July 7, 2023
Project No. 04223001.20

Mr. Ralph Munoz
Permitting Engineer
Puget Sound Clean Air Agency
1904 3rd Avenue, Suite 105
Seattle, WA 98101

Subject: **Notice of Construction (NOC) Application #12301, Revision**

Dear Mr. Munoz:

SCS Engineers (SCS) is submitting this revised Notice of Construction (NOC) application, on behalf of Pierce County Recycling, Composting, and Disposal, LLC (dba LRI), for the installation of a temporary flare, dedicated blower and sulfur treatment system at the LRI 304th Street Landfill in Graham, Washington.

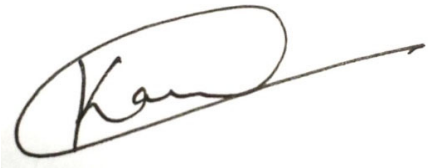
In November 2022, LRI submitted the first version of this application. PSCAA issued several requests for additional information. This revised NOC application addresses many of the issues you raised in your review of earlier drafts of the application. For instance, this version includes a SEPA checklist for the temp flare project, a top down BACT analysis for control of SO2 from the temp flare project and a revised air toxics emissions analysis showing that that the net emissions increase from the project will not exceed the Small Quantity Emission Rate for any toxic air pollutant. Other issues raised in your comments, e.g. issues related to the capacity of the landfill and the projected peak landfill gas generation rate during the life of the landfill, will be reserved for the NOC application for an enclosed combustor to replace the temporary flare.

On February 15, 2023 LRI submitted an NOC application for the enclosed combustor. LRI's goal is to permit and install the enclosed combustor as soon as possible. We plan to revise that application to address the same issues that PSCAA raised in comments on this NOC application.

In comments on previous drafts of the temp flare NOC application the Agency presented different views on whether the sulfur scrubbing system described in this application must have the capacity to treat landfill gas routed to the adjacent electric power generating plant owned and operated by Archaia. LRI views that issue as unrelated to this application, which seeks only to permit a temporary flare for a roughly two year operating life. LRI anticipates that the revised NOC application for the enclosed combustor will model growth in the volume of landfill gas over the projected life of the landfill.

Please contact Karam Singh at 321-370-3173 or by email at KSingh@scsengineers.com should you have any questions about this application.

Sincerely,



Jeff Leadford, PE (OR)
Project Manager
SCS Engineers

Karam Singh, PE
Project Director
SCS Engineers

List of Attachments:

Attachment A	*PSCAA NOC Forms*
Attachment B	*Project Description*
Attachment C	*Process Flow Diagram*
Attachment D	*Emissions Calculations*
Attachment E	*BACT Analysis*
Attachment F	*Flare Design Documents and Location*
Attachment G	*Sulfur and Volatile Organics Sampling Laboratory Reports*
Attachment H	*SEPA Checklist*

Attachment A
PSCAA NOC Forms

AGENCY USE ONLY	NOC#:	REG#:	Date Fee Pd:	Eng. Assigned:

PUGET SOUND
Clean Air Agency

1904 3rd Ave #105, Seattle, WA 98101
206-343-8800
pscleanair.gov

NOTICE OF CONSTRUCTION APPLICATION FOR ORDER OF APPROVAL

The following information must be submitted as part of this application packet before an Agency engineer is assigned to review your project.

SECTION 1. FACILITY INFORMATION

Business Name
Pierce County Recycling, Composting, and Disposal, LLC.

Equipment Installation Address	City	State	Zip
30919 Meridian St. E	Graham	WA	98338

Is the business registered with the Agency at this equipment installation address?

☒ Yes. Current Registration or AOP No. 11993 ☐ No, not registered ☐ Unknown

Business Owner Name
Waste Connections

Business Mailing Address	City	State	Zip
17925 Meridian St. E	Puyallup	WA	98375

Type of Business
Municipal Solid Waste Landfill

Is the installation address located within the city limits?

☐ Yes ☒ No

NAICS Code	NAICS Description
562212	Solid Waste Landfill

Contact Name (for this application)	Phone	Email
Kevin Green	253-847-7555	kevin.green@wasteconnections.com

Description for Agency Website Detailed project description is provided under Attachment B.

Provide a 1-2 sentence simple description of this project. See examples www.pscleanair.gov/176

Addition of a 2,200 scfm temporary flare (Flare #3) to the LRI 304th Street Landfill and a Landfill Gas H2S Reduction System before the flare.

SECTION 2: REQUIRED APPLICATION PACKET ATTACHMENTS

1) **Process flow diagram** Process flow diagram is provided under Attachment C.
☒ YES, attached. ☐ NO, not attached. This application is incomplete

2) **Emission estimate**. Emission rate increases for all pollutants.
☐ YES, attached. ☒ NO, not attached. This application is incomplete.
Emission Calculations are provided under Attachment D with supplemental information provided under Attachments E, F and G.

3) **Environmental Checklist** (or a determination made by another Agency under the State Environmental Policy Act) www.pscleanair.gov/DocumentCenter/View/170
☐ YES, attached. ☒ NO, not attached. This application is incomplete.
Environmnetal SEPA Checklist is provided under Attachment H.

SECTION 2: REQUIRED APPLICATION PACKET ATTACHMENTS (CONT)

4) Attach **equipment form**(s) applicable to your operation. Forms are available online at www.pscleanair.gov/179
☒ YES, attached. ☐ NO, not attached. This application is incomplete. PSCAA NOC Forms (including this NOC Form) are provided under Attachment A.

5) **Detailed Project Description** Detailed project description is provided under Attachment B.
The project description must include a detailed description of the project, a list of process and control equipment to be installed or modified, a description of how the proposed project will impact your existing operations (if applicable), and measures that will be taken to minimize air emissions.

Detailed description of the proposed project included in packet?

☒ YES, attached. ☐ NO, not attached. This application is incomplete.

6) **$1,550 filing fee** (nonrefundable) Payment was made with the initial submittal - this is a re-submittal.

☐ PAY BY CHECK – Attached and made payable to **Puget Sound Clean Air Agency**

☐ PAY BY CREDIT – Accounting technician will contact person identified below for payment information

Contact Name:	Contact Number:

SECTION 3: PROCESS AND CONTROL EQUIPMENT (attach additional pages if necessary)

Process Equipment		Does this equipment have air pollution control equipment?	**Air Pollution Control Equipment**	
# of Units	Equipment Type & Design Capacity		# of Units	Equipment Type
1	Landfill Gas Flares	☒ Yes ☐ No	1	H2S Reduction System
		☐ Yes ☐ No		
		☐ Yes ☐ No		
		☐ Yes ☐ No		

SECTION 4: CERTIFICATION STATEMENT

I, the undersigned, certify that the information contained in this application and the accompanying forms, plans, specifications, and supplemental data described herein is, to the best of my knowledge, accurate and complete.

Signature — Date: 7/7/2023

Kevin Green — Printed Name

District Manager — Title

SECTION 5: APPLICATION SUBMITTAL

☒ **EMAIL application and attachments to:**
NOC@pscleanair.gov

-OR-

☐ **MAIL application, payment, and attachments to:**
Puget Sound Clean Air Agency
ATTN: NOC Application Submittal
1904 3rd Ave, Suite 105 - Seattle, WA 98101

pscleanair.org
Puget Sound Clean Air Agency

PUGET SOUND CLEAN AIR AGENCY

Additional Notice of Construction Application Requirements for

FLARES

General

Equipment or Process Being Controlled *[Specify the source(s) of the contaminants to be controlled. If the source(s) are also new, complete the applicable permit forms]*

Identify which of the following categories the project fits into:

1. **New Construction** *(New construction also includes existing, unpermitted equipment or processes*)
2. Reconstruction *(Reconstruction means the replacement of components of an existing facility to such an extent that the fixed capital cost of the new components exceeds 50% of the fixed capital cost that would be required to construct a comparable entirely new facility)*
3. Modification *(Modification means any physical change in, or change in the method of operation of, a source, except an increase in the Hours of Operation or production rates (not otherwise prohibited) or the use of an alternative fuel or raw material that the source is approved to use under an Order of Approval or operating permit, that increases the amount of any air contaminant emitted or that results in the emission of any air contaminant not previously emitted)*
4. Amendment to Existing Order of Approval Permit Conditions

Estimated Hours of Operation (hr/day, day/wk, wk/yr) *[Estimate the hours of operation for the new flare - not necessarily the entire facility]* ***24 hr/day, 7 day/week, 52 week/year***

Estimated Installation Date *[Estimate the date when the new flare will be put into service]* **2023**

Waste Gas Stream Characteristics *[If the heat content of the gas stream is <300 Btu/scf (or <200 Btu/scf if nonassisted), supplementary fuel will be required]*

Flowrate (acfm) *[Specify the airflow in actual cubic feet per minute]* **2,200 scfm**

Temperature (°F) *[Specify the temperature of the waste gas going to the flare in degrees Fahrenheit.]* **120 deg. F (approximate with seasonal variations)**

Pollutant Concentrations (lb/hr or ppmv of each pollutant) *[Specify the pollutant concentrations in the waste gas going to the flare in pounds per hour or parts per million by volume]* **See the Emission Calculations provided as Attachment C.**

Heat Content (Btu/scf) *[Specify the heat content of the waste gas going to the flare in British thermal units per standard cubic foot.]* **500 btu/scf at 50% Methane**

Oxygen (% by volume) *[Specify the oxygen content of the waste gas going to the flare in percent by volume]* **0.1 to 3 percent by volume**

Molecular Weight (lb/lb-mol) *[Specify the volume weighted average molecular weight of the waste gas in pounds per pound-mole]* **30.03 lb/lb-mol**

Design *[Most design information is available from the manufacturer or vendor. Submittal of a brochure, scale drawing or process and instrumentation diagram will facilitate the review of the permit application]* **See design documents attached**

Make & Model *[Specify the manufacturer and model of the flare - not the serial number]* **Parnel 2,200 scfm Skid-Mounted Utility Landfill Flare System**

Flare Height (ft) *[Specify the height of the flare tip above ground - not above sea level]* **33 Feet**

Type of Assist System *[Specify steam assisted, air assisted, or unassisted]* **Unassisted**

Type of Ignition System *[Specify instantaneous spark, continuous spark or natural gas pilot. If pilot lights are used, specify the number of pilots]* **Propane Pilot**

Type of Monitor to Determine the Presence of a Pilot Flame *[Specify 'none', thermocouple, infrared, or optical sensor]* **Thermocouple**

Cross-Sectional Area of Flare Tip (ft2) *[Specify the unobstructed area of the flare tip in square feet]* **12 inch Diameter Flare Tip = 0.785 ft2**

Flared Gas Exit Velocity (ft/s) *[Specify the velocity at which the flared gas exits the flare in feet per second]* **60 ft/sec**

For Steam Assisted Flares, the Steam Flowrate (lb/min) *[Specify the amount of any steam supplied to the flare in pounds per minute]* - **Not Applicable**

For Flares with Supplementary Fuel, the Type of Fuel and its Flowrate (scfm) *[Specify the amount of any supplementary fuel supplied in standard cubic feet per minute]* **No Supplementary Fuel**

Method Used to Design/Size the Flare *[Specify the method used to select this design and size of flare. If design calculations were performed, they should be submitted. If the design and sizing was based on similar (successful) applications, list the owners and the city and state where they are located]* **Size of flare in scfm is based on U.S. EPA LandGEM software models showing projected landfill gas production from landfill in the coming years. Models are submitted to PSCAA Semi-annually in the required compliance reports.**

Distance to Nearest Property Line (ft) *[Specify the distance from the base of the stack to the nearest property line]* **750 feet**

Height, Length and Width of Buildings (ft) *[Specify the approximate dimensions of any buildings that are >40% of the stack height and are located within 5 building heights from the stack]* **No buildings within this range**

Operation and Maintenance Describe Preventive Maintenance: **This temporary flare will be operated and maintained per manufacturer (Perennial Biogas) recommendations. Landfill gas data will be monitored routinely per LRI Landfill's GCCS Operations and Maintenance Plan.**

Attachment B
Project Description

DETAILED PROJECT DESCRIPTION

This application proposes to permit a temporary flare with a manufacturer rated capacity of 3,000 standard cubic feet per minute (scfm), to remain in operation for approximately two years. Design details for this temporary flare system are provided under Attachment F.

Due to limitations on the volume of landfill gas (LFG) generated by the LRI Landfill during this period, the volume of gas processed by the temporary flare will not exceed 2,200 scfm on a 12-month rolling basis. This 2,200 scfm maximum average flow is a conservative flowrate based on actual data from 2022 and a 12% annual increase that is expected in years 2023 and 2024 per the LFG projection model for the landfill and recent 2023 LFG data. Table 1 below shows this calculation breakdown.

Table 1. Temporary Flare Predicted Flows

Years	12-Month Rolling Average LFG Flow (scfm)			Temporary Flare @55%[1] of Total LFG routed to flares (scfm)
	Total Flares	LFGTE	Total LRI	
2022	2,988	1,436	4,425	
2023[2]	3,356	1,600	4,956	1,846
2024	3,950	1,600	5,550	2,173

The flare is temporary in nature and will be operational for a maximum period of approximately 24-months, which is why Table 1 only shows flow out to end of year 2024. Within this 24-month timeframe, LRI intends to permit, procure and install a permanent enclosed combustion flare.

A process flow diagram is included in Attachment C outlining the conveyance of LFG from the gas collection and control system (GCCS) field to the installed sulfur treatment system (explained in detail below), the existing flare, temporary flare, and the separately permitted LFGTE plant. The temporary flare project also includes a dedicated blower to route LFG through the sulfur treatment system to the temporary flare. The blower is powered by electricity and will not contribute to emissions.

Sulfur Management/Treatment System

Current Sulfur Concentration-Loading

Recent analysis indicates that Total Residual Sulfur (TRS) and associated Hydrogen Sulfide (H_2S) concentrations in the LFG have increased at the facility.

[1] Based on available data, temporary flare handles 45% to 55% of the total flow routed to the flares. We have conservatively assumed 55% of *Total Flares* flow will be routed to the temporary flare until end of 2024.
[2] Projected Total flow rate for years 2023 and 2024 is calculated using 2022 actual Total flow and a conservative 12% annual increment. Based on available 2023 data, 1,600 scfm LFGTE flowrate is assumed for years 2023 and 2024.

TRS concentrations from samples collected and analyzed in an accredited laboratory from July 2022 through June of 2023 are shown in Table 2. The most recent laboratory analysis reports from June 2023 is provided under Attachment G. Averaging available data points for the last 12-month period yields a TRS value of approximately 2,000 parts per million by volume (ppmv) as shown in Table 2.

Table 2. Historical TRS Data

Date	TRS Reading in ppmv	Source	Comments
7/20/2022	998	Lab Analysis	TRS – ASTM D5504
9/7/2022	2,563	Lab Analysis	TRS – ASTM D5504
10/18/2022	2,729	Lab Analysis	TRS – ASTM D5504
11/17/2022	2,365	Lab Analysis	TRS – ASTM D5504
12/21/2022	1,895	Lab Analysis	TRS – ASTM D5504
1/24/2023	1,600	Lab Analysis	TRS – ASTM D5504
2/15/2023	1,591	Lab Analysis	TRS – ASTM D5504
3/28/2023	1,774	Lab Analysis	TRS – ASTM D5504
5/1/2023	1,663	Lab Analysis	TRS – ASTM D5504
5/16/2023	2,382	Lab Analysis	TRS – ASTM D5504
5/25/2023	725	Lab Analysis	TRS – ASTM D5504
5/31/2023	2,004	Lab Analysis	TRS – ASTM D5504
6/6/2023	1,915	Lab Analysis	TRS – ASTM D5504
6/13/2023	2,770	Lab Analysis	TRS – ASTM D5504
6/21/2023	2,657	Lab Analysis	TRS – ASTM D5504
6/27/2023	2,404	Lab Analysis	TRS – ASTM D5504
Average	***2,002***	***July 2022 to June 2023 Period***	

Sulfur Treatment

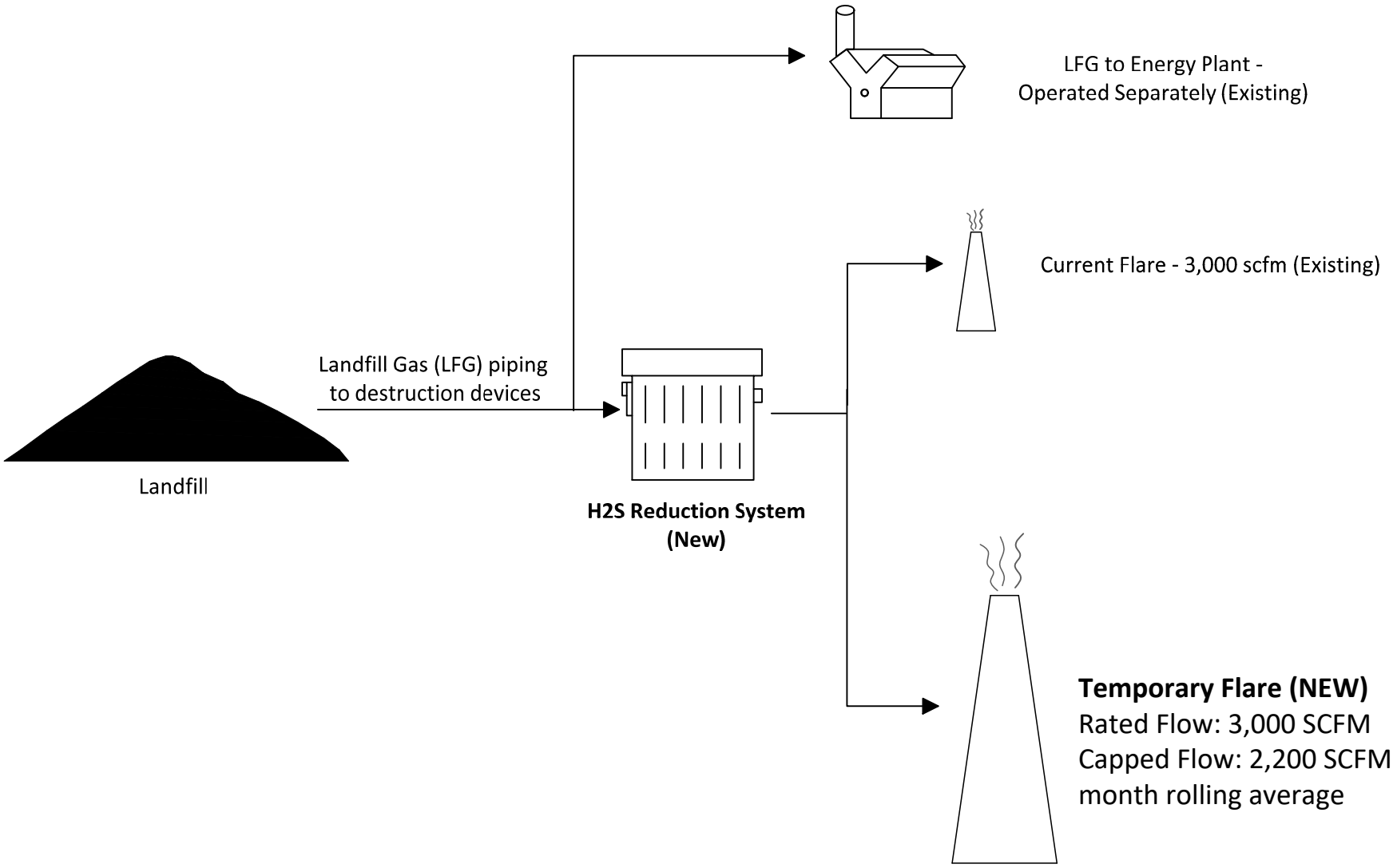
LRI Landfill has implemented a H_2S reduction system that uses solid scavenger type media to remove H_2S from the LFG stream. The LFG flow is directed through vessels that contain solid scavenger media. The media is a pelletized type media that typically contains a form of iron hydroxide to react with the H_2S in the gas stream and produce elemental sulfur and water as a byproduct.

LRI has selected the use of Vacuum Scrubber Vessels. Four vessels were installed in parallel and each receives a portion of the LFG stream for treatment. LRI has utilized Darco BG-1 activated carbon media for use inside the vessels. Darco BG-1 is manufactured by Norit. Darco BG-1 is granular activated carbon, developed for removing H_2S from biogas streams, that uses the adsorption process to remove H_2S from the LFG stream. After the volume of media in the vessels is used up to treat H_2S, the used media is removed from the vessels to be disposed of in the landfill and fresh media is replaced in the vessels. A different media may be used in the future, as performance and costs vary over time and a more economical option may become available. Regardless of the specific type of media selected, the system is designed to meet the limits established through the BACT analysis presented under Attachment E.

The process flow diagram in Attachment C further outlines the conveyance of LFG from the GCCS field to existing flare, temporary flare, and the separately permitted LFG to Energy (LFGTE) plant. The location of the H_2S reduction system is also included in the diagram.

Attachment C
Process Flow Diagram

LRI 304th St. Landfill
Notice of Construction: Temporary Flare
Process Flow Diagram



Attachment D
Emissions Calculations

Potential Annual Emission calculations are presented in Tables 1 and 2. Emission calculations have been performed using EPA's AP-42 guidance and as detailed in Tables 1 and 2. Supplemental information referenced/utilized in these emission calculations is provided under Attachments E through G.

Table 1 lists pertinent assumptions (e.g., capped 12-month rolling average flowrate for the flare [i.e., 2,200 scfm], methane content of landfill gas etc.) and presents Non-Methane Organic Compounds (NMOC), Volatile Organic Compounds (VOC), Carbon Monoxide (CO), Nitrogen Oxides (NOX), Particulate Matter and Sulfur Dioxide (SO2) emissions per AP-42, Chapter 2.4 methodology.

Table 2 presents emission calculations associated with Toxic Air Pollutants/Compounds (TAPs or TACs). The most recent lab analysis data (from June 2023) was used to calculate TAP emissions associated with this flare capacity upgrade. The June 2023 data for Toxics Analysis method TO15 is provided in Attachment G. When comparing TAPs emissions to the Small Quantity Emission Rate (SQER), a netting basis is allowed to deduct an emission source that was removed and replaced with a new source per RCW 70.94, Chapter 173-460 WAC[1]. However, only actual emissions from the removed source can be discounted. In this case, the temporary flare is replacing a 1,500 scfm capacity permanent flare that was taken out of service in December 2022. The actual flow at the replaced flare for the previous 12 months, from December 2021 through November 2022 was 956 scfm on average. Therefore, the effective flowrate that we are comparing to the SQER is 2,200 minus 956, or 1,244 scfm. No TAP exceeded the SQER, and thus, no modeling is required.

[1] Guidance for emissions netting is obtained from the Department of Ecology's Air Quality Program Policy titled "AQP-POL-2019 Evaluating Equipment Replacement" and dated August 2019 (please refer to Page 5 of this policy).

Potential Annual Emissions
Table 1
Temporary Flare, LRI Landfill, Pierce County, Washington

Prepared By:	JML	6/2/2023
Reviewed By:	KS	7/6/2023

	Maximum Flow Rate to Temporary Flare	Total Monthly Flow		Total Monthly Flow		Heat Content		Heat Release	
	scfm	m^3		ft^3		BTU	MMBTU	MMBTU/Hr	
January	2,200	2,781,308	m^3	98,208,000	ft^3	46,747,008,000	46,747		62.8
February	2,200	2,691,589	m^3	95,040,000	ft^3	45,239,040,000	45,239		62.8
March	2,200	2,781,308	m^3	98,208,000	ft^3	46,747,008,000	46,747		62.8
April	2,200	2,781,308	m^3	98,208,000	ft^3	46,747,008,000	46,747		62.8
May	2,200	2,512,150	m^3	88,704,000	ft^3	42,223,104,000	42,223		62.8
June	2,200	2,781,308	m^3	98,208,000	ft^3	46,747,008,000	46,747		62.8
July	2,200	2,691,589	m^3	95,040,000	ft^3	45,239,040,000	45,239		62.8
August	2,200	2,781,308	m^3	98,208,000	ft^3	46,747,008,000	46,747		62.8
September	2,200	2,691,589	m^3	95,040,000	ft^3	45,239,040,000	45,239		62.8
October	2,200	2,781,308	m^3	98,208,000	ft^3	46,747,008,000	46,747		62.8
November	2,200	2,781,308	m^3	98,208,000	ft^3	46,747,008,000	46,747		62.8
December	2,200	2,691,589	m^3	95,040,000	ft^3	45,239,040,000	45,239		62.8
Total landfill gas consumption =		32,747,664	m^3/yr	1,156,320,000	ft^3/yr	550,408,320,000	550,408		754.0
Methane consumption (assuming 50% of LFG is CH_4), scfm =		16,373,832	m^3/yr	578,160,000	ft^3/yr				
average =	2,200								
gas temperature =		25 degrees C							
		298 degrees K							

Compound	Molecular Weight	Concentration	Uncontrolled Emissions Estimate (Q_p)	Uncontrolled Emission Rate (UM_P)	Emission Rate (98% destruction for NMOC/VOC)	Total Emissions
	(gram/mol)	(ppmv)	(m^3/yr)	(Mg/yr)	(Mg/yr)	(tons/yr)
Non-Methane Organic Compounds (NMOC)	86.18	595	19,484.9	68.7	1.37	1.5
Volatile Organic Compounds (VOCs) = NMOC	86.18	595	19,484.9	68.7	1.37	1.5
Carbon Monoxide (CO)	28.01	—	—	—	—	85.3
Nitrogen Oxides (NO_X)	—	—	—	—	—	18.7
Particulate Matter , 10 µm (PM10)	—	—	—	—	4.4	4.9
Sulfur Dioxide (SO2) based on H_2S conc.	64.00	300	9,824.3	25.72	25.7	28

Notes:

$Q_P = 2 * Q_{CH4} * C_P/1x10^6$

$UM_P = Q_P * [(MW_P * 1\ atm)/((8.205x10^{-5}) * (1000g/Kg) * (273 + T\ ^oC))]$

CO = 0.31 lb / million BTU , based on manufacturer's data

NO_X = 0.068 lb / million BTU , based on manufacturer's data

PM10 = 270 kg / million scm methane discharged, based on AP-42, Table 2.4-4

NMOC/VOC = 595 ppmv from AP-42 Table 2.4-2

SO2/TRS = Sulfur treatment system will reduce TRS in the landfill gas to annual average 300 ppmv.

TABLE 2: POTENTIAL TAP EMISSIONS PART 1

CAS #	Pollutant Common Name	MW (g/mol)	AP-42 EF (ppmv)	WIAC-1 (ppmv)	WIAC 2 (ppmv)	June 2023 LFG Test Results (ppm)	EF To Use (ppmv)	Source	Uncontrolled Emissions Estimate (Q_p) (m3/yr)	Uncontrolled Emission Rate (UM_P) (Mg/yr)	Controlled Emission Rate after combustion (98% destruction) (Mg/yr)	Total Emissions (tpy)	Total Emissions (lb/yr)
71-55-6	1,1,1-Trichloroethane	133.41	0.48	0.168	0.168	ND	0.168	WIAC	5.50	3.00E-02	6.00E-04	6.62E-04	1.32
79-00-5	1,1,2,-Trichloroethane					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
79-34-5	1,1,2,2-Tetrachloroethane	167.85	1.11	0.07	0.005	ND	0.005	WIAC	0.16	1.12E-03	2.25E-05	2.48E-05	0.05
75-34-3	1,1-Dichloroethane	98.97	2.35	0.741	0.741	ND	0.741	WIAC	24.27	9.82E-02	1.96E-03	2.16E-03	4.33
75-35-4	1,1-Dichloroethene	96.94	0.2	0.092	0.092	ND	0.092	WIAC	3.01	1.19E-02	2.39E-04	2.63E-04	0.53
120-82-1	1,2,4-Trichlorobenzene					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
95-63-6	1,2,4 trimethylbenzene	120.19				ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
106-93-4	1,2-Dibromoethane	187.88	0.001	0.046	0.005	ND	0.005	WIAC	0.16	1.26E-03	2.52E-05	2.77E-05	0.06
107-06-2	1,2-Dichloroethane	98.96	0.41	0.12	0.12	ND	0.12	WIAC	3.93	1.59E-02	3.18E-04	3.51E-04	0.70
78-87-5	1,2-Dichloropropane	112.99	0.18	0.023	0.023	ND	0.023	WIAC	0.75	3.48E-03	6.96E-05	7.67E-05	0.15
106-99-0	1,3-Butadiene					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
542-75-6	1,3-Dichloropropene					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
108-67-8	1,3,5 trimethylbenzene	120.19				ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
106-46-7	1,4-Dichlorobenzene	147	0.21	1.607	1.448	ND	1.448	WIAC	47.42	2.85E-01	5.70E-03	6.28E-03	12.57
123-91-1	1,4-Dioxane (1,4-Diethylene oxide)					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
540-84-1	2,2,4 trimethyl pentane	114.23				ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
591-78-6	2-hexanone	100.16				ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
67-63-0	2-Propanol	60.11	50.1	7.908	7.908	13.1	13.1	2023 LFG Testing	428.99	1.05E+00	2.11E-02	2.32E-02	46.49
622-96-8	4-ethyltoluene	120.19				ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
67-64-1	Acetone	58.08	7.01	6.126	7.075	21.7	21.7	2023 LFG Testing	710.62	1.69E+00	3.38E-02	3.72E-02	74.41
107-13-1	Acrylonitrile	53.06	6.33	0.036	<0.036	ND	0.036	WIAC	1.18	2.56E-03	5.12E-05	5.64E-05	0.11
107-05-1	Allyl chloride					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
80-56-8	a-pinene	136.23				ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
71-43-2	Benzene	78.11	1.91	0.972	0.972	4.97	4.97	2023 LFG Testing	162.76	5.20E-01	1.04E-02	1.15E-02	22.92
100-44-7	Benzyl chloride					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
18172-67-3	b-pinene	136.23				ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
75-27-4	Bromodichloromethane	163.83	3.13	0.311	<0.264	ND	0.311	WIAC	10.18	6.82E-02	1.36E-03	1.50E-03	3.01
75-25-2	Bromoform					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
1016-97-8	Butane	58.12	5.03			ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
124-38-9	Carbon Dioxide					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
75-15-0	Carbon disulfide	76.13	0.58	0.32	0.221	ND	0.221	WIAC	7.24	2.25E-02	4.51E-04	4.97E-04	0.99
630-08-0	Carbon monoxide	28.01	141			ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
56-23-5	Carbon tetrachloride	153.84	0.004	0.007	<0.007*	ND	0.007	WIAC	0.23	1.44E-03	2.88E-05	3.18E-05	0.06
463-58-1	Carbonyl sulfide	60.07	0.49	0.183	0.183		0	2023 LFG Testing	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
108-90-7	Chlorobenzene	112.56	0.25	0.227	0.227	ND	0.227	WIAC	7.43	3.42E-02	6.84E-04	7.54E-04	1.51
75-45-6	Chlorodifluoromethane	86.47	1.3	0.355	0.355	ND	0.355	WIAC	11.63	4.11E-02	8.22E-04	9.06E-04	1.81
75-00-3	Chloroethane	64.52	1.25	0.239	0.448	ND	0.448	WIAC	14.67	3.87E-02	7.74E-04	8.53E-04	1.71
67-66-3	Chloroform	119.39	0.03	0.021	0.01	ND	0.01	WIAC	0.33	1.60E-03	3.20E-05	3.52E-05	0.07
74-87-3	Chloromethane	50.49	1.21	0.249	0.136	ND	0.136	WIAC	4.45	9.20E-03	1.84E-04	2.03E-04	0.41
156-59-2	cis-1,2 dichloroethene	96.94				ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
98-82-8	cumene	120.19				ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
110-82-7	cyclohexane	84.16				0.992	0.992	2023 LFG Testing	32.49	1.12E-01	2.24E-03	2.46E-03	4.93
124-48-1	Dibromochloromethane					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
75-71-8	Dichlorodifluoromethane	120.91	15.7	1.751	0.964	ND	0.964	WIAC	31.57	1.56E-01	3.12E-03	3.44E-03	6.88
75-43-4	Dichlorofluoromethane	102.92	2.62			ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
75-09-2	Dichloromethane	84.94	14.3	3.395	3.395	ND	3.395	WIAC	111.18	3.86E-01	7.72E-03	8.51E-03	17.02
115-10-6	dimethyl ether	46.07				ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
77-78-1	Dimethyl sulfide	62.13	7.82	6.809	6.809		0	2023 LFG Testing	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
74-84-0	Ethane	30.07	889	7.943	7.943		0	2023 LFG Testing	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
64-17-5	Ethanol	46.08	27.2	118.618	64.425	57.5	57.5	2023 LFG Testing	1,882.99	3.55E+00	7.10E-02	7.82E-02	156.43
141-78-6	ethyl acetate	88.11				2.22	2.22	2023 LFG Testing	72.70	2.62E-01	5.24E-03	5.77E-03	11.55
75-08-1	Ethyl mercaptan	62.13	2.28	1.356	0.226		0	2023 LFG Testing	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
100-41-4	Ethylbenzene	106.16	4.61	6.789	6.789	3.63	3.63	2023 LFG Testing	118.87	5.16E-01	1.03E-02	1.14E-02	22.75
75-69-4	Fluorotrichloromethane	137.38	0.76	0.327	0.327	ND	0.327	WIAC	10.71	6.02E-02	1.20E-03	1.33E-03	2.65
142-82-5	heptane	100.21				1.66	1.66	2023 LFG Testing	54.36	2.23E-01	4.46E-03	4.91E-03	9.82
87-68-3	Hexachlorobutadiene					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
110-54-3	Hexane	86.18	6.57	2.324	2.063	0.924	0.924	2023 LFG Testing	30.26	1.07E-01	2.13E-03	2.35E-03	4.70
7647-01-0	Hydrochloric Acid	36.5	42			ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
7783-06-4	Hydrogen sulfide*	34.08	35.5	23.578	23.578		300	Proposed BACT	9,824.30	1.37E+01	4.11E-02	4.53E-02	90.54
7439-97-6	Mercury (total)	200.61	0.000292				0	2023 LFG Testing	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
67-56-1	methanol	32.04				19.9	19.9	2023 LFG Testing	651.68	8.54E-01	1.71E-02	1.88E-02	37.64
74-83-9	Methyl bromide (Bromomethane)					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
78-93-3	Methyl ethyl ketone	72.11	7.09	10.557	12.694	13.9	13.9	2023 LFG Testing	455.19	1.34E+00	2.68E-02	2.96E-02	59.17
108-10-1	Methyl isobutyl ketone	100.16	1.87	0.75	0.75	1.14	1.14	2023 LFG Testing	37.33	1.53E-01	3.06E-03	3.37E-03	6.74
74-93-1	Methyl mercaptan	48.11	2.49	1.292	1.266		0	2023 LFG Testing	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
1634-04-4	Methyl tert butyl ether					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
103-65-1	n-propyl benzene	120.2				ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
95-47-6	o xylene	106.16				2.09	2.09	2023 LFG Testing	68.44	2.97E-01	5.94E-03	6.55E-03	13.10
1330-20-7	p,&m-Xylene	106.16	12.1	16.582	16.582	5.98	5.98	2023 LFG Testing	195.83	8.50E-01	1.70E-02	1.87E-02	37.48
127-18-4	Perchloroethylene (tetrachloroethylene)					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
109-66-0	Pentane	72.15	3.29	1.48E+01		ND	14.757	WIAC	483.26	1.43E+00	2.85E-02	3.14E-02	62.86
74-98-6	Propane	44.09	11.1	14.757	19.858	0	0	2023 LFG Testing	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
115-07-1	propene	42.08				16.5	16.5	2023 LFG Testing	540.34	9.30E-01	1.86E-02	2.05E-02	40.99
100-42-5	styrene	104.15				ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
75-65-0	tertbutanol	74.12				ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
127-18-4	Tetrachloroethylene	165.83	3.73	1.193	1.193	ND	1.193	WIAC	39.07	2.65E-01	5.30E-03	5.84E-03	11.68
109-99-9	tetrahydrofuran	72.11				4.46	4.46	2023 LFG Testing	146.05	4.31E-01	8.61E-03	9.49E-03	18.99
108-88-3	Toluene	92.14	39.3	25.405	25.405	9.43	9.43	2023 LFG Testing	308.81	1.16E+00	2.33E-02	2.56E-02	51.30
156-60-5	trans-1,2-dichloroethene	96.94	2.84	0.051	0.051	ND	0.051	WIAC	1.67	6.62E-03	1.32E-04	1.46E-04	0.29
79-01-6	Trichloroethene	131.4	2.82	0.681	0.681	ND	0.681	WIAC	22.30	1.20E-01	2.40E-03	2.64E-03	5.28
75-69-4	trichlorofluoromethane	137.37				ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
593-60-2	Vinyl bromide					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
108-05-4	Vinyl acetate					ND	0	Non Detect	0.00	0.00E+00	0.00E+00	0.00E+00	0.00
75-01-4	Vinyl chloride	62.5	7.34	1.077	1.077	ND	1.077	WIAC	35.27	9.02E-02	1.80E-03	1.99E-03	3.97

* Hydrogen Sulfide destruction is set to 99.7% as described for non-halogenated compounds in AP-42 Table 2.4-3. Assuming all total reduced sulfur (TRS) is hydrogen Sulfide.

TABLE 2: POTENTIAL TAP EMISSIONS PART 2

CAS #	Pollutant Common Name	Total Emissions (lb/yr)	HAP?	TAC?	Averaging Period	SQER (lb/averaging period)	De Minimis (lb/ averaging period)	Temporary Flare Emission (lb/averaging period)	Removed 956 scfm Flare (lb/averaging period)	Increase in Emissions Netting Basis (lb/averaging period)	Under deminimis?	Under SQER?
71-55-6	1,1,1-Trichloroethane	1.32	Yes	Yes	24-hr	370	19	0.003625199	0.001575314	0.002049885	UNDER	UNDER
79-34-5	1,1,2,2-Tetrachloroethane	0.05	Yes	Yes	year	2.8	0.14	0.049547119	0.021530475	0.028016644	UNDER	UNDER
75-34-3	1,1-Dichloroethane	4.33	Yes	Yes	year	100	5.1	4.329610563	1.88141259	2.448197973	UNDER	UNDER
75-35-4	1,1-Dichloroethene	0.53	Yes	Yes	24-hr	15	0.74	0.001442531	0.000626845	0.000815685	UNDER	UNDER
107-06-2	1,2-Dichloroethane	0.70	Yes	Yes	year	6.2	0.31	0.701080663	0.304651415	0.396429248	***OVER***	UNDER
78-87-5	1,2-Dichloropropane	0.15	Yes	Yes	year	16	0.81	0.153424565	0.066669947	0.086754618	UNDER	UNDER
67-63-0	2-Propanol	46.49	No	Yes	1-hr	5.9	0.3	0.005306901	0.00230609	0.003000811	UNDER	UNDER
67-64-1	Acetone	74.41	No	No				0.008493942	0.003691004	0.004802938		
107-13-1	Acrylonitrile	0.11	Yes	Yes	year	0.56	0.028	0.112770837	0.049004054	0.063766782	***OVER***	UNDER
71-43-2	Benzene	22.92	Yes	Yes	year	21	1	22.91870543	9.959219269	12.95948616	***OVER***	UNDER
75-27-4	Bromodichloromethane	3.01	No	Yes	year	4.4	0.22	3.008021087		3.008021087	***OVER***	UNDER
75-15-0	Carbon disulfide	0.99	Yes	Yes	24-hr	59	3	0.002721337	0.001182545	0.001538792	UNDER	UNDER
56-23-5	Carbon tetrachloride	0.06	Yes	Yes	year	27	1.4	0.063576171	0.027626736	0.035949435	UNDER	UNDER
463-58-1	Carbonyl sulfide	0.00	Yes	Yes	24-hr	0.74	0.037	0	0	0	UNDER	UNDER
108-90-7	Chlorobenzene	1.51	Yes	Yes	24-hr	74	3.7	0.004132798	0.001795888	0.002336909	UNDER	UNDER
75-45-6	Chlorodifluoromethane	1.81	No	Yes	24-hr	3700	190	0.0049651	0.002157562	0.002807538	UNDER	UNDER
75-00-3	Chloroethane	1.71	Yes	Yes	24-hr	2200	110	0.004675269	0.002031617	0.002643652	UNDER	UNDER
67-66-3	Chloroform	0.07	Yes	Yes	year	7.1	0.35	0.070484725	0.030628817	0.039855908	UNDER	UNDER
74-87-3	Chloromethane	0.41	Yes	Yes	24-hr	6.7	0.33	0.001110653	0.000482629	0.000628024	UNDER	UNDER
106-46-7	1,4-Dichlorobenzene	12.57	Yes	Yes	year	15	0.74	12.56645999		12.56645999	***OVER***	UNDER
75-71-8	Dichlorodifluoromethane	6.88	No	No				0.000785529	0.000341348	0.000444181		
75-09-2	Dichloromethane	17.02	Yes	Yes	year	9800	490	17.02468525	7.39799959	9.626685659	UNDER	UNDER
77-78-1	Dimethyl sulfide	0.00	Yes	No				0	0	0		
74-84-0	Ethane	0.00	No	No				0	0	0		
64-17-5	Ethanol	156.43	No	No				0.017856785	0.007759585	0.0100972		
75-08-1	Ethyl mercaptan	0.00	No	No				0	0	0		
100-41-4	Ethylbenzene	22.75	Yes	Yes	year	65	3.2	22.75069096	9.886209343	12.86448161	***OVER***	UNDER
106-93-4	1,2-Dibromoethane	0.06	Yes	Yes	year	0.27	0.014	0.055459712	0.024099766	0.031359946	***OVER***	UNDER
75-69-4	Fluorotrichloromethane	2.65	No	No				0.000302757	0.000131562	0.000171195		
110-54-3	Hexane	4.70	Yes	Yes	24-hr	52	2.6	0.012879905	0.005596904	0.007283001	UNDER	UNDER
7783-06-4	Hydrogen sulfide	90.54	No	Yes	24-hr	0.15	0.0074	0.248054033	0.107790752	0.14026328	***OVER***	UNDER
78-93-3	Methyl ethyl ketone	59.17	No	Yes	24-hr	370	19	0.162122946	0.070449789	0.091673157	UNDER	UNDER
108-10-1	Methyl isobutyl ketone	6.74	Yes	Yes	24-hr	220	11	0.018468574	0.008025435	0.010443139	UNDER	UNDER
74-93-1	Methyl mercaptan	0.00	No	No				0	0	0		
127-18-4	Tetrachloroethylene	0.00	Yes	Yes	year	27	1.3	0		0	UNDER	UNDER
74-98-6	Propane	0.00	No	No				0	0	0		
108-88-3	Toluene	51.30	Yes	Yes	24-hr	370	19	0.140538105	0.061070195	0.07946791	UNDER	UNDER
156-60-5	trans-1,2-dichloroethene	0.29	No	Yes	24-hr	60	3	0.000799664	0.00034749	0.000452173	UNDER	UNDER
79-01-6	Trichloroethene	5.28	Yes	Yes	year	34	1.7	5.282865251	2.295645082	2.987220169	***OVER***	UNDER
75-01-4	Vinyl chloride	3.97	Yes	Yes	year	18	0.92	3.973953461	1.726863413	2.247090048	***OVER***	UNDER
1330-20-7	p,&m-Xylene	37.48	Yes	No	24-hr	16	0.82	0.102682465	0.044620198	0.058062267	UNDER	UNDER
1016-97-8	Butane	0.00	No	No				0		0		
630-08-0	Carbon monoxide	0.00	No	Yes	1-hr	43	1.1	0		0	UNDER	UNDER
75-43-4	Dichlorofluoromethane	0.00	No	No				0		0		
7439-97-6	Mercury (total)	0.00	Yes	Yes	24-hr	0.0022	0.00011	0	0	0	UNDER	UNDER
109-66-0	Pentane	62.86	No	No				0.007175586		0.007175586		
124-38-9	Carbon Dioxide	0.00	No	No				0		0		
7647-01-0	Hydrochloric Acid	0.00	Yes	Yes	24-hr	0.67	0.033	0		0	UNDER	UNDER
115-07-1	propene	40.99	No	Yes	24-hr	220	11	0.112303649	0.04880104	0.063502609	UNDER	UNDER
67-56-1	methanol	37.64	Yes	Yes	24-hr	1500	74	0.103128755	0.044814132	0.058314623	UNDER	UNDER
156-59-2	cis-1,2 dichloroethene	0.00	No	No				0		0		
141-78-6	ethyl acetate	11.55	No	No				0.00131826	0.000572844	0.000745416		
109-99-9	tetrahydrofuran	18.99	No	Yes	24-hr	150	7.4	0.052019305	0.022604753	0.029414552	UNDER	UNDER
110-82-7	cyclohexane	4.93	No	Yes	24-hr	440	22	0.013503663	0.005867955	0.007635708	UNDER	UNDER
540-84-1	2,2,4 trimethyl pentane	0.00	Yes	No				0		0		
142-82-5	heptane	9.82	No	No				0.001121094	0.000487166	0.000633928		
100-42-5	styrene	0.00	Yes	Yes	24-hr	65	3.2	0		0	UNDER	UNDER
95-47-6	o xylene	13.10	Yes	Yes	24-hr	16	0.82	0.03588735	0.015594685	0.020292665	UNDER	UNDER
108-67-8	1,3,5 trimethylbenzene	0.00	No	Yes	24-hr	4.4	0.22	0		0	UNDER	UNDER
95-63-6	1,2,4 trimethylbenzene	0.00	No	Yes	24-hr	4.4	0.22	0		0	UNDER	UNDER
115-10-6	dimethyl ether	0.00	No	No				0		0		
75-69-4	trichlorofluoromethane	2.65	No	No				0.000302757	0.000131562	0.000171195		
75-65-0	tertbutanol	0.00	No	No				0		0		
591-78-6	2-hexanone	0.00	No	Yes	24-hr	2.2	0.11	0		0	UNDER	UNDER
98-82-8	cumene	0.00	Yes	Yes	24-hr	30	1.5	0		0	UNDER	UNDER
80-56-8	a-pinene	0.00	No	No				0		0		
103-65-1	n-propyl benzene	0.00	No	No				0		0		
622-96-8	4-ethyltoluene	0.00	No	No				0		0		
18172-67-3	b-pinene	0.00	No	No				0		0		

		Tons	Pounds
HAPS	**Total**	**0.12**	**247.48**
	Max Single	**0.08**	**156.43**
TACS	**Total**	**0.24**	**476.22**
	Max Single	**0.08**	**156.43**

Attachment E
BACT Analysis

SCS ENGINEERS

BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS
LRI 304th Street Landfill
Puyallup, Washington

Presented to:

LRI 304th Street Landfill
30919 Meridian St. E
Graham, WA 98338

Presented by:

SCS ENGINEERS
2405 140th Ave NE #107
Bellevue, WA 98005

July 2023
File No. 04222001.23

Offices Nationwide
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Appendices

1 INTRODUCTION

On behalf of LRI 304th Street Landfill (LRI or LRI Landfill), SCS Engineers (SCS) has developed the following analysis supporting a Best Available Control Technology (BACT) determination for control of sulfur oxides (SOx) from the temporary flare.

2. TOP DOWN BACT

As stated in Regulation I Section 6.01, PSCAA adopts by reference and enforces the Washington Department of Ecology (Ecology) definition of BACT:

WAC 173-400-030(13) - "Best available control technology (BACT)" means an emission limitation based on the maximum degree of reduction for each air pollutant subject to regulation under chapter 70.94 RCW emitted from or which results from any new or modified stationary source, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of each such pollutant. In no event shall application of the "best available control technology" result in emissions of any pollutants which will exceed the emissions allowed by any applicable standard under 40 C.F.R. Part 60 and Part 61. Emissions from any source utilizing clean fuels, or any other means, to comply with this paragraph shall not be allowed to increase above levels that would have been required under the definition of BACT in the federal Clean Air Act as it existed prior to enactment of the Clean Air Act Amendments of 1990.

SCS is using the commonly used and widely accepted “top-down approach” to complete this BACT analysis. Below are the five steps that are part of this top-down analysis:

1. Identify each emission unit and all available control options;
2. Evaluate the technical feasibility of each control option;
3. Rank the remaining control technologies by control effectiveness;
4. Eliminate control options based on economic, environmental and energy impacts; and
5. Select BACT.

STEP 1 - IDENTIFY CONTROL OPTIONS

Emissions of SOx at the LRI Landfill are generated via the conversion of various total reduced sulfur (TRS) compounds present in LFG to SOx during the combustion process of flare operation. Control technologies to reduce the emissions of SOx from LFG flares are divided into two groups; pre-combustion controls to reduce inlet sulfur concentrations and post combustion controls to reduce emissions of the SOx in the exhaust. SCS searched state and federal databases, and identified the following potential control technologies to control SOx emissions from the temporary flare:

- Pre-Combustion Control
  - Sulfa Treat
  - FerroSorp
  - Iron Sponge
  - Activated Carbon
  - LO-CAT
- Post-Combustion Control
  - Exhaust "Scrubbing"

Pre-Combustion Control

SulfaTreat

SulfaTreat is a solid scavenger system, which consists of passing the LFG either across a fixed bed or through a batch-type reactor of granular reactant. The granular material reacts with H_2S within the LFG to remove it from the gas stream. An additional moisture separator would need to be employed upstream of the process inlet to remove excess moisture from the LFG. Multiple equipment arrangement configurations are possible (e.g., parallel, series, etc.), depending on site needs including the need to minimize downtime of the treatment system. During the process, the LFG flows through the consistently sized and shaped granular SulfaTreat product in the bed, where the hydrogen sulfide (H_2S), the primary component in TRS for LFG, reacts with the product to form a stable and safe byproduct. The product consumption is dependent only on the amount of H_2S that passes through the bed. This matches the need for H_2S removal with variations in system flow conditions and outlet specifications, regardless of the total volume or other common components of the gas.

SCS is aware of the SulfaTreat technology having been used for LFG treatment, including at the Dry Bridge Road Landfill in Rhode Island, Cottage Street Landfill (7,200 parts per million by volume [ppmv] TRS inlet concentration inlet), McCommas Bluff Landfill (600 ppmv inlet concentration), Allentown Landfill (1,100 ppmv inlet concentration), and the University of New Hampshire (400 ppmv inlet concentration). SCS is not aware of any critical technical operational problems to date regarding this technology, and is one of the most frequently used technologies.

FerroSorp

FerroSorp is a solid scavenger system that consists of passing the LFG either across a fixed bed reactor of granular reactant. The granular material reacts with H_2S within the LFG to remove it from the gas stream. During the process, the LFG flows through the consistently sized and shaped granular FerroSorp product in the beds, where the H_2S reacts with the product to form a stable and safe byproduct. The filter media does need to be replaced once spent and spent media can be landfilled as nonhazardous waste after testing. The reactor vessels are designed in a specific configuration to ensure minimum residence time (contact time with media) as required by the manufacturer requirements. FerroSorp creates an exothermic reaction during sulfur removal that

can be a fire hazard when exposed to sudden increase in oxygen. This is of concern in a system with combustible LFG passing over the media and a need for the system to be opened up routinely to replace filter media.

SCS is aware of the FerroSorp technology having been used for anaerobic digester biogas at the GreenGasUSA Lewiston Perdue Chicken Processing facility in North Carolina and LFG at BRADS Landfill in Pennsylvania.

Iron Sponge

Iron Sponge is a solid scavenger system which consists of passing the uncombusted LFG across a bed of hydrated iron oxide. Sulfur compounds within the LFG react with the iron oxide to form iron sulfides, iron mercaptides, and other materials, along with a small amount of water by-product. The filter media can be partially regenerated during operation to prolong the life of media, but will become spent and will need to be replaced. Complete replacement of the media may be required after several regenerations. Please note that the media becomes susceptible to fire as soon as it dries out and comes in contact with oxygen. This makes the change out operations challenging and dangerous. Water has to be added continuously to the exhaust media while performing change outs in order to reduce any hazard. In addition, the spent media has commonly tested as a hazardous waste for Volatile Organic Compounds (VOCs) and metals, which increases disposal costs. The iron sponge system also has an electrical demand due to its regeneration blowers.

SCS is aware of the Iron Sponge technology having been used for LFG treatment, including at the Scholl Canyon Landfill in California (40 ppmv inlet concentration, but no longer in use) and the Kearny and Cape May County Landfills in New Jersey, Pine Avenue Landfill in Niagara Falls, New York, and Ada County Landfill in Boise, Idaho. Our experience has been that handling the spent filter media has been challenging, and that the media reportedly has auto-combusted once it came into contact with oxygen if not wetted down with water, making it extremely dangerous to use particularly with the flammability of LFG.

LO-CAT

LO-CAT is a wet-scrubbing liquid-redox system that essentially uses a water solution that contains a metal ion (iron) to convert H_2S into elemental sulfur, which ultimately settles out of the solution and is removed. In this process, LFG is passed through a chamber which contains a catalyst (special form of Chelated Iron). A chemical reaction occurs in this chamber, and after series of chemical reactions, fresh gas is produced. The used catalyst is sent to a catalyst regeneration chamber for rejuvenation. In this chamber, air is added to the used solution. As a result of chemical reactions in this chamber, a slurry of sulfur and fresh catalyst is produced. The catalyst is sent back to the LFG treatment chamber, and sulfur slurry is sent to a filter chamber which breaks down slurry into elemental sulfur and liquid filtrate. Liquid filtrate is sent back to the catalyst regeneration chamber for reuse. The sulfur becomes a waste product that must be managed.

LO-CAT does not use toxic chemicals nor does it produce hazardous by-products. The catalyst in the system regenerates so the maintenance is minimal, reducing operating and maintenance costs. However, capital costs are high, and if the catalyst is fouled, replacement is expensive. Maintenance of the solution pH is important, and is accomplished through the addition of NaOH or KOH to the system. Also, a number of operating parameters must be monitored and controlled during operation, including the temperature, the water balance, and sulfur content. LO-CAT is most efficient for sulfur loads greater than 200 lb/day and doesn't become economical until sulfur loads approach 1,000 lb/day. At lower concentrations and loads, this technology is considered infeasible, and vendors will not take on such projects.

SCS is aware of the LO-CAT technology being used for LFG treatment, including at the Central Landfill in Florida (5,000 ppmv), the Warren County Landfill in New Jersey (6,000 ppmv inlet concentration), and the Cherry Island Landfill in Delaware (2,000 ppmv inlet concentration), and is not aware of any operational problems regarding this technology, other than the aforementioned capital costs.

Activated Carbon

Activated Carbon is a physical adsorption process which consists of passing the LFG across a bed of activated carbon to remove H_2S from the gas stream. The H_2S is chemically adsorbed onto the activated carbon in addition to other constituents in the gas stream such as VOCs. Because of the affinity for the activate carbon to adsorb the VOCs present in LFG, the media will load up quickly requiring frequent change outs, the cost of which can make this option cost prohibitive.

SCS is most familiar with DARCO BG-1 activated carbon from Cabot Corporation. This product is used for large scale H_2S treatment upstream of renewable natural gas (RNG) facilities and is also one of the most widely-used technologies for sulfur reduction in LFG. The technology has been used at many landfills to treat all or portions of the total LFG flow, including use at individual/clusters of gas extraction wells, and/or to polish the LFG prior to additional pre-treatment units.

Post-Combustion Control

Exhaust Scrubbing

There are a number of technologies that have been applied to other industries for the control of post combustion SOx exhaust (or flue) gas emissions, most traditionally at coal and oil-fired power plants. Both "wet" and "dry" scrubbing technologies have been used for Sox exhaust gas control. These technologies utilize an alkaline or caustic solution which reacts chemically with the exhaust gas to convert SO_2 to calcium sulfate ($CaSO_3$) or some other compound.

Exhaust/flue gas SOx treatment has been utilized at coal and oil-fired power plants because it is less practical and much more expensive to treat these fuels prior to combustion. However, SCS is not aware of a single installation at which post-combustion control for SOx emissions has been

utilized at a LFG flare, thus we do not believe this technology can be considered technologically feasible in this application. For this application, due to the volume of exhaust gas to be managed in comparison to the raw gas inlet volume, it is simply not practical to treat the exhaust gas instead of the raw inlet LFG. Further, there is a complete absence of data to assess costs and operational issues in using this technology for LFG. Finally, LFG contains many impurities including VOCs, semi-VOCs, and siloxanes that commonly foul post-combustion controls.

STEP 2 – ELIMINATE TECHNICALLY INFEASIBLE OPTIONS

The following control technologies are considered to be technically infeasible and will be eliminated from further analysis.

Iron Sponge/FerroSorp

SCS experience has been that handling the spent filter media has been challenging, and that the media reportedly tended to auto-combust once it came into contact with oxygen, making it extremely dangerous to use particularly with the flammability of LFG. Therefore, due to the inherent danger associated with the iron sponge and FerroSorp, SCS does not consider these technologies to be feasible for the application considered herein.

Exhaust Scrubbing

No landfill gas flare projects were identified that utilize exhaust/flue gas SOx controls and there is no data available to assess the costs and operational issues in using this technology at a landfill flare; therefore, SCS does not consider exhaust sulfur scrubbing to be a control option that has been demonstrated to be technically feasible for the application being considered. Furthermore, due to the impurities present in LFG, such as VOC, semi-VOC, and siloxanes, extensive front-end treatment would likely be required, which would increase the costs substantially.

STEP 3 - RANK REMAINING CONTROL TECHNOLOGIES BY CONTROL EFFECTIVENESS

In SCS' experience and research, sulfur treatment has historically been implemented at sites with high sulfur content (generally in the thousands of ppmv). In general, aforementioned technologies are typically designed to treat gas to a specified outlet sulfur concentration and not to a percent removal as there are many variables that affect percent removal and the percentage can vary throughout the life-cycle of the media or catalyst. This section is intended to compare control effectiveness of the remaining technologies and then subsequently benchmark control effectiveness limit (i.e., outlet sulfur concentration) for these select technologies.

Control effectiveness

The technically-feasible control options (activated carbon, SulfaTreat, and LO-CAT) can all be designed to treat LFG with a TRS concentration of 2000 to 3000 ppmv and are ranked equally effective for this project. This allows them to be applied to a facility like the temporary flare in

this case, which is projected to combust LFG with an annual average TRS concentration of 2,000 ppmv.

Benchmark Control Effectiveness Limit

Numerous permits were surveyed to identify TRS reasonably available control technology (RACT)/BACT limits on flares burning LFG. In each of these cases, RACT or BACT was triggered, and a concentration limit was selected to either avoid exceeding the RACT/BACT cost effectiveness threshold and/or to avoid becoming a major source for SOx. Where controls have been employed, those controls have included treatment of the full LFG volume or partial treatment of areas of the landfill with the highest TRS so that the concentration limit is met.

Sulfur Reduction Limits at Other Landfill Flares

Landfill Name	State, Air Jurisdiction	Control Technology	LFG TRS Limit in ppmv & Averaging Specifics	Permit Condition and Basis
Potrero Hills Landfill	CA, BAAQMD	Controls not required, based on sulfur content in landfill gas	504 ppmv H2S [***Averaging via***: Quarterly Draeger tube samples, plus an annual source test]	#10. Basis: Regulation 9-1-302 (exhaust limit on SOx), voluntary limit on SO2 PTE to avoid public notice, Regulation 2-2-405
Redwood Landfill	CA, BAAQMD	Activated Carbon for flare	350 ppmv H2S annual average, 370 ppmv during any test on flare [***Averaging via***: Annual Average of Quarterly LFG Testing]	#18. Basis: Cumulative increase, RACT, Air Toxics Hot Spots Act and Regulations 2-5-302.3 (H2S acute health risk), 9-1-302 (exhaust limit on SOx), and 9-2-301 (H2S limit)
Vasco Road Landfill	CA, BAAQMD	Controls not required, based on sulfur content in landfill gas	320 ppmv [***Averaging via***: Rolling Annual Average of Quarterly LFG Testing]	#12. Basis: RACT for SO2 and Regulation 9-1-302 (exhaust limit on SOx),
Columbia Ridge	OR, ODEQ	Controls not required, based on sulfur content in landfill gas	300 ppmv [***Averaging via***: Shall Not Exceed]	Federal PSD BACT determination based on cost effectiveness analysis
Newby Island Landfill	CA, BAAQMD	Activated Carbon [used as partial control to meet sulfur limit]	300 ppmv [***Averaging via***: Shall Not Exceed]	#10. Basis: Cumulative Increase, Regulation 2-1-204, 2-2-303 (limit to avoid SOx offsets)
Sonoma Central Landfill	CA, BAAQMD	Controls not required, based on sulfur content in landfill gas	300 ppmv [***Averaging via***: Shall Not Exceed]	#7. Basis: Regulation 9-1-302 (exhaust limit on SOx).
Keller Canyon Landfill	CA, BAAQMD	Controls not required, based on sulfur content in landfill gas	300 ppmv [***Averaging via***: Shall Not Exceed]	#34. Basis: Cumulative Increase and Regulations 9-1-302 (exhaust limit on SOx),and 2-6-503.
West Contra Costa	CA, BAAQMD	Controls not required, based on sulfur content in landfill gas	300 ppmv [***Averaging via***: Shall Not Exceed]	#10. Basis: Regulation 9-1-302 (exhaust limit on SOx), Cumulative Increase.

Landfill Name	State, Air Jurisdiction	Control Technology	LFG TRS Limit in ppmv & Averaging Specifics	Permit Condition and Basis
County Landfill				

This table omits TRS limits imposed on LFG flares in California under regulatory requirements other than cases where RACT or BACT was triggered. For instance, SCAQMD Rule 431.1 sets a maximum H2S limit of 150 ppmv for all landfill gas combustors. The BAAQMD sets BACT limits, but District BACT does not consider the cost-effectiveness of a control option. See BAAQMD, Complex Permitting Handbook for BAAQMD New Source Review Permitting at 112 (September 2016). Therefore, District BACT is analogous to federal LAER, and BAAQMD BACT determinations have limited precedential value to a Washington BACT determination. Furthermore, the BAAQMD requires control devices, such as flares, meet RACT. However, the District's definition of RACT is analogous to federal BACT. As such, BAAQMD RACT determinations are relevant precedent for Washington BACT determinations.

STEP 4 - EVALUATE THE MOST EFFECTIVE OPTION BASED ON ECONOMIC, ENVIRONMENTAL, AND ENERGY IMPACTS

The remaining control technologies involve pre-treatment of LFG to reduce the TRS content of the LFG prior to combustion. The cost for implementing these technologies was evaluated and the results of this economic evaluation are presented below.

Cost Effectiveness Analysis

SCS evaluated the estimated capital and operating costs using the U.S. Environmental Protection Agency (EPA) Air Pollution Control Cost Manual to calculate the cost effectiveness of the potential emission control technologies. The cost effectiveness is defined as the ratio of the annualized cost of that abatement system over the reduction in annual pollutant emissions achieved by the system for the pollutant in question as shown below.

> **Cost-effectiveness =** (Annualized Cost of Abatement System ($/yr))/(Reduction in Annual Pollutant Emissions (ton/yr))
>
> **Reduction in Annual Pollutant Emissions (ton/yr) =** Baseline Uncontrolled Emissions – Control Option Emissions

The annualized cost of the abatement system was estimated from the installed cost of the control technology and its expected annual operating and maintenance costs, as shown below.

Annualized cost = Direct Costs + Indirect Costs

> **Direct Costs** (Sum of the Following):
> Labor
> Raw Materials

Replacement Parts
Utilities

Indirect Costs (Sum of the following):
Overhead (60% of Labor Costs)
Property Tax (1% of Total Capital Cost)
Insurance (1% of Total Capital Cost)
General & Administrative (2% of Total Capital Cost)
Capital Recovery (CRF x Total Capital Cost)
where Total Capital Cost = Installed Equipment Cost

Cost Evaluation

The reduction in the annual SOx emissions is based on the inlet concentration of TRS, the removal efficiency of the control technology, and the rolling 12 month average LFG flow rate of 2,200 scfm through the temporary flare, based on conservative model projections.

Over the two-year operating life of the temp flare the TRS concentration of LFG entering the scrubbing system is expected to average 2,000 ppmv. This is based on actual TRS levels observed in landfill gas samples. LFG sulfur scrubbing technologies selected as BACT have achieved an outlet TRS concentration of 300 ppm. The difference between a SOx emission rate at an inlet concentration of 2,000 ppmv and 300 ppmv is 895.27 lbs/day or 163.39 tons/year at the projected annual combustion rate of 2,200 scfm.

Estimated Annual Pollutant Reduction

Technology	Flare Inlet Concentration (ppmv)	SOX Emissions (lb/day)	SOX Emissions (tons/yr)
Uncontrolled	2,000	1,053.26	192.22
Controlled	300	157.99	28.83
Uncontrolled Minus Controlled	1,700	895.27	163.39

For the remaining control technologies, SCS evaluated the estimated capital and operating costs based on the parameters specified above and under the assumption that this temporary flare will operate for a maximum of 2 years.

LO-CAT

LO-CAT does not typically become economical unless the inlet has a very high sulfur concentration due to the high capital cost. Cost data from an analysis SCS conducted for the Lancaster Landfill and Recycling Center (Lancaster) in 2008 was utilized in this analysis. The Lancaster costs were multiplied by a ratio of the inlet TRS sulfur concentrations and/or maximum flow rates to estimate the costs for the LRI facility. The vendor would not supply updated cost

information for this project as they are sure it will not be cost effective. A summary of the cost are below and details are provided in Appendix A.

Type of Cost	Costs
Capital Cost	$3,945,824
Direct Costs (Annual Operating and Replacement)	$733,511
Indirect Costs (Including Capital Recovery)	$2,437,466
Total Annualized Cost	$3,170,977

SulfaTreat

SCS obtained updated costs from Schlumberger (SLB) for the amount and costs of media required for the LRI process. These costs were used along with the cost data from an analysis SCS conducted for the Arbor Hills Landfill Gas to Energy Facility (Arbor Hills) in 2018. A summary of the cost are below and details are provided in Appendix A.

Type of Cost	Costs
Capital Cost	$1,195,161
Direct Costs (Annual Operating and Replacement)	$676,469
Indirect Costs (Including Capital Recovery)	$718,680
Total Annualized Cost	$1,395,149

Activated Carbon

Cost data from an analysis SCS conducted for the Chiquita Canyon Landfill in Los Angeles County, California in 2015 was used to estimate the potential costs for an activated carbon system at the LRI. A summary of the costs are in the following table and details are provided in Appendix A. This cost is highly variable because of the consumption of carbon media by VOCs, but we have conservatively assumed limited VOC impacts.

Type of Cost	Costs
Capital Cost	$941,680
Direct Costs (Annual Operating and Replacement)	$832,592
Indirect Costs (Including Capital Recovery)	$658,730
Total Annualized Cost	$1,389,826

These estimated total costs were used to evaluate the approximate cost per pound of possible SO_x emission reductions. As shown in the following table, SulfaTreat and Activated Carbon are control technologies that are feasible in cost, with LO-CAT clearly being out of the feasible range.

Technology	Cost per Emissions Reduced ($/ton SOx)
LO-CAT	$19,408
SulfaTreat	$8,539
Activated Carbon	$8,506

STEP 5 - CONCLUSIONS AND SELECTION OF BACT

There are three technologies that are technologically feasible for the reduction of sulfur content in LFG flares. One option was eliminated on an economical basis leaving two options financially feasible compared to the cost, activated carbon and SulfaTreat. These two meet the BACT cost-effectiveness test, whereas LO-CAT has an exceptionally high cost per ton for the volume and sulfur concentration of the LFG that the temporary flare will burn. LRI submits that activated carbon is BACT for control of SOx emissions from the temporary flare.

PROPOSED BACT LIMIT

SCS is proposing that the BACT limit be established as 300 ppmv H_2S on a rolling 12-month average in the LFG prior to combustion in the temporary flare based on an average of H_2S concentration tests using ASTM Method D-5504, EPA Method 15/16, or another method approved by PSCAA. SCS is recommending that these H_2S tests be performed on a monthly basis. Additionally, LFG flow to the temporary flare will be monitored monthly to confirm an average flow rate of less than 2,200 scfm on a 12-month rolling basis.

2 GENERAL COMMENTS

This report is based on available information as available to SCS Engineers. This report has been prepared for specific application to the project discussed and has been prepared in accordance with generally accepted engineering practices. No warranties, express or implied, are intended or made.

ATTACHMENT A

COST ANALYSIS

BACT Analysis Data for LRI Landfill

Control Device Name: SLB SulfaTreat System

Control Device Description: SulfaTreat for reduction of TRS as H2S to 300 PPMV from 2000 PPM

Site-Wide Emissions	SOx	SOx lb/day	Site-Wide Emissions tpy
Guaranteed Uncontrolled (ppmv @0% O2)	2000	1053.26	192.22
Est. Controlled (ppmv @0% O2)	300	157.99	28.83
Reduction	85%	895.27	163.4

Temporary Flare Maximum LFG Flow scfm	2,200

Capital Cost (for SulfaTreat System) Description	Capital Cost*	Cost for SOx Reduction	Comments
SulfaTreat Material (First Fill of Media)	$ 255,779	$ 255,779	SLB Estimate[1]
SulfaTreat System*	$ 990,000	$ 544,500	SLB Estimate[2]
Transportation*	$ 118,800	$ 65,340	SLB Estimate[2]
Sulfa Treat Installation*	$ 125,000	$ 68,750	SCS Estimate[3]
Permitting and Design	$ 100,000	$ 100,000	SCS Estimate[3]
Sales Taxes@ 6%	$ 89,375	$ 52,142	For Purchase of Major Equipment[4]
Contingency @10%	$ 167,895	$ 108,651	Based on 10% contingency[5]
Total Capital Cost		$ 1,195,161	

*Capital Cost Based on LFG flow of 4,000 scfm

Annual Operating Cost (for SulfaTreat System) and Estimated Overhaul/Media Replacement Cost	Annual Cost	Cost for SOx Reduction	Comments
Media Purchase Cost	$ 281,356	$ 281,356	SLB Estimate[1]
Disposal Cost	$ 188,927	$ 188,927	SLB/SCS Estimate[6]
Transportation	$ 31,647	$ 31,647	SLB/SCS Estimate[7]
Labor	$ 31,647	$ 31,647	SLB Estimate/SCS Estimate[7]
Maintenance	$ 46,969	$ 46,969	SCS Estimate[8]
Vessel Repair Replacement Costs	$ 32,670	$ 32,670	Mi SWACO Estimate[9]
Miscellaneous	$ 5,197	$ 5,197	SCS Estimate[10]
Contingency @10%	$ 58,055	$ 58,055	Based on 10% contingency
Total Annual Operating and Replacement Cost		$ 676,469	
Overhead (60% of Labor Costs)		$ 18,988	USEPA Cost Estimate Manual, Section 2.6.5.7
Property Tax (1% of Total Capital Cost)		$ 11,952	USEPA Cost Estimate Manual, Section 2.6.5.8
Insurance (1% of Total Capital Cost)		$ 11,952	USEPA Cost Estimate Manual, Section 2.6.5.8
General & Administrative (2% of Total Capital Cost)		$ 23,903	USEPA Cost Estimate Manual, Section 2.6.5.8
Capital Recovery (CRF x Total Capital Cost)	0.545 CRF	651,885	USEPA Cost Estimate Manual, Equation 2.8a[11]
Total Annual Operating Cost		$ 1,395,149	
Total Annual Cost		$ 1,395,149	

Cost Effectiveness of SulfraTreat System:				
Cost effectiveness ($/ton) = (Annual cost $/year) / (District Standard Emissions - Emissions (w/tech feas BACT) (ton/year))				
Cost Effectiveness	$ 1,395,149.21	163.39 ton/year	**$8,538.95 /ton**	
Proposed SOx Cost Effectiveness				

Notes

[1] Estimates from SLB (Schlumberger) for media costs for the LRI facility

[2] Estimates for capital costs for initial SulfaTreat purchase and installation are based on estimates obtained from SLB at $165,000 per vessel, requiring 6 vessels from their experience with the SulfaTreat technology. Includes cost of initial media shipment.

[3] The design, permitting, and startup costs for the catalyst systems were estimates made by SCS Engineers from recent experience.

[4] Applied at 8.75% rate for major equipment purchases

[5] A 10% contingency was applied and considered reasonable for the uncertainties with this project

[6] Schlumberger estimate 128,000 pounds media per vessel and 6 vessels and change-out every 173 days, Mi SWACO estimate assuming $0.15/lb cleanout and SCS estimates $350/ton or $0.175/lb disposal cost as hazardous waste.

[7] SCS estimate based on $15,000 per changeout and changeout every 173 days per vessel based on Schlumberger quote.

[8] SCS estimate 5% of capital costs, less media

[9] Mi SWACO estimate using 50% of the sulfa treat system costs every 10 years plus 20% installation costs

[10] SCS estimates 0.5% of capital costs, less media plus $500 equipment rental

[11] Indirect costs based on USEPA Cost Estimation Manual, equation 2.8a. CRF = $i(1+i)^n / (1+i)^n-1$, where n = 2 years, I = 0.06 interest rate

BACT Analysis Data for LRI Facility

Control Device Name: LO-CAT System

Control Device Description: LO-CAT for reduction of TRS as H2S to 300 PPMV from 2000 PPM

Site-Wide Emissions	SOx	SOx lb/day	Site-Wide Emissions tpy
Guaranteed Uncontrolled (ppmv @15% O2)	2000	1053.26	192.22
Est. Controlled (ppmv @15% O2)	300	157.99	28.83
Reduction	85%	895.27	163.39

Temporary Flare Maximum LFG Flow scfm	2,200

Capital Cost (for LO-CAT System) Description	Capital Cost	Cost for SOx Reduction	Comments
LO-CAT System *	$ 1,120,000	$ 1,775,216	SCS Estimate[1] **
Support Equipment *	$ 448,000	$ 710,086	SCS Estimate[1] **
LO-CAT Installation *	$ 448,000	$ 710,086	SCS Estimate[2] **
Permitting and Design	$ 200,000	$ 200,000.00	SCS Estimate[2]
Sales Taxes@ 6%	$ 120,960	$ 191,723	For Purchase of Major Equipment[3]
Contingency @10%	$ 233,696	$ 358,711	Based on 10% contingency[4]
Total Capital Cost		$ 3,945,824	

*Based on Lancaster's LFG flow of 1,388 scfm

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Annual Operating Cost (for LO-CAT System) and Estimated Overhaul/Media Replacement Cost	Annual Cost	Cost for SOx Reduction**	Comments
Chemical Cost*	$ 7,770	$ 49,262	SCS Estimate[1] **
Disposal Cost*	$ 7,667	$ 48,611	SCS Estimate[5] **
Transportation*	$ 1,338	$ 8,484	SCS Estimate[1] **
Labor*	$ 33,500	$ 212,392	SCS Estimate[6] **
Maintenance	$ 197,291	$ 197,291	SCS Estimate[7]
Power*	$ 26,162	$ 165,867	SCS Estimate[8] **
Contingency @10%	$ 24,757	$ 51,604	Based on 10% contingency[4]
Total Annual Operating and Replacement Cost		$ 733,511	
Overhead (60% of Labor Costs)		$ 127,435	USEPA Cost Estimate Manual, Section 2.6.5.7
Property Tax (1% of Total Capital Cost)		$ 39,458	USEPA Cost Estimate Manual, Section 2.6.5.8
Insurance (1% of Total Capital Cost)		$ 39,458	USEPA Cost Estimate Manual, Section 2.6.5.8
General & Administrative (2% of Total Capital Cost)		$ 78,916	USEPA Cost Estimate Manual, Section 2.6.5.8
Capital Recovery (CRF x Total Capital Cost)	0.545 CRF	2,152,198	USEPA Cost Estimate Manual, Equation 2.8a[9]
Total Annual Operating Cost		$ 3,170,977	
Total Annual Cost		$ 3,170,977	

*Based on Lancaster's LFG flow of 1,388 scfm

**Multiplied by ratio of temporary flare maximum flow of 2,200 scfm to Lancaster's 1,388 scfm and the ratio of the LRI concentration of 2,000 ppm to Lancaster's 500 ppm

Cost Effectiveness of LO-CAT System:				
Cost effectiveness ($/ton) = (Annual cost $/year) / (District Standard Emissions - Emissions (w/tech feas BACT) (ton/year))				
Cost Effectiveness	$ 3,170,976.57	163.39 ton/year	**$19,407.82 /ton**	
Proposed SOx Cost Effectiveness				

Notes

[1] Estimates for capital costs for initial LO-CAT system purchase and installation are based on estimates obtained from SCS Engineers from previous estimates from Merichem

[2] The design, permitting, and startup costs for the catalyst systems were estimates made by SCS Engineers from recent experience

[3] Applied at 8.75% rate for major equipment purchases

[4] A 10% contingency was applied and considered reasonable for the uncertainties with this project

[5] SCS estimate assuming $0.15/lb cleanout plus disposal costs due to water content based upon amount of sulfur removed (lb/day)

[6] SCS estimate assumes 4 hours of operating labor per day per 5 day work week

[7] SCS estimate 5% of capital costs

[8] SCS estimates 18.1 kW required at $0.11 kW-hr for a full year (8,760 hours), 50% contingency also included

[9] Indirect costs based on USEPA Cost Estimation Manual, equation 2.8a. CRF = i(1+i)n / (1+i)n-1, where n = 2 years, I = 0.06 interest rate

BACT Analysis Data for LRI Facility

Control Device Name: Activated Carbon System

Control Device Description: Activated Carbon for reduction of TRS as H2S to 300 PPMV from 2000 PPM

Site-Wide Emissions	SOx	SOx lb/day	Site-Wide Emissions tpy
Guaranteed Uncontrolled (ppmv @15% O2)	2000	1053.26	192.22
Est. Controlled (ppmv @15% O2)	300	157.99	28.83
Reduction	85%	895.27	163.39

Temporary Flare Maximum LFG Flow scfm	2,200

Capital Cost (for Activated Carbon System) Description	Capital Cost	Cost for SOx Reduction	Comments
Activated Carbon Material (First Fill of Media) *	$ 516,923	$ 227,446	SCS Estimate[1] **
Activated Carbon System *	$ 450,000	$ 198,000	SCS Estimate[1] **
Activated Carbon Installation *	$ 654,160	$ 287,830	SCS Estimate[1] **
Permitting and Design	$ 100,000	$ 100,000	SCS Estimate[2]
Sales Taxes@ 6%	$ 97,265	$ 42,797	For Purchase of Major Equipment[3]
Contingency @10%	$ 181,835	$ 85,607	Based on 10% contingency[4]
Total Capital Cost		$ 941,680	

*Based on Chiquita LFG Flow of 5,000 scfm

**Multiplied by ratio of Site-Wide Maximum flow of 2,200 scfm to Chiquita's 5,000 scfm

Annual Operating Cost (for Activated Carbon System) and Estimated Overhaul/Media Replacement Cost	Annual Cost	Cost for SOx Reduction**	Comments
Media Cost*	$ 568,615	$ 568,615	SCS Estimate[1] **
Disposal*	$ 98,824	$ 98,824	SCS Estimate[5] **
Transportation*	$ 9,900	$ 9,900	SCS Estimate[6] **
Labor*	$ 9,900	$ 9,900	SCS Estimate[6] **
Power*	$ 18,000	$ 18,000	SCS Estimate[1] **
Maintenance	$ 35,712	$ 35,712	SCS Estimate[7]
Vessel Repair Replacement Costs	$ 11,880	$ 11,880	SCS Estimate[8]
Miscellaneous	$ 4,071	$ 4,071	SCS Estimate[9]
Contingency @10%	$ 75,690	$ 75,690	Based on 10% contingency[4]
Total Annual Operating and Replacement Cost		$ 832,592	
Overhead (60% of Labor Costs)		$ 5,940	USEPA Cost Estimate Manual, Section 2.6.5.7
Property Tax (1% of Total Capital Cost)		$ 9,417	USEPA Cost Estimate Manual, Section 2.6.5.8
Insurance (1% of Total Capital Cost)		$ 9,417	USEPA Cost Estimate Manual, Section 2.6.5.8
General & Administrative (2% of Total Capital Cost)		$ 18,834	USEPA Cost Estimate Manual, Section 2.6.5.8
Capital Recovery (CRF x Total Capital Cost)	0.545 CRF	513,627	USEPA Cost Estimate Manual, Equation 2.8a[10]
Total Annual Operating Cost		$ 1,389,826	
Total Annual Cost		$ 1,389,826	

*Based on Chiquita LFG Flow of 5,000 scfm

Cost Effectiveness of Activated Carbon System:				
Cost effectiveness ($/ton) = (Annual cost $/year) / (District Standard Emissions - Emissions (w/tech feas BACT) (ton/year))				
Cost Effectiveness	$ 1,389,826.35	163.39 ton/year	**$8,506.37 /ton**	
Proposed SOx Cost Effectiveness				

Notes

[1] Estimates for capital costs for initial activated carbon system purchase and installation are based on estimates obtained from SCS Engineers from previous estimates for the Chiquita Landfill

[2] The design, permitting, and startup costs for the system were estimates made by SCS Engineers from recent experience

[3] Applied at 8.75% rate for major equipment purchases

[4] A 10% contingency was applied and considered reasonable for the uncertainties with this project

[5] SCS estimates $0.15/lb cleanout and $350/ton or $0.175/lb disposal cost as hazardous waste

[6] SCS estimate based on $9,000 per changeout and 1.1 changeouts per year.

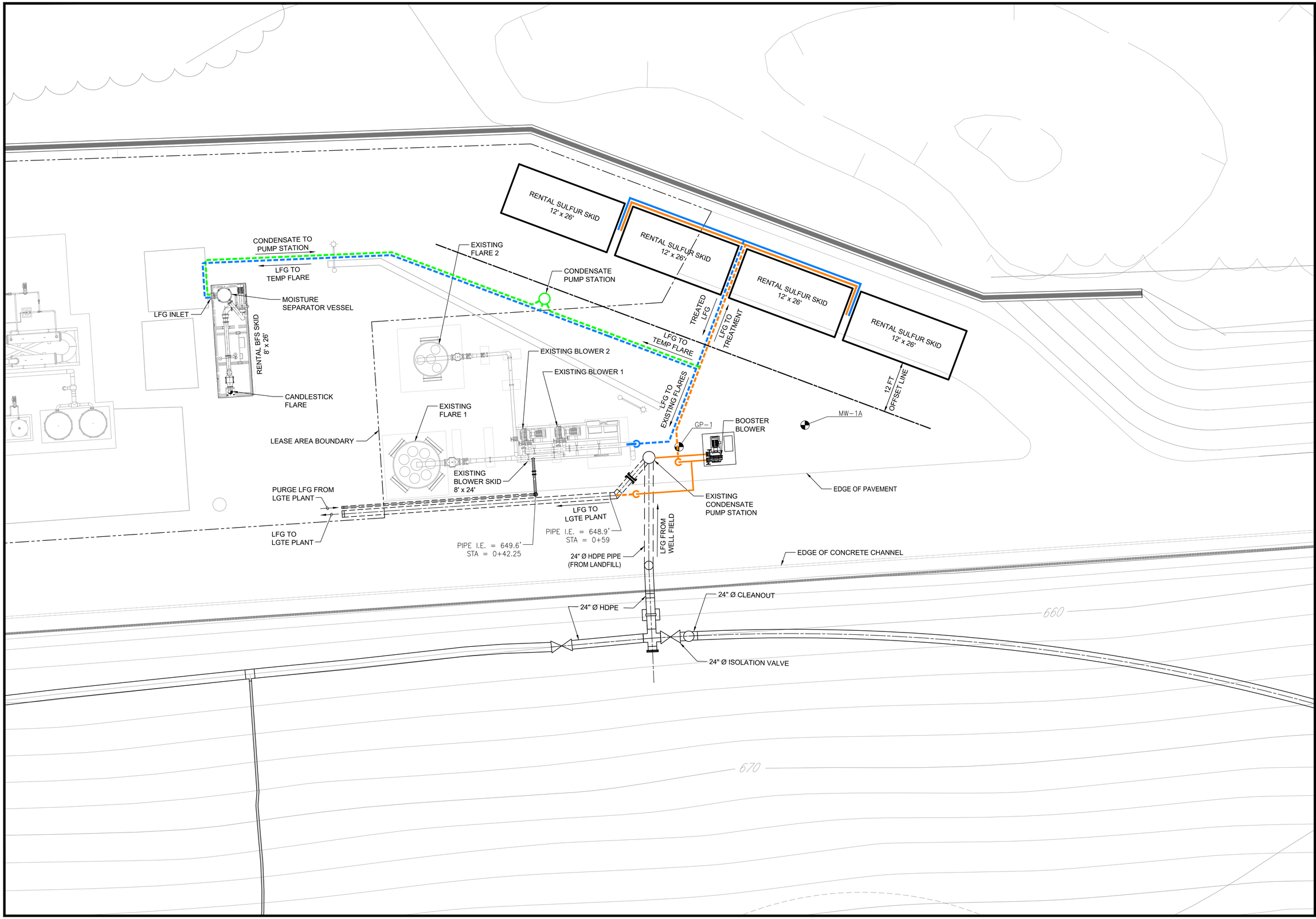
[7] SCS estimate 5% of capital costs, less media

[8] SCS estimate using 50% of the activated carbon system costs every 10 years plus 20% installation costs

[9] SCS estimates 0.5% of capital costs, less media plus $500 equipment rental

[10] Indirect costs based on USEPA Cost Estimation Manual, equation 2.8a. CRF = i(1+i)n / (1+i)n-1, where n = 2 years, I = 0.06 interest rate

Attachment F
Flare Design Documents and Location



NO.	REVISION	DATE
A	ISSUED FOR REVIEW	09/12/2022
B	ISSUED FOR REVIEW	10/12/2022

SHEET TITLE
PROPOSED BLOWER FLARE STATION SITE PLAN

PROJECT TITLE
BLOWER FLARE STATION UPGRADES
LRI LANDFILL
GRAHAM, WASHINGTON

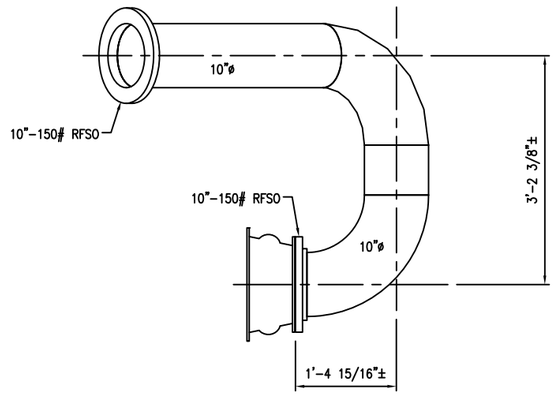
SCS ENGINEERS
Environmental Consultants and Contractors
2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005
(425) 746-4600 FAX (425) 746-6747

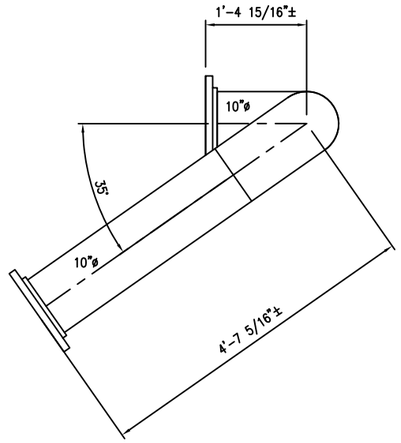
PROJ. NO.	04222001.10
DSN. BY:	TAM
DWN. BY:	LEL
CHK. BY:	TAB
ACAD FILE:	C2
APP. BY:	KGL

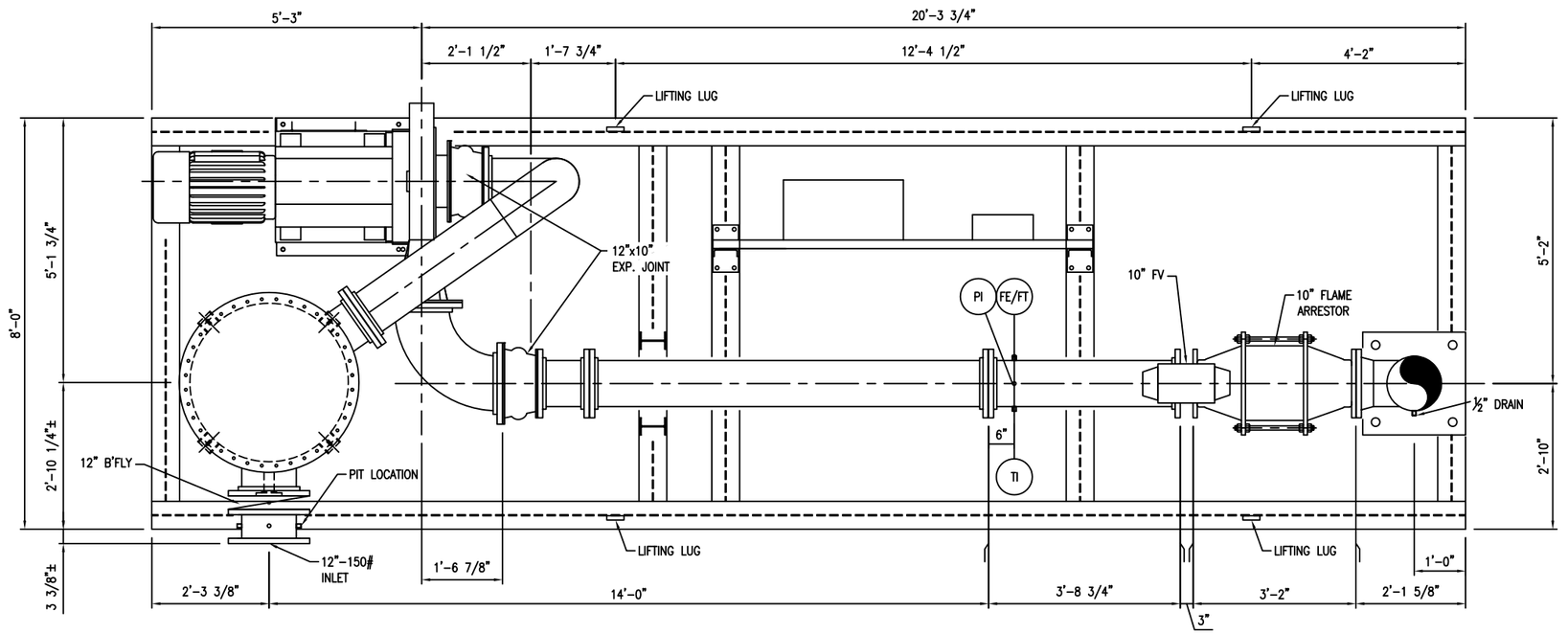
DATE:
OCTOBER 2022

SCALE:
AS SHOWN

DRAWING NO.
C2







PLAN VIEW

NOTES:
1. 304SS SCH. 10 UNLESS OTHERWISE NOTED

REV	DESCRIPTION	DATE	DR.	APP.
0	ISSUED FOR LAYOUT INFORMATION	11/11/21	AR	JP

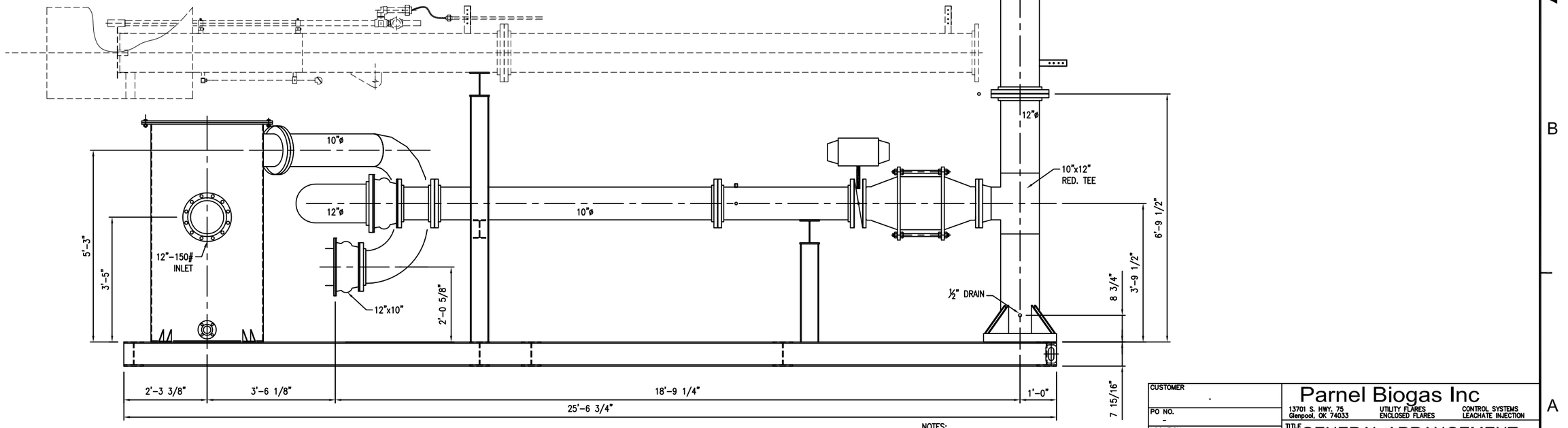
CUSTOMER -
PO NO. -
LOCATION -
USER - -

DRAWN AR | DATE 11/21
DESIGN AR | DATE 11/21

Parnel Biogas Inc
13701 S. HWY. 75 Glenpool, OK 74033
UTILITY FLARES ENCLOSED FLARES
CONTROL SYSTEMS LEACHATE INJECTION

TITLE: GENERAL ARRANGEMENT SKID AND PIPING DETAILS PLAN VIEW

SIZE D | DWG NO. RENTAL #1-301 | 0
SCALE NONE | REL DATE | SHEET 1 OF 1



ELEVATION VIEW

NOTES:
1. 304SS SCH. 10 UNLESS OTHERWISE NOTED

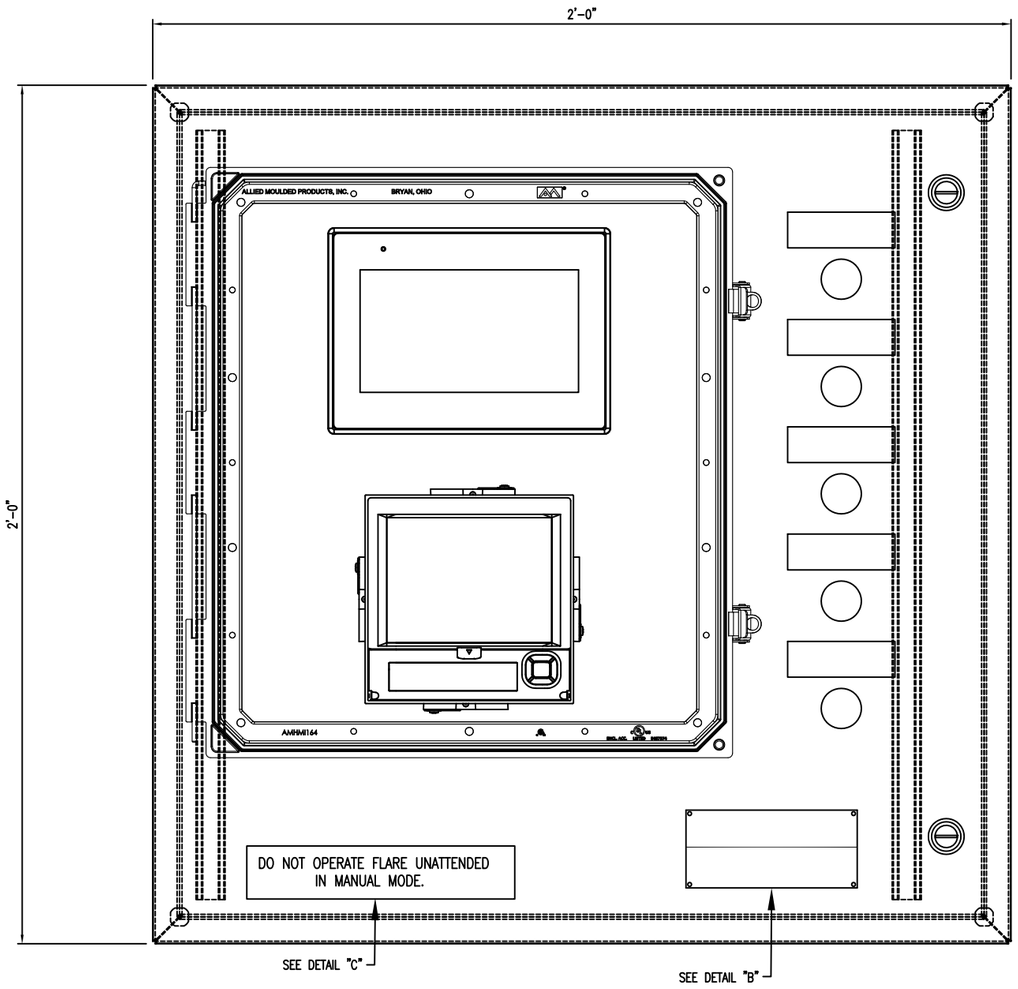
REV	DESCRIPTION	DATE	DR.	APP
0	ISSUED FOR LAYOUT INFORMATION	11/11/21	AR	JP

CUSTOMER	-
PO NO.	-
LOCATION	-
USER	- -
DRAWN	AR
DATE	11/21
DESIGN	AR
DATE	11/21

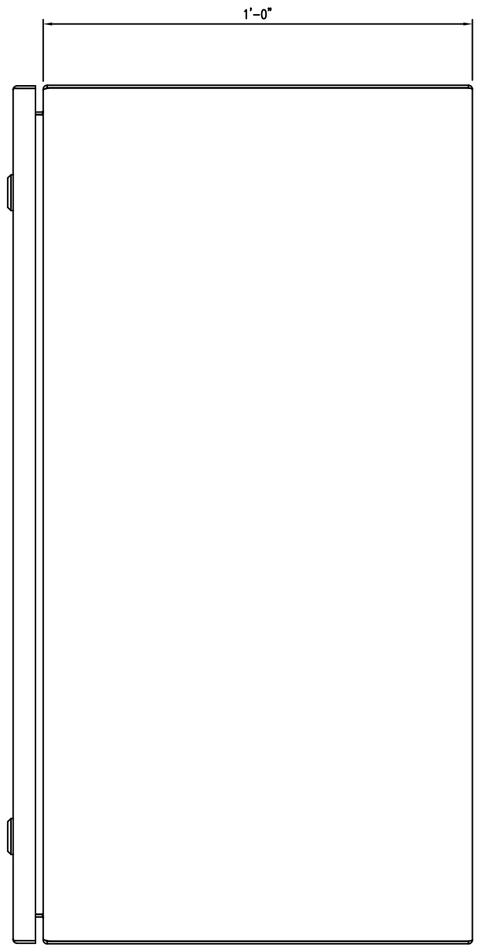
Parnel Biogas Inc
13701 S. HWY. 75, Glenpool, OK 74033
UTILITY FLARES | ENCLOSED FLARES | CONTROL SYSTEMS | LEACHATE INJECTION

TITLE: GENERAL ARRANGEMENT SKID AND PIPING DETAILS ELEV. VIEW

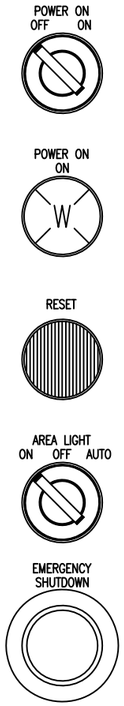
SIZE	DWG NO.	
D	RENTAL #1-302	0
SCALE	NONE	REL DATE
SHEET	1 OF 1	



FRONT VIEW



END VIEW



DETAIL "A"

Parnel Biogas Inc	
JOB NUMBER	RENTAL #1
DESCRIPTION	CONTROL PANEL
SHIP DATE	2022

DETAIL "B"

WARNING
DO NOT OPERATE FLARE UNATTENDED
IN MANUAL MODE.

DETAIL "C"

1. PANEL IS NEMA 4, NON-CLASSIFIED. AREA CLASSIFICATION IS CLASS 1 DIV2, GROUP D WITHIN 3' FT OF ANY GAS.
2. ALL TAGS TO BE WHITE WITH BLACK LETTERS.
3. CONDUIT SEALS ARE TO BE USED AT TRANSITIONS BETWEEN CLASSIFIED AND UNCLASSIFIED AREAS.
4. GROUNDING STRAPS MOUNTED ON ALL PANEL DOORS.

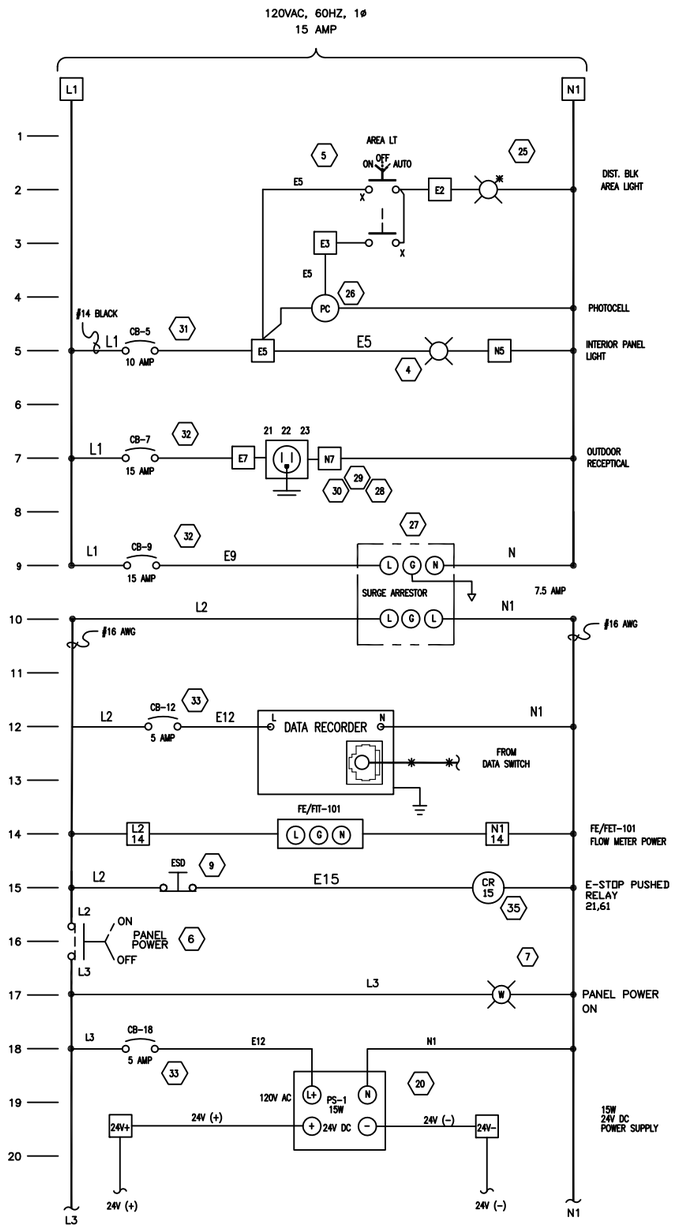
REV	DESCRIPTION	DATE	DR.	APP.
0	ISSUED FOR CONSTRUCTION	5/18/22	AR	AR

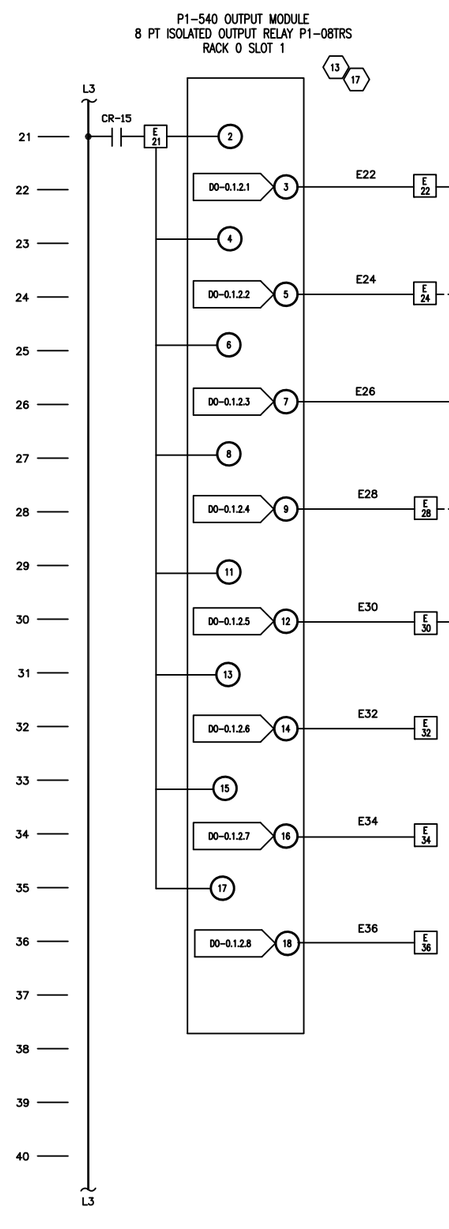
CUSTOMER: N/A
PO NO.:
LOCATION: N/A
USER: N/A
DRAWN: AR — DATE: 5/22
DESIGN: AR — DATE: 5/22

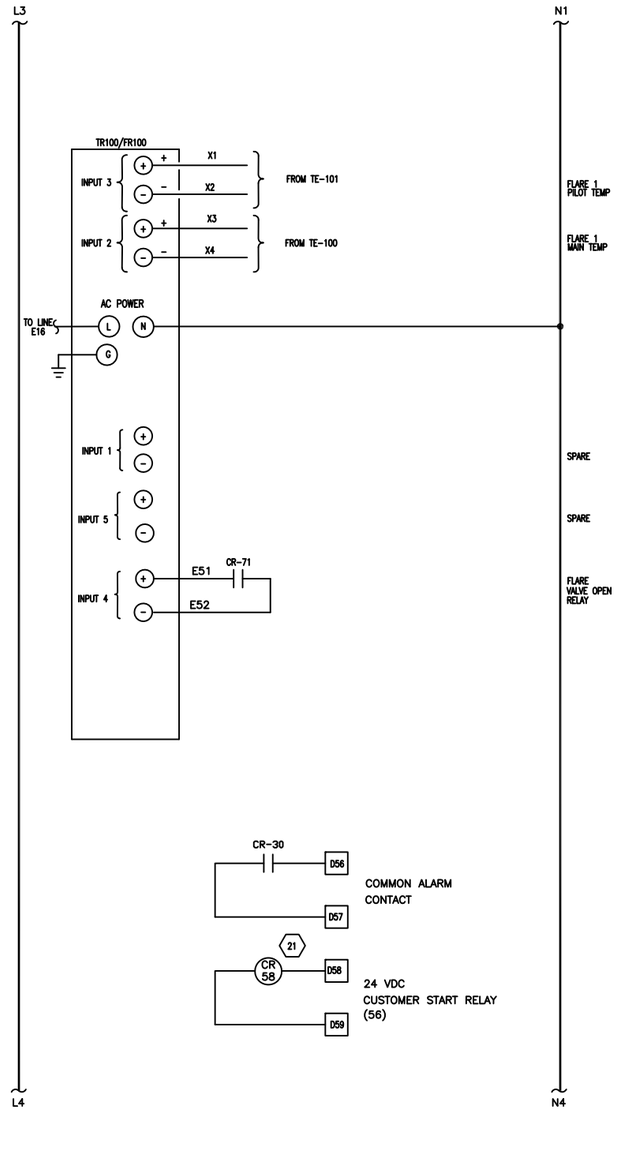
Parnel Biogas Inc
13701 S. HWY. 75, Glenpool, OK 74033
UTILITY FLARES · ENCLOSED FLARES · CONTROL SYSTEMS · LEACHATE INJECTION

TITLE: PANEL LAYOUT
PNL-101
CONTROL PANEL

SIZE: D — DWG NO.: RENTAL #1-700 — 0
SCALE: NONE — REL DATE — SHEET: 1 OF 1







LEGEND:

- PNL-101 TERMINAL
- PNL-102 TERMINAL
- WIRING BY PARNEL
- FIELD WIRING BY PARNEL
- ✱✱ DENOTES ITEMS SUPPLIED BY OTHERS, NOT PARNEL.

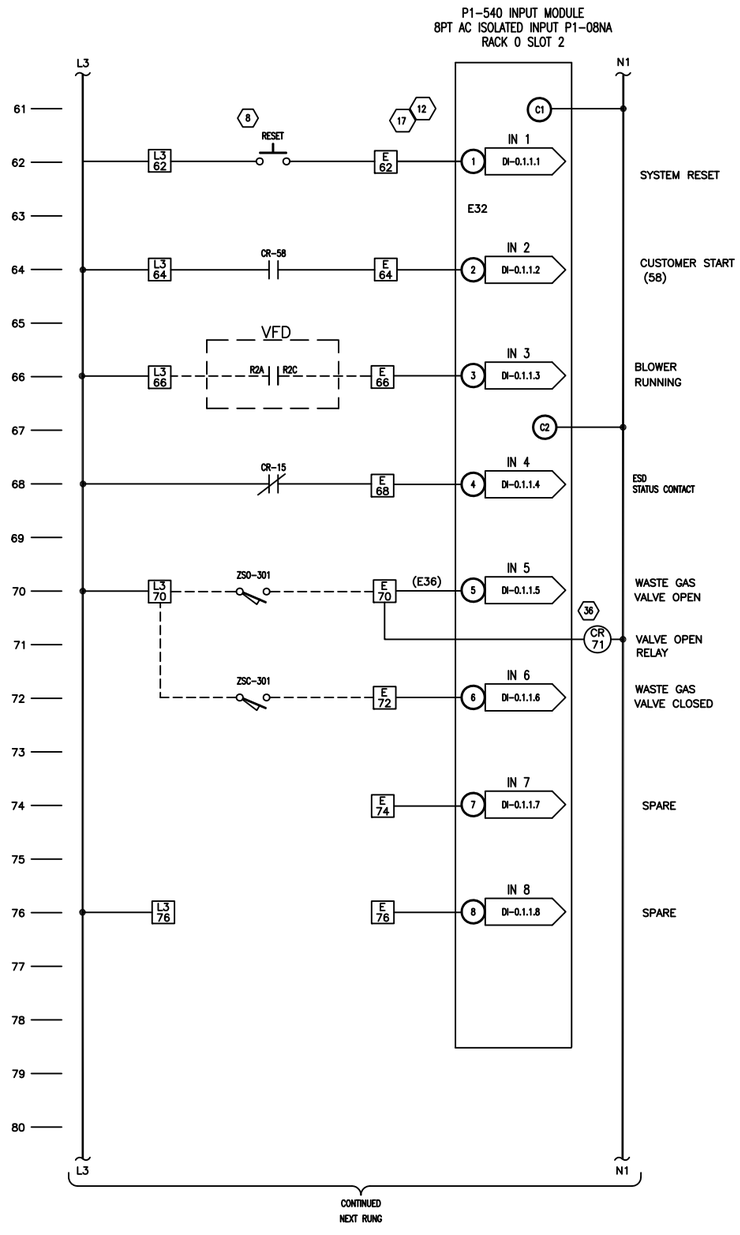
REV	DESCRIPTION	DATE	DR.	APP.
0				

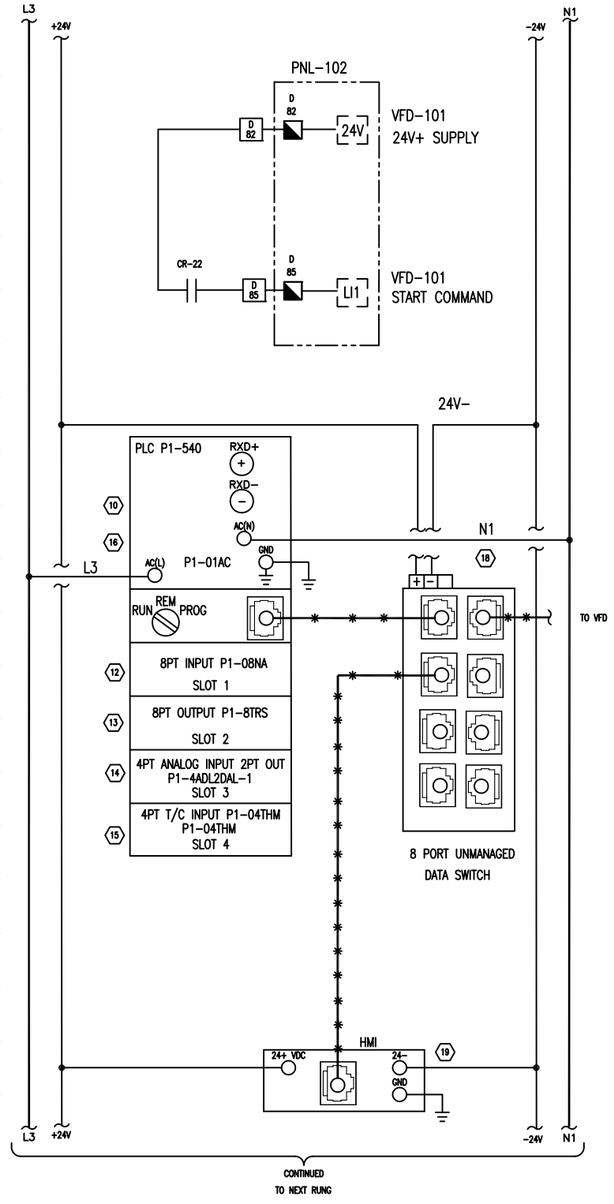
CUSTOMER: N/A
PO NO.: N/A
LOCATION:
USER: N/A
DRAWN: KDG — DATE: 5/16
DESIGN: CP — DATE: 5/16

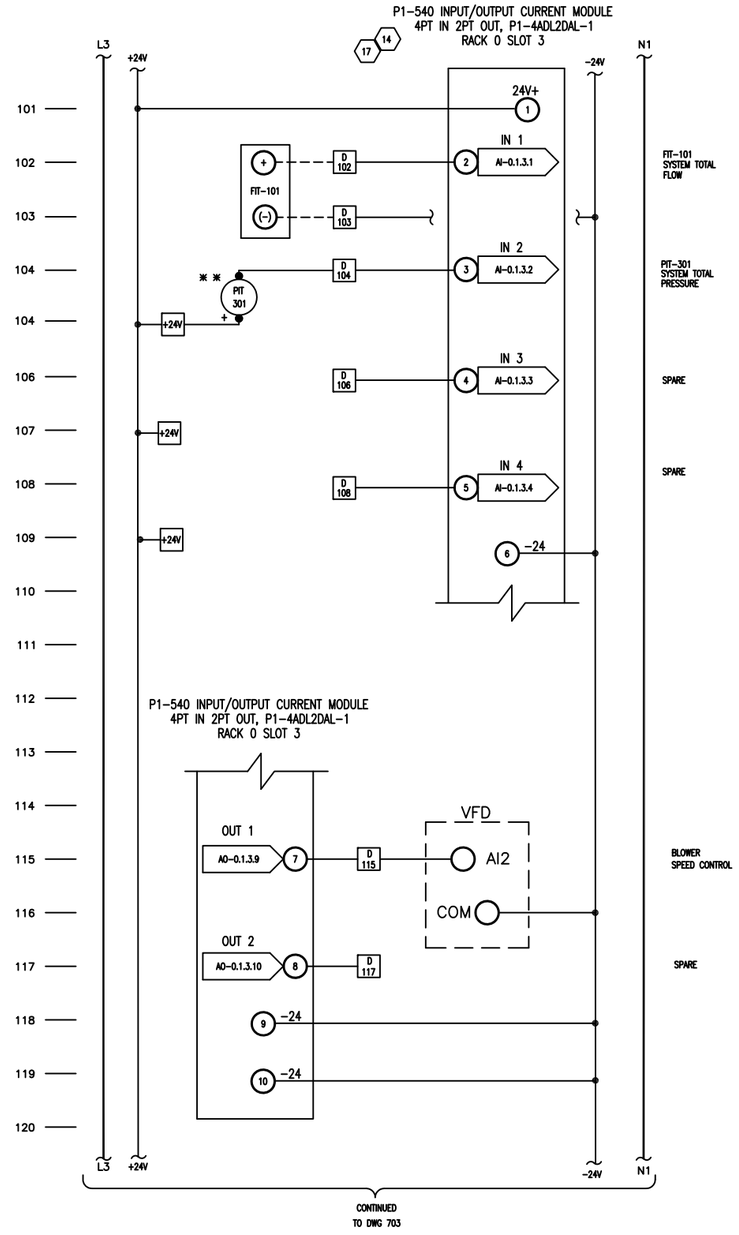
Parnel Biogas Inc
5868 S 129TH E. AVE, Tulsa, OK 74134
UTILITY FLARES · ENCLOSED FLARES · CONTROL SYSTEMS · LEACHATE INJECTION

TITLE: PNL-101 LADDER LOGIC

SIZE: D — DWG NO.: RENTAL #1-701 — 0
SCALE — REL DATE — SHEET 1 OF 1







LEGEND:

□ — CE-101 TERMINAL

——— WIRING BY PARNEL

- - - - FIELD WIRING BY PARNEL

** DENOTES ITEMS SUPPLIED BY OTHERS, NOT PARNEL

NOTES:

1.
2. AC WIRING FOR 480VAC AND LOWER SHALL BE YELLOW 600 VOLT INSULATION, TYPE THWN/THHN, 14 AWG MINIMUM.
3. DC WIRING FOR 24 VDC AND LOWER SHALL BE BLUE 600 VOLT INSULATION, -24 VDC COMMON SHALL BE BLUE/WHITE 600 VOLT INSULATION, TYPE THWN/THHN, 14 AWG MINIMUM.

REV	DESCRIPTION	DATE	DR.	APP.

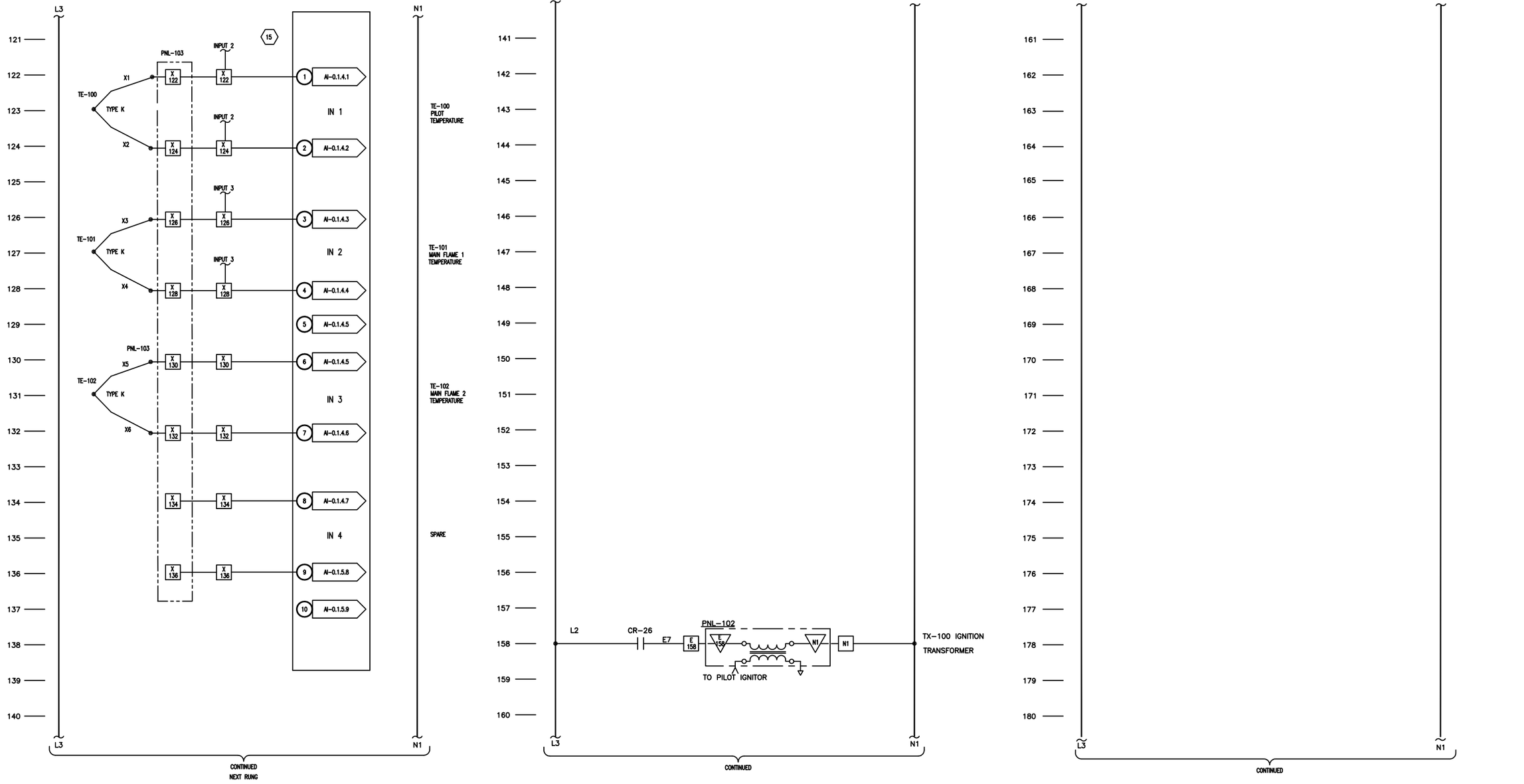
CUSTOMER: N/A
PO NO.: N/A
LOCATION: N/A
USER: N/A
DRAWN: CG — DATE: 5/21
DESIGN: KDG — DATE: 5/21

Parnel Biogas Inc
13701 S HWY 75 GLENPOOL, OK 74033
UTILITY FLARES ENCLOSED FLARES
CONTROL SYSTEMS LEACHATE INJECTION

TITLE
CE-101
ELECTRICAL SCHEMATIC

SIZE: D — DWG NO.: RENTAL #1-702
SCALE — REL DATE — SHEET 1 OF 1

P1-540 T/C INPUT MODULE
4PT T/C IN P1-04THM
RACK 0 SLOT 4



LEGEND:

- CE-101 TERMINAL
- PNL-102 TERMINAL
- WIRING BY PARNEL
- FIELD WIRING BY PARNEL
- ** DENOTES ITEMS SUPPLIED BY OTHERS, NOT PARNEL.

NOTES:

1. Panel to be built per 508A,
2. AC WIRING FOR 480VAC AND LOWER SHALL BE YELLOW 600 VOLT INSULATION, TYPE THWN/THHN, 14 AWG MINIMUM.
3. DC WIRING FOR 24 VDC AND LOWER SHALL BE BLUE 600 VOLT INSULATION, TYPE THWN/THHN, 14 AWG MINIMUM.

REV	DESCRIPTION	DATE	DR.	APP.
0	ISSUED FOR CONSTRUCTION	7/19/21	CR	TW

CUSTOMER: N/A
PO NO.: N/A
LOCATION: N/A
USER: N/A
DRAWN: CG — DATE: 5/21
DESIGN: KDG — DATE: 5/21

Parnel Biogas Inc
13701 S HWY 75 GLENPOOL, OK 74033
UTILITY FLARES ENCLOSED FLARES
CONTROL SYSTEMS LEACHATE INJECTION

TITLE
CE-101 ELECTRICAL SCHEMATIC

SIZE: D — DWG NO.: RENTAL #1-703 — 0
SCALE — REL DATE — SHEET 1 OF 1

480V/60Hz/3ø SUPPLY POWER (BY OTHERS)

A B C

** BRANCH CIRCUIT PROTECTOR TO BE PROVIDED BY INSTALLER

DISCONNECT

200 AMP 480V/60Hz/3ø

2/0

#12

#12

A B C

MSCB-4A 20 AMP

13

AMP LOAD: 15.6

12 AWG H1

H3

H2

12 AWG H4

8 AWG X1

8 AWG X3

X2

X4

TX-101
CONTROL TRANSFORMER and HEAT TRACE
480V PRIMARY 120V SECONDARY
5.0 KVA

#8

#8

37

L1

N1

120VAC/60Hz/1ø TO PNL-101 DWG 701 LINE1

7

120 VAC AIR CONDITIONER

N1 L1 G

#14

#14

CB-104 15 AMP 14

5 DISTRIBUTION BLOCK

#3 #3 #3

A B C

CB-101 150 AMP 3

#3 #3 #3

CR-22

8 LINE REACTOR

#3 #3 #3

L3 66 | E 66 | – 24V | D 115 | D 85 | D 82

R2A R2C C AUX | COM | AI2 | LI1 | 24V

L1 L2 L3

I/O BOARD

T1 T2 T3

#3 #3 #3

VFD-101
60 HP
480 VAC

60. HP

BL-1
WASTE GAS BLOWER MOTOR
52 AMP

LEGEND:

□ — PNL-101 TERMINAL

▽ — PNL-102 TERMINAL

REV	DESCRIPTION	DATE	DR.	APP.
0				

CUSTOMER

PO NO.

LOCATION

USER

DRAWN DATE

DESIGN DATE

Parnel Biogas Inc
5868 S 129TH E. AVE Tulsa, OK 74134
UTILITY FLARES ENCLOSED FLARES
CONTROL SYSTEMS LEACHATE INJECTION

TITLE
PNL-102
VFD PANEL

SIZE D | DWG NO. RENTAL#1-704 | 0

SCALE | REL DATE | SHEET 1 OF 1

PANEL INTERCONNECTIONS

PNL-102

CE-101

T.B.

T.B.

T.B. L1 N1 — #8 AWG #8 AWG (FROM TX-101)

NEMA 4 ENCLOSURE

MANUFACTURER: PARNEL BIOGAS, INC.
MAXIMUM VOLTAGE: 480VAC 3 PHASE, 60 HZ
TOTAL FULL LOAD AMPS: 200 AMPS
SHORT CIRCUIT RATING: 10KAIC
LARGEST MOTOR FLA: 77 AMPS
FIELD WIRING DIAGRAM: RENTAL FLARE-1

TRANSFORMER TX-101 — L1 N1 #8 #8 — 120 VAC TO CE-101

MSCB-4A — A C — #14 #14

MTS-101 480 VAC — #3/0 #3/0 #3/0 — DIST. BLOCK

BL-101 — #3 #3 #3 — T1 T2 T3 — VFD 1 — #3 #3 #3 — MSCB 101 — A B C — #3 #3 #3

T.B. +24V +24V L3 L3 N1 N1 -24V -24V D 283 D 287 — T.B. +24V +24V L3 L3 N1 N1 -24V -24V D 283 D 287

D 102 D 103 L2 14 N1 14 G — + − L1 L2 G — FT-101 FLOWMETER

E 28 N1 28 E 70 E 72 L3 70 — E 28 N1 28 E 49 L3 70 E 72 L4 70 — SV-102 ZSO-102 ZSC-102 — FV-102

VFD-101

VFD START COMMAND	+24V LI1	D 82 D 85	D 82 D 85
VFD AUX CONTACT	R2C R2A	E 66 L3 66	E 66 L3 66
VFD CONTROL LOOP	COM AI2	-24V D 115	-24V D 115

PNL-103

TX-100

E 158 N1 158 — IGNITION XFMR — IGNITION CABLE — PILOT IGNITOR

FLAME ARRESTOR T/C

X 130 X 132 X 126 X 128 X 122 X 124 — X 130 X 132 X 126 X 128 X 122 X 124 — + − + − + − — TE-102 TE-101 TE-100 — MAIN 1 T/C MAIN 2 T/C PILOT T/C

PT-100 — + − — 2 COND SHLD — 24V+ D 104

E 24 N1 24 — E 24 N1 24 — YEL BLK — SV-100 — PILOT GAS SOLENOID VALVE

LEGEND:

- □ — CE-101 TERMINAL
- △ — PNL-102 TERMINAL
- ▽ — PNL-103 TERMINAL
- ⬡ — DENOTES ITEM NUMBER OF PANEL BILL OF MATERIAL
- 4. - - - - - - - - ELECTRICAL SIGNAL
- 1. ✱✱ DENOTES ITEMS SUPPLIED BY OTHERS, NOT PARNEL.

1. PANEL TO BE BUILT PER UL 508A.
2. AC WIRING FOR 120VAC AND LOWER SHALL BE YELLOW 600 VOLT INSULATION, TYPE THWN/THHN, 16 AWG MINIMUM.
3. DC WIRING FOR 24 VDC AND LOWER SHALL BE BLUE 600 VOLT INSULATION, -24 VDC COMMON SHALL BE BLUE/WHITE 600 VOLT INSULATION, TYPE THWN/THHN, 16 AWG MINIMUM.

REV	DESCRIPTION	DATE	DR.	APP.

CUSTOMER: RENTAL-1
PO NO.:
LOCATION:
USER:

Parnel Biogas Inc
13701 S. HWY. 75 Glenpool, OK 74033
UTILITY FLARES ENCLOSED FLARES
CONTROL SYSTEMS LEACHATE INJECTION

TITLE: ELECTRICAL SCHEMATIC INTERCONNECT FLARE CONTROLS

DRAWN: CR DATE: 7/21
DESIGN: KDG DATE: 7/21
SIZE: D DWG NO.: RENTAL #1-705 0
SCALE: NONE REL DATE: SHEET: 1 OF 1

Attachment G
Sulfur and Volatile Organics Sampling Laboratory Reports

Atmospheric Analysis & Consulting, Inc

CLIENT	: SCS Engineers
PROJECT NAME	: H2S Sampling and Analysis
PROJECT NO.	: 04223001.20
AAC PROJECT NO.	: 231087
REPORT DATE	: 06/08/2023

On June 7th 2023, Atmospheric Analysis & Consulting, Inc. received four (4) Six-Liter Summa Canisters for Fixed Gases analysis by EPA 3C and Reduced Sulfur analysis by ASTM D-5504. Upon receipt, the samples were assigned unique Laboratory ID numbers as follows:

Client ID	Lab No.	Return Pressure (mmHg)
Sample 1- MP-1H2S Inlet	231087-45273	563.1
Sample 2- MP-1 Backup	231087-45274	442.2
Sample 3- MP-3 H2S Outlet	231087-45275	514.6
Sample 4-MP-3 Backup	231087-45276	523.2

This analysis is performed in accordance with AAC's Quality Manual. Test results apply to the sample(s) as received. For detailed information pertaining to specific EPA, NCASI, ASTM and SCAQMD accreditations (Methods & Analytes), please visit our website at www.aaclab.com.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. As per client request, all backup samples were placed on hold. No problems were encountered during receiving, preparation, and/or analysis of these samples. The Technical Director or his/her designee, as verified by the following signature, has authorized release of the data.

If you have any questions or require further explanation of data results, please contact the undersigned.

Sucha Parmar, Ph.D.
Technical Director

This report consists of 5 pages.

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

Laboratory Analysis Report

CLIENT : SCS Engineers
PROJECT NO. : 231087
MATRIX : AIR

SAMPLING DATE : 06/06/2023
RECEIVING DATE : 06/07/2023
ANALYSIS DATE : 06/07/2023
REPORT DATE : 06/08/2023

EPA 3C

Client ID	Sample 1- MP-1H2S Inlet	Sample 3- MP-3 H2S Outlet
AAC ID	231087-45273	231087-45275
Can Dilution Factor	2.72	2.99
Analyte	Result	Result
H_2	< 2.7 %	< 3.0 %
O_2	1.2 %	1.0 %
N_2	15.1 %	14.6 %
CO	< 0.3 %	< 0.3 %
CO_2	36.5 %	36.9 %
CH_4	47.1 %	47.5 %

All fixed gases have been normalized to 100% on a dry basis

Sample Reporting Limit (SRL) is equal to Reporting Limit x Analysis Dil. Fac x Canister Dil. Fac

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

Atmospheric Analysis & Consulting, Inc

LABORATORY ANALYSIS REPORT

CLIENT : SCS Engineers
PROJECT NO. : 231087
MATRIX : AIR
UNITS : ppmv

SAMPLING DATE : 06/06/2023
RECEIVING DATE : 06/07/2023
ANALYSIS DATE : 06/08/2023
REPORT DATE : 06/08/2023

Total Reduced Sulfur Compounds by ASTM D-5504

Client ID	Sample 1- MP-1H2S Inlet	Sample 3- MP-3 H2S Outlet
AAC ID	**231087-45273**	**231087-45275**
Canister Dil. Fac.	**2.7**	**3.0**
Analyte	**Result**	**Result**
Hydrogen Sulfide	**1885**	**282**
COS / SO2	**1.28**	**2.04**
Methyl Mercaptan	**11.0**	**3.19**
Ethyl Mercaptan	**0.575**	< 0.149
Dimethyl Sulfide	**8.46**	**8.57**
Carbon Disulfide	**0.335**	**0.289**
Isopropyl Mercaptan	**3.84**	< 0.149
tert-Butyl Mercaptan	**0.764**	< 0.149
n-Propyl Mercaptan	< 0.136	< 0.149
Methylethylsulfide	< 0.136	< 0.149
sec-Butyl Mercaptan / Thiophene	**3.70**	< 0.149
iso-Butyl Mercaptan	**0.544**	< 0.149
Diethyl Sulfide	< 0.136	< 0.149
n-Butyl Mercaptan	< 0.136	< 0.149
Dimethyl Disulfide	< 0.136	< 0.149
2-Methylthiophene	**0.670**	< 0.149
3-Methylthiophene	< 0.136	< 0.149
Tetrahydrothiophene	< 0.136	< 0.149
Bromothiophene	< 0.136	< 0.149
Thiophenol	< 0.136	< 0.149
Diethyl Disulfide	< 0.136	< 0.149
Total Unidentified Sulfur	< 0.136	**1.40**
Total Reduced Sulfurs	**1915**	**295**

All unidentified compound's concentrations expressed in terms of H_2S
Sample Reporting Limit (SRL) is equal to Reporting Limit x Canister Dil. Fac. x Analysis Dil. Fac.

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

Date Analyzed : 06/07/2023
Analyst : RW/KM
Units : %

Instrument ID : TCD #1
Calb Date : 08/22/22
Reporting Limit : 0.1%

I - Opening Continuing Calibration Verification - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
CCV	Spike Conc	10.0	10.2	20.2	10.0	10.0	10.0
	Result	9.6	10.4	22.7	9.9	8.9	9.8
	% Rec *	96.1	102.0	112.0	99.0	89.2	97.8

II - Method Blank - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
MB	Concentration	ND	ND	ND	ND	ND	ND

III - Laboratory Control Spike & Duplicate - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
Lab Control Standards	Sample Conc	0.0	0.0	0.0	0.0	0.0	0.0
	Spike Conc	10.0	10.2	20.2	10.0	10.0	10.0
	LCS Result	10.0	10.3	22.6	10.2	9.1	10.0
	LCSD Result	9.7	10.3	22.7	10.0	9.2	10.0
	LCS % Rec *	99.9	101.3	111.6	101.8	91.5	100.1
	LCSD % Rec *	97.0	101.6	111.9	100.3	92.4	99.5
	% RPD ***	2.9	0.3	0.3	1.5	0.9	0.6

IV -Sample & Sample Duplicate - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
230997-44790	Sample	0.0	0.0	1.6	92.5	0.0	1.0
	Sample Dup	0.0	0.0	1.5	92.3	0.0	0.9
	Mean	0.0	0.0	1.6	92.4	0.0	0.9
	% RPD ***	0.0	0.0	8.0	0.2	0.0	1.7

V - Matrix Spike & Duplicate- EPA 3C

AAC ID	Analyte	H_2	N_2	CH_4	CO	CO_2
230997-44790	Sample Conc	0.0	0.8	46.2	0.0	0.5
	Spike Conc	10.0	10.0	10.0	10.0	10.0
	MS Result	9.9	11.3	57.0	9.3	10.6
	MSD Result	10.1	11.6	56.5	9.2	10.7
	MS % Rec **	99.5	105.2	108.2	93.4	101.4
	MSD % Rec **	101.1	107.7	103.1	92.3	102.5
	% RPD ***	1.6	2.3	4.8	1.1	1.0

VI - Closing Continuing Calibration Verification - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
CCV	Spike Conc	10.0	10.2	20.2	10.0	10.0	10.0
	Result	9.7	9.7	20.9	10.1	8.9	10.1
	% Rec *	97.3	95.7	103.4	100.9	89.6	100.3

** Must be 85-115%*

*** Must be 75-125%*

**** Must be < 25%*

ND = Not Detected

<RL = less than Reporting Limit

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231087

CHAIN OF CUSTODY AND ANALYSIS REQUEST – Chain of Custody is a LEGAL DOCUMENT. Complete all relevant fields.

Atmospheric Analysis and Consulting · Phone: 805-650-1642 · Email: info@aaclab.com · 2225 Sperry Ave, Ventura, CA 93003

AAC Project No.:

Client/Company Name
LRI Facility

Project Name
H2S Sampling and Analysis

Project Number
04223001.20

Project Manager Name
Karamjit Singh

Send Report To (Name/Email/Address)
Karamjit Singh
KSingh@Scsengineers.com

Turnaround Time
X Rush 24 h ☐ Same Day
☐ Rush 48 h ☐ 5 Days
☐ Rush 72 h Normal

Sampler Name
Print: John Faille
Signature:

Send Invoice To (Name/Email/Address)
Karamjit Singh
KSingh@Scsengineers.com
PO Number

	Client Sample Name	Sample ID	Sampling Date	Sampling Time	Container Type/Qty	ASTM D-5504 (Include TRS)	EPA TO 15	EPA 3C			Lab ID
273	Sample 1 – MP-1 H2S Inlet	000719	6/6/23	08:00		X	X	X			
274	Sample 2 – MP-1 Backup	000676	6/6/23	08:00							
275	Sample 3 – MP-3 H2S Outlet	001911	6/6/23	08:00		X	X	X			
276	Sample 4 – MP-3 Backup	000360	6/6/23	08:00							

Analysis Requested

LAB USE ONLY

Sample Received via:
☐FedEx
☐UPS
☐Courier
☐Other_____

Temperature
_____°C
Thermometer ID _____
Initials _____

Returned Eqmt
Total cans: _____
Unused cans: _____
Flow Controllers: _____

Client Notes/Special Instructions: Please test only Sample 1 – MP-1 H2S Inlet and Sample 3 – MP-3 H2S Outlet unless there are issues with the samples (no residual vacuum for example). If issue with primary sample please test the corresponding backup instead.

EDD?
☐Yes
☐No

LAB USE ONLY
Notes:

Relinquished By Print: John Faille Signature: John T. Faille	Date 6/6/23 Time 1200	**Received By** Print: Zachary Smith Signature:	Date 6/7/23 Time 1454	
Relinquished By Print: Signature:	Date Time	**Received By** Print: Signature:	Date Time	

AAC COC Rev 3

6 x 1.4L cans + 1 x 3-way manifold (Removed)

Issued 02/04/2021

F+

Atmospheric Analysis & Consulting, Inc.

CLIENT	: SCS Engineers
PROJECT NAME	: LRI Facility
PROJECT NO.	: 04223001.20
AAC PROJECT NO.	: 231087
REPORT DATE	: 06/08/2023

On June 7, 2023, Atmospheric Analysis & Consulting, Inc. received four (4) 1.4-Liter Silonite Canisters for Volatile Organic Compounds analysis by EPA Method TO-15. Upon receipt, the samples were assigned unique Laboratory ID numbers as follows:

Client ID	Lab ID	Return Pressure (mmHga)
Sample 1—MP-1 H2S Inlet	231087-45273	563.1
Sample 2—MP-1 Backup	231087-45274	442.2
Sample 3—MP-3 H2S Outlet	231087-45275	514.6
Sample 4—MP-3 Backup	231087-45276	523.2

This analysis is accredited under the laboratory's ISO/IEC 17025:2017 accreditation issued by the ANSI National Accreditation Board. Refer to certificate and scope of accreditation AT-1908. Test results apply to the sample(s) as received. For detailed information pertaining to specific EPA, NCASI, ASTM and SCAQMD accreditations (Methods & Analytes), please visit our website at www.aaclab.com.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. No problems were encountered during receiving, preparation, and/or analysis of these samples.

The Technical Director or his designee, as verified by the following signature, has authorized release of the data contained in this hardcopy report.

If you have any questions or require further explanation of data results, please contact the undersigned.

Sucha Parmar, Ph.D.
Technical Director

This report consists of 8 pages.

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Laboratory Analysis Report

CLIENT : SCS Engineers
PROJECT NO : 231087
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 06/07/2023
DATE REPORTED : 06/08/2023
ANALYST : DL/CH

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	Sample 1—MP-1 H2S Inlet			Sample Reporting Limit (SRL)	Sample 3—MP-3 H2S Outlet			Sample Reporting Limit (SRL)	Method Reporting Limit (MRL)
AAC ID	231087-45273				231087-45275				
Date Sampled	06/06/2023				06/06/2023				
Date Analyzed	06/08/2023				06/08/2023				
Can Dilution Factor	2.72				2.99				
Compound	Result	Qualifier	Analysis DF	(MRLxDF's)	Result	Qualifier	Analysis DF	(MRLxDF's)	
Chlorodifluoromethane	<SRL	U	500	680	<SRL	U	500	747	0.50
Propene	16500		500	1360	17900		500	1490	1.00
Dichlorodifluoromethane	<SRL	U	500	680	<SRL	U	500	747	0.50
Chloromethane	<SRL	U	500	680	<SRL	U	500	747	0.50
Dichlorotetrafluoroethane	<SRL	U	500	680	<SRL	U	500	747	0.50
Vinyl Chloride	<SRL	U	500	680	<SRL	U	500	747	0.50
Methanol	19900		500	6800	17400		500	7470	5.00
1,3-Butadiene	<SRL	U	500	680	<SRL	U	500	747	0.50
Bromomethane	<SRL	U	500	680	<SRL	U	500	747	0.50
Chloroethane	<SRL	U	500	680	<SRL	U	500	747	0.50
Dichlorofluoromethane	<SRL	U	500	680	<SRL	U	500	747	0.50
Ethanol	57500		500	2720	44600		500	2990	2.00
Vinyl Bromide	<SRL	U	500	680	<SRL	U	500	747	0.50
Acetone	21700		500	2720	22500		500	2990	2.00
Trichlorofluoromethane	<SRL	U	500	680	<SRL	U	500	747	0.50
2-Propanol (IPA)	13100		500	2720	9340		500	2990	2.00
Acrylonitrile	<SRL	U	500	680	<SRL	U	500	747	0.50
1,1-Dichloroethene	<SRL	U	500	680	<SRL	U	500	747	0.50
Methylene Chloride (DCM)	<SRL	U	500	1360	<SRL	U	500	1490	1.00
Allyl Chloride	<SRL	U	500	1360	<SRL	U	500	1490	1.00
Carbon Disulfide	<SRL	U	500	2720	<SRL	U	500	2990	2.00
Trichlorotrifluoroethane	<SRL	U	500	680	<SRL	U	500	747	0.50
trans-1,2-Dichloroethene	<SRL	U	500	680	<SRL	U	500	747	0.50
1,1-Dichloroethane	<SRL	U	500	680	<SRL	U	500	747	0.50
Methyl Tert Butyl Ether (MTBE)	<SRL	U	500	680	<SRL	U	500	747	0.50
Vinyl Acetate	<SRL	U	500	1360	<SRL	U	500	1490	1.00
2-Butanone (MEK)	13900		500	1360	12000		500	1490	1.00
cis-1,2-Dichloroethene	<SRL	U	500	680	<SRL	U	500	747	0.50
Hexane	924		500	680	957		500	747	0.50
Chloroform	<SRL	U	500	680	<SRL	U	500	747	0.50
Ethyl Acetate	2220		500	680	2110		500	747	0.50
Tetrahydrofuran	4460		500	680	4400		500	747	0.50
1,2-Dichloroethane	<SRL	U	500	680	<SRL	U	500	747	0.50
1,1,1-Trichloroethane	<SRL	U	500	680	<SRL	U	500	747	0.50
Benzene	4970		500	680	3890		500	747	0.50

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Laboratory Analysis Report

CLIENT : SCS Engineers
PROJECT NO : 231087
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 06/07/2023
DATE REPORTED : 06/08/2023
ANALYST : DL/CH

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	Sample 1—MP-1 H2S Inlet			Sample Reporting Limit (SRL) (MRLxDF's)	Sample 3—MP-3 H2S Outlet			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	231087-45273				231087-45275				
Date Sampled	06/06/2023				06/06/2023				
Date Analyzed	06/08/2023				06/08/2023				
Can Dilution Factor	2.72				2.99				
Compound	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Carbon Tetrachloride	<SRL	U	500	680	<SRL	U	500	747	0.50
Cyclohexane	992		500	680	1060		500	747	0.50
1,2-Dichloropropane	<SRL	U	500	680	<SRL	U	500	747	0.50
Bromodichloromethane	<SRL	U	500	680	<SRL	U	500	747	0.50
1,4-Dioxane	<SRL	U	500	1360	<SRL	U	500	1490	1.00
Trichloroethene (TCE)	<SRL	U	500	680	<SRL	U	500	747	0.50
2,2,4-Trimethylpentane	<SRL	U	500	680	<SRL	U	500	747	0.50
Heptane	1660		500	680	1440		500	747	0.50
cis-1,3-Dichloropropene	<SRL	U	500	680	<SRL	U	500	747	0.50
4-Methyl-2-pentanone (MiBK)	1140		500	680	<SRL	U	500	747	0.50
trans-1,3-Dichloropropene	<SRL	U	500	680	<SRL	U	500	747	0.50
1,1,2-Trichloroethane	<SRL	U	500	680	<SRL	U	500	747	0.50
Toluene	9430		500	680	3870		500	747	0.50
2-Hexanone (MBK)	<SRL	U	500	1360	<SRL	U	500	1490	1.00
Dibromochloromethane	<SRL	U	500	680	<SRL	U	500	747	0.50
1,2-Dibromoethane	<SRL	U	500	680	<SRL	U	500	747	0.50
Tetrachloroethene (PCE)	<SRL	U	500	680	<SRL	U	500	747	0.50
Chlorobenzene	<SRL	U	500	680	<SRL	U	500	747	0.50
Ethylbenzene	3630		500	680	1480		500	747	0.50
m & p-Xylene	5980		500	1360	2360		500	1490	1.00
Bromoform	<SRL	U	500	680	<SRL	U	500	747	0.50
Styrene	<SRL	U	500	680	<SRL	U	500	747	0.50
1,1,2,2-Tetrachloroethane	<SRL	U	500	680	<SRL	U	500	747	0.50
o-Xylene	2090		500	680	882		500	747	0.50
4-Ethyltoluene	<SRL	U	500	680	<SRL	U	500	747	0.50
1,3,5-Trimethylbenzene	<SRL	U	500	680	<SRL	U	500	747	0.50
1,2,4-Trimethylbenzene	<SRL	U	500	680	<SRL	U	500	747	0.50
Benzyl Chloride (a-Chlorotoluene)	<SRL	U	500	680	<SRL	U	500	747	0.50
1,3-Dichlorobenzene	<SRL	U	500	680	<SRL	U	500	747	0.50
1,4-Dichlorobenzene	<SRL	U	500	680	<SRL	U	500	747	0.50
1,2-Dichlorobenzene	<SRL	U	500	680	<SRL	U	500	747	0.50
1,2,4-Trichlorobenzene	<SRL	U	500	680	<SRL	U	500	747	0.50
Hexachlorobutadiene	<SRL	U	500	680	<SRL	U	500	747	0.50
BFB-Surrogate Std. % Recovery		95%				95%			70-130%

U - Compound was not detected at or above the SRL.

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QUALITY CONTROL / QUALITY ASSURANCE REPORT

ANALYSIS DATE : 06/14/1902
MATRIX : High Purity N_2
UNITS : PPB (v/v)

INSTRUMENT ID : GC/MS-02
CALIBRATION STD ID : MS1-042023-02
ANALYST : DL

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Continuing Calibration Verification of the 10/17/1902 Calibration

Analyte Compounds	*Source*[1]	*CCV*[2]	*% Recovery*[3]
4-BFB (surrogate standard)	9.60	9.65	101
Chlorodifluoromethane	10.40	9.55	92
Propene	10.60	9.00	85
Dichlorodifluoromethane	10.40	10.39	100
Dimethyl Ether	10.20	9.42	92
Chloromethane	10.40	9.37	90
Dichlorotetrafluoroethane	10.30	10.13	98
Vinyl Chloride	10.50	9.95	95
Acetaldehyde	21.10	22.99	109
Methanol	18.80	16.10	86
1,3-Butadiene	10.60	9.53	90
Bromomethane	10.40	9.69	93
Chloroethane	10.30	9.07	88
Dichlorofluoromethane	10.20	9.59	94
Ethanol	11.20	9.64	86
Vinyl Bromide	10.10	9.35	93
Acrolein	11.10	9.33	84
Acetone	10.60	9.19	87
Trichlorofluoromethane	10.50	9.69	92
2-Propanol (IPA)	11.00	9.45	86
Acrylonitrile	11.20	9.36	84
1,1-Dichloroethene	10.40	9.38	90
Methylene Chloride (DCM)	10.50	9.47	90
TertButanol (TBA)	11.10	9.54	86
Allyl Chloride	10.20	9.28	91
Carbon Disulfide	10.50	9.40	90
Trichlorotrifluoroethane	10.40	9.35	90
trans-1,2-Dichloroethene	10.60	9.14	86
1,1-Dichloroethane	10.50	8.93	85
Methyl Tert Butyl Ether (MTBE)	10.50	7.84	75
Vinyl Acetate	11.00	8.93	81
2-Butanone (MEK)	10.60	8.26	78
cis-1,2-Dichloroethene	10.50	9.13	87
Hexane	10.70	8.57	80
Chloroform	10.60	9.21	87
Ethyl Acetate	10.60	8.58	81
Tetrahydrofuran	10.20	7.74	76
1,2-Dichloroethane	10.50	8.66	82
1,1,1-Trichloroethane	10.40	9.01	87
Benzene	10.60	9.52	90
Carbon Tetrachloride	10.20	9.41	92
Cyclohexane	10.50	8.98	86

Analyte Compounds (Continued)	*Source*[1]	*CCV*[2]	*% Recovery*[3]
1,2-Dichloropropane	10.50	9.31	89
Bromodichloromethane	10.40	9.59	92
1,4-Dioxane	10.40	9.34	90
Trichloroethene (TCE)	10.40	9.80	94
2,2,4-Trimethylpentane	10.00	8.98	90
Methyl Methacrylate	11.00	9.40	85
Heptane	10.50	8.92	85
cis-1,3-Dichloropropene	10.40	9.12	88
4-Methyl-2-pentanone (MiBK)	10.40	9.15	88
trans-1,3-Dichloropropene	10.50	9.12	87
1,1,2-Trichloroethane	10.50	9.55	91
Toluene	10.60	9.77	92
2-Hexanone (MBK)	10.50	9.37	89
Dibromochloromethane	10.30	9.86	96
1,2-Dibromoethane	10.60	9.69	91
Tetrachloroethene (PCE)	10.40	9.69	93
Chlorobenzene	10.60	10.25	97
Ethylbenzene	10.50	10.46	100
m & p-Xylene	21.00	21.18	101
Bromoform	10.50	10.83	103
Styrene	10.50	10.33	98
1,1,2,2-Tetrachloroethane	10.50	10.87	104
o-Xylene	10.50	10.58	101
1,2,3-Trichloropropane	11.00	10.57	96
Isopropylbenzene (Cumene)	10.30	10.45	101
α-Pinene	10.70	9.30	87
2-Chlorotoluene	10.30	9.91	96
n-Propylbenzene	10.10	10.29	102
4-Ethyltoluene	10.30	10.65	103
1,3,5-Trimethylbenzene	10.30	10.35	100
β-Pinene LR	11.00	7.15	65
1,2,4-Trimethylbenzene	10.30	10.47	102
Benzyl Chloride (a-Chlorotoluene)	10.40	9.67	93
1,3-Dichlorobenzene	10.40	10.90	105
1,4-Dichlorobenzene	10.30	10.41	101
Sec-ButylBenzene	10.10	10.30	102
1,2-Dichlorobenzene	10.60	10.76	102
n-ButylBenzene	10.20	10.24	100
1,2-Dibromo-3-Chloropropane	10.10	10.05	100
1,2,4-Trichlorobenzene	11.00	11.48	104
Naphthalene	11.50	11.83	103
Hexachlorobutadiene	11.00	10.46	95

[1] Concentration of analyte compound in certified source standard.

[2] Measured result from daily Continuing Calibration Verification (CCV).

[3] The acceptable range for analyte recovery is 100±30%.

LR - Recovery for this compound was low. Results should be considered estimated.

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QUALITY CONTROL / QUALITY ASSURANCE REPORT

ANALYSIS DATE : 06/14/1902
MATRIX : High Purity N_2
UNITS : PPB (v/v)

INSTRUMENT ID : GC/MS-02
CALIBRATION STD ID : MS1-042023-02
ANALYST : DL

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Laboratory Control Spike Analysis

System Monitoring Compounds	*Sample Concentration*	*Spike Added*	*LCS[1] Recovery*	*LCSD[1] Recovery*	*LCS[1] % Recovery[2]*	*LCSD[1] % Recovery[2]*	*RPD[3]*
4-BFB (surrogate standard)	0.0	9.60	9.65	9.43	101	98	2.3
1,1-Dichloroethene	0.0	10.40	9.38	9.44	90	91	0.6
Methylene Chloride (DCM)	0.0	10.50	9.47	9.33	90	89	1.5
Benzene	0.0	10.60	9.52	9.37	90	88	1.6
Trichloroethene (TCE)	0.0	10.40	9.80	9.56	94	92	2.5
Toluene	0.0	10.60	9.77	9.77	92	92	0.0
Tetrachloroethene (PCE)	0.0	10.40	9.69	9.59	93	92	1.0
Chlorobenzene	0.0	10.60	10.25	10.18	97	96	0.7
Ethylbenzene	0.0	10.50	10.46	9.81	100	93	6.4
m & p-Xylene	0.0	21.00	21.18	20.22	101	96	4.6
o-Xylene	0.0	10.50	10.58	10.38	101	99	1.9

[1] Laboratory Control Spike (LCS) / Laboratory Control Spike Duplicate (LCSD)

[2] The acceptable range for analyte recovery is 100±30%.

[3] Relative Percent Difference (RPD) between LCS recovery and LCSD recovery (acceptable range is <25%).

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QUALITY CONTROL / QUALITY ASSURANCE REPORT

ANALYSIS DATE : 06/14/1902 | **INSTRUMENT ID : GC/MS-02**

MATRIX : High Purity He or N_2 | **ANALYST : DL**

UNITS : PPB (v/v)

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Method Blank Analysis

Analyte Compounds	*MB 061402*	*Reporting Limit (RL)*
4-BFB (surrogate standard)	89%	100±30%
Chlorodifluoromethane	<RL	0.5
Propene	<RL	1.0
Dichlorodifluoromethane	<RL	0.5
Dimethyl Ether	<RL	1.0
Chloromethane	<RL	0.5
Dichlorotetrafluoroethane	<RL	0.5
Vinyl Chloride	<RL	0.5
Acetaldehyde	<RL	5.0
Methanol	<RL	5.0
1,3-Butadiene	<RL	0.5
Bromomethane	<RL	0.5
Chloroethane	<RL	0.5
Dichlorofluoromethane	<RL	0.5
Ethanol	<RL	2.0
Vinyl Bromide	<RL	0.5
Acrolein	<RL	1.0
Acetone	<RL	2.0
Trichlorofluoromethane	<RL	0.5
2-Propanol (IPA)	<RL	2.0
Acrylonitrile	<RL	0.5
1,1-Dichloroethene	<RL	0.5
Methylene Chloride (DCM)	<RL	1.0
TertButanol (TBA)	<RL	0.5
Allyl Chloride	<RL	1.0
Carbon Disulfide	<RL	2.0
Trichlorotrifluoroethane	<RL	0.5
trans-1,2-Dichloroethene	<RL	0.5
1,1-Dichloroethane	<RL	0.5
Methyl Tert Butyl Ether (MTBE)	<RL	0.5
Vinyl Acetate	<RL	1.0
2-Butanone (MEK)	<RL	1.0
cis-1,2-Dichloroethene	<RL	0.5
Hexane	<RL	0.5
Chloroform	<RL	0.5
Ethyl Acetate	<RL	0.5
Tetrahydrofuran	<RL	0.5
1,2-Dichloroethane	<RL	0.5
1,1,1-Trichloroethane	<RL	0.5
Benzene	<RL	0.5
Carbon Tetrachloride	<RL	0.5
Cyclohexane	<RL	0.5

Analyte Compounds (Continued)	*MB 061402*	*Reporting Limit (RL)*
1,2-Dichloropropane	<RL	0.5
Bromodichloromethane	<RL	0.5
1,4-Dioxane	<RL	1.0
Trichloroethene (TCE)	<RL	0.5
2,2,4-Trimethylpentane	<RL	0.5
Methyl Methacrylate	<RL	0.5
Heptane	<RL	0.5
cis-1,3-Dichloropropene	<RL	0.5
4-Methyl-2-pentanone (MiBK)	<RL	0.5
trans-1,3-Dichloropropene	<RL	0.5
1,1,2-Trichloroethane	<RL	0.5
Toluene	<RL	0.5
2-Hexanone (MBK)	<RL	1.0
Dibromochloromethane	<RL	0.5
1,2-Dibromoethane	<RL	0.5
Tetrachloroethene (PCE)	<RL	0.5
Chlorobenzene	<RL	0.5
Ethylbenzene	<RL	0.5
m & p-Xylene	<RL	1.0
Bromoform	<RL	0.5
Styrene	<RL	0.5
1,1,2,2-Tetrachloroethane	<RL	0.5
o-Xylene	<RL	0.5
1,2,3-Trichloropropane	<RL	0.5
Isopropylbenzene (Cumene)	<RL	0.5
α-Pinene	<RL	1.0
2-Chlorotoluene	<RL	0.5
n-Propylbenzene	<RL	0.5
4-Ethyltoluene	<RL	0.5
1,3,5-Trimethylbenzene	<RL	0.5
β-Pinene	<RL	2.0
1,2,4-Trimethylbenzene	<RL	0.5
Benzyl Chloride (a-Chlorotoluene)	<RL	0.5
1,3-Dichlorobenzene	<RL	0.5
1,4-Dichlorobenzene	<RL	0.5
Sec-ButylBenzene	<RL	0.5
1,2-Dichlorobenzene	<RL	0.5
n-ButylBenzene	<RL	0.5
1,2-Dibromo-3-Chloropropane	<RL	0.5
1,2,4-Trichlorobenzene	<RL	0.5
Naphthalene	<RL	0.5
Hexachlorobutadiene	<RL	0.5

QUALITY CONTROL / QUALITY ASSURANCE REPORT

ANALYSIS DATE : 06/14/1902
MATRIX : Air
UNITS : PPB (v/v)

INSTRUMENT ID : GC/MS-02
ANALYST : DL
DILUTION FACTOR[1] : x5.7

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Duplicate Analysis of AAC Sample ID: 231013-44921

Analyte Compounds	*Sample*	*Duplicate*	*RPD[2]*
4-BFB (surrogate standard)	9.25	9.31	0.6
Chlorodifluoromethane	<SRL	<SRL	*NA*
Propene	185	178	4.0
Dichlorodifluoromethane	<SRL	<SRL	*NA*
Dimethyl Ether	<SRL	<SRL	*NA*
Chloromethane	<SRL	<SRL	*NA*
Dichlorotetrafluoroethane	<SRL	<SRL	*NA*
Vinyl Chloride	<SRL	<SRL	*NA*
Acetaldehyde	<SRL	<SRL	*NA*
Methanol	<SRL	<SRL	*NA*
1,3-Butadiene	<SRL	<SRL	*NA*
Bromomethane	<SRL	<SRL	*NA*
Chloroethane	<SRL	<SRL	*NA*
Dichlorofluoromethane	<SRL	<SRL	*NA*
Ethanol	54.6	54.1	0.9
Vinyl Bromide	<SRL	<SRL	*NA*
Acrolein	<SRL	<SRL	*NA*
Acetone	91.9	91.6	0.4
Trichlorofluoromethane	<SRL	<SRL	*NA*
2-Propanol (IPA)	<SRL	<SRL	*NA*
Acrylonitrile	<SRL	<SRL	*NA*
1,1-Dichloroethene	<SRL	<SRL	*NA*
Methylene Chloride (DCM)	10.8	11.2	4.1
TertButanol (TBA)	<SRL	<SRL	*NA*
Allyl Chloride	<SRL	<SRL	*NA*
Carbon Disulfide	13.0	12.1	6.8
Trichlorotrifluoroethane	<SRL	<SRL	*NA*
trans-1,2-Dichloroethene	<SRL	<SRL	*NA*
1,1-Dichloroethane	<SRL	<SRL	*NA*
Methyl Tert Butyl Ether (MTBE)	<SRL	<SRL	*NA*
Vinyl Acetate	<SRL	<SRL	*NA*
2-Butanone (MEK)	<SRL	<SRL	*NA*
cis-1,2-Dichloroethene	349	346	1.0
Hexane	<SRL	<SRL	*NA*
Chloroform	<SRL	<SRL	*NA*
Ethyl Acetate	<SRL	<SRL	*NA*
Tetrahydrofuran	<SRL	<SRL	*NA*
1,2-Dichloroethane	<SRL	<SRL	*NA*
1,1,1-Trichloroethane	<SRL	<SRL	*NA*
Benzene	<SRL	<SRL	*NA*
Carbon Tetrachloride	<SRL	<SRL	*NA*
Cyclohexane	<SRL	<SRL	*NA*

Analyte Compounds (Continued)	*Sample*	*Duplicate*	*RPD[2]*
1,2-Dichloropropane	<SRL	<SRL	*NA*
Bromodichloromethane	<SRL	<SRL	*NA*
1,4-Dioxane	<SRL	<SRL	*NA*
Trichloroethene (TCE) J	2.96	2.79	5.9
2,2,4-Trimethylpentane	<SRL	<SRL	*NA*
Methyl Methacrylate	<SRL	<SRL	*NA*
Heptane	<SRL	<SRL	*NA*
cis-1,3-Dichloropropene	<SRL	<SRL	*NA*
4-Methyl-2-pentanone (MiBK)	<SRL	<SRL	*NA*
trans-1,3-Dichloropropene	<SRL	<SRL	*NA*
1,1,2-Trichloroethane	<SRL	<SRL	*NA*
Toluene	10.4	9.57	8.5
2-Hexanone (MBK)	<SRL	<SRL	*NA*
Dibromochloromethane	<SRL	<SRL	*NA*
1,2-Dibromoethane	<SRL	<SRL	*NA*
Tetrachloroethene (PCE)	<SRL	<SRL	*NA*
Chlorobenzene	<SRL	<SRL	*NA*
Ethylbenzene	<SRL	<SRL	*NA*
m & p-Xylene	<SRL	<SRL	*NA*
Bromoform	<SRL	<SRL	*NA*
Styrene	<SRL	<SRL	*NA*
1,1,2,2-Tetrachloroethane	<SRL	<SRL	*NA*
o-Xylene	<SRL	<SRL	*NA*
1,2,3-Trichloropropane	<SRL	<SRL	*NA*
Isopropylbenzene (Cumene)	<SRL	<SRL	*NA*
α-Pinene	3.02	3.53	15.7
2-Chlorotoluene	<SRL	<SRL	*NA*
n-Propylbenzene	<SRL	<SRL	*NA*
4-Ethyltoluene	<SRL	<SRL	*NA*
1,3,5-Trimethylbenzene	<SRL	<SRL	*NA*
β-Pinene J	3.59	4.05	11.9
1,2,4-Trimethylbenzene	<SRL	<SRL	*NA*
Benzyl Chloride (a-Chlorotoluene)	<SRL	<SRL	*NA*
1,3-Dichlorobenzene	<SRL	<SRL	*NA*
1,4-Dichlorobenzene	<SRL	<SRL	*NA*
Sec-ButylBenzene	<SRL	<SRL	*NA*
1,2-Dichlorobenzene	<SRL	<SRL	*NA*
n-ButylBenzene	<SRL	<SRL	*NA*
1,2-Dibromo-3-Chloropropane	<SRL	<SRL	*NA*
1,2,4-Trichlorobenzene	<SRL	<SRL	*NA*
Naphthalene	<SRL	<SRL	*NA*
Hexachlorobutadiene	<SRL	<SRL	*NA*

[1] Dilution factor is the product of the Canister Dilution Factor and the Analysis Dilution Factor.

[2] Relative Percent Difference (RPD) between Sample analysis and Duplicate analysis (acceptable range is <25%).

SRL - Sample Reporting Limit (minimum)

J - Estimated value between the detection limit and the minimum reporting limit, shown for duplication purposes only.

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AAC Project No.:

Client/Company Name
LRI Facility

Project Name
H2S Sampling and Analysis

Project Number
04223001.20

Project Manager Name
Karamjit Singh

Send Report To (Name/Email/Address)
Karamjit Singh
KSingh@Scsengineers.com

Turnaround Time
X Rush 24 h ☐ Same Day
☐ Rush 48 h ☐ 5 Days
☐ Rush 72 h Normal

Sampler Name
Print: John Faille
Signature:

Send Invoice To (Name/Email/Address)
Karamjit Singh
KSingh@Scsengineers.com
PO Number

Analysis Requested

	Client Sample Name	Sample ID	Sampling Date	Sampling Time	Container Type/Qty	ASTM D-5504 (Include TRS)	EPA TO 15	EPA 3C			Lab ID
5273	Sample 1 – MP-1 H2S Inlet	000719	6/6/23	08:00		X	X	X			
5274	Sample 2 – MP-1 Backup	000676	6/6/23	08:00							
5275	Sample 3 – MP-3 H2S Outlet	001511	6/6/23	08:00		X	X	X			
5276	Sample 4 – MP-3 Backup	000360	6/6/23	08:00							

LAB USE ONLY

Sample Received via:
☐FedEx
☐UPS
☐Courier
☐Other_____

Temperature
_____°C
Thermometer ID _____
Initials _____

Returned Eqmt
Total cans: _____
Unused cans: _____
Flow Controllers: _____

Client Notes/Special Instructions: Please test only Sample 1 – MP-1 H2S Inlet and Sample 3 – MP-3 H2S Outlet unless there are issues with the samples (no residual vacuum for example). If issue with primary sample please test the corresponding backup instead.

EDD?
☐Yes
☐No

LAB USE ONLY
Notes:

Relinquished By Print: John Faille Signature: John T. Faille	**Date** 6/6/23 **Time** 1200	**Received By** Print: Zachary Smith Signature:	**Date** 6/7/23 **Time** 1454
Relinquished By Print: Signature:	**Date** **Time**	**Received By** Print: Signature:	**Date** **Time**

AAC COC Rev 3

6 x 1.4L cans + 1 x 3-way manifold (2 unused)

Issued 02/04/2021

Fy

Page_____of_____

CLIENT	: SCS Engineers
PROJECT NAME	: H2S Sampling and Analysis
PROJECT NO.	: 04223001.20
AAC PROJECT NO.	: 231131
REPORT DATE	: 06/15/2023

On June 14th 2023, Atmospheric Analysis & Consulting, Inc. received four (4) 1.4-Liter Summa Canisters for Fixed Gases analysis by EPA 3C and Total Reduced Sulfur analysis by ASTM D-5504. Upon receipt, the samples were assigned unique Laboratory ID numbers as follows:

Client ID	Lab No.	Return Pressure (mmHg)
Sample 1-MP-1 H2S Inlet	231131-45441	512.5
Sample 1-MP-1 Backup	231131-45442	440.1
Sample 3-MP-3 H2S Outlet	231131-45443	558.0
Sample 3-MP-3 Backup	231131-45444	493.1

This analysis is performed in accordance with AAC's Quality Manual. Test results apply to the sample(s) as received. For detailed information pertaining to specific EPA, NCASI, ASTM and SCAQMD accreditations (Methods & Analytes), please visit our website at www.aaclab.com.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. As per client request, all back up samples were placed on hold. No problems were encountered during receiving, preparation, and/or analysis of these samples. The Technical Director or his/her designee, as verified by the following signature, has authorized release of the data.

If you have any questions or require further explanation of data results, please contact the undersigned.

Sucha Parmar, Ph.D.
Technical Director

This report consists of 6 pages.

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

Laboratory Analysis Report

CLIENT : SCS Engineers
PROJECT NO. : 231131
MATRIX : AIR

SAMPLING DATE : 06/13/2023
RECEIVING DATE : 06/14/2023
ANALYSIS DATE : 06/14/2023
REPORT DATE : 06/15/2023

EPA 3C

Client ID	Sample 1-MP-1 H2S Inlet	Sample 3-MP-3 H2S Outlet
AAC ID	231131-45441	231131-45443
Can Dilution Factor	3.05	2.74
Analyte	Result	Result
H_2	< 3.1 %	< 2.7 %
O_2	1.2 %	1.0 %
N_2	15.3 %	15.2 %
CO	< 0.3 %	< 0.3 %
CO_2	36.5 %	36.6 %
CH_4	47.0 %	47.2 %

All fixed gases have been normalized to 100% on a dry basis

Sample Reporting Limit (SRL) is equal to Reporting Limit x Analysis Dil. Fac x Canister Dil. Fac

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LABORATORY ANALYSIS REPORT

CLIENT : SCS Engineers
PROJECT NO. : 231131
MATRIX : AIR
UNITS : ppmv

SAMPLING DATE : 06/13/2023
RECEIVING DATE : 06/14/2023
ANALYSIS DATE : 06/14/2023
REPORT DATE : 06/15/2023

Total Reduced Sulfur Compounds by ASTM D-5504

Client ID	Sample 1-MP-1 H2S Inlet	Sample 3-MP-3 H2S Outlet
AAC ID	231131-45441	231131-45443
Canister Dil. Fac.	3.1	2.7
Analyte	Result	Result
Hydrogen Sulfide	2732	379
COS / SO2	17.3	3.53
Methyl Mercaptan	12.5	6.05
Ethyl Mercaptan	1.02	< 0.137
Dimethyl Sulfide	9.62	11.4
Carbon Disulfide	1.90	0.462
Isopropyl Mercaptan	5.02	1.42
tert-Butyl Mercaptan	1.37	< 0.137
n-Propyl Mercaptan	< 0.153	< 0.137
Methylethylsulfide	< 0.153	< 0.137
sec-Butyl Mercaptan / Thiophene	5.08	1.37
iso-Butyl Mercaptan	0.409	0.559
Diethyl Sulfide	< 0.153	< 0.137
n-Butyl Mercaptan	< 0.153	< 0.137
Dimethyl Disulfide	< 0.153	< 0.137
2-Methylthiophene	0.814	0.630
3-Methylthiophene	< 0.153	< 0.137
Tetrahydrothiophene	< 0.153	< 0.137
Bromothiophene	< 0.153	< 0.137
Thiophenol	< 0.153	< 0.137
Diethyl Disulfide	< 0.153	< 0.137
Total Unidentified Sulfur	< 0.153	4.49
Total Reduced Sulfurs	2770	405

All unidentified compound's concentrations expressed in terms of H_2S
Sample Reporting Limit (SRL) is equal to Reporting Limit x Canister Dil. Fac. x Analysis Dil. Fac.

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Atmospheric Analysis & Consulting, Inc

Quality Control/Quality Assurance Report

Date Analyzed : 06/14/2023
Analyst : RW/KM
Units : %

Instrument ID : TCD #1
Calb Date : 08/22/22
Reporting Limit : 0.1%

I - Opening Continuing Calibration Verification - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
CCV	Spike Conc	10.0	10.2	20.2	10.0	10.0	10.0
	Result	10.0	10.0	22.7	10.2	9.3	10.2
	% Rec *	100.3	98.7	112.4	102.3	92.8	101.4

II - Method Blank - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
MB	Concentration	ND	ND	ND	ND	ND	ND

III - Laboratory Control Spike & Duplicate - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
Lab Control Standards	Sample Conc	0.0	0.0	0.0	0.0	0.0	0.0
	Spike Conc	10.0	10.2	20.2	10.0	10.0	10.0
	LCS Result	9.9	10.2	22.5	10.3	9.3	10.1
	LCSD Result	10.4	10.5	22.3	10.2	9.3	10.1
	LCS % Rec *	98.8	100.0	111.1	103.0	93.2	101.2
	LCSD % Rec *	104.3	103.0	110.2	102.3	92.9	100.9
	% RPD ***	5.4	2.9	0.8	0.7	0.3	0.3

IV -Sample & Sample Duplicate - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
231094-45315	Sample	0.0	0.0	0.8	46.7	0.0	0.4
	Sample Dup	0.0	0.0	0.7	46.7	0.0	0.4
	Mean	0.0	0.0	0.8	46.7	0.0	0.4
	% RPD ***	0.0	0.0	2.4	0.1	0.0	0.7

V - Matrix Spike & Duplicate- EPA 3C

AAC ID	Analyte	H_2	N_2	CH_4	CO	CO_2
231094-45315	Sample Conc	0.0	0.4	23.3	0.0	0.2
	Spike Conc	10.0	10.0	10.0	10.0	10.0
	MS Result	10.5	11.6	33.3	9.9	11.1
	MSD Result	10.4	11.4	33.7	9.7	10.9
	MS % Rec **	105.6	112.4	99.9	99.7	108.3
	MSD % Rec **	103.9	109.9	103.3	97.3	106.1
	% RPD ***	1.6	2.3	3.4	2.5	2.1

VI - Closing Continuing Calibration Verification - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
CCV	Spike Conc	10.0	10.2	20.2	10.0	10.0	10.0
	Result	10.1	9.4	20.9	10.3	9.3	10.2
	% Rec *	101.5	92.8	103.3	103.4	93.4	102.2

** Must be 85-115%*

*** Must be 75-125%*

**** Must be < 25%*

ND = Not Detected

<RL = less than Reporting Limit

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Quality Control/Quality Assurance Report
ASTM D-5504

Date Analyzed: 6/14/2023
Analyst: ZD
Units: ppbV

Instrument ID: SCD#10
Calb. Date: : 07/11/2022

Opening Calibration Verification Standard

499.8 ppbV H2S (SS1289)

H_2S	Resp. (area)	Result	% Rec *	% RPD ****
Initial	1807	490	98.1	0.2
Duplicate	1779	483	96.6	1.3
Triplicate	1824	495	99.0	1.1

547.5 ppbV H2S (SS1289)

MeSH	Resp. (area)	Result	% Rec *	% RPD ****
Initial	2429	563	102.9	1.6
Duplicate	2342	543	99.2	2.1
Triplicate	2404	557	101.8	0.5

479.0 ppbV H2S (SS1289)

DMS	Resp. (area)	Result	% Rec *	% RPD ****
Initial	2556	483	100.9	0.0
Duplicate	2558	484	101.0	0.1
Triplicate	2552	482	100.7	0.1

Method Blank

Analyte	Result
H_2S	<PQL
MeSH	<PQL
DMS	<PQL

Duplicate Analysis **Sample ID** 220521-28941

Analyte	Sample Result	Duplicate Result	Mean	% RPD ***
H_2S	<PQL	<PQL	0.0	0.0
MeSH	<PQL	<PQL	0.0	0.0
DMS	<PQL	<PQL	0.0	0.0

Matrix Spike & Duplicate **Sample ID** 220521-28941

Analyte	Sample Conc.	Spike Added	MS Result	MSD Result	MS % Rec **	MSD % Rec **	% RPD ***
H_2S	<PQL	249.9	259.8	253.6	104.0	101.5	2.4
MeSH	<PQL	273.8	283.4	274.9	103.5	100.4	3.0
DMS	<PQL	239.5	237.1	248.1	99.0	103.6	4.6

Closing Calibration Verification Standard

Analyte	Std. Conc.	Result	% Rec **
H_2S	499.8	493.7	98.8
MeSH	547.5	536.2	97.9
DMS	479.0	440.6	92.0

** Must be 95-105%, ** Must be 90-110%, *** Must be < 10%, **** Must be < 5% RPD from Mean result.*

MeSH: PQL = 10.5 ppbV, MDL = 1.12 ppbV
DMS: PQL = 11.0 ppbV, MDL = 1.12 ppbV

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AAC Project No.:

Client/Company Name LRI Facility **Project Manager Name** Karamjit Singh	**Project Name** H2S Sampling and Analysis **Project Number** 04223001.20				**Analysis Requested**					**Send Report To** (Name/Email/Address) Karamjit Singh KSingh@Scsengineers.com	
Turnaround Time X Rush 24 h ☐ Same Day ☐ Rush 48 h ☐ 5 Days ☐ Rush 72 h Normal	**Sampler Name** **Print: John Faille** **Signature:**									**Send Invoice To** (Name/Email/Address) Karamjit Singh KSingh@Scsengineers.com **PO Number**	
										LAB USE ONLY	
Client Sample Name	**Sample ID**	**Sampling Date**	**Sampling Time**	**Container Type/Qty**	**ASTM D-5504 (Include TRS)**	**EPA TO 15**	**EPA 3C**			**Lab ID**	**Sample Received via:**
54411 Sample 1 – MP-1 H2S Inlet	000298	6/13/23	0800		X		X				☐FedEx ☐UPS ☐Courier ☐Other_____
54412 Sample 2 – MP-1 Backup	000320	6/13/23	0800								
54413 Sample 3 – MP-3 H2S Outlet	001546	6/13/23	0800		X		X				
54414 Sample 4 – MP-3 Backup	001070	6/13/23	0800								**Temperature** _____°C Thermometer ID _____ Initials _____
											Returned Eqmt Total cans: _____ Unused cans: _____ Flow Controllers: _____

Client Notes/Special Instructions: Please test only Sample 1 – MP-1 H2S Inlet and Sample 3 – MP-3 H2S Outlet unless there are issues with the samples (no residual vacuum for example). If issue with primary sample please test the corresponding backup instead.

EDD? ☐Yes ☐No

LAB USE ONLY
Notes:

Relinquished By **Print: John Faille** **Signature:**	**Date** 6/13/23 **Time** 16:00	**Received By** **Print:** Zachary Smith **Signature:**	**Date** 6/14/23 **Time** 1126
Relinquished By **Print:** **Signature:**	**Date** **Time**	**Received By** **Print:** **Signature:**	**Date** **Time**

6x 1.4L cans (2x void) + 2x 3-way manifold Fx

Atmospheric Analysis & Consulting, Inc

CLIENT	: SCS Engineers
PROJECT NAME	: H2S Sampling and Analysis
PROJECT NO.	: 04223001.20
AAC PROJECT NO.	: 231214
REPORT DATE	: 06/23/2023

On June 22nd, 2023, Atmospheric Analysis & Consulting, Inc. received four (4) 1.4-Liter Silonite Canisters for Fixed Gases analysis by EPA 3C and Total Reduced Sulfurs by ASTM D-5504. Upon receipt, the samples were assigned unique Laboratory ID numbers as follows:

Client ID	Lab No.	Return Pressure (mmHg)
Sample 1 – MP-1 H2S Inlet	231214-45844	483.5
Sample 2 – MP-1 Backup	231214-45845	441.5
Sample 3 – MP-3 H2S Outlet	231214-45846	510.5
Sample 4 – MP-3 Backup	231214-45847	535.6

This analysis is performed in accordance with AAC's Quality Manual. Test results apply to the sample(s) as received. For detailed information pertaining to specific EPA, NCASI, ASTM and SCAQMD accreditations (Methods & Analytes), please visit our website at www.aaclab.com.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. Per client request, samples "Sample 2 – MP-1 Backup" (231214-45845) and "Sample 4 – MP-3 Backup" (231214-45847) were placed on hold. No problems were encountered during receiving, preparation, and/or analysis of these samples. The Technical Director or his/her designee, as verified by the following signature, has authorized release of the data.

If you have any questions or require further explanation of data results, please contact the undersigned.

Sucha Parmar, Ph.D.
Technical Director

This report consists of 6 pages.

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

Laboratory Analysis Report

CLIENT : SCS Engineers
PROJECT NO. : 231214
MATRIX : AIR

SAMPLING DATE : 06/21/2023
RECEIVING DATE : 06/22/2023
ANALYSIS DATE : 06/22/2022
REPORT DATE : 06/23/2023

EPA 3C

Client ID	Sample 1 – MP-1 H2S Inlet	Sample 3 – MP-3 H2S Outlet
AAC ID	231214-45844	231214-45846
Can Dilution Factor	3.16	3.00
Analyte	Result	Result
H_2	< 3.2 %	< 3.0 %
O_2	1.3 %	1.2 %
N_2	16.0 %	15.8 %
CO	< 0.3 %	< 0.3 %
CO_2	36.0 %	36.2 %
CH_4	46.7 %	46.9 %

All fixed gases have been normalized to 100% on a dry basis

Sample Reporting Limit (SRL) is equal to Reporting Limit x Analysis Dil. Fac x Canister Dil. Fac

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

LABORATORY ANALYSIS REPORT

CLIENT : SCS Engineers
PROJECT NO. : 231214
MATRIX : AIR
UNITS : ppmv

SAMPLING DATE : 06/21/2023
RECEIVING DATE : 06/22/2023
ANALYSIS DATE : 06/22/2022
REPORT DATE : 06/23/2023

Total Reduced Sulfur Compounds by ASTM D-5504

Client ID	Sample 1 – MP-1 H2S Inlet	Sample 3 – MP-3 H2S Outlet
AAC ID	231214-45844	231214-45846
Canister Dil. Fac.	3.2	3.0
Analyte	Result	Result
Hydrogen Sulfide	**2613**	**0.428**
COS / SO2	< 0.158	**1.09**
Methyl Mercaptan	**16.2**	< 0.150
Ethyl Mercaptan	**1.36**	< 0.150
Dimethyl Sulfide	**12.2**	**26.0**
Carbon Disulfide	**0.444**	**0.638**
Isopropyl Mercaptan	**5.78**	< 0.150
tert-Butyl Mercaptan	**1.52**	< 0.150
n-Propyl Mercaptan	< 0.158	< 0.150
Methylethylsulfide	< 0.158	< 0.150
sec-Butyl Mercaptan / Thiophene	**5.59**	< 0.150
iso-Butyl Mercaptan	< 0.158	< 0.150
Diethyl Sulfide	< 0.158	< 0.150
n-Butyl Mercaptan	< 0.158	< 0.150
Dimethyl Disulfide	< 0.158	< 0.150
2-Methylthiophene	**0.788**	< 0.150
3-Methylthiophene	< 0.158	< 0.150
Tetrahydrothiophene	< 0.158	< 0.150
Bromothiophene	< 0.158	< 0.150
Thiophenol	< 0.158	< 0.150
Diethyl Disulfide	< 0.158	< 0.150
Total Unidentified Sulfur	< 0.158	< 0.150
Total Reduced Sulfurs	**2657**	**27.1**

All unidentified compound's concentrations expressed in terms of H_2S
Sample Reporting Limit (SRL) is equal to Reporting Limit x Canister Dil. Fac. x Analysis Dil. Fac.

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

Quality Control/Quality Assurance Report
ASTM D-5504

Date Analyzed: 6/22/2023
Analyst: ZD
Units: ppbV

Instrument ID: SCD#10
Calb. Date: : 07/11/2022

Opening Calibration Verification Standard

499.8 ppbV H2S (SSI289)

H_2S	Resp. (area)	Result	% Rec *	% RPD ****
Initial	1845	501	100.2	1.8
Duplicate	1894	514	102.8	0.8
Triplicate	1896	514	102.9	0.9

547.5 ppbV H2S (SSI289)

MeSH	Resp. (area)	Result	% Rec *	% RPD ****
Initial	2449	568	103.7	1.4
Duplicate	2419	561	102.5	0.2
Triplicate	2375	551	100.6	1.6

479.0 ppbV H2S (SSI289)

DMS	Resp. (area)	Result	% Rec *	% RPD ****
Initial	2579	488	101.8	0.2
Duplicate	2525	477	99.7	1.9
Triplicate	2615	494	103.2	1.6

Method Blank

Analyte	Result
H_2S	<PQL
MeSH	<PQL
DMS	<PQL

Duplicate Analysis **Sample ID** 220521-28941

Analyte	Sample Result	Duplicate Result	Mean	% RPD ***
H_2S	<PQL	<PQL	0.0	0.0
MeSH	<PQL	<PQL	0.0	0.0
DMS	<PQL	<PQL	0.0	0.0

Matrix Spike & Duplicate **Sample ID** 220521-28941

Analyte	Sample Conc.	Spike Added	MS Result	MSD Result	MS % Rec **	MSD % Rec **	% RPD ***
H_2S	<PQL	249.9	252.3	267.9	101.0	107.2	6.0
MeSH	<PQL	273.8	277.5	285.1	101.4	104.1	2.7
DMS	<PQL	239.5	249.9	246.5	104.3	102.9	1.3

Closing Calibration Verification Standard

Analyte	Std. Conc.	Result	% Rec **
H_2S	499.8	534.3	106.9
MeSH	547.5	544.6	99.5
DMS	479.0	503.1	105.0

** Must be 95-105%, ** Must be 90-110%, *** Must be < 10%, **** Must be < 5% RPD from Mean result.*

MeSH: PQL = 10.5 ppbV, MDL = 1.12 ppbV
DMS: PQL = 11.0 ppbV, MDL = 1.12 ppbV

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

Atmospheric Analysis & Consulting, Inc

Quality Control/Quality Assurance Report

Date Analyzed : 06/22/2023
Analyst : RW/KM
Units : %

Instrument ID : TCD #1
Calb Date : 08/22/22
Reporting Limit : 0.1%

I - Opening Continuing Calibration Verification - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
CCV	Spike Conc	10.0	10.2	20.2	10.0	10.0	10.0
	Result	9.6	10.1	22.7	10.1	9.1	10.1
	% Rec *	95.7	99.5	111.9	100.5	91.4	100.2

II - Method Blank - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
MB	Concentration	ND	ND	ND	ND	ND	ND

III - Laboratory Control Spike & Duplicate - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
Lab Control Standards	Sample Conc	0.0	0.0	0.0	0.0	0.0	0.0
	Spike Conc	10.0	10.2	20.2	10.0	10.0	10.0
	LCS Result	9.6	10.4	22.4	10.0	9.1	10.0
	LCSD Result	9.8	10.5	22.9	10.1	9.1	10.1
	LCS % Rec *	95.8	102.1	110.5	100.4	91.0	100.2
	LCSD % Rec *	98.6	103.0	113.3	101.3	91.1	101.2
	% RPD ***	2.9	0.9	2.5	0.9	0.1	1.0

IV -Sample & Sample Duplicate - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
231100-45335	Sample	0.0	1.1	10.0	14.6	0.0	11.7
	Sample Dup	0.0	1.1	9.9	14.5	0.0	11.6
	Mean	0.0	1.1	10.0	14.6	0.0	11.7
	% RPD ***	0.0	2.7	1.7	0.6	0.0	1.2

V - Matrix Spike & Duplicate- EPA 3C

AAC ID	Analyte	H_2	N_2	CH_4	CO	CO_2
231100-45335	Sample Conc	0.0	5.0	7.3	0.0	5.8
	Spike Conc	10.0	10.0	10.0	10.0	10.0
	MS Result	9.5	15.3	17.3	9.0	15.9
	MSD Result	10.3	15.5	17.7	9.6	16.3
	MS % Rec **	95.4	103.2	99.5	90.2	100.8
	MSD % Rec **	103.2	105.1	103.8	96.4	104.2
	% RPD ***	7.9	1.8	4.2	6.6	3.4

VI - Closing Continuing Calibration Verification - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
CCV	Spike Conc	10.0	10.2	20.2	10.0	10.0	10.0
	Result	9.8	9.7	21.0	10.1	9.1	9.9
	% Rec *	98.2	95.6	103.7	101.0	91.3	98.7

** Must be 85-115%*

*** Must be 75-125%*

**** Must be < 25%*

ND = Not Detected

<RL = less than Reporting Limit

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231214

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AAC Project No.:

Client/Company Name
LRI Facility

Project Name
H2S Sampling and Analysis

Project Number
04223001.20

Project Manager Name
Karamjit Singh

Send Report To (Name/Email/Address)
Karamjit Singh
KSingh@Scsengineers.com

Turnaround Time
X Rush 24 h ☐ Same Day
☐ Rush 48 h ☐ 5 Days
☐ Rush 72 h Normal

Sampler Name
Print: John Faille
Signature: John T. Faille

Send Invoice To (Name/Email/Address)
Karamjit Singh
KSingh@Scsengineers.com
PO Number

Analysis Requested

Client Sample Name	Sample ID	Sampling Date	Sampling Time	Container Type/Qty	ASTM D-5504 (Include TRS)	EPA TO 15	EPA 3C			Lab ID
5844 Sample 1 – MP-1 H2S Inlet	001522	6/21/23	0945		X		X			
5845 Sample 2 – MP-1 Backup	000863	6/21/23	0945							
5846 Sample 3 – MP-3 H2S Outlet	001048	6/21/23	0945		X		X			
5847 Sample 4 – MP-3 Backup	001517	6/21/23	0945							

LAB USE ONLY

Sample Received via:
☐FedEx
☐UPS
☐Courier
☐Other_____

Temperature
_____°C
Thermometer ID _____
Initials _____

Returned Eqmt
Total cans: _____
Unused cans: _____
Flow Controllers: _____

Client Notes/Special Instructions: Please test only Sample 1 – MP-1 H2S Inlet and Sample 3 – MP-3 H2S Outlet unless there are issues with the samples (no residual vacuum for example). If issue with primary sample please test the corresponding backup instead.

EDD?
☐Yes
☐No

LAB USE ONLY
Notes:

Relinquished By	Date	Received By	Date
Print: John Faille Signature: John T. Faille	6/21/23 Time 17:00	Print: Signature:	Time
Relinquished By Print: Signature:	Date Time ~~17:00~~	Received By Print: Signature:	Date 6/22/23 Time 1032

AAC COC Rev 3

Issued 02/04/2021

Page_____of_____

6x 1mL cans (2x wet) + 1x manifold

Atmospheric Analysis & Consulting, Inc

CLIENT	: SCS Engineers
PROJECT NAME	: H2S Sampling and Analysis
PROJECT NO.	: 04223001.04
AAC PROJECT NO.	: 231265
REPORT DATE	: 06/29/2023

On June 28th, 2023, Atmospheric Analysis & Consulting, Inc. received four (4) 1.4-Liter Summa Canisters for Fixed Gases analysis by EPA 3C and Total Reduced Sulfur analysis by ASTM D-5504. Upon receipt, the samples were assigned unique Laboratory ID numbers as follows:

Client ID	Lab No.	Return Pressure (mmHg)
Sample 1-MP-1 H2S Inlet	231265-46202	543.5
Sample 2-MP-1 Backup	231265-46203	571.5
Sample 3-MP-3 H2S Outlet	231265-46204	501.0
Sample 4-MP-3 Backup	231265-46205	496.5

This analysis is performed in accordance with AAC's Quality Manual. Test results apply to the sample(s) as received. For detailed information pertaining to specific EPA, NCASI, ASTM and SCAQMD accreditations (Methods & Analytes), please visit our website at www.aaclab.com.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. Samples 231265-46203 (Sample 2-MP Backup) and 231265-46205 (Sample 4-MP-3 backup) were placed on Hold per client request. No problems were encountered during receiving, preparation, and/or analysis of these samples. The Technical Director or his/her designee, as verified by the following signature, has authorized the release of the data.

If you have any questions or require further explanation of data results, please contact the undersigned.

Sucha Parmar, Ph.D.
Technical Director

This report consists of 6 pages.

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

Atmospheric Analysis & Consulting, Inc

Laboratory Analysis Report

CLIENT : SCS Engineers
PROJECT NO. : 231265
MATRIX : AIR

SAMPLING DATE : 06/27/2023
RECEIVING DATE : 06/28/2023
ANALYSIS DATE : 06/28/2023
REPORT DATE : 06/29/2023

EPA 3C

Client ID	Sample 1-MP-1 H2S Inlet	Sample 3-MP-3 H2S Outlet
AAC ID	231265-46202	231265-46204
Can Dilution Factor	2.81	3.06
Analyte	Result	Result
H_2	< 2.8 %	< 3.1 %
O_2	1.4 %	1.4 %
N_2	16.7 %	16.6 %
CO	< 0.3 %	< 0.3 %
CO_2	35.9 %	35.9 %
CH_4	46.0 %	46.0 %

All fixed gases have been normalized to 100% on a dry basis

Sample Reporting Limit (SRL) is equal to Reporting Limit x Analysis Dil. Fac x Canister Dil. Fac

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

LABORATORY ANALYSIS REPORT

CLIENT : SCS Engineers
PROJECT NO. : 231265
MATRIX : AIR
UNITS : ppmv

SAMPLING DATE : 06/27/2023
RECEIVING DATE : 06/28/2023
ANALYSIS DATE : 06/28/2023
REPORT DATE : 06/29/2023

Total Reduced Sulfur Compounds by ASTM D-5504

Client ID	Sample 1-MP-1 H2S Inlet	Sample 3-MP-3 H2S Outlet
AAC ID	231265-46202	231265-46204
Canister Dil. Fac.	2.8	3.1
Analyte	Result	Result
Hydrogen Sulfide	**2369**	**0.493**
COS / SO2	< 0.141	**1.95**
Methyl Mercaptan	**12.7**	< 0.153
Ethyl Mercaptan	**0.687**	< 0.153
Dimethyl Sulfide	**10.2**	**9.94**
Carbon Disulfide	**0.369**	**0.395**
Isopropyl Mercaptan	**5.31**	< 0.153
tert-Butyl Mercaptan	**0.966**	< 0.153
n-Propyl Mercaptan	< 0.141	< 0.153
Methylethylsulfide	< 0.141	< 0.153
sec-Butyl Mercaptan / Thiophene	**4.31**	**0.819**
iso-Butyl Mercaptan	< 0.141	< 0.153
Diethyl Sulfide	< 0.141	< 0.153
n-Butyl Mercaptan	< 0.141	< 0.153
Dimethyl Disulfide	< 0.141	< 0.153
2-Methylthiophene	**0.874**	< 0.153
3-Methylthiophene	< 0.141	< 0.153
Tetrahydrothiophene	< 0.141	< 0.153
Bromothiophene	< 0.141	< 0.153
Thiophenol	< 0.141	< 0.153
Diethyl Disulfide	< 0.141	< 0.153
Total Unidentified Sulfur	< 0.141	**5.31**
Total Reduced Sulfurs	**2404**	**17.0**

All unidentified compound's concentrations expressed in terms of H_2S
Sample Reporting Limit (SRL) is equal to Reporting Limit x Canister Dil. Fac. x Analysis Dil. Fac.

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

Atmospheric Analysis & Consulting, Inc

Quality Control/Quality Assurance Report

Date Analyzed : 06/28/2023
Analyst : RW/KM
Units : %

Instrument ID : TCD #1
Calb Date : 08/22/22
Reporting Limit : 0.1%

I - Opening Continuing Calibration Verification - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
CCV	Spike Conc	10.0	10.2	20.2	10.0	10.0	10.0
	Result	10.0	10.1	22.5	10.3	9.3	10.1
	% Rec *	100.1	99.3	111.1	102.9	93.1	100.8

II - Method Blank - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
MB	Concentration	ND	ND	ND	ND	ND	ND

III - Laboratory Control Spike & Duplicate - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
Lab Control Standards	Sample Conc	0.0	0.0	0.0	0.0	0.0	0.0
	Spike Conc	10.0	10.2	20.2	10.0	10.0	10.0
	LCS Result	9.8	9.9	21.9	10.3	9.3	10.1
	LCSD Result	10.1	10.0	22.0	10.5	9.3	10.3
	LCS % Rec *	98.4	98.0	108.4	102.7	93.1	100.7
	LCSD % Rec *	101.0	98.2	108.5	104.5	93.7	102.5
	% RPD ***	2.6	0.2	0.1	1.7	0.7	1.7

IV -Sample & Sample Duplicate - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
231134-45453	Sample	0.0	13.3	53.0	0.0	0.0	0.0
	Sample Dup	0.0	13.1	52.6	0.0	0.0	0.0
	Mean	0.0	13.2	52.8	0.0	0.0	0.0
	% RPD ***	0.0	1.3	0.8	0.0	0.0	0.0

V - Matrix Spike & Duplicate- EPA 3C

AAC ID	Analyte	H_2	N_2	CH_4	CO	CO_2
231134-45453	Sample Conc	0.0	26.4	0.0	0.0	0.0
	Spike Conc	10.0	10.0	10.0	10.0	10.0
	MS Result	10.7	36.1	10.9	9.9	10.7
	MSD Result	10.8	36.3	10.9	9.8	10.7
	MS % Rec **	107.1	96.8	109.4	99.3	107.1
	MSD % Rec **	108.4	98.7	108.9	98.4	106.5
	% RPD ***	1.2	1.9	0.5	0.9	0.6

VI - Closing Continuing Calibration Verification - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
CCV	Spike Conc	10.0	10.2	20.2	10.0	10.0	10.0
	Result	9.9	9.7	20.6	10.2	9.2	10.0
	% Rec *	99.5	95.2	101.8	101.9	92.3	100.1

** Must be 85-115%*

*** Must be 75-125%*

**** Must be < 25%*

ND = Not Detected

<RL = less than Reporting Limit

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

Quality Control/Quality Assurance Report
ASTM D-5504

Date Analyzed: 6/28/2023
Analyst: ZD
Units: ppbV

Instrument ID: SCD#10
Calb. Date: : 07/11/2022

Opening Calibration Verification Standard

499.8 ppbV H2S (SS1289)

H_2S	Resp. (area)	Result	% Rec *	% RPD ****
Initial	1834	498	99.6	0.5
Duplicate	1824	495	99.0	1.1
Triplicate	1874	508	101.7	1.6

547.5 ppbV H2S (SS1289)

MeSH	Resp. (area)	Result	% Rec *	% RPD ****
Initial	2299	533	97.4	2.5
Duplicate	2397	556	101.5	1.6
Triplicate	2379	552	100.8	0.9

479.0 ppbV H2S (SS1289)

DMS	Resp. (area)	Result	% Rec *	% RPD ****
Initial	2555	483	100.8	0.1
Duplicate	2603	492	102.7	1.9
Triplicate	2503	473	98.8	2.0

Method Blank

Analyte	Result
H_2S	<PQL
MeSH	<PQL
DMS	<PQL

Duplicate Analysis **Sample ID** 220521-28941

Analyte	Sample Result	Duplicate Result	Mean	% RPD ***
H_2S	<PQL	<PQL	0.0	0.0
MeSH	<PQL	<PQL	0.0	0.0
DMS	<PQL	<PQL	0.0	0.0

Matrix Spike & Duplicate **Sample ID** 220521-28941

Analyte	Sample Conc.	Spike Added	MS Result	MSD Result	MS % Rec **	MSD % Rec **	% RPD ***
H_2S	<PQL	249.9	261.8	245.9	104.8	98.4	6.3
MeSH	<PQL	273.8	290.1	285.5	106.0	104.3	1.6
DMS	<PQL	239.5	255.4	261.8	106.6	109.3	2.5

Closing Calibration Verification Standard

Analyte	Std. Conc.	Result	% Rec **
H_2S	499.8	541.6	108.4
MeSH	547.5	567.8	103.7
DMS	479.0	480.5	100.3

** Must be 95-105%, ** Must be 90-110%, *** Must be < 10%, **** Must be < 5% RPD from Mean result.*

MeSH: PQL = 10.5 ppbV, MDL = 1.12 ppbV
DMS: PQL = 11.0 ppbV, MDL = 1.12 ppbV

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2712 65

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Atmospheric Analysis and Consulting · Phone: 805-650-1642 · Email: info@aaclab.com · 2225 Sperry Ave, Ventura, CA 93003

AAC Project No.:

Client/Company Name LRI Facility **Project Manager Name** Karamjit Singh	**Project Name** H2S Sampling and Analysis **Project Number** 04223001.04
Turnaround Time X Rush 24 h ☐ Same Day ☐ Rush 48 h ☐ 5 Days ☐ Rush 72 h Normal	**Sampler Name** **Print: John Faille** **Signature:**

Send Report To (Name/Email/Address)
Karamjit Singh
KSingh@Scsengineers.com

Send Invoice To (Name/Email/Address)
Karamjit Singh
KSingh@Scsengineers.com
PO Number

					Analysis Requested					LAB USE ONLY	
Client Sample Name	**Sample ID**	**Sampling Date**	**Sampling Time**	**Container Type/Qty**	**ASTM D-5504 (Include TRS)**	**EPA TO 15**	**EPA 3C**			**Lab ID**	**Sample Received via:** ☐FedEx ☐UPS ☐Courier ☐Other
6202 Sample 1 – MP-1 H2S Inlet	001540	6/27/23	8:25	Summa 1L	X		X				**Temperature** ____°C Thermometer ID ____ Initials ____
6203 Sample 2 – MP-1 Backup	001538	6/27/23	8:30 AM	Summa 1L							**Returned Eqmt** Total cans: ____ Unused cans: ____ Flow Controllers: ____
6204 Sample 3 – MP-3 H2S Outlet	001527	6/27/23	8:35	Summa 1L	X		X				
6205 Sample 4 – MP-3 Backup	00625	6/27/23	8:45	Summa 1L							

Client Notes/Special Instructions: Please test only Sample 1 – MP-1 H2S Inlet and Sample 3 – MP-3 H2S Outlet unless there are issues with the samples (no residual vacuum for example). If issue with primary sample please test the corresponding backup instead.

EDD? ☐Yes ☐No

LAB USE ONLY
Notes:

Relinquished By **Print: Karam Singh** **Signature:**	**Date** ~~6/27/23~~ **Time**	**Received By** **Print:** **Signature:**	**Date** **Time**
Relinquished By **Print:** **Signature:**	**Date** **Time**	**Received By** **Print:** **Signature:**	**Date** 6/28/23 **Time** 1006

for 1:4L cans (1a unit, 1c unused) + 5x manifolds (1a hand fitting missing)

Attachment H
SEPA Checklist

pscleanair.org
Puget Sound Clean Air Agency

Puget Sound Clean Air Agency
1904 Third Avenue, Suite 105 | Seattle, WA 98101-3317
Phone 206-343-8800 | 206-343-7522 Fax

ENVIRONMENTAL CHECKLIST

Because of the State Environmental Policy Act, the action for which you are filing a Notice of Construction and Application for Approval to this Agency requires the completion of an environmental checklist.

BUT: If you can answer "yes" to either of the following statements with respect to the action being proposed, the attached checklist need not be completed:

1. I have obtained a State, City, or County Permit and filled out an environmental checklist.

☐ **Yes** ☒ **No**

If yes, complete the following:

State, City or County Department: _____

Date the checklist was completed: _____

Attach a copy of the checklist

2. An environmental checklist or assessment has previously been filled out for another agency.

☐ **Yes** ☒ **No**

If yes, complete the following:

Agency: _____

Date the checklist was completed: _____

Attach a copy of the checklist

If your answers are NO to both of the above statements, you must complete the attached environmental checklist.

Prepared by:

Signature 

Name Karamjit Singh, P.E.

Position Project Director

Agency/Organization SCS Engineers

Date Submitted 7/7/23

ENVIRONMENTAL CHECKLIST

Date: 6/15/23

Proponent: **Pierce County Recycling, Composting and Disposal LLC (dba LRI)**

Project, Brief Title: Temp. Flare/Sulfur Treatment Project

Purpose of Checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for Applicants:

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use “not applicable” or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for Lead Agencies:

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of Checklist for Nonproject Proposals:

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of Sections A, B, and C plus section D: Supplemental Sheet for Nonproject Actions.

Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Section B: Environmental Elements that do not contribute meaningfully to the analysis of the proposal.

ENVIRONMENTAL CHECKLIST

A. BACKGROUND

1. Name of proposed project, if applicable: LRI Temporary Flare and Sulfur Treatment Project			
2. Name of Applicant Pierce County Recycling, Composting and Disposal, LLC (dba LRI)			
3. Applicant Address 30919 Meridian Ave E	City Graham	State WA	Zip 98338
Applicant Phone 253-377-2959	Applicant Email Kevin.Green@WasteConnections.com		
Contact Person Kevin Green	Title District Manager		
Company/Firm Waste Connections			
4. Date Checklist Prepared 6/15/23	**5.** Agency Requesting Checklist Puget Sound Clean Air Agency		
6. Proposed timing or schedule (including phasing, if applicable). Phase 1: The skid mounted temporary flare has been installed and operating since December 12, 2022 Phase 2: The sulfur removal system has been installed and operating since May 9th, 2023.			
7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? ☒ Yes ☐ No. If yes, explain. As a separate proposal, LRI will submit an application for a permanent flare that will be installed in place of the Temporary Flare. A separate SEPA checklist will be prepared for that application.			
8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal. Emission Calculations BACT Analysis Landfill Gas samples and lab analysis			
9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? ☐ Yes ☒ No. If yes, explain.			
10. List any government approvals or permits that will be needed for your proposal, if known. PSCAA Approval Order			

ENVIRONMENTAL CHECKLIST

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page.

A 3,000 scfm temporary open flare ("the Temp Flare") with a dedicated blower is proposed as part of this project. Temporary Flare performance specifications will meet landfill industry standards and landfill gas control system standards. The project includes a sulfur treatment system to provide the ability to treat landfill gas prior to flaring.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

30919 Meridian Ave E, Graham WA 98338 at the existing blower flare station on the north end of the landfill.

B. ENVIRONMENTAL ELEMENTS

1. EARTH

a. General description of the site:

☒ flat ☐ rolling ☐ hilly ☐ steep slopes ☐ mountains

☐ other _____

b. What is the steepest slope on the site (approximate percent slope)?

0% - the project area is flat

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them, and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

The types of soils observed at the project site included dense glacial till, gravelly ashy loam.

d. Are there surface indications or history of unstable soils in the immediate vicinity? ☐ Yes ☒ No. If yes, describe.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Excavation and site grading will take place associated with the installation of the sulfur treatment system.
Total excavation and associated backfill will be less than 100 CY for pipe installation.
Site grading will take place associated with the installation of the sulfur treatment system and overall area to be graded is approximately 6,000 square feet.

f. Could erosion occur as a result of clearing, construction, or use? ☐ Yes ☒ No. If yes, generally describe.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

0%

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

None - Not necessary

ENVIRONMENTAL CHECKLIST

2. AIR

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke, greenhouse gases) during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities, if known.

The Temporary Flare is skid-mounted, and installation generated no emissions. Emissions from the Temporary Flare during operations are described in the accompanying NOC Application. Project will overall result in a significant decrease in sulfur dioxide emissions from the landfill with the installation of the new treatment system..

b. Are there any off-site sources of emissions or odor that may affect your proposal? ☐ Yes ☒ No.
If yes, generally describe.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

The Temp Flare and the sulfur treatment system are in themselves emission control devices.

3. WATER

a. Surface

1. Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands) ? ☒ Yes ☐ No. If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

Wetlands are located north of project's construction limits. An existing MSE retaining wall creates a physical barrier between the construction area and surface water features to the north. The project will not affect these surface water features as all construction and installation occurred above the retaining wall.

2. Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? ☒ Yes ☐ No. If yes, please describe and attach available plans.

See response to 3.a.1.

3. Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

No material will be placed or removed from surface water or wetlands.

4. Will the proposal require surface water withdrawals or diversions? ☐ Yes ☒ No.
Give general description, purpose, and approximate quantities if known.

5. Does the proposal lie within a 100-year floodplain? ☐ Yes ☒ No. If yes, note location on the site plan.

6. Does the proposal involve any discharges of waste materials to surface waters? ☐ Yes ☒ No. If yes, describe the type of waste and anticipated volume of discharge.

b. Ground Water

1. Will groundwater be withdrawn from a well for drinking water or other purposes? ☐ Yes ☒ No. If yes, give a general description of the well, proposed uses and approximate quantities withdrawn from the well.

Will water be discharged to groundwater? ☐ Yes ☒ No. If yes, give general description, purpose, and approximate quantities, if known.

2. Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: domestic sewage; industrial, containing the following chemicals...; agricultural; etc.). Describe the general size of the systems, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

c. Water Runoff (including storm water)

1. Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? ☐ Yes ☒ No. If yes, describe.

There is no anticipated runoff associated with this project. All stormwater in this project area infiltrates into the ground.

2. Could waste material enter ground or surface waters? ☐ Yes ☒ No. If yes, generally describe.

3. Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? ☐ Yes ☒ No. If yes, describe.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, impacts, if any:

ENVIRONMENTAL CHECKLIST

4. PLANTS				
a. Check the types of vegetation found on the site:				
Deciduous Trees:	☐ Alder	☐ Maple	☐ Aspen	☐ other (specify):
Evergreen Trees:	☐ Fir	☐ Cedar	☐ Pine	☐ other (specify):
☒ Shrubs				
☒ Grass				
☐ Pasture				
☐ Crop or Grain				
☐ Orchards, Vineyards, or other permanent crops				
☐ Other types of Vegetation (specify):				
Wet Soil Plants:	☐ Cattail	☐ Buttercup	☐ other (specify):	
	☐ Bulrush	☐ Skunk Cabbage		
Water Plants:	☐ Water Lily	☐ Eelgrass	☐ Milfoil	☐ other (specify):
b. What kind and amount of vegetation will be removed or altered? None				
c. List threatened or endangered species known to be on or near the site. None Known				
d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any: None				
e. List all noxious weeds and invasive species known to be on or near the site. None Known				

ENVIRONMENTAL CHECKLIST

5. ANIMALS

a. Indicate birds and other animals that have been observed on or near the site or are known to be on or near the site.

Birds:	☐ Hawk	☒ Heron	☒ other (specify): gulls, crows, magpies
	☐ Eagle	☐ Songbirds	
Mammals:	☐ Deer	☐ Bear	☐ other (specify):
	☒ Elk	☒ Beaver	
Fish:	☐ Bass	☐ Salmon	☐ Trout
	☐ Hearing	☐ Shellfish	☐ other (specify):

b. List any threatened or endangered species known to be on or near the site.

None Known

c. Is the site part of a migration route? ☒ Yes ☐ No. If yes, explain.

Yes, the site lies within the western flyway for migratory birds.

d. Proposed measures to preserve or enhance wildlife, if any:

None

e. List any invasive animal species known to be on or near the site.

None Known

6. ENERGY AND NATURAL RESOURCES

a. What kinds of energy (electric, natural gas, oil, woodstove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Electricity will be used for energy required to operate the Temp Flare. The sulfur treatment system does not have any supplied energy requirements.

b. Would your project affect the potential use of solar energy by adjacent properties? ☐ Yes ☒ No. If yes, generally describe.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

None.

ENVIRONMENTAL CHECKLIST

7. ENVIRONMENTAL HEALTH

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste that could occur as a result of this proposal? ☒ Yes ☐ No.
If yes, describe:

Landfill gas contains toxic chemicals that are explosive in nature. However, this project will meet all applicable health and safety standards. Installation of flares destructs toxic chemicals in landfill gas and thus controls toxic emissions.

2. Describe any known or possible contamination at the site from present or past uses.

None known.

3. Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

Existing gas conveyance lines are located underground within the project area that contain LFG.
Existing condensate conveyance lines are located within the project area that transfer condensate from the condensate knockout to the leachate force main.
Finally, there is an existing emergency use leachate force main line located within the project area. Currently this line is unused and is only brought online in case of emergency conveyance of leachate around the north end of the site through the project area.

4. Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

None

5. Describe special emergency services that might be required.

None

6. Proposed measures to reduce or control environmental health hazards, if any:

N/A

b. Noise

1. What types of noise exist in the area that may affect your project (for example, traffic, equipment, operation, other)?

Traffic noise from nearby roads and the adjacent landfill is not anticipated to affect the proposed development.

2. What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example, traffic, construction, operation, other)? Indicate what hours noise would come from the site.

With addition of the Temp Flare and blower, there will be marginal increase in the existing operational noise from landfill flares.

3. Proposed measures to reduce or control noise impacts, if any:

N/A

ENVIRONMENTAL CHECKLIST

8. LAND AND SHORELINE USE

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? ☐ Yes ☒ No. If yes, describe.

Current location contains a blower flare station equipped with the existing blowers and flare and open dirt area for vehicle turnaround. Adjacent to the project location to the north and northeast is the aforementioned MSE wall and wetlands. Adjacent to the project location to the west is the Landfill Gas to Energy plant operated and owned by a third party. Adjacent to the project to the south is the landfill. This project will not affect any of the surrounding properties.

b. Has the project site been used as working farmlands or working forest lands? ☐ Yes ☒ No. If yes, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

The site has not been used as working farmlands and forest lands.

1. Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? ☐ Yes ☒ No. If yes, how?

c. Describe any structures on the site.

None

d. Will any structures be demolished? ☐ Yes ☒ No. If yes, what?

e. What is the current zoning classification of the site?

RSR - Rural Sensitive Resource

f. What is the current comprehensive plan designation of the site?

Rural

g. If applicable, what is the current shoreline master program designation of the site?

Not applicable.

h. Has any part of the site been classified as a critical area by the city or community? ☐ Yes ☒ No. If yes, specify.

i. Approximately how many people would reside or work in the completed project?

0

j. Approximately how many people would the completed project displace?

0

k. Proposed measures to avoid or reduce displacement impacts, if any:

Not applicable.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

Not applicable.

m. Proposed measures to ensure the proposal is compatible with nearby agricultural and forest lands of long-term commercial significance, if any:

Not applicable.

9. HOUSING

a. Approximately how many units would be provided, if any? Indicate whether high- middle- or low-income housing.

0

b. Approximately how many units, if any, would be eliminated? Indicate whether high- middle- or low-income housing.

0

c. Proposed measures to reduce or control housing impacts, if any:

Not applicable.

10. AESTHETICS

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

The Temp Flare is 33 feet tall and constructed of steel.

b. What views in the immediate vicinity would be altered or obstructed?

None.

c. Proposed measures to reduce or control aesthetic impacts, if any:

Not applicable.

11. LIGHT AND GLARE

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

The open flame temporary flare will produce a flame, and thus produce light at all times during operation. This light is generally not visible during daylight hours.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No.

c. What existing off-site sources of light or glare may affect your proposal?

None.

d. Proposed measures to reduce or control light and glare impacts, if any:

None.

12. RECREATION

a. What designated and informal recreational opportunities are in the immediate vicinity?

None.

b. Would the proposed project displace any existing recreational uses? ☐ Yes ☒ No. If yes, describe.

c. Proposed measures to reduce or control impacts on recreation, including recreational opportunities to be provided by the project or applicant, if any:

Not applicable.

13. HISTORIC AND CULTURAL PRESERVATION

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers located on or near the site? ☐ Yes ☒ No. If yes, specifically describe.

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

No archaeological or historic-period sites were identified for this review within the proposed landfill site.

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

The Temp Flare project presented no risk of impacts to cultural or historic resources, as the flare and blower are installed on a surface mounted skid and the sulfur treatment plant required minimum excavation on a previously disturbed area backfilled with engineered fill.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

Halting of work if any suspected or previously unknown archaeological materials are found, with inspection of material by a qualified archaeologist or county coroner (if human burials are found).

14. TRANSPORTATION

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on-site plans, if any.

Meridian Avenue E is the main road used to access the site. No changes to access proposed.

b. Is site or affected geographic area currently served by public transit? ☐ Yes ☒ No. If yes, generally describe. If not, what is the approximate distance to the nearest transit stop?

Distance to the nearest transit stop is approximately 9 miles.

c. How many parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

No changes to parking

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? ☐ Yes ☒ No. If yes, generally describe (indicate whether public or private).

e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? ☐ Yes ☒ No. If yes, generally describe.

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

No new trips are being created.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? ☐ Yes ☒ No. If yes, generally describe.

h. Proposed measures to reduce or control transportation impacts, if any:

None

15. PUBLIC SERVICES

a. Would the project result in an increased need for public services (for example, fire protection, police protection, public transit, health care, schools, other)? ☐ Yes ☒ No. If yes, generally describe.

b. Proposed measures to reduce or control direct impacts on public services, if any:

None

16. UTILITIES

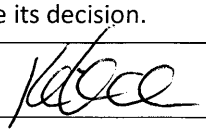
a. Indicate utilities currently available at the site:

☒ Electricity	☐ Natural gas	☐ Water	☐ Refuse Service
☒ Telephone	☐ Sanitary Sewer	☐ Septic System	☐ Other (specify):

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity that might be needed.

Electricity is provided to the landfill by Puget Sound Energy (PSE). Electrical conduits and associated wire have been installed as needed to provide power to the Temp Flare.

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.	
Signature	
Name	Kevin Green
Position	District Manager
Agency/Organization	Waste Connections
Date Submitted	7/7/23