will be determined according to the procedures outlined in USEPA Method 2. Velocity measurements will be made using Type S pitot tubes conforming to the geometric specifications outlined in USEPA Method 2. Differential pressures will be measured with fluid manometers. Stack gas temperatures will be measured with thermocouples equipped with digital readouts.

Table 3-3. Stack Emissions Sampling Summary

Parameter	Sampling Method	Sample Fraction(s)
Gas flow rate, composition, and moisture content	USEPA Methods 1 (sampling points), 2 (gas velocity), 3A (oxygen and carbon dioxide content for molecular weight determination and oxygen correction), and 4 (moisture)	Not applicable; part of each isokinetic sampling method.
Particulate matter, hydrogen chloride, chlorine	USEPA Method 5/26A	Tare weighed filter
		Front half (filter holder, probe, and nozzle) acetone rinses
		Moisture knockout (if used) and sulfuric acid impingers contents and back-half rinses
		Sodium hydroxide impingers contents and rinses
Antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, nickel, and selenium	USEPA Method 29	Filter
		Front half (filter holder, probe, and nozzle) nitric acid rinses
		Moisture knockout (if used) and HNO_3/H_2O_2 impingers contents and rinses
		Initially empty impingers contents and rinses (mercury only)
		$KMnO_4$/H_2SO_4 impingers contents and rinses (mercury only)
		$KMnO_4$/H_2SO_4 impingers HCl rinses (mercury only)
Semivolatile POHC and dioxins/furans	SW-846 Method 0023A	Filter (POHC and DFs)
		Front half acetone and methylene chloride rinses (POHC and DFs)
		Front half toluene rinses (DFs only)
		Back half acetone and methylene chloride rinses (POHC and DFs)
		Back half toluene rinses (DFs only)
		XAD-2 resin (POHC and DFs)
		Impinger contents and rinses (POHC only)
		Impinger acetone and methylene chloride rinses (POHC only)
Carbon monoxide	40 CFR 60, Appendix B, Performance Specification 4B	Installed CEMS
Oxygen	40 CFR 60, Appendix B, Performance Specification 4B	Installed CEMS
Hydrocarbons	40 CFR 60, Appendix B, Performance Specification 8A	Installed CEMS
Sulfur dioxide	40 CFR 60, Appendix B, Performance Specification 2	Installed CEMS
Nitrogen oxides	40 CFR 60, Appendix B, Performance Specification 2	Installed CEMS

3.4.3 STACK GAS COMPOSITION AND MOLECULAR WEIGHT – USEPA METHOD 3A

The composition of the bulk gas and the gas molecular weight at the stack (concentration of carbon dioxide and oxygen) will be determined by USEPA Method 3A. The stack sampling contractor will supply oxygen and carbon dioxide analyzers and all other associated equipment. The analyzers will be calibrated according to the procedures outlined in the method.

A continuous sample of stack gas will be withdrawn via a sample probe. The gas will be filtered and passed through a conditioning system for removal of particulate matter and moisture prior to being sent to the analyzer.

The calculated molecular weight will be used for all isokinetic calculations. The measured oxygen concentration will also be used to correct emission concentrations to seven percent oxygen.

3.4.4 STACK GAS MOISTURE CONTENT – USEPA METHOD 4

The stack gas moisture content will be determined in conjunction with each isokinetic train according to the sampling and analytical procedures outlined in USEPA Method 4. The impingers will be connected in series and will contain reagents as described for each sampling method. The impingers will be housed in an ice bath to ensure condensation of the moisture from the gas stream. Any moisture that is not condensed in the impingers is captured in the silica gel. Stack gas moisture content is determined by pre- and post-test run weighing of the impingers to determine moisture weight gain.

3.4.5 PARTICULATE MATTER, HYDROGEN CHLORIDE, CHLORINE– USEPA METHOD 5/26A

A single sampling train will be used to sample emissions for particulate matter (PM), hydrogen chloride (HCl), and chlorine (Cl_2). The sampling and analytical procedures outlined in USEPA Method 5 will be used to determine PM concentrations in the stack gas. The sampling and analytical procedures outlined in USEPA Method 26A will be used to determine HCl/Cl_2 emissions.

The sampling train will consist of a glass/quartz fiber filter (heated) and up to six (6) impingers. If high moisture condition is expected, the first impinger may be a moisture knockout impinger which will contain 50 mL of 0.1 Normal (N) sulfuric acid. The next two impingers, referred to as the acid impingers, will each contain 100 mL of 0.1 N sulfuric acid. The acid impingers will be followed by two more impingers that are referred to as the alkaline impingers. These two impingers will each contain 100 mL of 0.1 N sodium hydroxide. The final impinger will contain at least 200 to 300 grams of silica gel. A detailed description of the types of impingers used in this sampling train can be found in USEPA Method 26A. A diagram of the sampling train is presented in Figure 3-1.

All sampling train components will be constructed of materials specified in the test methods and will be cleaned and prepared per method specifications prior to testing. The probe and filter temperatures will be maintained in excess of 248°F to prevent condensation on these components. The sampling runs will be performed within ± 10 percent of isokinetic conditions. The total sampling time and minimum sample volume will be determined in accordance with method and/or rule requirements. Total sample time will be approximately two (2) hours. The actual sampling time and the actual sample volume will be determined from the sample rate needed to maintain isokinetic sampling conditions.

Sample recovery procedures will follow those outlined in the test methods (Methods 5 and 26A) and delineated in Figure 3-2. Recovery of the sampling train will result in the sample fractions listed in Table 3-3. For sample transport, the filter portion of this fraction will be packaged in a Petri dish; the acetone, knockout, and acid impinger contents and rinses portions will be collected in a glass jars; and the alkaline impinger contents and rinses portions will be collected in a high-density polyethylene (HDPE) jars. Sample collection will include one set of filter, acetone, deionized water, sulfuric acid, and sodium hydroxide reagent blanks for the CPT program.

Filterable particulate matter will be collected on a pre-weighed (tared) filter, which meets USEPA Method 5 filter criteria. The filterable particulate emissions will be determined by weighing the solid residue collected from an acetone probe and front half filter housing rinse and by weighing the train particulate filter before and after sampling to determine total particulate capture by difference. Filter and acetone reagent blanks will also be analyzed.

Hydrogen chloride (HCl) emissions will be determined by ion chromatography (IC) analysis of the combined knockout and acid impingers sampling train fraction. Molecular chlorine (Cl_2) emissions will be determined by IC analysis of the alkaline impingers sampling train fraction. Deionized water, sulfuric acid, and sodium hydroxide reagent blanks will also be analyzed.

3.4.6 ARSENIC, BERYLLIUM, CADMIUM, CHROMIUM, LEAD, TITANIUM AND MERCURY – USEPA METHOD 29

The sampling procedures outlined in USEPA Method 29 will be used to determine the concentration of arsenic, beryllium, cadmium, chromium, lead, and mercury [and antimony, cobalt, manganese, nickel, and selenium for possible alternative PM compliance] in the stack gas. The sampling train will consist of up to seven (7) impingers. If high moisture conditions is expected, the first impinger may be an empty knockout impinger. The next two impingers will each contain 100 mL each of a five percent (5%) nitric acid (HNO_3) and ten percent (10%) hydrogen peroxide solution (H_2O_2) solution. These impingers are followed by an empty impinger. The next two impingers will each contain 100 mL of a four percent (4%) potassium permanganate ($KMnO_4$) and ten percent (10%) sulfuric acid (H_2SO_4) solution. The final impinger will contain between 200 and 300 grams of silica gel. A detailed description of the types of impingers used in this sampling train can be found in USEPA Method 29. A diagram of the sampling train is presented in Figure 3-3.

All sampling train components will be constructed of materials specified in the method and will be cleaned and prepared per method specifications prior to testing. Total sample time will be approximately two (2) hours. The actual sampling time and the actual sample volume will be determined from the sample rate needed to maintain isokinetic sampling conditions.

Sample recovery procedures will follow those outlined in the test method and delineated in Figure 3-4. The USEPA Method 29 sampling train will produce the sample fractions listed in Table 3-3. The filter will be packaged in a Petri dish for shipping. All other sample fractions will be collected in amber glass jars. The filter and front half HNO_3 rinse, and the contents and rinses from the HNO_3/H_2O_2 impingers will be analyzed for all target metals including mercury. The contents and rinses from the initially empty impinger, $KMnO_4/H_2SO_4$ impingers, and 8N HCl $KMnO_4$ impinger rinses will be analyzed for mercury only. Sample collection includes:

- A field blank train which is set for sampling, heated up, leak checked, allowed to stand for approximately the same amount of time as a sampling run, leak checked again, and recovered for analysis; and
- One set of filter, deionized water, HNO_3/H_2O_2 solution, $KMnO_4/H_2SO_4$ solution and 8N HCl reagent blanks.

The field blank train is prepared and analyzed to assess background levels or artifacts of the target metal analytes. Reagent blanks are also analyzed to assess possible blank contamination.

3.4.7 SEMIVOLATILE POHC AND DIOXINS AND FURANS – SW-846 METHOD 0023A

A single SW-846 Method 0023A sampling train will be used to determine the semivolatile POHC (1,2-dichlorobenzene or 1,2,4-trichlorobenzene) and dioxin/furan (DF) concentrations in the stack gas. The sampling train will consist of a glass fiber filter and coil condenser followed by a XAD-2 resin trap with 25-40 grams of resin and a series of impingers. A total of five impingers will be used in the sampling train. The first of these impingers will be empty and will be followed by two impingers each containing 100 mL of high-performance liquid chromatography (HPLC) water. The fourth impinger will be empty and the fifth impinger will contain at least 200 grams of silica gel. A recirculating pump will also be connected to the sampling train to continuously circulate cold water to the condenser and resin trap to maintain the resin trap temperature below 68°F. A diagram of the sampling train is presented in Figure 3-5.

In preparation for the sampling event, a number of isotopically labeled surrogate sampling standards the selected semivolatile POHC and dioxins/furans will be spiked onto the XAD-2 resin by the analysis laboratory to monitor sampling efficiencies as well as to provide insights to the sample preservation and storage conditions. The isotopically labeled surrogates listed in Table 3-4 will be used. Upon preparation of the spiked resin traps for the CPT, a separate resin trap with 25-40 grams of resin from the same batch of resin will be spiked the same day using the same solutions as used for preparing the field sampling modules. This separate resin trap will be refrigerated in the laboratory until the return of the field samples. At such a time, the control resin will become the laboratory method blank.

The major sampling train components are described below:

a) Nozzle - Borosilicate glass or Teflon-coated stainless steel with sharp tapered leading edge.

b) Probe - Type 316 stainless steel with borosilicate glass liner and attached pitot tube and stack temperature thermocouple.

c) Sample Box - Containing Pyrex glass filter holder, glass fiber filter, water jacketed sample chiller, sorbent trap containing XAD-2 resin, five Greenburg-Smith impingers and the connecting glassware.

d) Meter Box – Gas meter, vacuum pump, heat controllers and oil gauge manometers.

The sample adsorbent traps and filters will be cleaned and prepared by emission sample analysis laboratory using SW-846 Method 0023A and Method 0010 procedures. The stack sampling company laboratory will clean all sampling train glassware to pesticide analytical requirements using procedures outlined in Section 3A of the *"Manual of Analytical Methods for the Analysis of Pesticide in Human and Environmental Samples".*

All sampling train components will be constructed of materials specified in the methods and will be cleaned and prepared per method specifications prior to testing. The probe and filter temperatures will be maintained between 223°F and 273°F (120 ± 14ºC). The sorbent trap will be kept below 68ºF to ensure that the XAD resin stays efficient during the testing. The sampling runs will be performed within ± 10 percent of isokinetic conditions. As required by Section 6.3.4 of SW-846 Method 0010 when measuring DRE using a semivolatile POHC, a minimum of 105.9 dscf (3.0 dscm) of stack gas will be sampled. As required by 40 CFR 63.1208, a minimum of 2.5 dscm of stack gas will be sampled over a minimum of 180 minutes so non-detect 2,3,7,8-chlorinated dioxin/furan analytes may be counted as "zero" in calculating 2,3,7,8-tetra-chlorinated dibenzodioxin toxicity equivalence (TEQ).

The sampling train will be recovered according to the procedures specified in SW-846 Method 0023A except as noted below and delineated in Figure 3-6. The specific aspects of sampling a semivolatile POHC and dioxins/furans using a single sampling train is the toluene rinses must be recovered and maintained separately from the acetone and methylene chloride rinses, and the impinger contents are recovered for semivolatile POHC analysis. At the completion of each run, a final leak test will be performed on the sampling system. Upon completion of each test run and final leak check, the following sampling train recovery procedure is performed in the on-site mobile laboratory:

1. Container No. 1 - The filter is removed from its holder and placed and sealed in a glass Petri dish.

2. Container No. 2 - All loose particulate matter and rinse washings from all sample exposed surfaces preceding the filter paper are placed in Container 2. The probe, nozzle and front half of the filter holder are rinsed with acetone and methylene chloride are added to Container 2. The container is sealed, and the level of liquid is marked on the bottle.

3. Container No. 2A - The probe liner, nozzle and front half of the filter holder are rinsed thoroughly with toluene and placed in Container No. 2A. The container is sealed, and the level of liquid is marked on the bottle.

4. Container No. 3 - The sorbent trap is sealed with Teflon tape and glass ends. The trap is weighed to determine moisture gain. The trap is refrigerated or stored in ice chests with coolant packs for travel to the laboratory.

5. Container No. 4 - The back half of the filer holder and coil condenser glassware are thoroughly rinsed with acetone and methylene chloride and placed in Container No. 4. The container is sealed, and the level of liquid will be marked on the bottle.

6. Container No. 4A - The back half of the filter holder and coil condenser glassware will be thoroughly rinsed toluene and placed in Container No. 4A. The container is sealed, and the level of liquid will be marked on the bottle.

7. Container No. 5 - The impingers will be individually weighed to determine moisture gain. The contents of the impingers are transferred to a recovery bottle Container 5. Each impinger is rinsed with HPLC water with the rinses added to the impinger contents recovery bottle. The container is sealed, and the level of liquid will be marked on the bottle.

8. The silica gel impinger will be weighed to the nearest 0.5 gram.

The recovery of the sampling train will result in the sample fractions listed in Table 3-3. The filter will be shipped in a Petri dish, and all rinses will be collected in amber glass jars. The samples will be recovered, sealed, labeled and levels marked. The XAD-2 resin traps will be wrapped in aluminum foil and stored on ice in a storage chest. Sample collection includes:

- A field blank train which is set for sampling, heated up, leak checked, allowed to stand for approximately the same amount of time as a sampling run, leak checked again, and recovered for analysis; and
- One set of filter, XAD-2, acetone, methylene chloride, and toluene reagent blanks.

The field blank train is prepared and analyzed to assess background levels or artifacts of the target dioxin/furan analytes and semivolatile POHC. The reagent blanks are archived and only analyzed if the target analytes are exhibited above the reporting limit in the field blank train samples.

Table 3-4. Semivolatile Organic and Dioxins and Furans Sampling Surrogates [1]

$^{13}C_6$-Naphthalene
$^{37}C_4$ -2,3,7,8-Tetrachlorodibenzodioxin
$^{13}C_{12}$ -1,2,3,4,7,8-Hexachlorodibenzodioxin
$^{13}C_{12}$ -2,3,4,7,8-Pentachlorodibenzofuran
$^{13}C_{12}$ -1,2,3,4,7,8-Hexachlorodibenzofuran
$^{13}C_{12}$ -1,2,3,4,7,8,9-Heptachlorodibenzofuran

3.4.8 CARBON MONOXIDE, HYDROCARBONS, AND OXYGEN BY INSTALLED CEMS

The CO, O_2, and THC CEMS will be installed, maintained, and operated in accordance 40 CFR 60, Appendix B, Performance Specifications 4B and 8A. As part of the normal annual test requirements and in preparation for the CPT, a relative accuracy test audit (RATA) of the CO and O_2 CEMS will be performed in the quarter the CPT is conducted as required by Section 5.0 of the Appendix to 40 CFR 63, Subpart EEE (HWC MACT) to ensure that the instrumentation meets the HWC NESHAP requirements. Note: Performance Specification 8A does not specify performing RATA testing of HC CEMS, simply quarterly cylinder gas audits (CGAs). The installed CO, O_2, and THC CEMS will be calibration drift checked daily.

3.4.9 SULFUR DIOXIDE, AND NITROGEN OXIDES BY INSTALLED CEMS

The SO_2 and NO_X CEMS will be installed, maintained, and operated in accordance 40 CFR 60, Appendix B, Performance Specification 2. The installed SO_2 and NO_X CEMS will be calibration drift checked daily.

3.5 SAMPLING QUALITY CONTROL PROCEDURES

Specific sampling QC procedures will be followed to ensure the production of useful and valid data throughout the course of this test program.

Prior to the start of testing, all sampling equipment will be thoroughly checked to ensure clean and operable components and to ensure that no damage occurred during shipping. Once the equipment has been set up, the manometer used to measure pressure across the pitot tube will be leveled and zeroed, and the number and location of all sampling traverse points will be checked.

To ensure that the sampling trains are free of contamination, all glassware will remain sealed until assembly of the sampling train. The trains will be assembled in a clean environment.

At the start of each test day and throughout the testing, all sample train components will be checked to ensure that they remain in good condition and continue to operate properly. Electrical components will be checked for damaged wiring or bad connections. All glassware will be inspected to make sure no cracks or chips are present. Care will be taken to make sure that all sampling trains are being operated within the specifications of their respective method. At the end of testing each day, all sampling equipment will be sealed and covered to protect from possible contamination .

3.6 METHOD MODIFICATIONS

No major sampling or analytical method modifications or alternative methods are requested. Sample analyses will be performed in accordance with laboratory standard operating procedures (SOPs), as approved under their National Environmental Laboratory Accreditation Certification (NELAC) and state certifications.

Figure 3-1. USEPA Method 5/26A Sampling Train

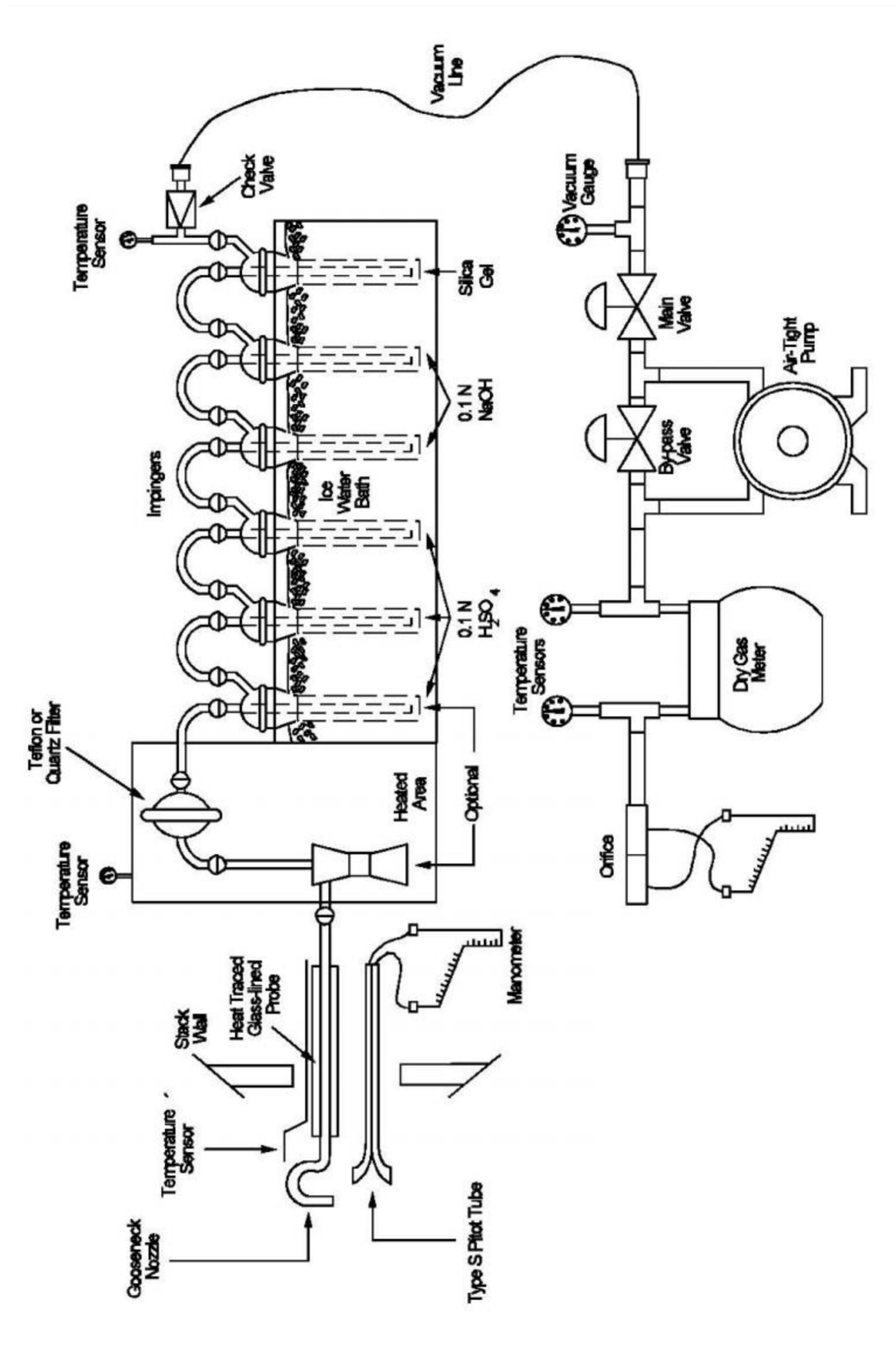


Figure 3-2. USEPA Method 5/26A Sampling Train Recovery

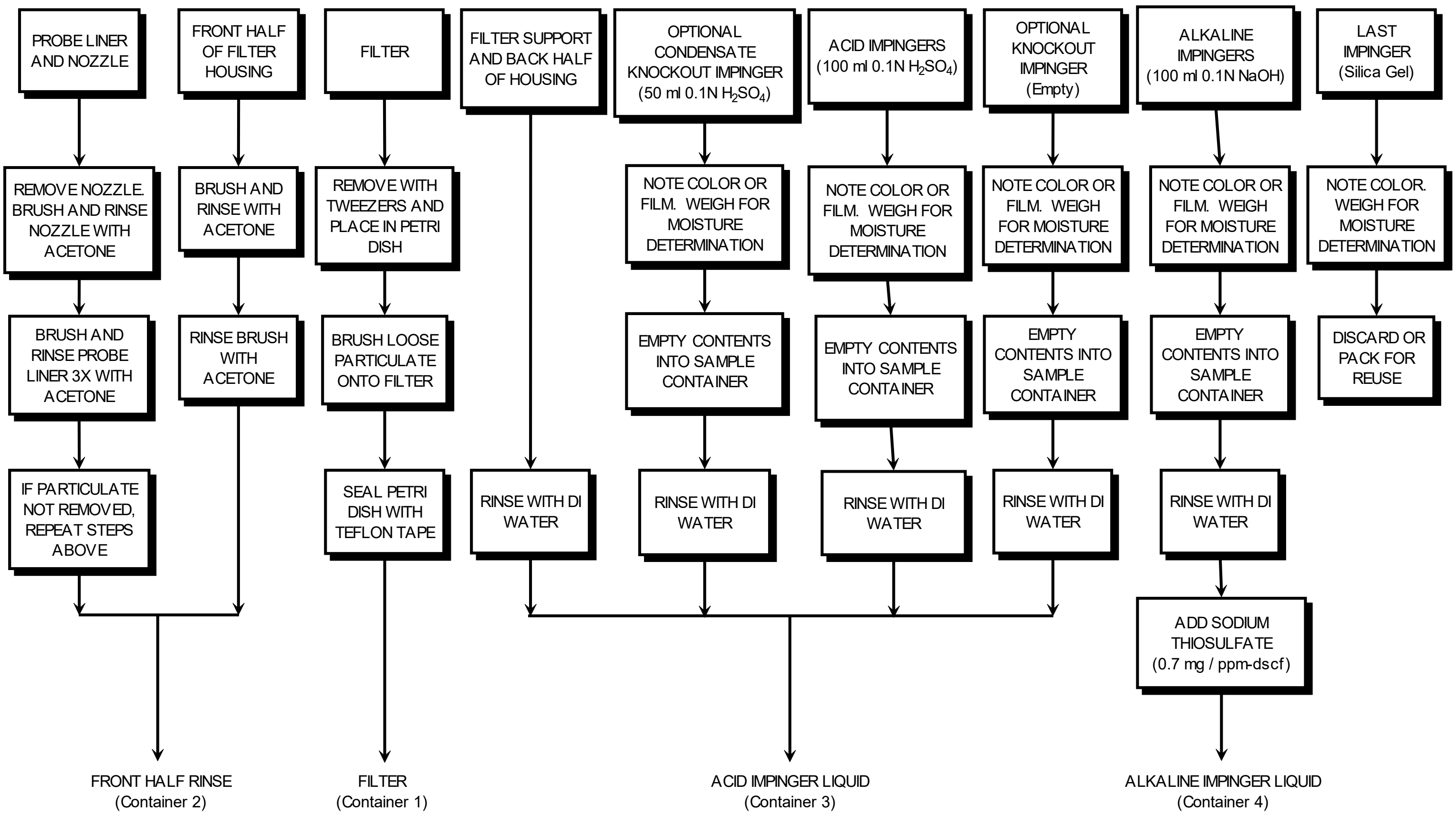


Figure 3-3. USEPA Method 29 Sampling Train

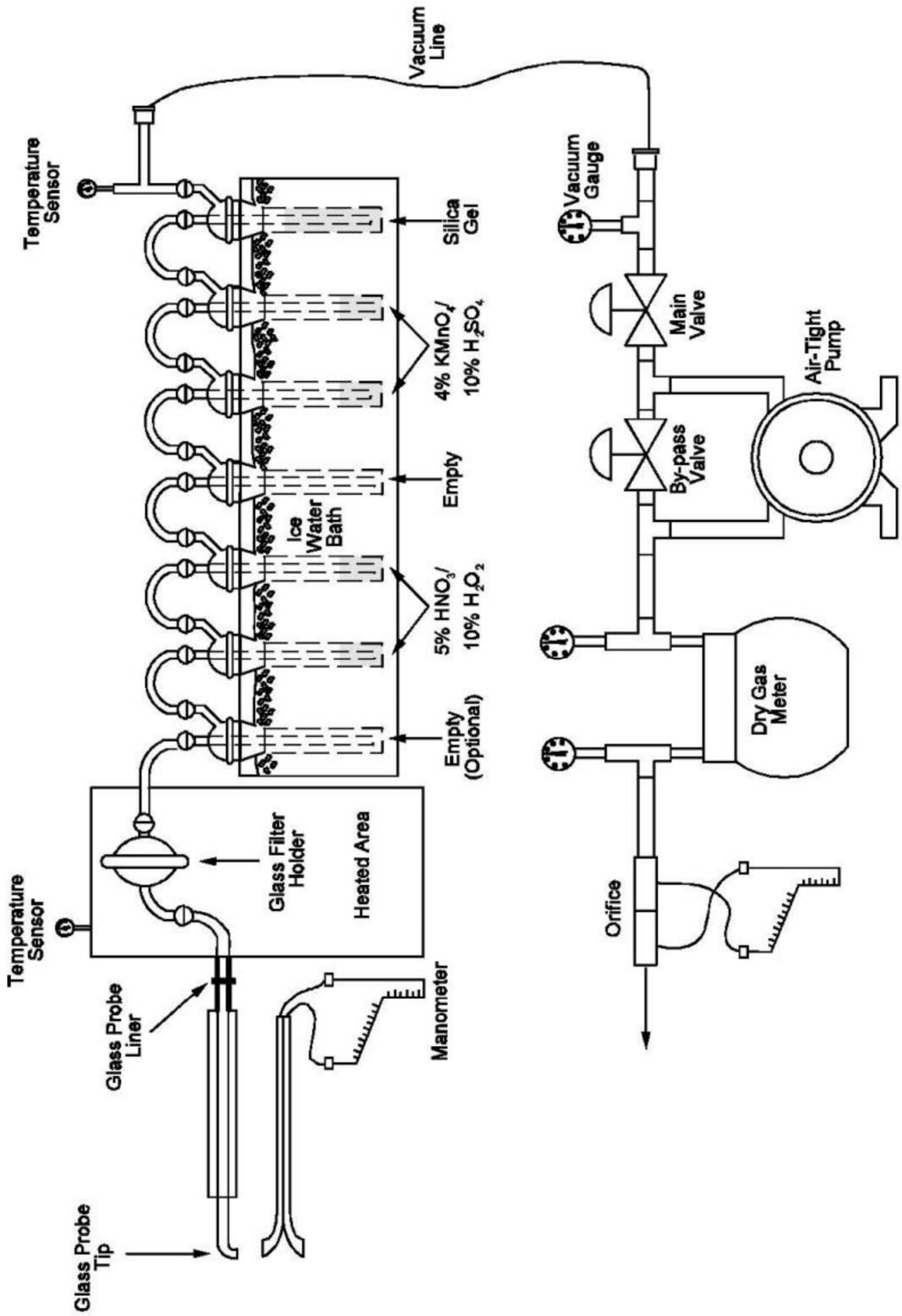


Figure 3-4. USEPA Method 29 Sampling Train Recovery

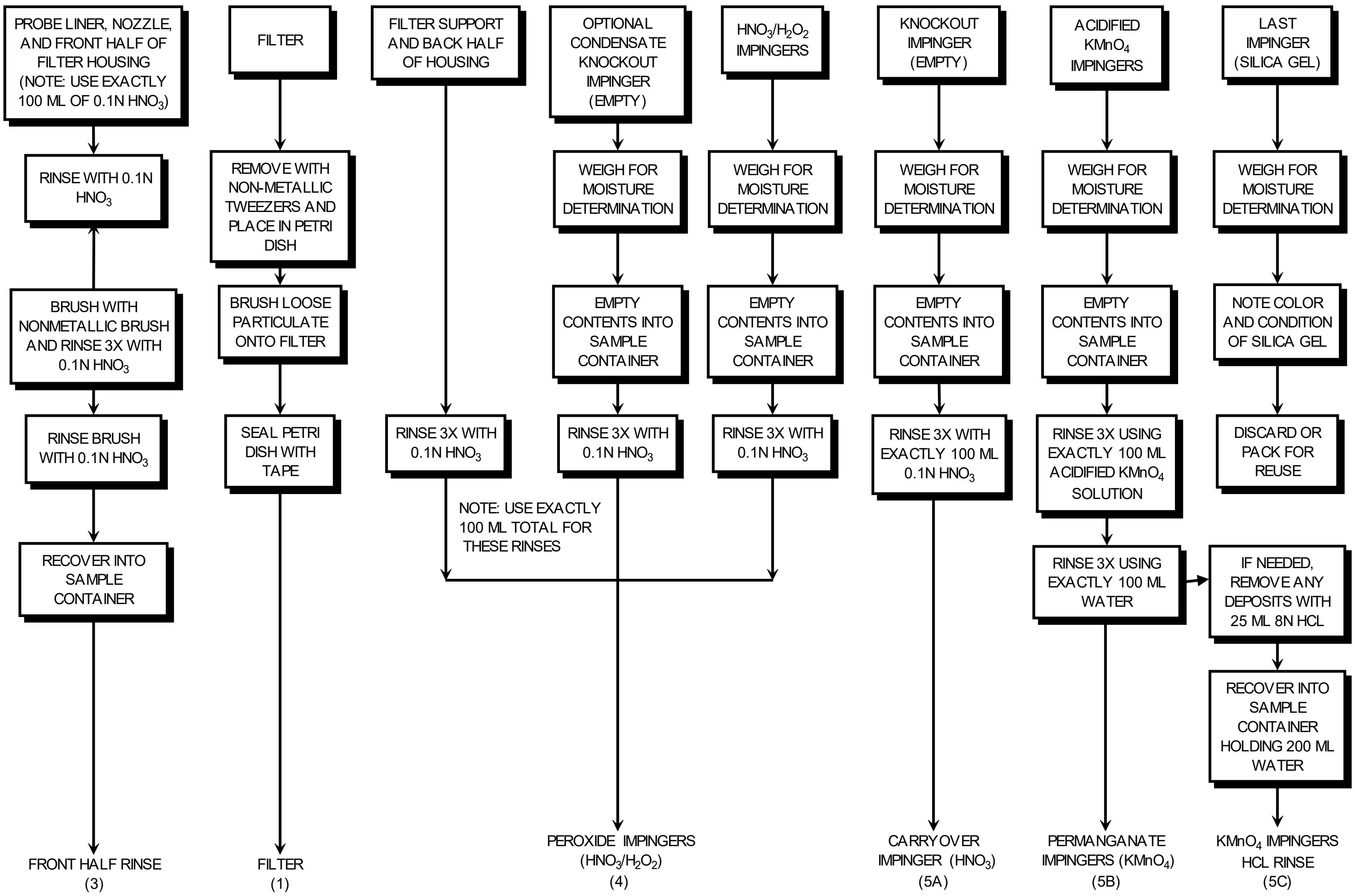


Figure 3-5. SW-846 Method 0023A Sampling Train

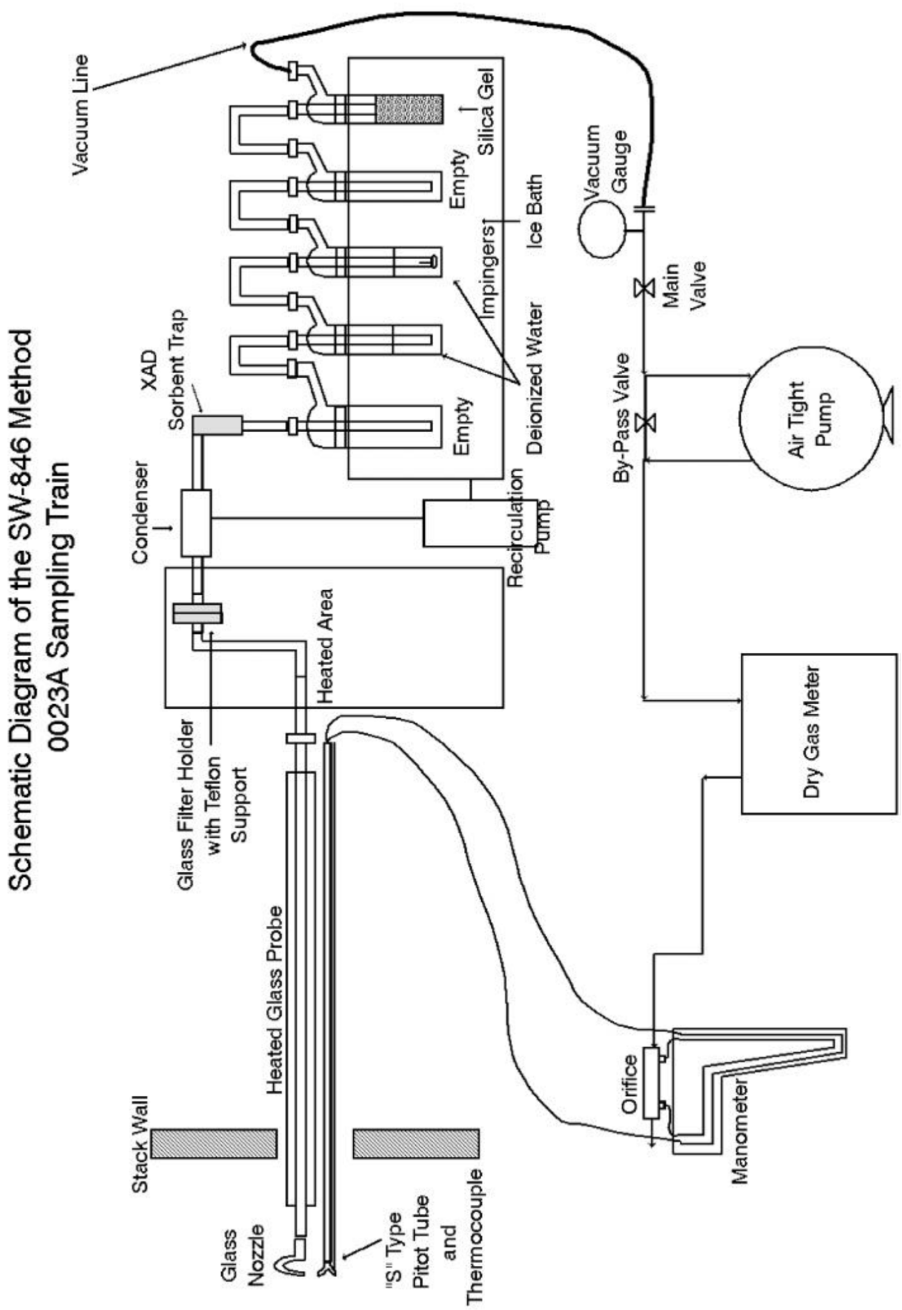
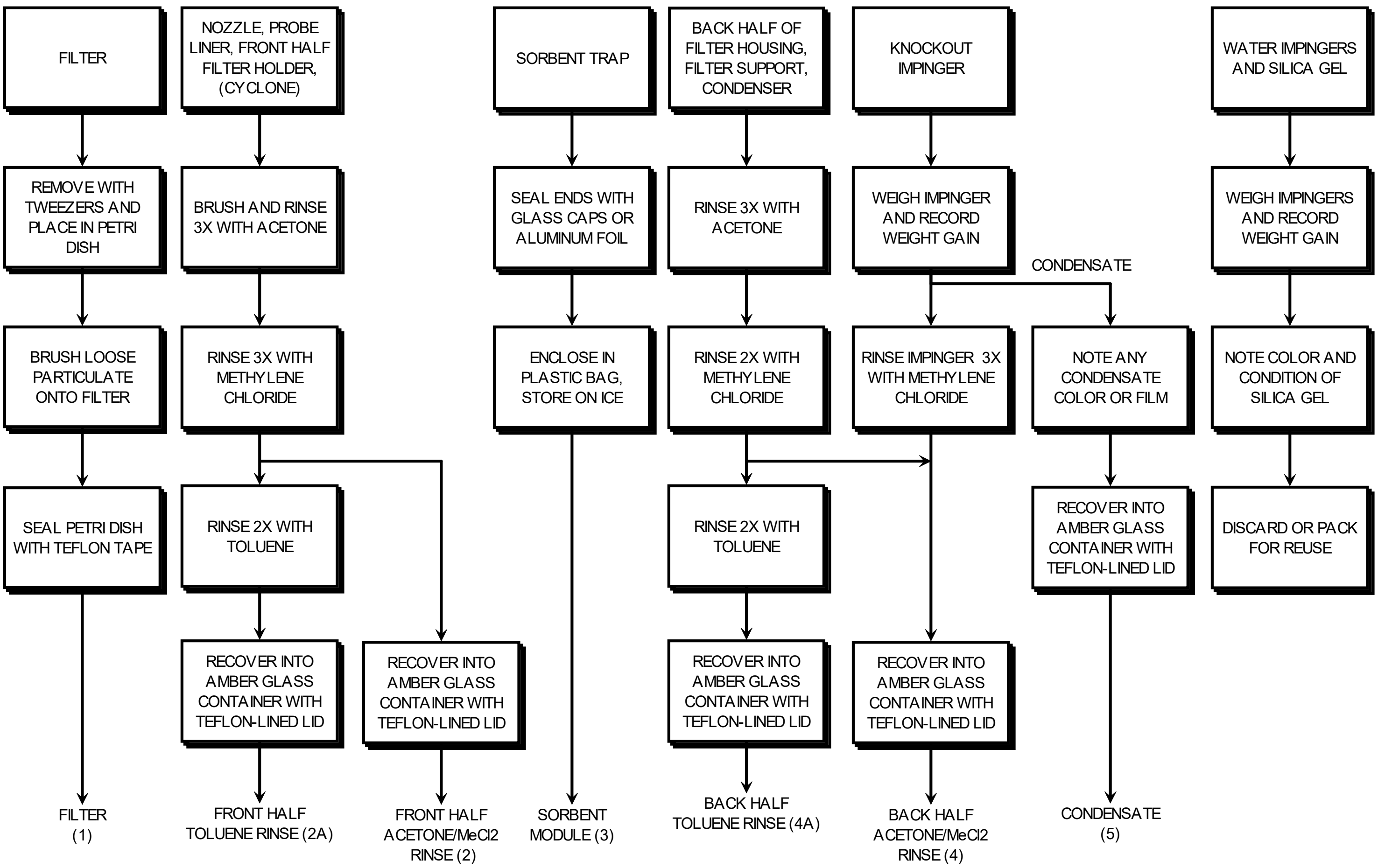


Figure 3-6. Sample Recovery for Combined Dioxins/Furans and SVOC POHC via SW-846 Method 0023A



4.0 SAMPLE HANDLING AND DOCUMENTATION

Sample custody procedures for this program are based on procedures from Handbook: QA/QC Procedures for Hazardous Waste Incineration (USEPA, 1990) (QA/QC Handbook) and SW-846, Chapter One. The procedures that will be used are discussed below.

4.1 FIELD SAMPLING OPERATIONS

Documentation of all sample collection activities will be recorded on pre-printed data collection forms. Table 4-1 provides a summary of sample custody documentation requirements. Samples will be collected, transported, and stored in clean and labeled containers that are constructed of materials inert to the analytical matrix, such as glass jars. Only containers that allow airtight seals will be used.

The holding times and sample preservation indicated in Section 5, Tables 5-1 and 5-2, will be adhered to.

4.1.1 Waste Feed Samples

Waste feed samples will be collected by CHESI personnel and will be delivered to the on-site laboratory for analysis. Sample collection documentation will accompany the waste feed samples to the on-site laboratory.

4.1.2 Emissions Samples

The stack sampling contractor will be responsible for ensuring that custody and sample tracking documentation procedures are followed for the field sampling and field analytical efforts. The emissions samples collected by stack sampling personnel will be packaged for shipment by the sampling contractor. Samples will be sent via overnight shipper, e.g., Federal Express, or transported by a sampling contractor employee or contracted courier to the designated laboratory for analysis. Sample tracking and custody forms, which include sample identification and analysis requests, will be enclosed in the sample shipment container.

Upon receipt by the laboratory, information pertaining to the samples will be recorded on the sample tracking and custody form or an attachment to the form. The laboratory will note the overall condition of the samples, including the temperature of the samples upon receipt. The laboratory will also note any discrepancy in the sample identification between the sample labels and the custody forms. The signature of the person receiving the samples will be provided on the chain of custody.

The records pertaining to emissions sample collection activities, including, but not limited to, emissions sampling data sheets, sample tracking forms, sample identification log, sampling equipment calibration forms, balance calibration forms, and reagent preparation will be included with the stack sampling report to provide evidence that the samples were handled properly, taken at the correct time and in the correct manner, assigned a unique identifier, received intact by the laboratory, and preserved as appropriate. Adherence to the preservation and holding times indicated in Section 5, Tables 5-1 and 5-2, will be noted in the laboratory analytical results.

4.2 FIELD LABORATORY OPERATIONS

The stack sampling contractor will provide an onsite laboratory trailer for sample train assembly and recovery and documentation and recordkeeping activities. Sample tracking documentation, shipping records, reagent and standards traceability, and all sampling activity records will be maintained in the laboratory trailer during the CPT.

Documentation of onsite analytical activities, such as calibration, standards traceability, sample preparation steps, and raw measurement results will also be maintained onsite.

Table 4-1. Sample Custody Documentation Requirements

Custody Document	Required Information
Sample identification log	List of all samples taken
	Time and date of sampling
	Description of sample
	Unique identifier for each sample
Sample data forms	Sampler's name or initials
	Date and time of sample collection
	Sampling technique
	Sample identifier
	Sampling location
Chain of custody	Identifier of every sample shipped
	Sample preservation requirements
	Analysis and preparation procedures requested
	Signature of individual relinquishing sample custody

5.0 ANALYTICAL PROCEDURES

The analytical methods to be used during this test effort are detailed in Tables 5-1 and 5-2. Table 5-1 presents the analytical methods for waste samples. Table 5-2 presents the analytical methods for stack gas samples. These tables present the referenced analytical method, the laboratory performing the analysis, the extraction and analysis holding time, and if required, the sample preservation and sample preparation method. Collection of these samples was described in Section 3. Note that the tables in Section 3 specify which samples are to be collected using which methods; the tables included in this section specify the preparation and analytical methods to be used to evaluate each sample.

Tables 5-3 through 5-5 show the anticipated laboratory method detection limits (MDLs) and reporting limits (RLs) for the waste feed samples and air samples. The actual laboratory detection limits and reporting limits will vary based on sample matrix and dilutions, if any, that are required. Waste liquids and waste solids, in particular, are expected based on experience to require the use of differing sample sizes and dilutions, which will affect the reporting limits. The laboratories have been instructed to attempt to attain the lowest possible detection limits for all samples.

Table 5-1. Sample Preparation and Analysis Procedures for Waste Samples

Parameter	Analytical Method	Preservative Required	Extraction Holding Time	Analysis Holding Time (Days)	Preparation Method
Higher heating value	ASTM Method D240	NA	NA	180	NA
Ash content	ASTM Method D482	NA	NA	180	NA
Chlorine	SW-846 Methods 9056A	NA	NA	28	SW-846 Method 5050
Antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, nickel, and selenium	SW-846 Method 6010B or C or 6020	NA	NA	180	SW-846 Method 3050B
Mercury	SW-846 Method 7470A/7471B	Chill to 4°C $\pm$2°C	NA	28	NA

Table 5-2. Sample Preparation and Analysis Procedures for Stack Gas Samples

Parameter	Analytical Method	Preservative Required	Extraction Holding Time	Analysis Holding Time (Days)	Preparation Method
Particulate matter	USEPA Method 5	NA	NA	180	NA
Hydrogen chloride and chlorine	USEPA Method 26A SW-846 Method 9056A	NA	NA	28	NA
Antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, nickel, and selenium	SW-846 Method 6010B or C or 6020	NA	NA	180	USEPA Method 29
Mercury	SW-846 Method 7470A	NA	NA	28	USEPA Method 29
Semivolatile POHC Dioxins and furans	SW-846 Method 8270D SW-846 Method 8290A	Chill to 4°C $\underline{+}$2°C	14 (POHC) 30 (DFs)	30 (POHC) 45 (DFs) following extraction	SW-846 Methods 0023A, 8270D, and 8290A

Table 5-3. Summary of Emissions Sample Detection Limits

Compound	Analysis Method	Laboratory Method Detection Limit (MDL)	Laboratory Reporting Limit (RL)
Method 5/26 Sampling Train Analyses (Per Sampling Train Analysis Fraction)			
Particulate	USEPA 5	0.5 mg	0.5 mg
Chlorine/Hydrogen Chloride	USEPA 26A SW-846 9056A	100 ug	200 ug
Method 29 Sampling Train Analyses (Sampling Train Fraction Totals)			
Antimony	SW-846 6010B or C, or 6020	1.2 ug	12 ug
Arsenic		0.68 ug	2.0 ug
Beryllium		0.27 ug	1.0 ug
Cadmium		0.13 ug	1.0 ug
Chromium		0.53 ug	2.0 ug
Cobalt		1.0 ug	10 ug
Lead		0.57 ug	2.0 ug
Manganese		0.30 ug	3.0 ug
Mercury		0.42 ug	1.3 ug
Nickel		0.84 ug	8.0 ug
Selenium		0.57 ug	2.0 ug
Method 0023A Sampling Train POHC Analyses			
Semivolatile POHC	SW-846 8270D w/ Selected Ion Monitoring (SIM)	9.4 ng front half fraction 6.8 ng XAD trap and back half fraction 2.0 ng condensate fraction	40 ng front half fraction 40 ng XAD trap and back half fraction 10 ng condensate fraction

Table 5-4. Summary of Dioxins/Furans Air Sample Detection Limits

Compound	I-TEF Factor	Front Half Reporting Limit (ng/Sample)	Back Half Reporting Limit (ng/Sample)	Total (I-TEQ ng)
Dioxins				
2,3,7,8-TCDD	1.0	0.01	0.01	0.02
1,2,3,7,8-PeCDD	0.5	0.05	0.05	0.05
1,2,3,4,7,8-HxCDD	0.1	0.05	0.05	0.01
1,2,3,6,7,8-HxCDD	0.1	0.05	0.05	0.01
1,2,3,7,8,9-HxCDD	0.1	0.05	0.05	0.01
1,2,3,4,6,7,8-HpCDD	0.01	0.05	0.05	0.001
OCDD	0.001	0.10	0.10	0.0002
Furans				
2,3,7,8-TCDF	0.1	0.01	0.01	0.002
1,2,3,7,8-PeCDF	0.05	0.05	0.05	0.005
2,3,4,7,8-PeCDF	0.5	0.05	0.05	0.05
1,2,3,4,7,8-HxCDF	0.1	0.05	0.05	0.01
1,2,3,6,7,8-HxCDF	0.1	0.05	0.05	0.01
2,3,4,6,7,8-HxCDF	0.1	0.05	0.05	0.01
1,2,3,7,8,9-HxCDF	0.1	0.05	0.05	0.01
1,2,3,4,6,7,8-HpCDF	0.01	0.05	0.05	0.001
1,2,3,4,7,8,9-HpCDF	0.01	0.05	0.05	0.001
OCDF	0.001	0.10	0.10	0.0002
Summation (ng)				0.2004
Gas Volume (dscm)				3.0
TEQ ng/dscm				0.067

The actual limits will vary based on sample extract splits and updated detection limits at the time of the analyses.

Table 5-5. Summary of Waste Liquid and Solid Sample Detection Limits

Parameter	Method	Method Detection Limit (MDL)	Laboratory Reporting Limit (RL)
Higher Heating Value	ASTM-D240	130 BTU/lb	1,800 BTU/lb
Ash	ASTM-D482	51 mg/kg	200 mg/kg
Chlorine	SW-846-5050/9056A	60 mg/kg	200 mg/kg
Metals			
Antimony	SW-846-6010B or C or 6020	0.21 mg/kg	6.0 mg/kg
Arsenic		0.59 mg/kg	2.0 mg/kg
Beryllium		0.020 mg/kg	0.50 mg/kg
Cadmium		0.080 mg/kg	0.50 mg/kg
Chromium		0.40 mg/kg	1.0 mg/kg
Cobalt		0.19 mg/kg	5.0 mg/kg
Lead		0.11 mg/kg	0.30 mg/kg
Manganese		0.070 mg/kg	1.5 mg/kg
Nickel		0.34 mg/kg	4.0 mg/kg
Selenium		0.31 mg/kg	0.50 mg/kg
Mercury	SW-846-7470A/7471B	0.010 mg/kg	0.033 mg/kg

6.0 DATA QUALITY OBJECTIVES

The purpose of this test program is to demonstrate compliance with the HWC NESHAP performance standards and the Air Quality Construction Permit. CHESI is committed to ensuring that the data generated during this project are scientifically valid, defensible, complete, and of known precision and accuracy. These objectives can be best achieved by applying the requirements of USEPA accepted methodology as well as the more specific recommendations and guidelines specific to test burns. To ensure the consistency and adequacy of plans, reports, and overall data quality, guidance from Chapter One of SW-846 and the QA/QC Handbook have been integrated into the approaches and philosophies in this QAPP.

Although the QA/QC procedures included in the QA/QC Handbook lack the statistical approach in establishing acceptance criteria for the specified methodology, this document does provide specific guidance for performance tests. It is important that these objectives be defined in terms of project requirements, not in terms of the capabilities of the test methods used, per se. In this context, QA objectives should not only be attainable by the chosen methods of sampling, sample preparation, and analysis, but should indicate the quality necessary to draw valid conclusions regarding the achievement of the objectives of the program, such as provided in the QA/QC Handbook. Key measures of successful achievement, which apply to all environmental measurement programs, include the objectives for precision, accuracy, representativeness, completeness, and comparability.

This section presents project-specific data quality objectives for this CPT. These objectives represent the level of data quality that would be considered acceptable for valid decision making, as measured in a manner that best reflects performance in the actual project matrices. These objectives will be communicated to the entire project team, including onsite sampling personnel and off-site contract laboratories. Factors that entered the selection and specification of the data quality control objectives include:

- The CPT project objectives – providing accurate and reliable data for demonstrating compliance with the HWC NESHAP and the Air Quality Construction Permit
- The end-use of the data – determining compliance with emission standards and establishing feed rate limits for constituents; and
- The level of detection required to satisfy the project objectives and establish regulatory compliance parameters.

6.1 QUALITY CONTROL PARAMETERS

QC objectives include precision, accuracy, representativeness, comparability, and completeness. Typical QC parameters include matrix spike (MS) and MS duplicate (MSD) samples, laboratory control sample (LCS) and LCS duplicate (LCSD) samples, post-digestion spike (PDS) samples, surrogates, standards, spikes, and duplicates. Tables 6-1, 6-2, and 6-3 provide the project specific QC procedures for assessing accuracy and precision measurements for critical measurement parameters. Critical parameters are those that directly relate to the demonstration of regulatory compliance. These tables list the parameter of analysis, QC parameter, QC procedure, frequency at which accuracy and precision are determined, and objective.

Table 6-1. Quality Control Objectives for Waste Feed Samples

Analytical Parameters	QC Parameter	QC Procedure	Frequency [1]	Objective [1]
Higher heating value	Precision	Field duplicate	1 per matrix	<20% RPD [2,3,4]
Ash content	Precision	Field duplicate	1 per matrix	<20% RPD [2,3,4]
Chloride	Precision	Field duplicate	1 per matrix	<20% RPD [2,3,4]
Antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, nickel, and selenium	Accuracy	MS/MSD/PDS	1 per matrix	80-120% recovery[5]
	Precision	Field duplicate	1 per matrix	<25% RPD [2,3,4]

Notes:

[1] The frequency and objective provided for each parameter are based on specifications in the analytical method and as demonstrated by the laboratory.

[2] RPD refers to relative percent difference. RSD refers to relative standard deviation.

[3] If the concentrations are less than five times the reporting limit, the laboratory may be unable to attain these limits. Waste sample matrix and homogeneity have a direct impact on the attainment of precision for field duplicates.

[4] Limits specified are generally applicable. Actual limits are determined by the laboratory and are compound specific based on internal performance data. Waste sample matrix and homogeneity have a direct impact on the attainment of precision and accuracy for field duplicates and surrogate recovery.

[5]Matrix spikes are not applicable on samples with greater than 0.1% of the target analyte.

Table 6-2. Quality Control Objectives for Stack Gas Samples

Analytical Parameters	QC Parameter	QC Procedure	Frequency [1]	Objective [1]
Hydrogen chloride and chlorine	Accuracy	LCS	Per batch	80-120% recovery
	Accuracy	MS	Per batch	70-130% recovery
	Precision	MSD	Per batch	≤30% RPD [2,3]
Particulate	Accuracy	Std weights	Daily	± 0.5 mg
	Precision	Replicate weighing	Per Batch	± 0.5 mg
Antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, nickel, and selenium	Accuracy	LCS	Per batch	80-120% recovery
	Accuracy	PDS	One per sampling train matrix	75-125% recovery
	Precision	LCSD	Per batch	≤25% RPD [2]
Mercury	Accuracy	LCS	Per batch	80-120% recovery
	Accuracy	PDS	One per sampling train matrix	70-130% recovery
	Precision	LCSD	Per batch	≤30% RPD [2,3]
Dioxins and furans	Accuracy	Extraction and isotope dilution internal standards [3]	Every sample	40-135% recovery for tetra through octa isomers
	Accuracy	Sampling standards [4]	Back half samples	70-130% recovery
	Precision	NA [5]	NA	NA
Semivolatile POHC	Accuracy	Isotope dilution standard [3]	Every sample	30-120% recovery
	Accuracy	Sampling standard [4]	Back half samples	50-150% recovery
	Precision	NA [5]	NA	NA

Notes:

[1] The frequency and objective provided for each parameter are based on specifications in the analytical method and as demonstrated by the laboratory.

[2] RPD refers to relative percent difference. RSD refers to relative standard deviation.

[3] Limits specified have been determined by the laboratory based on internal performance data.

[4] Sampling standards are added to back-half samples only.

[5] For isotope-dilution high-resolution gas chromatography/mass spectrometry (HRGC/HRMS), a MS is of no value to determine the precision and accuracy.

Table 6-3. Organic Surrogate Spike and Matrix Spike Recovery Limits

Sample Matrix	QA Parameter	Spiking Compound	Recovery Limits
Stack Gas PCDD/PCDFs (Method 0023A)	Pre-sampling Surrogate Spikes (to XAD-2 resin before field use and to the filter immediately prior to extraction)	$^{37}Cl_4$-2,3,7,8-TCDD	70 – 130%
		$^{13}C_{12}$-2,3,4,7,8-PeCDF	70 – 130%
		$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	70 – 130%
		$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	70 – 130%
		$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	70 – 130%
	Internal Surrogate Spikes (to sample fraction before extraction)	$^{13}C_{12}$-2,3,7,8-TCDF	40 – 130%
		$^{13}C_{12}$-2,3,7,8-TCDD	40 – 130%
		$^{13}C_{12}$-1,2,3,7,8-PeCDF	40 – 130%
		$^{13}C_{12}$-1,2,3,7,8-PeCDD	40 – 130%
		$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	40 – 130%
		$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	40 – 130%
		$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	25 – 130%
		$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	25 – 130%
		$^{13}C_{12}$-OCDD	25 – 130%
	Standard (to extract before cleanup)	$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	50 – 150%
	Recovery Standards (to extract before analysis)	$^{13}C_{12}$-1,2,3,4-TCDD	50 – 150%
		$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	50 – 150%
Stack Gas Semivolatile POHC (Method 0023A)	Sampling Surrogate (to XAD-2 resin before field use)	$^{13}C_6$-Naphthalene	50 - 150%
	Isotope Dilution	1,2-Dichlorobenzene-d_4	30 – 120%
		Naphthalene-d_8	30 – 120%

6.1.1 PRECISION

Precision is a measure of the reproducibility of results under a given set of conditions. It is expressed in terms of the distribution, or scatter, of replicate measurement results, calculated as the relative standard deviation (RSD) or, for duplicates, as relative percent difference (RPD). RPD and RSD values are calculated using the following equations:

$$RPD = \left(\frac{X_1 - X_2}{\text{Average } X} \right) \times 100\%$$

$$RSD = \left(\frac{\text{Std. Dev.}}{\text{Average } X} \right) \times 100\%$$

Where X_1 and X_2 represent each of the duplicate results.

6.1.2 ACCURACY

Accuracy is a measure of the difference between an analysis result and the "true" value. Accuracy is expressed in terms of percent recovery (e.g., for surrogates, spikes, and reference material). Percent recovery for spiked samples, such as MS samples, is calculated using the equation below:

$$\%\ \text{Recovery} = \left(\frac{\text{SSR - SR}}{\text{SA}} \right) \times 100\%$$

Where: SSR = Spiked Sample Result

SR = Sample Result

SA = Spike Added.

Percent recovery for other QC parameters, such as LCS, surrogates, and standards, is calculated using the equation below:

$$\%\ \text{Recovery} = \left(\frac{\text{Measured Value}}{\text{True Value}} \right) \times 100\%$$

6.1.3 REPRESENTATIVENESS

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. An appropriate sampling strategy that addresses collection of representative samples in time and space is crucial to subsequent decision-making and defensibility of the data. There are no numerical objectives for representativeness. The selection of suitable locations and sampling strategies, as described in this QAPP, and adherence to sample collection protocols, are the bases for ensuring representativeness.

6.1.4 COMPARABILITY

Comparability is defined as expressing the confidence with which one data set can be compared to another. There are no numerical objectives for comparability. A representative sample whose results are comparable to other data sets is ensured primarily through the use of standard reference sampling and analytical methods. Reported in common units, the results generated should thus be comparable to those obtained from other emissions tests and allow for consistent decision-making.

6.1.5 COMPLETENESS

Completeness is defined as "the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under optimal normal conditions." Completeness can be defined quantitatively using the equation below:

$$\%\ \text{Completeness} = \left(\frac{\text{No. of Valid Data}}{\text{No. of Data Planned}} \right) \times 100\%$$

In the overall project context, the target is 100 percent completeness, which for a valid test condition is defined as consisting of three valid test runs. A valid test run is one in which sufficient valid data are presented to make any necessary demonstrations and to enable the permit writer/reviewer to write appropriate permit conditions or to be confident about demonstration of compliance with a current permit or regulation.

A run can be valid even though the completeness objective of 100 percent for the data package is not achieved. Given the possibility of human error (and other unpredictable problems) and the inability of collecting additional samples after a test is completed, the impact of achieving less than 100 percent completeness must be assessed in the specific situation, rather than arbitrarily rejecting all the useable scientific information for the run without such consideration. For example, satisfying the completeness objective for a single piece of analytical data includes providing documentation that proves the following:

- An acceptable number of sub-samples were collected and composited;
- Compositing procedures were followed;
- The sample collection log was completed;
- Shipping documents and laboratory instructions were prepared and followed;
- The correct analytical procedures were followed;
- Any necessary modifications to methodology were documented and justified;
- Approved laboratory records were complete;
- Proper data reduction procedures were followed; and
- Analytical instrument printouts were included.

Clearly, the failure of a sampler to note the time a sub-sample was taken (where the previous and following sample times are noted) has less impact on the validity and acceptability of a data package than a failure by the laboratory to demonstrate that the analytical instrument was properly calibrated.

Any errors or omissions in a data package will be identified and accompanied by a discussion of the potential impact on the validity of the data package, the conclusions of the report, and the demonstration of performance standards for the consideration and approval of the Nebraska Department of Environment and Energy (NDEE).

6.2 EVALUATION OF CONTAMINATION EFFECTS

Various blanks will be collected throughout the test program to evaluate the effects of contamination on results. Sampling field blanks will be collected and analyzed for Method 29 and Method 0023A to evaluate the impact of the sampling train recovery process on test results. Blank samples of all reagents used in the emissions sampling program (Method 5/26A, Method 29, and Method 0023A) will also be collected. Method blanks will be prepared and analyzed by the respective laboratories to evaluate the cleanliness of sample handling and preparation and overall laboratory practices. Since field and reagent blanks cannot be collected for waste samples, the laboratory method blank will be used to determine the effects of contamination for waste analyses.

Table 6-4 provides the type and acceptance criteria for each stack gas blank to be analyzed. All these blanks, as well as the laboratory method blanks for the waste samples, provide critical information on the potential contamination that may occur in test program samples. The results of blank analyses can prove very useful when attempting to understand anomalies in data, or generally higher than expected test results.

6.3 PERFORMANCE AUDITS

If available at the time of testing, the stack sampling contractor will obtain analytical dioxin/furan, metals, and HCl/Cl_2 audit samples for the Method 0023A, Method 29, and Method 26A sampling trains an EPA-approved Stationary Source Audit Sample Program (SSASP) provider. However, at the time of this test plan publication, one of the two EPA approved providers has withdrawn from the program. In accordance with the regulations, EPA has suspended the SSASP until such time a second vendor is qualified and samples from at least two vendors are made available. If the program is re-established by the time testing under this plan is performed, CHESI will obtain audit samples as they may be available for Method 26A (HCl/Cl_2), Method 29 (Multi-Metals), and Method 0023A (DFs), and submit those samples for analysis by the selected analytical laboratory.

https://www.federalregister.gov/documents/2019/09/11/2019-19573/stationary-source-audit-program-notification-of-availability-and-request-for-comments

6.4 SAMPLE COLLECTION AND ANALYSIS SUMMARY

Table 6-5 summarizes the expected field samples to be collected during the CPT and analyses required including QA/QC analyses described in Section 6.0.

Table 6-4. Blank Analysis Objectives for Stack Gas Samples

Analytical Parameters	Blank Type	Frequency	Objective
Particulate matter	Acetone reagent blanks	One per CPT	<0.001 percent
	Particulate filter reagent blank	One per CPT	<0.50 mg
Hydrogen chloride and chlorine	Method blank	One per batch	<Reporting limit
	Reagent blanks	One per CPT	<Reporting limit
Antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, nickel, and selenium	Initial calibration blank	Following initial calibration verification	<Reporting limit
	Continuing calibration blank	Following continuing calibration verification	<Reporting limit
	Field blank train	One per CPT	<Reporting limit
	Method blank	One per batch	<Reporting limit
	Reagent blanks	One set per CPT	<Reporting limit
Mercury	Initial calibration blank	Following initial calibration verification	<Reporting limit
	Continuing calibration blank	Following continuing calibration verification	<Reporting limit
	Field blank train	One per CPT	<Reporting limit
	Method blank	One per batch	<Reporting limit
	Reagent blanks	One set per CPT	<Reporting limit
Dioxins and furans	Field blank	One per CPT	<Reporting limit
	Method blank	One per batch	<Reporting limit
	Reagent blanks	One set per CPT	Archived [1]
Semivolatile POHC	Field blank train	One per CPT	<Reporting limit
	Method blank	One per batch	<Reporting limit
	Reagent blanks	One set per CPT	Archived [1]

Notes:
[1] The specified reagent blanks will initially be archived. These blanks will only be analyzed if the field blank indicates possible sample contamination. Possible contamination will be assessed using the objectives for field blanks stated in this table.

Table 6-5. Summary of Test Program Samples and Analyses

Analysis	Sample Matrix	CPT	Field QC	Reference Preparation Method	Reference Analytical Method	QC Analysis	QC Analysis Frequency [1]	QC Analyses	Total Analyses [2]
Ash	Waste	6	--	NA	Residue after muffle furnace combustion (ASTM Method D-482)	Duplicate	One per stream	2	8
Heat Content				NA	Bomb calorimeter (ASTM Method D-240)	Duplicate	One per stream	2	8
Total chloride				Bomb or flask combustion (SW-846 Method 5050)	Ion chromatography of residue (SW-846 Method 9056A)	Duplicate	One per stream	2	8
Metals by ICP	Waste	6	--	Digestion (SW-846 Method 3050B)	ICP (SW-846 Method 6010B/C)	MS/MSD [4]	One per stream	6	12
	Analytical system QC	NA	NA	Digestion (SW-846 Method 3050B)	ICP (SW-846 Method 6010B/C)	LCS	One per batch/ matrix specific	2 or more	2
						Serial dilution	One per batch/ matrix specific	2 or more	2
						Method Blank	One per batch/ matrix specific	2 or more	2
Metals by CVAA	Waste	6	--	CVAA (SW-846 Method 7470A/7471B)	CVAA (SW-846 Method 7470A/7471B)	MS/MSD [4]	One per stream	6	12
	Analytical system QC	NA	NA	CVAA (SW-846 Method 7470A/7471B)	CVAA (SW-846 Method 7470A/7471B)	LCS	One per batch/ matrix specific	3 or more	3
						Method Blank	One per batch/ matrix specific	2 or more	2

Table 6-5. Summary of Test Program Samples and Analyses (cont'd)

Analysis	Sample Matrix	CPT	Field QC	Reference Preparation Method	Reference Analytical Method	QC Analysis	QC Analysis Frequency [1]	QC Analyses	Total Analyses [2]
PCDD/PCDFs & SV POHC by SW-846 Method 0023A	Method 0023A front half composite; filter, and front half of filter holder and probe rinses.	3	1	Soxhlet extraction (SW-846 Methods 0023A/3542A)	GC/MS with SIM for SV POHC (SW-846 Method 8270D)	Semivolatile surrogate spikes	Every sample	4	4
						Semivolatile internal standard surrogate spikes	Every sample	4	
					HRGC/HRMS for PCDD/PCDFs (SW-846 Method 8290)	PCDD/PCDF isotope dilution internal standard spike	Every analysis [3]	4	4
						PCDD/PCDF recovery standard spike	Every analysis [3]	4	
	Method 0023A back half composite; XAD-2 resin, and back half of filter holder and condenser rinses.	3	1	Soxhlet extraction with MeCl2 (SW-846 Methods 0023A/3542A)	GC/MS with SIM for SV POHC (SW-846 Method 8270D)	Pre-sampling surrogate spikes	Every XAD-2 resin tube before sampling	4	4
						Semivolatile surrogate spikes	Every sample	4	
						Semivolatile internal standard surrogate spikes	Every sample	4	
					HRGC/HRMS for PCDD/PCDFs (SW-846 Method 8290)	PCDD/PCDF pre-sampling surrogate spikes	Every XAD-2 resin tube before sampling	4	4
						PCDD/PCDF isotope dilution internal standard spike	Every analysis [3]	4	
						PCDD/PCDF recovery standard spike	Every analysis [3]	4	

Table 6-5. Summary of Test Program Samples and Analyses (cont'd)

Analysis	Sample Matrix	CPT	Field QC	Reference Preparation Method	Reference Analytical Method	QC Analysis	QC Analysis Frequency [1]	QC Analyses	Total Analyses [2]
PCDD/PCDFs & SV POHC by SW-846 Method 0023A (cont'd)	Method 0023A Condensate Impinger	3	1	Separatory funnel extraction (SW-846 Method 3542A)	GC/MS with SIM for SV POHC (SW-846 Method 8270D)	Semivolatile surrogate spikes	Every sample	4	4
						Semivolatile internal standard surrogate spikes	Every sample	4	
	Method 0023A acetone reagent blank	--	1	NA	GC/MS with SIM for SV POHC (SW-846 Method 8270D)	Semivolatile surrogate spikes	Every sample	1	1
						Semivolatile internal standard surrogate spikes	Every sample	1	
					HRGC/HRMS for PCDD/PCDFs (SW-846 Method 8290)	PCDD/PCDF isotope dilution internal standard spike	Every analysis [3]	1	1
						PCDD/PCDF recovery standard spike	Every sample	1	
	Method 0023A methylene chloride reagent blank	--	1	NA	GC/MS with SIM for SV POHC (SW-846 Method 8270D)	Semivolatile surrogate spikes	Every sample	1	1
						Semivolatile internal standard surrogate spikes	Every sample	1	
					HRGC/HRMS for PCDD/PDDFs (SW-846 Method 8290)	PCDD/PCDF isotope dilution internal standard spike	Every analysis [3]	1	1
						PCDD/PCDF recovery standard spike	Every analysis [3]	1	
	Method 0023A toluene reagent blank	--	1	NA	HRGC/HRMS for PCDD/PDDFs (SW-846 Method 8290)	PCDD/PCDF isotope dilution internal standard spike	Every analysis [3]	1	1
						PCDD/PCDF recovery standard spike	Every analysis [3]	1	

Table 6-5. Summary of Test Program Samples and Analyses (cont'd)

Analysis	Sample Matrix	CPT	Field QC	Reference Preparation Method	Reference Analytical Method	QC Analysis	QC Analysis Frequency [1]	QC Analyses	Total Analyses [2]
PCDD/PCDFs & SV POHC by SW-846 Method 0023A (cont'd)	Method 0023A spiked XAD-2 resin blank	--	2	Soxhlet extraction (SW-846 Methods 0023A/3542A)	GC/MS with SIM for SV POHC (SW-846 Method 8270D)	Pre-sampling surrogate spikes	Every XAD-2 resin tube before sampling	2	2
						Semivolatile surrogate spikes	Every sample	2	
						Semivolatile internal standard surrogate spikes	Every sample	2	
						Method blank	1 per analytical batch	1 or more	1
						Blank spike	2 per analytical batch	2	2
					HRGC/HRMS for PCDD/PDDFs (SW-846 Method 8290)	PCDD/PCDF pre-sampling surrogate spikes	Every XAD-2 resin tube before sampling	2	2
						PCDD/PCDF isotope dilution internal standard spike	Every analysis [3]	2	
						PCDD/PCDF recovery standard spike	Every analysis [3]	2	
						Method blank	1 per analytical batch	1 or more	1
						Blank spike	2 per analytical batch	2	2

Table 6-5. Summary of Test Program Samples and Analyses (cont'd)

Analysis	Sample Matrix	CPT	Field QC	Reference Preparation Method	Reference Analytical Method	QC Analysis	QC Analysis Frequency [1]	QC Analyses	Total Analyses [2]
Metals by Method 29	Method 29 front half: filter, and nitric acid probe and front half filter holder rinses	3	1	Method 29	ICP (SW-846 Method 6010B/C)	PDS [4]	One per test	1	5
					CVAA (SW-846 Method 7470A/7471B)	PDS [4]	One per test	1	5
	Method 29 10%HNO_3/5%H_2O_2 impinger contents and rinses	3	1	Method 29	ICP (SW-846 Method 6010B/C)	PDS [4]	One per test	1	5
					CVAA (SW-846 Method 7470A/7471B)	PDS [4]	One per test	1	5
	Method 29 initially empty contents and rinses	3	1	Method 29	CVAA (SW-846 Method 7470A/7471B)	PDS [4]	One per test	1	5
	Method 29 4%$KMnO_4$/10%H_2SO_4 impinger contents and rinses	3	1	Method 29	CVAA (SW-846 Method 7470A/7471B)	PDS [4]	One per test	1	5
	Method 29 4%KMnO4/10%H2SO4 8N HCl rinses	3	1	Method 29	CVAA (SW-846 Method 7470A/7471B)	PDS [4]	One per test	1	5
	Method 29 filter reagent blank	--	1	Method 29	ICP (SW-846 Method 6010B/C)	Reagent Blank	One for test program	1	1
					CVAA (SW-846 Method 7470A/7471B)	Reagent Blank	One for test program	1	1
	Method 29 HNO3 reagent blank	--	1	Method 29	ICP (SW-846 Method 6010B/C)	Reagent Blank	One for test program	1	1
					CVAA (SW-846 Method 7470A/7471B)	Reagent Blank	One for test program	1	1
	Method 29 10%HNO3/5%H2O2 reagent blank	--	1	Method 29	ICP (SW-846 Method 6010B/C)	Reagent Blank	One for test program	1	1
					CVAA (SW-846 Method 7470A/7471B)	Reagent Blank	One for test program	1	1
	Method 29 4%$KMnO_4$/10%H_2SO_4 reagent blank	--	1	Method 29	CVAA (SW-846 Method 7470A/7471B)	Reagent Blank	One for test program	1	1
	Method 29 8N HCl reagent blank	--	1	Method 29	CVAA (SW-846 Method 7470A/7471B)	Reagent Blank	One for test program	1	1

Table 6-5. Summary of Test Program Samples and Analyses (cont'd)

Analysis	Sample Matrix	CPT	Field QC	Reference Preparation Method	Reference Analytical Method	QC Analysis	QC Analysis Frequency [1]	QC Analyses	Total Analyses [2]
Metals by Method 29 (cont'd)	Analytical system QC	NA	NA	NA	ICP (SW-846 Methods 3050B, 6010B/C)	LCS	One per batch/ matrix specific	1	1
						Serial dilution	One per batch/ matrix specific	1	1
						Method blank	One per batch/ matrix specific	1	1
	Analytical system QC	NA	NA	NA	CVAA (SW-846 Method 7470A/7471B)	LCS	One per batch/ matrix specific	1	1
						Serial dilution	One per batch/ matrix specific	1	1
						Method blank	One per batch/ matrix specific	1	1
Particulate by Method 5	Method 5 particulate filter	3	--	Desiccate to constant mass	Gravimetric (Method 5)	Replicate weighing to constant weight	Every sample	3	3
	Method 5 probe and filter holder acetone rinses	3	--	Evaporate/Desiccate to constant mass	Gravimetric (Method 5)	Replicate weighing to constant weight	Every sample	3	3
	Method 5 filter reagent blank	--	1	Desiccate to constant mass	Gravimetric (Method 5)	Replicate weighing to constant weight	Every sample	1	1
	Method 5 acetone reagent blank	--	1	Evaporate/Desiccate to constant mass	Gravimetric (Method 5)	Replicate weighing to constant weight	Every sample	1	1
	Method 5 water reagent blank	--	1	Evaporate/Desiccate to constant mass	Gravimetric (Method 5)	Replicate weighing to constant weight	Every sample	1	1

Table 6-5. Summary of Test Program Samples and Analyses (cont'd)

Analysis	Sample Matrix	CPT	Field QC	Reference Preparation Method	Reference Analytical Method	QC Analysis	QC Analysis Frequency [1]	QC Analyses	Total Analyses [2]
HCl by Method 26A	Method 26A H2SO4 impingers	3	--	NA	Ion chromatography (EPA Method 26A)	Duplicate	One per test	1	6
						MS/MSD analyzed in duplicate [4]	1 per batch	2	
	Method 26A H2SO4 reagent blank	--	1	NA	Ion chromatography (EPA Method 26A)	Reagent Blank	One for test program	1	1
Cl2 by Method 26A	Method 26A NaOH impingers	3	--	NA	Ion chromatography (EPA Method 26A)	Duplicate	One per test	1	6
						MS/MSD analyzed in duplicate [4]	1 per batch	2	
	Method 26A NaOH reagent blank	--	1	NA	Ion chromatography (EPA Method 26A)	Reagent Blank	One for test program	1	1
Cl^- ion by Method 26A	Method 26A deionized water reagent blank	--	1	NA	Ion chromatography (EPA Method 26A)	Reagent Blank	One for test program	1	1
Cl^- ion chromatography	Analytical system QC	NA	NA	NA	Ion chromatography (EPA Method 26A)	LCS/LCSD	1 per batch following initial calibration (separate calibration for each matrix)	1	2
						Method Blank	One per batch/ matrix specific - analyzed in duplicate	1	
TOTAL									**169**

Notes:

[1] Each test condition is comprised of three replicate sampling runs.

[2] Total laboratory analyses includes field sample analyses and laboratory QC analyses

[3] Surrogate spikes are applied to all samples. Refer to Table 6-3 for the surrogate compounds.

[4] MS = Matrix spike
MSD = Matrix spike duplicate
PDS = Post-digestion spike

6.5 CORRECTIVE ACTION

During any testing project, simple or complex, there is potential that deviations from data quality objectives may occur. This section gives corrective action procedures to be used to mitigate such problems.

6.5.1 EQUIPMENT FAILURE

The stack sampling contractor will bring spare meter boxes to the site. . Any equipment found to be out of calibration or operating improperly will be repaired or replaced before additional measurements are made. If equipment repair is done onsite, calibrations will be performed in accordance with the applicable methods prior to use. It may be necessary to transport equipment offsite for calibration. If calibrations cannot be performed, the equipment will not be used.

If measurements are made with equipment subsequently found to be out of calibration or operating improperly, a detailed explanation of the cause of the malfunction will be provided. The effect of the malfunction on the data will be assessed, and the data will be qualified.

6.5.2 ANALYTICAL DEVIATIONS

For analyses where a method QC check sample, such as a method blank, does not meet method specifications, the problem will be investigated to determine the cause as well as any corrective action that should be taken. Once the corrective action has been taken, the analysis will be re-examined to verify that the problem has been eliminated.

In instances of out of specification spikes or calibrations, the samples involved will be re-extracted or reanalyzed if possible. In those instances where reanalyzing the sample is not possible (e.g., the entire extract is consumed in the analysis), corrective measures will be taken to improve method performance prior to analysis of the next batch of samples.

6.5.3 CONTAMINATION

The handling procedures for sorbent traps and all other samples taken during this test project, from blank testing to sample collection and analysis, are designed to eliminate contamination by limiting their exposure to contaminants in the ambient air and other outside sources. If levels of contamination are present above the reporting limits in the analyzed blanks, the archived blank samples will be analyzed.

Corrective action will be taken if the results of the field blanks are significantly different from those of the reagent blanks. This comparison will indicate whether high levels in the field blank are due to contamination from exposure to outside sources, contamination of reagent materials or, in the case of sorbent traps, from degradation of the traps.

6.5.4 PROCEDURAL DEVIATIONS

Standard operating procedures for the air sampling methods being performed will be available onsite during all testing. CHESI and the project team will determine an appropriate action in all cases where standard procedures cannot resolve the problem.

7.0 CALIBRATION PROCEDURES AND PREVENTATIVE MAINTENANCE

This section presents a brief discussion of calibration and routine maintenance procedures to be used for sampling and analytical equipment. Criteria for analytical calibrations are also included. Calibration procedures for each analytical method are discussed in detail within the methods themselves.

7.1 SAMPLING EQUIPMENT

All air sampling equipment will be provided by the stack sampling contractor. The equipment will be calibrated prior to arrival onsite and after all testing has been completed. The sampling equipment calibration requirements and acceptance limits are listed in Table 7-1.

The equipment will be calibrated according to the criteria specified in the reference method being employed. In addition, the stack sampling contractor will follow the guidelines set forth in the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods. When these methods are inapplicable, methods such as those prescribed by the ASTM International (ASTM) will be used. Dry gas meters, orifices, nozzles, and pitot tubes are calibrated in accordance with these documents. The range of the calibration is specified for all environmental measurements to encompass the range of probable experimental values. This approach ensures that all results are based upon interpolative analyses rather than extrapolative analyses. Calibrations are designed to include, where practical, at least three or four measurement points evenly spaced over the range. This practice minimizes the probability that false assumptions of calibration linearity will be made.

In addition, it is common practice to select, when practical, at least one calibration value that approximates the levels anticipated in the actual measurement.

Data obtained during calibrations are recorded on standardized forms, which are checked for completeness and accuracy. Data reduction and subsequent calculations are performed using computer software. Calculations are checked at least twice for accuracy. Copies of calibration forms will be included in the test reports.

7.1.1 PITOT TUBES

Each pitot tube is inspected in accordance with the geometry standards contained in USEPA Method 2. A calibration coefficient of 0.84 is assigned for each pitot tube.

7.1.2 DIFFERENTIAL PRESSURE GAUGES

Fluid manometers do not require calibration other than leak checks. Manometers are leak-checked in the field prior to each test series and again upon completion of testing.

Table 7-1. Sampling Equipment Calibration Requirements

Stack Gas Parameter	Quality Parameter	Method of Determination	Frequency	Criteria
Gas flow	Pitot tube angle and dimensions	Measurements with a vernier micrometer and angle indicator	Initially and If Visible Inspections Indicate Damage or Misalignment. Visible Inspections Conducted Pre-test and post-test	To specifications in USEPA Method 2
	Barometer	Calibrated vs. National Weather Service station	Pre-test and post-test	Within 0.1 in. Hg
	Stack gas thermocouple	Calibrated vs. Calibrated Digital Thermometer	Pre-test and post-test	Within 1.5% as °R
Isokinetic sampling trains	Dry gas meter	Calibrated with critical orifices	Every 6 months	ALT-009 – Yqa within +/-5%
	Probe nozzle	Measurements with a vernier micrometer to 0.001 in.	Pre-test	Maximum difference in any two dimensions within 0.004 inches
	Dry gas meter thermocouples	Calibrated vs. NIST traceable thermometer	Every 6 months	Within 1.5% as °R
	Trip balance	Calibrated vs. standard weights	Pre-test	Within 0.5 grams
Carbon dioxide and oxygen analyzers (EPA Method 3A)	System calibration error test (3-point)	Checked using USEPA Protocol 1 calibration gases	Daily and after any failed system calibration error (2-point) or drift check	± 0.5% CO_2 or O_2
	System calibration error test (2-point)	Checked using USEPA Protocol 1 calibration gases	Before and after each test run	± 0.3% CO_2 or O_2
	System drift check	Checked using USEPA Protocol 1 calibration gases	After the post-run calibration error test	± 0.5% CO_2 or O_2

The frequency and objective provided for each parameter are based on specifications in the analytical method, and as demonstrated by the laboratory.

7.1.3 DIGITAL TEMPERATURE INDICATOR

One digital temperature indicator is used to determine the stack gas temperature, probe temperature, oven temperature, impinger outlet temperature, and dry gas meter temperature. The digital temperature indicator is calibrated over a sixteen-point range (0 to 1,200°F) using an NIST traceable thermometer as a reference. The calibration is acceptable if the agreement is within ±1.5 percent in degrees Rankin (°R) in the temperature range of 492 to 654°R (32 to 194°F).

7.1.4 DRY GAS METER AND ORIFICE

A calibrated critical orifice set is used to calibrate the dry gas meter and orifice. The full calibration procedure is used to obtain the calibration factor of the dry gas meter at the time of purchase and a three-point calibration is used thereafter on a semiannual basis. A post-test calibration check is performed during each field use by USEPA Alternate Test Method 009. If Y deviates by more than 5%, the meter is recalibrated.

7.1.5 BAROMETER

The stack sampling contractor personnel will calibrate the barometer prior to arrival onsite against a National Weather Service (NWS) station.

7.1.6 NOZZLE

Glass or Teflon coated stainless steel nozzles will be calibrated onsite using a micrometer. Three readings will be across separate measurement lines and the arithmetic average of the values obtained during the calibration is used.

7.1.7 CONTINUOUS EMISSIONS MONITORS

. The monitors will be calibrated according to the procedures outlined in the test methods.

7.2 ANALYTICAL EQUIPMENT

Analytical equipment calibration and QC procedures and internal QC checks are included to ensure accuracy of the measurements made by laboratory equipment. Table 7-2 provides a summary of the calibration and QC checks included for each analytical method for this test program.

7.3 WASTE SPIKING EQUIPMENT

A calibration check of the spiking equipment (scales, pumps, flow meters) using standard operating procedures will be performed prior to the CPT. These procedures are the same as those used for plant CMS equipment as stated in the CMS PET Plan.

7.4 PREVENTATIVE MAINTENANCE

To ensure the quality and reliability of the data obtained, preventative maintenance is performed on the sampling and analytical equipment. The following sections outline those procedures.

7.4.1 SAMPLING EQUIPMENT

The potential impact of equipment malfunction on data completeness is minimized through two complimentary approaches. First, an in-house equipment maintenance program is part of routine operations. The maintenance program's strengths include:

- Availability of personnel experienced in the details of equipment maintenance and fabrication;
- Maintenance of an adequate spare parts inventory; and
- Availability of tools and specialized equipment.

For field equipment, preventive maintenance schedules are developed from historical data. Table 7-3 gives specific maintenance procedures for field equipment. Maintenance schedules for major analytical instruments (e.g., balances, GCs) are based on the manufacturer's recommendations.

Table 7-2. Summary of Analytical Equipment Calibration and Quality Control Checks

Parameter	Quality Control Check	Method of Determination	Frequency	Acceptance Criteria
Particulate matter	Calibration check	Class S weights	Daily	≤0.5 milligrams
Hydrogen chloride, and chlorine	Initial calibration	Four levels	Initially and as needed	$r^2 \geq 0.995$
	Continuing accuracy check	Instrument calibration verification (ICV)	Following initial calibration	ICV ±10% difference
	Continuing calibration	Midpoint standard (CCV)	Every 10 samples	CCV ±10% difference
Antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, nickel, and selenium	Initial calibration	Calibration blank with at least one standard	Daily before analysis	Analysis of second calibration standard ±10 % difference
	Calibration check	ICV	Following initial calibration	ICV ±10% difference with RSD <5% from replicate (minimum of two) integrations
	Serial dilution	Five-fold dilution of sample digestate	1 per batch	For samples >50x instrument detection limit (IDL), dilutions must agree within 10%.
	Interference check	Interference check sample (ICS) A /AB analysis	Beginning of sequence	1. <2x RL for applicable analytes 2. Recovery ±20% (as applicable)
	Continuing calibration	Continuing calibration verification (CCV)	Every 10 samples and at the end of the sequence	CCV ± 10% difference with RSD <5% from replicate (minimum of two) integrations
Mercury	Initial calibration	Calibration blank and five standards	Daily before analysis	$r^2 \geq 0.995$
	Calibration check	ICV	Following initial calibration	ICV ±10% difference

Table 7-2. Summary of Analytical Equipment Calibration and Quality Control Checks

Parameter	Quality Control Check	Method of Determination	Frequency	Acceptance Criteria
Mercury (cont'd)	Continuing calibration	CCV	Every 10 samples and at the end of the sequence	CCV ±20% difference
Dioxins/furans	Mass scale calibration	Tuning using PFK	Prior to initial calibration, before each 12-hour shift	• Measured mass of PFK within 5 ppm of exact mass (m/z 380.9760) • Resolving power at reduced accelerating voltage > 10,000 at m/z 380.9760
	Retention time window verification and GC column performance (resolution check)	Monitor retention times and resolution	Prior to initial calibration, before each 12-hour shift	Resolution of 2,3,7,8-TCDD from nearest non-2,3,7,8-TCDD isomer • %Valley ≤ 25%
	Initial Calibration (ICAL)	Linearity check at five concentration levels and retention time window verification	Prior to analysis, repeat as needed	Relative Response Factors (RRF): • %RSD ± 20% for unlabeled standards • %RSD ± 30% for labeled standards Other criteria • S/N ratios ≥ 10 • Isotopic ratios within control limits
	Continuing Calibration	Linearity check at mid concentration level and retention time window verification	Beginning and end of each 12-hour shift	%Difference (%D) of RRF from ICAL average RRF • %D ≤ 20% for unlabeled standards • %D ≤ 30% for unlabeled standards Other criteria • Mass scale calibration within specifications • S/N ratios ≥ 10 • Isotopic ratios within control limits
	Laboratory Method Blanks	Analyze Method blank after calibration standard and before the first sample	Once per sample batch (maximum 20 samples)	Target compound concentrations • Concentration ≤ lower quantitation level
	Laboratory Control Sample	Analyze LCS after calibration standard and before the first sample	Once per sample batch (maximum 20 samples)	Within established control limits

Table 7-2. Summary of Analytical Equipment Calibration and Quality Control Checks

Parameter	Quality Control Check	Method of Determination	Frequency	Acceptance Criteria
Dioxins/furans (cont'd)	Internal standard spikes	Internal standards in all samples; analyzed and quantified	Every sample (including method blanks and all QC samples)	%Recovery of internal standards Within established laboratory control limits 40-135%
	Glass fiber filter surrogate and XAD-2 resin sampling recovery	Spike filter before preparation, spike XAD-2 sample tubes	Every filter before preparation and each XAD-resin tube	% Recovery of surrogates 70-130%
Semivolatile POHC	Initial Calibration (ICAL)	Linearity check at five concentration levels and retention time window verification	Prior to analysis, repeat as needed	Relative Response Factors (RRF): • %RSD ± 20% for standards Other criteria • S/N ratios ≥ 10 • Isotopic ratios within control limits
	Continuing calibration	Midlevel standard	Prior to sample analysis, then every 12 hours or after sample set	RRF for CCCs within 20% of ICAL average RRF. SPCCs greater than or equal to 0.05.
	Consistency in chromatography	For MS methods, monitor internal standard retention time and area. For non-MS methods, monitor retention time window for compounds of interest.	Every sample, standard, and blank	Retention time within 30 seconds of last calibration check. Area within -50 to +100% of last calibration check
	Calibration check	Analysis of independent calibration check standard	In association with each initial calibration	Within 3 std. deviations of historical mean (laboratory specific)
	Method Blank	Analysis of blank	Analyze one with each analytical batch	Results less than method detection limit
	Laboratory Method Blanks	Analyze Method blank after calibration standard and before the first sample	Analyze one with each analytical batch	Target compound concentrations ≤ lower quantitation level
	Laboratory Control Sample	Analyze LCS after calibration standard and before the first sample	Analyze one with each analytical batch	Within established control limits
	Internal standard spikes	Internal standards in all samples; analyzed and quantified	Every sample (including method blanks and all QC samples)	%Recovery of internal standards Within established laboratory control limits 30-120%

Table 7-2. Summary of Analytical Equipment Calibration and Quality Control Checks

Parameter	Quality Control Check	Method of Determination	Frequency	Acceptance Criteria
Semivolatile POHC (cont'd)	Glass fiber filter surrogate and XAD-2 resin sampling recovery	Spike filter before preparation, spike XAD-2 sample tubes	Every filter before preparation and each XAD-resin tube	% Recovery of surrogates 50-150%

The frequency and objective provided for each parameter are based on specifications in the analytical method, and as demonstrated by the laboratory.

Table 7-3. Maintenance Activities for Field Sampling Equipment

Equipment	Maintenance Activity	Spare Parts
Vacuum system	Before and after field program: 1) Check oil and oiler jar. 2) Leak check. 3) Vacuum gauge is functional. Yearly or as needed: 1) Replace valves in pump.	Spare fluid
Inclined manometer	Before and after each field program: 1) Leak check. 2) Check fluid for discoloration or visible matter. Yearly or as needed: 1) Disassemble and clean. 2) Replace fluid.	Spare fluid, O-rings
Dry gas meter	Before and after each field program: 1) Check meter dial for erratic rotation. Every 3 months: 1) Remove panels and check for excessive oil or corrosion. 2) Disassemble and clean.	None
Nozzles	Before and after each test: 1) No dents, corrosion, or other damage. 2) Glass or quartz nozzles, check for chips and cracks.	Spare nozzles
Diaphragm pump	Before and after each test: 1) Leak check. Change diaphragm if needed.	None
Miscellaneous	Check for availability of spare parts	Fuses, fittings, thermocouples, thermocouple wire, variable transformers.

7.4.2 ANALYTICAL EQUIPMENT

In addition to including QC checks in the analysis of test program samples, the laboratories also perform regular inspection and maintenance of the laboratory equipment. Table 7-4 lists some of the routine maintenance procedures associated with the analytical equipment to be used in this test program.

Table 7-4. Maintenance Activities for Analytical Equipment

Parameter	Equipment	Maintenance Procedures
Hydrogen chloride and chlorine	Ion chromatograph	-Check pump and gas pressure -Check all lines for crimping leaks and discoloration
Antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, nickel, and selenium	Inductively coupled plasma (ICP)	-Check gases, vacuum pump and cooling water, nebulizer, capillary tubing, peristaltic pump, high voltage switch, exhaust screens and torch, glassware, and aerosol injector tube -Clean plasma torch, nebulizer, and filters -Replace pump tubing -Clean and lubricate pump rollers, audit sampler arm -Clean and replace power unit and coolant water filters
Mercury	Atomic absorption analyzer	-Clean optic cell and tubing -Change stannous chloride and related tubing -Adjust/change mercury lamp
PM	Balance	-Daily calibrations, manufacturer performs any maintenance
Dioxins and furans and Semivolatile POHC	Gas Chromatograph/ Mass Spectroscopy (GC/MS)	-Change rotary pump oil -Clean beam center/focus stack, Y-lens stack, and outer source -Rinse ESA plates and flight tube -Bake flight tube -Change source slit

8.0 DATA REDUCTION, VALIDATION AND REPORTING

This section presents the approaches to be used to reduce, validate, and report measurement data. This discussion includes an annotated report outline and describes the reporting conventions that will be applied.

A quality team of companies and laboratories will be working together to ensure the success of this project. The team will make certain that:

- All raw data packages are paginated and assigned a unique project number. Each project number will reflect the type of analyses performed (i.e., organic, inorganic, waste feed, air emissions).
- The data packages contain a case narrative, sample description information, sample receipt information, COC documentation, and summary report. All associated QA/QC results, run/batch data, instrument calibration data, sample extraction/preparation logs, and chromatograms, etc., will be included in the final laboratory report.
- If any data results are determined to be invalid for whatever reason, this data will be identified in the case narratives, in the executive summary of the final report, and highlighted or noted in the appropriate data tables in the final report.
- These data are assigned to a specific appendix in the emissions sampling report for easy reference and data review.

The project team routinely compiles large emission test reports that contain all the information in an organized fashion.

8.1 DATA REDUCTION

The methods referenced in this QAPP for field measurements and lab analyses are standard methods and are routinely used for such measurements and analysis. Data reduction procedures will follow the specific calculations presented in the reference methods.

Extreme care will be exercised to ensure hand recorded data are written accurately and legibly. Additionally, prepared and formatted data recording forms will be required for all data collection. This is an important aid to verify that all necessary data items are recorded. The collected field and laboratory data will be reviewed for correctness and completeness.

The stack sampling contractor will reduce and validate all the sampling and field measurement data that are collected. The sampling data will include flow measurements, calibrations, etc. Each laboratory will reduce all analytical results prior to submission. The analytical data will be used to determine concentrations and emission rates of the compounds of interest. The manner in which the derived quantities will be reported is discussed in Section 8.3.

8.2 DATA VALIDATION

Validation demonstrates that a process, item, data set, or service satisfies the requirements defined by the user. For this program, review and evaluation of documents and records will be performed to assess the validity of samples collected, methodologies used, and data reported. This review comprises three parts: review of field documentation, review of laboratory data reports, and evaluation of data quality.

The sampling and analytical methods for this program have been selected because of their accepted validity for these types of applications. Adherence to the accepted methods, as described in this QAPP, is the first criterion for validation. The effectiveness of the analytical methods as applied to this particular study will be evaluated based on project-specific quality indicators, such as audit samples, replicate samples, and matrix and surrogate spikes.

8.2.1 REVIEW OF FIELD DOCUMENTATION

Sample validation is intended to ensure that the samples collected are representative of the population under study. Criteria for acceptance include positive identification, documentation of sample shipment, preservation, and storage, and documentation demonstrating adherence to sample collection protocols and QC checks.

As part of the review of field documentation, field data sheets and master logbooks will be checked for completeness, correctness, and consistency. The following specific items will be checked:

- Sample collection date;
- Sample identification, type, and volume;
- Analysis requested;
- Any comments that may affect interpretation of results;
- Number of required field QC samples (i.e., field blanks, field duplicate samples, MSs);
- Sample tracking documentation; and
- Documentation of calibration procedures for field instruments and other field parameters, such as iso-kinetics, temperatures, volumes, and sampling durations.

8.2.2 LABORATORY REVIEW OF DATA REPORTS

The representative from each laboratory will approve all data results. The representative's signature will be included in the report. This signature will indicate that all QA/QC expectations were met. If expectations were not met, the discrepancies will be explained in the laboratory case narrative. The laboratory representatives will discuss the QA/QC issues and include the impact of these issues on the data results in the case narrative.

Laboratory raw data packages will include the following information:

- A table of contents for the raw data; and
- Numbered pages, correlating to the table of contents, and
- Subject tabs will be included for each parameter.

8.2.3 REVIEW OF LABORATORY DATA REPORTS

The project team will perform a qualitative evaluation of the reported data to verify:

- Adherence to holding time requirements;
- Completeness of target analyte lists;
- Correctness of reporting limits;
- Correctness and consistency of measurement units;
- Inclusion of necessary flags and meaningful comments regarding data;
- Adherence to specified analytical methodologies; and
- Sample tracking documentation.

8.2.4 EVALUATION OF DATA QUALITY

The project team will review field and laboratory documentation to assess the following indicators of data quality:

- Integrity and stability of samples;
- Performance of instruments used for analysis;
- Possibility of sample contamination;
- Identification and quantitation of analytes; and
- Precision; and
- Accuracy.

This review will be based on evaluation of documentation by the laboratory project manager, laboratory technical reviewers, and stack sampling contractor personnel for each of the following, as appropriate to the analytical method:

- Analytical and preparation methods used;
- Sample preservation and custody documentation;
- Instrument tuning - mass spectrometer;
- Initial calibration;
- Continuing calibration verification;
- Blank analyses;
- Duplicate samples;

- LCS analyses;
- Surrogate spike analyses; and
- MS analyses.

Review of the above documentation will result in an evaluation of the following parameters:

- Maximum holding time for samples from date of collection to date of preparation and/or analysis;
- Sample storage conditions during the holding period prior to analysis;
- Method used to tune and calibrate instruments;
- Tuning and calibration acceptance criteria;
- Frequency of required blank sample analyses; and
- Frequency and type of performance evaluation (audit) sample analyses.

8.3 DATA REPORTING

All data will be reported in the appropriate units as applicable to the sample stream and the method of analysis. Waste feed analytical results will be reported as concentrations by weight. Emission results will be reported as appropriate for compliance on a concentration basis and/or a mass emission rate basis.

8.4 REPORT CONTENTS

The CPT report will be submitted to NDEE within 90 days of completing the testing as required by Subpart EEE (40 CFR 63.1207(j)(1)) or an extension will be requested. The Notification of Compliance (NOC) and CPT Report itself will be submitted in both electronic and hard copies. The appendices and analytical data packages will be provided in electronic portable document format (PDF). Figure 8-1 is a general CPT report outline.

Figure 8-1. Example Test Report Outline

NOTIFICATION OF COMPLIANCE
1.0 SUMMARY OF TEST RESULTS
 1.1 HWC MACT CPT RESULTS
 1.2 OPERATING PARAMETER LIMITS
 1.3 DEVIATIONS FROM THE APPROVED CPT PLAN AND THEIR IMPACTS
2.0 INTRODUCTION/PROCESS DESCRIPTION
 2.1 BRIEF UNIT DESCRIPTION
 2.2 TEST OBJECTIVES OVERVIEW
  2.2.1 APPLICABLE EMISSIONS STANDARDS
  2.2.2 TEST OPERATING OBJECTIVES
  2.2.3 PLANNED TEST PROTOCOL
 2.3 TEST RESPONSIBLE PARTIES
 2.4 TEST CHRONOLOGY
 2.5 CONTINUOUS MONITORING SYSTEMS
 2.6 PROCESS FLOW DIAGRAM
3.0 OPERATING PARAMETER DATA SUMMARY
4.0 FEEDSTREAM SAMPLING AND ANALYSIS
 4.1 SAMPLING LOCATIONS
 4.2 SAMPLING AND ANALYTICAL METHODS
 4.3 CHARACTERIZATIONS
 4.4 HWC MACT CONSTITUENT AND POHC FEED RATES
5.0 HWC MACT COMPLIANCE RESULTS
 5.1 DIOXINS AND FURANS
 5.2 METALS
 5.4 HYDROGEN CHLORIDE AND CHLORINE
 5.5 PARTICULATE MATTER
 5.6 DESTRUCTION AND REMOVAL EFFICIENCY (DRE)
 5.7 CONTINUOUS EMISSIONS MONITORING
 5.8 METALS EXTRAPOLATION
 5.9 CONTINUOUS MONITORING SYSTEM (CMS) PERFORMANCE EVALUATION
6.0 OTHER HAZARDOUS WASTE OR AIR PERMIT-BASED RESULTS
7.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) DOCUMENTATION
 7.1 SUMMARY OF QA/QC DATA QUALITY ASSESSMENT
  7.1.1 QA/QC ACTIVITIES AND IMPLEMENTATION
  7.1.2 AUDITS
  7.1.3 DATA VALIDATION
  7.1.4 EXAMPLE CALCULATIONS
 7.2 SUMMARY OF DEVIATIONS FROM THE APPROVED QAPP
 7.3 LABORATORY ACCREDITATIONS
 7.4 RESUMES

LIST OF APPENDICES
APPENDIX A STACK SAMPLING REPORT
APPENDIX B WASTE SAMPLING REPORT
APPENDIX C SPIKING REPORT
APPENDIX D SUMMARY ANALYTICAL DATA
APPENDIX E-1 CEMS PERFORMANCE EVALUATION REPORT
APPENDIX E-2 CMS PERFORMANCE EVALUATION REPORT
APPENDIX F EXAMPLE CALCULATIONS
APPENDIX G PROCESS OPERATING DATA
APPENDIX H FIELD LOGS
APPENDIX I ALTERNATIVE MONITORING APPLICATION AND APPROVALS

8.5 REPORTING CONVENTIONS

Specific procedures will be followed when reporting test results. This section describes the conventions for detection limits, correction of data due to background contamination, and the use of significant figures, as applicable.

8.5.1 MANAGEMENT OF NON-DETECTS

There are several specific situations that will arise in which calculations will need to be performed, but the analytical results are non-detects (at some level). This section presents a series of conventions that will be used for dealing with those situations.

For the HWC NESHAP compliance demonstrations, CHESI will rely on the reporting limits (RLs) and method detection limits (MDLs) for the analytical methods. For DRE and SRE (system removal efficiency) calculations, a non-detect in a waste feed and waste feeds not analyzed for POHCs will be treated as having zero concentration for the purposes of calculation, and a non-detect in the emissions will be treated as the RL or MDL (with a less-than sign) for the purposes of calculation. This will provide for the most conservative estimate of emission rates, DREs and SRE in assessing the performance of the incinerator. Note that calculations of emissions using non-detects will be reported as maxima (i.e., with a less-than sign – “<”) and determinations of DRE and SRE using non-detects will be reported as minima (i.e., with a greater-than sign – “>”).

In cases where there is more than one component of a sampling train whose results are combined, the following guidelines will be used:

- All components of a train (or combined analysis) are non-detects. In this case, the various detection limits will be summed. (Example: If the three separate fractions for Method 0023A ODBC are all reported as <40, <40, and <10 ng per fraction, the summed result would be less than (40 + 40 + 10) or <90 ng. This provides a conservative estimate of the emissions).
- One or more components of a train (or combined analysis) are non-detects, and there is at least one positive result. In this case, the non-detects and the positive results are summed and reported as a maximum. (Example: Analysis of the components of a metals train shows <1.0 ug lead in the front-half fraction and 30 ug lead in the back-half fraction. The result would be reported as <31 ug for the entire train).

The stack gas will be sampled for dioxins/furans using a SW-846 Method 0023A sampling train. The Method 0023A sampling train will be analyzed for dioxins/furans via Method 8290 [high resolution gas chromatography/high resolution mass spectrometry (HRGC/HRMS)]. At 40 CFR 63.1208(b)(1)(iii), the HWC MACT rule requires that the Method 0023A sampling train be operated for a minimum of 180 minutes (3 hours) to sample a minimum of 2.5 dry standard cubic meters (dscm) of stack gas during each sampling run so that any 2,3,7,8-chlorinated dioxin/furan congener that is non-detect may be counted as zero. The

Method 0023A sampling train will be operated for the minimum specified time and to obtain the minimum specified volume.

These procedures for handling non-detects will be communicated to each laboratory and the stack sampling contractor. The laboratories will be instructed to define and provide all detection/reporting limits for each tested parameter in their laboratory documentation. These detection and reporting limits will be summarized in the CPT reports.

8.5.2 BACKGROUND/BLANK CORRECTION

Some of the methods specified for use in this test program allow background or blank correction (e.g., Method 29 for metals). Every effort will be made to use reagents and sampling media of the highest quality to ensure that no contamination is indicated in any of the blank samples. If background contamination is found, any background or blank correction will be carefully documented, and all calculations (e.g., emission rates) will be developed using both corrected and uncorrected data. All corrections will be performed according to the applicable method.

8.5.3 ROUNDING AND SIGNIFICANT FIGURES

Observational results will be made with as many significant figures as possible. Rounding will be deferred until all resultant calculations have been made. The following rules will be applied in rounding data:

- When the digit after the one to be rounded is less than five, the one to be rounded is left unchanged; and
- When the digit after the one to be rounded is greater than or equal to five, the one to be rounded is increased by one.

Analytical data are typically reported to three (3) significant figures. The HWC MACT rule at 40 CFR 63.1219(d) states:

> *"The emission limits provided by paragraphs (a) and (b) of this section are presented with two significant figures. Although you must perform intermediate calculations using at least three significant figures, you may round the resultant emission levels to two significant figures to document compliance."*

Intermediate results, typically to three significant or more figures, will be presented in the final report at an appropriate level of significance (i.e., rounded), although the derived, or resultant, calculations will be based on unrounded intermediate data. All final emissions compliance and performance data will be reported to two (2) significant figures. Zeros after the decimal point preceding the first non-zero digit are not significant figures, e.g., 0.00073 has only two (2) significant figures. Accordingly, the "9"s preceding the first non-nine (non-9) digit in destruction and removal efficiency (DRE) and system removal efficiency (SRE) values are not significant figures, e.g., 99.99973 has only two (2) significant figures. As such, it may not always be possible to precisely reconstruct the resultant calculations on any particular table from the rounded intermediate results due to rounding errors.

9.0 QUALITY ASSURANCE REPORTS

Activities affecting data quality will be reviewed by the project team daily in the field, and as appropriate during non-field efforts. This will allow assessment of the overall effectiveness of the QAPP. These reviews will include the following:

- Summary of key QA activities, stressing measures that are being taken to ensure adherence to the QAPP;
- Description of problems observed that may impact data quality and corrective actions taken;
- Status of sample shipment and integrity at time of receipt and progress of sample analysis;
- Assessment of the QC data gathered over that time period;
- Any changes in QA organizational activities and personnel; and
- Results of internal or external assessments and the plan for correcting identified deficiencies, if any.

The testing program to be conducted at CHESI will have multiple tiers of QA/QC reviews. The specific laboratory performing the analysis will review the data they are responsible for, and the laboratory project manager will sign the analytical data reports. Any QA/QC anomalies will be discussed in the case narrative. The stack sampling company and testing consultant will also review the laboratory data package to discuss how the QA/QC anomalies may impact the emissions calculations. The CHESI Performance Test Manager will perform a final overall review of all reported results. Any data that is determined to be invalid will be stated in the final report, and the impact of the invalid data on the test program will be assessed. Through this multiple tier process, all stages of the testing program will be tracked, monitored, reviewed, and documented.

10.0 REFERENCES

1) USEPA. November 1986 and updates. Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, Third Edition. USEPA 530/ SW-846.

2) USEPA. 1994. Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods. Office of Research and Development. EPA/600/R-94/038C.

3) USEPA. February 1991. Preparation Aids for the Development of Category I Quality Assurance Project Plan. Office of Research and Development. EPA/600/8-91/003.

4) USEPA. 1990. Handbook: QA/QC Procedures for Hazardous Waste Incineration. Office of Research and Development. EPA/625/6-89/023.

5) USEPA. New Source Performance Standards, Test Methods and Procedures, Appendix A, 40 CFR Part 60.

ATTACHMENT A

RESUMES

Resumes will be provided just prior to the CPT when the contractors are selected.

APPENDIX B

CONTINUOUS MONITORING SYSTEMS PERFORMANCE EVALUATION TEST PLAN CLEAN HARBORS ENVIRONMENTAL SERVICES, INC. TRAIN 2 INCINERATION SYSTEM AIR QUALITY CONSTRUCTION PERMIT CP23-003 EPA ID NED 981 723 513

PREPARED FOR:

CleanHarbors ENVIRONMENTAL SERVICES®

CLEAN HARBORS ENVIRONMENTAL SERVICES, INC.
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KIMBALL, NE 69145

NOVEMBER 2023, REVISION 0
FOCUS PROJECT NO. P-001551

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List of Acronyms

AWFCO	automatic waste feed cutoff
CEM	continuous emission monitor
CEMs	continuous emission monitors
CEMS	continuous emissions monitoring system
CFR	Code of Federal Regulations
CMS	continuous process monitoring systems
CPMS	continuous monitoring systems
CPT	comprehensive performance test
DRE	destruction and removal efficiency
dP	differential pressure
FAP	Feedstream Analysis Plan
HWC	Hazardous Waste Combustors
ID	induced draft
LVM	low volatile metals
MACT	Maximum Achievable Control Technology
NDEE	Nebraska Department of Environment and Energy
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOC	Notification of Compliance
NO_X	nitrogen oxides
PET	performance evaluation test
PETP	performance evaluation test plan
PM	particulate matter
POHC	principal organic hazardous constituent
QAPP	quality assurance project plan
RCRA	Resource Conservation Recovery Act
SAM	shredder/auger machine
SCC	secondary combustion chamber
SRE	system removal efficiency
SO_2	sulfur dioxide
SSMP	startup, shutdown, and malfunction plan
SVM	semivolatile metals
WMDS	waste material data sheet
VFD	variable frequency drive

1.0 INTRODUCTION

Clean Harbors Environmental Services, Inc. (Clean Harbors) is submitting this continuous monitoring systems (CMS) performance evaluation test (PET) plan in accordance with Title 40 Code of Federal Regulations (CFR) Part 63, Section 1207(b)(1). This test plan describes the CMS PET that Clean Harbors will conduct for the new Train 2 Incineration System (Train 2) located at the Kimball, Nebraska facility as part of the comprehensive performance test (CPT). The Clean Harbors incineration system is regulated under 40 CFR Part 63 Subpart EEE, the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Hazardous Waste Combustors (HWC).

1.1 FACILITY OVERVIEW

Clean Harbors operates a hazardous waste treatment, storage, and disposal facility (TSDF) located in an industrial area south of Kimball, Nebraska. The commercial function of the facility is to thermally treat (incinerate) hazardous and non-regulated materials, rendering the residue ash acceptable for disposal at regulated Subtitle C landfills. The facility currently operates a fluidized bed incineration system (Train 1) at this location. The new Train 2 Incineration System is a rotary kiln equipped with a secondary combustion chamber (SCC) and associated air pollution control (APC) system. The facility identification and contact person are:

Facility Name:	Clean Harbors Environmental Services, Inc.
Physical Address:	2247 South Highway 71 Kimball, NE 69145
EPA ID Number:	NED 981 723 513
Facility Contact:	Alyssa King, Environmental Compliance Manager
Telephone No.:	(308) 235-8212
E-mail:	king.alyssa@cleanharbors.com.

1.2 HAZARDOUS WASTE COMBUSTOR OVERVIEW

The new Train 2 Incineration System consists of a rotary kiln, a SCC, a gas conditioning system, and an APC system. Wastes are processed in the rotary kiln and the SCC. Gases from the thermal treatment are routed to a spray dryer (to lower gas temperature) and then to the first baghouse. The gases upon exiting the first baghouse enter a saturator (to lower gas temperature further), and then flow through two parallel condenser columns. The gases are then reheated, activated carbon is injected, and further treated in a second baghouse. Upon exiting the second baghouse, the gases flow to a Selective Catalytic Reduction (SCR) De-NOx unit for nitrogen oxides (NO_X) removal before exiting through the stack.

1.3 REGULATORY OVERVIEW

The HWC NESHAP was promulgated under joint authority of the Clean Air Act Amendments of 1990 (CAAA) and Resource Conservation and Recovery Act (RCRA), and codified at 40 CFR Part 63, Subpart EEE. The Train 2 Incineration System is expected to begin operation in third or fourth calendar quarter 2024. In accordance with 40 CFR §63.1206(a)(1)(ii)(B), Train 2 is subject to the HWC NESHAP performance and emission standards for new source hazardous waste incinerators.

The emissions standards are based upon the maximum achievable control technology (MACT) for the source category. HWC NESHAP established emission standards for dioxins/furans, mercury, total chlorine (HCl/Cl_2), semivolatile metals – lead and cadmium (SVM), low volatile metals – arsenic, beryllium, and chromium (LVM), particulate matter (PM), carbon monoxide (CO), and hydrocarbon (HC) from both new and existing HWC sources. These new source standards appliable to Unit 2 are summarized in Table 1-1.

Table 1-1. New Incinerator Final Replacement Standards

Parameter	Units	Emission/Performance Standard
Dioxins and furans	ng TEQ/dscm [1]	0.11
Mercury	ug/dscm [1]	8.1
Semivolatile metals	ug/dscm [1]	10
Low volatile metals	ug/dscm [1]	23
Hydrogen chloride and chlorine	ppmv (dry) [1]	21
Particulate matter	gr/dscf [1]	0.0016
Carbon monoxide [2]	ppmv (dry) [1]	100
Total Hydrocarbon [2]	ppmv (dry) [1]	10
Destruction and removal efficiency	%	99.99

Notes:
[1] Emission standard corrected to seven (7) percent oxygen.
[2] Clean Harbors will demonstrate both carbon monoxide (CO) and hydrocarbon (HC) emissions during the CPT.

HWC NESHAP requires that facilities continuously monitor both process operations and emissions to ensure that the HWC is operating in compliance with the standards at all times. 40 CFR §63.1209(b)(1) requires that CMS be used to document compliance with the applicable HWC NESHAP operating parameter limits (OPLs). The performance of the CMS must be evaluated in conjunction with each CPT [40 CFR §63.1207(b)(1)]. This evaluation is referred to as the CMS PET. Facilities must document the protocol for each CMS PET in a CMS PET plan (CMS PETP) and must submit the plan for review and approval along with the CPT plan.

1.4 CONTINUOUS MONITORING SYSTEMS OVERVIEW

40 CFR §63.1209 of the HWC NESHAP specifies operating parameters that must be continuously monitored to demonstrate continuous compliance with the applicable emission standards. Table 1-2 presents a summary of the required OPLs for the Train 2 incineration system. The instruments listed in

Table 2-1 provide data that generates the parameters below, when they are not measured directly. The constituent feed limits below are calculated using the flow data combined with analytical data input to the control system from laboratory analysis and generator knowledge.

Table 1-2. Train 2 Applicable Operating Parameter Limits Summary

Operating Parameter	Applicable Emission Standard	Regulatory Citation[1]	Averaging Period
Minimum kiln combustion temperature	CO, THC, DRE, dioxin/furan [2]	(a)(7), (j)(1), (k)(2)	HRA
Minimum secondary combustion chamber temperature	CO, THC, DRE, dioxin/furan [2]	(a)(7), (j)(1), (k)(2)	HRA
Maximum stack gas flow rate	CO, THC, DRE, dioxin/furan, PM, SVM, LVM, Hg, HCl/Cl_2 [2]	(a)(7), (j)(2), (k)(3), (m)(2), (n)(5), (o)(2)	HRA
Maximum total hazardous waste feed rate to kiln	CO, THC, DRE, dioxin/furan [2]	(a)(7), (j)(3), (k)(4)	HRA
Maximum pumpable hazardous waste feed rate to kiln	CO, THC, DRE, dioxin/furan [2]	(a)(7), (j)(3), (k)(4)	HRA
Maximum total hazardous waste feed rate to the secondary combustion chamber	CO, THC, DRE, dioxin/furan [2]	(a)(7), (j)(3), (k)(4)	HRA
Maximum total system mercury feed rate [4]	Mercury	(l)(1)(i)	THRA
Maximum total system semivolatile metals feed rate [4]	SVM	(n)(2)(ii)	THRA
Maximum total system low volatile metals feed rate [4]	LVM	(n)(2)(ii)	THRA
Maximum total system pumpable low volatile metals feed rate [4]	LVM	(n)(2)(vi)	THRA
Maximum total system ash feed rate	PM	(m)(3)	THRA
Maximum total system chlorine feed rate	SVM, LVM, HCl/Cl_2	(n)(4), (o)(1)	THRA
Minimum condenser columns liquid nozzle pressure	Mercury, HCl/Cl_2	(l)(2), (o)(3)(iii)	HRA
Minimum condenser columns liquid flow rate	Mercury, PM, SVM, LVM, HCl/Cl_2, dioxin/furan	(l)(2), (m)(1)(C), (o)(3)(v), (n)(3), (k)(5)	HRA
Minimum condenser columns liquid pH	HCl/Cl_2	(o)(3(iv)	HRA
Maximum baghouse No. 2 inlet temperature	Dioxin/furan, SVM, and LVM	(k)(1)(i), (n)(1)	HRA
Minimum activated carbon feed rate	Dioxin/furan, mercury	(k)(6)(i), (l)(3)	HRA

Table 1-2. Train 2 Applicable Operating Parameter Limits Summary

Operating Parameter	Applicable Emission Standard	Regulatory Citation[1]	Averaging Period
Minimum activated carbon carrier fluid flow rate	Dioxin/furan, mercury	(k)(6)(ii), (l)(3)	HRA
Maximum stack carbon monoxide [2]	Carbon monoxide	1219(b)(5)(i)	HRA
Maximum stack hydrocarbon [2]	Hydrocarbon	1219(b)(5)(ii)	HRA
Maximum kiln pressure	Fugitive emissions	(p)	Instant-aneous [3]
Maximum secondary combustion chamber pressure	Fugitive emissions	(p)	Instant-aneous [3]
Minimum burner gun atomizing fluid pressure [4]	THC, DRE [2]	(a)(7), (j)(4)	HRA
Baghouse No. 2 bag leak detection system	Dioxin/furan, PM, SVM, and LVM	1206(c)(8)	NA

Notes:
[1] 40 CFR Part 63 Section 1209 unless otherwise noted.
[2] 40 CFR §63.1209(a)(7) requires that OPLs established to demonstrate compliance with DRE also be used to demonstrate compliance with the carbon monoxide and hydrocarbon emission standards.
[3] Due to the nature of kiln operation, these instantaneous pressure limits are established with a one-second delay, which reflects instrument reaction time.
[4] Applies to the individual burners and lances on the combustion unit.

1.5 CONTINUOUS EMISSIONS MONITORING SYSTEMS OVERVIEW

In addition to monitoring process parameters, facilities are also required by 40 CFR §63.1209(a) to continuously monitor the CO or THC concentrations in the HWC's stack gas to demonstrate compliance with the CO and THC standards. Additionally, facilities must use an oxygen continuous emissions monitoring system (CEMS) to correct the reported CO or THC concentrations to seven percent oxygen (7% O_2).

These analyzers must comply with the quality assurance (QA) procedures for CEMS contained in the Appendix to the HWC NESHAP and in Performance Specifications 4B (CO and O_2) and 8A (THC) contained in 40 CFR Part 60 Appendix B.

Clean Harbors has elected to continuously monitor the CO and THC concentrations in the incineration system stack gas. The CO and THC readings are continuously corrected to seven percent oxygen using measurements of the respective gas oxygen concentration. All these measurements are collected using the CEMS described in Section 3.

1.6 OPERATING PARAMETER LIMITS OVERVIEW

Clean Harbors has prepared this CMS PET plan following the regulations codified in 40 CFR §63 Subpart EEE for CMS PET evaluation in conjunction with the CPT.

With this CMS PET, Clean Harbors will demonstrate that the CMS are operating in compliance with the standards presented in the HWC NESHAP requirements (Subpart EEE) and in the NESHAP General Provisions contained in 40 CFR §63.1 through 63.15. More specifically, Clean Harbors will, in accordance with 40 CFR §§63.8(c)(2) and (c)(3), demonstrate that that applicable CMS are installed such that they can obtain representative measurements of the process or emissions parameter. This will include verification of proper installation, operation, and calibration of each applicable CMS.

This CMS PET plan includes both an internal and external QA program, as required by 40 CFR §63.8(e)(3). The internal QA program specifies the procedures that will be used to verify correct installation, calibration, and operation of each CMS device prior to the CPT. The external QA program provides information on data validation and documentation measures for the CMS PET. The remaining sections of this plan are organized as follows:

- Section 2 provides a detailed description of the CMS;
- Section 3 provides a detailed description of the CEMS;
- Section 4 provides a summary of the CMS performance evaluations that will be performed (internal QA program) and presents a schedule for the CMS PET;
- Section 5 provides information on the data validation and reporting procedures (external QA program); and
- Attachment 1 is a completion checklist for the CMS PET.

2.0 PROCESS MONITORS

40 CFR §63.1209(b)(1) requires that a facility use CMS to document compliance with the applicable OPLs of the HWC NESHAP. These required CMS must sample regulated operating parameters without interruption and must evaluate the detector's response at least once every 15 seconds. One-minute average (OMA) values are calculated and recorded for each OPL, and the appropriate rolling average – hourly rolling average (HRA) or 12-hour rolling average (THRA) – is calculated from the OMAs.

Table 2-1 provides a description of each monitor, including the tag number, instrument type, range, and calibration accuracy. The instruments described in the table reflect the process design at the time this plan was developed. These instruments may change due to the use of spare parts or replacement monitors. However, should these changes occur, the replacements will have equivalent or better performance than the instruments described herein.

Table 2-1. Summary of Train 2 Process Parameters

Parameter	Instrument Tag	Instrument Type	Programmed Span	Calibration Accuracy
Kiln liquid Lance Nos. 1 and 2 to Burner 370BUR400	370FT134	Coriolis flow meter	0 – 150 lb/min	± 1% of span
Kiln Lance No. 1 370BUR401	370FT154	Coriolis flow meter	0 – 150 lb/min	± 1% of span
Kiln Lance No. 3 to 370BUR403	370FT171	Coriolis flow meter	0 – 150 lb/min	± 1% of span
Kiln Lance No. 4 to 370BUR404	370FT414	Coriolis flow meter	0 – 150 lb/min	± 1% of span
Scale for Area 57A Container Feed to Kiln	SP-130	Scale	N/A	± 1% of span
Scale for Area 57A Container Feed to Kiln	SP-131	Scale	N/A	± 1% of span
Scale for Area 57B Container Feed to Kiln	SP-132	Scale	N/A	± 1% of span
Scale for Area 61A Container Feed to Kiln	SP-133	Scale	N/A	± 1% of span
Scale for Area 61B Container Feed to Kiln	SP-134	Scale	N/A	± 1% of span
Scale for Area 61C Container Feed to Kiln	SP-135	Scale	N/A	± 1% of span
Scale for Area 61C Container Feed to Kiln	SP-136	Scale	N/A	± 1% of span
Scale for Area 62 Container Feed to Kiln	SP-137	Scale	N/A	± 1% of span
Scale for Area 62 Container Feed to Kiln	SP-138	Scale	N/A	± 1% of span
Scale for Area 62 Container Feed to Kiln	SP-139	Scale	N/A	± 1% of span

Table 2-1. Summary of Train 2 Process Parameters

Parameter	Instrument Tag	Instrument Type	Programmed Span	Calibration Accuracy
Skip Hoist Bulk Feed to Kiln (Clamshell Weigh Cell)	390WT2304	Cable strain gauge	0-14,000 lbs	± 0.1% of full scale
Secondary combustion chamber Lance #1 to Burner #1 380BUR400	380FT319	Coriolis flow meter	0 – 4,500 lb/hr	± 1% of span
Secondary combustion chamber Lance #2 to Burner #2 380BUR401	380FT357	Coriolis flow meter	0 – 4,500 lb/hr	± 1% of span
Secondary combustion chamber Lance No. 3 380BUR402	380FT368	Coriolis flow meter	0 – 4,500 lb/hr	± 1% of span
Secondary combustion chamber Lance No. 4 380BUR403	380FT377	Coriolis flow meter	0 – 4,500 lb/hr	± 1% of span
Secondary combustion chamber Lance No. 5 380BUR404	380FT385	Coriolis flow meter	0 – 4,500 lb/hr	± 1% of span
Secondary combustion chamber Lance No. 6 380BUR405	380FT394	Coriolis flow meter	0 – 4,500 lb/hr	± 1% of span
Secondary combustion chamber Lance No. 7 380BUR406	380FT403	Coriolis flow meter	0 – 4,500 lb/hr	± 1% of span
Secondary combustion chamber Lance No. 8 380BUR407	380FT1416	Coriolis flow meter	0 – 4,500 lb/hr	± 1% of span
Secondary combustion chamber Lance No. 9 380BUR408	380FT1426	Coriolis flow meter	0 – 4,500 lb/hr	± 1% of span
Secondary combustion chamber Lance No. 10 380BUR409	380FT1435	Coriolis flow meter	0 – 4,500 lb/hr	± 1% of span
Aspirated drum waste feed to 380BUR-410	FIT-467/469/471	Coriolis flow meter	0 – 4,500 lb/hr	± 1% of span
Natural gas to kiln burner 370BUR400	370FT124	Natural gas meter	To be determined	To be determined
Natural gas to SCC burner 380BUR400	380FT282	Natural gas meter	To be determined	To be determined
Natural gas to SCC burner 380BUR401	380FT336	Natural gas meter	To be determined	To be determined
Kiln front wall shroud pressure	370PIT190A	Pressure transmitter	0 – 10 in. w.c.	± 1% of span
Kiln exit shroud pressure	370PIT190B	Pressure transmitter	0 –10 in. w.c.	± 1% of span
Kiln front wall pressure (draft)	370PIT188	Pressure transmitter	-5 – 10 in. w.c.	± 1% of span

Table 2-1. Summary of Train 2 Process Parameters

Parameter	Instrument Tag	Instrument Type	Programmed Span	Calibration Accuracy
Secondary combustion chamber inlet pressure (draft)	370PIT201	Pressure transmitter	-5 – 10 in. w.c.	± 1% of span
Kiln #1 combustion chamber temperature	370TI200A/B/C	Type S thermocouple	0 – 3,000°F	± 1% of span
Secondary combustion chamber temperature	380TI437A/B/C	Type K thermocouple	0 – 2,500°F	± 1% of span
Condenser 401 liquid feed pressure	385PIT583	Pressure transmitter	0 - 150 psig	± 1% of span
Condenser 402 liquid feed pressure	385PIT599	Pressure transmitter	0 - 150 psig	± 1% of span
Condenser 401 liquid flow rate	385FIT592	Magnetic flow meter	0 – 3,000 gpm	± 2% of span
Condenser 402 liquid flow rate	385FIT596	Magnetic flow meter	0 – 3,000 gpm	± 2% of span
Condenser inlet liquid pH	385AIT601A/B	pH transmitter	0 – 14 pH	± 0.1 pH
Baghouse #2 Activated carbon feed rate	385WE1593A/B	Weighing system and screw feeder	0 – 40 lb	± 1% of measured weight
Baghouse #2 Activated carbon carrier fluid flow rate	385FIT646	Thermal mass probe flow meter	0 – 80 scfm	± 3% of rate
Baghouse #2 inlet temperature	385TIT1201A	Resistance temperature detector	0 – 500 ºF	± 1% of span
Baghouse #2 broken bag detector	385AIT1212	Inductive particulate emissions monitor	0.5 – 500 mg/m^3	± 5% of range
Baghouse #2 pressure differential	385DP718A-B	DP transmitter	0 - 15 in w.c.	± 1% of span
Stack gas moisture	385AIT787A/B	Moisture/ Humidity Analyzer	6-30%	± 3% of span
Stack gas SO_2	385AIT790A/B/C	UV Fluorescence SO2 analyzer	0-500 ppm	± 3% of span
Stack gas CO	385AIT791A/B/C	Gas Filter Correlation	Dual Range: 0-200 ppm 0-3,000 ppm	± 3% of span
Stack gas NO_x	385AIT792A/B/C	Chemiluminescence NOx analyzer	Dual Range: 0-50 ppm 0-5,000 ppm	± 3% of span
Stack gas O_2	385AIT793A/B/C	Paramagnetic oxygen analyzer	0-25%	± 0.5% O_2
Stack gas flow rate	385FIT794	Stack gas flow meter	0 – 120,000 acfm	± 5% of span
Stack opacity (A or B)	385AIT795A/B	Double pass opacity monitor	0-100% opacity	± 1% of span

Table 2-1. Summary of Train 2 Process Parameters

Parameter	Instrument Tag	Instrument Type	Programmed Span	Calibration Accuracy
Stack temperature	385TIT796	Isolated thermocouple transmitter	0-500 °F	± 0.1% of mV input
DeNox duct total hydrocarbons	385AIT797A/B/C	Thermo THC analyzer	0-100 ppm	± 1% of span
Stack pressure	385PIT798	Pressure transmitter	0 –10 in. w.c.	± 1% of span
Kiln liquid feed Lances 1 & 2 to Burner 370BUR-400 atomizing fluid pressure	370PT139	Pressure transmitter	0 - 150 psig	± 1% of span
Kiln liquid feed Lance #1 370BUR-401 atomizing fluid pressure	370PT159	Pressure transmitter	0 - 150 psig	± 1% of span
Kiln liquid feed Lance #3 370BUR-403 atomizing fluid pressure	370PIT176	Pressure transmitter	0 - 150 psig	± 1% of span
Kiln liquid feed lance #4 370BUR-404 atomizing fluid pressure	370PIT419	Pressure transmitter	0 - 150 psig	± 1% of span
SCC Burner No. 1 atomizing fluid pressure (380BUR400)	380PT302	Pressure transmitter	0 - 150 psig	± 1% of span
SCC Burner No. 2 atomizing fluid pressure (380BUR401)	380PT345	Pressure transmitter	0 - 150 psig	± 1% of span
SCC Lance No. 3 atomizing fluid pressure (380BUR402)	380PIT373	Pressure transmitter	0 - 150 psig	± 1% of span
SCC Lance No. 4 atomizing fluid pressure (380BUR403)	380PIT382	Pressure transmitter	0 - 150 psig	± 1% of span
SCC Lance No. 5 atomizing fluid pressure (380BUR404)	380PIT390	Pressure transmitter	0 - 150 psig	± 1% of span
SCC Lance No. 6 atomizing fluid pressure (380BUR405)	380PIT399	Pressure transmitter	0 - 150 psig	± 1% of span
SCC Lance No. 7 atomizing fluid pressure (380BUR406)	380PIT408	Pressure transmitter	0 - 150 psig	± 1% of span
SCC Lance No. 8 atomizing fluid pressure (380BUR407)	380PIT1422	Pressure transmitter	0 - 150 psig	± 1% of span
SCC Lance No. 9 atomizing fluid pressure (380BUR408)	380PIT1431	Pressure transmitter	0 - 150 psig	± 1% of span
SCC Lance No. 10 atomizing fluid pressure (380BUR409)	380PIT1440	Pressure transmitter	0 - 150 psig	± 1% of span

Table 2-1. Summary of Train 2 Process Parameters

Parameter	Instrument Tag	Instrument Type	Programmed Span	Calibration Accuracy
Condenser 401 pressure drop	385PD594-595	DP transmitter	0 – 100 in. w.c.	± 1% of span
Condenser 402 pressure drop	385PD597-598	DP transmitter	0 – 100 in. w.c.	± 1% of span

Note: Individual waste feeds rates at ports are not required OPLs but must be monitored to calculate the required OPLs for total and pumpable waste feed rates to kiln and SCC.

2.1 COMBUSTION CHAMBER TEMPERATURE

The temperature of each combustion chamber is continuously monitored per 40 CFR §§ 63.1209(a)(7), (j)(1), and (k)(2) to demonstrate compliance with the HC and D/F emission standards and the DRE performance standard. The continuous measurements are used to calculate OMAs and HRAs. The HRA values are compared to the OPL to demonstrate compliance with the HWC NESHAP. There are two combustion chambers in the incineration system: the Kiln and the SCC.

Clean Harbors measures the temperature in the SCC using three identical temperature measurement devices. Each SCC temperature measurement device consists of a Type K thermocouple and transmitter, all located in the SCC gas exit duct. One of the thermocouples will always be on-line when hazardous waste is being fed to the SCC and will be the thermocouple used to trigger an automatic waste feed cutoff (AWFCO). The other two thermocouples provide backup systems. If the selected primary thermocouple goes out of range or fails, the system will switch to one of the backup thermocouples. A minimum of one of the three thermocouples must be operational for waste to be fed to the kiln.

Similarly, the temperature in the Kiln exit duct to the SCC is measured with three identical measurement devices. Each Kiln temperature measurement device consists of a Type J thermocouple and transmitter. These thermocouples are located immediately above the entrance to the SCC, where kiln gases flow into it. One of the kiln thermocouples will always be on-line when hazardous waste is being fed to the kiln and will be the thermocouple used to trigger an automatic waste feed cutoff. The other two thermocouples provide backup systems If the selected primary thermocouple goes out of range or fails, the system will switch to one of the backup thermocouples. A minimum of one of the three thermocouples must be operational for waste to be fed to the kiln.

Table 2-1 provides the programmed range and calibration accuracy for all CMS devices. The calibration of each temperature transmitter is checked at least annually following site-specific procedures, as required by 40 CFR § 63.1209(b)(2)(i). Replacement with a factory-certified device is the default approach to annual calibration.

2.2 FLUE GAS FLOW RATE OR PRODUCTION RATE

The stack (flue) gas flow rate is continuously monitored per 40 CFR §§ 63.1209(a)(7), (j)(2), (k)(3), (l)(2), (m)(2), (n)(5), and (o)(2) to demonstrate compliance with the HC, D/F, Mercury, PM, SVM, LVM, and HCl/Cl_2 emission standards and the DRE standard. The continuous measurements are used to calculate OMAs and HRAs. The HRA values are compared to the OPL to demonstrate compliance with the HWC NESHAP.

Clean Harbors monitors the stack gas flow rate using an differential pressure instrument . The stack flow meter is comprised of dual probes, an ultra-low range differential pressure transmitter, and a temperature probe. Table 2-1 provides the programmed range and calibration accuracy for these devices. The stack flow meter calibration is checked semiannually following instrument and site-specific procedures.

2.3 TOTAL HAZARDOUS WASTE FEED RATE

The total hazardous waste feed rate to each feed location is continuously monitored per 40 CFR §§ 63.1209(a)(7), (j)(3), and (k)(4) to demonstrate compliance with the HC and D/F emission standards and the DRE performance standard. The continuous measurements are used to calculate OMAs and HRAs. The HRA values are compared to the OPL to demonstrate compliance with the HWC NESHAP.

The total waste feed rate to the kiln is determined by summing the flow rate measured by the liquid flow meters (main burner and separate lances) and the solid waste feed rate calculated by the control system. Solids feed rates are summed from the bulk feed rate, the shredder feed rate, and the drum/container weights for container direct feed. Pumpable waste feed rate for the kiln is determined by summing the liquid flow rates to the kiln main burner and separate lances, which are measured using Coriolis flow meters or loss in weight scale systems. The calibration of each flow meter is checked annually following plant and manufacturer recommended procedures. Scales, if installed and used, are calibrated quarterly.

The weight of the containerized waste (drums, boxes, etc.) is measured when the waste is received in the warehouse. An outside contractor checks the calibration of the warehouse scales on a semi-annual basis. The wastes are then bar-coded, and the weights and constituent concentrations for those streams are stored in the bar-code system. Before drums are processed in the kiln, the bar codes are scanned and this information, combined with the sequencing data for each container, is used by the control system to determine waste feed rate.

The bulk feeds are measured by the bulk feed metering conveyer located at discharge from the bulk feed system skip hoist. The metering conveyor is calibrated by an outside contractor on a quarterly basis.

Total waste feed rate to the SCC is determined by summing the flows measured by several different flow measurement devices. All waste to the SCC is pumpable waste therefore the pumpable waste feed is equal to the total waste feed to the SCC. The pumpable wastes fed to the SCC are measured by Coriolis flow meters. The main burners and lances are each equipped with Coriolis flow meters. Some liquids fed from containers may be measured by a scale - loss in weight system (to be installed) to determine the feed rate. Table 2-1 provides the programmed range and calibration accuracy for each flow meter. The calibration of each flow meter is checked annually following site specific procedures.

2.4 MERCURY FEED RATES

The feed rate of mercury to the entire incineration system is continuously monitored per 40 CFR 63.1209(l)(1) to demonstrate compliance with the mercury emission standards. The continuous measurements are used to calculate OMAs and THRAs. The rolling average values are compared to the OPLs to demonstrate compliance with the HWC NESHAP.

To determine total system mercury feed rate, Clean Harbors continuously monitors the feed rates of the hazardous waste to the entire incineration system. The CMS associated with these measurements are discussed in Sections 2.3. The mercury concentrations of the waste streams are determined in accordance with the HWC NESHAP feedstream analysis plan (FAP). The mercury concentration data generated is multiplied by the flows, and the products summed, to track total mercury feed rate to the system.

2.5 ASH FEED RATE

The ash feed rate to the entire incineration system is continuously monitored per 40 CFR 63.1209(m)(3) to demonstrate compliance with the PM emission standards. The continuous measurements are used to calculate OMAs and THRAs. The rolling average values are compared to the OPLs to demonstrate compliance with the HWC NESHAP.

As described for mercury, feed rates of individual wastes are multiplied by analytical data for ash content to track the total ash feed rate to the system.

2.6 SEMIVOLATILE METALS FEED RATES

The feed rate of SVM to the incineration system is continuously monitored per 40 CFR 63.1209(n)(2) to demonstrate compliance with the SVM emission standards. The continuous measurements are used to calculate OMAs and THRAs. The THRA values are compared to the OPLs to demonstrate compliance with the HWC NESHAP.

As described for mercury, feed rates of individual wastes are multiplied by analytical data for SVM content to track the total SVM feed rate to the system.

2.7 LOW VOLATILE METALS FEED RATES

The feed rate of LVM to the incineration system is continuously monitored per 40 CFR 63.1209(n)(2) to demonstrate compliance with LVM emission standard. The continuous measurements are used to calculate OMAs and THRAs. The THRA values are compared to the OPLs to demonstrate compliance with the HWC NESHAP.

As described for mercury, feed rates of individual wastes are multiplied by analytical data for LVM content to track the total LVM feed rate to the system. HWC MACT requires establishing total and pumpable LVM feed rate limits with pumpable be a subset of the total feed rate. The feed rates of individual pumpable wastes are multiplied by analytical data for LVM content to track the pumpable LVM feed rate to the system.

2.8 CHLORINE FEED RATES

The chlorine feed rate to the incineration system is continuously monitored to per 40 CFR 63.1209(n)(4) and (o)(1) to demonstrate compliance with the SVM, LVM and HCl/Cl2 emission standards. The continuous measurements are used to calculate OMAs and THRAs. The THRA values are compared to the OPL to demonstrate compliance with the HWC NESHAP.

As described for mercury, feed rates of individual wastes are multiplied by analytical data for chlorine content to track the total chlorine feed rate to the system.

2.9 CONDENSER/ SCRUBBER PRESSURE DROP

The pressure drop across the condensers is continuously monitored for informational purposes. An alternative monitoring request in accordance with 40 CFR 63.1209(g) was made concurrently with submission of the CPT plan to waive the pressure drop monitoring requirement described at 40 CFR 63.1209(l)(2) and (o)(3)(i) to demonstrate compliance with the mercury and HCl/Cl_2 emission standards. The continuous measurements are used to calculate OMAs and HRAs.

Clean Harbors measures the pressure drop using a differential pressure transmitter. Table 2-1 provides the programmed range and calibration accuracy for the device. The pressure transmitter calibration is checked semiannually following site-specific procedures.

2.10 CONDENSER/SCRUBBER LIQUID FEED PRESSURE

The liquid feed pressure to the scrubbers is continuously monitored per 40 CFR 63.1209(l)(2) and (o)(3)(iii) to demonstrate compliance with the mercury and HCl/Cl_2 emission standards. The continuous measurements are used to calculate OMAs and HRAs. The HRA values are compared to the OPL to demonstrate compliance with the HWC NESHAP.

Clean Harbors measures the liquid feed pressure using a pressure transmitter. Table 2-1 provides the programmed range and calibration accuracy for the device. The pressure transmitter calibration is checked semiannually following site specific procedures.

2.11 CONDENSER/ SCRUBBER LIQUID FLOW RATE

The liquid flow rate to the scrubber is continuously monitored per 40 CFR 63.1209(l)(2) and (o)(3)(v) to demonstrate compliance with the mercury and HCl/Cl_2 emission standards. The continuous measurements are used to calculate OMAs and HRAs. The HRA values are compared to the OPL to demonstrate compliance with the HWC NESHAP.

The water liquid flow rate is measured by a magnetic flow meter. Table 2-1 provides the programmed range and calibration accuracy for the device. The flow meter calibration is checked semiannually following site specific procedures.

2.12 CONDENSER/SCRUBBER LIQUID PH

The pH of the scrubber liquid to the condenser/scrubber inlet is continuously monitored per 40 CFR 63.1209(o)(3)(iv) to demonstrate compliance with the HCl/Cl_2 emission standard. The continuous measurements are used to calculate OMAs and HRAs. The HRA values are compared to the OPL to demonstrate compliance with the HWC NESHAP.

Clean Harbors measures the liquid pH using a pH electrode and transmitter. Table 2-1 provides the programmed range and calibration accuracy for the device. The pH analyzer and transmitter calibration is checked routinely following site specific procedures.

2.13 ACTIVATED CARBON FEED RATE

The feed rate of activated carbon, injected into the gas upstream of baghouse No. 2 is continuously monitored per 40 CFR 63.1209(k)(6)(i) and (l)(3) to demonstrate compliance with the D/F and mercury emission standards. The continuous measurements are used to calculate OMAs and HRAs. The HRA values are compared to the OPL to demonstrate compliance with the HWC NESHAP.

Clean Harbors monitors the feed rate of activated carbon using a weighing system incorporated into the carbon storage and feed system. These systems use a feed belt and integrated weigh scale to track the carbon feed rate. Table 2-1 provides the programmed range and calibration accuracy for this system. As required by 40 CFR 63.1209(b)(2)(ii), the carbon feed rate weight scale calibration is performed quarterly to ensure an accuracy of at least one percent of the weight being measured.

2.14 ACTIVATED CARBON CARRIER FLUID FLOW RATE

The activated carbon fluid flow rate is continuously monitored per 40 CFR 63.1209(k)(6)(ii) and (l)(3) to demonstrate compliance with the D/F and mercury emission standards. The continuous measurements are to calculate OMAs and HRAs. The HRA values are compared to the OPL to demonstrate compliance with the HWC NESHAP.

Clean Harbors monitors the activated carbon carrier fluid flow rate using a thermal mass flow transmitter with an in-line flow body probe. Table 2-1 provides the programmed range and calibration accuracy for the device. The flow meter calibration is performed annually following site-specific procedures.

2.15 BAGHOUSE NO. 2 INLET TEMPERATURE

40 CFR 63.1206(k)(1) and (n)(1) require that the inlet temperature to the baghouse be monitored to demonstrate compliance with the D/F, SVM, and LVM standards. The continuous measurements are used to calculate OMAs and HRAs. The HRA values are compared to the OPL to demonstrate compliance with the HWC NESHAP.

Clean Harbors monitors this temperature using a resistance temperature detector, documented in Table 2-1. This device is installed, maintained, and calibrated at least annually according to manufacturer's recommendations.

2.16 BAGHOUSE NO. 2 BAG LEAK DETECTION MONITORING

40 CFR 63.1206(c)(8)(i)(A) requires that facilities equipped with a baghouse install and continuously operate a bag leak detection system. The leak detection system must be capable of continuously detecting and recording PM emissions at concentrations of 1.0 milligram per actual cubic meter (mg/acm). Additionally, the HWC NESHAP requires that the system be installed and operated in accordance with available written USEPA guidance, or, if no guidance is available, manufacturer's specifications.

Clean Harbors operates a particulate emission monitor to comply with the HWC NESHAP requirements for bag leak detection monitors. The emission monitor is capable of detecting particles with diameters ranging from 0.3 micrometers (μm) and higher. The leak detection system continuously detects and records PM emissions at concentrations of 0.5 mg/acm to 500 mg/acm. Installation and operation of the system was performed in accordance with manufacturer's recommendations and USEPA guidance on leak detection systems, Fabric Filter Bag Leak Detection Guidance, EPA-454/R-98-015 (USEPA, 1997).

2.17 WASTE FIRING SYSTEM

40 CFR 63.1206(j)(4) requires that good engineering practice be deployed to ensure DRE performance of the incineration. While many of the instruments discussed throughout this plan are part of that practice, and the primary safety system for the unit, the Burner Management System (BMS), can also be described

as such. Specific pressure monitoring at each liquid injection burner or lance are tied to the atomizing fluid line (typically pressurized with compressed air) ensures that this fluid is sufficient to fully atomize the liquid flowing to the burner or lance. This in turn ensures proper combustion. These instruments are listed in Table 2-1 and incorporated into the CMS PET plan. The BMS also monitors the main burners for loss of flame, natural gas pressure and flow, and monitors energy content of feeds to the burners. Monitoring burner operations using the BMS helps to ensure safe and good combustion conditions.

2.18 COMBUSTION CHAMBER PRESSURE

Clean Harbors controls fugitive emissions by use of pressurized kiln shrouds (a double seal system) at each end of the rotary kiln. Under normal operating conditions, the entire incinerator (kiln and SCC) operates under negative pressure, i.e., less than ambient pressure. Combustion air is distributed to the combination burner in the front wall of the rotary kiln and to the combination burners in the SCC. An induced draft fan is used to draw combustion gases through the unit and maintain negative pressure in the incineration system. An emergency vent is located in the ductwork above the afterburner. It is normally sealed and only opens to the atmosphere in an emergency situation where downstream equipment would be damaged.

An alternative monitoring request in accordance with 40 CFR 63.1209(g) and 40 CFR 63.1206(c)(5)(i)(C) was made concurrently with submission of the CPT plan to comply with this monitoring requirement. Clean Harbors injects air into the inlet and outlet shrouds to maintain approximately 0.2 inches of water pressure or higher in the shrouds. During transient pressure spikes, the pressurized shrouds act as barriers to prevent any gas leaks from the combustion zone.

The alternative monitoring approach for controlling combustion leaks is in accordance with 40 CFR 63.1206(c)(5)(i)(C). The following operating limits apply to the shrouds and SCC based on the language in the alternative monitoring request:

(1) CHESI will inject air into the kiln inlet and the outlet shrouds such that the difference between pressure in each shroud and the SCC will be at least 0.2 inches of water column;

(2) CHESI will measure pressures in the SCC and in both kiln shrouds on a continuous basis. The pressure differential OPL and AWFCO for each kiln shroud are set independent of each other;

(3) If at any time the pressure in the SCC is greater than the pressure of either of the kiln shrouds, the AWFCO will be triggered instantaneously;

(4) If the kiln shroud fan fails and the pressure in the SCC is greater than ambient pressure (0 inches water column) for a period of more than one second, an AWFCO will be triggered; and

(5) If the pressure in the SCC is greater than ambient pressure (0 inches of water column) but still less than the kiln shroud pressures for more than 10 seconds, an AWFCO is triggered.

The "instantaneous AWFCO" in all the above conditions means that the waste feed is cut off within one second of any pressure OPL exceedance, provided the pressure is measured on a continuous basis in the SCC and the kiln shrouds.

The pressures in the Kiln shrouds and the SCC are measured using pressure transmitters and differential pressure transmitters. Table 2-1 provides the programmed range and calibration accuracy for these devices. The calibration of each transmitter is checked semiannually following site-specific procedures.

2.19 BAGHOUSE NO. 2 PRESSURE DROP

In addition to specific OPLs in the regulations (inlet temperature, bag leak detection systems), other baghouse related operating parameters are monitored in accordance with the manufacturer specifications and based on Clean Harbors experience. Total baghouse pressure drop is monitored for both baghouses as indicator of baghouse condition. Pressure drop in baghouse No. 2 is monitored for informational purposes and used as part of the baghouse automatic cleaning control system. Baghouse cleaning (pulsing of the bags in a cell to remove solids) can be initiated based on pressure drop across individual cell. The automatic cleaning system is setup so that at a preset pressure drop the cleaning cycle will be initiated.

Clean Harbors measures the total pressure drop across baghouse No. 2 using differential pressure transmitters. Individual cells in the baghouse is monitored using the differential pressure transmitters. Table 2-1 provides the programmed range and calibration accuracy for the device. The calibration of the pressure transmitters is checked semiannually following site-specific procedures.

3.0 CONTINUOUS EMISSIONS MONITORING SYSTEMS

3.1 HWC MACT COMPLIANCE

The stack gas CO or THC concentrations must be continuously monitored with a CEMS to satisfy the requirements of 40 CFR 63.1209(a) and to demonstrate compliance with the CO and THC emission standards. The continuously measured values must be corrected to seven percent oxygen using measurements of the stack gas oxygen concentration that are also collected using a CEMS.

Clean Harbors monitors the CO, THC, and oxygen concentrations in the incineration system's exhaust stack to comply with these requirements. HWC NESHAP requires that the CO and O_2 CEMS comply with Performance Specification 4B in 40 CFR Part 60, Appendix B. The THC CEMS must comply with Performance Specification 8A in 40 CFR Part 60, Appendix B. These CEMS are configured as follows:

- CO CEMS: A minimum of two ranges, with span values of zero to 200 parts per million by volume (ppmv) for the low range, and zero to 3,000 ppmv for the high range.
- CO CEMS: Anytime a reading of the CO monitor exceeds 3,000 ppmv, the CEMS records the value as 10,000 ppmv.
- HC CEMS: Single range of 0-100 ppmv.
- O_2 CEMS: A single range with a span value of zero to 25 percent oxygen by volume on a dry basis.

Currently, Clean Harbors utilizes three Teledyne API T300M Gas Filter Correlation or equivalent analyzers to monitor CO emissions. The measured CO concentrations are corrected to seven percent oxygen using a paramagnetic oxygen analyzer. Three HC analyzers, ThermoFisher 51iHT FTIR Total Hydrocarbon or equivalent, are also deployed. The units are configured as parallel systems so that two sets of instruments can be in calibration (or otherwise out of service) while the third is in operation.

The CO and O_2 CEMS sample the system exhaust gas at the stack. The stack gas is sampled using heated sample filters and lines, routed to the CEMS. For the CO and O_2 CEMS, prior to entering the analyzer, the gas sample is cooled with a specially designed condenser to preclude water entering the analyzer, and filtered again. A sample pump draws the gas sample to each CEMS from the stack. The CO and O_2 CEMS values are on a dry basis. The O_2 CEMS values are used to correct the CO CEMS values to seven percent oxygen.

The THC CEMS samples the system exhaust gas in the DeNOx inlet duct. The system exhaust gas is sampled using heated sample filters and lines, routed to the CEMS. For the THC CEMS, prior to entering the analyzer, the hot gas sample is filtered again. A sample pump draws the gas sample to the CEMS from the DeNOx duct. A moisture analyzer in the stack is used to correct the THC values to dry basis. The dry O_2 CEMS values are used to correct the moisture-corrected THC CEMS values to seven percent oxygen.

Clean Harbors maintains redundant sets of analyzers to ensure an analyzer is on-line whenever waste is being burned, even during the daily calibration periods. The CO and O_2 analyzers are calibrated daily in accordance with the Appendix to 40 CFR 63, Subpart EEE requirements. Each analyzer is checked daily for zero and calibration drift. The analyzers are also checked on a quarterly basis by the performance of a Gas Cylinder Audit (CGA), also called an Absolute Calibration Audit (ACA). The CO and O_2 analyzers are certified on a yearly basis by the performance of a Relative Accuracy Test Audit (RATA) by an independent contractor.

Each THC analyzer is checked daily for zero and calibration drift. The analyzers are also checked on a quarterly basis by the performance of a CGA. Performance Specification 8A does not require the THC monitors to undergo a yearly RATA, but simply quarterly CGAs.

3.2 AIR QUALITY CONSTRUCTION PERMIT COMPLIANCE

Clean Harbors also operates SO_2 and NO_X CEMS to demonstrate compliance with the Air Quality Construction Permit. Three UV fluorescence analyzers are used to monitor SO_2 emissions. Three chemiluminescence analyzers are used to monitor NO_X emissions. These CEMS are also configured as parallel systems so that two sets of instruments can be in calibration (or otherwise out of service) while the third is in operation.

The stack gas is sampled using heated sample filters and lines, routed to the CEMS. Like the CO and O_2 CEMS, the gas samples for SO_2 and NO_X analysis are cooled with a specially designed condenser to preclude water entering the analyzers, and filtered again. A sample pump draws the gas sample to each CEMS from the stack. The SO_2 and NO_X CEMS values are on a dry basis. Moisture corrected stack flow data is used to continuously calculate the mass emission rates of SO_2 and NO_X for Air Quality Construction Permit compliance.

The SO_2 and NO_X analyzers are maintained in accordance with Performance Specification 2 in 40 CFR Part 60, Appendix B. The analyzers are calibrated daily with each analyzer checked for zero and calibration drift. The SO_2 and NO_X analyzers are also checked on a quarterly basis by the performance of a CGA and certified on a yearly basis by the performance of a RATA by an independent contractor.

4.0 INTERNAL QUALITY ASSURANCE PROGRAM

40 CFR 63.8(e)(3) requires that the CMS PET plan include an internal QA program that specifies the procedures that will be used to verify correct installation, calibration, and operation of each CMS device prior to the CPT. Additionally, the CMS PET plan must provide a schedule for the program's implementation. This section provides an overview of the required program and the anticipated test schedule.

4.1 INSTALLATION CHECKS

During the CMS PET, installation checks will be performed on each of the HWC NESHAP required CMS to verify that they are installed in accordance with manufacturer recommendations and plant internal standards. These checks include verifying proper orientation of the CMS and looking for evidence of corrosion or excessive buildup.

4.2 OPERATIONAL CHECKS

Operational checks will also be performed on each of the CMS to verify that they are operating properly. These operational checks will vary depending upon the diagnostic capabilities of the instrument. For those CMS equipped with internal diagnostic test routines, Clean Harbors will activate the routine, if necessary, and will review the instrument display for error codes after the diagnostic test is complete.

Absent such a diagnostic routine, Clean Harbors will observe the CMS during normal unit operation and will confirm that changes are registered with known changes in process conditions. CGAs and RATAs will be performed as applicable for each CEMS.

4.3 CALIBRATION CHECKS

In addition to verifying proper installation and operation of each CMS, Clean Harbors will also check the calibration of each CMS during the CMS PET. Clean Harbors will perform complete calibrations of the CMS if the calibration checks indicate the potential for an unacceptable amount of bias in the instrument readings.

Clean Harbors utilizes various site-specific procedures to check the calibration of the CMS installed on the incineration system. A description of the general procedure that will be employed for each CMS during the CMS PET is provided in Table 4-1.

Table 4-1. Calibration Check Procedures

Device Type	Summary of Calibration Check Procedure
Thermocouples and temperature transmitters	Check the transmitter's calibration by simulating an input signal and verifying the transmitter's output.
Air flow transmitter	A differential pressure is applied across the flow meter at both the zero and span values. Adjustments are made at both points until the measurements are within five percent of the span value from the applied value.
Coriolis and magnetic flow meters	Flow meters are zeroed. To complete the zeroing, the process line upstream and downstream of the flow meter is filled with process fluid. The meter's zero reading is then adjusted as necessary until it is within one percent of the span value from zero.
Pressure and differential pressure transmitters	A differential pressure is applied across the transmitter at both the zero and span values. Adjustments are made at both points until the measurements are within one percent of the span value from the applied value.
On-line pH analyzer and transmitter	The pH measurement device is removed from the system for calibration and placed in a series of certified buffer solutions. Two buffer solutions are used: pH 4 and pH 7. Adjustments are made to the transmitter at both pH levels if the measured values are not within ±0.1 pH of the buffer solution pH.
Weighing system and mechanical screw feeder	The weight measurement system is calibrated using a three-point technique. Three different test weights are applied to the measurement system, and the reported value is compared to the known value of the applied test weight. If the reported reading differs from the test weight by less than one percent of the weight being measured, no further adjustment is necessary.
Baghouse leak detection systems	Conduct sensitivity check of the system by injecting dust into the flue gas upstream of the probe. Confirm that known changes in PM emissions cause a proportional change above the baseline signal.
Continuous emissions monitoring systems	Automatic daily calibration check is performed.

4.4 INTERNAL QUALITY ASSURANCE PROGRAM SCHEDULE

The activities designated for the internal QA program requires careful planning and substantial time to complete. In fact, in some cases, it may be necessary to shut down the incineration system in order to complete the CMS PET activities. Clean Harbors will perform the CMS PET to provide ample time for maintenance, repair, or replacement of a CMS should the initial CMS PET indicate unacceptable performance of the device.

5.0 EXTERNAL QUALITY ASSURANCE PROGRAM

The external QA program required by 40 CFR 63.8(e)(3) includes those procedures utilized to validate the data collected during the CMS PET and to document the CMS PET activities. The primary goal of the external QA program is proper collection and organization of test data followed by clear and concise reporting of the test results. Details on the external QA program for this CMS PET are provided in this section.

5.1 TEST PERSONNEL

The CMS PET activities described in this test plan will be performed by Clean Harbors instrumentation staff or qualified contractors. The personnel involved in each program element will be documented in the contractor's test logs and report.

5.2 REDUCTION OF TEST DATA

The data collected during the CMS PET will be compiled following test completion and will be included in the CMS PET report. Extreme care will be exercised by test personnel to ensure that all manually recorded data are written accurately and legibly. To help increase the quality and uniformity of the test data, electronic calibration documents will be developed for applicable equipment and provided to test coordinator in advance of test.

5.3 VALIDATION OF TEST RESULTS

After the CMS PET is performed, Clean Harbors will review the data recorded by the test personnel. When evaluating the data, Clean Harbors will make sure that the specified procedures were followed, the necessary forms were completed, and the results of each CMS installation, operation, and calibration check were successful. A preliminary review of the test results will be conducted following test completion prior to the CPT. A final validation of the test results will be performed prior to submittal of the CMS PET report.

5.4 REPORTING OF TEST RESULTS

The results of the CMS PET will be compiled and will be summarized in the CMS PET report, which will be prepared by a qualified contractor. The CMS PET report will provide the result of each CMS installation, operation, and calibration check The CMS PET report will be submitted to the NDEE as an appendix to the CPT report and Notification of Compliance within 90 days of completion of the testing as required by in accordance with 40 CFR §63.1207(j)(1). The report will document compliance or non-compliance with the data quality objectives specified in this CMS PET Plan.

ATTACHMENT 1:
CMS PET COMPLETION CHECKLIST

CMS PET Completion Checklist

DATE:______________________ **REVIEWER INITIALS:**_______________

Instrument Tag	Measured Parameter	Device Type	CMS PET Completed
370FT134	Kiln liquid Lance Nos. 1 and 2 to Burner 370BUR400	Coriolis flow meter	☐
370FT154	Kiln Lance No. 1 370BUR401	Coriolis flow meter	☐
370FT171	Kiln Lance No. 3 to 370BUR403	Coriolis flow meter	☐
370FT414	Kiln Lance No. 4 to 370BUR404	Coriolis flow meter	☐
SP-130	Scale for Area 57A Container Feed to Kiln	Scale	☐
SP-131	Scale for Area 57A Container Feed to Kiln	Scale	☐
SP-132	Scale for Area 57B Container Feed to Kiln	Scale	☐
SP-133	Scale for Area 61A Container Feed to Kiln	Scale	☐
SP-134	Scale for Area 61B Container Feed to Kiln	Scale	☐
SP-135	Scale for Area 61C Container Feed to Kiln	Scale	☐
SP-136	Scale for Area 61C Container Feed to Kiln	Scale	☐
SP-137	Scale for Area 62 Container Feed to Kiln	Scale	☐
SP-138	Scale for Area 62 Container Feed to Kiln	Scale	☐
SP-139	Scale for Area 62 Container Feed to Kiln	Scale	☐
390WT2304	Skip Hoist Bulk Feed to Kiln (Clamshell Weigh Cell)	Cable Strain Gauge	☐
380FT319	Secondary combustion chamber Lance #1 to Burner #1 380BUR400	Coriolis flow meter	☐

CMS PET Completion Checklist

DATE:____________________ **Reviewer Initials:______________**

Instrument Tag	Measured Parameter	Device Type	CMS PET Completed
380FT357	Secondary combustion chamber Lance #2 to Burner #2 380BUR401	Coriolis flow meter	☐
380FT368	Secondary combustion chamber Lance No. 3 380BUR402	Coriolis flow meter	☐
380FT377	Secondary combustion chamber Lance No. 4 380BUR403	Coriolis flow meter	☐
380FT385	Secondary combustion chamber Lance No. 5 380BUR404	Coriolis flow meter	☐
380FT394	Secondary combustion chamber Lance No. 6 380BUR405	Coriolis flow meter	☐
380FT403	Secondary combustion chamber Lance No. 7 380BUR406	Coriolis flow meter	☐
380FT1416	Secondary combustion chamber Lance No. 8 380BUR407	Coriolis flow meter	☐
380FT1426	Secondary combustion chamber Lance No. 9 380BUR408	Coriolis flow meter	☐
380FT1435	Secondary combustion chamber Lance No. 10 380BUR409	Coriolis flow meter	☐
FIT-467/469/471	Aspirated drum waste feed to 380BUR-410	Coriolis flow meter	☐
370FT124	Natural gas to kiln burner 370BUR400	Natural gas meter	☐
380FT282	Natural gas to SCC burner 380BUR400	Natural gas meter	☐
380FT336	Natural gas to SCC burner 380BUR401	Natural gas meter	☐
370PIT190A	Kiln front wall shroud pressure	Pressure transmitter	☐
370PIT190B	Kiln exit shroud pressure	Pressure transmitter	☐

CMS PET Completion Checklist

DATE:______________________ **Reviewer Initials:**_______________

Instrument Tag	Measured Parameter	Device Type	CMS PET Completed
370PIT188	Kiln front wall pressure (draft)	Pressure transmitter	☐
370PIT201	Secondary combustion chamber inlet pressure (draft)	Pressure transmitter	☐
370TI200A/B/C	Kiln #1 combustion chamber temperature	Type S thermocouple	☐
380TI437A/B/C	Secondary combustion chamber temperature	Type K thermocouple	☐
385PIT583	Condenser 401 liquid feed pressure	Pressure transmitter	☐
385PIT599	Condenser 402 liquid feed pressure	Pressure transmitter	☐
385FIT592	Condenser 401 liquid flow rate	Magnetic flow meter	☐
385FIT596	Condenser 402 liquid flow rate	Magnetic flow meter	☐
385AIT601A/B	Condenser inlet liquid pH	pH transmitter	☐
385WE1593A/B	Baghouse #2 Activated carbon feed rate	Weighing system and screw feeder	☐
385FIT646	Baghouse #2 Activated carbon carrier fluid flow rate	Thermal mass probe flow meter	☐
385TIT1201A	Baghouse #2 inlet temperature	Resistance temperature detector	☐
385AIT1212	Baghouse #2 broken bag detector	Inductive particulate emissions monitor	☐
385DP718A-B	Baghouse #2 pressure differential	DP transmitter	☐
385AIT787A/B	Stack gas moisture	Moisture/ Humidity Analyzer	☐
385AIT790A/B/C	Stack gas SO_2	UV Fluorescence SO2 analyzer	☐
385AIT791A/B/C	Stack gas CO	Gas Filter Correlation	☐
385AIT792A/B/C	Stack gas NO_x	Chemiluminescence NOx analyzer	☐

CMS PET COMPLETION CHECKLIST

DATE:______________________ **REVIEWER INITIALS:**_______________

INSTRUMENT TAG	MEASURED PARAMETER	DEVICE TYPE	CMS PET COMPLETED
385AIT793A/B/C	Stack gas O_2, dry basis	Paramagnetic oxygen analyzer	☐
385FIT794	Stack gas flow rate	Stack gas flow meter	☐
385AIT795A/B	Stack opacity (A or B)	Double pass opacity monitor	☐
385TIT796	Stack temperature	Isolated thermocouple transmitter	☐
385AIT797A/B/C	DeNox duct total hydrocarbons	Thermo THC analyzer	☐
385PIT798	Stack pressure	Pressure transmitter	☐
370PT139	Kiln liquid feed Lances 1 & 2 to Burner 370BUR-400 atomizing fluid pressure	Pressure transmitter	☐
370PT159	Kiln liquid feed Lance #1 370BUR-401 atomizing fluid pressure	Pressure transmitter	☐
370PIT176	Kiln liquid feed Lance #3 370BUR-403 atomizing fluid pressure	Pressure transmitter	☐
370PIT419	Kiln liquid feed lance #4 370BUR-404 atomizing fluid pressure	Pressure transmitter	☐
380PT302	SCC Burner No. 1 atomizing fluid pressure (380BUR400)	Pressure transmitter	☐
380PT345	SCC Burner No. 2 atomizing fluid pressure (380BUR401)	Pressure transmitter	☐
380PIT373	SCC Lance No. 3 atomizing fluid pressure (380BUR402)	Pressure transmitter	☐
380PIT382	SCC Lance No. 4 atomizing fluid pressure (380BUR403)	Pressure transmitter	☐
380PIT390	SCC Lance No. 5 atomizing fluid pressure (380BUR404)	Pressure transmitter	☐

CMS PET Completion Checklist

DATE:______________________ **Reviewer Initials:**_______________

Instrument Tag	Measured Parameter	Device Type	CMS PET Completed
380PIT399	SCC Lance No. 6 atomizing fluid pressure (380BUR405)	Pressure transmitter	☐
380PIT408	SCC Lance No. 7 atomizing fluid pressure (380BUR406)	Pressure transmitter	☐
380PIT1422	SCC Lance No. 7 8 atomizing fluid pressure (380BUR407)	Pressure transmitter	☐
380PIT1431	SCC Lance No. 8 9 atomizing fluid pressure (380BUR408)	Pressure transmitter	☐
380PIT1440	SCC Lance No. 9 10 atomizing fluid pressure (380BUR409)	Pressure transmitter	☐
385PD594-595	Condenser 401 pressure drop	DP transmitter	☐
385PD597-598	Condenser 402 pressure drop	DP transmitter	☐

APPLICATION FOR ALTERNATIVE MONITORING UNDER HAZARDOUS WASTE COMBUSTOR NESHAPS
(40 CFR Part 63 Subpart EEE)

CLEAN HARBORS ENVIRONMENTAL SERVICES, INC.
KIMBALL, NEBRASKA

Train 2 Incineration System
November 2023

Alternative Monitoring Request Summary

The Clean Harbors Environmental Services, Inc. (Clean Harbors) new Train 2 Incineration System, currently being constructed, is regulated under the National Emission Standards for Hazardous Air Pollutants (NESHAPS) for Hazardous Waste Combustors (HWC) as codified in Title 40 Code of Federal Regulations (CFR) Part 63, Subpart EEE. These regulations established performance and emission standards for existing and new hazardous waste incinerators. The Maximum Achievable Control Technology (MACT) standards are applicable to this new incineration system. The HWC MACT rule prescribes specific operating parameter limits (OPLs) to ensure compliance with the performance and emission standards. Since these limits apply to all hazardous waste incinerators, they are necessarily generic. The regulations [40 CFR 63.1209(g) and 40 CFR 63.1206(c)(5)(ii)(C)] provide a method to request alternate monitoring that reflects site-specific and equipment specific operating conditions. Clean Harbors is applying for alternate monitoring for two specific operating parameters for Train 2. The two alternatives are:

1) an alternative monitoring method for control of combustion leaks from the kiln and secondary combustion chamber, as allowed under 40 CFR 63.1206(c)(5)(i)(C), and
2) waiver from the use of pressure drop as an OPL for the low energy condenser/scrubbers (spray towers).

The requested alternative monitoring approach for control of combustion leaks has been approved for similar Clean Harbors incineration systems by USEPA Region 6 (Deer Park, Texas facility), by USEPA Region 8 (Aragonite, Utah facility), and Arkansas Department of Environmental Quality (ADEQ) (Eldorado, Arkansas facility). All these incineration systems are rotary kilns with secondary combustion chambers. The new incinerator Train 2 is based on the same type of design with a rotary kiln with secondary combustion chamber.

The requested waiver of the use of pressure drop for the low energy condenser/scrubbers has been approved by USEPA Region 6 for the Deer Park facility. The Deer Park facility uses two low energy scrubbers for removal of HCl/Cl_2. The Eldorado, Arkansas facility also uses two low energy scrubbers configured in parallel and substantially similar to the Unit 2 design. ADEQ approved the same type of alternative morning request. The previous reviews and approval of these alternative monitoring requests are directly applicable to Train 2.

The regulation [40 CFR 63.1209(g)(1)(iii)(A)] requires that a request for an alternative monitoring approach be prepared and submitted prior to or in conjunction with the submittal of the comprehensive performance test plan (CPT Plan). Clean Harbors is submitting this Alternative Monitoring Application (AMA) in conjunction with the submittal of the CPT Plan for Train 2.

Clean Harbors asks the Nebraska Department of Environment and Energy (NDEE) to review and approve this Alternative Monitoring Application request in a prompt manner in accordance with 40 CFR 63.1209(g)(1)(iii)(C).

The regulations cited above are included in this document for reference.

Site Information

Facility Location:

Clean Harbors Environmental Services, Inc.
2247 South Highway 71
Kimball, NE 69145

Train 2 Incineration System Permitting:

USEPA ID No. NED 981 723 513
Title V permit No. CP23-003
Air Quality Class I Operating Permit No. OP22R1-022

Clean Harbors Environmental Services, Inc. Contact:

Alyssa King
Environmental Compliance Manager
Clean Harbors Environmental Services, Inc.
2247 South Highway 71
Kimball, NE 69145
(308) 235-8212
king.alyssa@cleanharbors.com

Overview of Train 2 Incineration Unit

Clean Harbors is constructing the new Train 2 hazardous waste incinerator with an air pollution control system (APCS) to meet the HWC MACT rule requirements for new incinerators. The HWC MACT rule prescribes specific OPLs and interlocks to assure performance and emissions compliance.

Clean Harbors is submitting a CPT Plan for Train 2. The CPT design includes the selection of operating targets and associated OPLs in keeping with the regulations. The CPT Plan discusses each applicable OPL and the relationship to ensuring the performance and emission standards are met. The CPT Plan incorporates this request for alternative monitoring as part of the OPLs for Train 2. The CPT Plan also includes a discussion of the automatic waste feed cutoff (AWFCO) system used to ensure waste feed is stopped if an established OPL is exceeded. Please refer to the CPT Plan Section 2.0 for detailed information on the regulatory background and the basis for the selection of OPLs.

The new incineration system consists of a rotary kiln, a secondary combustion chamber (SCC), and an APCS. The APCS includes a spray dryer, a first baghouse, a saturator, two (2) low energy wet scrubbers (spray towers), a second baghouse with activated carbon injection, and a selective catalytic reduction (SCR) DeNOx unit. Wastes are fed to one of the primary feed locations: the rotary kiln and the SCC. The purpose of the rotary kiln is to process solid and liquid wastes before the resulting gases flow to the SCC. The gases generated in the kiln flow to the SCC for final thermal treatment. The slag or ash (inorganic and inert materials) remaining after thermal treatment in the kiln are removed via a wet deslagger with the solid residues ultimately sent to a hazardous waste landfill.

The SCC processes the combustion gas from the kiln, and combusts liquid and gaseous wastes. The SCC is designed to provide sufficient residence time and temperature to achieve the required destruction and removal efficiency (DRE) of 99.99% specified by the HWC MACT rule. Auxiliary fuel, typically natural gas, fuel oil, or clean fuels, is used to maintain combustion system temperatures when there is insufficient heat content in the waste feeds. Based on similar designs at other Clean Harbors facilities, DRE is expected to exceed 99.999% (5-9s) at maximum waste feed rate and maximum gas flow rate.

Combustion (i.e., flue) gases from the SCC are routed through a spray dryer to lower gas temperature via temperature controlled adiabatic evaporation of water atomized into the gas before entering the first baghouse (baghouse No. 1). The spray dryer uses combination of process water and blowdown from the condenser towers (brine water) as the water source. The baghouse removes the solids and dried salts formed from evaporation of the water in the spray dryer. Using the condenser towers blowdown in the spray dryer evaporates the water while removal of the formed salts results in a zero discharge of water from the APCS. The gas exits the baghouse and enters the saturator. The saturator rapidly adiabatically cools and saturates the combustion gases via recycled water sprays, conditioning the gas prior to entering the condensing towers (spray towers). The gas stream is split and passes into the two parallel condensing towers where it is further cooled via additional recycled water sprays, condensing some of the moisture carried with the gas. Heat is removed from the condenser recycled water via indirect cooling by in-line heat exchangers. The condenser towers are the primary APCS devices for scrubbing chlorine/chloride and removal of some mercury from the combustion gas. Sulfur dioxide (SO_2) is also removed in the condenser towers to ensure compliance with the Air Quality Construction Permit emission limit.

The gas flows from the two parallel condensing towers are recombined and are routed to an in-line reheater to raise the gas temperature above the dew point prior to entering the second baghouse (baghouse No. 2). Activated carbon is introduced into the gas prior to baghouse No. 2 for control of dioxins/furans and mercury. Baghouse No. 2 is the primary APCS device for the removal of particulate matter, low-volatile metals (LVM), and semi-volatile metals (SVM).

The treated combustion gas then passes through the induced draft (ID) fan and enters the SCR DeNOx system. The gas is heated and ammonia is injected into the gas prior to treatment by the catalyst. The SCR provides NOx destruction to meet the Air Quality Construction Permit requirement for NOx emissions. The gas exits the DeNOx unit and is discharged to the atmosphere through the stack. Continuous emission monitor systems (CEMS) monitor the emissions concentrations of carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide (SO_2), total hydrocarbons (THC), oxygen (O_2), moisture, and opacity. Gas flow rate is also monitored continuously at the stack.

The CPT Plan Section 4.0 provides more detail on the Train 2 system design and processes.

<u>Alternative Monitoring Parameter Requests</u>

This Alternative Monitoring Application request is specifically focused on two OPLs prescribed by the HWC MACT rule which Clean Harbors proposes variance. Both alternative monitoring requests have been previously approved by USEPA Regions 6 and 8, and by the States of Arkansas, Utah, and Texas for similarly designed and operated Clean Harbors incineration systems in those regions and states.

Clean Harbors is applying for variance from the same two alternate monitoring approaches for Train 2. The regulations that define the requirements of an alternative monitoring application are copied at the end of the document. The two parameters that this application addresses are:

1) Combustion chamber pressure (Combustor Unit - Kiln and SCC)
2) Low energy wet scrubber pressure drop (Spray Towers)

<u>Combustion Chamber Pressure - Control of Combustion System Leaks</u>

[40 CFR 63.1206(c)(5) and 40 CFR 63.1209(p)]

The HWC MACT rule at 40 CFR 63.1206(c)(5)(i) requires that combustion system leaks of hazardous air pollutants must be controlled by:

(A) keeping the combustion zone sealed to prevent combustion system leaks; or
(B) maintaining the maximum combustion zone pressure lower than ambient pressure using an instantaneous monitor; or

> *(C) upon written approval of the Administrator, an alternative means of control to provide control of combustion leaks equivalent to maintenance of combustion zone pressure lower than ambient pressure; or*
> *(D) upon written approval of the Administrator, other techniques which can be demonstrated to prevent fugitive emissions without use of an instantaneous pressure limits.*

Under normal operating conditions, the incinerator combustion zones (kiln and SCC) operate under negative pressure, i.e., lower than ambient pressure. Combustion air is distributed to the combination burner in the front wall of the rotary kiln and to the combination burners in the SCC. An induced draft fan is used to draw combustion gases through the system and maintain negative pressure in the combustion zones. An emergency vent is located in the ductwork above the SCC. The emergency vent is normally closed and only opens to the atmosphere in a malfunction situation or electrical power failure where downstream equipment would be thermally damaged.

The Clean Harbors combustion zones (kiln and SCC) are sealed except at the feed and discharge ends of the kiln. The rotating kiln is not completely sealed at the front feed wall or at the exit from the kiln, as the design must allow for the kiln to rotate. Kiln seals are installed at the feed and discharge ends of the kiln. These seals are designed in segments to surround the approximately 14-foot diameter of the kiln. The segments are notched to fit snuggly against the outer shell of the kiln. These seals reduce the amount of opening to less than 1/16 of an inch.

The Clean Harbors Train 2 is designed with the same unique approach to improve the kiln seal system that was developed and implemented at the Deer Park, Texas, Aragonite, Utah, and Eldorado, Arkansas facilities. A second set of seals are installed next to each primary seal, which allows air to be injected into a shroud between the two sets of seals such that positive pressure is maintained at the primary seal gap. Maintaining positive pressure in the shroud prevents fugitive emissions from escaping from around the seals even if the pressure in the kiln goes above ambient pressure, as long as the pressure at the shroud is higher than the pressure in the downstream SCC.

Combustion chamber pressure is measured and monitored at a pressure tap located at the kiln exit/SCC inlet. An additional pressure monitoring tap is located at the front wall of the kiln to provide the system operators with additional pressure (draft) information. The induced draft fan speed is controlled to keep the pressure in both the kiln and SCC below atmospheric pressure under normal operating conditions. Should any transient short duration pressure spikes occur, the kiln inlet and outlet shrouds, typically pressurized to 0.5 to 2 inches of water column, act as an alternative method of controlling combustion leaks that is equivalent to maintaining the pressure in the kiln below ambient pressure.

This unique pressurized double kiln seal design was first developed and installed by Clean Harbors at the Deer Park, Texas incinerators (two kilns - a 4.4 meter kiln and 3.6 meter kiln of same basic design as the Train 2 kiln). The same pressurized double seal design has since been also installed on the Clean Harbors Aragonite, Utah incinerator and the Unit 44 incinerator located at Eldorado, Arkansas, both of which are also similar diameter kilns with the same basic design as the Train 2 kiln.

As part of HWC MACT compliance, Clean Harbors submitted information on the design and operation of this pressurized shroud double seal system to USEPA Region 6, USEPA Region 8, and ADEQ as part of an Alternative Monitoring Application request. Clean Harbors requested that the following operating conditions and three (3) OPLs be approved as an alternative means to control and monitor combustion systems leaks under 40 CFR 63.1206(c)(5)(C):

1. Pressurize the kiln inlet and outlet shrouds to approximately 0.2 inches of water column (gauge pressure) or higher;
2. Monitor the pressure in the inlet and outlet shrouds and in the secondary combustion chamber;
3. Establish three OPLs that trigger an Automatic Waste Feed Cutoff:

a. If the pressure in the secondary combustion chamber is greater than the pressure in either the inlet or the outlet shroud;
b. If the pressure in the secondary combustion chamber is greater than zero inches of water column for more than 10 seconds, even if the pressure in the shrouds is higher than the SCC;
c. If the pressure in the secondary combustion chamber is greater than ambient pressure for more than 2 seconds during an operating period when the pressurizing equipment for the either shroud has failed.

4. If Clean Harbors exceeds any of these OPLs, the AWFCO system will engage.

Both USEPA Regions 6 and 8, and ADEQ, reviewed the Alternative Monitoring Application and approved the use of the pressurized double seals for the kilns with monitoring of the shroud pressures and the SCC pressure as an alternative monitoring approach. All three regulatory agencies approved the language for this alternative monitoring approach and this language is incorporated into the Notice of Compliance (NOC) and operating records for these units. The agency approvals are included in Attachments A and C.

Clean Harbors requests that NDEE approve the use of the same alternative monitoring approach for the control of combustion system leaks, as has been previously approved for the other Clean Harbors incinerators. Clean Harbors requests the same specific language that defines the monitoring, OPLs, and when an AWFCO occurs be applied to the new Train 2 incineration system.

Requested Alternative Monitoring for Control of Combustion System Leaks:

Clean Harbors controls fugitive emissions by use of kiln shrouds at each end of the rotary kiln. Under normal operating conditions, the induced draft fan maintains the maximum combustion zone pressure below ambient pressure. Clean Harbors injects air into the inlet and outlet shrouds to maintain approximately 0.2 inches of water pressure or higher in the shrouds. During transient pressure spikes, the pressurized shrouds act as barriers to prevent any gas leaks from the combustion zone. The following conditions apply to the shrouds:

(1) CHESI will inject air into the kiln inlet and the outlet shrouds such that the difference between pressure in each shroud and the SCC will be at least 0.2 inches of water column;

(2) CHESI will measure pressures in the SCC and in both kiln shrouds on a continuous basis. The pressure differential OPL and AWFCO for each kiln shroud are set independent of each other;

(3) If at any time the pressure in the SCC is greater than the pressure of either of the kiln shrouds, the AWFCO will be triggered instantaneously;

(4) If the kiln shroud fan fails and the pressure in the SCC is greater than ambient pressure (0 inches water column) for a period of more than one second, an AWFCO will be triggered; and

(5) If the pressure in the SCC is greater than ambient pressure (0 inches of water column) but still less than the kiln shroud pressures for more than 10 seconds, an AWFCO is triggered.

The "instantaneous AWFCO" in all the above conditions means that the waste feed is cut off within one second of any pressure OPL exceedance, provided the pressure is measured on a continuous basis in the SCC and the kiln shrouds.

Low Energy Wet Scrubber Minimum Pressure Drop [40 CFR 63.1209(o)(3)(ii)]

During the development of the HWC MACT required OPLs, USEPA established a limit for minimum pressure drop to ensure low energy scrubber/condenser performance in controlling HCl/Cl_2 emissions. The reasoning was that the pressure drop is considered an indicator of good mixing of the combustion gas and the scrubbing solution. A low-pressure drop may indicate poor mixing and poor efficiency in certain types of scrubbers. For low energy scrubbers (such as spray towers and packed bed scrubbers), USEPA established this OPL as an hourly rolling average (HRA) limit based on the manufacturer's specification. USEPA recognized that in low energy scrubbers, pressure drop is only a rough indicator of mixing and not an important parameter to maintain performance, as compared to high energy scrubbers.[1] The amount of mixing of the combustion gas and liquid phase in the Clean Harbors spray tower design is dependent on design specifications, which include spray nozzles, spray patterns, and contact time in the towers. These operating parameters are defined and monitored by scrubber liquid flow rate and scrubber liquid pressure. Scrubber minimum liquid flow rate, minimum liquid pressure, and maximum stack flow rate are OPLs that are already established by the HWC MACT rule to control the spray tower contact time and spray patterns. Pressure drop across the spray towers is not considered an important or key operating specification.

The wet scrubber minimum pressure drop OPL is based on the manufacturer's specification per 40 CFR 63.1209(o)(3)(ii). The manufacturer's specification for operating the Clean Harbors spray towers does not include a specification for minimum pressure drop. Bionomics, the manufacturer of the spray tower, has stated in a letter that there is no minimum pressure drop required for the spray tower operation and that pressure drop is not an important parameter for ensuring scrubbing efficiency. This letter is presented in Attachment B.

Clean Harbors is requesting alternate monitoring for this parameter, specifically its exclusion. Clean Harbors agrees with the manufacturer and with USEPA that pressure drop is at best a very coarse indicator of performance in low energy scrubbers - in the case of the Clean Harbors spray towers, it is too coarse of a measurement to provide any meaningful information. These units have a very low pressure drop by design, typically less than 1 inch of water column (inwc). The pressure drop remains constant over the short term, and therefore does not provide a timely indication of scrubber performance. Any changes in the scrubber's operating conditions (such as scale build up) that result in a change in pressure drop conditions will typically occur over a long period time, e.g. weeks, months. These long-term changes are appropriately tracked and identified with inspections and corrected with regular maintenance.

A minimum pressure drop interlock on a low energy low pressure drop spray tower would most likely never trip in a real scenario on this type of scrubber. Regular maintenance inspections would identify any problems before the pressure drop would decrease below a minimum level. Also, for the spray towers' pressure drop to fall below 0.5 inwc, a significant event would have to occur, disrupting the gas flow in the spray towers. This situation would also trip numerous other safety and/or compliance interlocks.

Clean Harbors operates spray tower low energy scrubbers on its Deer Park, Texas and Eldorado, Arkansas incinerators. The Deer Park facility submitted an alternative monitoring request to waive the use of minimum pressure drop as an OPL for the low energy scrubbers to USEPA Region 6. After review Region 6 approved the elimination of the minimum pressure drop OPL for the low energy scrubbers on both incinerator trains in Deer Park. A copy of the Region 6 approval letter is included in Attachment B. The approval of the waiver of the use of pressure drop is Request No. 2 in the USEPA Region 6 letter. Similar approval was received from ADEQ for the Eldorado, Arkansas incineration system.

The key OPLs for the low energy scrubbers (spray towers) are the water flow rate and gas flow rate [liquid to gas ratio (L/G)] as recognized by USEPA in the HWC MACT rule [40 CFR 63.1209(o)(2) and

[1] "NESHAPS: Final Standards for Hazardous Air Pollutants for Hazardous Waste Combustors; Final Rule," Federal Register, Vol. 64, No. 189 (September 30, 1999), pg. 52952.

1209(o)(3)(v)]. The liquid feed pressure also can impact the spray pattern and thus scrubbing efficiency. Clean Harbors will establish an OPL for minimum liquid feed pressure to the spray towers in keeping with the regulations [40 CFR 63.1209(o)(3)(ii)] and the manufacturer's specification. Clean Harbors will also maintain a minimum inlet liquid pH as required at 40 CFR 1209(o)(3)(iv).

Clean Harbors is requesting that the low energy scrubber minimum pressure drop OPL (based on the manufacturer's specification) be eliminated as a required OPL for Train 2. The key OPLs for the Train 2 spray towers are maximum gas flow (stack flow) and minimum liquid feed rate, which sets the minimum liquid to gas ratio for the scrubbers. Additional OPLs will be minimum inlet liquid pH and minimum liquid feed pressure (based on manufacturer's specification). The minimum liquid feed rate and liquid feed pressure, minimum inlet liquid pH, and maximum stack flow rate limits will adequately constrain the performance of the spray towers to optimum levels, meet the OPL requirement established in the regulations, and ensure compliance with HCl/Cl_2 emission standards.

Excerpts from the HWC MACT Rule

Alternative Monitoring Applications

§ 63.1209 (g) Alternative monitoring requirements other than continuous emissions monitoring systems (CEMS).

(1) Requests to use alternative methods.

(i) You may submit an application to the Administrator under this paragraph for approval of alternative monitoring requirements to document compliance with the emission standards of this subpart…

(A) The Administrator will not approve averaging periods for operating parameter limits longer than specified in this section unless you document using data or information that the longer averaging period will ensure that emissions do not exceed levels achieved during the comprehensive performance test over any increment of time equivalent to the time required to conduct three runs of the performance test.

(B) If the Administrator approves the application to use an alternative monitoring requirement, you must continue to use that alternative monitoring requirement until you receive approval under this paragraph to use another monitoring requirement.

(ii) You may submit an application to waive an operating parameter limit specified in this section based on documentation that neither that operating parameter limit nor an alternative operating parameter limit is needed to ensure compliance with the emission standards of this subpart.

(iii) You must comply with the following procedures for applications submitted under paragraphs (g)(1)(i) and (ii) of this section:

(A) Timing of the application. You must submit the application to the Administrator not later than with the comprehensive performance test plan.

(B) Content of the application. You must include in the application:

(1) Data or information justifying your request for an alternative monitoring requirement (or for a waiver of an operating parameter limit), such as the technical or economic infeasibility or the impracticality of using the required approach;

(2) A description of the proposed alternative monitoring requirement, including the operating parameter to be monitored, the monitoring approach/technique (e.g., type of detector, monitoring location), the averaging period for the limit, and how the limit is to be calculated; and

(3) Data or information documenting that the alternative monitoring requirement would provide equivalent or better assurance of compliance with the relevant emission standard, or that it is the monitoring requirement that best assures compliance with the standard and that is technically and economically practicable.

(C) Approval of request to use an alternative monitoring requirement or waive an operating parameter limit. The Administrator will notify you of approval or intention to deny approval of the request within 90 calendar days after receipt of the original request and within 60 calendar days after receipt of any supplementary information that you submit. The Administrator will not approve an alternative monitoring request unless the alternative monitoring requirement provides equivalent or better assurance of compliance with the relevant emission standard, or is the monitoring requirement that best assures compliance with the standard and that is technically and economically practicable. Before disapproving any request, the Administrator will notify you of the Administrator's intention to disapprove the request together with:

(1) Notice of the information and findings on which the intended disapproval is based; and

(2) Notice of opportunity for you to present additional information to the Administrator before final action on the request. At the time the Administrator notifies you of intention to disapprove the request, the Administrator will specify how much time you will have after being notified of the intended disapproval to submit the additional information.

(D) Responsibility of owners and operators. You are responsible for ensuring that you submit any supplementary and additional information supporting your application in a timely manner to enable the Administrator to consider your application during review of the comprehensive performance test plan. Neither your submittal of an application, nor the Administrator's failure to approve or disapprove the application, relieves you of the responsibility to comply with the provisions of this subpart.

Control of Combustion Leaks

§ 63.1206 (c)

(5) Combustion system leaks.

(i) Combustion system leaks of hazardous air pollutants must be controlled by:

(A) Keeping the combustion zone sealed to prevent combustion system leaks; or

(B) Maintaining the maximum combustion zone pressure lower than ambient pressure using an instantaneous monitor; or

(C) Upon prior written approval of the Administrator, an alternative means of control to provide control of combustion system leaks equivalent to maintenance of combustion zone pressure lower than ambient pressure; or

(D) Upon prior written approval of the Administrator, other technique(s) which can be demonstrated to prevent fugitive emissions without use of instantaneous pressure limits; and

(ii) You must specify in the performance test workplan and Notification of Compliance the method that will be used to control combustion system leaks. If you control combustion system leaks by maintaining the combustion zone pressure lower than ambient pressure using an instantaneous monitor, you must also specify in the performance test workplan and Notification of Compliance the monitoring and recording frequency of the pressure monitor, and specify how the monitoring approach will be integrated into the automatic waste feed cutoff system.

Monitoring Requirements - Combustion Chamber Pressure

§ 63.1209

(p) Maximum combustion chamber pressure. If you comply with the requirements for combustion system leaks under § 63.1206(c)(5) by maintaining the maximum combustion chamber zone pressure lower than ambient pressure to prevent combustion systems leaks from hazardous waste combustion, you must perform instantaneous monitoring of pressure and the automatic when negative pressure is not adequately maintained.

Attachment A
to
Alternative Monitoring Application
Clean Harbors Environmental Services, Inc.
Kimball, Nebraska
Train 2 Incineration System

USEPA Regions 6 and 8
Approval Letters for Alternative Monitoring
for Combustion Leak Control
at Deer Park, Texas and Aragonite, Utah Facilities

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

September 30, 2004

Mr. Timothy F. Kent
Senior Compliance Manager
Clean Harbors Deer Park, LP
2027 Battleground Road
Deer Park, Texas 77536

RE: United States Environmental Protection Agency (EPA) Region 6 Response to Alternative Monitoring Application (AMA) Requests for the Train I and Train II Rotary Kiln Incinerators (RKIs) at the Clean Harbors facility in Deer Park, Texas; EPA ID TXD055141378

Dear Mr. Kent:

As you are aware, EPA issued an AMA determination letter on April 2, 2004 for your requests identified in your letter dated July 22, 2003. After EPA visited your facility on July 23, 2004, you submitted a revised proposal on July 26, 2004, for request number 4 regarding the control of combustion system leaks. Based upon our understanding of the new information, we have made a revised determination of this AMA request. There is no change in our determinations for your requests numbers 1, 2, 3 and 5, specified in our April 2, 2004 letter.

It is important to recognize that during our review and approval of your CPT Plan or during our evaluation of your test data from the Initial CPT, determinations may be subject to change if there is any new information that could adversely affect the operation of the incinerator or the requirements of the National Emissions Standards for Hazardous Air Pollutants (NESHAPs) under 40 CFR Part 63 Subpart EEE.

Request # 4: Alternative Measures to Control Combustion Gas Leaks

Requested Alternative: Clean Harbors proposes to construct shrouds at both ends of the rotary kilns in Train I (3.6 meter RKI) and Train II (4.4 meter RKI) as an alternative measure to control combustion gas leaks. (Alternative Monitoring Application - Alternate Time Delay for Automatic Waste Feed Cut-off (AWFCO) due to Combustion Gas Leaks dated July 22, 2003; and revised proposal dated July 26, 2004)

Regulatory Requirement(s): 40 CFR Part 63.1206(c)(5)(i) and (ii) Control of leaks from the combustion system.

The maximum combustion zone pressure must be maintained lower than ambient pressure using an instantaneous monitor. The facility has an option to control combustion system leaks of hazardous pollutants by an alternative means of control equivalent to maintenance of combustion zone pressure lower than ambient pressure.

The facility must specify in the performance test workplan the monitoring and recording frequency of the pressure monitor, and specify how the monitoring approach will be integrated into the AWFCO system.

Technical Justification: Clean Harbors proposes to construct shrouds at both ends of the rotary kilns in both Trains I and II. Under normal operating conditions, the induced draft fan maintains the maximum combustion zone pressure below the ambient pressure. Clean Harbors plans to inject air into the inlet and outlet shrouds to maintain approximately 0.2 inches of water pressure in the shrouds. During transient pressure spikes, the pressurized shrouds will act as barriers to prevent any gas leaks from the combustion zone.

Determination: The request is approved with the following conditions:

1. Clean Harbors will inject air into the inlet and the exit shrouds such that the difference between pressure in each shroud and the secondary combustion chamber (SCC) will be a minimum of 0.2 inches of water column;

2. Clean Harbors will measure pressures in the SCC and in both shrouds of the rotary kilns on a continuous basis. The pressure differential Operating Parameter Limit (OPL) and AWFCO for each inlet and outlet shroud will be set independent of each other;

3. If at anytime the pressure difference between each shroud and the SCC is less than 0.2 inches of water column, and the pressure in the SCC is equal to zero or higher, the AWFCO will be triggered instantaneously;

4. The AWFCO will not be triggered if the shroud fan fails, and the pressure in the SCC is lower than the ambient pressure; and

5. If the pressure difference in each shroud and the secondary combustion chamber is at least 0.2 inches water column, and the pressure in the secondary combustion chamber is higher than the ambient pressure for more than 10 seconds, the AWFCO will be triggered instantaneously.

The "instantaneous AWFCO" in all the above conditions means that the waste feed will be cut-off within one second of any pressure OPL exceedance, provided the pressure is measured on a continuous basis in the RKIs and the shrouds.

All documents in support of compliance with the Subpart EEE regulations, including your Initial CPT results and any supplemental information pertaining to your AMA requests, should be sent to the following address:

U.S. EPA Region 6, Multimedia Planning and Permitting Division
Attention: Mr. Darrin Swartz-Larson (6PD-A)
Chief, RCRA Facility Assessment Section
1445 Ross Avenue
Dallas, Texas 75202-2733

If you have any questions or concerns, please feel free to contact Dr. Kishor Fruitwala, P.E., of my staff at 214-665-6669.

Sincerely,

Darrin Swartz-Larson for

Stephen A. Gilrein, P.E.
Associate Director, RCRA
Multimedia Planning and Permitting Division

cc: Mark Vickery, TCEQ
Wade Wheatley, TCEQ
Dale Beebe Farrow, TCEQ
William Honker, 6EN-A

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 300
DENVER, CO 80202-2466
Phone 800-227-8917
http://www.epa.gov/region08

OCT 19 2004

Ref: ENF-AT

Mr. Shawn Raju
General Manager
Clean Harbors Aragonite, LLC
11600 North Aptus Road
Aragonite, Utah 84029

RE: Request for Alternative Monitoring Application by Clean Harbors Aragonite for its Rotary Slagging Kiln
AFS #: 4904500048

Dear Mr. Raju:

On February 12, 2004, Clean Harbors Aragonite (CHA) submitted an application for six alternative monitoring parameters. In July of 2003, the U.S. Environmental Protection Agency (EPA) and the Utah Division of Air Quality (UDAQ) determined that five of the six requests fell within the jurisdiction of UDAQ as outlined in the delegation of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Hazardous Waste Combustors, 40 CFR Part 63, Subpart EEE, (HWC MACT). EPA and UDAQ agreed that the request regarding combustion chamber pressure, as described in the February 12, 2004 application, constituted a "major" alternative monitoring request and was therefore before EPA Region 8 to address. UDAQ is the proper authority for the remaining requests.

This letter responds solely to your application for alternative monitoring of pressure within the slagging rotary kiln. On June 28, 2004, CHA withdrew its February 12, 2004, request and submitted a revised request based on installation of shrouds on the seals of the rotary kiln to create positive pressure at the seal gap. On September 20, 2004, EPA visited your facility to inspect the seals, which were being commissioned. In brief, EPA has approved your request, pending completion of the commissioning process, and conditioned upon five operating parameters. A summary of your request and our determination follow.

Process Description

CHA's incineration system consists of a slagging rotary kiln followed by a vertical afterburner chamber and a gas conditioning and air pollution control train composed of a spray dryer, baghouse, saturator, two-stage packed bed scrubber, and wet electrostatic precipitator.

Under normal operating conditions, the incinerator operates under negative pressure. Combustion air is distributed to the combination burner located in the front wall of the rotary kiln and to the two combination burners in the afterburner chamber. An induced draft fan, located approximately 350 feet from the kiln exit, is used to draw combustion gases through the unit and to maintain a negative pressure on the incineration system. An emergency vent is located in the ductwork above the afterburner. It opens and discharges combustion gases to atmosphere only in situations where the downstream equipment would otherwise be damaged.

Kiln seals are installed at the feed and discharge end of the kiln. The rotating kiln does not fit precisely into the front feed wall or the fixed afterburner chamber. The first set of seals consists of 16 graphite segments that surround the approximately 14-foot diameter kiln. In order to minimize openings, the notched graphite segments fit against the outside of the kiln and are held in place with a weighted steel cable that fits into the seal segment notches. The seals reduce the amount of opening to about 1/16 of an inch.

In August of 2004, CHA installed a second set of seals next to each original seal and injects air into a shroud between the two seals such that positive pressure is maintained at the seal gap. Positive pressure will be maintained in the shroud to prevent chamber pressure below seal pressure from blowing combustion gases through the seals. The pressure between the seals will be maintained at approximately 0.5 inches water column with exact pressure determined during initial start up and operation.

Combustion chamber pressure is measured in the afterburner where the kiln combustion gases flows from the kiln. There are three pressure taps located on the north side of the afterburner chamber. The induced draft fan speed is controlled to keep the pressure in both the kiln and afterburner below atmospheric pressure. This control prevents emissions from openings in the equipment. Instantaneous pressure at any specified point can vary due to turbulent and disorderly pressure spikes that occur when energetic containers are fed or when slag falling into the deslagger causes a rapid steam generation.

The pressure tap used to monitor the pressure between kiln seals at the charge end of the kiln is be located on the South side of the kiln at approximately shoulder height. The tap for the discharge end of the kiln is located at the orientation.

Request of Alternative Measures to Control Combustion System Leaks

Requested Alternative: Clean Harbors Aragonite has installed shrouds at both ends of the rotary kiln as an alternative measure to control combustion gas leaks. (Alternative Monitoring Application - Alternate Time Delay for Automatic Waste Feed Cut-Off (AWFCO) due to Combustion Gas Leaks dated February 19, 2004, and revised June 28, 2004.)

Regulatory Requirement(s), 40 CFR Part 63.1206(c)(5) and §63.1209(p) Control of leaks from the combustion system and instantaneous monitoring requirements

Four options are provided in 40 CFR Part 63.1206(c)(5) for control of leaks from the combustion system: A) the combustion zone must be sealed; B) the maximum combustion zone pressure must be maintained lower than ambient pressure using an instantaneous monitor; C) an alternative means of control equivalent to maintenance of combustion zone pressure lower than ambient; D) or demonstration of another technique to prevent fugitive emissions without use of instantaneous pressure limits. 40 CFR Section 63.1209(p) requires the owner or operator of a hazardous waste incinerator who chooses the monitoring option in 40 CFR Section 63.1206(c)(5)(i)(B) to monitor the pressure instantaneously and to engage the AWFCO system when negative pressure is not maintained at any time. The facility must specify in the performance test workplan the monitoring and recording frequency of the pressure monitor, and specify how the monitoring approach will be integrated into the AWFCO system.

Technical Justification: CHA has installed shrouds at each end of the rotary kiln. Under normal operating conditions, the induced draft fan maintains the maximum combustion zone pressure below the ambient pressure. CHA pressurizes the gas in the inlet and outlet seals to approximately 0.5 inches of water column. During transient pressure spikes, the pressurized inlet and outlet shrouds act as an alternative means of control of combustion system leaks that is equivalent to maintaining the pressure in the maximum combustion zone below the ambient pressure. CHA has chosen the option in 40 CFR Section 63.1206(c)(5)(i)(C), an alternative means of control equivalent to maintenance of combustion zone pressure lower than ambient. (Alternative Monitoring Application, June 28, 2004.)

Determination: The request is approved with the following conditions:

1. CHA will inject air into the inlet and outlet shrouds such that the difference between pressure in each shroud and the secondary combustion chamber (SCC) will be at least 0.2 inches of water column;

2. CHA will measure pressures in the SCC and each shroud of the kiln continuously. The pressure differential Operating Parameter Limit (OPL) and AWFCO for each shroud will be set independent of each other;

3. If at anytime the pressure difference between each shroud and the SCC is less than 0.2 inches of water column, and the pressure in the SCC is equal to zero or higher, an AWFCO will be triggered instantaneously;

4. If the shroud fan fails, and the pressure in the SCC is greater than ambient pressure, an AWFCO will be triggered instantaneously; and

5. If the pressure difference in each shroud and the SCC is at least 0.2 inches water column, and the pressure in the SCC is higher than ambient pressure for more than 10 seconds, an AWFCO will be triggered instantaneously.

The "instantaneous AWFCO" in all conditions described above means that the waste feed will be cut-off within one second of any pressure OPL exceedance, provided the pressure is measured continuously in the rotary kiln and the shrouds.

In addition, whenever one of the three OPLs trigger an AWFCO, 40 CFR Section 63.1206(c)(3)(v) requires CHA: 1), to investigate the cause of the event; 2) to take appropriate corrective measures that will minimize repetitions of the same cause; and 3) to record the findings and corrective measures in the operating record. Therefore, the Administrator of the US EPA, by authority duly delegated to the undersigned, approves CHA's request for alternative monitoring requirements to monitor pressure in the combustion system and to engage the AWFCO system when operating conditions exceed one of operating conditions one through five.

Please note that the determination made above is subject to further review if there is reason to believe that an alternative monitoring requirement fails to provide an equivalent or better assurance of compliance with the relevant emission standard in 40 CFR Part 63 Subpart EEE; or if new information is brought to light that could adversely affect the operation of the incinerator. If you have any questions or concerns, please feel free to contact Deldi Reyes of my staff at (303) 312-6055.

Sincerely,

Martin Hestmark, Director
Technical Enforcement Program

cc: Bob Ford, UDAQ
Joe Randolph, UDAQ
Carol Smith, 8ENF-AT
Terry Brown, 8P-HW
Mike Owens, 8P-AR

Attachment B
to
Alternative Monitoring Application
Clean Harbors Environmental Services, Inc.
Kimball, Nebraska
Unit 2 Incineration System

Manufacturer's Letter on Pressure Drop Specification
and
USEPA Region 6
Approval Letter for Alternative Monitoring
Low Energy Scrubber Pressure Drop
at Deer Park, Texas Facility
(see Request 2 in approval letter in Attachment A)

BIONOMIC INDUSTRIES

"Superior Engineered Pollution Control Systems With Unequaled Performance"

July 20, 2016

Clean Harbors El Dorado LLC.
C/O CDM Constructors, Inc.
309 American Circle
El Dorado, AR 71730

Attention: Scot A Shoemaker: (870) 864-3644 or shoemaker.scot@cleanharbors.com
Kevin Sullivan: (501)-708-0532 or sullivanks@cdmsmith.com
Michael Blake: (214)-316-7954 or blakemj@cdmsmith.com

Subject: CDM PO# 100312-2004 and Our Job #13981

Reference: (2) Series 9700 Model 144 Spray Tower Condensers
(1) Series 8500 Model 102/79 Venturi Saturator & Equipment

Dear Scot,

I am writing first to formally confirm thje following.

1) Pressure drop is not an important parameter in scrubbing efficiency in a spray tower, so no minimum limit is required.
2) Liquid feed pressure to the nozzle headers must be maintained +/- 25% of the baseline pressure demonstrated during the scrubber performance testing.

Furthermore, I am fine and approve the intended location to monitor the pressure with the location to monitor this pressure being at or near the elevation of the uppermost header as described on the marked PID drawing.

If you have any questions or problems please don't hesitate contact me.

Regards,

Bob Truskosky

Bob Truskosky, P.E.
Engineering Manager
Bionomic Industries, Inc.
777 Corporate Drive
Mahwah, NJ 07430
PH: 201-529-1094 Extension 12
Fax: 201-529-0252
E-Mail: btruskosky@bionomicind.com

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

APR 2 2004

RECEIVED
APR 19 2004
ENV. AFFAIRS

Mr. Timothy F. Kent
Senior Compliance Manager
Clean Harbors Deer Park, LP
2027 Battleground Road
Deer Park, Texas 77536

RE: United States Environmental Protection Agency (EPA) Region 6 Response to Alternative Monitoring Application (AMA) Requests for the Train I Rotary Kiln Incinerators (RKIs) at the Clean Harbors facility in Deer Park, Texas; EPA ID TXD055141378.

Dear Mr. Kent:

Your Initial Comprehensive Performance Test (CPT) will be conducted to demonstrate Hazardous Waste Combustion (HWC) unit operations in compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAPs) as specified in 40 CFR Part 63 Subpart EEE, and additional Resource Conservation and Recovery Act (RCRA) and Toxic Substances Control Act (TSCA) provisions. EPA Region 6 has reviewed your AMA requests provided in conjunction with your CPT Plan submittal. Although we have not yet approved your CPT Plan for the Initial CPT, your Plan is currently under review and will be addressed under separate correspondence. This letter does not constitute approval of your CPT Plan.

Based upon our understanding of the available information, we have evaluated each of your AMA requests. It is important to recognize that during our review and approval of your CPT Plan or during our evaluation of your test data from the Initial CPT, determinations may be subject to change if there is any new information that could adversely affect the operation of the incinerator or the requirements of the NESHAPs under Subpart EEE. For convenience, an acronym list is provided as an enclosure to this document. Summaries of your AMA requests and our determinations are as follows:

<u>Request #1: Monitoring Stack Gas Flow Rate Instead of Flue Gas Flow Rate</u>

Requested Alternative: Clean Harbors proposes to monitor stack gas flow rate instead of flue gas flow rate as a measure of residence time. (Alternative Monitoring Application - Request to Monitor Stack Gas Flow Rate instead of Flue Gas Flow Rate dated July 22, 2003)

Regulatory Requirement(s): 40 CFR Part 63.1206 (b)(11), 63.1207 (f)(1)(ix), 63.1209 (j)(2), (k)(3), (m)(2), (n)(5) and (o)(2) Measurement of flue gas or production gas flow rate.

The facility must measure flue gas flow rate or a surrogate parameter including stack gas flow rate as a measure of residence time. The surrogate gas flow measurement must correlate with the residence time calculations.

Technical Justification: The use of stack flow for compliance monitoring is a reliable primary control method for the rotary kiln incinerators at Clean Harbors. It has also been an Operating Parameter Limit (OPL) under the existing RCRA permit. Also, all performance tests at the facility in the past conducted for EPA and TCEQ have used the stack flow rate as the basis for operation of the units and for setting operating limitations.

Determination: The request is approved.

Request #2: Measurement of Pressure Drop Across the Wet Scrubber

Requested Waiver: Clean Harbors requests a waiver from monitoring the liquid pressure drop across the scrubber as an OPL. (Alternative Monitoring Application - Waiver to Measure Pressure Drop across the Wet Scrubber dated July 22, 2003)

Regulatory Requirement(s): 40 CFR Part 63.1209(l)(2) and (o)(3)(iii) Monitoring requirements for Hg, HCl, and chlorine in the wet scrubber.

Minimum liquid feed pressure drop must be established for a wet scrubber to ensure removal of Hg and Cl_2 from the flue gas.

Technical Justification: The pressure drop of liquid across a high-energy scrubber is one parameter indicative of the scrubber performance. However, it is not a critical parameter in a low energy wet scrubber like a packed-bed as long as the scrubber is operated according to the manufacturer's specifications.

Determination: The request is approved with the following conditions:

(1) a minimum liquid to gas ratio for the scrubber must be established during the CPT; and

(2) scrubber must be operated in accordance with the manufacturer's design specifications.

Request #3: Measurement of Scrubber System Liquid Feed Pressure

Requested Waiver: The facility requests a waiver from monitoring the liquid feed pressure for the scrubbers. (Alternative Monitoring Application - Waiver to Measure Scrubber System Liquid feed Pressure dated July 22, 2003)

Regulatory Requirement(s): 40 CFR Part 63.1209(o)(3)(ii) Establishing OPLs for a wet scrubber.

The facility must comply with HCl and Cl_2 gas emissions standard by establishing and complying with the OPLs for wet scrubbers.

Technical Justification: Effective performance of a wet scrubber requires proper distribution and mixing of both liquid and gas in the scrubber. The minimum liquid feed pressure ensures proper distribution of liquid in the scrubber. However, in the scrubber used by Clean Harbors, the liquid feed distribution is achieved through spray nozzles and the scrubber packing. Monitoring the liquid flow rate rather than the liquid flow pressure will ensure the effective performance of the scrubber.

Determination: The waiver request is approved with the conditions specified in Request #2 above.

Request #4: Time Delay for an AWFCO due to Combustion Gas Leaks

Requested Alternative: Clean Harbors proposes that before an Automatic Waste Feed Cut-off (AWFCO) is engaged, the pressure in the combustion zone must remain positive for 30 continuous seconds to indicate a combustion system leak. (Alternative Monitoring Application - Alternate Time Delay for AWFCO due to Combustion Gas Leaks dated July 22, 2003)

Regulatory Requirement(s): 40 CFR Part 63.1206(c)(5) Control of leaks from the combustion system.

In order to control leaks from the combustion system, negative pressure must be maintained at all times in the combustion chamber(s).

Technical Justification: Clean Harbors states that, while the overall 'bulk' pressure in system consistently holds at a slightly negative value, the instantaneous pressure at a specified point can vary up to 1 inch of water column for a few seconds.

Determination: The justification provided is not acceptable. The request for the 10-second delay is denied. An AWFCO must be engaged any time the pressure in the combustion system is positive for more than one second.

Request #5: Use of Secondary Voltage alone as an AWFCO Parameter for Wet Electrostatic Precipitator (WESP)

Requested Alternative: Clean Harbors proposes that the secondary voltage alone should be monitored and set as an AWFCO parameter rather than the power to the WESP. (Alternative Monitoring Application - Request to Use of Secondary Voltage alone as an AWFCO Parameter for Wet Electrostatic Precipitator dated July 22, 2003 and supplemental information dated March 12, 2004)

Regulatory Requirement(s): 40CFR Part 63.1209(m)(1)(iv) Establishing operating parameter limits to control particulate matters.

The facility must select a set of operating parameters appropriate for the control device design (such as WESP) that it determines to be both representative and reliable indicators of control device performance. Operating parameters selected may be based on manufacturer specifications, provided the facility supports the use of manufacturer specifications in the performance test plan.

Technical Justification: For the WESP electrodes, current is not a control parameter. Instead, current is a function of the controlled voltage. The gas characteristics that affect WESP current are gas flow rate, particulate loading, temperature, and moisture content. Voltage is a controlling factor in particulate removal by the WESP.

Determination: The information provided is insufficient to make a determination. Please provide additional information, including manufacturer's design specifications showing correlation between power density, current density, secondary voltage, particle size (submicron and greater than 1 micron), and collection efficiency. Also, please explain the significant difference between voltage and current during the CPT and the normal operations.

All documents in support of compliance with the Subpart EEE regulations, including your Initial CPT results and any supplemental information pertaining to your AMA requests, should be sent to the following address:

Attention: Ms. Cynthia J. Kaleri (6PD-A)
U.S. EPA Region 6
Multi-Media Planning and Permitting Division
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Once your CPT Plan is approved and regulatory testing is complete, my staff will work closely with you and staff at TCEQ to evaluate the need for risk-based permit limits in your RCRA permit. In consideration of facility-specific information, risk-based provisions may need to be incorporated into your RCRA permit in order to supplement both your Title V and RCRA regulatory permit limits that would otherwise result in emissions not considered protective of human health under RCRA and TSCA authorities.

If you have any questions or concerns, please feel free to contact Ms. Cynthia Kaleri of my staff at 214-665-6772.

Sincerely,

Stephen A. Gilrein, P.E.
Associate Director, RCRA
Multimedia Planning and Permitting Division

Enclosure - List of Acronyms

cc: Mark Vickery, TCEQ
Wade Wheatley, TCEQ
Dale Beebe Farrow, TCEQ
William Honker, 6EN-A

AMA Requests
RKIs, Clean Harbors

Enclosure - Acronyms List

AMA	Alternate Monitoring Application
APCE	Air Pollution Control Equipment
APCS	Air Pollution Control System
AWFCO	Automatic Waste Feed Cut-off
CAA	Clean Air Act
CEM	Continuous Emissions Monitor
CEMS	Continuous Emissions Monitoring System
CFR	Code of Federal regulations
CMS	Continuous Monitoring System
CPT	Comprehensive Performance Test
DOC	Documentation of Compliance
ESP	Electrostatic Precipitator
FAP	Feedstream Analysis Plan
HRA	Hourly Rolling Average
12-HRA	12-Hour Rolling Average
HWC	Hazardous Waste Combustor
IWS	Ionizing Wet Scrubber
MACT	Maximum Achievable Control Technology
NOC	Notice of Compliance
OPL	Operating Parameter Limit
NESHAPs	National Emission Standards for Hazardous Air Pollutants
RCRA	Resource Conservation and Recovery Act
SSMP	Startup, Shutdown, and Malfunction Plan
TSCA	Toxic Substances Control Act
TTU	Thermal Treatment Unit

Attachment C
to
Alternative Monitoring Application
Clean Harbors Environmental Services, Inc.
Kimball, Nebraska
Train 2 Incineration System

Arkansas Department of Environmental Quality
Alternative Monitoring Approval
Communications
Unit 44 Incinerator, Eldorado, Arkansas

Chris McBride

From: Shoemaker, Kathleen <shoemaker.kathleen@cleanharbors.com>
Sent: Thursday, April 28, 2022 2:57 PM
To: Matthews, Paula D; Chris McBride
Subject: FW: [External] CPT at SN 44

We received an email approval for the CPT Plan and AMA from Mike Porta below. This is also saved on the G drive.

Safety Starts with Me: Live It 3-6-5

Kathy Shoemaker
Clean Harbors El Dorado LLC
Mobile: 870.814.2110
Email: shoemaker.kathleen@cleanharbors.com
Web: www.cleanharbors.com

From: Porta, Mike <PORTA@adeq.state.ar.us>
Sent: Monday, January 8, 2018 2:39 PM
To: Shoemaker, Kathleen <shoemaker.kathleen@cleanharbors.com>
Subject: RE: CPT at SN 44

Yes.

From: Shoemaker, Kathleen [mailto:shoemaker.kathleen@cleanharbors.com]
Sent: Monday, January 08, 2018 2:34 PM
To: Porta, Mike
Subject: RE: CPT at SN 44

Mike,

So the email below is ADEQ's approval of the CPT and Alternate Monitoring Plan which was submitted for Clean Harbors SN-44 Incinerator?

Kathy

From: Porta, Mike [mailto:PORTA@adeq.state.ar.us]
Sent: Monday, January 08, 2018 1:19 PM
To: Shoemaker, Kathleen <shoemaker.kathleen@cleanharbors.com>
Subject: RE: CPT at SN 44

I don't have any questions, comments, or concerns about the August revisions to the CPT.

Does this e-mail meet your needs or do you need a letter?

From: Shoemaker, Kathleen [mailto:shoemaker.kathleen@cleanharbors.com]
Sent: Friday, January 05, 2018 7:17 AM

To: Porta, Mike
Subject: RE: CPT at SN 44

Yes, the revision were to account for all direct burn lines. Thanks!

Safety Starts with Me: Live It 3-6-5

Kathy Shoemaker, CHMM
Senior Environmental Compliance Manager
Clean Harbors El Dorado LLC
309 American Circle
El Dorado, AR 71730
Office: 870.864.3711
Mobile: 870.814.2110
Fax: 870.864.3730
Email: shoemaker.kathleen@cleanharbors.com
Web: www.cleanharbors.com

From: Porta, Mike [mailto:PORTA@adeq.state.ar.us]
Sent: Thursday, January 04, 2018 2:45 PM
To: Shoemaker, Kathleen <shoemaker.kathleen@cleanharbors.com>
Subject: RE: CPT at SN 44

I have looked over the October , 2017 revisions to the CPT. It looks to me that the revisions are primarily to account for the direct burn of waste. If that is not right, let me know.

From: Shoemaker, Kathleen [mailto:shoemaker.kathleen@cleanharbors.com]
Sent: Tuesday, January 02, 2018 1:30 PM
To: Porta, Mike
Subject: RE: CPT at SN 44

Thank you.

From: Porta, Mike [mailto:PORTA@adeq.state.ar.us]
Sent: Tuesday, January 02, 2018 1:29 PM
To: Shoemaker, Kathleen <shoemaker.kathleen@cleanharbors.com>
Subject: RE: CPT at SN 44

My goal is to get back to you by 1/8/18 with any questions I may have.

From: Shoemaker, Kathleen [mailto:shoemaker.kathleen@cleanharbors.com]
Sent: Tuesday, January 02, 2018 12:24 PM
To: Porta, Mike; Rheaume, Thomas
Cc: Crisenbery, Michael; Ricullrich; CeMcBride@focusenv.com
Subject: CPT at SN 44
Importance: High

Good morning Mr. Porta and Mr. Rheaume,

Happy New Year! I am awaiting the ADEQ approval of the submitted CPT/Alternate Monitoring Plan for SN -44. With our one year startup date approaching in February 2018, we must move ahead with the CPT beginning on January 22, 2018. All appropriate notices have been done noting this date. If you have any questions, please let us know ASAP and I can put together a call. We look forward to communication with you.

Thank you

Safety Starts with Me: Live It 3-6-5

Kathy Shoemaker, CHMM
Senior Compliance Manager
Clean Harbors El Dorado LLC
309 American Circle
El Dorado, AR 71730
Office: 870.864.3711
Mobile: 870.814.2110
Fax: 870.864.3730
Email: shoemaker.kathleen@cleanharbors.com
Web: www.cleanharbors.com

From: Shoemaker, Kathleen
Sent: Thursday, December 14, 2017 10:02 AM
To: 'Porta, Mike' <PORTA@adeq.state.ar.us>
Cc: Crisenbery, Michael <crisenberym@cleanharbors.com>; 'Ricullrich' <ricullrich@aol.com>; 'CeMcBride@focusenv.com' <CeMcBride@focusenv.com>
Subject: RE: signed letter-dire t burn line
Importance: High

Good morning Mike,

How is the CPT /Alternate Monitoring Plan review and approval coming along? We are moving ahead with a CPT begin date of January 22, 2018. The CPT Plan has been sent for public notice as required. The Test Protocol paperwork will be submitted before the end of December.

If you have any questions please let me know and I can schedule a call with you and the CPT Consultants/Engineers.

Safety Starts with Me: Live It 3-6-5

Kathy Shoemaker, CHMM
Senior Compliance Manager
Clean Harbors El Dorado LLC
309 American Circle

El Dorado, AR 71730
Office: 870.864.3711
Mobile: 870.814.2110
Fax: 870.864.3730
Email: shoemaker.kathleen@cleanharbors.com
Web: www.cleanharbors.com

APPENDIX D PROCESS FLOW DRAWINGS

DRAWING NO.	TITLE
D-100-02-603	KILN & SECONDARY COMBUSTION CHAMBER
D-100-02-604	GAS CLEANING SHEET NO. 1
D-100-02-605	GAS CLEANING SHEET NO. 2
D-370-02-202	KILN BURNER
D-370-02-203	KILN LIQUID FEED LANCES
D-370-02-204	ROTARY KILN
D-370-02-206	DISCHARGE CHAMBER & EXIT DUCT
D-380-02-201	SCC BURNER NO. 1
D-380-02-202	SCC BURNER NO. 1
D-380-02-203	SCC LIQUID LANCES I
D-380-02-204	SCC LIQUID LANCES II
D-380-02-205	SCC LIQUID LANCES III
D-380-02-206	SECONDARY COMBUSTION CHAMBER
D-380-02-210	DRUM PUMPING
D-385-02-213	NOX REDUCTION SYSTEM
D-385-02-214	STACK

REV. NO.	DATE	DRWN	CHKD	REMARKS
B	02/25/22	MHA	RB/SK	PERMIT ISSUE WITH CLEAN HARBOR COMMENTS
A	12/20/21	MHA	RB/SK	ISSUED FOR PERMIT

DESIGNED BY: X
DRAWN BY: X
SHEET CHK'D BY: X
CROSS CHK'D BY: X
APPROVED BY: X
DATE: X

wood.

WOOD PROJECT NUMBER: 251305
NEBRASKA CA-2974
WOOD GROUP USA INC
17325 PARK ROW
HOUSTON, TX 77084
PHONE: (979) 849-1682

CleanHarbors
KIMBALL COUNTY, NEBRASKA

CLEAN HARBORS KIMBALL, LLC

KP INCINERATOR EXPANSION PROJECT

PROCESS FLOW DIAGRAM
KP TRAIN 2
KILN & SECONDARY COMBUSTION CHAMBER

PROJECT NO. ZKP2109-01
FILE NAME: D-100-02-603
DRAWING NO. D-100-02-603
SCALE NONE
REV. B

385CNV-400B SPRAY DRYER BOTTOM ASH CONVEYOR
385AGI-400A/B/C SATURATOR RUN DOWN TANK AGITATORS
385AGI-401A/B CONDENSER RUN DOWN TANK MIXERS
385AGI-405A/B BRINE RUNDOWN TANK AGITATORS
385BGH-400 BAG HOUSE
385CLR-400 / 401 COOLING TOWER CELLS (2)
385CNV-400A SPRAY DRYER BOTTOM DELUMPER
385CNV-403 / 404 BAG HOUSE No. 1 COLLECTION CONVEYORS
385HEX-400 - 402 HEAT EXCHANGERS (4)
385PMP-400 / 401 SATURATOR RECYCLE PUMPS
385PMP-402 / 403 / 404 CONDENSER PUMPS
385PMP-405 / 406 / 407 COOLING WATER PUMPS
385PMP-408 - 411 SPRAY DRYER HIGH PRESSURE PUMPS
385PMP-415A/B BRINE SURGE PUMPS
385TNK-405A SATURATOR RUNDOWN VENT SEAL TANK
385TNK-405B RUNDOWN OVERFLOW TANK
385SAT-400 SATURATOR
385SCR-400 SPRAY DRYER
385SCR-401 / 402 CONDENSER COLUMNS
385TNK-400A/B/C SATURATOR RUN DOWN TANKS
385TNK-401 SATURATOR EMG. QUENCH TANK
385TNK-402 SPRAY DRYER EMG. QUENCH TANK
385TNK-403A/B CONDENSER RUN DOWN TANKS
385TNK-410A / B BRINE RUN-DOWN SURGE TANK
385VLV-402 - 407 BAG HOUSE ROTARY VALVES
385TNK-406A CONDENSER RUNDOWN VENT SEAL TANK
385TNK-406B RUNDOWN OVERFLOW TANK
385VNT-400 EMERGENCY VENT STACK
385DCT-401 SDA TO BH1 DUCT
385DCT-402 BH1 TO SATURATOR DUCT
385DCT-403 SATURATOR TO CONDENSERS DUCT
385DCT-404 CONDENSER EXIT DUCT (FRP)
385DCT-405 CONDENSER TO BAGHOUSE 2 DUCT (ALLOY 2205)

1. THIS PROCESS FLOW DIAGRAM IS INTENDED TO SHOW THE OVERALL PROCESS ONLY AND IS NOT COMPLETE IN EVERY DETAIL. REFER TO P&ID DRAWINGS FOR COMPLETE PROCESS PIPING AND INSTRUMENTATION DETAILS.

PROFESSIONAL Chemical ENGINEER A. Scott Kafesijan E-11147 STATE OF NEBRASKA

REV. NO.	DATE	DRWN	CHKD	REMARKS
B	02/25/22	MHA	RB/SK	PERMIT ISSUE WITH CLEAN HARBOR COMMENTS
A	12/20/21	MHA	RB/SK	ISSUED FOR PERMIT

DESIGNED BY:
DRAWN BY:
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE:

wood.
WOOD PROJECT NUMBER: 251305
NEBRASKA CA-2974
WOOD GROUP USA INC
17325 PARK ROW
HOUSTON, TX 77084
PHONE: (979) 849-1682

CleanHarbors
KIMBALL COUNTY, NEBRASKA

CLEAN HARBORS KIMBALL, LLC

KP INCINERATOR EXPANSION PROJECT

PROCESS FLOW DIAGRAM KP TRAIN 2 GAS CLEANING SHEET NO. 1

PROJECT NO. ZKP2109-01
FILE NAME: D-100-02-604
DRAWING NO. D-100-02-604
SCALE NONE
REV. B

385BLF-403 REHEAT BURNER COMBUSTION AIR FAN

385BUR-400 REHEAT BURNER

385EDR-400 ACTIVATED CARBON (PAC) EDUCTOR

385ACS-404 ACTIVATED CARBON (PAC) SILO

385FDR-400 ACTIVATED CARBON (PAC) FEEDER

385TNK-407 AMMONIA TANK

385PMP-414A/B AMMONIA INJECTION PUMPS

385BGH-401A-D BAG HOUSE #2 DUST COLLECTORS

385VLV-408- 411 BAG HOUSE SLIDE GATE VALVES

385BIN-403A/B/C/D BAGHOUSE #2 SPENT ABSORBENT BINS

385BLF-400 INDUCED DRAFT FAN

385BLF-402 DENOX BURNER COMBUSTION AIR FAN

385BUR-401 DENOX BURNER

385RCT-400 DENOX SCR UNIT

385STK-400 STACK

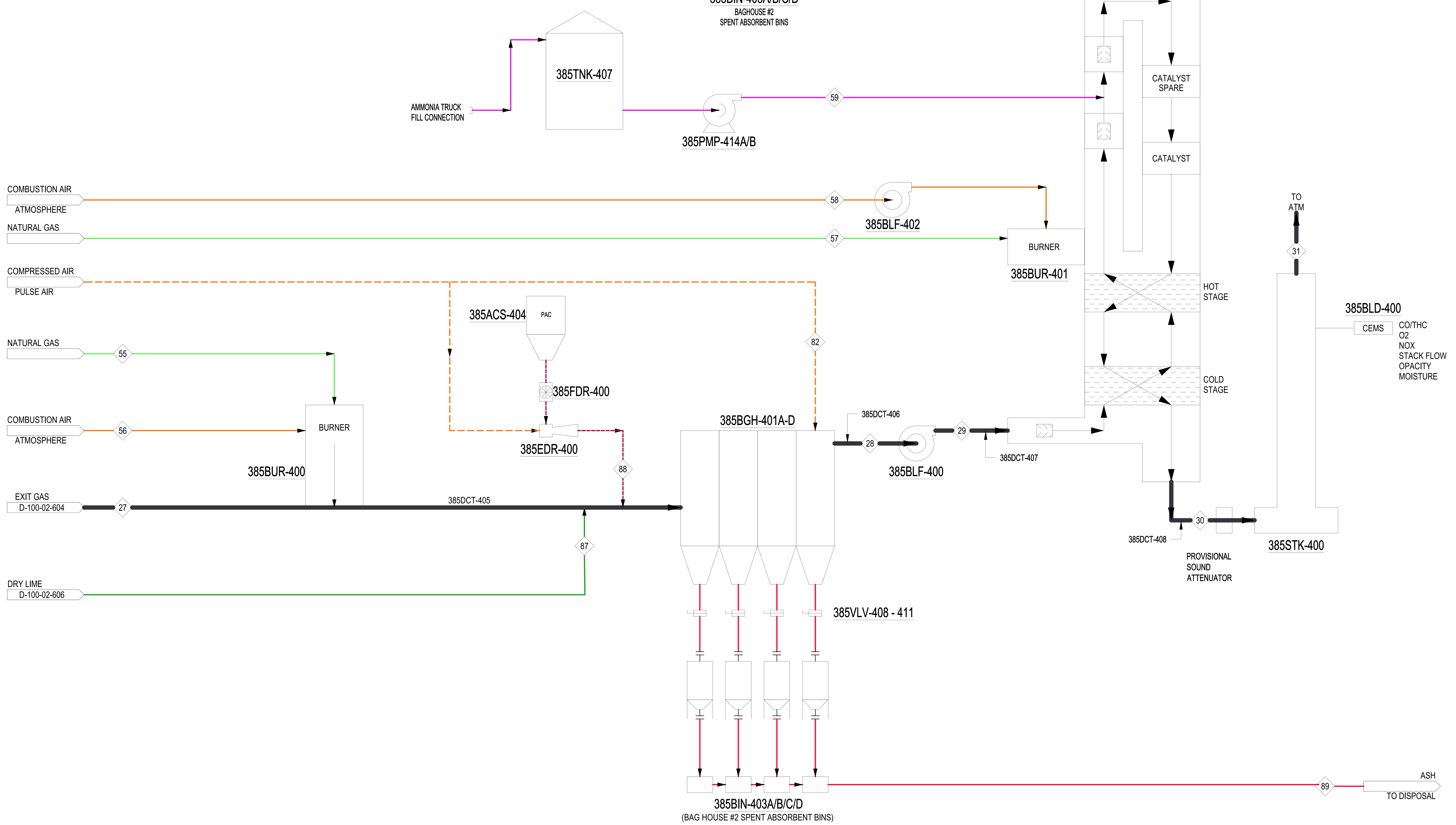
385BLD-400 CONTINUOUS EMISSIONS MONITORING SYSTEM ANALYZER BUILDING

1. THIS PROCESS FLOW DIAGRAM IS INTENDED TO SHOW THE OVERALL PROCESS ONLY AND IS NOT COMPLETE IN EVERY DETAIL. REFER TO P&ID DRAWINGS FOR COMPLETE PROCESS PIPING AND INSTRUMENTATION DETAILS.

385DCT-406 BAG HOUSE 2 TO ID FAN DUCT

385DCT-407 ID FAN TO DENOX DUCT

385DCT-408 DENOX TO STACK DUCT



LEGEND

- AIR/VENT
- AMMONIA
- BRINE
- CARBON
- CAUSTIC
- COMPRESSED AIR
- FLUE GAS
- FUEL OIL
- LIME SLURRY/DRY LIME
- NATURAL GAS
- PROCESS WATER
- SOLIDS
- PLANT WATER
- WASTE
- STREAM NUMBERS

PROFESSIONAL Chemical ENGINEER
5 Feb 2022
A. Scott Kafesjian
E-11147
STATE OF NEBRASKA

REV. NO.	DATE	DRWN	CHKD	REMARKS
B	02/25/22	MHA	RB/SK	PERMIT ISSUE WITH CLEAN HARBOR COMMENTS
A	12/20/21	MHA	RB/SK	ISSUED FOR PERMIT

DESIGNED BY: X
DRAWN BY: X
SHEET CHK'D BY: X
CROSS CHK'D BY: X
APPROVED BY: X
DATE: X

wood.
WOOD PROJECT NUMBER: 251305
NEBRASKA CA-2974
WOOD GROUP USA INC
17325 PARK ROW
HOUSTON, TX 77084
PHONE: (979) 849-1682

CleanHarbors
KIMBALL COUNTY, NEBRASKA

CLEAN HARBORS KIMBALL, LLC

KP INCINERATOR EXPANSION PROJECT

PROCESS FLOW DIAGRAM
KP TRAIN 2
GAS CLEANING
SHEET NO. 2

PROJECT NO. ZKP2109-01
FILE NAME: D-100-02-605
DRAWING NO. D-100-02-605
SCALE NONE
REV. B

NOTES:

1. INSTRUMENTS ON THIS DRAWING ARE TO BE PRECEDED BY ACCOUNTING NUMBER 370 UNLESS OTHERWISE DENOTED WITH AN *.
2. DOUBLE STAR (**) IN DEVICE BUBBLE DENOTES TAG NUMBER TO BE EQUIPMENT NUMBER THE DEVICE OPERATES.
3. BURNER AIR DUCT WORK FURNISHED BY HZI.
4. FIELD LOCATE IA PIPING FROM NEAREST SUPPLY BRANCH.
5. FI-124 AND FI-134 ARE USED IN SEVERAL CALCULATIONS TO GET NATURAL FIRING RATE (FQY-124) AND LIQUID FIRING RATE (FQY-134). THE TOTAL BURNER FIRING RATE (FQY-70) = (FQY-124) + (FQY-134). WHEN FQY-70 GETS TO 55 MMBTU.HR, VALVES FCV-124 AND FCV-134 SHALL FREEZE.
6. FI-124 AND FI-134 ARE USED IN SEVERAL CALCULATIONS TO GET THE TOTAL COMBUSTION AIR NEEDED FOR GAS AND LIQUID FUEL FLOW TO THE KILN. THE RESULT (FSRP-150) SHALL SERVE AS THE REMOTE FLOW SET POINT TO FIC-150.

FOR PERMIT
DATE: 10/09/23
– NOT FOR CONSTRUCTION –

PROFESSIONAL MECHANICAL ENGINEER TIMOTHY D. BURTON E-19281 STATE OF NEBRASKA 10/09/23

REV. NO.	DATE	DRWN	CHKD	REMARKS
E	10/09/23	HGA	TDB	MODIFIED VALVE TAGS, UPDATED TO MATCH TANK FARM NOMENCLATURE
D	07/12/23	HGA	TDB	ISSUED FOR DESIGN
C	12/16/22	HGA	TDB	ISSUED FOR REVIEW AND COMMENT
B	02/25/22	MHA	RB/SK	PERMIT ISSUE WITH CLEAN HARBOR COMMENTS
A	12/20/21	MHA	RB/SK	ISSUED FOR PERMIT

DESIGNED BY: X
DRAWN BY: X
SHEET CHK'D BY: X
CROSS CHK'D BY: X
APPROVED BY: X
DATE: X

HGA Engineering
www.hga-llc.com
Home Office: Ruston, LA
T: 318-255-6825
FIRM #: NE CA4153
HUNT, GUILLOT & ASSOCIATES LLC

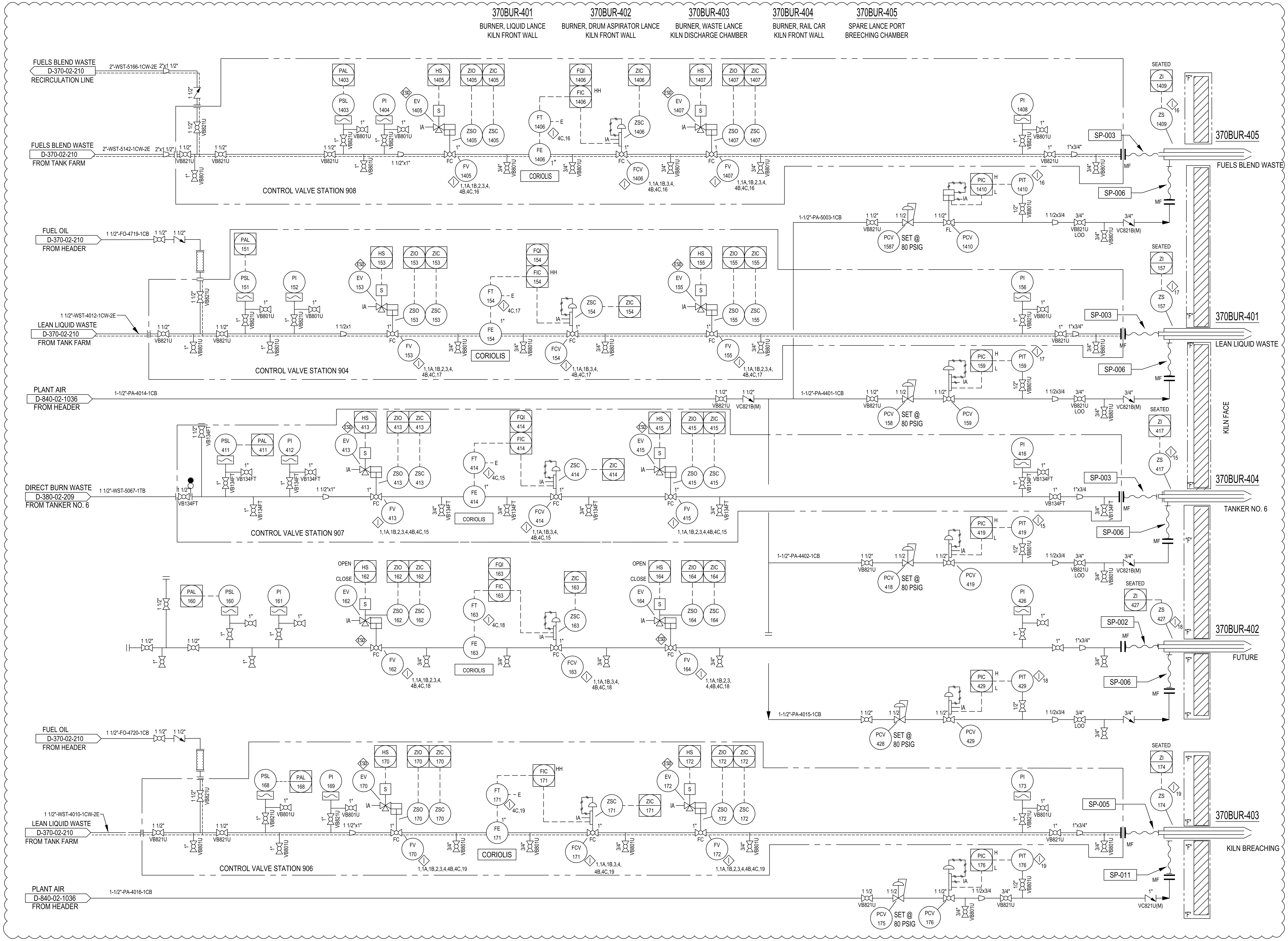
CleanHarbors
KIMBALL COUNTY, NEBRASKA

CLEAN HARBORS KIMBALL, LLC

KP INCINERATOR EXPANSION PROJECT

PROCESS & INSTRUMENTATION DIAGRAM
KP TRAIN 2
KILN BURNER

PROJECT NO. R22013
FILE NAME: D–370–02–202
DRAWING NO. D-370-02-202
SCALE NONE
REV. E



NOTES:
1. INSTRUMENTS ON THIS DRAWING ARE TO BE PRECEDED BY ACCOUNTING NUMBER 370 UNLESS OTHERWISE DENOTED WITH AN *.
2. DOUBLE STAR (**) IN DEVICE BUBBLE DENOTES TAG NUMBER TO BE EQUIPMENT NUMBER THE DEVICE OPERATES.
3. FIELD LOCATE IA PIPING FROM NEAREST SUPPLY BRANCH.

FOR PERMIT
DATE: 10/09/23
– NOT FOR CONSTRUCTION –

PROFESSIONAL MECHANICAL ENGINEER TIMOTHY D. BURTON E-19281 STATE OF NEBRASKA 10/09/23

REV. NO.	DATE	DRWN	CHKD	REMARKS
E	10/09/23	HGA	TDB	ADDED BURNER, MODIFIED VALVE TAGS, UPDATED TO MATCH TANK FARM NOMENCLATURE
D	07/12/23	HGA	TDB	ISSUED FOR DESIGN
C	12/16/22	HGA	TDB	ISSUED FOR REVIEW AND COMMENT
B	02/25/22	MHA	RB/SK	PERMIT ISSUE WITH CLEAN HARBOR COMMENTS
A	12/20/21	MHA	RB/SK	ISSUED FOR PERMIT

DESIGNED BY: X
DRAWN BY: X
SHEET CHK'D BY: X
CROSS CHK'D BY: X
APPROVED BY: X
DATE: X

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www.hga-llc.com
Home Office: Ruston, LA
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FIRM #: NE CA4153
HUNT, GUILLOT & ASSOCIATES LLC

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KIMBALL COUNTY, NEBRASKA

CLEAN HARBORS KIMBALL, LLC

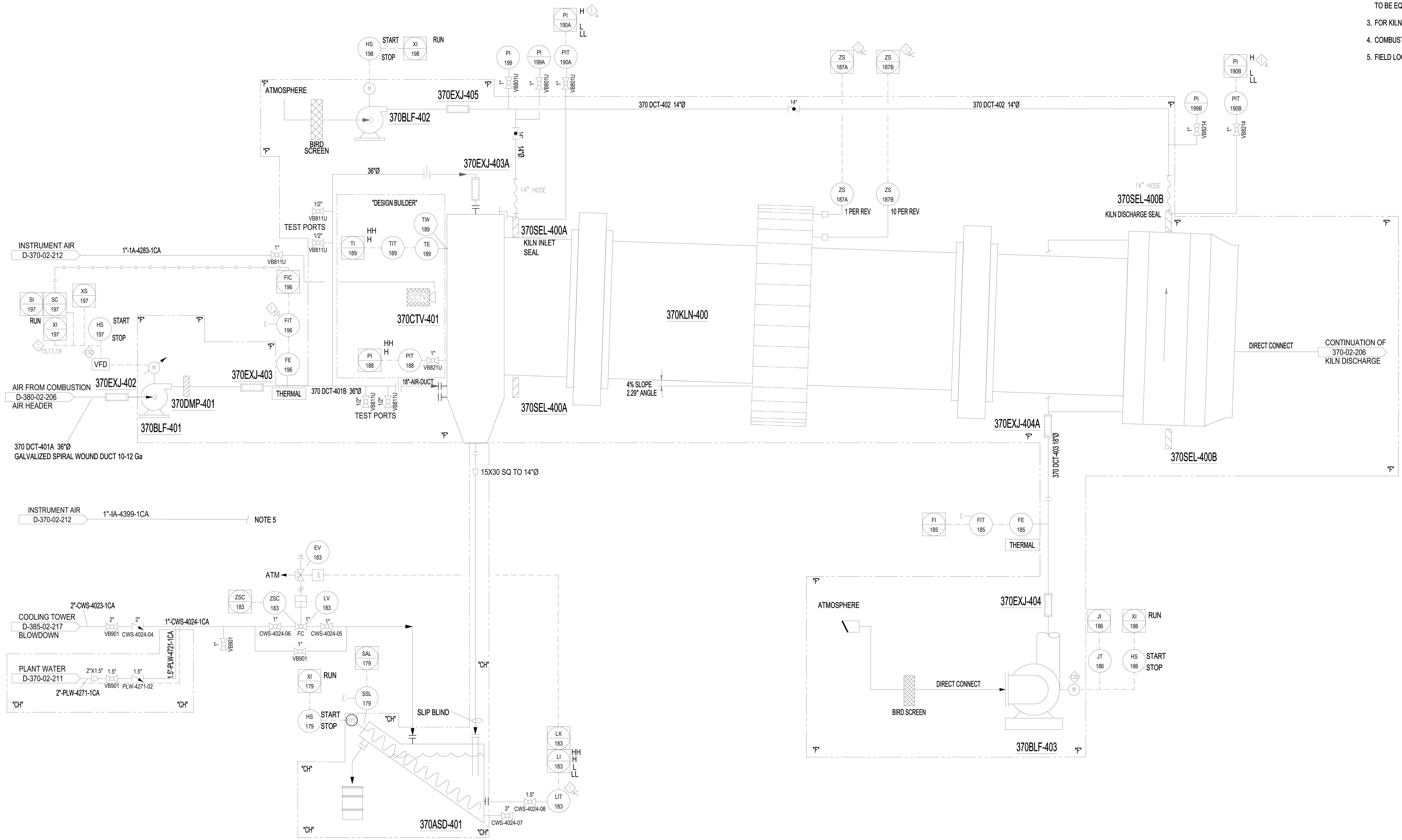
KP INCINERATOR EXPANSION PROJECT

PROCESS & INSTRUMENTATION DIAGRAM
KP TRAIN 2
KILN LIQUID FEED LANCES

PROJECT NO. R22013
FILE NAME: D-370-02-203
DRAWING NO. D-370-02-203
SCALE NONE
REV. E

370DMP-401	370BLF-401	370CTV-401	370ASD-401	370BLF-402	370KLN-400	370EJX-402	370EJX-403/403A	370EJX-404/404A	370EJX-405	370SEL-400A/B	370BLF-403	370DCT-401	370DCT-402	370DCT-403
ROTARY KILN SECONDARY AIR FAN FIRE DAMPER	ROTARY KILN SECONDARY AIR FAN FLOW (ACFM): 25,000 HP: 100 TEMP (°F): 110 MATERIAL: CS	CCTV IR CAMERA KILN BURNER	FRONT WALL ASH SCREW CONVEYOR	KILN SEAL BLOWER FLOW (ACFM): 1,200 HP: 3 TEMP (°F): 110 MATERIAL: CS	ROTARY KILN	SEAL AIR BLOWER EXPANSION JOINTS	SECONDARY AIR FAN EXPANSION JOINTS	COOLING AIR BLOWER EXPANSION JOINTS	SEAL AIR BLOWER EXPANSION JOINT	ROTARY KILN MECHANICAL SEALS	ROTARY KILN DISCHARGE COOLING AIR FAN FLOW (ACFM): 4,000 HP: 10 TEMP (°F): 110 MATERIAL: CS	SECONDARY AIR DUCT	SEAL AIR DUCT	COOLING AIR DUCT

1. INSTRUMENTS ON THIS DRAWING ARE TO BE PRECEDED BY ACCOUNTING NUMBER 370 UNLESS OTHERWISE DENOTED WITH AN *.
2. DOUBLE STAR (**) IN DEVICE BUBBLE DENOTES TAG NUMBER TO BE EQUIPMENT NUMBER THE DEVICE OPERATES.
3. FOR KILN BURNER WASTE LANCES SEE D-370-02-202.
4. COMBUSTION AIR SUPPLY DUCTWORK FURNISHED BY HZI.
5. FIELD LOCATE IA PIPING FROM NEAREST SUPPLY BRANCH.



REV. NO.	DATE	DRWN	CHKD	REMARKS
B	02/25/22	MHA	RB/SK	PERMIT ISSUE WITH CLEAN HARBOR COMMENTS
A	12/20/21	MHA	RB/SK	ISSUED FOR PERMIT

DESIGNED BY: X
DRAWN BY: X
SHEET CHK'D BY: X
CROSS CHK'D BY: X
APPROVED BY: X
DATE: X

wood.
WOOD PROJECT NUMBER: 251305
NEBRASKA CA-2974
WOOD GROUP USA INC
17325 PARK ROW
HOUSTON, TX 77084
PHONE: (979) 849-1682

CleanHarbors
KIMBALL COUNTY, NEBRASKA

CLEAN HARBORS KIMBALL, LLC

KP INCINERATOR EXPANSION PROJECT

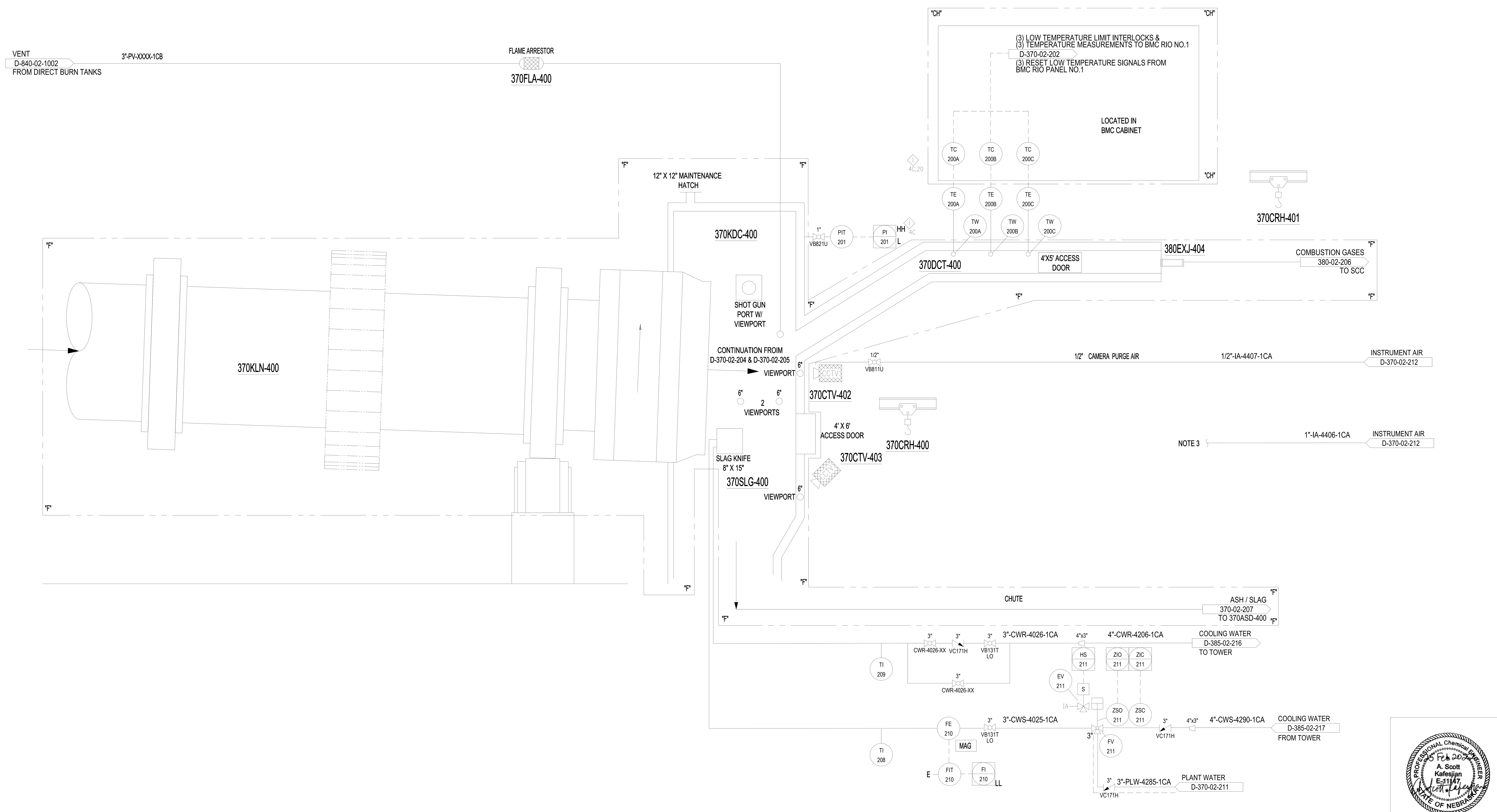
PROCESS & INSTRUMENTATION DIAGRAM
KP TRAIN 2
ROTARY KILN

PROJECT NO. ZKP2109-01
FILE NAME: D-370-02-204
DRAWING NO. D-370-02-204
SCALE NONE
REV. B

PROFESSIONAL Chemical ENGINEER
25 Feb 2022
A. Scott Kafesjian
E-11147
STATE OF NEBRASKA

370SLG-400	370KLN-400	370FLA-400	370CRH-401	370CRH-400	370KDC-400	370DCT-400	370CTV-402	370CTV-403	380EXJ-404
SLAG KNIFE	ROTARY KILN	KILN DETONATION ARRESTOR	MONORAIL CAP: 1.5 TON	HOIST AND TROLLEY CAP: 0.5 TON	KILN DISCHARGE CAMBER	KILN DISCHARGE DUCT	CCTV CAMERA IR TYPE KILN BREECHING	CCTV CAMERA	CONNECTOR DUCT EXPANSION JOINT

1. INSTRUMENTS ON THIS DRAWING ARE TO BE PRECEDED BY ACCOUNTING NUMBER 370 UNLESS OTHERWISE DENOTED WITH AN *.
2. DOUBLE STAR (**) IN DEVICE BUBBLE DENOTES TAG NUMBER TO BE EQUIPMENT NUMBER THE DEVICE OPERATES.
3. FIELD LOCATE IA PIPING FROM NEAREST SUPPLY BRANCH.



PROFESSIONAL Chemical ENGINEER
A. Scott Kafesjian
E-11147
STATE OF NEBRASKA
25 Feb 2022

REV. NO.	DATE	DRWN	CHKD	REMARKS
B	02/25/22	MHA	RB/SK	PERMIT ISSUE WITH CLEAN HARBOR COMMENTS
A	12/20/21	MHA	RB/SK	ISSUED FOR PERMIT

DESIGNED BY: X
DRAWN BY: X
SHEET CHK'D BY: X
CROSS CHK'D BY: X
APPROVED BY: X
DATE: X

wood.
WOOD PROJECT NUMBER: 251305
NEBRASKA CA-2974
WOOD GROUP USA INC
17325 PARK ROW
HOUSTON, TX 77084
PHONE: (979) 849-1682

CleanHarbors
KIMBALL COUNTY, NEBRASKA

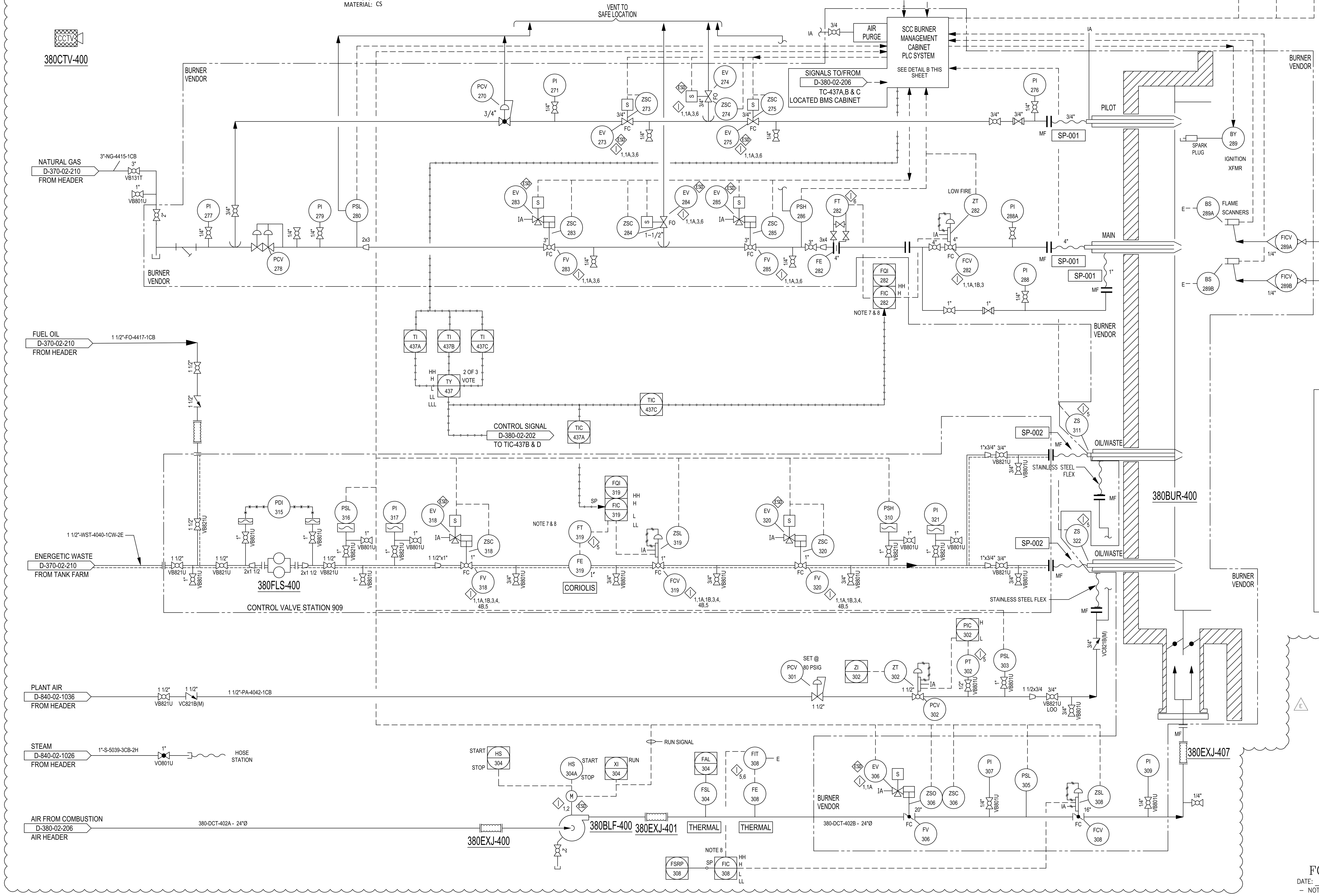
CLEAN HARBORS KIMBALL, LLC
KP INCINERATOR EXPANSION PROJECT

PROCESS & INSTRUMENTATION DIAGRAM KP TRAIN 2 DISCHARGE CHAMBER & EXIT DUCT

PROJECT NO. ZKP2109-01
FILE NAME: D-370-02-206
DRAWING NO. D-370-02-206
SCALE NONE
REV. B

370BUR-400	MAIN KILN BURNER W/PILOT
380CTV-400	CCTV CAMERA SCC BURNER AREA CAMERA
380FLS-400	DUPLEX STRAINER MATERIAL: SIZE: 2" W/ 3/16" STRAINER
380BLF-400	SCC BURNER COMBUSTION AIR FAN FLOW (ACFM): 7,900 HP: 50 TEMP(°F): 110 MATERIAL: CS
380EXJ-400	EXPANSION JOINT MATERIAL: NEOPRENE
380DCT-402A/B	SCC BURNER NO.1 AIR DUCT FAN
380BUR-400	SCC BURNER W/PILOT MATERIAL: REFRACTORY LINED DUTY: HASTELLOY GUN
380EXJ-401	SCC EXPANSION JOINT
380EXJ-407	SCC EXPANSION JOINT

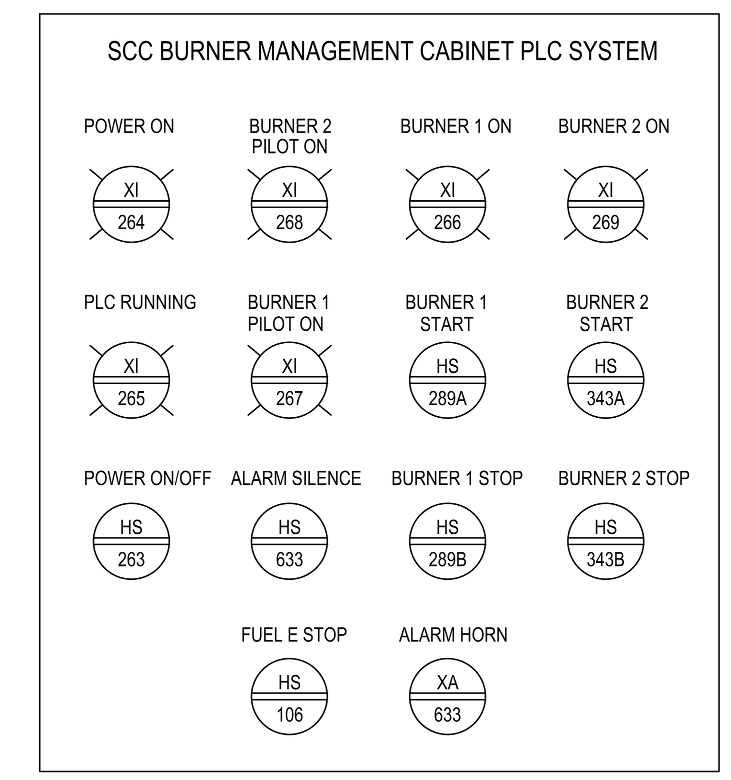
MULTIPLE INPUTS AND OUTPUTS TO/FROM SCADA PLC SYSTEM, INCLUDING NECESSARY SOFTWARE INTERLOCKS VIA ETHERNET.



NOTES:

1. INSTRUMENTS ON THIS DRAWING ARE TO BE PRECEDED BY ACCOUNTING NUMBER 380 UNLESS OTHERWISE DENOTED WITH AN *.
2. DOUBLE STAR (**) IN DEVICE BUBBLE DENOTES TAG NUMBER TO BE EQUIPMENT NUMBER THE DEVICE OPERATES.
3. LINES REQIRE 5 DIAMETER BENDS/SWEEPS.
4. CLEANOUTS REQUIRE ON PROCESS LINE TO BURNER AT SCC FLOOR AND RUNS IN EXCESS OF 50 FEET.
5. BURNER AIR DUCT WORK FURNISHED BY HZI.
6. FIELD LOCATE IA PIPING FROM NEAREST SUPPLY BRANCH.
7. FIC-282 AND FIC-319 ARE USED IN SEVERAL CALCULATIONS TO GET NATURAL FIRING RATE (FQY-282) AND LIQUID FIRING RATE (FQY-319). THE TOTAL BURNER FIRING RATE (FQY-71) = (FQY-282) + (FQY-319). WHEN FQY-71 GETS TO 45 MMBTU.HR, VALVES FCV-282 AND FCV-319 SHALL FREEZE.
8. FIC-282 AND FIC-319 ARE USED IN SEVERAL CALCULATIONS TO GET THE TOTAL COMBUSTION AIR NEEDED FOR GAS AND LIQUID FUEL FLOW TO THE KILN. THE RESULT (FSRP-308) SHALL SERVE AS THE REMOTE FLOW SET POINT TO FIC-308.

DETAIL B



FOR PERMIT
DATE: 10/09/23
– NOT FOR CONSTRUCTION –

TIMOTHY D. BURTON E-19281 PROFESSIONAL MECHANICAL ENGINEER STATE OF NEBRASKA 10/09/23

REV. NO.	DATE	DRWN	CHKD	REMARKS
E	10/09/23	HGA	TDB	MODIFIED VALVE TAGS, UPDATED TO MATCH TANK NOMENCLATURE
D	07/12/23	HGA	TDB	ISSUED FOR DESIGN
C	12/16/22	HGA	TDB	ISSUED FOR REVIEW AND COMMENT
B	02/25/22	MHA	RB/SK	PERMIT ISSUE WITH CLEAN HARBOR COMMENTS
A	12/20/21	MHA	RB/SK	ISSUED FOR PERMIT

DESIGNED BY: X
DRAWN BY: X
SHEET CHK'D BY: X
CROSS CHK'D BY: X
APPROVED BY: X
DATE: X

HGA Engineering
www.hga-llc.com
Home Office: Ruston, LA
T: 318-255-6825
FIRM #: NE CA4153
HUNT, GUILLOT & ASSOCIATES LLC

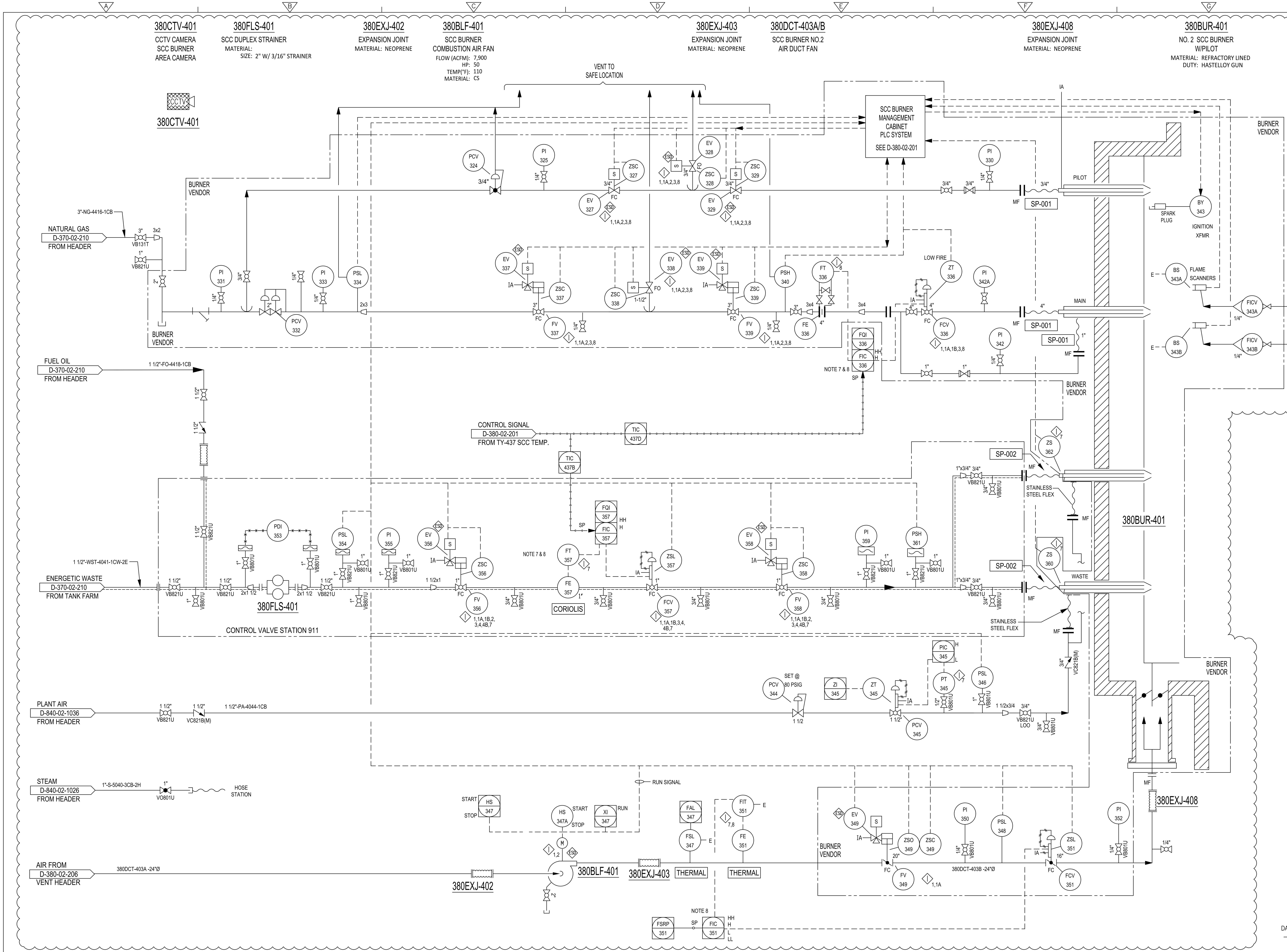
CleanHarbors®
KIMBALL COUNTY, NEBRASKA

CLEAN HARBORS KIMBALL, LLC

KP INCINERATOR EXPANSION PROJECT

PROCESS & INSTRUMENTATION DIAGRAM KP TRAIN 2 SCC BURNER NO. 1

PROJECT NO. R22013
FILE NAME: D-380-02-201
DRAWING NO. D-380-02-201
SCALE NONE
REV. E



NOTES:

1. INSTRUMENTS ON THIS DRAWING ARE TO BE PRECEDED BY ACCOUNTING NUMBER 380 UNLESS OTHERWISE DENOTED WITH AN *.
2. DOUBLE STAR (**) IN DEVICE BUBBLE DENOTES TAG NUMBER TO BE EQUIPMENT NUMBER THE DEVICE OPERATES.
3. LINES REQIRE 5 DIAMETER BENDS/SWEEPS.
4. CLEANOUTS REQUIRE ON PROCESS LINE TO BURNER AT SCC FLOOR AND RUNS IN EXCESS OF 50 FEET.
5. BURNER AIR DUCT WORK FURNISHED BY HZI.
6. FIELD LOCATE IA PIPING FROM NEAREST SUPPLY BRANCH.
7. FIC-336 AND FIC-357 ARE USED IN SEVERAL CALCULATIONS TO GET NATURAL FIRING RATE (FQY-336) AND LIQUID FIRING RATE (FQY-357). THE TOTAL BURNER FIRING RATE (FQY-72) = (FQY-336) + (FQY-357). WHEN FQY-72 GETS TO 45 MMBTU.HR, VALVES FCV-336 AND FCV-357 SHALL FREEZE.
8. FIC-336 AND FIC-357 ARE USED IN SEVERAL CALCULATIONS TO GET THE TOTAL COMBUSTION AIR NEEDED FOR GAS AND LIQUID FUEL FLOW TO THE KILN. THE RESULT (FSRP-351) SHALL SERVE AS THE REMOTE FLOW SET POINT TO FIC-351.

FOR PERMIT
DATE: 10/09/23
– NOT FOR CONSTRUCTION –

PROFESSIONAL MECHANICAL ENGINEER
TIMOTHY D. BURTON
E-19281
STATE OF NEBRASKA
10/09/23

REV. NO.	DATE	DRWN	CHKD	REMARKS
E	10/09/23	HGA	TDB	MODIFIED VALVE TAGS, UPDATED TO MATCH TANK FARM NOMENCLATURE
D	07/12/23	HGA	TDB	ISSUED FOR DESIGN
C	12/16/22	HGA	TDB	ISSUED FOR REVIEW AND COMMENT
B	02/25/22	MHA	RB/SK	PERMIT ISSUE WITH CLEAN HARBOR COMMENTS
A	12/20/21	MHA	RB/SK	ISSUED FOR PERMIT

DESIGNED BY: X
DRAWN BY: X
SHEET CHK'D BY: X
CROSS CHK'D BY: X
APPROVED BY: X
DATE: X

HGA Engineering
www.hga-llc.com
Home Office: Ruston, LA
T: 318-255-6825
FIRM #: NE CA4153
HUNT, GUILLOT & ASSOCIATES LLC

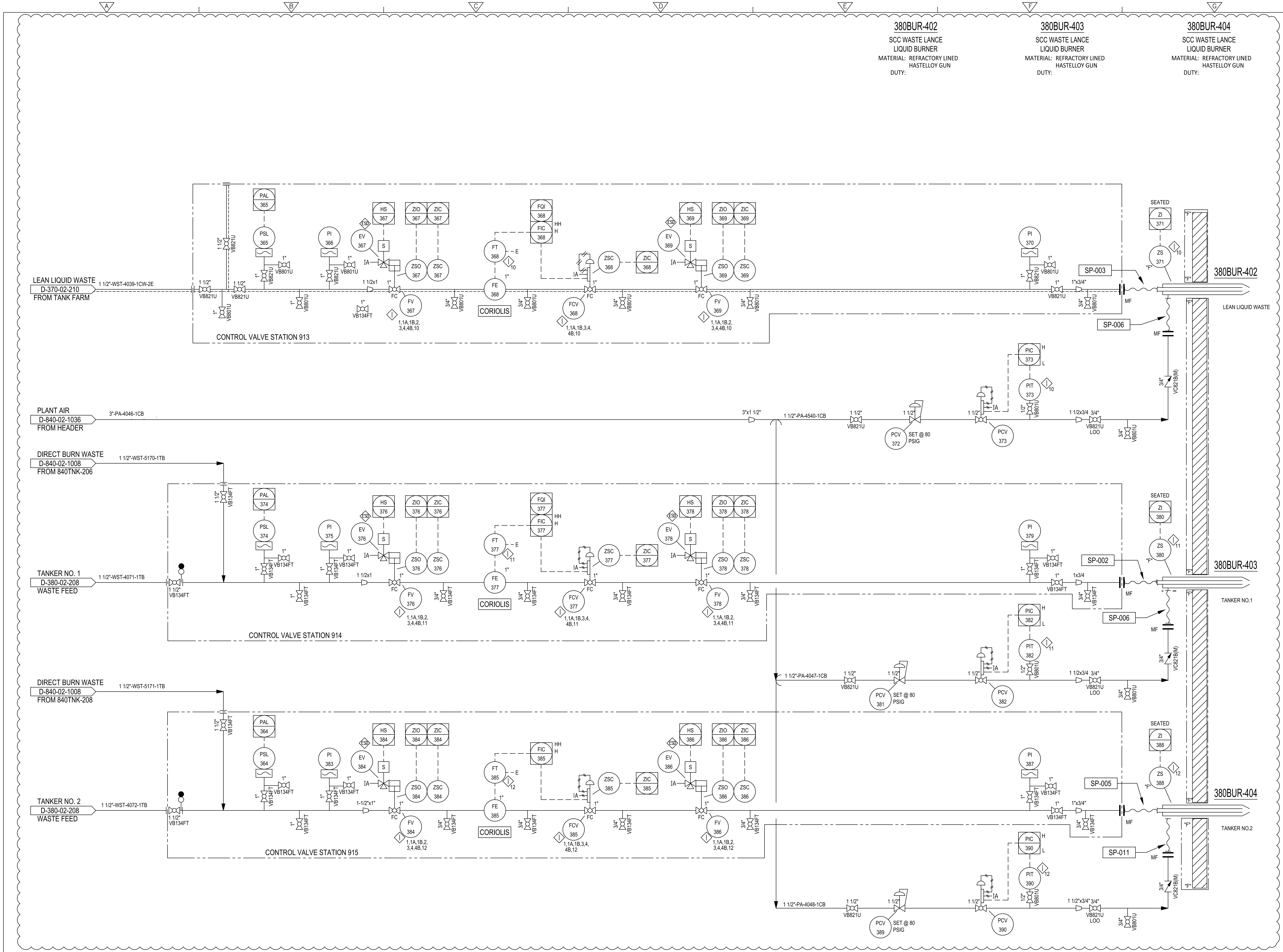
CleanHarbors®
KIMBALL COUNTY, NEBRASKA

CLEAN HARBORS KIMBALL, LLC

KP INCINERATOR EXPANSION PROJECT

PROCESS & INSTRUMENTATION DIAGRAM
KP TRAIN 2
SCC BURNER NO.2

PROJECT NO. R22013
FILE NAME: D-380-02-202
DRAWING NO. D-380-02-202
SCALE NONE
REV. E



NOTES:

1. INSTRUMENTS ON THIS DRAWING ARE TO BE PRECEDED BY ACCOUNTING NUMBER 380 UNLESS OTHERWISE DENOTED WITH AN *.
2. DOUBLE STAR (**) IN DEVICE BUBBLE DENOTES TAG NUMBER TO BE EQUIPMENT NUMBER THE DEVICE OPERATES.
3. LINES REQIRE 5 DIAMETER BENDS/SWEEPS.
4. CLEANOUTS REQUIRE ON PROCESS LINE TO BURNER AT SCC FLOOR AND RUNS IN EXCESS OF 50 FEET.
5. FIELD LOCATE IA PIPING FROM NEAREST SUPPLY BRANCH.

FOR PERMIT
DATE: 10/09/23
– NOT FOR CONSTRUCTION –

PROFESSIONAL MECHANICAL ENGINEER
TIMOTHY D. BURTON
E-11928
STATE OF NEBRASKA
10/09/23

REV. NO.	DATE	DRWN	CHKD	REMARKS
E	10/09/23	HGA	TDB	MODIFIED VALVE TAGS, UPDATED TO MATCH TANK FARM NOMENCLATURE
D	07/12/23	HGA	TDB	ISSUED FOR DESIGN
C	12/16/22	HGA	TDB	ISSUED FOR REVIEW AND COMMENT
B	02/25/22	MHA	RB/SK	PERMIT ISSUE WITH CLEAN HARBOR COMMENTS
A	12/20/21	MHA	RB/SK	ISSUED FOR PERMIT

DESIGNED BY: X
DRAWN BY: X
SHEET CHK'D BY: X
CROSS CHK'D BY: X
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DATE: X

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FIRM #: NE CA4153
HUNT, GUILLOT & ASSOCIATES LLC

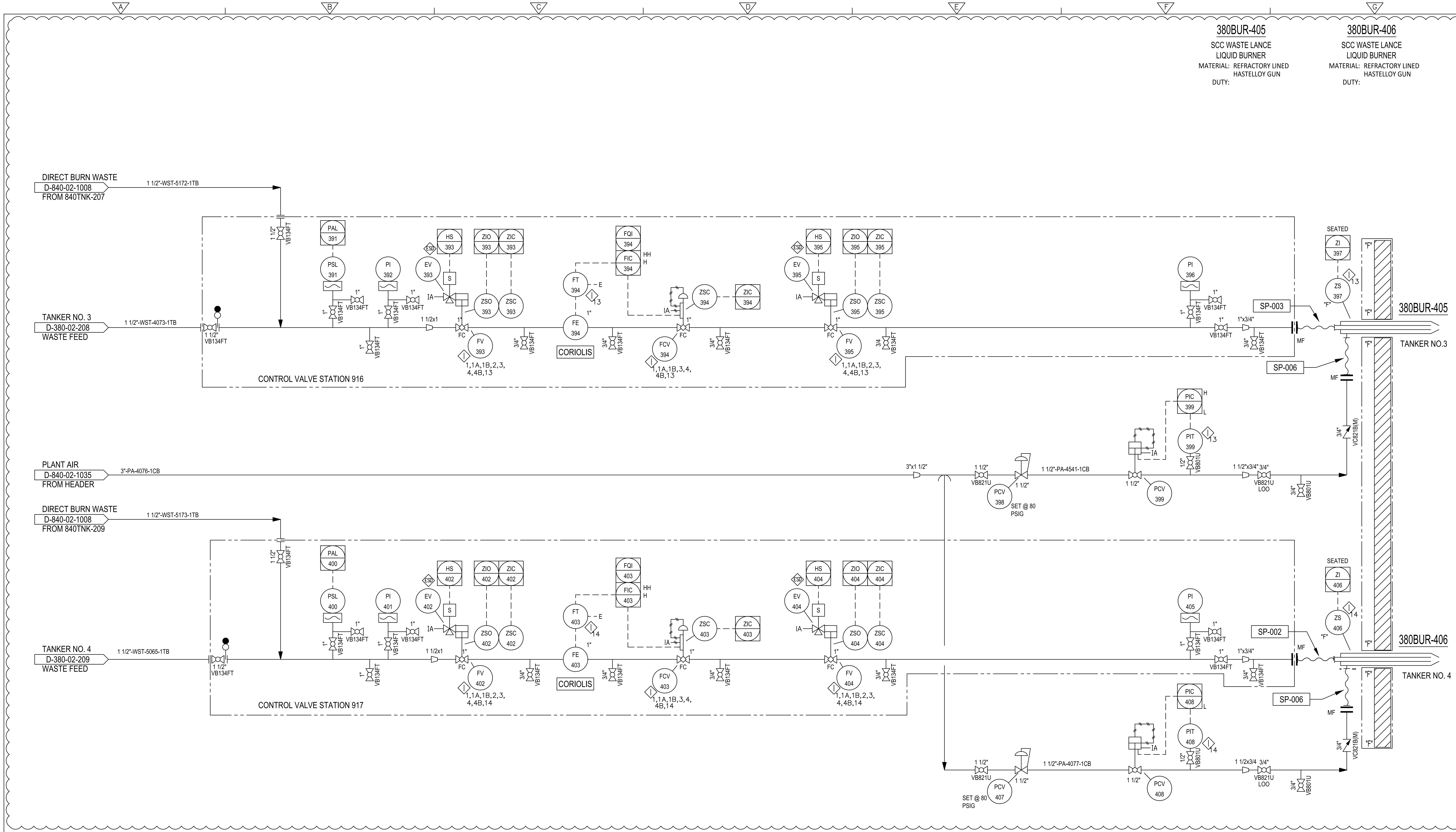
CleanHarbors
KIMBALL COUNTY, NEBRASKA

CLEAN HARBORS KIMBALL, LLC

KP INCINERATOR EXPANSION PROJECT

PROCESS & INSTRUMENTATION DIAGRAM
KP TRAIN 2
SCC LIQUID LANCES I

PROJECT NO. R22013
FILE NAME: D-380-02-203
DRAWING NO. D-380-02-203
SCALE: NONE
REV. E



NOTES:

1. INSTRUMENTS ON THIS DRAWING ARE TO BE PRECEDED BY ACCOUNTING NUMBER 380 UNLESS OTHERWISE DENOTED WITH AN *.
2. DOUBLE STAR (**) IN DEVICE BUBBLE DENOTES TAG NUMBER TO BE EQUIPMENT NUMBER THE DEVICE OPERATES.
3. LINES REQIRE 5 DIAMETER BENDS/SWEEPS.
4. CLEANOUTS REQUIRE ON PROCESS LINE TO BURNER AT SCC FLOOR AND RUNS IN EXCESS OF 50 FEET.
5. FIELD LOCATE IA PIPING FROM NEAREST SUPPLY BRANCH TO SCC BURNER LEVEL.

FOR PERMIT
DATE: 10/09/23
– NOT FOR CONSTRUCTION –

PROFESSIONAL MECHANICAL ENGINEER TIMOTHY D. BURTON E-19281 STATE OF NEBRASKA 10/09/23

REV. NO.	DATE	DRWN	CHKD	REMARKS
E	10/09/23	HGA	TDB	MODIFIED VALVE TAGS, UPDATED TO MATCH TANK FARM NOMENCLATURE
D	07/12/23	HGA	TDB	ISSUED FOR DESIGN
C	12/16/22	HGA	TDB	ISSUED FOR REVIEW AND COMMENT
B	02/25/22	MHA	RB/SK	PERMIT ISSUE WITH CLEAN HARBOR COMMENTS
A	12/20/21	MHA	RB/SK	ISSUED FOR PERMIT

DESIGNED BY: X
DRAWN BY: X
SHEET CHK'D BY: X
CROSS CHK'D BY: X
APPROVED BY: X
DATE: X

HGA Engineering
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Home Office: Ruston, LA
T: 318-255-6825
FIRM #: NE CA4153
HUNT, GUILLOT & ASSOCIATES LLC

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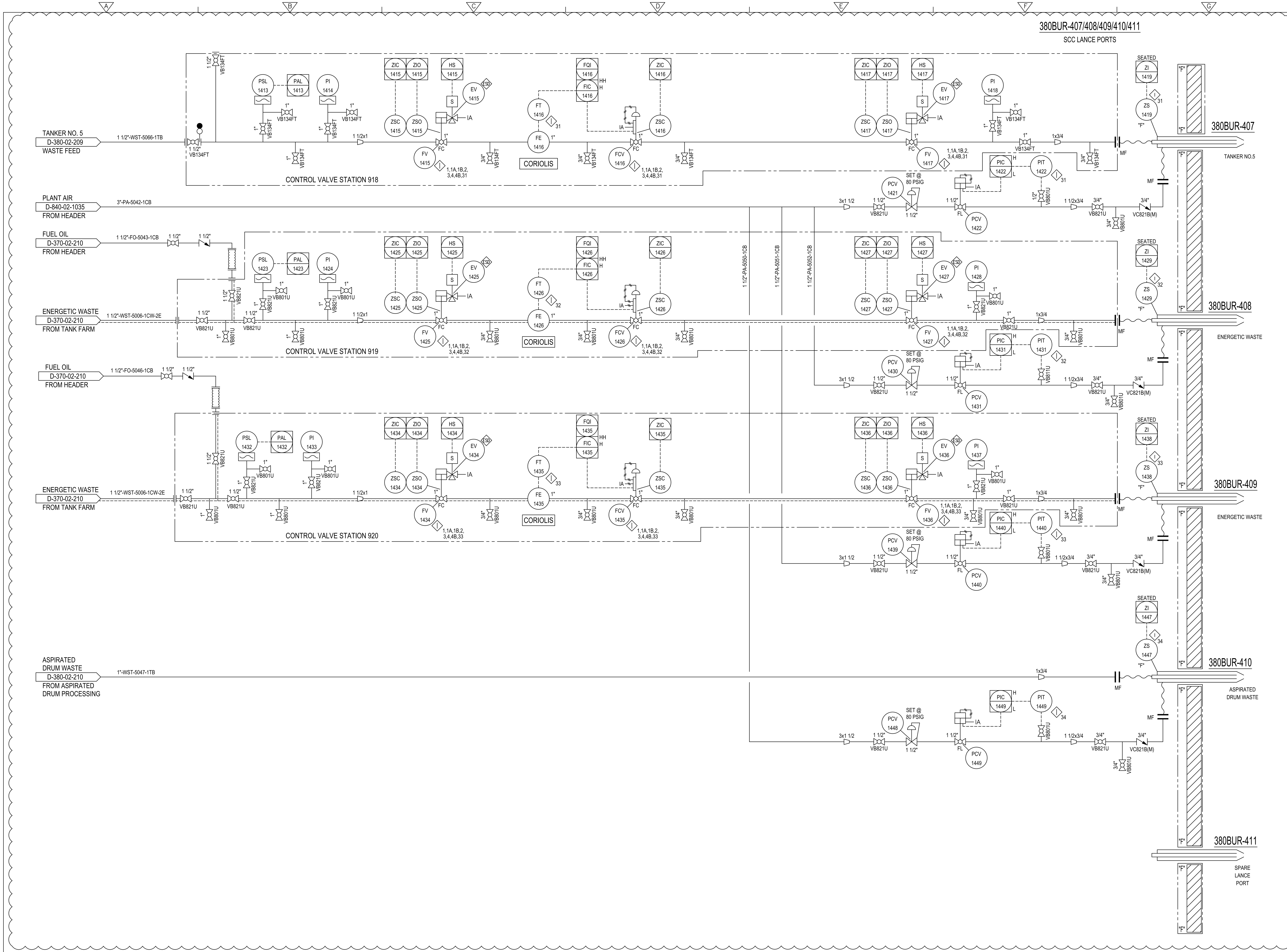
CLEAN HARBORS KIMBALL, LLC

KP INCINERATOR EXPANSION PROJECT

PROCESS & INSTRUMENTATION DIAGRAM KP TRAIN 2 SCC LIQUID LANCES II

PROJECT NO. R22013
FILE NAME: D-380-02-204
DRAWING NO. D-380-02-204
SCALE NONE
REV. E



NOTES:
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2. DOUBLE STAR (**) IN DEVICE BUBBLE DENOTES TAG NUMBER TO BE EQUIPMENT NUMBER THE DEVICE OPERATES.
3. LINES REQIRE 5 DIAMETER BENDS/SWEEPS.
4. CLEANOUTS REQUIRE ON PROCESS LINE TO BURNER AT SCC FLOOR AND RUNS IN EXCESS OF 50 FEET.

FOR PERMIT
DATE: 10/09/23
– NOT FOR CONSTRUCTION –

PROFESSIONAL MECHANICAL ENGINEER
TIMOTHY D. BURTON
E-19281
STATE OF NEBRASKA
10/09/23

REV. NO.	DATE	DRWN	CHKD	REMARKS
E	10/09/23	HGA	TDB	MODIFIED VALVE TAGS, UPDATED TO MATCH TANK FARM NOMENCLATURE
D	07/12/23	HGA	TDB	ISSUED FOR DESIGN
C	12/16/22	HGA	TDB	ISSUED FOR REVIEW AND COMMENT
B	02/25/22	MHA	RB/SK	PERMIT ISSUE WITH CLEAN HARBOR COMMENTS
A	12/20/21	MHA	RB/SK	ISSUED FOR PERMIT

DESIGNED BY: X
DRAWN BY: X
SHEET CHK'D BY: X
CROSS CHK'D BY: X
APPROVED BY: X
DATE: X

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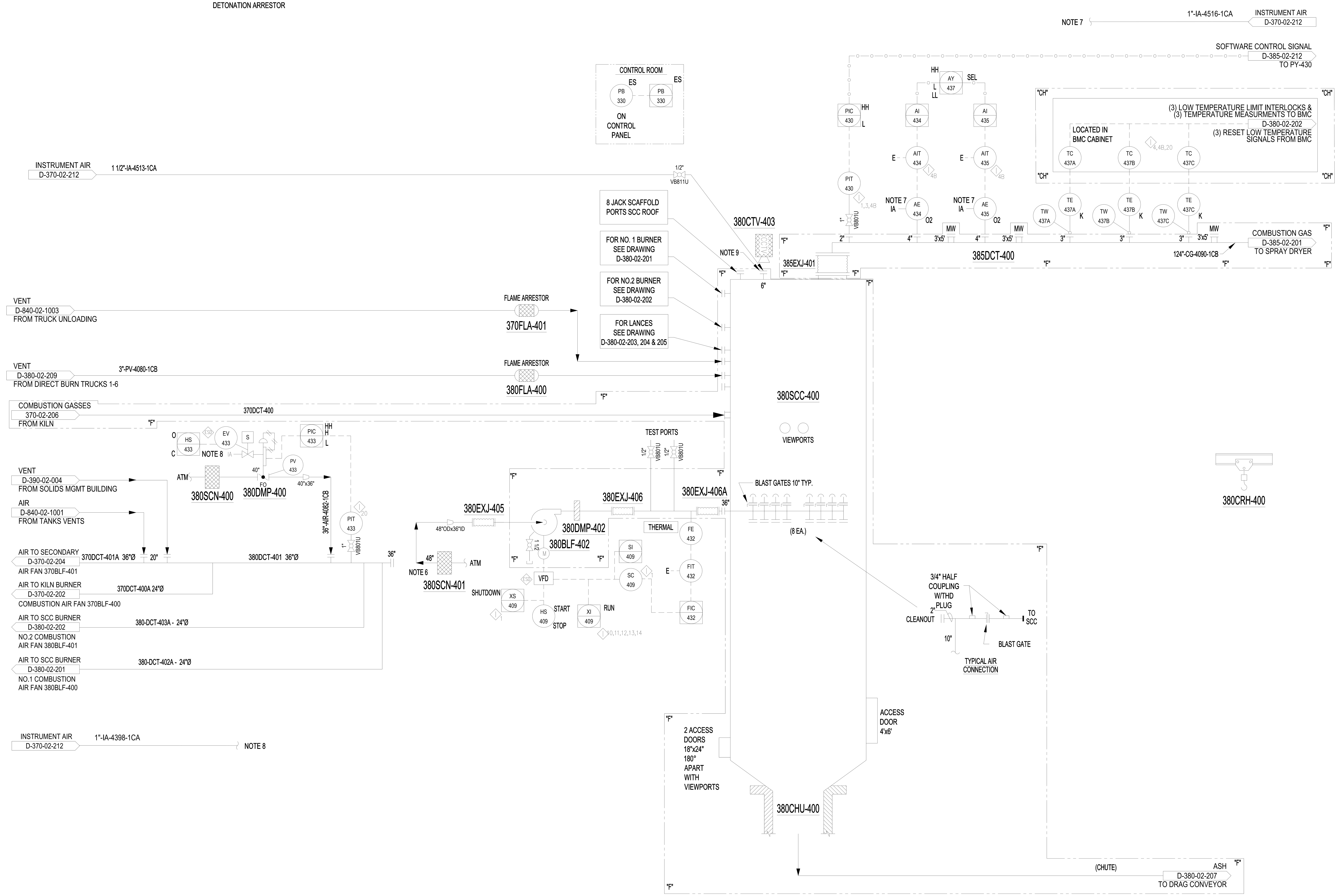
KP INCINERATOR EXPANSION PROJECT

PROCESS & INSTRUMENTATION DIAGRAM
KP TRAIN 2
SCC LIQUID LANCES III

PROJECT NO. R22013
FILE NAME: D-380-02-205
DRAWING NO. D-380-02-205
SCALE NONE
REV. E

380SCN-400	380SCN-401	380FLA-400	380CHU-400	380BLF-402	380EXJ-405	380EXJ-406/406A	380SCC-400	380CTV-403	385EXJ-401	380DMP-402	385DCT-400	380CRH-400	380DMP-400
BIRD SCREEN	BIRD SCREEN	SCC DETONATION ARRESTOR	SCC DISCHARGE CHUTE	SCC COMBUSTION AIR FAN	SCC FAN INLET EXPANSION JOINT	SCC FAN OUTLET EXPANSION JOINTS	SECONDARY COMBUSTION CHAMBER	SCC IR CAMERA	SPRAY DRYER EXPANSION JOINT NO.1	SCC SECONDARY AIR FAN FIRE DAMPER	SCC HOT DUCT	MAINTENANCE MONORAIL	ATM. DAMPER
		380FLA-401 SCC DETONATION ARRESTOR		FLOW (ACFM): 25,000; HP: 100; TEMP (°F): 110; MATERIAL: CS								CAP: 0.5 TON	



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2. DOUBLE STAR (**) IN DEVICE BUBBLE DENOTES TAG NUMBER TO BE EQUIPMENT NUMBER THE DEVICE OPERATES.
3. LINES REQUIRE 5 DIAMETER BENDS / SWEEPS.
4. CLEANOUTS REQUIRED ON PROCESS LINES TO BURNER AT SCC FLOOR AND RUNS IN EXCESS OF 50 FEET.
5. VALVE TO BE ON UPS POWER.
6. COMBUSTION AIR SUPPLY DUCTWORK FURNISHED BY HZI
7. FIELD LOCATE IA PIPING FROM NEAREST SUPPLY BRANCH AT THIS LEVEL.
8. IA FOR 380DMP400 CONNECT TO IA SUPPLY HEADER IN SOLIDS FEED BUILDING.
9. 6 INCH VIEW PORT EXTENDS THROUGH REFRACTORY AND ABOVE STEEL FRAME.

PROFESSIONAL Chemical ENGINEER A. Scott Kafesjian E-11147 STATE OF NEBRASKA 25 Feb 2022

REV. NO.	DATE	DRWN	CHKD	REMARKS
B	02/25/22	MHA	RB/SK	PERMIT ISSUE WITH CLEAN HARBOR COMMENTS
A	12/20/21	MHA	RB/SK	ISSUED FOR PERMIT

DESIGNED BY: X
DRAWN BY: X
SHEET CHK'D BY: X
CROSS CHK'D BY: X
APPROVED BY: X
DATE: X

wood.
WOOD PROJECT NUMBER: 251305
NEBRASKA CA-2974
WOOD GROUP USA INC
17325 PARK ROW
HOUSTON, TX 77084
PHONE: (979) 849-1682

CleanHarbors
KIMBALL COUNTY, NEBRASKA

CLEAN HARBORS KIMBALL, LLC
KP INCINERATOR EXPANSION PROJECT

PROCESS & INSTRUMENTATION DIAGRAM KP TRAIN 2 SECONDARY COMBUSTION CHAMBER

PROJECT NO. ZKP2109-01
FILE NAME: D-380-02-206
DRAWING NO. D-380-02-206
SCALE NONE
REV. B

380DMP-403	380CTV-404	380FAN-400	380PMP-400	380PMP-401	380PMP-402	380STK-400	380ABS-831
BUTTERFLY VENT DAMPER	CCTV CAMERA ASPIRATOR BUILDING	VENT FAN	KYNAR DIAPHRAM REACTIVE PUMP	KYNAR DIAPHRAM OXIDIZER PUMP	KYNAR DIAPHRAM FUEL PUMP	VENT STACK	CARBON FILTER

NOTES:
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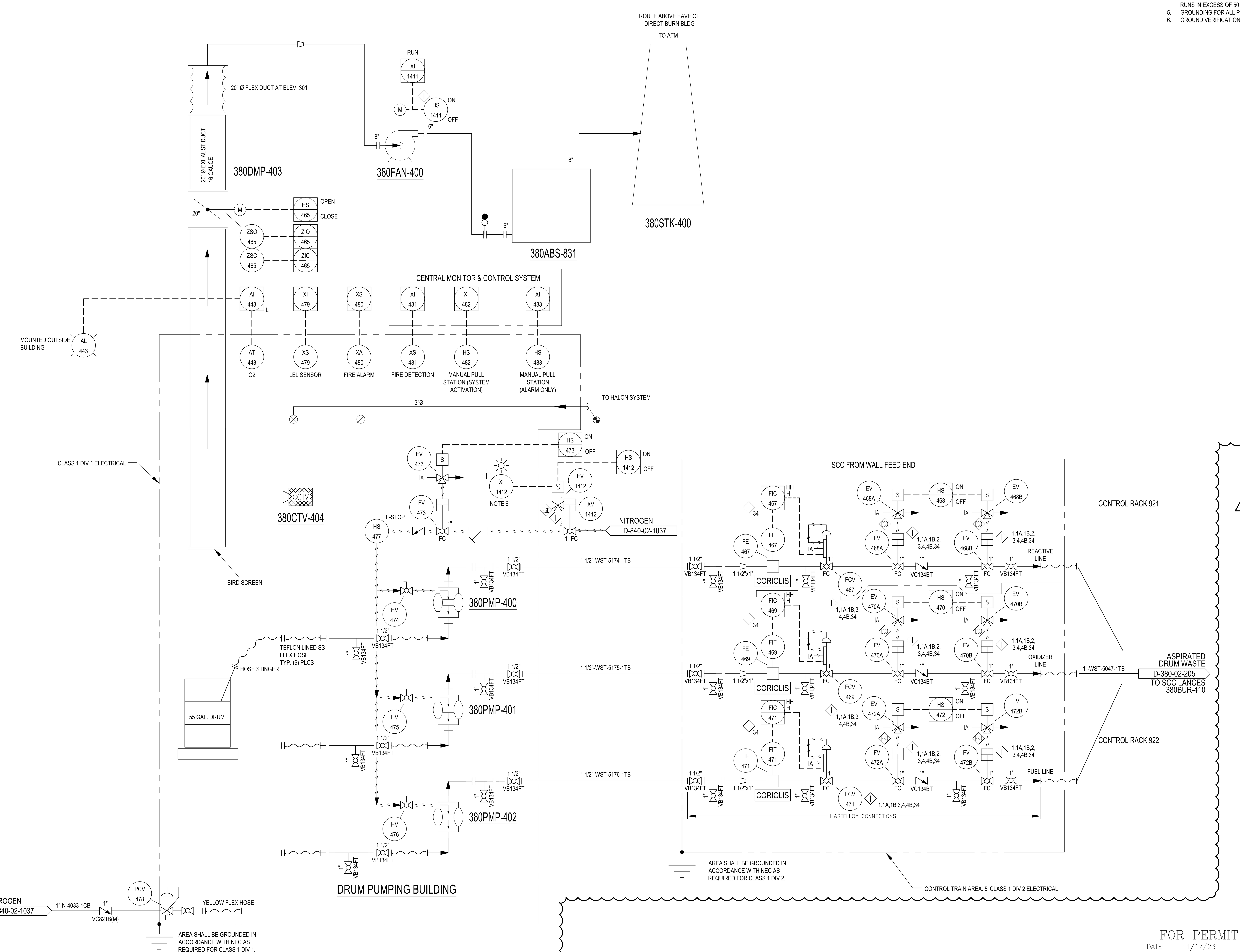
2. DOUBLE STAR (**) IN DEVICE BUBBLE DENOTES TAG NUMBER TO BE EQUIPMENT NUMBER THE DEVICE OPERATES.
3. LINES REQUIRE 5 DIAMETER BENDS/SWEEPS.
4. CLEANOUTS REQUIRE ON PROCESS LINE TO BURNER AT SCC FLOOR AND RUNS IN EXCESS OF 50 FEET.
5. GROUNDING FOR ALL PUMPS, TRUCKS AND OTHER EQUIPMENT.
6. GROUND VERIFICATION INTERLOCK.



FOR PERMIT
DATE: 11/17/23
– NOT FOR CONSTRUCTION –

TIMOTHY D. BURTON E-19281 PROFESSIONAL MECHANICAL ENGINEER STATE OF NEBRASKA 11/16/23

REV. NO.	DATE	DRWN	CHKD	REMARKS
B	11/17/23	HGA	TDB	ADDED 380ABS-381
A	10/09/23	HGA	TDB	DRAWING RENUMBERED – THIS DRAWING REPLACES PREVIOUS VERSION OF D-370-02-209

DESIGNED BY: X
DRAWN BY: X
SHEET CHK'D BY: X
CROSS CHK'D BY: X
APPROVED BY: X
DATE: X

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FIRM # NE CA4153
HUNT, GUILLOT & ASSOCIATES LLC

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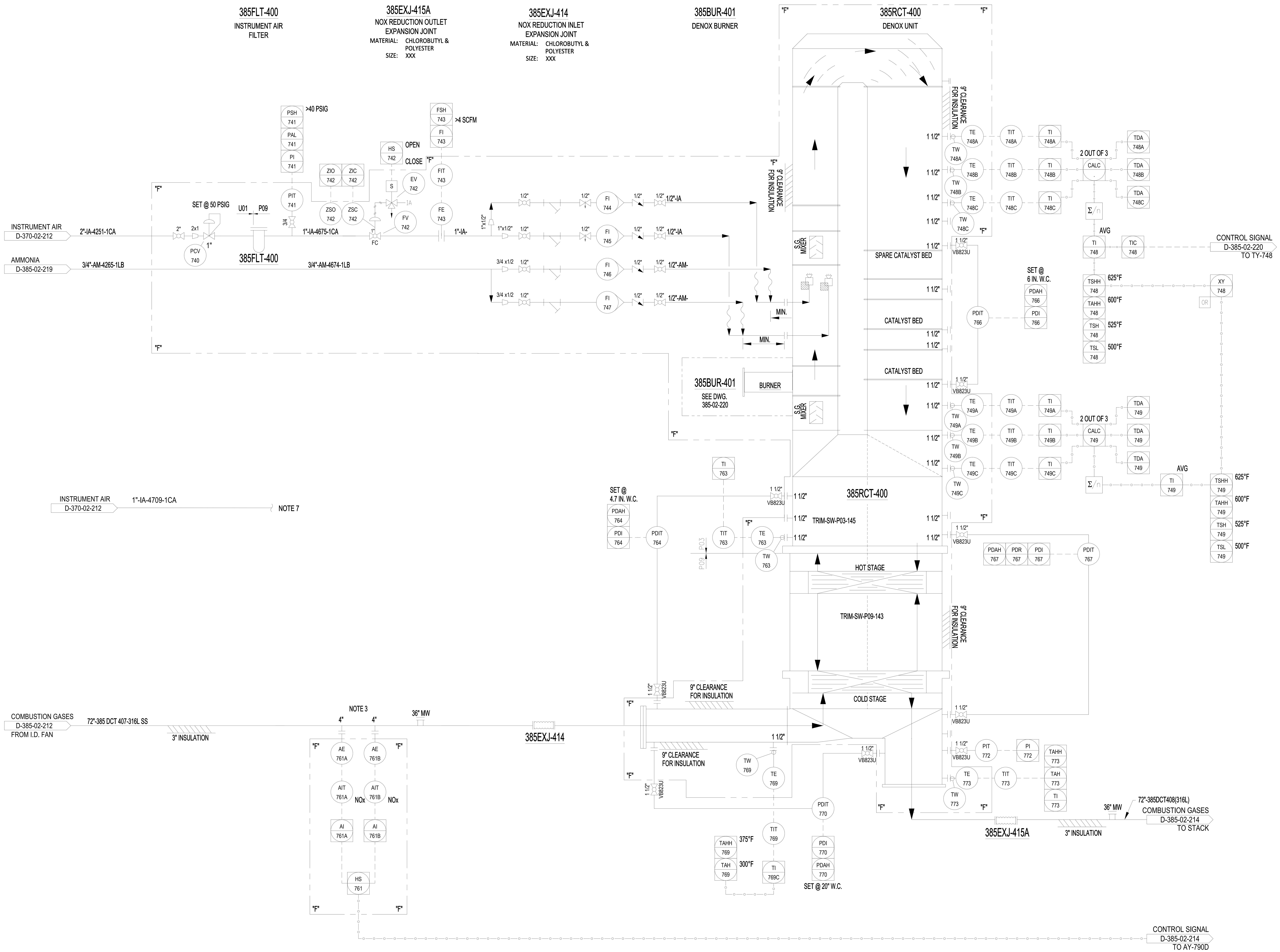
KIMBALL COUNTY, NEBRASKA

CLEAN HARBORS KIMBALL, LLC

KP INCINERATOR EXPANSION PROJECT

PROCESS & INSTRUMENTATION DIAGRAM KP TRAIN 2 DRUM PUMPING

PROJECT NO. R22013
FILE NAME: D-380-02-210
DRAWING NO. D-380-02-210
SCALE NONE
REV. B



1. INSTRUMENTS ON THIS DRAWING ARE TO BE PRECEDED BY ACCOUNTING NUMBER 385 UNLESS OTHERWISE DENOTED WITH AN *.
2. DOUBLE STAR (**) IN DEVICE BUBBLE DENOTES TAG NUMBER TO BE EQUIPMENT NUMBER THE DEVICE OPERATES.
3. NOx ANALYZERS, TRANSMITTERS AND SAMPLE LINES WILL BE SUPPPLIED BY CEMS SUPPLIER. THE 4-INCH FLANGED DUCT CONNECTIONS WILL BE BY THE DESIGN BUILDER.
4. NOx REDUCTION SYSTEM INSULATION FURNISHED AND INSTALLED BY DESIGN BUILDER.
5. DUCT FURNISHED BY HZI.
6. REFER DENOX VENDOR DRAWINGS FOR AMMONIA INJECTION SYSTEM PIPING DETAILS.
7. FIELD LOCATE IA PIPING FROM NEAREST SUPPLY BRANCH.

REV. NO.	DATE	DRWN	CHKD	REMARKS
B	02/25/22	MHA	RB/SK	PERMIT ISSUE WITH CLEAN HARBOR COMMENTS
A	12/20/21	MHA	RB/SK	ISSUED FOR PERMIT

DESIGNED BY: X
DRAWN BY: X
SHEET CHK'D BY: X
CROSS CHK'D BY: X
APPROVED BY: X
DATE: X

wood.
WOOD PROJECT NUMBER: 251305
NEBRASKA CA-2974
WOOD GROUP USA INC
17325 PARK ROW
HOUSTON, TX 77084
PHONE: (979) 849-1682

CleanHarbors
KIMBALL COUNTY, NEBRASKA

CLEAN HARBORS KIMBALL, LLC

KP INCINERATOR EXPANSION PROJECT

PROCESS & INSTRUMENTATION DIAGRAM
KP TRAIN 2
NOX REDUCTION SYSTEM

PROJECT NO. ZKP2109-01
FILE NAME: D-385-02-213
DRAWING NO. D-385-02-213
SCALE NONE
REV. B

PROFESSIONAL Chemical ENGINEER
A. Scott Kafesjian
E-11147
STATE OF NEBRASKA

1. INSTRUMENTS ON THIS DRAWING ARE TO BE PRECEDED BY ACCOUNTING NUMBER 385 UNLESS OTHERWISE DENOTED WITH AN *.
2. DOUBLE STAR (**) IN DEVICE BUBBLE DENOTES TAG NUMBER TO BE EQUIPMENT NUMBER THE DEVICE OPERATES.
3. DELETED
4. ALL POINTS WILL BE RECORDED AND ARCHIVED WITH A DATE AND TIME STAMP ON THE OPERATOR IT MMI.
5. WASTE FEED CUT OFF.
6. CEMS 1A 4" SAMPLE PROBE.
7. CEMS 1B 4" SAMPLE PROBE.
8. CORRECTED TO 7% O2 DRY GAS BASIS.
9. ALL STATUS AND ALARMS IN THE CEMS SYSTEM SHALL BE AVAILABLE TO THE SCADA NETWORK.
10. DUCT FURNISHED BY HZI.
11. REFER TO CEMS VENDOR P&ID'S FOR FURTHER DETAILS.
12. REFER TO SPECIAL INTRUCTIONS FOR ANALYZER INSTALLATION IN STACK.

FOR PERMIT
10/09/23
– NOT FOR CONSTRUCTION –

PROFESSIONAL MECHANICAL ENGINEER TIMOTHY D. BURTON E-19281 STATE OF NEBRASKA 10/09/23

REV. NO.	DATE	DRWN	CHKD	REMARKS
E	10/09/23	HGA	TDB	ADDED ANALYZERS AND CEMS INSTRUMENTS
D	07/21/23	HGA	TDB	ISSUED FOR DESIGN
C	02/02/23	HGA	TDB	ISSUED FOR REVIEW AND COMMENT
B	02/25/22	MHA	RB/SK	PERMIT ISSUE WITH CLEAN HARBOR COMMENTS
A	12/20/21	MHA	RB/SK	ISSUED FOR PERMIT

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CLEAN HARBORS KIMBALL, LLC
KP INCINERATOR EXPANSION PROJECT

PROCESS & INSTRUMENTATION DIAGRAM
KP TRAIN 2
STACK

PROJECT NO. R22013
FILE NAME: D–385–02–214
DRAWING NO. D-385-02-214
SCALE NONE
REV. E