Source Test Protocol
November 11th, 2019

Prepared for:
Chemical Waste Management of the Northwest, Inc
18177 Cedar Springs Ln
Arlington, OR 97812

Located at:
Chemical Waste Management of the Northwest, Inc
18177 Cedar Springs Ln
Arlington, OR 97812
DEQ Oregon PERMIT #11-002

Submitted to:
Department of Environmental Quality
700 NE Multnomah Street, Suite 600
Portland, Oregon, 97232
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Prepared by:
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GENERAL INFORMATION

Source Owner:	Chemical Waste Management of the Northwest, Inc 18177 Cedar Springs Ln Arlington, OR 97812
Source Location:	Chemical Waste Management of the Northwest, Inc 18177 Cedar Springs Ln Arlington, OR 97812
Source Contact:	James Denson (PNW/BC) Environmental Protection Manager 602-757-3352 jdenson@wm.com Bob Mulholland (District Manager)
Regional Contact:	ODEQ-Attn: Jonathan Giska 503-229-5178 Department of Environmental Quality 700 NE Multnomah Street, Suite 600 Portland, Oregon, 97232 giska.jonathan@deq.state.or.us
Federal Contact:	USEPA Region 10 N/A
Source Description:	Organic Recovery Unit 2 (ORUN2)
Permit:	11-0002
Regulation Requirements:	Clean Air Oregon Rules Oregon DEQ Letter Dated Aug 8, 2019
Source Testing Company:	BLUE SKY ENVIRONMENTAL, Inc 624 San Gabriel Ave Albany, CA 94706
Contact:	Guy Worthington 510-525-1261 or 510-508-3469
Scheduled Test Date(s):	TBD

1.0 Introduction

This testing is planned to comply with the ODEQ emission test requirements stated in communications from Jonathan Giska of ODEQ to Jim Denson of WM dated August 8th, 2019. Testing will produce emissions data from the Organic Recovery Unit #2 (ORU2) to be used in Air Dispersion Modelling and Risk Assessment.

Specified Testing Requirements
EPA M29 for Metals (As, Cd, Cr, Pb, Mg, Hg, Ni)
EPA 306 Hexavalent Chromium
EPA 26A for Halogenated Organics (HCl, HF, HBr)
EPA M23 for Polycyclic Aromatic Hydrocarbons, Dioxins and Furans
EPA 25A TOU (exhaust) & EPA 25C (inlets) for Total Volatile Organic Compounds
EPA TO-15 for Specific Toxic Organic Compounds at Thermal Oxidizer Unit TOU Inlet & Outlet

2.0 Emission Source Information

The ORU2 processes and recycles refinery tank bottom wastes. These wastes are processed in an indirect fired Rotary Kiln operated at 900-950°F. The gases are directed to the Vapor Recovery Unit (VRU, ME-1301) where water is sprayed into the gas stream, followed by a venturi scrubber with demisters to knock out fine particulates and soluble and condensible organic and inorganic gases. The gases proceed through a chiller to further remove moisture and condensible materials, before entering the Thermal Oxidizer Unit (TOU) operated at 1600-1650°F.

Ports will be installed at each of the two inlet waste gas streams feeding the TOU (one from the conveyors and hoppers including inside Building B5, and the other from the Rotary Kiln emissions. These ports will be used to measure the inlet organics by EPA 25C and EPA TO-15, Fixed gases by ASTM 1945 and volumetric flowrate by pitot tube. The inlet gases are close to ambient temperature and will be assumed to be at 100% humidity for moisture determination.

No ports currently exist on the TOU stack (~ 60" ID), however plans are underway to provide four 6" diameter ports with a platform, located 5-8 diameters downstream and >2 diameters upstream of the exit, which will require a stack extension and platform construction, which is being designed and will be constructed prior to testing.

3.0 Source Testing Program Description

Test Location	No. Runs & Duration	Methods	Parameters
Stack Gas	3 x 1-hr simultaneously with isokinetic tests	EPA 1, 2, 4 EPA 3A, 10 EPA 25A/ALT-106	Flowrate & H_2O % CO, CO_2, O_2 THC, NMOC
Stack Gas	3 x 1-hr Isokinetic	EPA 5/26A	Filterable Particulates, HCl, HF, HBr
Stack Gas	3 x 1+ hr Isokinetic	EPA 29	Metals (As, Cd, Cr, Pb, Mg, Hg, Ni)

Stack Gas	3 x 1+ hr Isokinetic	EPA 306	Metals (Total and Hexavalent Cr)
Test Location	No. Runs & Duration	Methods	Parameters
Stack Gas	3 x 3+ hr Isokinetic	EPA 0023	Dioxins/Furans & PAH's
Stack Gas	3 x 1 hr simultaneously with THC and NMOC	EPA TO-15	Volatile Organic Species
TOU 2 Inlet streams	3 x 1 hr simultaneously with Stack Gas TO-15	EPA TO-15	Volatile Organic Species
TOU 2 Inlet streams	3 x 1 hr simultaneously with Stack Gas THC and NMOC	EPA 25C & ASTM 1945	NMOC & Fixed Gases
TOU 2 Inlet streams		EPA 1, 2, 3A	Flowrate %CO, CO_2, O_2
Solid Feed Material	15 -minute grabs (1-hr composites)	SW-846 Metals by ICPES 60100B and 7471 for Hg Chlorine, Methods 5050 & 9056A	Metals, Total Chlorine Bromine, Fluorine, TPH and BTEX
Reporting units			Gases in ppmvd PM in gr/dscf Metals in ug/dscm Dioxins etc in ng/dscm
Operating Parameters	15-min intervals		Feed TPH Auger RPM Temperatures

Sampling Methods: The following Source Test Methods of the U.S. Environmental Protection Agency (EPA) are used:

Exhaust Gas Analysis

EPA Method 3A	CO_2 & O_2 Continuous Monitoring
EPA Method 10	CO Continuous Monitoring
EPA Method 25A/ALT-106	THC/NMHC/CH_4
EPA Method 1, 2, 4	Traverse Point, Velocity, Volumetric Flowrate & Moisture
EPA Method 29	Multiple Metals
EPA 306	Hexavalent and Total Chromium
EPA Method 5	Filterable Particulate Matter
EPA Method 23	Dioxins and Furans
EPA Method 26A	Hydrogen Halides and Halogens (HCl, HF, HBr)
EPA TO-15	Volatile Organic Compound (VOC) Species

Inlet Gas Analysis

ASTM 1945	Gas Analysis for CH4, CO2, O2, CO, H2, C2-C6+
EPA 25C	NMOC
EPA TO-15	VOC species

Inlet Feed Analysis

TPH, BTEX, Metals, Total Cl-, F- and Br-

Sampling & Traverse Points Selection by EPA Method 1, 1A. This method is used to determine the duct or stack area and appropriate traverse points that represent equal areas of the duct for sampling and velocity measurements.

Stack Gas Velocity & Flow Rate by EPA Method 2. This method is used to determine stack gas velocity using a standard or S-type pitot tube and inclined manometer. Temperature is monitored using a K-type thermocouple and calibrated Omega temperature meter. QA/QC procedures include leak checks before and after each traverse to validate the results. Thermometer calibrations are performed using an Omega Model CL-300 calibrator. Geometric calibrations of S-type pitots are performed every 6 months or following modification according to EPA guidelines. The absence of Cyclonic Flow will be confirmed.

Stack Gas Moisture by EPA Method 4. This method is used to determine the moisture content in the gas stream by extracting a sample and condensing the moisture in Greenburg-Smith impingers immersed in an ice bath and in a final impinger silica gel trap. The moisture is condensed in a solution of de-ionized water, or solutions of another type of sampling train if the moisture is being determined as part of another sampling method, such as EPA Method 5 or EPA 12. The moisture gain in the impinger solutions and silica gel is determined volumetrically and gravimetrically respectively. QA/QC procedures require that a minimum of 21 cubic feet of sample is pulled using a leak tight pump. The sample volume is measured with a calibrated dry gas meter. The impingers are immersed in a ice bath to maintain a gas outlet temperature of <68°F. Pre-test leak checks are performed for each run at least 15 inches of mercury vacuum. Post-test leak checks are performed at the highest sample vacuum or greater. The leak test is acceptable if the leak rate is less than 0.02 cubic feet per minute or 4% of the average sampling rate, whichever is less. If the final leak check exceeds the criteria, then the volume is corrected based on the leak rate, or the run is voided and repeated.

EPA Method 5/26A. (Particulate and HCl, HF, HBr). This method was used to determine the emissions of acid gases that pass through the probe/filter assembly maintained at 248 ± 25°F. The sampling equipment consists of Method 5 type heated glass probe with glass nozzle, heated filter box with Teflon mat filter, Teflon® umbilical, four Greenburg-Smith impingers immersed in ice, and a meter control module. Particulate matter is collected in the nozzle/probe and on the heated filter maintained at 248 ± 25°F. Condensible gaseous and particulate emissions that pass through the filter (rated at 99.95% efficient for 0.3µm particles) are collected and recovered from the back-half of the filter holder, the sample line and finally the impingers (two containing an acidic absorbing solution of 0.1 N H_2SO_4 and two containing an alkaline absorbing solution of 0.1 N NaOH) and the final impinger contains silica gel desiccant). The impinger solutions are analyzed using ion chromatography for any of the following; HCl, HNO_3, HBr, HF, H_3PO_4, or H_2SO_4. The filter is discarded. Sampling QA/QC: consists of pitot leak checks performed by pressurizing each leg of the pitot separately to a pressure greater than 3" H_2O. The leak check is passed when no movement in the manometer fluid occurs over 15 seconds. Sampling system leak checks are performed before and after each test run. The sampling system leak checks are performed by capping the nozzle and pulling a vacuum greater than 15 inches of mercury, and observing the meter rate. The leak check is passed when the leak rate is less than 0.02CFM or 4% of the average sample rate, whichever is less. The final leak check is performed at a vacuum at least as high as the highest vacuum pulled during the run. The impingers are kept in ice to maintain the temperature of the gas exiting the last impinger to below 68°F. No silicone grease is used in the components of the sampling train. The dry gas meter, pitot, thermocouples, gauges and nozzles are all calibrated according to the methods and with a frequency of between 6 to 12 months as specified in CARB QA/QC Volume VI, Table 3. Nozzles are calibrated to within 0.001" diameter and are inspected for damage prior to each test. Field train blanks were collected using identical equipment, reagents, proportions and techniques as the test samples. Analytical QA/QC consisted of a field train blank, laboratory blanks, duplicates and spikes.

Multiple Metals by EPA Method 29. This method is used to determine the emissions of antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), manganese (Mn), mercury (Hg), nickel (Ni), phosphorous (P), selenium (Se), silver (Ag), thallium (Tl) and zinc (Zn). For this test program only Hg, Cd and Pb were analyzed. The sampling equipment consists of a Method 5 arrangement with a borosilicate glass nozzle, heated glass probe and heated quartz glass fiber filter, followed by a Teflon® line to a series of five Greenburg-Smith impingers immersed in ice. Particulate matter is collected in the nozzle/probe and on the heated filter. Condensible gaseous and particulate emissions that pass through the filter (rated at 99.95% efficient for 0.3µm particles) are collected and recovered from the sample line, the back half of the filter holder, and the impingers. The first two impingers contain a solution of 5%HNO_3/10%H_2O_2, the third is empty, the fourth contains a solution of 4%$KMnO_4$/10%H_2SO_4 and the final impinger contains silica gel desiccant. A schematic of the sampling train is contained in the Sampling System Diagram section of the Appendices.

Analysis for metals was performed by ICPMS and Cold Vapor AAS (CVAAS). Sampling QA/QC: consists of pitot leak checks that are performed by pressurizing each leg of the pitot separately to a pressure greater than 3" H_2O. The leak check is passed when no movement in the manometer fluid occurs over 15 seconds. Sampling system leak checks are performed before and after each test run. The sampling system leak check is performed by, capping the nozzle and pulling a vacuum greater than 15 inches of mercury while observing the meter rate. The leak check passes when the leak rate is less than 0.02CFM, or 4% of the average sample rate, whichever is less. The final leak check is performed at a vacuum at least as high as the highest vacuum pulled during the run. The impingers are kept in ice to maintain the temperature of the gas exiting the last impinger to below 68°F. The acidified $KMnO_4$ solution is prepared fresh daily and is protected from daylight. During testing the solution is observed to detect any discoloration due to mercury. No silicone grease is used in the components of the sampling train. The dry gas meter, pitot, thermocouples, gauges and nozzles are all calibrated according to the methods and with a frequency of between 6 to 12 months as specified in CARB QA/QC Volume VI, Table 3. Nozzles are calibrated in the field to within 0.001" diameter and are inspected

for damage prior to each test. Field train blanks were collected using identical equipment, reagents, proportions and techniques as the test samples. Analytical QA/QC consisted of a field train blank, laboratory blanks, duplicates and spikes.

EPA Method 306 (Hexavalent Chromium) Three 60-minute tests will be performed on the selected source using EPA Method 306 to determine the Total and Hexavalent Chromium. Volumetric flowrate will be determined using EPA Method 1-4. Stack Gas $\%O_2$ and $\%CO_2$ will be assumed to be ambient. Testing will include pre-cleaning and pre analytical QC of all sampling glassware trains and reagents prior to use.

Sampling times may be adjusted to meet required detection limits. Sampling duration is currently based on 60 minutes per scrubber based on previous testing. All Laboratory analyses will be performed by ELEMENT, Santa Fe Springs, CA. The reporting limits for Hexavalent Chromium are 0.02 ug/L (EPA 7196) and 2 ug/L for Total Chromium (EPA 6020). Sampling and analytical will be performed with the same batch of sodium bicarbonate/sodium carbonate. No field or reagent blank corrections will be used. Sample pH will be kept >8.0 and will be kept below 4°C (38°F) until analysis within 14 days. It is proposed to combine the front-half probe and nozzle rinse with the impinger and filter back-half fractions to avoid the addition of non-detects.

EPA Method 23 Dioxins/Furans & Polycyclic Aromatic Hydrocarbons (PAHs) is used to determine the emissions of polychlorinated dibenzo-p-dioxins (PCDD's) and polychlorinated dibenzofurans (PCDFs). The sampling equipment consists of a glass nozzle, a Stainless Steel sheathed heated glass-lined probe, heated filter box and filter holder with teflon-coated, toluene-rinsed, glass-fiber filter, followed by a Teflon® line to a condenser and XAD sorbent module that sits directly on-top of the first of four modified Greenburg-Smith impingers. The first impinger (optional) has a short stem and is empty, the second and third contain 100 ml each of De-Ionized water, and the fourth is empty. A fifth impinger contains 200-plus gm of silica gel to remove any remaining moisture. The sample is drawn through the sample train using a vacuum pump and the volume is measured by a dry gas meter in an isokinetic metering control module.

Sampling is performed isokinetically. Sampling QA/QC: consists of pitot leak checks which are performed by pressurizing each leg of the pitot separately to a pressure greater than 3" H_2O. The leak check is passed when no movement in the manometer fluid occurs over 15 seconds. Sampling system leak checks are performed before and after each test run. The sampling system leak checks are performed by capping the nozzle and pulling a vacuum greater than 15 inches of mercury, and observing the meter rate. The leak check is passed when the leak rate is less than 0.02CFM or 4% of the average sample rate, whichever is less. The final leak check is performed at a vacuum at least as high as the highest vacuum pulled during the run. The impingers are kept in ice to maintain the temperature of the gas exiting the last impinger to below 68°F. No silicone grease is used in the components of the sampling train.

Sample recovery is performed in a clean enclosed area or at the laboratory. The nozzle/probe sample is recovered with acetone, then methylene chloride and finally a toluene rinse. The filter is carefully removed and placed in a labeled petri-dish. The transfer line between the filter and condenser, the condenser and the first impinger are rinsed three times, first with acetone, then methylene chloride followed by toluene. The sorbent module is capped. The volume of the contents of the first, second and third impingers are measured for moisture determination and are discarded. The silica gel is recovered and weighed.

Equipment QA/QC includes the following: The dry gas meter, pitot, thermocouples, gauges and nozzles are all calibrated according to the methods and with a frequency of between 6 to 12 months as specified in CARB QA/QC Volume VI, Table 3. Nozzles are calibrated to within 0.001" diameter and are inspected for damage prior to each test. Reagent and Field blanks were collected using identical equipment, reagents, proportions and techniques as the test samples. Analytical QA/QC consists of at least one field blank, which is a sample train assembled tested and recovered in the same manner as the samples without drawing any sample. A chain of custody is completed for all samples, and the samples are packaged and shipped to the laboratory according to the method.

EPA Method 3A (O_2, CO_2) & 10 (CO) describes continuous monitoring techniques using instrumental analyzers. Sampling is performed by extracting exhaust flue gas from the stack, conditioning the sample and analyzing it by continuous monitoring gas analyzers in a CEM test van. The sampling system consists of a stainless-steel sample probe, teflon sample line, glass-fiber particulate filter, glass moisture-knockout condensers in ice, followed by thermoelectric coolers (optional), teflon sample transfer tubing, diaphragm pump and a stainless steel/teflon manifold and flow control/delivery system. A constant sample and calibration gas supply pressure of 5 PSI is provided to each analyzer to avoid pressure variable response differences. The entire sampling system is leak checked prior to and at the end of the sampling program.

The sampling and analytical system (for EPA Methods) is checked for linearity with zero, mid (40-60% of span) and span (80-100% of range) calibrations and is checked for system bias at the beginning and end of each run. System bias is determined by introducing calibration gas to the probe and pulling it through the entire sampling system. Individual test run calibrations usually use the calibration gas that most closely matches the stack gas effluent. Along with the Sampling System Bias, the Zero and Calibration Drift values were determined for each test. Methods 3A, 7E and 10 all defer to EPA Method 7E for the calculations of effluent concentration, Span, Calibration Gas, Analyzer Calibration Error (Linearity), Sampling System Bias, Zero Drift, Calibration Drift and Response Time. If NOx is being measured, then the NOx analyzer NO2 to NO conversion efficiency check is performed according to EPA Method 20 section 5.6 criteria and procedures.

All calibration gases are EPA Protocol #1. The analyzer data recording system consists of Honeywell DPR3000 or Omega 3 channel strip chart recorders, which are supported by a Data Acquisition System (DAS).

CEM Reference Method System Performance Criteria

Instrument Linearity (25A)	≤±5% Span Gas
Instrument Linearity	≤± 2% Span (high Cal Gas value)
Instrument Bias	≤± 5% Span (high Cal Gas value)
System Response Time	≤± 2 minutes
Instrument Zero Drift (EPA 7E)	≤± 3% Span (high Cal Gas value)
Instrument Span Drift (EPA 7E)	≤± 3% Span (high Cal Gas value)

EPA 25A/EPA Method ALT-106: Sampling for Total Hydrocarbons, Methane and Non-Methane Hydrocarbons. EPA Method ALT-106 (FID/GC Method) employs a heated TECO 55C FID with GC column, heated Teflon sample gas transfer lines to provide a continuous sample to the heated FID/GC Hydrocarbon Analyzer. Heated lines are used if necessary to avoid any moisture or hydrocarbon condensation. Methane is determined by the calibrated GC method in the TECO 55C NMHC/CH_4/THC Analyzer. Calibration gases are selected to fall within 25-35%, 45-55% and 80-90% of Range for Methane, Total Hydrocarbon and Non-Methane Hydrocarbons. The stack is traversed with the monitoring probe at 3 points per diameter, per EPA Method 1A to measure stratification.

Calibrations are performed through the probe and entire sample system. The system linearity check is performed prior to testing and during testing and calibration drift checks are performed after every run. All data is corrected according to EPA Method 25A.

Instrumentation: The following continuous emission monitors or equivalents are used:

Instrument	Analyte	Principle
Servomex 1440	O2	Paramagnetic
Servomex 1440	CO2	NDIR
TEI 55C	THC/NMOC	FID
TECO 48C	CO	NDIR

The following calibration ranges and EPA Protocol gases are proposed. Gases may be substituted depending on changes of analyzer range and availability at the time of testing.

	Expected Concentration	Analyzer Range	Hi Span	Mid Span	Low Span / Zero
NMOC	0-25 ppm	100	85	45	22 / ZERO
CO	0-500 ppm	500	450	225	ZERO
O_2	11-16 %	25	20.5	14	ZERO
CO_2	4-8%	15	12	8	ZERO

Feed Material: The feed material to the ATDU Kiln will be sampled at intervals of 15-minutes and composited into 1-hr samples for analysis of the Metals and Total Chlorine, Fluorine, Bromine.

Process Data: The following information will be collected during every test run, at intervals of 15-minute or less. What do we want to list here? (see the facility monitor). The objective will be to test the process will be operated at the maximum sustainable operating rate of 5-7 TPH.

4.0 Reporting, QA & QC Procedures

The referenced sampling methods describe the QA/QC procedures and documentation that will be followed in implementing and executing this Source Test Program.

Responsibility for all QA/QC is that of the onsite Project Manager. The Project Manager will be Chuck Arrivas, supported by Jeramie Richardson, Adam Ashlin and Guy Worthington. Mr. Worthington has over 33 years of experience in source emissions testing, most of that time in the position of a senior Project Manager. Jeramie Richardson (QSTi), Adam Ashlin and Chuck Arrivas (QSTi) all have greater than 12 years' experience each.

All Labs shall be ODEQ approved. Labs yet to be determined.

Data collection, reduction and reporting are performed using Word and Excel software, and HP basic programmable calculators. The report will contain all raw data and calculations, with equations shown. The final report is normally submitted within 4 weeks of the test completion, or 2 weeks following the completion of any laboratory analysis. A DEQ Source Test Audit Report (STAR) for all applicable test Methods will be prepared to accompany the submittal of the final source test report. Three copies of the report are submitted to the client, and it is their responsibility to forward a copy to the appropriate agency.

Expected Timeline

Day 1	Setup		
Day 2	3 x 1hr M5/26A	+ 1 x 3hr M23	+ 3 x THC, O_2, CO, CO_2
Day 3	3 x 2hr M29	+ 2 x 3hr M23	+ 3 x O_2 and CO_2
Day 4	3 x 1hr? M306	+ 3 x TO-15	+ 3 x O_2 and CO_2

Inlet Gas Analysis

Day 2 3 x 1 hr ASTM 1945 for Gas Analysis for CH_4, CO_2, O_2, CO, H_2, C2-C6+ Methods 1-4
Day 3 3 x 1 hr ASTM 1945 for Gas Analysis for CH_4, CO_2, O_2, CO, H_2, C2-C6+ Methods 1-4
Day 4 3 x 1 hr ASTM 1945 for Gas Analysis for CH_4, CO_2, O_2, CO, H_2, C2-C6+ Methods 1-4
Day 4 3 x 1 hr EPA 25C for NMOC and EPA TO-15 VOC species

Inlet Feed Analysis – (Hourly)

TPH, BTEX, Metals, Total Cl-, F- and Br-

5.0 Plant Entry and Safety

For this site, personnel must be OSHA Hazwoper trained to work within the area. All visitors to site must sign in at the office trailer and complete a safety orientation be trained on basic procedures for the facility. While on site all personnel must where appropriate safety gear as needed including hard-hat, safety glasses, safety shoes and appropriate clothing. All work performed on site must be approved by site manager and documented in a work permit.

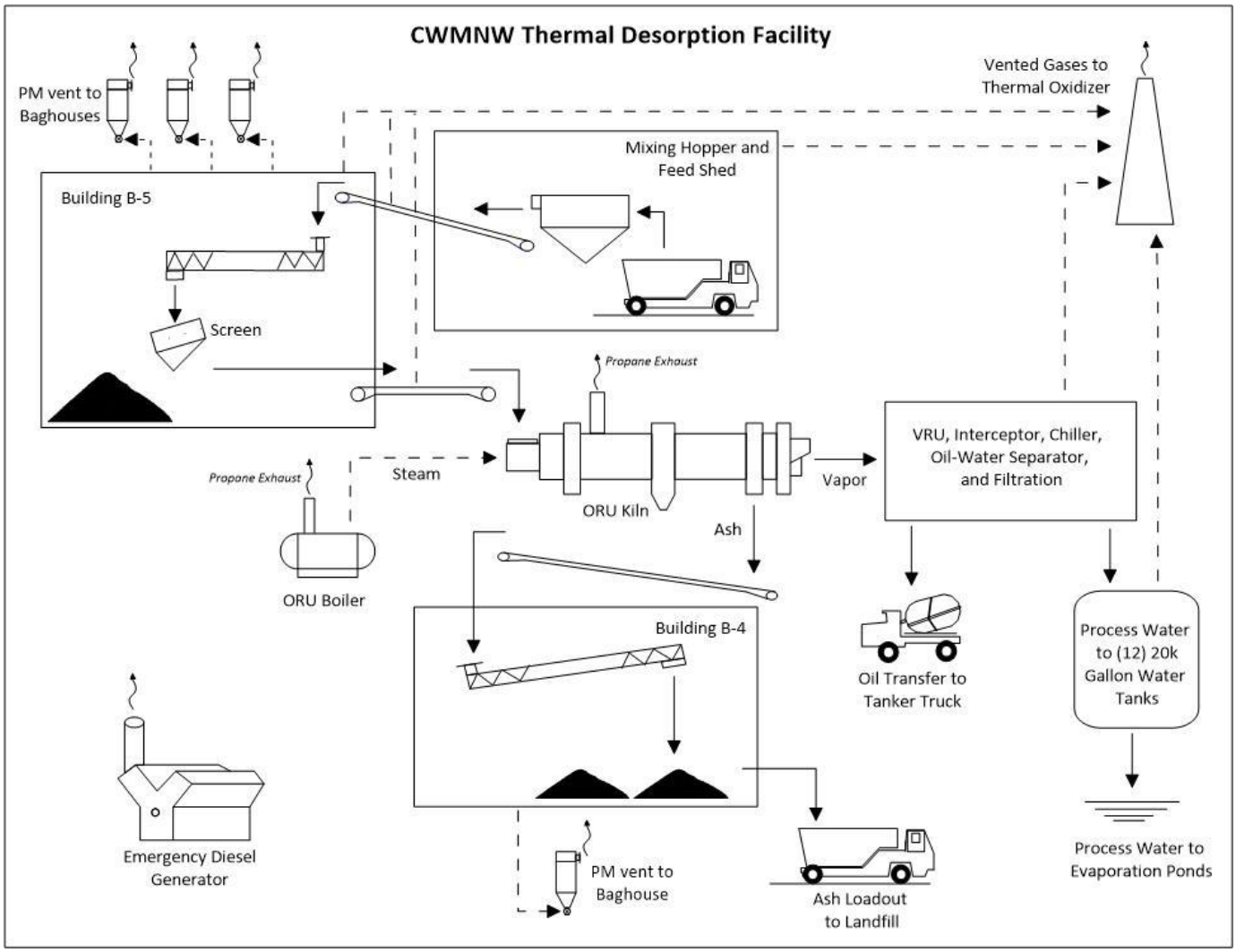
If there are any questions concerning this Source Test Plan, please contact Guy Worthington at 510-525-1261 or 510-508-3469 or Chuck Arrivas at 925-338-4875.

Submitted by,

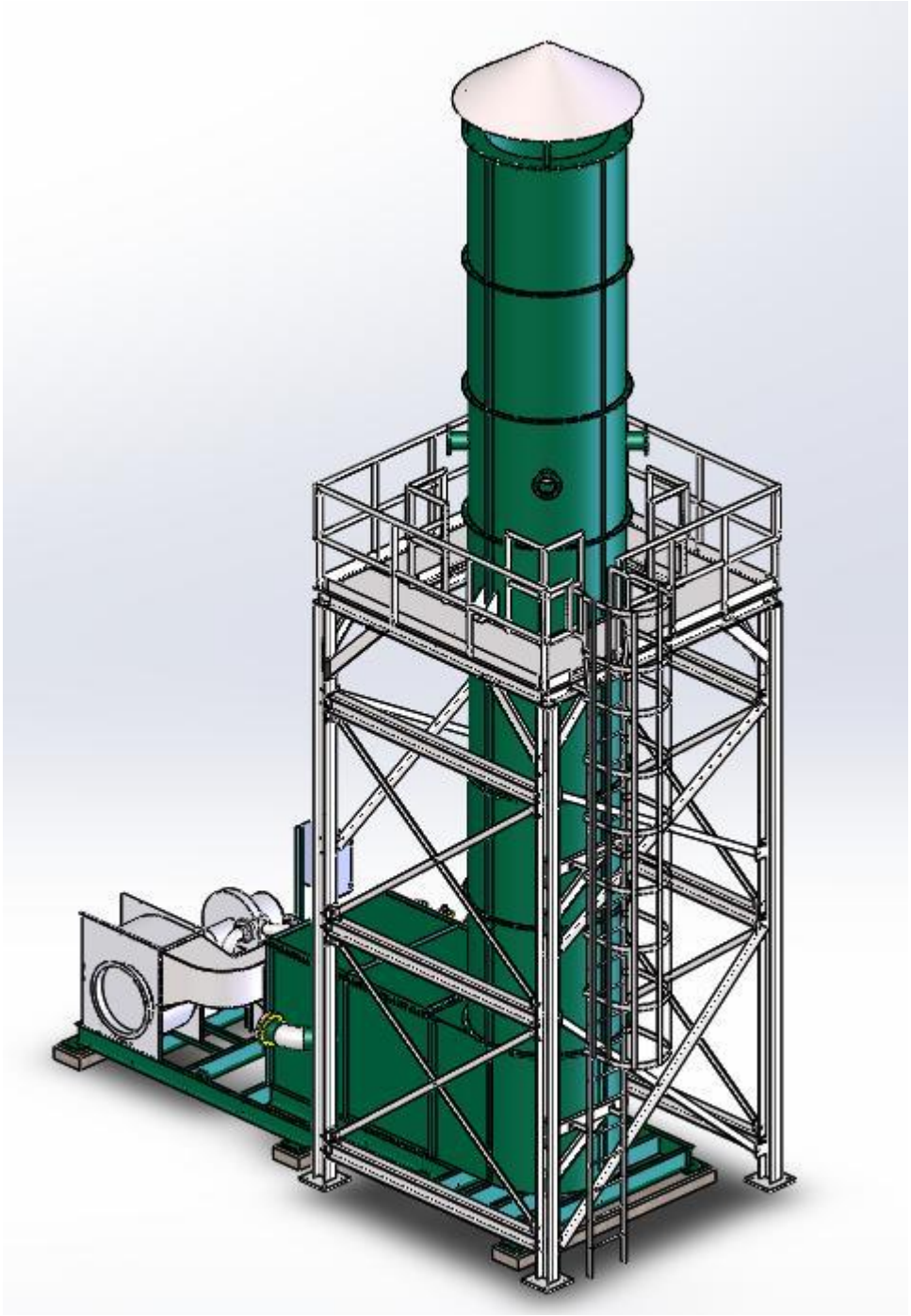
Guy Worthington

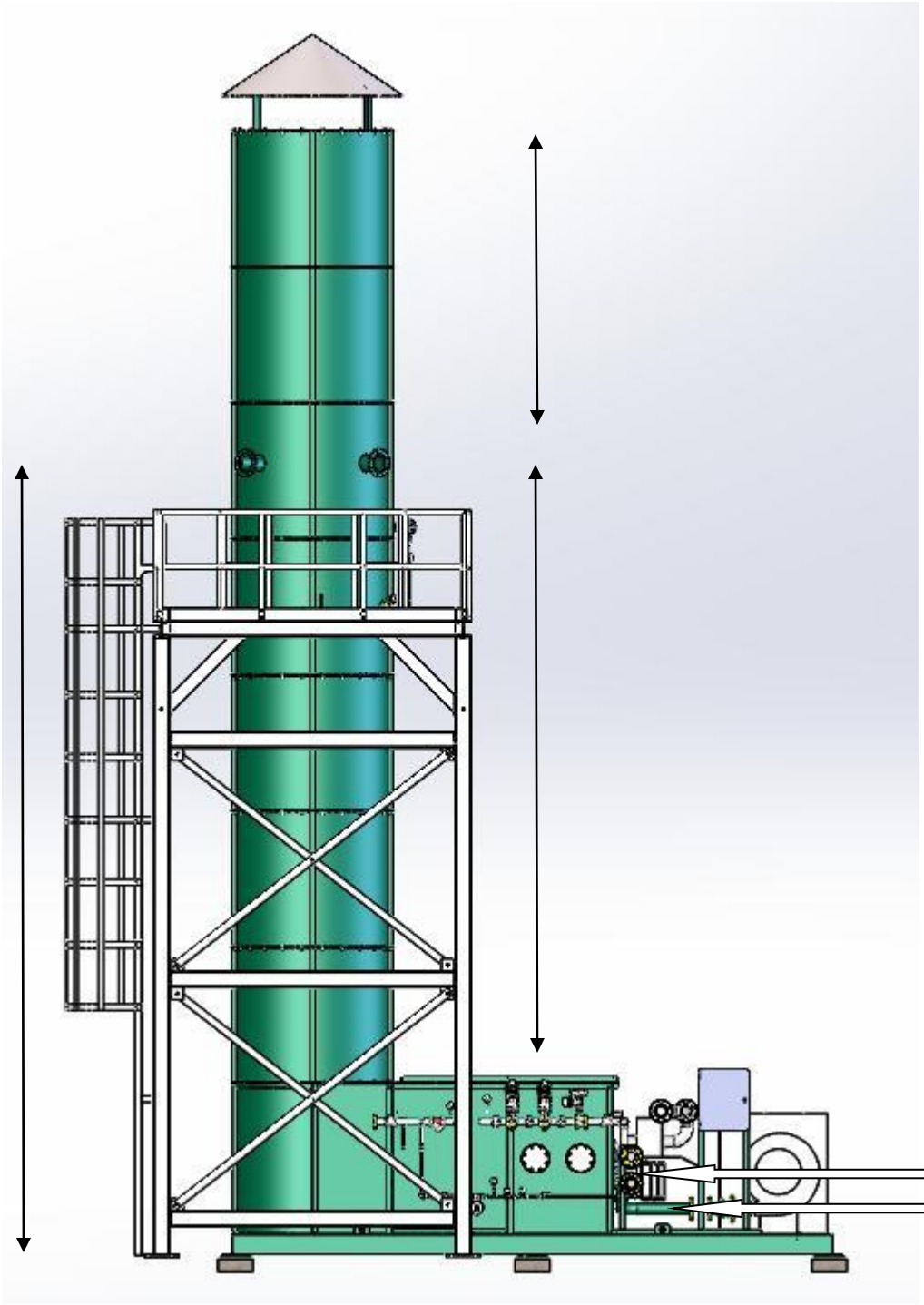
Appendix A Process Flow Diagram
Appendix B Stack and Port Location & Configuration

APPENDIX A
Process Flow Diagram


CWMNW Thermal Desorption Facility
PM vent to Baghouses
Vented Gases to Thermal Oxidizer
Mixing Hopper and Feed Shed
Building B-5
Screen
Propane Exhaust
Steam
Propane Exhaust
ORU Kiln
Vapor
VRU, Interceptor, Chiller, Oil-Water Separator, and Filtration
Ash
ORU Boiler
Building B-4
Oil Transfer to Tanker Truck
Process Water to (12) 20k Gallon Water Tanks
Emergency Diesel Generator
PM vent to Baghouse
Ash Loadout to Landfill
Process Water to Evaporation Ponds

APPENDIX B
Stack and Port Location Configuration




Inlet gas streams

Top Inlet line ~ 6”

Lower Inlet Line ~4”