REPORT

Air Toxics Emissions Inventory Plan

City of Lompoc Sanitary Landfill, Lompoc California Facility ID: 8774 Stationary Source ID: 8772

Submitted to:

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Distribution List

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1.0 INTRODUCTION

WSP USA, Inc. (WSP) has updated this this Air Toxics Emissions Inventory Plan (ATEIP) originally prepared by Golder Associates, Inc. upon the request from the Santa Barbara County Air Pollution Control District (SBCAPCD or District) on behalf of the City of Lompoc. Pursuant to the SBCAPCD request, this ATEIP follows the SBCAPCD guidelines. The requested electronic copies of the modeling protocol tables are provided on a compact disc. The emission inventory prepared data used in the preparation of this ATEIP are for the calendar year of 2018. It is intent of the City of Lompoc to use 2018 as the basis for the emissions calculated in the upcoming Air Toxics Emissions Inventory Report.

The City of Lompoc recognizes that this plan must be approved before the Air Toxics Emissions Inventory Report can be finalized and submitted to SBCAPCD. The SBCAPCD Guidelines for Preparing ATEIPs and ATEIRs in Santa Barbara County (Guidelines) were followed in the preparation of this plan. When possible, specific guidelines are identified as the information is provided.

The following sections provide information regarding the calculation of potential emissions of toxic air contaminants (TACs) from the Lompoc Sanitary Landfill and the methodology for modeling the potential impacts from TACs. General facility and source information is provided in Section 2.0. Section 3.0 includes sample calculations and emission factors. Section 4.0 describes the modeling approach.

2.0 GENERAL INFORMATION

2.1 Facility Information

The Guidelines request the following information be provided for each stationary source:

- Stationary source name
- Stationary source identification number (SSID)
- All facility names and facility identification numbers (FIDs) associated with the stationary source
- Location (street address, UTM coordinates, including datum)
- Description of stationary source operations
- Comprehensive process flow diagram
- Plot plan of stationary source
- Aerial photo map

The permitted name of the landfill is Lompoc Sanitary Landfill. The stationary source identification number is 8772. There is only one facility identification number and it is 8774. The device identification numbers for the facility are presented in Table 1.

Table 1: Device Identification Numbers

Device	Device Identification Number
Municipal Solid Waste Landfill	114827
Landfill Gas Collection Wells	390237
Landfill Gas Piping System	390241
Landfill Gas Blowers	390238
Condensate Knockout	390240
Enclosed Flare	390236
Waste Grinder Engine	114674
Solvent Usage (exempt)	114829
Used Oil Tanks (2) (exempt)	114828
Propane Tanks (2) (exempt)	390242
Water Storage Tank (exempt)	393005

The facility is located at the south end of Avalon Street in Lompoc, California. The physical address is 700 S. Avalon Street, Lompoc, California 93436. The plot plan is depicted in Figure 1 and the facility boundary is shown in the aerial photo map in Figure 2. The UTM coordinates (datum NAD 83) are presented in Table 2.

Table 2: Facility Boundary UTM Coordinates (starting at the northeast corner and circling clockwise)

North	East
3834851.5	730995.3
3834714.3	730996.5
3834105.6	730998.0
3833897.6	730966.1
3834070.3	730286.4
3834371.3	730341.0
3834334.6	730433.1
3834397.2	730519.0
3834624.5	730596.8
3834825.1	730596.3

2.2 Stationary Source Operations

The Lompoc Sanitary Landfill is a canyon-type municipal solid waste landfill that commenced operations in 1961. The facility covers 115.4 acres and the waste disposal footprint is 39 acres. As of January 1, 2019, the mass of the waste-in-place at the landfill is 2,314,993 tons. The maximum elevation of the site is 460 feet above the landfill and the maximum depth below grade surface is 90 feet. The design capacity of the landfill is 6.1 million cubic meters. The estimated closure date for the landfill is 2045.

The Lompoc Sanitary Landfill receives approximately 107 tons per day based upon the mass of waste received in 2018. The landfill operates under a Solid Waste Facility Permit issued by the Santa Barbara County Public Health Department Environmental Health Service Division, which allows the landfill to accept up to 400 tons per day of municipal waste and receive up to 6,000 vehicles per month. The facility includes various areas for recyclable waste including electronic waste. The landfill operations consist of a fill and cover with either clean soil or an alternative daily cover (ADC). Alternatives to clean soil include ground wood and green waste, ground construction and demolition materials, water treatment plant filter material (WTPFM) and tarps. In 2018 WTPFM mixed with clean soil was used for cover. Cover materials are applied at the end of each day to control vectors, fires, odors, blowing liter and scavenging.

The processes at the facility are depicted in the process flow diagram (Figure 3). Waste is accepted and covered as previously described. Landfill gas (LFG) is produced by the anaerobic digestion of organic waste in the material deposited. Landfill gas is comprised largely of methane and carbon dioxide (CO2) with smaller amounts of non-methane organic compounds (NMOC). Some NMOCs are also TAC.

The LFG is collected through a series of pipes and wells with perforations and routed using blowers to an enclosed landfill gas flare. The collection system is estimated to collect 75 percent of the LFG generated through anaerobic digestion. The remaining 25 percent escapes from the landfill as fugitive emissions.

The flare destroys at least 98 percent of NMOCs and converts methane to CO2. The flare must operate whenever LFG is being routed to it. The flare temperature is maintained at a high enough level to control the landfill gas emissions in accordance with the requirement for 98 percent destruction.

Green waste is also processed at the landfill. Wood and green waste brought in by self-haul customers is processed on site and used as ADC. Source separated green or wood waste material is diverted to a recycling area where the material is off-loaded by the customer. A portable grinder powered by a 630 bhp engine is used to grind the wood or green waste. The ground wood or green waste is also used as ADC.

The facility has designated areas for recycling metal and appliances, cardboard, tires, electronic waste, used oil and oil filters, concrete and topsoil.

Condensate is a liquid that is formed when the warm, moist landfill gas is transported through the collection system to the enclosed flare. The condensate is collected and periodically injected into the flare where it is converted in the combustion chamber into steam and any NMOCs that might be present are destroyed.

The site is accessed by a paved road. The site haul roads and dumping aprons are watered to maintain dust control. Ground roadway material is used in the winter to control dust in the pad area. The material is received at no charge at the landfill and spread out over the area and compacted. Nothing is added and no additional processing of the material is performed. There is no available SDS for the material.

The following potential sources of Toxic Air Contaminants (TAC) have been identified:

- Unpaved Roads (controlled with watering)
- Paved Roads
- Diesel-fired Grinder Engine
- Municipal Solid Waste Landfill (Landfill gas) fugitive

- Enclosed Flare
- Earthmoving Activities
- Tarp -O- Matic diesel-fired Engine

A summary of the devices and the TACs emitted by each are summarized in Appendix A.

2.3 Device Operation Schedule

The Guidelines require a table listing the operating schedule for devices present at the facility. In Table 3 the devices identified at the facility and potential sources of TAC emissions are listed with the following information as requested in the Guidelines:

- Device name
- Device ID number (if available)
- Device description
- Number of operating hours per day
- Number of operating hours per year
- Hours operated
- Number of operating days per week
- Days of the week operated
- Number of operating weeks per year
- Primary function of the landfill (yes or no)
- HARP 2 Source ID for sources where emissions are released

Table 3: Device Operation Schedule

Device Information	Operating Schedule	Primary Function of the Landfill?	HARP 2 Source ID
Municipal Solid Waste Landfill Device ID #114827 Landfill gas generated through anaerobic digestion	24 hours per day 8,760 hours per year 00:00 to 24:00 7 days per week Monday through Sunday 52 weeks per year	Yes	MSW_FUG
Landfill Gas Collection Wells Device ID # 390237 Wells with perforations to collect landfill gas below surface – no associated TAC emissions	24 hours per day 8,760 hours per year 00:00 to 24:00 7 days per week Monday through Sunday 52 weeks per year	Yes	Not Applicable
Landfill Gas Piping System Device ID # 390241 Pipes to	24 hours per day 8,760 hours per year 00:00 to 24:00	Yes	Not Applicable

Device Information	Operating Schedule	Primary Function of the Landfill?	HARP 2 Source ID
connect wells to blower – no associated TAC emissions	7 days per week Monday through Sunday 52 weeks per year		
Landfill Gas Blowers Device ID # 390238 Electric blowers to pull landfill gas from the waste field to the enclosed flare – no associated TAC emissions	24 hours per day 8,760 hours per year 00:00 to 24:00 7 days per week Monday through Sunday 52 weeks per year	Yes	Not Applicable
Condensate Knockout Device ID # 390240 Condensate removal from landfill gas collection system – no associated TAC emissions	24 hours per day 8,760 hours per year 00:00 to 24:00 7 days per week Monday through Sunday 52 weeks per year	Yes	Not Applicable
Enclosed Flare Device ID # 390236 12.01 MMBtu/hr LFG Specialist flare to combust landfill gas with propane auxiliary fuel	24 hours per day 8,760 hours per year 00:00 to 24:00 7 days per week Monday through Sunday 52 weeks per year	Yes	FLARE
Waste Grinder Engine Device ID #114674 EPA Tier 4, 630 Bhp-hr, Diesel-fired Caterpillar C18 engine to power waste grinder	Operated as needed Up to 8 hours per day Up to 1,000 hours per year 7:00 am to 4:00 pm 7 days per week Monday through Sunday 52 weeks per year	No	DIESEL_ENG
Used Oil Tanks (2) (exempt) Device ID # 114828 Two 400 gallon used lubricating oil storage tanks	24 hours per day 8,760 hours per year 00:00 to 24:00 7 days per week Monday through Sunday 52 weeks per year	No	Not Applicable
Propane Tanks (2) (exempt)	24 hours per day 8,760 hours per year 00:00 to 24:00	Yes	Not Applicable
Device ID # 390242 Two 5-gallon propane storage tanks used for pilot for the enclosed flare	7 days per week Monday through Sunday 52 weeks per year		
Water Storage Tank (exempt) Device ID # 393005 A 10,000 gallon water storage tank – No associated TAC emissions	24 hours per day 8,760 hours per year 00:00 to 24:00 7 days per week Monday through Sunday 52 weeks per year	No	Not Applicable
Unpaved Roads	8.5 hours per day Monday through Friday	Yes	UPV

Device Information	Operating Schedule	Primary Function of the Landfill?	HARP 2 Source ID
Unpaved vehicle travel areas which emit fugitive dust	6 hours per day Saturday and Sunday 2,757 hours per year maximum 7:30 am to 4 pm Monday through Friday 10 am to 4 pm Saturday and Sunday 7 days a week Monday through Sunday 52 weeks per year (Closed 12 days per year for holidays)		
Paved Roads Paved vehicle travel areas which emit fugitive dust	8.5 hours per day Monday through Friday 6 hours per day Saturday and Sunday 2,757 hours per year maximum 7:30 am to 4 pm Monday through Friday 10 am to 4 pm Saturday and Sunday 7 days a week Monday through Sunday 52 weeks per year (Closed 12 days per year for holidays)	Yes	PV
Earthmoving Includes waste placement, cover material mixing and placement and compaction	8.5 hours per day Monday through Friday 2,210 hours per year maximum 7:30 am to 4 pm Monday through Friday 5 days a week Monday through Friday 52 weeks per year (Closed 12 days per year for holidays)	Yes	WBL_FUG1-11 BRW_FUG MSW_FUG 1-15
Tarp-O-Matic	1 hour per day 5 days per week 52 weeks per year.	No	TARP_ENG

3.0 EMISSION CALCULATION METHODOLOGY

The Guidelines require a description of the emission calculation methodology for each TAC emitting device. The District requests the use of site-specific emission factors from district-approved source tests. If these factors are not available, the District has published District approved emission factors for TACs. If emission factors are not available from either of these two sources, emission factors published from the California Air Resources Board were used. Lastly, other published sources such as the U.S. EPA Compilation of Air Emission Factors or industry sources were reviewed for emission factors. Emission factors referenced in this plan are presented in Appendix B.

A copy of the 2018 Flare Source Test is used as a reference for the emission factors is also included in Appendix B.

The emission factors used, parameters and equations for each TAC device are presented below.

3.1 Unpaved Roads

Several areas on the landfill where vehicles travel are not paved. Dust particles may become airborne due to tire friction and wake effects when vehicles pass. The U.S. EPA Compilation of Air Emission Factors (AP42) has a methodology for determining the emissions of particulates from unpaved surface vehicle traffic. The equation from AP42 is listed below as Equation 1.

$$E = k * \left(\frac{S}{12}\right)^{a} * \left(\frac{W}{3}\right)^{b}$$

Equation 1

Where:

E	= TSP emission factor (lb/Vehicle Mile Traveled (VMT))
k	= particulate fraction empirical constant (lb/VMT)
a, b	= size specific empirical constants (unitless)
S	= silt content of surface material (%)
W	= mean vehicle weight (tons)

The appropriate k, a, and b factors for industrial roads from Table 13.2.2-2 in AP42 will be used to calculate the emission factor. The unitless k value for PM30 (assumed to be Total Suspended Particulate) is 4.9. The values for a and b are 0.7 and 0.45 respectively. The silt content of surface material on the unpaved roads will be determined through sampling and laboratory testing. The testing protocol is presented in Appendix C.

The mean vehicle weight of vehicles traveling on the unpaved roads during 2018 will be determined using data provided by the City of Lompoc and presented in Appendix D. Unpaved roads have been segmented based on use. The segments are presented in Figure 2. Vehicle types, weights and segments traveled are summarized in Table 4.

Table 4: Unpaved Road Vehicle Weight Data

Vehicle Type	Material Hauled/Location	Number of Vehicles in 2018	Average Load Weight (tons)	Average Vehicle Weight (tons)	Average Vehicle Weight on Road (tons)	Roadway Segment(s)
End Dumps with WTPFM only	WTPFM/Cover Material Mixing Area	819	22.51	12	23.26	UPV6, (New)
Route/Roll- off Trucks	Refuse/ Waste Placement Area	5075	6.41	16.5	19.71	UPV6, UP2
Commercial (2 Axle Trailers, Dump Box Trucks)	Refuse/ Waste Placement Area	2334	1.41	4.88	5.59	UPV6, UP2

Vehicle Type	Material Hauled/Location	Number of Vehicles in 2018	Average Load Weight (tons)	Average Vehicle Weight (tons)	Average Vehicle Weight on Road (tons)	Roadway Segment(s)
Small (Cars, Pickups, Single Axle Trailers)	Refuse/ Waste Placement Area	6486	0.33	3	3.17	UPV6, UP2
Route/Roll- off Trucks	Recycle Area	790	4.64	16.5	18.82	UP7
Commercial (2 Axle Trailers, Dump Box Trucks)	Recycle Area	1911	1.01	4.1	4.61	UP7
Small (Cars, Pickups, Single Axle Trailers)	Recycle Area	11033	0.29	3	3.15	UP7
Water Truck	Water Tank and Throughout Landfill		16	11.5	19.5	UP1, UP2, UP3, UP4, UP5, UP6, UP7
Scraper	Cover Material from the Mixing Area to the Waste Placement Area		20	41.72	51.72	UPV5
City of Lompoc Trucks for Employee Use	Employee Access Roads and Waste Placement Area	2118	0	3	3	UP2, UP3, UP4

During 2018 28,448 vehicles accessed the landfill to either deliver WTPFM or drop off refuse or recyclables. The vehicles that traveled on unpaved road segments are listed in Table 4 above. Because a large number of vehicles never traveled to the waste placement area, the unpaved roadway was divided into segments based upon the location to which the vehicles traveled, and the average vehicle weight was determined for each segment. The vehicle miles for each segment were multiplied by the average vehicle weight and the annual number of miles traveled by the vehicle classification. These values were summed and then divided by the total annual number of vehicle miles traveled on the unpaved roadway segment to determine the mean vehicle weight for the segment.

Average load weights were reported by the City of Lompoc (see Appendix D). Empty vehicle weights were determined using published references. According to Department of Motor Vehicle records, an empty garbage route truck weighs 16.5 tons. The average on road truck or SUV weighs 3 tons. An empty truck capable of hauling at least 23 tons of material is 20,000 to 26,000 pounds according to the United States Department of Energy (https://www.energy.gov/eere/vehicles/fact-621-may-3-2010-gross-vehicle-weight-vs-empty-vehicle-weight). Commercial vehicles capable of hauling at least 2 tons not including landscape trucks have an average empty vehicle weight of 4.88 tons. Those hauling lighter loads including landscape materials have a slightly lower vehicle weight of 4.1 tons.

The mean vehicle weight over each type of vehicle and the average load for each vehicle type was calculated by averaging the empty vehicle weight with the full vehicle weight. For example, full route trucks enter an unpaved area to unload and leave empty making the mean vehicle weight an average of 16.5 tons and 22.91 tons, or 19.71 tons. Similarly, the average small vehicle hauling refuse weight would be 3.17 tons (3 tons empty and 3.33 tons with load).

The mean vehicle weight by unpaved road segment is calculated by multiplying the average vehicle weight for each class of vehicle traveling on the segment by the total number of miles that class of vehicle travels on the segment and totaling for each roadway segment. The total value is then divided by the total vehicle miles traveled on the segment. This provides a representative average vehicle weight for the segment. The average vehicle weights by segment are provided in Table 5 below.

Table 5: Average Vehicle Weight by Unpaved Road Segment

Roadway Segment Identification	Description of Roadway Segment	Vehicle Type	Average Vehicle Weight by Type (tons)	Vehicle Miles Traveled on Segment by Vehicle Type	Total Vehicle Miles Traveled on Unpaved Road Segment	Average Vehicle Weight of Segment
UP1	Water Truck Route to Water Tank	Water Truck	19.5	440.3	440.3	19.5
UP2	From Cover Material Mixing to Refuse/ Waste Placement Area	Water Truck	19.5	619.2	9456.7	10.0
		Route/Roll-off Trucks	19.71	2,800.9		
		Commercial (2 Axle Trailers, Dump Box Trucks)	5.59	3579.6		
		Small (cars, pickups, single Axle Trailers	3.17	1288.1		
		City of Lompoc Truck for Employee Use19	3	1168.9		
UP3	Roadway to open area	Water Truck	19.5	1197.1	3456.8	8.7
		City of Lompoc Trucks for Employee Use	3	2259.7		
UP4	Utility Road on south and west sides of landfill	Water Truck	19.5	1848.1	5336.7	8.7
		City of Lompoc Trucks for Employee Use	3	3488.6		
UP5	Scrapper Route	Water Truck	19.5	202	432.7	37.5
		Scrapper	51.72	241.1		
UP6		Water Truck	19.5	141.2	1993.5	11.0

Roadway Segment Identification	Description of Roadway Segment	Vehicle Type	Average Vehicle Weight by Type (tons)	Vehicle Miles Traveled on Segment by Vehicle Type	Total Vehicle Miles Traveled on Unpaved Road Segment	Average Vehicle Weight of Segment
	From End of Pavement to Cover Material Mixing Area	End Dumps with WTPFM only	23.26	103.1		
		Route/Roll-off Trucks	19.71	638.9		
		Commercial (2 Axle Trailers, Dump Box Trucks)	5.59	293.8		
		Small (Cars, Pickups, Single Axle Trailers)	3.17	816.5		
UP7	From End of Paved Road to Recycle	Water Truck	19.5	32.8	433.9	5.4
		Route/Roll-off Trucks	18.82	23.1		
		Commercial (2 Axle Trailers, Dump Box Trucks)	4.61	55.8		
		Small (Cars, Pickups, Single Axle Trailers)	3.15	322.2		

A water truck operates on site and hauls water from the water tank and sprays the unpaved roads, borrow material areas and any other exposed soil areas that are not crusted. The water truck capacity is 4000 gallons which weighs approximately 32,000 pounds at an average water density of 8 pounds per gallon. The weight of the water truck is 23,000 pounds. Therefore, the average vehicle weight is 39,000 pounds ((23,000 + 55,000)/2). This weight will be used for estimating emissions from all unpaved roads on site including the unpaved road to and from the water tower (UP1).

The facility uses a 20-ton scraper to move a mixture of soil and WTPFM from the borrow material area to the waste placement area (UP5). An empty scraper of this size is reported to weigh 83,441 pounds empty. Therefore, the average vehicle weight for the borrow area is 103,441 pounds (average of 83,441 pounds and 123,441 pounds) and this vehicle weight will be used in the borrow material area (UP5).

The unpaved surfaces throughout the landfill where vehicles travel are routinely watered. The moisture content of the material on the unpaved roads will be measured using the methodology in Appendix C. Once the measured moisture content is determined, SBCAPCD will determine the percent control efficiency for watering for the unpaved roads.

The average gallons per day of water applied by water truck by month for the year 2018 is presented in Table 6.

Table 6: Average Daily Water Use in 2018

Month	Average Daily Water Usage (gallons)
January	7,532
February	9,031
March	5,574
April	7,661
May	14,810
June	16,481
July	18,800
August	18,507
September	17,023
October	14,115
November	18,914
December	3,142

As shown in the table the daily average did vary by ambient temperature and rainfall. The table does establish that a regular watering program was in place throughout the year. Watering occurs as needed. Site personnel watering daily and increase the frequency if dust is observed from roadways and when wind speeds increase. A detailed record of watering events is not maintained at the site. Fugitive dust is logged if levels reach 20% opacity. No opacity levels of 20% or higher were recorded in 2018.

The following equation will be used for calculating the annual emissions from unpaved roads:

$$EM_{c\ annual} = E * VMT_{annual} * \mathrm{WF}_c * (1 - \%ControlEfficiency)$$

Equation 2

Where:

$EM_{C\ annual}$	= Average Annual Emissions of Pollutant C (lb C/yr)
E	= TSP emission factor by vehicle classification (lb/VMT)
VMT_{annual}	= Annual Vehicle Miles Traveled by classification (mile)
WF_c	= Weight Fraction of Pollutant C (lb TAC/ lb PM)

The TSP factor will be calculated using Equation 1 as previously described. As previously described unpaved roads were divided into segments based upon use. Round trip distances for each segment were measured and are presented in Table 7 below.

Table 7: Round Trip Distances for Unpaved Roadway Segments

Roadway Segment Identification	Description	Length of Segment (miles)	Length of Round Trip (miles)	Total Number of Vehicle Trips	Total Number of VMT
UP1	Water Truck Route to Water Tank	0.20	0.39	1122	440.3
UP2	From Cover Material Mixing to Refuse/ Waste Placement Area	0.28	0.55	17,135	9,456.8
UP3	Roadway to open area	0.53	1.07	3,240	3,456.7
UP4	Utility Road on south and west sides of landfill	0.82	1.65	3,240	5,336.7
UP5	Scrapper Route	0.09	0.17	2534	432.7
UP6	From End of Pavement to Cover Material Mixing Area	0.06	0.13	15,836	1,993.6
UP7	From End of Paved Road to Recycle	0.01	0.03	14,856	433.9

The City of Lompoc conducted a detailed vehicle count for the year 2018 (Appendix D). The vehicle count includes the destination of the vehicles. The location of the destination of each vehicle was marked on the site map and the distance measured. These data were used to calculate the vehicle miles traveled during 2018 for each unpaved road segment.

Based on the volume of water hauled by the water truck in 2018, it was determined that the water truck made 1122 trips. The water truck sprays all unpaved roads on site. Therefore, 1122 vehicle trips were added to every unpaved road segment when determining the number of vehicle miles traveled in 2018.

Employees on site travel along other unpaved roadways to check on the landfill gas system and other perimeter areas. These roadways are depicted as UP3 and UP4 in Figure 2. Additionally, 3 employees worked on the site and accessed the waste placement area daily using light duty trucks. It is assumed two round trips per day are made using a facility pickup truck along each of these roads by each employee.

Cover material is created by mixing native soil with WTPFM on a 1 to 1 basis. During 2018 a scraper was used to carry material to the working face. The travel area from the working face to the cover material mixing area is 0.09 miles long (0.17 miles round trip). The scraper makes a maximum of 4 trips per day. Therefore, an additional 432.7 miles of emissions using the average vehicle weight of the scraper and the water truck will be attributed to the scrapper route (UP5).

The following equation will be used for calculating the maximum hourly emissions from unpaved roads:

$$EM_{c\ hourly} = E * VMT_{hou} \quad * WF_c * (1 - \%ControlEfficiency)$$

Equation 3

Where:

$EM_{C\ hourly}$	= Maximum Hourly Emissions of Pollutant C (lb C/yr)
E	= TSP emission factor by vehicle classification (lb/VMT)
VMT_{hourly}	= Maximum Hourly Vehicle Miles Traveled by classification (miles)
WF_c	= Weight Fraction of Pollutant C (lb TAC/ lb PM)

Traffic at the landfill is not measured on an hourly basis. However, some hours are typically busier than others. Generally, the beginning of the day when the route trucks enter the landfill from the first part of their daily routes is the busiest time of the day. After the first routes, the timing of the unloads will vary by a greater amount. The typical time to weigh and unload a route truck is 10 to 15 minutes. Assuming 10 minutes as a minimum, and two route trucks at a time unload, the maximum number of route trucks that can be unloaded in an hour is 12. Other vehicles take longer and they may unload while route trucks are unloading. Therefore, assuming 10 other vehicles are unloading while route trucks are unloading is a conservative estimate. If the workers were traveling to and from the working face during the same hour, there would be 3 light trucks during the hour as well. Therefore, the maximum number of hourly vehicle miles traveled would be 12 for route trucks, 10 for other loaded vehicles and 3 for unloaded vehicles for a total of 25 vehicles.

All other roads are only accessed as needed. A maximum hourly travel rate would be two round trips per hour.

3.2 Paved Roads

The roadway from the public street to the scale and recycling area is paved. Dust particles may become airborne due to tire friction and wake effects when vehicles pass. The U.S. EPA Compilation of Air Emission Factors (AP42) has a methodology for determining the emissions of particulates from paved surface vehicle traffic. The equation from AP42 is listed below as Equation 4.

$$E = k * sL^{0.91} * W^{1.02}$$

Equation 4

Where:

E	= particulate emission factor (lb/Vehicle Mile Traveled (VMT))
k	= particle size multiplier for particle size range (lb/VMT)
sL	= road surface silt loading (grams per square meter) (g/m^2)
W	= average vehicle weight (tons) of the vehicles traveling the road

The value of k for TSP is 0.011 lb/VMT. The silt loading factor will be provided by SBCAPCD based on sampling and laboratory testing.

During 2018 35,088 vehicles entered the landfill to place waste or deliver WTPFM. In addition to the 35,088 vehicles which entered the site to place waste or deliver WTPFM, workers, suppliers, and inspectors routinely access the site. Assuming each worker drives their own vehicle, and 2 additional vehicles access the site daily, an additional 1,765 vehicles would travel on the paved road in a year. It is also assumed the paved roads are traveled upon by workers during their work duties. Therefore, an additional 2118 trips for work trips will be included. Also the water truck would travel on the paved road for 1122 trips. Therefore, the total number of vehicles is 40,093.

The average vehicle weight is calculated based on the average weight of the vehicles and the percentage of the vehicle mix the vehicles represent. It is assumed vehicles that drop off material at the scales carry the same loads as vehicles hauling to refuse. The fleet average is calculated by multiplying the average vehicle weight by the percentage of the fleet represented by the vehicle. The data used to calculate the fleet average vehicle weight is presented in Table 8.

Table 8: Average Vehicle Weight for Paved Roads

Vehicle Type	Average Weight by Type (Tons)	Number of Annual Trips	Percentage of Vehicle Fleet	Contribution to Vehicle Average Weight
Water Truck	19.5	1122	2.8	0.55
Route/Roll-off Trucks with refuse	19.71	5075	12.7	2.50
Route/Roll-off Trucks to recycle	18.82	790	2.0	0.38
Route/Roll-off Trucks to scale	18.1	269	0.7	0.13
Commercial (2 Axle Trailers, Dump Box Trucks) with refuse	5.59	2334	5.8	0.32
Commercial (2 Axle Trailers, Dump Box Trucks) to recycle	4.61	1911	4.8	0.22
Commercial (2 Axle Trailers, Dump Box Trucks) to scale	5.36	442	1.1	0.06
Small (Cars, Pickups, Single Axle Trailers) with refuse	3.17	6486	16.2	0.51
Small (Cars, Pickups, Single Axle Trailers) to recycle	3.15	11,033	27.5	0.87
Small (Cars, Pickups, Single Axle Trailers) to recycle	3.12	5929	14.8	0.46

Vehicle Type	Average Weight by Type (Tons)	Number of Annual Trips	Percentage of Vehicle Fleet	Contribution to Vehicle Average Weight
City of Lompoc Trucks for Employee Use, Worker Commutes, Suppliers and Inspectors	3	3883	9.7	0.29
End Dumps with WTPFM only	23.26	819	2.0	0.47
Total Vehicles	40,093			
Total Percentage of Vehicle Fleet	100.1			
Average Vehicle Weight of Fleet	6.76			

The length of the paved road is 0.7 miles. One round trip equals 1.4 miles. The total vehicle miles traveled on the road in 2018 would be 56,130.2 miles.

The following equation will be used for calculating the annual emissions from paved roads:

$$\mathrm{EM}_{c\ annual} = E * \mathrm{VMT}_{annual} * \mathrm{WF}_c$$

Equation 5

Where:

$EM_{C\ annual}$	= Average Annual Emissions of Pollutant C (lb C/yr)
E	= Paved Road Emission Factor (lb/VMT)
VMT_{annual}	= Annual Vehicle Miles Traveled (miles)
WF_c	= Weight Fraction of Pollutant C (lb TAC/ lb PM)

The concentration of compounds has been provided by SBCAPCD. The values have been added to the emission factor summary in Appendix B.

The following equation will be used for calculating the maximum hourly emissions from paved roads:

$$EM_{c\ hou} = E * VMT_{hourly} * WF_c$$

Equation 6

Where:

$EM_{C\ hourly}$	= Maximum Hourly Emissions of Pollutant C (lb C/yr)
E	= Paved Road Emission Factor (lb/VMT)
$VMT_{\ hourly}$	= Maximum Hourly Vehicle Miles Traveled (miles)
WF_c	= Weight Fraction of Pollutant C (lb TAC/ lb PM)

Traffic at the landfill is not measured on an hourly basis. However, some hours are typically busier than others. Generally, the beginning of the day when the route trucks enter the landfill from the first part of their daily routes is the busiest time of the day. After the first routes, the timing of the unloads will vary by a greater amount. The typical time to weigh and unload a route truck is 10 to 15 minutes. Assuming 10 minutes as a minimum, and two route trucks at a time unload, the maximum number of route trucks that can be unloaded in an hour is 12. Other vehicles take longer to unload and they may unload while route trucks are unloading. Therefore, assuming 10 other vehicles are unloading while route trucks are unloading is a conservative estimate. If the workers were traveling to and from the working face during the same hour, there would be 3 light trucks during the hour as well. Therefore, the maximum number of hourly vehicle miles traveled would be 12 for route trucks, 10 for other loaded vehicles and 3 for unloaded vehicles for a total of 25.

3.3 Diesel-Fired Grinder Engine

The 630 bhp-hr Caterpillar C18 internal combustion engine is used to power the Morbark 3800 Wood Hog waste grinder. The engine is an EPA Tier 4 transitional engine equipped with a turbo charger and aftercooler. The engine operated 335 hours in 2018. The TAC emissions will be calculated using the hours operated in 2018, the inventory year, and the equation in Section 2.4.1 of the SBCAPCD’s Approved Emission Factors for Toxic Air Contaminants.

The average annual emissions equation that will be used is:

$$Em_{\ DPM\ Annual} = \frac{EF_{gDPM/bhp-hr} * BHP * LF * H_{Annual}}{453.6}$$

Equation 7

Where:

DPM	= Diesel PM
$Em_{DPM\ Annual}$	= Average Annual Emissions of diesel PM (lb C/yr)
$EF_{g\ DPM/bhp-hr}$	= PM emission factor (g/bhp-hr)
BHP	= Engine rating brake horsepower of the engine (bhp)
LF	= Load factor (Default of 1)
H_{Annual}	= Hours operated per year (hr/yr)
453.6	= Conversion factor (453.6 g = lb)

The not to exceed particulate factor is 0.022 g/bhp-hr. The maximum hourly emissions are not required to be calculated for a Tier 4 engine.

3.4 Municipal Solid Waste Landfill Fugitives

Landfill gas is collected through wells with perforations below the landfill surface and routed to the enclosed flare for destruction. The collection efficiency of the landfill gas system is 75 percent (AP42, Section 2.4.4.2 and Title V Permit 14708, Condition C.8.a.vii). The remaining 25 percent is released into the atmosphere either through leaks in the collection system or cracks in the landfill cover. These fugitive emissions can potentially occur anywhere within the waste placed footprint or in the gas collection system before the gas reaches the enclosed flare. Therefore, emissions from the following devices are included in the Municipal Solid Waste Landfill Device # 114827:

- Landfill Gas Collection Wells – Device ID #390237

- Landfill Gas Piping System – Device ID #390241
- Landfill Gas Blowers – Device ID #390238
- Condensate Knockout – Device ID #390240.

To determine the amount of emissions that escape the landfill gas control system (fugitive emissions), the amount of landfill gas generated must first be determined. The EPA has developed an equation that is presented in AP42, Chapter 2, Section 4 to use for calculating the annual landfill gas generation rate. This equation will be used to determine the overall landfill gas generated in 2018. The equation is below.

$$Q_{CH4} = 1.3L_o\mathrm{R}(e^{-ke} - e^{-kt})$$

$$Q_P = \frac{Q_{CH4} * C_P}{C_{CH4} * 10^6}$$

Equation 8

Where:

Q_{CH4}	= Methane generation rate at time t, m^3/yr
L_o	= Methane generation potential, m^3 CH_4/Mg of "wet" or "as received" refuse
R	= Average annual refuse acceptance rate during active life (Mg waste/year)
e	= Base log (unitless)
k	= Methane generation rate constant, yr^{-1}
c	= Time since landfill closure (years) (0 for active landfills)
t	= Time since the initial refuse placement (years)
Q_P	= Emission rate of pollutant P (i.e., NMOC), m^3/yr
C_P	= Concentration of pollutant P in LFG
C_{CH4}	= Concentration CH_4 in the LFG (Assumed to be 48.3% expressed as 0.483)

The landfill opened in 1961 and as of January 1, 2019 had 2,314,993 tons of waste in place for an average annual acceptance rate of 39,913.67 tons for the 58 years the landfill had been accepting waste.

The volume of landfill gas collected and combusted by the flare in 2018 was 108,119,806 scf.

The concentration of TAC within the landfill gas is provided by SBCAPCD and is presented in Appendix B. Therefore, the mass of specific pollutant emitted during 2018 will be calculated as follows:

$$Em_{c\ Annual} = \frac{LFG_{Annual} * \mathrm{MW} * Conc_{c\ ppmv}}{\mathrm{MV} * 10^6}$$

Equation 9

Where:

C	= Specific pollutant
$Em_{c\ Annual}$	= Average annual emissions of pollutant C (lb C/yr)
LFG_{Annual}	= Annual fugitive landfill gas emissions to atmosphere (scf/year)
$Conc_{c\ ppmv}$	= Concentration of specific pollutant in ppmv
MV	= Molar Volume (379.62 scf/lb-mol)
MW	= Molecular Weight of specific pollutant, C (lb/lb-mol)
10^6	= Conversion factor for concentration in ppmv

The maximum hourly emissions equation that will be used is:

$$Em_{C\ Max\ Hourly} = \frac{LFG_{Annual} * MW * Conc_{C\ ppmv}}{(8760) * MV * 10^6}$$

Equation 10

Where:

C	= Specific pollutant
$Em_{C\ Annual}$	= Average annual emissions of pollutant C (lb C/yr)
LFG_{Annual}	= Annual fugitive landfill gas emissions to atmosphere (scf/year)
$Conc_{C\ ppmv}$	= Concentration of specific pollutant in ppmv
MV	= Molar volume (379.62 scf/lb-mol)
MW	= Molecular weight of specific pollutant, C (lb/lb-mol)
8760	= Number of hours in a year (8760 hours/year)
10^6	= Conversion factor for concentration in ppmv

Fugitives occur throughout the year as landfill gas is generated so it is assumed to be a steady-state event. The annual fugitive concentration divided by the number of hours in a year is used for the hourly emission rate. Numerous published articles on landfill gas collection rates were reviewed. The report from the Solid Waste Industry for Climate Solutions entitled Current MSW Industry Position and State-of-the-Practice of LFG Collection Efficiency, Methane Oxidation, and Carbon Sequestration in Landfills (2008) states that landfills with daily soil cover and an active landfill gas system have a collection efficiency ranging from 50 to 70 percent and that landfills which meet the 40 Code of Federal Regulations (CFR) 60, Subpart WWW requirements should assume a 70 percent collection efficiency. The Lompoc City Landfill complies with the California Air Resources Board (CARB) Landfill Methane Regulation (LMR) which is more stringent than 40 CFR 60, Subpart WWW. CARB has stated that the collection efficiency associated with LMR is 80 percent.

Reviewing the 2018 data for the Lompoc City Landfill, all requirements of 40 CFR 60, Subpart WWW were met as were the requirements for LMR. The Surface Emissions Monitoring results showed one instantaneous reading of 218 ppmv methane and it was the highest reading of the year. This value is below the 500 ppmv requirement of 40 CFR 60, Subpart WWW and only slightly higher than the 200 ppmv action level of CARB LMR. Assuming this event relates to the highest one-hour emission rate for fugitive emissions for the landfill and extrapolating between a value less than 500 ppmv equating to 70 percent collection efficiency to a value of less than 200 ppmv equating to 80 percent collection efficiency, the collection efficiency for this high value would be 79 percent. This assumes a linear scale when comparing concentrations with percent collection efficiencies. Use of nonlinear scales would not change the number greatly because the measured value is so close to the LMR limit.

Because an overall collection efficiency for the landfill of 75 percent is assumed in the CARB calculation program and in the permit for the site, it is conservatively proposed that the hourly collection efficiency used for estimating emissions be the same.

3.5 Enclosed Flare

The collected landfill gas is routed to a 12.01 MMBtu LFG Specialties enclosed flare that controls 98 percent or greater of the NMOC. The flare has a maximum flow rate of 400 scf per minute of landfill gas and is equipped with thermocouples to measure combustion temperature. The flare is also equipped with a continuous flow meter and has a propane pilot flame that is used to start the flare on the rare occasions it goes out.

Emissions from the flare are calculated from the volume of landfill gas that is combusted in the flare and the constituent concentrations of the flare exhaust. The amount of gas combusted in the flare is recorded continuously at the site. In 2018, a total of 108,119,806 scf (108.12 MMscf) of landfill gas was combusted in the flare. The highest daily average flowrate recorded during the year was 240.3 scf per minute.

The SBCAPCD has approved TAC emission factors for the combustion of landfill gas in enclosed flares. These factors will be used with the site-specific landfill gas flow rates to estimate the emissions of TAC in 2018.

The average annual emissions equation that will be used is:

$$\mathrm{Em}_{c\ Annual} = FC_{Annual} * EF_{lb\ C\ /\ MMcf}$$

Equation 11

Where:

C	= Specific pollutant
$\mathrm{Em}_{\mathrm{c\ Annual}}$	= Average annual emissions of pollutant C (lb C/yr)
$\mathrm{FC}_{\mathrm{Annual}}$	= Amount of landfill gas combusted (MMscf/year)
$\mathrm{EF}_{\mathrm{lb\ C/MMscf}}$	= Emission factor lb C/MMscf (SBCAPCD Approved TAC Emission Factors, May 2019)

The maximum hourly emissions will be calculated based on the design of the flare. The flare is rated at 400 scf (0.0004 MMscf) per minute. The maximum hourly emission equation is:

$$\mathrm{Em}_{c\ Hour} = FC_{minute} * 60\ Minutes\ /\ Hour\ *\ \mathrm{EF}_{lb\ C\ /\ MMcf}$$

Equation 12

Where:

C	= Specific pollutant
$Em_{c\ Hour}$	= Maximum hourly emissions of pollutant C (lb C/yr)
FC_{minute}	= Maximum amount of landfill gas combusted in a minute (MMscf/minute)
$EF_{lb\ C/MMscf}$	= Emission factor lb C/MMscf (SBCAPCD Approved TAC Emission Factors, May 2019)

The combustion of propane in the enclosed flare is minimal. Propane is used to start the flare only. The system is programmed to restart the flare using propane if the flare loses flame. In 2018 the flare was restarted using propane on 40 occasions. It takes a maximum of a gallon of propane to restart the flare. Conservatively, it will be assumed that 40 gallons of propane were combusted in 2018. The restart program consists of three tries to restart the flare before the automatic restart is discontinued and the flare must be manually restarted. Therefore, the most propane that could be combusted in a single hour is one gallon because the manual restart takes more than one hour.

The emissions from propane combustion in the flare will be calculated using the SBCAPCD-approved TAC emission factors. To calculate the average annual and maximum hourly emissions of TAC from propane combustion the following equations will be used:

$$Em_{C\ Annual} = \frac{FC_{Annual} * EF_{lb\ C/kgal}}{1000}$$

Equation 13

Where:

C	= Specific pollutant
$Em_{c\ Annual}$	= Average annual emissions of pollutant C (lb C/yr)
FC_{Annual}	= Annual propane combusted (gallons/year)
$EF_{lb\ C/k\ gal}$	= Emission factor lb C/k gal (SBCAPCD Approved TAC Emission Factors, May 2019)
1000	= conversion factor (1000 gal = 1 kgal)

Maximum hourly emissions will be calculated as follows:

$$Em_{C\ Hourly} = \frac{FC_{Hourly} * EF_{lb\ C/kgal}}{1000}$$

Equation 14

Where:

C	= Specific pollutant
$Em_{c\ Hourly}$	= Maximum hourly emissions of pollutant C (lb C/yr)
FC_{Hourly}	= Maximum hourly propane combusted (gallons/hour)
$EF_{lb\ C/k\ gal}$	= Emission factor lb C/kgal (SBCAPCD Approved TAC Emission Factors, May 2019)
1000	= Conversion factor (1000 gal = 1 kgal)

The maximum hourly emissions from the flare for each contaminant combusted on propane will be compared to the emissions for the flare for each contaminant combusted on LFG and the higher of the two will be used to represent maximum hourly flare combustion emissions.

3.5.1 Condensate Injection

Condensate is injected into the flare for removal of possible contaminants. Very small concentrations of landfill gas contaminants may be present and will be controlled by the flare. To determine the emissions of TAC from the flare when condensate is introduced the TAC concentration of the landfill gas as provided by SBCAPCD will be divided by the AP42 NMOC concentration and multiplied by 1 million. This will provide the concentration in the organic portion of the condensate. This methodology has been provided by SBCAPCD.

The NMOC concentration in LFG is 2420 ppmv. Therefore, the concentration of a TAC in the condensate would be calculated as shown in Equation 15.

$$C_{cc} = \frac{C_{CLFG}}{C_{NMOC}} * 1{,}000{,}000$$

Equation 15

Where:

C	= Specific pollutant
C_{cc}	= Concentration in Condensate (ppmv)
C_{CLFG}	= Concentration in LFG (ppmv)
C_{NMOC}	= Concentration of NMOC in LFG (2420 ppmv)
1,000,000	= Constant (unitless)

The annual volume of condensate combusted in 2018 is 19,826 gallons. It is assumed organics make up 5% of the total condensate or 991 gallons. The amount of any one TAC being emitted from the flare annually can be calculated as follows:

$$CE_{TAC} = \frac{C_{cc}}{1{,}000{,}000} * D_c * \mathrm{Con}(1 - \%\mathrm{ControlEfficiency})$$

Equation 16

Where:

C	= Specific pollutant
CE_{TAC}	= Contaminant Emitted (lb/yr)
C_{cc}	= Concentration in Condensate (ppmv)
D_c	= Density of C (lb/gal)
Con	= Condensate Injected (gallons/year)
% Control Efficiency	= Control Efficiency of the flare (98%)
1,000,000	= Constant (unitless)

3.6 Diesel Internal Combustion Engines

Several non-road mobile pieces of equipment are routinely used at the site. These vehicles are self-propelled and are not required to be included in the emission inventory. The only other diesel internal combustion engines are a small engine associated with the power washer and the engine used for the Tarp-O-Matic. The power washer was not used during 2018. Therefore, the Tarp-O-Matic engine is the only engine requiring inclusion in the emission inventory. The location has been updated from previous versions of the ATEIP as a result of using the 2018 aerial maps and photos as indicated during an August 9, 2022 meeting.

The engine is a Kubota, 25 bhp, EPA Tier 4 engine. The engine operated 130 hours in 2018. The TAC emissions will be calculated using the hours operated in 2018, the inventory year, and the equation in Section 2.4.1 of the SBCAPCD's Approved Emission Factors for Toxic Air Contaminants.

The average annual emissions equation that will be used is:

$$Em_{DPM\ Annual} = \frac{EF_{g\ DPM\ /\ bhp-hr} * BHP_* LF_* H_{Annual}}{453.6}$$

Equation 17

Where:

DPM	= Diesel PM
$Em_{DPM\ Annual}$	= Average annual emissions of diesel PM (lb C/yr)
$EF_{g\ DPM/bhp-hr}$	= PM emission factor (g/bhp-hr)
BHP	= Engine rating brake horsepower of the engine (bhp)
LF	= Load factor (Default of 1)
H_{Annual}	= Hours operated per year (hr/yr)
453.6	= Conversion factor (453.6 g = lb)

The not to exceed particulate factor is 0.298 g/bhp-hr. The maximum hourly emissions are not required to be calculated for a Tier 4 engine.

3.7 Fugitive Dust Sources

There are numerous sources of fugitive dust emissions on the site including wind erosion, earthmoving operations, and bulk material handling. The compound specific lb per lb PM emission factors from San Diego Air Pollution Control District and CARB's PM speciation profile for landfill dust have been incorporated into the Misc. Fugitive Dust tab of the spreadsheet, SBCAPCD-Approved TAC Emission Factors and are presented in Appendix B. These compound specific emission factors will be used for fugitive emissions from soils and landfill operations. The chemical profile for the WTPFM is also presented in Appendix E and will be use for the emissions of this material. The calculation methodology and particulate emissions equation for each activity is described in detail below.

3.7.1 Wind Erosion

When winds exceed the threshold wind velocity, fugitive dust may be emitted from the open areas of the landfill. Much of the landfill area is covered with material that forms a crust and when left undisturbed withstands winds. The working face, disturbed areas and borrow material may be subject to wind erosion whenever winds exceed the threshold wind velocity.

The equation from AP42, Chapter 13, Section 2.5, Industrial Wind Erosion can be used to estimate the emissions from wind erosion on dry, disturbed areas:

$$\mathrm{P} = 58(u^* - u_t)^2 + 25(u^* - u_t)$$

Equation 18

Where:

P	= Emissions potential (g/m2/hr)
*u**	= Friction velocity (m/s)
u_t	= Threshold friction velocity (m/s)

The threshold friction velocity could not be determined from the sampling results because the correct sieve sizes were not used. Therefore, the District approved a conservative value of 0.4927 m/s for the threshold friction velocity, which was previously submitted by the Lompoc Sanitary Landfill. Wind speeds measured at the Lompoc H Street monitor were used to calculate u* using the following AP42 equation:

$$u^* = 0.053 * u_{10}$$

Equation 19

Where:

*u**	= Friction velocity (m/s)
u_{10}	= Wind speed measured at 10 meters (m/s)

When the threshold friction velocity is less than the friction velocity, wind-blown emissions do not occur (the expression $(u^* - u_t)$ becomes zero).

Once the emissions potential of the surface is determined, the exposed area is multiplied by P and the control efficiency of the control method and controlled emissions are determined. The annual emission rate equation is below.

$$E_{WBFD\ Annual} = \frac{DA * P * (1 - \%\ Control\ Efficiency)}{453.6}$$

Equation 20

Where:

$E_{WBFD\ Annual}$	= Emissions potential (g/m^2/hr)
DA	= Disturbed area (m^2)
P	= Emissions potential (g/m^2/hr)
453.6	= Conversion factor (453.6 g = lb)

The hourly P values are totaled to determine the total annual emissions. The control efficiency is determined by SBCAPCD based on the results of the soil moisture tests. The soil moisture testing protocol is included in Appendix F.

The hourly equation is similar requiring only the P value for the hour the sustained hourly winds were the highest.

$$E_{WBFD\ Hourly} = \frac{DA * P_{max} * (1 - \%\ Control\ Efficiency)}{453.6}$$

Equation 21

Where:

$E_{WBFD\ Hourly}$	= Emissions potential (g/m^2/hr)
DA	= Disturbed area (m^2)
P_{max}	= Emissions potential for maximum hourly wind speed (g/m^2/hr)
453.6	= Conversion factor (453.6 g = lb)

The percent control efficiency is based on the moisture content of the material. As described for unpaved roads, the facility has a routine watering program for unpaved roads and disturbed areas. Bulk samples of loose material will be collected and laboratory measurements of silt and moisture content will be completed. The percent control efficiency will be determined by SBCAPCD based upon the laboratory analysis results.

3.7.2 Earth Moving Operations

Earth moving operations at the landfill are limited to moving of cover soil from the borrow area to the working face, mixing cover soil with Water Treatment Plant Filter Material (WTPFM) for alternative intermediate cover (AIC), and the compaction of the waste material as it is received at the working face.

3.7.2.1 Scraper

A scraper with a 20-ton capacity is used to move cover material (a 1:1 mix of native soil and WTPFM) from the cover borrow area to the working face to be used as AIC. A load is mixed when it is moved so no more than one load is moved in any one hour. The AP42 section on Heavy Construction Operations (Chapter 13, Section 2.3) recommends the use of factors or equations from Chapter 11, Section 9, Western Surface Coal Mining. For moving material from the cover soil pile to the working face, AP42 Chapter 13 recommends the use of the topsoil removal by scraper factor in Table 11.9-4. This factor is 0.058 pounds of TSP per ton of material moved. This factor is uncontrolled. Samples from the cover material pile will be analyzed for moisture content. The methodology is described in Appendix F for both the sampling and the laboratory analysis. Based upon the results of the samples, SBCAPCD will determine the control efficiency to be applied. The equation for hourly emissions is as follows:

$$E_{CSM\ Hourly} = EF_{STS} * \mathrm{SC} * (1 - \%\mathrm{ControlEfficiency})$$

Equation 22

Where:

$E_{CSM\ Hourly}$	= Hourly emissions potential (lb/hr)
EF_{STS}	= Emission factor for scraper moving topsoil (lb/ton of material moved) (AP42, Table 11.9-4)
SC	= Scraper capacity (tons)

For annual emissions, the calculation is based on the total amount of material moved in a year. In 2018, the landfill moved 18,302 tons of cover soil to the working face. The equation for annual emissions is below.

$$E_{CMS\ Annual} = EF_{STS} * MM_{Annual}\ (1 - \%\mathrm{ControlEfficiency})$$

Equation 23

Where:

$E_{CSM\ Annual}$	= Annual emissions potential (lb/yr)
EF_{STS}	= Emission factor for scraper moving topsoil (lb/ton of material moved) (AP42, Table 11.9-4)
MM_{Annual}	= Material moved annually (tons)

3.7.2.2 Dozer

WTPFM is mixed with the cover soil by a dozer on a one-to-one basis. This material is hauled and placed at the working face as part of the regular landfill operations and the emissions associated with these activities have been included with the rest of the waste handling emissions. It was originally speculated that mixed material would have a moisture content of between 15 to 20 percent (Appendix G) Subsequently, the mixed material was tested and the moisture content of the mixture measured at 46.2 and 51.4 percent. References for these values have been included in Appendix G. Equations 24 and 25 for emissions were used to estimate the emissions from this activity. The silt content and moisture content for mixing soil with WTPFM will be provided by SBCAPCD based on sampling and laboratory testing.

The WTPFM is mixed with the soil at a 1-to-1 ratio. The hourly maximum amount of material the dozer can mix is 40 tons. The total amount of material mixed during the year is 18,302 tons of each type of material. The chemical breakdown of the WTPFM is presented in Appendix E and will be used to estimate speciated emissions from this material. The SBCAPCD particulate matter chemical composition will be used to estimate the speciated material for the soil in the mixture.

3.7.2.3 Compaction of Waste

Although compaction is not typically considered an earth moving activity, the emission factors used are from AP42, Chapter 13, so this activity has been included here. The equation from AP42 Table 11.9-1 for bulldozer overburden is recommended for use for compaction in Chapter 13 of AP42. This equation is presented below.

$$EM_{c_{Hourly}} = \frac{5.7\ (S)^{1.2}}{M^{1.3}}$$

Equation 24

Where:

$EM_{C\ Hourly}$	= Hourly emissions from compaction (lb/hr)
S	= Silt content (percentage)
M	= Moisture Content (percentage)

SBCAPCD provided a silt content of 12.7% as proposed in a permit application for the Gregory Canyon Landfill in San Diego County. This silt content will be used for the estimation of emissions from the compactor.

Moisture content of municipal solid waste has been measured using various methods. Because MSW is not homogeneous in nature a range of values have been obtained. The compactor will come in contact with freshly placed waste. Once the waste has been compacted, additional waste or cover material will be placed on top. Solid Wastes Engineering Principles and Management Issues (Tchobanoglous, George, Theisen, Hilary, Eliassen, Rolf, McGraw-Hill, Inc., 1977) provides a range of 15% to 40% with 20% listed as typical for MSW. These samples were of waste as collected before it was placed into a landfill. A moisture content of 19.6% was proposed for the Gregory Canyon Landfill in San Diego County. Therefore, the typical value of 20% moisture will be used to calculate the fugitive emissions from compaction.

The compactor operated 260 days in 2018 for a total of 1048 hours. The annual emissions can be calculated using the equation below.

$$E_{c\ Annual} = \frac{EM_{c\ Hourly} * H_{Annual}}{2000}$$

Equation 25

Where:

$E_{c\ Annual}$	= Annual emissions from compaction (tons/year)
$EM_{C\ Hourly}$	= Hourly emissions from compaction (lb/hr)
H_{Annual}	= Silt content (percentage)
2000	= Conversion factor (1 ton/2000 lb)

3.7.3 Bulk Material Handling

Material is removed from vehicles and placed onto the working face of the landfill. This includes municipal solid waste, green waste, and other bulk wastes. This activity has been referred to as waste placement. At the request of SBCAPCD, AP42 equation 13.2.4 will be used to determine the particulate emission factor for waste placement. The equation is presented below.

$$E_{annual} = \mathrm{k}(0.0032) * \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

Equation 26

Where:

E_{annual}	= Emission factor (lb/ton)
k	= Particle size multiplier (unitless)
U	= Mean wind speed (miles per hour)
M	= Material Moisture content (percentage)

The factor includes the moisture content of material typically received at a landfill or transfer station. As discussed in Section 3.7.2.2 the moisture content of material received at the landfill is 20%. The mean wind speed is the wind speed measure for 2018 at the Lompoc H Street Station for 2018.

The hourly emissions factor will be calculated using the following equation.

$$E_{hourl} = k(0.0032) * \frac{(\frac{U_{max}}{S})^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

Equation 27

Where:

E_{hourly}	= Hourly emission factor (lb/ton)
k	= Particle size multiplier (unitless)
U_{max}	= Maximum hourly wind speed (miles per hour)
M	= Material Moisture content (percentage)

$$EM_{WP\ Annual} = EF_{annual} * WP_{Max\ Annual}$$

Equation 28

Where:

$EM_{WP\ Annual}$	= Annual emissions from waste placement (lb/year)
EF_{annual}	= Annual emissions factor (lb/ton)
$WP_{Max\ Annual}$	= Annual waste placed (tons/year)

Hourly emissions can be calculated using the equation below.

$$EM_{WP\ Hourly} = EF_{hou} \quad * WP_{Max\ Hourly}$$

Equation 29

Where:

$EM_{WP\ Hourly}$	= Hourly emissions from waste placement (lb/hr)
EF_{hourly}	= Hourly emission factor (lb/ton)
$WP_{Max\ Hourly}$	= Maximum hourly waste placed (tons)

The average amount of waste placed in the landfill per day is 107 tons. The maximum amount of waste placed in the landfill in one hour is based on the time it takes to unload a route truck, the vehicle that places the most waste the fastest in the landfill. It takes approximately 10 minutes to safely unload a route truck. Up to 4 vehicles can be unloaded at the same time. The average route truck carries 2.25 tons. Therefore, the maximum hourly waste placement rate is 54 tons per hour. Some material coming into the landfill is separated before being placed in the working face or hauled offsite. A total of 7,551 tons of material was stockpiled and then moved in 2018. This material was handled twice. Adding this amount of material to the total amount of material entering the landfill in 2018, will account for the double handling of the 7,551 tons of material. Adding 7,551 tons to the total amount of waste placed in 2018 of 39,333 tons, results in a total amount of 46,884 tons of material handled in 2018.

3.8 Devices without TAC Emissions

The Water Storage Tank (Device ID # 393005), the Used Oil Tanks (Device ID # 114828) and the Propane Storage Tanks (Device ID # 390242) have been eliminated from further consideration because they do not emit any TACs on the current AB2588 list or any compounds on the proposed AB2588 list. The water tank stores potable water and does not contain any TAC. The water truck loads water from the large City of Lompoc water tank to the northeast of the site and shown in the facility aerial map. The propane storage tanks contain only propane, and this compound is not required by the California Air Resources Board to be included in an AB2588 human health risk assessment. The Used Oil Tanks contain only lubricant oils with a Reid Vapor Pressure less than 0.5 lbs per square inch. Lubricant oils are exempt from permit requirements in accordance with SBCAPCD Rule 201.V.3 and compounds with vapor pressures less than 0.5 lbs per square inch are not considered volatile in accordance with AP42 unless heated above ambient temperatures. The tanks are not heated. Therefore, the tanks do not have measurable volatile emissions if any.

4.0 MODELING INFORMATION

In accordance with the SBCAPCD Guidelines for Preparing Air Toxics Emission Inventory Plans and Reports, ATEIP guidelines, the District's Modeling Protocol Tables for ATEIP (8) must be completed and submitted with the ATEIP. The Modeling Protocol Tables for ATEIP consist of the AERMOD Options Table, Source Parameters Table, Building Parameters Table and HARP2 Options Table. The District requires electronic copies of these tables. These tables were previously submitted with the previous ATEIP. The onsite receptor locations for waste drop off as well as the location of the engine were updated based on the updated 2018 aerial photos and maps.

All UTM coordinates use datum NAD83. The fugitive landfill gas emissions area source X, Y coordinates required more than 4 X, Y point sets so additional labelled sets were provided. The number of sets extended beyond the capacity of the spread sheet, so the source was divided into 2 separate sources. Emissions from unpaved roads were identified as volume sources. The grinder engine and enclosed flare were characterized as point sources. The release heights for UPV3, UPV4, and UPV5 were estimated at 0.5 times the plume height, and the plume height was estimated at 1.7 times the average vehicle height. The average vehicle height was estimated based on the type of vehicles that transit on each road weighted by the traffic volume.

AERMOD input values and receptor information are also included in the spreadsheet. Default AERMOD values were used unless source parameters differed from the defaults. The nearest receptor is a business and no homes are immediately adjacent to the site boundaries.

5.0 CLOSING

This Air Toxics Emission Inventory Plan was prepared for the City of Lompoc, Utilities Department, Solid Waste Division. WSP has been diligent in efforts to obtain and document the actual activities, emission factors, equipment capacities, and permit requirements applicable to the sources present at the site. Preparation of this report was consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with the City. This report is solely for the use and information of the City and District unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

WSP USA INC.

Rebecca Frohning

Assistant Vice President, Environmental Scientist

FIGURE 1

Facility Plot Plan

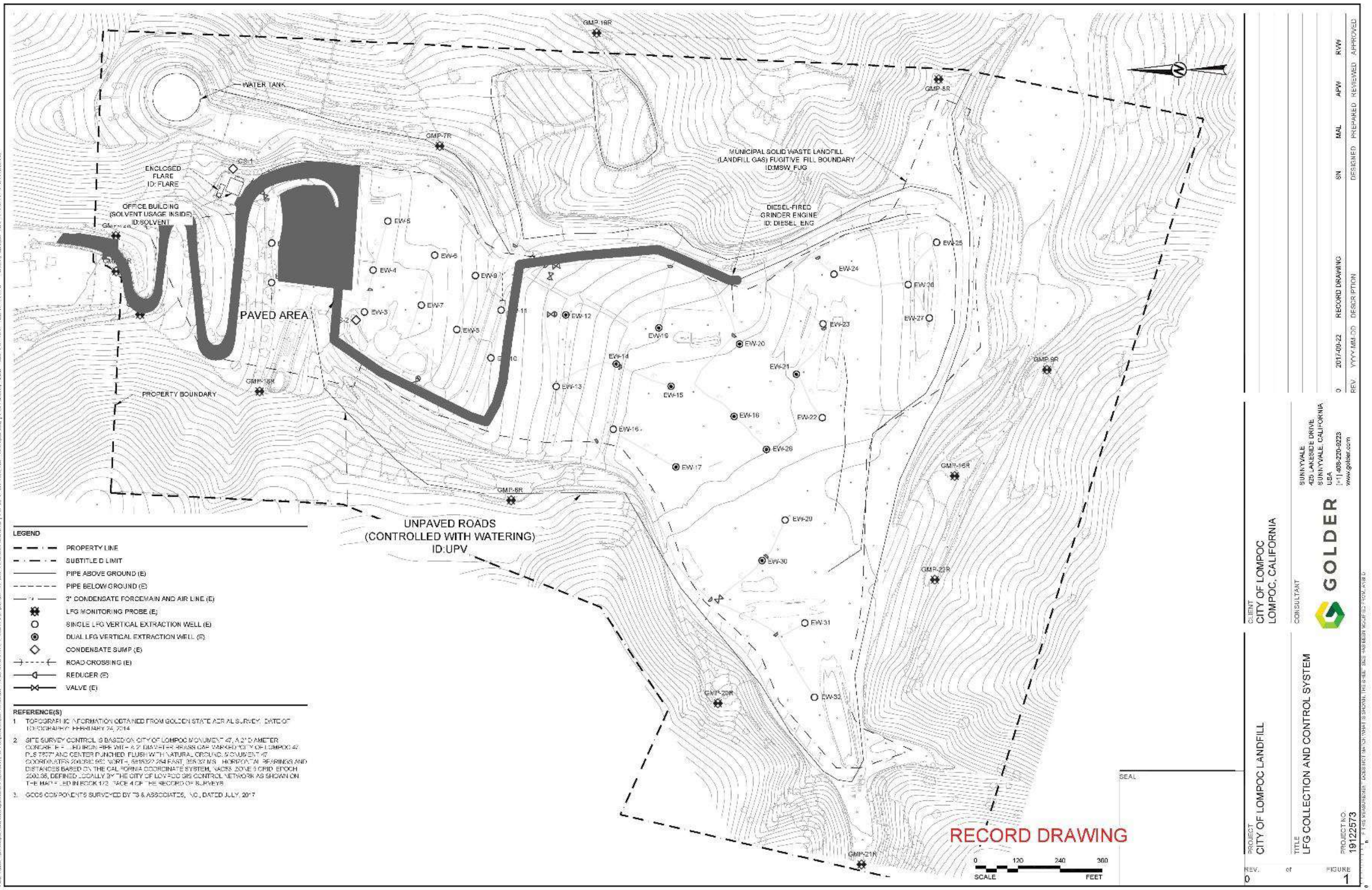
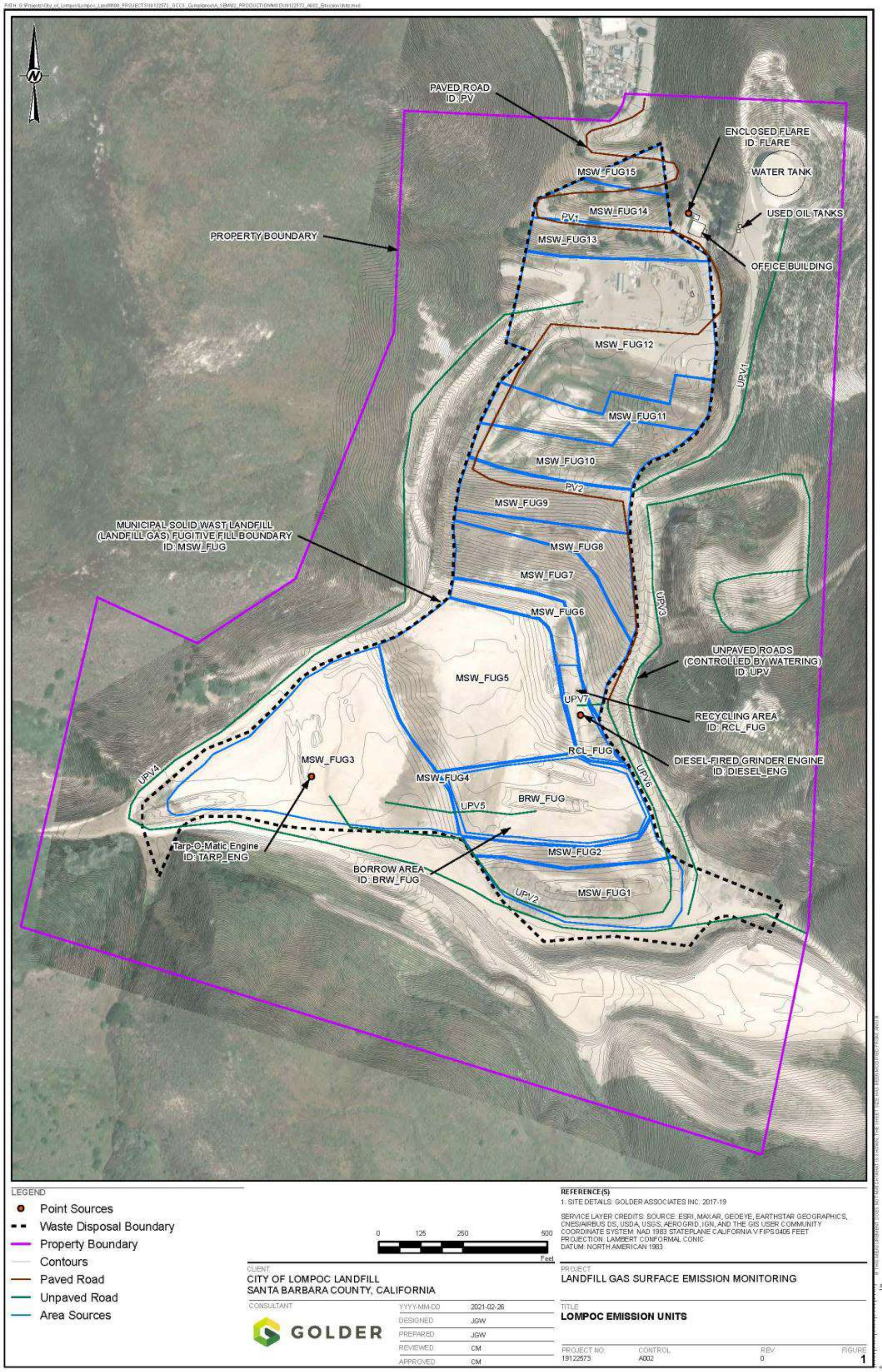


Figure 1: Facility Plot Plan

FIGURE 2

Aerial Photo Map



PAVED ROAD
ID: PV
ENCLOSED FLARE
ID: FLARE
WATER TANK
USED OIL TANKS
OFFICE BUILDING
PROPERTY BOUNDARY
MSW_FUG15
MSW_FUG14
PV1
MSW_FUG13
MSW_FUG12
UPV1
MSW_FUG11
MSW_FUG10
PV2
MSW_FUG9
MUNICIPAL SOLID WAST LANDFILL
(LANDFILL GAS) FUGITIVE FILL BOUNDARY
ID: MSW_FUG
MSW_FUG8
MSW_FUG7
UPV3
MSW_FUG6
UNPAVED ROADS
(CONTROLLED BY WATERING)
ID: UPV
MSW_FUG5
UPV7
RECYCLING AREA
ID: RCL_FUG
RCL_FUG
DIESEL-FIRED GRINDER ENGINE
ID: DIESEL_ENG
MSW_FUG3
UPV4
MSW_FUG4
UPV6
BRW_FUG
UPV5
Tarp-O-Matic Engine
ID: TARP_ENG
MSW_FUG2
BORROW AREA
ID: BRW_FUG
UPV2
MSW_FUG1
LEGEND
Point Sources
Waste Disposal Boundary
Property Boundary
Contours
Paved Road
Unpaved Road
Area Sources
0 125 250 500
Feet
REFERENCE(S)
1. SITE DETAILS: GOLDER ASSOCIATES INC. 2017-19
SERVICE LAYER CREDITS: SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY
COORDINATE SYSTEM: NAD 1983 STATEPLANE CALIFORNIA V FIPS 0405 FEET
PROJECTION: LAMBERT CONFORMAL CONIC
DATUM: NORTH AMERICAN 1983
CLIENT
CITY OF LOMPOC LANDFILL
SANTA BARBARA COUNTY, CALIFORNIA
CONSULTANT
GOLDER
YYYY-MM-DD 2021-02-26
DESIGNED JGW
PREPARED JGW
REVIEWED CM
APPROVED CM
PROJECT
LANDFILL GAS SURFACE EMISSION MONITORING
TITLE
LOMPOC EMISSION UNITS
PROJECT NO. 19122573
CONTROL A002
REV 0
FIGURE 1

FIGURE 3

Facility Process Flow Diagram

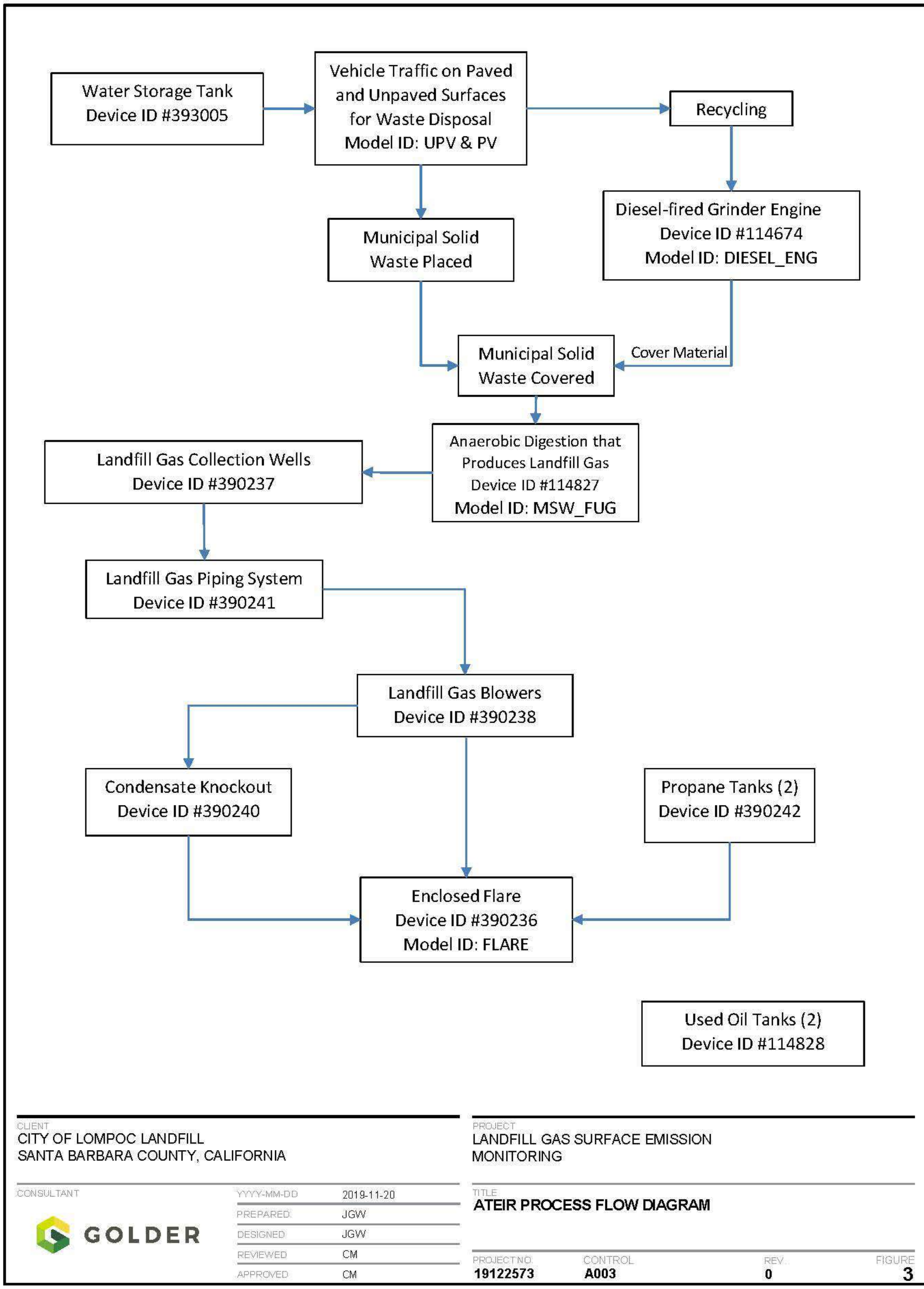


Figure 3: Facility Process Flow Diagram

APPENDIX A

Toxic Air Contaminant Device Table

AB2588 Substances to be Quantified for Year 2018 Toxics Emission Inventory

APCD Device ID	Device Name	Acetaldehyde (75070)	Acetonitrile (75070)	Acrolein (107028)	Acrylonitrile (107131)	Ammonia (7664417)	Anthracene (120127)	Benz(a)anthracene (56553)	Benzene (71432)	Benzo(a)pyrene (50328)	Benzo(b)fluoranthene (205992)	Benzo(k)fluoranthene (207089)	Benzyl Chloride (98884)	1,3-Butadiene (106990)	Carbon Tetrachloride (56235)	Carbonyl Sulfide (463581)	Chlorobenzene (108907)	Chlorodifluoromethane (75456)	Chloroform (67663)	Chloromethane (74873)	Dibenz(a,h)anthracene (53703)	p-Dichlorobenzene (106467)	1,1-Dichloroethane (75343)	Dichloromethane (75092)	1,4-Dioxane (123911)	Ethylbenzene (100414)	Ethylene Dibromide (106934)
	Unpaved Roads (controlled with watering)																										
	Paved Roads																										
114827	Municipal Solid Waste Landfill (Landfill gas) fugitive	X	X		X				X				X	X	X	X	X	X	X	X		X		X	X	X	X
390236	Enclosed Flare	X	X	X	X		X	X	X	X	X	X			X		X		X		X		X		X	X	
114674	Diesel-fired Grinder Engine	X		X		X			X					X			X									X	
114829	Solvent Usage (exempt)																										

[a] Metals include antimony, arsenic, beryllium, cadmium, chromium (total and hexavalent), copper, lead, manganese, mercury, nickel, phosphorous, selenium, vanadium, and zinc.

APCD Device ID	Device Name	Ethylene Dichloride (107062)	Formaldehyde (50000)	Hexachlorobutadiene (87683)	Hexane (110543)	Hydrochloric Acid (7647010)	Metals a	Methyl Chloroform (71556)	Methyl Ethyl Ketone (78933)	Methyl Isobutyl Ketone (108101)	Methyl Tert-Butyl Ether (1634044)	Methylene Chloride (75092)	Naphthalene (91203)	PAHs (1150/1151)	Propylene (115071)	Propylene Dichloride (78875)	Styrene (100425)	1,1,2,2-Tetrachloroethane (79345)	1,1,2-Trichloroethane (79005)	Toluene (108883)	1,2,4-Trichlorobenzene (120821)	Trichloroethylene (79016)	2,2,4-Trimethylpentane (540841)	Vinyl Acetate (108054)	Vinyl Chloride (75014)	Vinylidene Chloride (75354)	Xylenes (1330207)
	Unpaved Roads (controlled with watering)						X																				
							X																				
114827	Municipal Solid Waste Landfill (Landfill gas) fugitive	X	X	X	X		X	X	X	X			X			X	X	X	X	X	X	X	X	X	X	X	X
390236	Enclosed Flare	X	X		X	X	X					X	X	X						X		X			X		X
114674	Diesel-fired Grinder Engine		X		X	X	X						X	X	X					X							X
114829	Solvent Usage (exempt)																										

[a] Metals include antimony, arsenic, beryllium, cadmium, chromium (total and hexavalent), copper, lead, manganese, mercury, nickel, phosphorous, selenium, vanadium, and zinc.

APPENDIX B

Table Toxic Air Contaminant Emission Factors

Appendix A
Toxic Air Contaminant (TAC) Emissions Factors for Sources
Lompoc Landfill - ATEIP

Pollutant	Emission Factor			
	Flare - propane[a]	Landfill Fugitives [b]	Grinder Diesel Engine [c]	Fugitive Dust [d,e]
	lb/1000 gal	ppm	g/hp-hr	weight fraction (lb /lb PM)
PM	--	--	0.022	--
TSP	--	--	--	~~1000000.00~~
PM10	--	--	--	~~1000000.00~~
HAPs Calculations				
Aluminum				7.24E-02
Antimony				1.00E-05
Arsenic	1.79E-05	--	--	1.70E-05
Barium	3.95E-04	--	--	8.62E-04
Beryllium	1.08E-06	--	--	~~1.00E+00~~
Cadmium	9.87E-05	--	--	2.10E-05
Chromium 6+	--	--	--	--
Chromium (total)	1.26E-04	--	--	2.24E-04
Cobalt	7.54E-06	--	--	1.15E-04
Copper	7.63E-05	--	--	1.02E-04
Lead	4.49E-05	--	--	5.57E-04
Manganese	3.41E-05	--	--	9.45E-04
Mercury	2.33E-05	2.92E-04	--	1.50E-05
Molybdenum	9.87E-05	--	--	--
Nickel	1.88E-04	--	--	5.90E-05
Phosphorus	--	--	--	1.50E-03
Selenium	2.15E-06	--	--	2.00E-06
Silica, crystalline	--	--	--	1.00E-01
Sulfates				4.29E-03
Vanadium	2.06E-04	--	--	2.76E-04
Zinc	2.60E-03	--	--	5.18E-04
Acenaphthene	--	--	--	--
Acenaphthylene	--	--	--	--
Acetaldehyde	3.86E-03	--	--	--
Acetonitrile	--	~~5.56E-01~~	--	--
Acrolein	8.97E-04	--	--	--
Acrylonitrile	--	6.33E+00	--	--
Ammonia	--	--	--	--
Anthracene	--	--	--	--
Benz(a)anthracene	--	--	--	--
Benzene	1.43E-02	1.11E+01	--	--
Benzo(a)pyrene	--	--	--	--
Benzo(b)fluoranthene	--	--	--	--
Benzo(e)pyrene	--	--	--	--
Benzo(g,h,i)perylene	--	--	--	--
Benzo(k)fluoranthene	--	--	--	--
1,3-Butadiene	--	--	--	--
~~Carbon Disulfide~~	~~--~~	~~2.00E-01~~	--	--
Carbon Tetrachloride	--	4.00E-03	--	--
Chlorine	--	--	--	--
Chlorobenzene	--	2.50E-01	--	--
Chloroform	--	3.00E-02	--	--
Chrysene	--	--	--	--
Cumene	--	--	--	--
Dibenz(a,h)anthracene	--	--	--	--
1,1-Dichloroethane	--	--	--	--
1,2-Dichloropropane	--	--	--	--
1,3-Dichloropropene	--	--	--	--
p-Dichlorobenzene	--	--	--	--
1,4-Dioxane	--	~~8.29E-03~~	--	--
Ethyl Benzene	1.30E-01	4.61E+00	--	--
Ethyl Chloride	--	1.25E+00	--	--
~~Ethylene Dibromide~~	--	~~4.80E-03~~	--	--
Ethylene Dichloride	--	4.10E-01	--	--
Fluoranthene	--	--	--	--
Fluorene	--	--	--	--

Appendix A
Toxic Air Contaminant (TAC) Emissions Factors for Sources
Lompoc Landfill - ATEIP

Pollutant	Emission Factor			
	Flare - propane[a]	Landfill Fugitives [b]	Grinder Diesel Engine [c]	Fugitive Dust [d,e]
	lb/1000 gal	ppm	g/hp-hr	weight fraction (lb /lb PM)
Formaldehyde	1.05E-01	~~1.17E-02~~	--	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran	--	--	--	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzofuran	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzofuran	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzofuran	--	--	--	--
2,3,4,6,7,8-Hexachlorodibenzofuran	--	--	--	--
n-Hexane	2.60E-03	--	--	--
Hydrochloric Acid	--	--	--	--
Hydrogen fluoride	--	--	--	--
Indeno(1,2,3-c,d)pyrene	--	--	--	--
Methanol	--	--	--	--
~~Methyl Bromide~~	--	--	--	--
~~Methyl Chloride~~	--	--	--	--
Methyl Chloroform	--	4.80E-01	--	--
Methyl Ethyl Ketone	--	2.49E+00	--	--
Methyl tert-Butyl Ether	--	~~1.18E-01~~	--	--
Methylene Chloride	--	1.43E+01	--	--
2-Methylnaphthalene	--	--	--	--
Naphthalene	9.87E-04	~~1.07E-01~~	--	--
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	--	--	--	--
1,2,3,4,6,7,8,9-Octachlorodibenzofuran	--	--	--	--
PAHs (excl. naphthalene)	2.69E-04	--	--	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	--	--	--	--
1,2,3,7,8-Pentachlorodibenzofuran	--	--	--	--
2,3,4,7,8-Pentachlorodibenzofuran	--	--	--	--
Perchloroethylene	--	3.73E+00	--	--
Perylene	--	--	--	--
Phenanthrene	--	--	--	--
Phenol	--	--	--	--
Propionaldehyde	--	--	--	--
Propylene	2.19E-01	--	--	--
Propylene Oxide	--	--	--	--
Pyrene	--	--	--	--
Quinone	--	--	--	--
Styrene	--	~~4.11E-01~~	--	--
2,3,7,8-Tetrachlorodibenzo-p-dioxin	--	--	--	--
2,3,7,8-Tetrachlorodibenzofuran	--	--	--	--
~~1,1,2,2-Tetrachloroethane~~	~~--~~	~~6.00E-02~~	~~--~~	~~--~~
Toluene	5.20E-03	1.65E+02	--	--
Trichloroethylene	--	2.82E+00	--	--
1,1,2-Trichloroethane	--	6.00E-02	--	--
1,2,4-Trimethylbenzene	--	--	--	--
2,2,4-Trimethylpentane	--	~~6.14E-01~~	--	--
Unspeciated Dioxins (Treated as 2,3,7,8-TCDD)	--	--	--	--
Unspeciated Furans (Treated as 2,3,7,8-TCDD)	--	--	--	--
Vinyl Chloride	--	7.34E+00	--	--
Vinylidene Chloride	--	2.00E-01	--	--
Xylenes	2.60E-03	1.21E+01	--	--
m-Xylene	--	--	--	--
o-Xylene	--	--	--	--
Benzil Chloride	--	~~1.81E-02~~	--	--
Bromomethane	--	~~2.10E-02~~	--	--
~~1,3-Butadiene~~	--	~~1.66E-01~~	--	--
Carbonyl Sulfide	--	4.90E-01	--	--
~~Chlorodifluormethane~~	~~--~~	~~7.96E-01~~	--	--
~~Chloroethane~~	~~--~~	~~9.10E-02~~	--	--
~~Chlorometane~~	~~--~~	~~2.44E-01~~	--	--

Appendix A
Toxic Air Contaminant (TAC) Emissions Factors for Sources
Lompoc Landfill - ATEIP

Pollutant	Emission Factor			
	Flare - propane[a]	Landfill Fugitives [b]	Grinder Diesel Engine [c]	Fugitive Dust [d,e]
	lb/1000 gal	ppm	g/hp-hr	weight fraction (lb /lb PM)
Dichlorobenzene	--	2.10E-01	--	--
~~Dichlorometane~~	~~--~~	~~6.00E-02~~	--	--
~~Ethylidense dichloride~~	~~--~~	~~6.00E-02~~	--	--
Hexachlorobutadiense	--	~~3.49E-03~~	--	--
Hexane	--	6.57E+00	--	--
Hydrogen Chloride	--	--	--	--
Isopropylbenzene	--	~~4.30E-01~~	--	--
Methyl Isobutyl ketone	--	1.87E+00	--	--
Propylene Dichloride	--	1.80E-01	--	--
Tribromomethane	--	~~1.24E-02~~	--	--
1,2,4-Trichlorobenzene	--	~~5.51E-03~~	--	--
Tetrachloroethylene	--	3.73E+00	--	--
Vinyl acetate	--	~~2.48E-01~~	~~2.48E-01~~	--
1,1,2,2-Tetrachloroethane	--	1.11E+00	--	--
1,1-Dichloroethane (ethylidene dichloride)	--	2.35E+00	--	--
1,1-Dichloroethene (vinylidene chloride)	--	2.00E-01	--	--
2-Propanol (isopropyl alcohol)	--	5.01E+01	--	--
Acetone	--	7.01E+00	--	--
Bromodichloromethane	--	3.13E+00	--	--
Butane	--	5.03E+00	--	--
Carbon disulfide	--	5.80E-01	--	--
Carbon monoxide	--	1.41E+02	--	--
Chlorodifluoromethane	--	1.30E+00	--	--
Chloromethane	--	1.21E+00	--	--
Dichlorodifluoromethane	--	1.57E+01	--	--
Dichlorofluoromethane	--	2.62E+00	--	--
Dimethyl sulfide	--	7.82E+00	--	--
Ethane	--	8.89E+02	--	--
Ethanol	--	2.72E+01	--	--
Ethyl mercaptan (ethanethiol)	--	2.28E+00	--	--
~~Ethylbenzene~~	~~--~~	~~4.61E+00~~	--	--
Ethylene dibromide	--	1.00E-03	--	--
Fluorotrichloromethane	--	7.60E-01	--	--
Hydrogen sulfide [f]	--	5.02E+01	--	--
Methyl mercaptan	--	2.49E+00	--	--
Pentane	--	3.29E+00	--	--
Propane	--	1.11E+01	--	--
t-1,2-dichloroethene	--	2.84E+00	--	--

[a] Santa Barbara County Air Pollution Control District's June 2020 *Approved Emission Factors for Toxic Air Contaminants* profile for *Flares, Propane-fired.*
[b] Concentrations from AP-42 Table 2.4-2 and supplemented with Tajiguas Landfill's test results for LFG from 2009 to 2013.
[c] Emission Factors from Title V Permit 14708 Section 4.5.2
[d] Emission Factors to apply to paved and unpaved roads, fugitive dust from waste placement, wind blown fugitive dust, and landfill operations.
[e] Emission Factors based on Santa Barbara County Air Pollution Control District's June 2020 *Approved Emission Factors for Toxic Air Contaminants* profile for *Landfill Dust (Haul Roads and Other Dust from Landfills)*.
[f] Hydrogen sulfide concentration is based on 2018 source test.

City of Lompoc Municipal Solid Waste Landfill

SBCAPCD Permit # 14708

Compliance Emissions Test Report #18260
Source Test for Landfill Gas Flare

Located at:
City of Lompoc Municipal Solid Waste Landfill
700 Avalon St.
Lompoc, CA 93436

Prepared For:
Golder Associates Inc.
Melissa St. John
1000 Enterprise Way, Suite 190
Roseville, CA 95678
Melissa_St.John@golder.com

For Submittal To:
Attn: William Sarraf
Santa Barbara County Air Pollution Control District
260 N. San Antonia Rd., Ste. A
Santa Barbara, CA 93110
SarrafW@sbcapcd.org

Testing Performed On:
September 27th, 2018

Final Report Submitted On:
November 1st, 2018

Performed and Reported by:
Blue Sky Environmental, Inc.
624 San Gabriel Avenue
Albany, CA 94706
blueskyenvironmental@yahoo.com
Office (510) 525 1261
Cell (510) 508 3469

REVIEW AND CERTIFICATION

Team Leader:

The work performed herein was conducted under my supervision, and I certify that: a) the details and results contained within this report are to the best of my knowledge an authentic and accurate representation of the test program; b) that the sampling and analytical procedures and data presented in the report is authentic and accurate: c) that all testing details and conclusions are accurate and valid, and: d) that the production rate and/or heat input rate during the source test are reported accurately.

If this report is submitted for Compliance purposes it should only be reproduced in its entirety. If there are any questions concerning this report, please contact me at (559) 706 4055.

Anthony Bomprezzi
Project Manager

TABLE of CONTENTS

SECTION 1. INTRODUCTION

1.1. Summary

Blue Sky Environmental, Inc. was contracted to perform the emissions testing on the Landfill Gas Flare at the City of Lompoc Municipal Solid Waste Landfill, 700 Avalon St., Lompoc, California. Test was to demonstrate that the Flare operates in compliance with the Santa Barbara County APCD Permit# 14708. Table 1 summarizes the source test information. Table 2 summarizes the results compared to the emission limits. The flare met all compliance emission criteria.

Table 1. Source Test Information

Test Location:	City of Lompoc Municipal Solid Waste Landfill 700 Avalon St., Lompoc, CA 93436
Source Contact:	Melissa St. John, Golder Associates (916) 786-2424
Source Tested:	12.010 MMBTUH LFG Specialties Enclosed Landfill Gas Flare
Source Test Date:	September 27th, 2018
Test Objective:	Determine Compliance with Santa Barbara County (APCD) Permit# 14708
Test Performed By:	Blue Sky Environmental, Inc. 624 San Gabriel Ave., Albany, CA 94706 Anthony Bomprezzi (559) 706-4055 tbomprezzi@blueskyenvironmental.com
Test Parameters	Exhaust, NO_X, CO, CH_4, THC, NMOC LFG Sulfur content TRS, H_2S, BTU, CO_2, N_2, O_2, NMOC & CH_4 Fuel analysis TRS, H_2S, BTU, CO_2, N_2, O_2, NMOC & CH_4 LFG Flowrate & Flare Temperature SO_2 ppm, lbs/MMBTU, % by volume, lbs/day NMOC >98% DE ROC > 98% DE CH_4 > 99% DE

Table 2. Compliance Summary

Emission Parameter	Average Test Result	Permit Limit	Compliance Status
NOx, lbs/MMBTU	0.037	0.060	In Compliance
CO, lbs/MMBTU	0.002	0.200	In Compliance
NMHC, ppm @ 3% O2 (as Hexane)	<0.33	20 or 98%	In Compliance
NMHC Destruction Efficiency	>99.3%		In Compliance
CH_4 Destruction Efficiency	>99.95%	99%	In Compliance
THC (TOC) Destruction Effciency	99.95%	98%	In Compliance

SECTION 2. SOURCE TEST PROGRAM

2.1. Overview

This Source test was conducted to demonstrate that the landfill gas (LFG) flare is operating in accordance with the Santa Barbara County Air Pollution Control District (SBCAPCD) Permit # 14708.

2.2. Pollutants Tested

The following California Air Resources Board (CARB), Environmental Protection Agency (EPA) and American Society for Testing and Materials (ASTM) sampling and analytical methods were used:

CARB 1 & 2	Sample Location.Traverse Points and Stratification Check
CARB 100	CO_2, CO, NMOC, NO_X, O_2, THC & CH_4
EPA 18	(VOC) THC/NMHC/CH_4
EPA 19	Exhaust Flow Rate Calculation, DSCFM
EPA 25C	LFG Gas analysis for THC, NMOC & CH_4 by GC
ASTM 5504/1072	Fuel Sulfur content including H_2S
ASTM 1945/3588	LFG Gas analysis for BTU and F-Factor

2.3. Test Date(s)

Testing was performed on September 27th, 2018.

2.4. Sampling and Observing Personnel

Anthony Bomprezzi and Guy Worthington representing Blue Sky Environmental, Inc., performed testing.

Keith of the City of Lompoc was present to operate and oversee the Flare operation and assist in coordinating testing and the collection of process data during testing.

A Source Test Plan was submitted to Will Sarraf of the SBCAPCD on August 31st, 2018. A Source Test Protocol acknowledgement was requested and received by Blue Sky Environmental. No representative of the SBCAPCD was present to witness the testing. A copy of the source test protocol can be found in Appendix I.

2.5. Source/Process Description

The enclosed LFG Specialties Model EF62516 400 SCFM Flare consists of a 12.010 million British Thermal Units per hour (MMBtu/hr) multiple nozzle burner. The flare shell is approximately 25 feet high and has an approximately 63.5 inch inside diameter (ID).

2.6. Source Operating Conditions

The flare operating temperature and the LFG flow rate records are contained in Appendix-F. The condensate injection system was not operational at any time during the source test.

The flare was operated at 1,600 degrees Fahrenheit (°F). The LFG flow rate averaged 200 Standard Cubic Feet per Minute (SCFM) and the stack exhaust flow rate averaged 2,127 (SCFM).

The LFG methane content ranged between 40.5 percent (%) and 45.7 %, the average methane content for the flare inlet was 43.8%.

SECTION 3. SAMPLING AND ANALYSIS PROCEDURES

3.1. Port location

The Flare sampling was conducted in the 63.5 inch inside diameter stack, via ports approximately 22 feet above grade, accessed by boom-lift. Two 6-inch ports with 2.5-inch insulation were available approximately 2.5 stack diameters downstream from the burners and approximately 1 stack diameter upstream from the exit.

3.2. Point description/Labeling – ports/stack

Blue Sky Environmental conducted 8-point traverses and found stratification of more than 10%. Subsequent CEM sampling was conducted using the same traverse points.

The traverse points for the 63.5-inch diameter exhaust stack with 6-inch ports plus 2.5 inch insulation were 10.5, 15.2, 20.8, 29.0, 51.5, 59.7, 65.3 and 70.0 inches.

3.3. Sample train description

Sampling system diagrams are included in the Appendix H. Additional descriptive information is included in the following section.

3.4. Sampling procedure description

Three, 40-minute test runs were performed. During all runs a full traverse was performed and involved a delay for the port change.

CARB 100 is the protocol for continuous monitoring techniques using instrumental analyzers. Sampling is performed by extracting exhaust flue gas from the stack via a heated sample line, conditioning the sample to remove moisture and particulates and analyzing it by continuous monitoring gas analyzers in a Continuous Emission Monitoring (CEM) test van. The sampling system consists of a stainless-steel sample probe, heated teflon sample line maintained @ 248°F ±25, a glass-fiber particulate filter, glass moisture-knockout condensers in ice, teflon sample transfer tubing, diaphragm pump and a stainless steel/teflon manifold and flow control/delivery system. A constant sample and calibration gas supply pressure of ~5 PSI is provided to each analyzer to avoid pressure variable response differences. The entire sampling system is leak checked prior to and at the end of the sampling program.

The calibration gases are selected to fall approximately within the following instrument ranges; 40-60% and 80-100% of range and zero. Linearity and system bias checks are performed prior to Run 1. All calibrations during testing are performed externally to incorporate any system bias that may exist. Zero and calibration drift and bias values are determined for each run.

System Performance Criteria

Instrument Linearity	≤2% Full Scale (checked)
Instrument Bias	≤5% Full Scale (checked)
System Response Time	≤ 2 minutes (checked)
NO_X Converter Efficiency (EPA 20)	≥ 90% (checked)
Instrument Zero Drift	≤± 3% Full Scale (complied)
Instrument Span Drift	≤± 3% Full Scale (complied)

EPA Method 18. At the exhaust, Blue Sky collected three integrated samples using 6L SUMMA canisters with flow orifices and fitted with a purged stainless -steel probe. The gas samples were controlled with an orifice at the outlet to collect a 40-minute integrated samples.

Concurrent with the exhaust sampling, Blue Sky collected a total of three integrated 10-liter Tedlar Bag samples of the landfill gas (LFG) which were transferred immediately into 6L SILCO SUMMA cans onsite for analysis for TNMOC by EPA 25C, TRS by ASTM 5504 and ASTM D-1945.

EPA Method 19 (gas) was used to determine stack gas volumetric flow rates using oxygen-based F-factors. F-factors are ratios of combustion gas volumes generated from heat input. The heating value of the fuel in Btu per cubic foot is determined from analysis of the fuel gas samples using ASTM D1946/3588 gas chromatography analytical procedures. The total cubic feet per hour of fuel multiplied times the Btu/cf provides million Btu per hour (MMBtu) heat input. The heat input in MMBtu/hr is multiplied by the F-factor (DSCF/MMBtu) and adjusted for the measured oxygen content of the source to determine volumetric flow rate. The facility flow rates were used to determine emission rates.

The inlet volumetric flow rate was continuously measured and recorded by the facility monitors. The data is recorded on a Yokogawa system and was exported into Excel then submitted to Blue Sky for inclusion in this report.

3.5. Instrumentation and Analytical procedures

The following continuous emissions analyzers were used:

Instrumentation	Parameter	Principle
TECO 42i	NO_x	Chemiluminescence
TECO 48C	CO	GFC/IR
TECO 60i	O_2/CO_2	Paramagnetic

All calibration gases are EPA Protocol #1. The analyzer data recording system consists of a Honeywell DPR3000 strip chart recorder, which can be supported by a Data Acquisition System (DAS).

The instrument responses were recorded on strip charts in addition to data acquisition into excel files. The averages were corrected for drift using CARB Method 100-6 equations.

3.6. Comments: Limitations and Data Qualifications

Blue Sky Environmental has reviewed this report for accuracy, and concluded that the test procedures were followed and accurately described and documented. The review included the following items:

Review of the general text
Review of calculations
Review of CEMS data
Review of supporting documentation

The services described in this report were performed in a manner consistent with the generally accepted professional testing principles and practices. No other warranty, expressed or implied, is made. These services were performed in a manner consistent with our agreement with our client. The report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions contained in this report pertain to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and operating parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations, subsequent to this, and do not warranty the accuracy of information supplied by others.

SECTION 4. APPENDICES

- **A.** **Tabulated Results**
- **B.** **Calculations**
- **C.** **Laboratory Reports**
- **D.** **Field Data Sheets**
- **E.** **Strip Chart Records**
- **F.** **Process Information**
- **G.** **Calibration Certifications and Quality Assurance Records**
- **H.** **Sample Train Configuration and Stack Diagrams**
- **I.** **Related Correspondence (Source Test Plan)**
- **J.** **Permit to Operate**

A
Tabulated Results

TABLE #1

Golder (Lompoc)
FLARE
1604°F

RUN	Run 1	Run 2	Run 3	AVERAGE	LIMITS
Test Date	9/27/18	9/27/18	9/27/18		
Test Time	0859-0949	1010-1054	1111-1153		
Standard Temp., °F	68	68	68		
Flare Temperature, °F	1,609	1,603	1,600	1,604	
Fuel Flow Rate, DSCFM (Facility Monitor)	200	200	200	200	
Fuel Heat Input, MMBTU/Hr	5.8	5.8	5.8	5.8	
Exhaust Flow Rate, DSCFM (Method 19)	2,162	2,078	2,142	2,127	
Oxygen, O_2, %	12.1	11.7	12.0	11.9	
Carbon Dioxide, CO_2, %	7.8	8.2	7.9	8.0	
NOx, ppm	14.5	14.1	13.9	14.2	
NOx, ppm @ 15% O_2	9.6	9.1	9.2	9.3	
NOx, lbs/hr	0.22	0.21	0.21	0.22	
NOx, lbs/day	5.37	5.05	5.13	5.18	
NOx, lbs/MMBTU	**0.039**	**0.036**	**0.037**	**0.037**	**0.06**
CO, ppm	3.0	0.3	0.4	1.3	
CO, ppm @ 15% O_2	2.0	0.2	0.3	0.8	
CO, lbs/hr	0.03	0.00	0.00	0.01	
CO, lbs/day	0.68	0.08	0.10	0.29	
CO, lbs/MMBTU	**0.005**	**0.001**	**0.001**	**0.002**	**0.20**
Total Reduced Sulfur as H_2S in fuel, ppm	**48.3**	**44.5**	**57.9**	**50.2**	**260**
TRS as H_2S in fuel, grains/100 dscf	2.8	2.6	3.4	2.9	
SO_2, ppm calculated emission concentration	4.5	4.3	5.4	4.7	
SO_2, lbs/hr	0.10	0.09	0.12	0.10	
SO_2, lbs/day	2.31	2.13	2.77	2.41	
THC, ppm (M18)	60.5	2.0	2.0	21.5	
THC, lbs/hr as CH_4	0.33	0.01	0.01	0.12	
CH_4, ppm (M18)	59.5	<1.0	<1.0	20.5	
CH_4, lbs/hr as CH_4	0.32	0.01	0.01	0.11	
NMHC, ppm @ 3% O_2 (as Hexane)	**<0.34**	**<0.32**	**<0.33**	**<0.33**	**20**
NMHC, ppm as CH_4 (M18)	<1.0	<1.0	<1.0	<1.0	
NMHC, lbs/hr as CH_4	<0.01	<0.01	<0.01	<0.01	
NMHC, lbs/day as CH_4	<0.1	<0.1	<0.1	<0.1	
NMHC, lbs/MMBTU as CH_4	<0.002	<0.002	<0.002	<0.002	**or**
INLET NMHC ppm as CH_4	1,436	1,358	1,622	1,472	
INLET NMHC lbs/hr as CH_4	0.7	0.7	0.8	0.7	
NMHC Removal Efficiency	**>99.2%**	**>99.2%**	**>99.3%**	**>99.3%**	**>98**
INLET CH_4	457,000	405,000	451,000	437,667	
INLET CH_4 lbs/hr as CH_4	227.8	201.8	224.8	218.1	
CH_4 Removal Efficiency	**>99.86%**	**>99.997%**	**>99.998%**	**>99.95%**	**>99**
INLET THC (TOC) ppm as CH_4	458,436	406,358	452,622	439,139	
INLET THC (TOC) lbs/hr as CH_4	228	203	226	219	
THC (TOC) Removal Efficiency	**99.86%**	**99.99%**	**99.995%**	**99.95%**	**>98**

WHERE,

ppm = Parts Per Million Concentration
Lbs/hr = Pound Per Hour Emission Rate
Tstd. = Standard Temp. (°R = °F+460)
MW = Molecular Weight
DSCFM = Dry Standard Cubic Feet Per Minute
NOx = Oxides of Nitrogen as NO_2 (MW = 46)
CO = Carbon Monoxide (MW = 28)
TOC = THC = Total Organic Carbon as Methane including CH_4 (MW = 16)
CH4 = Methane (MW = 16)
THC = Total Hydrocarbons as Methane (MW = 16)
NMHC = Total Non-Methane Hydrocarbons as Methane (MW = 16)

CALCULATIONS,

PPM @ 15% O_2 = ppm * 5.9 / (20.9 - %O_2)
PPM @ 3% O_2 = ppm * 17.9 / (20.9 - %O_2)
Lbs/hr = ppm x 8.223 E-05 x DSCFM x MW / Tstd. °R
Lbs/MMBtu = (Lbs/hr)/(MMBtu/hr)
Lbs/day = Lbs/hr * 24
Removal Efficiency = (inlet lbs/hr- outlet lbs/hr) / inlet lbs/hr
NMHC as Hexane @ 3% O_2 = (NMHC as CH_4 / 6) * 17.9 / (20.9 - %O_2)
TRS as H_2S in fuel,
grains / 100 dscf = ppm x 1.42 = mg/dscm / 35.3 cf per m3 = mg/d
then, mg/dscf / 1000 = gm/dscf x 14.43 grains per gram x 100 ft3

B
Calculations

BLUE SKY ENVIRONMENTAL, INC

PRELIMINARY CEM SYSTEM QA/QC SUMMARY SHEET

Facility: Golder (Lompoc) Date: 9/27/18

Location: FLARE Personnel: TB/GW

Parameter	O2	CO2	NOx	CO			Comments
Analyzer	60i	60i	42C	48C			
Range	25	15	25	100			
Cal Value (low)	0	0	0	0			EPA 20 & 25A only
Cyl. #							
Cal Value (mid)	14.48	8.392	12.38	45.33			
Cyl. #							
Cal Value (Hi)	20.5	12.65	23.33	85.08			
Cyl. #							

LINEARITY

low cal (int)	0.0	0.0	0.0	0.0			zero gas
Abs. Difference	0.0	0.0	0.0	0.0			
% Linearity	**0.0**	**0.3**	**0.0**	**0.0**			<2%
mid cal (int)	14.5	8.4	12.4	44.9			set at mid
Abs. Difference	0.0	0.0	0.0	-0.4			
% Linearity	**0.0**	**0.1**	**0.2**	**-0.4**			<2%
high cal (int)	20.5	12.6	23.3	84.9			
Abs. Difference	0.0	-0.1	0.0	-0.2			
% Linearity	**0.2**	**-0.5**	**0.0**	**-0.2**			<2%

Initial SYSTEM BIAS Check

Zero (int)	0.0	0.0	0.0	0.0			
Zero (ext)	0.1	-0.2	0.1	-0.3			
Abs. Difference	0.1	-0.3	0.1	-0.3			
bias, % range	**0.5**	**-1.8**	**0.5**	**-0.3**			EPA 20/6C/7E (±5%)
Cal (int)	14.5	8.4	12.4	44.9			
Cal (ext)	14.5	8.2	12.3	44.9			
Abs. Difference	0.0	-0.2	-0.1	0.0			
bias, % range	**0.2**	**-1.2**	**-0.3**	**0.0**			EPA 20/6C/7E (±5%)

SYSTEM RESPONSE TIME (secs) - time from ext. zero to ext. cal, or ext. cal to ext. zero (95% response) -

zero to cal.	60	60	60	60		
cal. to zero	60	60	60	60		

If NO_2 % > 5% of NOx then run converter test.

Stack Gas NOx =	
Stack Gas NO =	
Stack Gas NO_2 =	
NO_2 %=	

NO_2 CONVERTER TEST

Cal value NO2	12.9
Analyzer NOx Response =	12.82
Analyzer NO_2 Response =	12.82
Analyzer NO Response =	0.0

% Efficiency = $\frac{\text{NOx-NO response}}{NO_2 \text{ cal gas value}}$ x 100 = 99.15

System Cal. Bias (Limit ± 5%) = $\frac{100 * \text{External cal - Internal cal}}{\text{Span Range}}$

% Linearity (Limit ± 2%) = $\frac{100 * \text{Cal Gas Value - Internal cal}}{\text{Span Range}}$

CEM BIAS CORRECTION SUMMARY

Facility:	Golder (Lompoc)	Barometric:	N/A
Unit:	FLARE	Leak Check:	OK
Condition:	1604°F	Strat. Check:	OK
Date:	9/27/18	Personnel:	TB/GW

		O_2	CO_2	NOx	CO				
Analyzer		60i	60i	42C	48C				
Range, r		25	15	25	100				r
EPA Span		20.50	12.65	23.33	85.08				
Units, ppm or %		%	%	ppm	ppm				
Span Gas Value		**14.48**	**8.392**	**12.38**	**45.33**				**Ccal Primary**
Span Gas Value		20.50	12.65	23.33	85.08				Ccal Secondary
Initial (int. zero)		-0.01	0.04	-0.01	0.0				Analyzer Response, Ca
Initial (int. cal) hi		20.54	12.58	23.34	84.9				Analyzer Response, Ca
Initial (int. cal) mid		14.49	8.40	12.42	44.9				Analyzer Response, Ca
Initial (int. cal) run		14.49	8.40	12.42	44.90				Analyzer Response, Ca

Run 1	ext	0.12	-0.23	0.12	-0.3				zero (initial), Cib
Test Time:	ext	14.53	8.22	12.34	44.9				cal (initial), Cib
0859-0949		12.12	7.64	14.40	2.7				TEST AVG, Cavg
	ext	0.11	-0.19	0.30	-0.2				zero (final), Cfb
	ext	14.52	8.26	12.40	44.7				cal (final), Cfb
CARB	3	*0.0%*	*0.3%*	*0.7%*	*0.1%*				% zero drift
CARB	3	*0.0%*	*0.3%*	*0.2%*	*-0.2%*				% cal drift
CARB	5	0.5%	-1.5%	1.2%	-0.2%				% zero bias
CARB	5	0.1%	-0.9%	-0.1%	-0.2%				% cal bias
		12.06	**7.80**	**14.45**	**3.0**				**Cgas**

Run 2	ext	0.11	-0.19	0.30	-0.2				zero (initial), Cib
Test Time:	ext	14.52	8.26	12.40	44.7				cal (initial), Cib
1010-1054		11.75	8.03	14.13	0.0				TEST AVG, Cavg
	ext	0.10	-0.18	0.27	-0.4				zero (final), Cfb
	ext	14.50	8.26	12.41	44.7				cal (final), Cfb
CARB	3	*0.0%*	*0.1%*	*-0.1%*	*-0.2%*				% zero drift
CARB	3	*-0.1%*	*0.0%*	*0.0%*	*0.0%*				% cal drift
CARB	5	0.4%	-1.5%	1.1%	-0.4%				% zero bias
CARB	5	0.0%	-0.9%	0.0%	-0.2%				% cal bias
		11.71	**8.16**	**14.14**	**0.3**				**Cgas**

Run 3	ext	0.10	-0.18	0.27	-0.4				zero (initial), Cib
Test Time:	ext	14.50	8.26	12.41	44.7				cal (initial), Cib
1111-1153		12.01	7.82	13.89	0.0				TEST AVG, Cavg
	ext	0.07	-0.19	0.23	-0.4				zero (final), Cfb
	ext	14.50	8.36	12.35	44.6				cal (final), Cfb
CARB	3	*-0.1%*	*-0.1%*	*-0.2%*	*0.0%*				% zero drift
CARB	3	*0.0%*	*0.7%*	*-0.2%*	*-0.1%*				% cal drift
CARB	5	0.3%	-1.5%	1.0%	-0.4%				% zero bias
CARB	5	0.0%	-0.3%	-0.3%	-0.3%				% cal bias
		11.98	**7.91**	**13.92**	**0.4**				**Cgas**

Pollutant Concentration (Cgas) = (Cavg - Co) x Ccal / (Cbcal - Co)
Zero and Calibration Drift = 100 x (Cfb - Cib) / r
Bias = 100 x (Cfb - Ca) / r

Co = (Cib + Cfb) / 2 for zero gas
Cbcal = (Cif + Cfb) / 2 for cal gas
Cib (CARB=Pre-first run) (EPA=Pre-run)

STACK GAS FLOW RATE DETERMINATION -- Method 19

Facility: Golder (Lompoc)
Unit: FLARE
Condition: 1604°F
Date: 9/27/18

	Time:	0859-0949	1010-1054	1111-1153	
	Run:	**1**	**2**	**3**	
# cubic feet/rev		200	200	200	ft^3
# of seconds/rev		60	60	60	seconds
Gas Line Pressure (PSIG)		0.0	0.0	0.0	PSI Gauge
Gas Line Pressure (PSIA)		14.7	14.7	14.7	PSI Absolute
Gross Calorific Value @ 60°F		488.4	488.4	488.4	Btu / ft^3
Stack Oxygen		12.1	11.7	12.0	%
Gas Fd-Factor @ 60°F		9,357.9	9,357.9	9,357.9	DSCF/MMBtu
Gas Temperature (°F)		68	68	68	°F
Standard Temperature (°F) Tstd		68	68	68	°F
Realtime Fuel Rate (CFM)		200.0	200.0	200.0	CFM
Corrected Fuel Rate (SCFM) @ Tstd		200.0	200.0	200.0	SCFM
Fuel Flowrate (SCFH)		12,000	12,000	12,000	SCFH
Million Btu per minute		0.096	0.096	0.096	MMBtu/min
Heat Input (MMBtu/hour)		5.8	5.8	5.8	MMBtu/Hr
Stack Gas Flow Rate @ Tstd		**2,162**	**2,078**	**2,142**	**DSCFM**

WHERE:

Gas Fd-Factor = Fuel conversion factor (ratio of combustion gas volumes to heat inputs)
MMBtu = Million Btu

CALCULATIONS:

SCFM = CFM * (460+Tstd) * (PSIA) / 14.7 / (460+Gas°F))

SCFH = SCFM * 60

MMBtu/min = SCFM * (Btu/ft^3) * (520/(460+Tstd)) / 1,000,000

MMBtu/hr Heat Input = MMBtu/min * 60

DSCFM = Gas Fd-Factor * ((460+Tstd)/520) * MMBtu/min * 20.9/ (20.9 - O_2%)

Fd-FACTOR CALCULATION

Sample ID: LFG-Run-1
FACILITY Golder (Lompoc)
UNIT FLARE
Date: 9/27/18

	Molecular Weight	Ideal Gas Specific Gravity, G_i	Ideal Gas Total Calorific Value, H_i	Compressibility Summation Factor, $\sqrt{b_i}$	Specific Volume, ft^3/lb	PPM / %	Composition Mole Fraction, x_i	Specific Gravity Fraction, x_iG_i	Calorific Value Fraction, x_iH_i	Compressibility Fraction, $x_i\sqrt{b_i}$	x_iMW	Weight Fraction, ξ_iMW / ΣxiMW	CARBON Weight Fraction	HYDROGEN Weight Fraction	OXYGEN Weight Fraction	NITROGEN Weight Fraction	SULFUR Weight Fraction	CHONS SUM	Specific Volume, ft^3/lb
Helium‡	4.00	0.1382	0.0	-0.0170		0.00	0.000000	0.0000	0.0	0.0000	0.0000	0.0000							
Hydrogen (H_2) ‡	2.02	0.0696	324.9		187.723	<1.0	0.010000	0.0007	3.2	0.0000	0.0202							0.0000	
Nitrogen	28.01	0.9672	0.0	0.0164	13.443	19.2	0.192000	0.1857	0.0	0.0031	5.3779	0.1914				0.1914		0.1914	2.5727
Oxygen	32.00	1.1053	0.0		11.819	1.0	0.010000	0.0111	0.0	0.0000	0.3200	0.0114			0.0114			0.0114	0.1346
Carbon Monoxide	28.01	0.9671	321.3	0.0217	13.506	<0.1	0.001000	0.0010	0.3	0.0000	0.0280	0.0010	0.0004	0.0000	0.0006			0.0010	0.0135
Carbon Dioxide‡	44.01	1.5194	0.0	0.0640	8.548	34.1	0.341000	0.5181	0.0	0.0218	15.0074	0.5341	0.1457	0.0000	0.3883			0.5341	4.5651
Methane	16.04	0.5539	1012.0	0.0436	23.565	45.7	0.457000	0.2531	462.5	0.0199	7.3303	0.2609	0.1953	0.0656				0.2609	6.1470
Ethane (C2H6)	30.01	1.0382	1772.9	0.0917	12.455	<3.4	0.000003	0.0000	0.0	0.0000	0.0001	0.0000	0.0000	0.0000				0.0000	0.0000
Propane (C3H8)	44.09	1.5224	2523.0	0.1342	8.365	31.3	0.000031	0.0000	0.1	0.0000	0.0014	0.0000	0.0000	0.0000				0.0000	0.0004
Isobutane (C4H10)	58.12	2.0067	3260.1	0.1744	6.321	7.7	0.000008	0.0000	0.0	0.0000	0.0004	0.0000	0.0000	0.0000				0.0000	0.0001
n-Butane	58.12	2.0067	3269.6	0.1825	6.321		0.000000	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000
Isopentane (C5H12)	72.14	2.4910	4009.4	0.2276	5.252	3.7	0.000004	0.0000	0.0	0.0000	0.0003	0.0000	0.0000	0.0000				0.0000	0.0000
n-Pentane	72.14	2.4910	4018.5	0.2377	5.252		0.000000	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000
Hexanes (C6H14)	86.17	2.9753	4758.0	0.2830	4.398	5.6	0.000006	0.0000	0.0	0.0000	0.0005	0.0000	0.0000	0.0000				0.0000	0.0001
C6+	86.17	2.9753	4758.0	0.2830	4.398	170	0.000170	0.0005	0.8	0.0000	0.0146	0.0005	0.0006	0.0001				0.0007	0.0023
Total						1543.6	1.011222	**0.970**	**467.0**	0.0232	28.1011	0.9993	0.3421	0.0657	0.4003	0.1914	0.0000	0.9995	**13.44**
								SG	**Btu/ft³**	$\sum x_i\sqrt{b_i}$	ΣxiMW		**34.23%**	**6.57%**	**40.05%**	**19.15%**	**0.00%**		**ft³/lb**

‡ Omitted from Compressibility Factor Calculation

Calculated Specific Gravity (SG) (Air = 1.000 @ 760mm Hg, 60°F) 0.970
Compressibility Factor (Z) 0.999

Z = 1 - [(âxiÖbi)2 + (2xH -xH2) (0.0005)]

Specific Gravity (corrected) 0.971

Specific Volume, (SV) ft3/lb 13.4 ft3/lb

Gross Calorific Value (GCV) @ 60°F 467 Btu/ft3 Gross
Gross Calorific Value (GCV) @ 68°F 460 Btu/ft3 Gross

Gross Calorific Value (GCV) 6,278 Btu/lb

*Btu/lb = Btu/ft3 * ft3/lb*

Gas Fd-Factor @ 68°F 9,646 DSCF/MMBtu

*DSCF/MMBtu = 106 * ((3.64*%H2)+(1.53*%C)+(0.57*%S)+(0.14*%N2)-(0.46*%O2)) / Btu/lb*

Gas Fd-Factor @ 60°F 9,500 DSCF/MMBtu

BLUE SKY ENVIRONMENTAL, INC

Fd-FACTOR CALCULATION

Sample ID:	LFG A Run 2
FACILITY	Golder (Lompoc)
UNIT	FLARE
Date:	9/27/18

	Molecular Weight	Ideal Gas Specific Gravity, G_i	Ideal Gas Total Calorific Value, H_i	Compressibility Summation Factor, $\sqrt{bi}$	Specific Volume, ft^3/lb	PPM %	Composition Mole Fraction, x_i	Specific Gravity Fraction, xG_i	Calorific Value Fraction, xH_i	Compressibility Fraction, $x\sqrt{bi}$	x_iMW	Weight Fraction, $\xi_iMW / \sum xiMW$	CARBON Weight Fraction	HYDROGEN Weight Fraction	OXYGEN Weight Fraction	NITROGEN Weight Fraction	SULFUR Weight Fraction	CHONS SUM	Specific Volume, ft^3/lb
Helium‡	4.00	0.1382	0.0	-0.0170		0.00	0.000000	0.0000	0.0	0.0000	0.0000	0.0000							
Hydrogen (H_2) ‡	2.02	0.0696	324.9		187.723	<1.0	0.010000	0.0007	3.2	0.0000	0.0202							0.0000	
Nitrogen	28.01	0.9672	0.0	0.0164	13.443	24.0	0.240000	0.2321	0.0	0.0039	6.7224	0.2396				0.2396		0.2396	3.2216
Oxygen	32.00	1.1053	0.0		11.819	1.0	0.010000	0.0111	0.0	0.0000	0.3200	0.0114			0.0114			0.0114	0.1348
Carbon Monoxide	28.01	0.9671	321.3	0.0217	13.506	<0.2	0.000000	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000
Carbon Dioxide‡	44.01	1.5194	0.0	0.0640	8.548	32.9	0.329000	0.4999	0.0	0.0211	14.4793	0.5162	0.1409	0.0000	0.3753			0.5162	4.4123
Methane	16.04	0.5539	1012.0	0.0436	23.565	40.5	0.405000	0.2243	409.9	0.0177	6.4962	0.2316	0.1734	0.0582				0.2316	5.4573
Ethane (C2)	30.01	1.0382	1772.9	0.0917	12.455	<4.1	0.000000	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000
Propane (C3)	44.09	1.5224	2523.0	0.1342	8.365	19.2	0.000019	0.0000	0.0	0.0000	0.0008	0.0000	0.0000	0.0000				0.0000	0.0003
Isobutane (C4)	58.12	2.0067	3260.1	0.1744	6.321	6.5	0.000007	0.0000	0.0	0.0000	0.0004	0.0000	0.0000	0.0000				0.0000	0.0001
n-Butane	58.12	2.0067	3269.6	0.1825	6.321		0.000000	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000
Isopentane (C5)	72.14	2.4910	4009.4	0.2276	5.252	3.4	0.000003	0.0000	0.0	0.0000	0.0002	0.0000	0.0000	0.0000				0.0000	0.0000
n-Pentane	72.14	2.4910	4018.5	0.2377	5.252		0.000000	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000
Hexanes (C6)	86.17	2.9753	4758.0	0.2830	4.398	5.2	0.000005	0.0000	0.0	0.0000	0.0004	0.0000	0.0000	0.0000				0.0000	0.0001
C6+	86.17	2.9753	4758.0	0.2830	4.398	127	0.000127	0.0004	0.6	0.0000	0.0109	0.0004	0.0004	0.0001				0.0005	0.0017
Total						1147.8	0.994161	**0.969**	**413.8**	0.0216	28.0509	0.9993	0.3148	0.0583	0.3867	0.2396	0.0000	0.9994	**13.23**
								SG	**Btu/ft^3**	**$\sum x_i\sqrt{b_i}$**	**$\sum$xiMW**		**31.49%**	**5.83%**	**38.69%**	**23.98%**	**0.00%**		**ft^3/lb**

‡ Omitted from Compressibility Factor Calculation

Calculated Specific Gravity (SG) (Air = 1.000 @ 760mm Hg, 60°F)	**0.969**	
Compressibility Factor (Z)	**1.000**	
Z = 1 - [(åxiÖbi)2 + (2xH -xH2) (0.0005)]		
Specific Gravity (corrected)	**0.969**	
Specific Volume, (SV) ft3/lb	**13.2**	**ft3/lb**
Gross Calorific Value (GCV) @ 60°F	**414**	**Btu/ft3 Gross**
Gross Calorific Value (GCV) @ 68°F	**408**	**Btu/ft3 Gross**
Gross Calorific Value (GCV)	**5,477**	**Btu/lb**
*Btu/lb = Btu/ft3 * ft3/lb*		
Gas Fd-Factor @ 68°F	**10,038**	**DSCF/MMBtu**
*DSCF/MMBtu = 106 * ((3.64*%H2)+(1.53*%C)+(0.57*%S)+(0.14*%N2)-(0.46*%O2)) / Btu/lb*		
Gas Fd-Factor @ 60°F	**9,886**	**DSCF/MMBtu**

BLUE SKY ENVIRONMENTAL, INC

Fd-FACTOR CALCULATION

Sample ID: LFG-Run-3
FACILITY Golder (Lompoc)
UNIT FLARE
Date: 9/27/18

	Molecular Weight	Ideal Gas Specific Gravity, G_i	Ideal Gas Total Calorific Value, H_i	Compressibility Summation Factor, $\sqrt{bi}$	Specific Volume, ft^3/lb	PPM %	Composition Mole Fraction, x_i	Specific Gravity Fraction, xG_i	Calorific Value Fraction, xH_i	Compressibility Fraction, $x\sqrt{bi}$	x_iMW	Weight Fraction, $\xi_iMW / \sum xiMW$	CARBON Weight Fraction	HYDROGEN Weight Fraction	OXYGEN Weight Fraction	NITROGEN Weight Fraction	SULFUR Weight Fraction	CHONS SUM	Specific Volume, ft^3/lb
Helium‡	4.00	0.1382	0.0	-0.0170		0.00	0.000000	0.0000	0.0	0.0000	0.0000	0.0000							
Hydrogen (H_2) ‡	2.02	0.0696	324.9		187.723	<1.0	0.010000	0.0007	3.2	0.0000	0.0202							0.0000	
Nitrogen	28.01	0.9672	0.0	0.0164	13.443	17.5	0.175000	0.1693	0.0	0.0029	4.9018	0.1717				0.1717		0.1717	2.3082
Oxygen	32.00	1.1053	0.0		11.819	0.7	0.007000	0.0077	0.0	0.0000	0.2240	0.0078			0.0078			0.0078	0.0927
Carbon Monoxide	28.01	0.9671	321.3	0.0217	13.506	<0.2	0.000000	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000
Carbon Dioxide‡	44.01	1.5194	0.0	0.0640	8.548	36.7	0.367000	0.5576	0.0	0.0235	16.1517	0.5658	0.1544	0.0000	0.4114			0.5658	4.8363
Methane	16.04	0.5539	1012.0	0.0436	23.565	45.1	0.451000	0.2498	456.4	0.0197	7.2340	0.2534	0.1897	0.0637				0.2534	5.9714
Ethane (C2)	30.01	1.0382	1772.9	0.0917	12.455	<4.1	0.000004	0.0000	0.0	0.0000	0.0001	0.0000	0.0000	0.0000				0.0000	0.0001
Propane (C3)	44.09	1.5224	2523.0	0.1342	8.365	22.4	0.000022	0.0000	0.1	0.0000	0.0010	0.0000	0.0000	0.0000				0.0000	0.0003
Isobutane (C4)	58.12	2.0067	3260.1	0.1744	6.321	7.6	0.000008	0.0000	0.0	0.0000	0.0004	0.0000	0.0000	0.0000				0.0000	0.0001
n-Butane	58.12	2.0067	3269.6	0.1825	6.321		0.000000	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000
Isopentane (C5)	72.14	2.4910	4009.4	0.2276	5.252	4.7	0.000005	0.0000	0.0	0.0000	0.0003	0.0000	0.0000	0.0000				0.0000	0.0001
n-Pentane	72.14	2.4910	4018.5	0.2377	5.252		0.000000	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000
Hexanes (C6)	86.17	2.9753	4758.0	0.2830	4.398	6.0	0.000006	0.0000	0.0	0.0000	0.0005	0.0000	0.0000	0.0000				0.0000	0.0001
C6+	86.17	2.9753	4758.0	0.2830	4.398	160	0.000160	0.0005	0.8	0.0000	0.0138	0.0005	0.0005	0.0001				0.0006	0.0021
Total						1445.3	1.010205	**0.986**	**460.6**	0.0226	28.5478	0.9993	0.3447	0.0638	0.4192	0.1717	0.0000	0.9995	**13.21**
								SG	**Btu/ft^3**	**$\sum x_i\sqrt{b_i}$**	**$\sum$xiMW**		**34.49%**	**6.38%**	**41.94%**	**17.18%**	**0.00%**		**ft^3/lb**

‡ Omitted from Compressibility Factor Calculation

Calculated Specific Gravity (SG) (Air = 1.000 @ 760mm Hg, 60°F) **0.986**
Compressibility Factor (Z) **0.999**
Z = 1 - [(åxiÖbi)2 + (2xH -xH2) (0.0005)]

Specific Gravity (corrected) **0.986**

Specific Volume, (SV) ft3/lb **13.2** ft3/lb

Gross Calorific Value (GCV) @ 60°F **461** Btu/ft3 Gross
Gross Calorific Value (GCV) @ 68°F **454** Btu/ft3 Gross

Gross Calorific Value (GCV) **6,088** Btu/lb
*Btu/lb = Btu/ft3 * ft3/lb*

Gas Fd-Factor @ 68°F **9,712** DSCF/MMBtu
*DSCF/MMBtu = 106 * ((3.64*%H2)+(1.53*%C)+(0.57*%S)+(0.14*%N2)-(0.46*%O2)) / Btu/lb*
Gas Fd-Factor @ 60°F **9,565 DSCF/MMBtu**

C
Laboratory Reports

Atmospheric Analysis & Consulting, Inc.

CLIENT	: Blue Sky Environmental
PROJECT NAME	: Golder (Lompoc Flare)
AAC PROJECT NO.	: 181493
REPORT DATE	: 10/9/2018

On September 28, 2018, Atmospheric Analysis & Consulting, Inc. received three (3) Six-Liter Silonite Canisters for TNMOC analysis by EPA 25C, ASTM D-1945 analysis, and TRS analysis by ASTM D-5504. Also received were three (3) Six-Liter Summa Canisters for Hydrocarbon analysis by EPA 18 Modified. Upon receipt, the samples were assigned unique Laboratory ID numbers as follows:

Client ID	Lab No.	Initial Press ure (mmHg)
R1-LFG	181493-113503	746.7
R2-LFG	181493-113504	625.4
R3-LFG	181493-113505	615.2
Lompoc Flare Exhaust #2818	181493-113506	697.6
Exhaust #2455	181493-113507	701.1
Exhaust #2590	181493-113508	698.6

All of the analyses mentioned above were performed in accordance with AAC's ISO/IEC 17025:2005 and NELAP approved Quality Assurance Plan. 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 Laboratory Director or his/her 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.

Marcus Hueppe
Laboratory Director

This report consists of 10 pages.

1534 Eastman Ave., Ste. A • Ventura, • CA 93003 www.aaclab.com • (805) 650-1642 • FAX (805) 650-1644

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : **Blue Sky Environmental**
PROJECT NO. : **181493**
MATRIX : **Air**

SAMPLING DATE : **09/27/2018**
RECEIVING DATE : **09/28/2018**
ANALYSIS DATE : **10/02-03/2018**
REPORT DATE : **10/09/2018**

ASTM D-1945 & EPA 25C

Client ID	R1-LFG	R2-LFG	R3-LFG
AAC ID	181493-113503	181493-113504	181493-113505
Can Dilution Factor	1.37	1.64	1.66
Analyte	Result	Result	Result
H_2	< 1.0 %	< 1.0 %	< 1.0 %
O_2	1.0 %	2.6 %	0.7 %
N_2	19.2 %	24.0 %	17.5 %
CO	< 0.1 %	< 0.2 %	< 0.2 %
CO_2	34.1 %	32.9 %	36.7 %
CH_4	45.7 %	40.5 %	45.1 %
C_2 (as Ethane)	< 3.4 ppmV	< 4.1 ppmV	< 4.1 ppmV
C_3 (as Propane)	31.3 ppmV	19.2 ppmV	22.4 ppmV
C_4 (as Butane)	7.7 ppmV	6.5 ppmV	7.6 ppmV
C_5 (as Pentane)	3.7 ppmV	3.4 ppmV	4.7 ppmV
C_6 (as Hexane)	5.6 ppmV	5.2 ppmV	6.0 ppmV
C_6+ (as Hexane)	170 ppmV	127 ppmV	160 ppmV
TNMOC (as Carbon)	1,436 ppmC	1,358 ppmC	1,622 ppmC

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 (if applicable)

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

LABORATORY ANALYSIS REPORT

CLIENT : **Blue Sky Environmental**
PROJECT NO. : **181493**
MATRIX : **AIR**
UNITS : **ppmV**

SAMPLING DATE : **09/27/2018**
RECEIVING DATE : **09/28/2018**
ANALYSIS DATE : **09/28/2018**
REPORT DATE : **10/09/2018**

Total Reduced Sulfur Compounds Analysis by ASTM D-5504

Client ID	**R1-LFG**	**R2-LFG**	**R3-LFG**
AAC ID	181493-113503	181493-113504	181493-113505
Canister Dil. Fac.	1.4	1.6	1.7
Analyte	**Result**	**Result**	**Result**
Hydrogen Sulfide	**46.0**	**42.8**	**55.9**
Carbonyl Sulfide	< 0.068	< 0.082	< 0.083
Sulfur Dioxide	< 0.068	< 0.082	< 0.083
Methyl Mercaptan	**0.584**	**0.525**	**0.597**
Ethyl Mercaptan	**0.085**	< 0.082	< 0.083
Dimethyl Sulfide	**0.637**	**0.561**	**0.631**
Carbon Disulfide	< 0.068	< 0.082	< 0.083
Isopropyl Mercaptan	**0.344**	**0.334**	**0.363**
tert-Butyl Mercaptan	**0.104**	< 0.082	< 0.083
n-Propyl Mercaptan	< 0.068	< 0.082	< 0.083
Methylethylsulfide	< 0.068	< 0.082	< 0.083
sec-Butyl Mercaptan / Thiophene	**0.440**	**0.333**	**0.400**
iso-Butyl Mercaptan	< 0.068	< 0.082	< 0.083
Diethyl Sulfide	< 0.068	< 0.082	< 0.083
n-Butyl Mercaptan	< 0.068	< 0.082	< 0.083
Dimethyl Disulfide	< 0.068	< 0.082	< 0.083
2-Methylthiophene	**0.122**	< 0.082	< 0.083
3-Methylthiophene	< 0.068	< 0.082	< 0.083
Tetrahydrothiophene	< 0.068	< 0.082	< 0.083
Bromothiophene	< 0.068	< 0.082	< 0.083
Thiophenol	< 0.068	< 0.082	< 0.083
Diethyl Disulfide	< 0.068	< 0.082	< 0.083
Total Unidentified Sulfur	< 0.068	< 0.082	< 0.083
Total Reduced Sulfurs	**48.3**	**44.5**	**57.9**

All unidentified compound's concentrations expressed in terms of H_2S (TRS does not include COS and SO_2)
Sample Reporting Limit (SRL) is equal to Reporting Limit x Canister Dil. Fac. x Analysis Dil. Fac.

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LABORATORY ANALYSIS REPORT

CLIENT	: Blue Sky Environmental	SAMPLING DATE	: 09/24/2018
PROJECT NO.	: 181493	RECEIVING DATE	: 09/28/2018
MATRIX	: Air	ANALYSIS DATE	: 10/02/2018
UNITS	: ppmV	REPORT DATE	: 10/09/2018

C_1 to C_6+ Hydrocarbons by EPA 18 Modified

Client ID	Lompoc Flare Exhaust		SRL (RL x DF's)	Exhaust #2455		SRL (RL x DF's)	Exhaust #2590		SRL (RL x DF's)	Reporting Limit (RL)
AAC ID	181493-113506			181493-113507			181493-113508			
Canister Dil. Fac.	1.5			1.5			1.5			
Analyte	Result	Analysis Dil. Fac.		Result	Analysis Dil. Fac.		Result	Analysis Dil. Fac.		
C_1 (as Methane)	59.5	1	0.7	<SRL	1	0.7	<SRL	1	0.7	0.5
C_2 (as Ethane)	<SRL	1	0.7	<SRL	1	0.7	<SRL	1	0.7	0.5
C_3 (as Propane)	<SRL	1	0.7	<SRL	1	0.7	<SRL	1	0.7	0.5
C_4 (as Butane)	<SRL	1	0.7	<SRL	1	0.7	<SRL	1	0.7	0.5
C_5 (as Pentane)	<SRL	1	0.7	<SRL	1	0.7	<SRL	1	0.7	0.5
C_6 (as Hexane)	<SRL	1	0.7	<SRL	1	0.7	<SRL	1	0.7	0.5
C_6+ (as Hexane)	<SRL	1	0.7	<SRL	1	0.7	<SRL	1	0.7	0.5
TNMOC (as Methane)	<SRL	1	0.7	<SRL	1	0.7	<SRL	1	0.7	0.5

Sample Reporting Limit (SRL) is equal to Reporting Limit (RL) x Canister Dilution Factor x Analysis Dilution Factor (if applicable)

TNMOC - Total Non-Methane Non-Ethane Organic Carbon Reported as Methane

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

Date Analyzed : **10/02/2018**
Analyst : **DL**
Units : **%**

Instrument ID : **TCD #1**
Calb Date : **08/28/18**
Reporting Limit : **0.1%**

I - Opening Continuing Calibration Verification - BTU/ASTM D-1945

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
CCV	Spike Conc	9.5	10.4	19.9	10.3	10.2	10.2
	Result	10.1	10.3	19.8	10.3	10.0	10.0
	% Rec *	105.8	98.6	99.5	99.9	98.7	97.9

II - Method Blank - BTU/ASTM D-1945

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 - BTU/ASTM D-1945

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	9.5	10.4	19.9	10.3	10.2	10.2
	LCS Result	10.0	10.3	19.8	10.2	10.0	9.8
	LCSD Result	10.1	10.2	19.7	10.1	9.9	10.0
	LCS % Rec *	105.1	98.9	99.6	98.8	98.5	96.4
	LCSD % Rec *	106.3	98.0	99.0	98.5	97.7	98.0
	% RPD ***	1.1	0.9	0.6	0.4	0.8	1.7

IV -Sample & Sample Duplicate - BTU/ASTM D-1945

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
181493-113505	Sample	0.0	0.4	10.0	25.6	0.0	20.9
	Sample Dup	0.0	0.4	9.9	25.9	0.0	21.0
	Mean	0.0	0.4	10.0	25.7	0.0	20.9
	% RPD ***	0.0	0.0	0.8	1.1	0.0	0.3

V - Matrix Spike & Duplicate- BTU/ASTM D-1945

AAC ID	Analyte	H_2	N_2	CH_4	CO	CO_2
181493-113505	Sample Conc	0.0	5.0	12.9	0.0	10.5
	Spike Conc	9.5	9.8	10.3	10.2	10.2
	MS Result	9.4	15.0	23.2	10.2	20.4
	MSD Result	9.6	16.6	23.1	10.3	20.6
	MS % Rec **	98.8	101.9	100.4	100.0	97.5
	MSD % Rec **	100.6	118.2	100.0	101.3	99.7
	% RPD ***	1.8	14.7	0.4	1.3	2.3

VI - Closing Continuing Calibration Verification - BTU/ASTM D-1945

AAC ID	Analyte	H_2	O_2	N_2	CH_4	CO	CO_2
CCV	Spike Conc	9.5	10.4	19.9	10.3	10.2	10.2
	Result	9.5	10.3	19.9	10.3	10.0	10.1
	% Rec *	100.3	98.5	100.3	100.4	98.4	98.6

***Must be 85-115%*
*** Must be 75-125%*
**** Must be < 25%*
ND = Not Detected
<RL = less than Reporting Limit

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

Date Analyzed : **10/02/2018**
Analyst : **DL**
Units : **ppmv**

Instrument ID : **FID #3**
Calb Date : **02/27/18**
Reporting Limit : **0.5 ppmv**

I - Opening Continuing Calibration Verification - BTU/ASTM D-1945

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
CCV	Spike Conc	99.7	100.1	99.9	99.8	100.0	99.9
	Result	96.4	97.2	97.1	95.0	94.7	92.8
	% Rec *	96.7	97.0	97.1	95.2	94.7	92.8

II - Method Blank - BTU/ASTM D-1945

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
MB	Concentration	ND	ND	ND	ND	ND	ND

III - Laboratory Control Spike & Duplicate - BTU/ASTM D-1945

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
Lab Control Standards	Sample Conc	0.0	0.0	0.0	0.0	0.0	0.0
	Spike Conc	99.7	100.1	99.9	99.8	100.0	99.9
	LCS Result	95.8	96.9	95.8	95.2	94.3	92.3
	LCSD Result	96.3	97.3	96.5	96.0	94.9	92.7
	LCS % Rec *	96.1	96.7	95.9	95.4	94.3	92.3
	LCSD % Rec *	96.6	97.2	96.6	96.2	95.0	92.7
	% RPD ***	0.5	0.4	0.7	0.8	0.7	0.5

IV - Sample & Sample Duplicate - BTU/ASTM D-1945

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
181493-113506	Sample	41.3	0.0	0.0	0.0	0.0	0.0
	Sample Dup	40.1	0.0	0.0	0.0	0.0	0.0
	Mean	40.7	0.0	0.0	0.0	0.0	0.0
	% RPD ***	3.0	0.0	0.0	0.0	0.0	0.0

V - Matrix Spike & Duplicate - BTU/ASTM D-1945

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
181493-113506	Sample Conc	20.3	0.0	0.0	0.0	0.0	0.0
	Spike Conc	49.8	50.1	50.0	49.9	50.0	50.0
	MS Result	68.3	48.5	48.1	47.5	46.7	45.1
	MSD Result	68.2	48.5	47.4	47.7	46.8	45.6
	MS % Rec **	96.2	96.9	96.3	95.2	93.3	90.3
	MSD % Rec **	96.0	96.8	95.0	95.6	93.6	91.2
	% RPD ***	0.2	0.1	1.4	0.5	0.2	1.0

VI - Closing Continuing Calibration Verification - BTU/ASTM D-1945

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
CCV	Spike Conc	99.7	100.1	99.9	99.8	100.0	99.9
	Result	95.7	96.1	95.5	95.5	94.1	92.1
	% Rec *	96.0	95.9	95.5	95.6	94.1	92.1

** Must be 85-115%*

*** Must be 75-125%*

**** Must be < 25%*

ND = Not Detected

<RL = less than Reporting Limit

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

ASTM D-5504

Date Analyzed: 9/28/2018
Analyst: ZB
Units: ppbV

Instrument ID: SCD#10
Calb. Date: 7/31/2018

Opening Calibration Verification Standard

465.3 ppbV H2S (SS1099)

H_2S	Resp. (area)	Result	% Rec *	% RPD ****
Initial	3180	454	97.7	1.2
Duplicate	3281	469	100.8	2.0
Triplicate	3193	456	98.1	0.8

452.0 ppbV H2S (SS1099)

MeSH	Resp. (area)	Result	% Rec *	% RPD ****
Initial	3922	453	100.2	1.0
Duplicate	3927	454	100.4	1.1
Triplicate	3800	439	97.1	2.1

476.3 ppbV H2S (SS1099)

DMS	Resp. (area)	Result	% Rec *	% RPD ****
Initial	4900	478	100.3	0.1
Duplicate	4926	480	100.9	0.4
Triplicate	4888	477	100.1	0.3

Method Blank

Analyte	Result
H_2S	<PQL
MeSH	<PQL
DMS	<PQL

Duplicate Analysis — Sample ID 181490-113494

Analyte	Sample Result	Duplicate Result	Mean	% RPD ***
H_2S	1873.1	1858.1	1865.6	0.8
MeSH	<PQL	<PQL	0.0	0.0
DMS	<PQL	<PQL	0.0	0.0

Matrix Spike & Duplicate — Sample ID 181490-113494 x10

Analyte	Sample Conc.	Spike Added	MS Result	MSD Result	MS % Rec **	MSD % Rec **	% RPD ***
H_2S	186.6	232.6	407.7	419.8	97.3	100.2	2.9
MeSH	<PQL	226.0	221.5	217.0	98.0	96.0	2.0
DMS	<PQL	238.1	232.9	241.7	97.8	101.5	3.7

Closing Calibration Verification Standard

Analyte	Std. Conc.	Result	% Rec **
H_2S	465.3	480.2	103.2
MeSH	452.0	460.7	101.9
DMS	476.3	492.7	103.5

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

H2S: PQL = 10.0 ppbV, MDL = 1.09 ppbV
MeSH: PQL = 10.0 ppbV, MDL = 1.13 ppbV
DMS: PQL = 10.0 ppbV, MDL = 1.39 ppbV

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

Analysis Date : **10/03/2018**
Analyst : **DL**
Units : **ppmv**

Instrument ID: **FID#4**
Calibration Date: **1/9/2018**

I - Opening Calibration Verification Standard - Method 25C

Analyte	xRF	DRF	%RPD*
Propane	35106	35072	0.1

II - TNMOC Response Factor - Method 25C

Analyte	xRF	CV RF	CV dp RF	CV tp RF	Average RF	% RPD***
Propane	35106	35072	36935	35638	35882	2.2

III - Method Blank - Method 25C

AAC ID	Analyte	Sample Result
MB	TNMOC	ND

IV - Laboratory Control Spike & Duplicate - Method 25C

AAC ID	Analyte	Spike Added	LCS Result	LCSD Result	LCS % Rec **	LCSD % Rec **	% RPD***
LCS/LCSD	Propane	50.9	54.6	52.6	107.3	103.5	3.6

V - Closing Calibration Verification Standard - Method 25C

Analyte	xCF	dCF	%RPD*
Propane	35106	35719	1.7

xCF - Average Calibration Factor from Initial Calibration Curve
dCF - Daily Calibration Factor
* Must be <15%
** Must be 90-110 %
*** Must be <20%

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

Date Analyzed : **10/02/2018**
Analyst : **DL**
Units : **ppmv**

Instrument ID : **FID #3**
Calb Date : **02/27/18**
Reporting Limit : **0.5 ppmv**

I - Opening Continuing Calibration Verification - EPA 18 Mod

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
CCV	Spike Conc	99.7	100.1	99.9	99.8	100.0	99.9
	Result	96.4	97.2	97.1	95.0	94.7	92.8
	% Rec *	96.7	97.0	97.1	95.2	94.7	92.8

II - Method Blank - EPA 18 Mod

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
MB	Concentration	ND	ND	ND	ND	ND	ND

III - Laboratory Control Spike & Duplicate - EPA 18 Mod

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
Lab Control Standards	Sample Conc	0.0	0.0	0.0	0.0	0.0	0.0
	Spike Conc	99.7	100.1	99.9	99.8	100.0	99.9
	LCS Result	95.8	96.9	95.8	95.2	94.3	92.3
	LCSD Result	96.3	97.3	96.5	96.0	94.9	92.7
	LCS % Rec *	96.1	96.7	95.9	95.4	94.3	92.3
	LCSD % Rec *	96.6	97.2	96.6	96.2	95.0	92.7
	% RPD ***	0.5	0.4	0.7	0.8	0.7	0.5

IV -Sample & Sample Duplicate - EPA 18 Mod

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
181493-113506	Sample	41.3	0.0	0.0	0.0	0.0	0.0
	Sample Dup	40.1	0.0	0.0	0.0	0.0	0.0
	Mean	40.7	0.0	0.0	0.0	0.0	0.0
	% RPD ***	3.0	0.0	0.0	0.0	0.0	0.0

V - Matrix Spike & Duplicate- EPA 18 Mod

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
181493-113506	Sample Conc	20.3	0.0	0.0	0.0	0.0	0.0
	Spike Conc	49.8	50.1	50.0	49.9	50.0	50.0
	MS Result	68.3	48.5	48.1	47.5	46.7	45.1
	MSD Result	68.2	48.5	47.4	47.7	46.8	45.6
	MS % Rec **	96.2	96.9	96.3	95.2	93.3	90.3
	MSD % Rec **	96.0	96.8	95.0	95.6	93.6	91.2
	% RPD ***	0.2	0.1	1.4	0.5	0.2	1.0

VI - Closing Continuing Calibration Verification - EPA 18 Mod

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
CCV	Spike Conc	99.7	100.1	99.9	99.8	100.0	99.9
	Result	95.7	96.1	95.5	95.5	94.1	92.1
	% Rec *	96.0	95.9	95.5	95.6	94.1	92.1

** Must be 85-115%*
*** Must be 75-125%*
**** Must be < 25%*
ND = Not Detected
<RL = less than Reporting Limit

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Contact: Marcus Hueppe

Page __ of __

CHAIN OF CUSTODY RECORD

Project Name: **Golder (Lompoc Flare)**

Project #: 181493

SAMPLE Date	SAMPLE Time	Sample ID (Source-Method-Run-Fraction)	Type/Size of container	25C-M NMOC	ASTM 1945	ASTM5504	EPA 18 (C1 - C6 + CH4) and TNMOC			
09/27/18	113503	R1-LFG #2803	Silco	X	X	X				
09/27/18	113504	R2-LFG #2805	Silco	X	X	X				
09/27/18	113505	R3-LFG #2619	Silco	X	X	X				
09/24/18	113506	R1-~~Outlet~~ LOMPOC Flare Exhaust #2818	Silco				X			
09/24/18	113507	R2-~~Outlet~~ Exhaust #2455	Silco				X			
09/24/18	113508	R3-~~Outlet~~ Exhaust 2590	Silco				X			

All samples submitted to laboratories for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the sample. Samples should be held for 90+ days. The laboratory reserves the right to return unused sample portions.

COMMENTS:

P/U.
@ SOLVANG BREWING CO.

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
[signature]	9-27-18	1pm	GSO	9/27	1pm
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by: [signature]	9/28/18	0720

GSO

D
Field Data Sheets

Golder (Lompoc)

FLARE

		O_2	CO_2	NO_X	CO	
DATE	TIME	%	%	PPM	PPM	
9/27/2018	7:40:51	-0.01	0.04	-0.01	0.0	INTERNAL LINEARITY
9/27/2018	7:55:53	20.54	12.58	23.34	84.9	
9/27/2018	7:59:54	14.49	8.40	12.42	44.9	
9/27/2018	8:02:54			12.82		NO2 CHECK
9/27/2018	8:20:58	14.53	8.22	0.12	-0.3	EXTERNAL BIAS
9/27/2018	8:24:58	0.12	-0.23	12.34		
9/27/2018	8:29:59				44.9	

ZERO
SPAN

RUN 1		O_2	CO_2	NO_X	CO
DATE	TIME	%	%	PPM	PPM
9/27/2018	8:59:04	11.19	8.47	16.1	0.0
9/27/2018	9:00:04	11.63	8.17	15.1	0.0
9/27/2018	9:01:05	11.47	8.25	15.6	0.7
9/27/2018	9:02:05	11.40	8.20	15.9	0.2
9/27/2018	9:03:05	10.93	8.56	16.6	1.4
9/27/2018	9:04:05	10.59	8.75	17.2	0.7
9/27/2018	9:05:05	10.15	9.34	18.2	1.7
9/27/2018	9:06:05	10.34	9.17	17.6	0.9
9/27/2018	9:07:06	10.69	8.96	16.9	0.1
9/27/2018	9:08:06	11.91	8.34	15.7	0.1
9/27/2018	9:09:06	11.88	7.62	14.5	-0.3
9/27/2018	9:10:06	13.08	7.01	12.9	-0.3
9/27/2018	9:11:06	13.41	6.56	12.0	-0.1
9/27/2018	9:12:06	13.48	6.75	11.9	0.1
9/27/2018	9:13:07	15.00	5.28	9.7	-0.1
9/27/2018	9:14:07	13.69	5.81	10.6	-0.2
9/27/2018	9:15:07	13.68	6.19	11.3	-0.3
9/27/2018	9:16:07	15.72	4.66	10.2	-0.1
9/27/2018	9:17:07	15.58	4.13	11.0	-0.1
9/27/2018	9:18:07	14.05	5.42	10.9	-0.2
PORT CHANGE					
9/27/2018	9:31:10	11.59	7.86	14.6	0.1
9/27/2018	9:32:10	11.05	8.50	15.9	0.0
9/27/2018	9:33:10	11.10	8.58	16.0	-0.1
9/27/2018	9:34:10	11.35	8.35	15.7	-0.1
9/27/2018	9:35:10	11.39	8.33	15.6	0.0
9/27/2018	9:36:11	11.24	8.34	15.9	0.1
9/27/2018	9:37:11	11.54	8.23	15.3	0.1
9/27/2018	9:38:11	11.16	8.39	15.7	0.3
9/27/2018	9:39:11	10.73	8.68	16.7	0.9
9/27/2018	9:40:11	10.81	8.89	16.8	0.6
9/27/2018	9:41:11	11.08	8.95	16.6	0.4
9/27/2018	9:42:12	11.21	8.35	15.8	0.2
9/27/2018	9:43:12	11.87	7.93	14.7	0.1
9/27/2018	9:44:12	13.97	6.87	11.9	1.3
9/27/2018	9:45:12	12.69	6.97	12.6	19.8
9/27/2018	9:46:12	12.28	7.38	13.6	17.7
9/27/2018	9:47:13	12.23	7.39	13.6	17.2
9/27/2018	9:48:13	12.26	7.44	13.6	10.5
9/27/2018	9:48:50	12.62	7.43	13.1	21.7
9/27/2018	9:49:50	12.79	7.18	12.6	14.8
AVERAGE		**12.12**	**7.64**	**14.4**	**2.7**

9/27/2018	9:54:51	14.52	8.26	0.30	-0.2
9/27/2018	9:57:52	0.11	-0.19	12.40	
9/27/2018	10:01:52				44.7

RUN 2	O_2	CO_2	NO_X	CO
TIME	%	%	PPM	PPM
10:10:54	11.41	8.15	14.18	-0.1
10:11:54	11.02	8.78	16.19	0.2
10:12:54	11.60	8.10	14.65	0.2
10:13:54	12.07	7.77	13.87	0.1
10:14:54	11.97	7.76	13.77	0.0
10:15:55	11.94	7.98	14.15	0.3
10:16:55	11.43	8.18	14.71	0.4
10:17:55	11.90	8.04	14.18	0.4
10:18:55	11.56	8.07	14.25	0.3
10:19:55	11.77	8.27	14.48	0.6
10:20:56	11.25	8.34	14.85	0.6
10:21:56	11.34	8.47	14.98	0.7
10:22:56	11.21	8.41	14.90	0.5
10:23:56	10.32	9.17	16.52	0.5
10:24:56	10.91	8.92	15.85	0.3
10:25:56	10.91	8.70	15.32	0.2
10:26:57	11.65	8.35	14.84	0.0
10:27:57	11.72	8.20	14.31	-0.3
10:28:57	12.74	7.26	12.58	-0.4
10:29:57	13.35	6.87	11.57	-0.4
PORT CHANGE				
10:34:58	13.58	4.79	8.39	-0.3
10:35:58	11.65	8.18	14.31	-0.4
10:36:58	11.57	8.21	14.49	-0.2
10:37:58	11.69	8.14	14.38	0.0
10:38:59	11.77	8.08	14.20	0.0
10:39:59	11.75	8.13	14.24	0.1
10:40:59	11.19	8.35	14.85	0.1
10:41:59	11.47	8.37	14.95	0.1
10:42:59	10.99	8.55	15.15	0.1
10:44:00	10.92	9.05	15.83	0.2
10:45:00	11.06	8.56	15.29	0.2
10:46:00	10.90	8.84	15.72	0.1
10:47:00	11.34	8.61	15.20	0.0
10:48:00	11.53	8.22	14.46	-0.2
10:49:00	11.97	7.98	13.97	-0.3
10:50:01	12.52	7.39	12.74	-0.4
10:51:01	12.93	7.23	12.19	-0.3
10:52:01	12.75	7.22	12.04	-0.4
10:53:01	13.18	6.93	11.68	-0.4
10:54:01	13.25	6.59	10.84	-0.3
AVERAGE	**11.75**	**8.03**	**14.13**	**0.0**

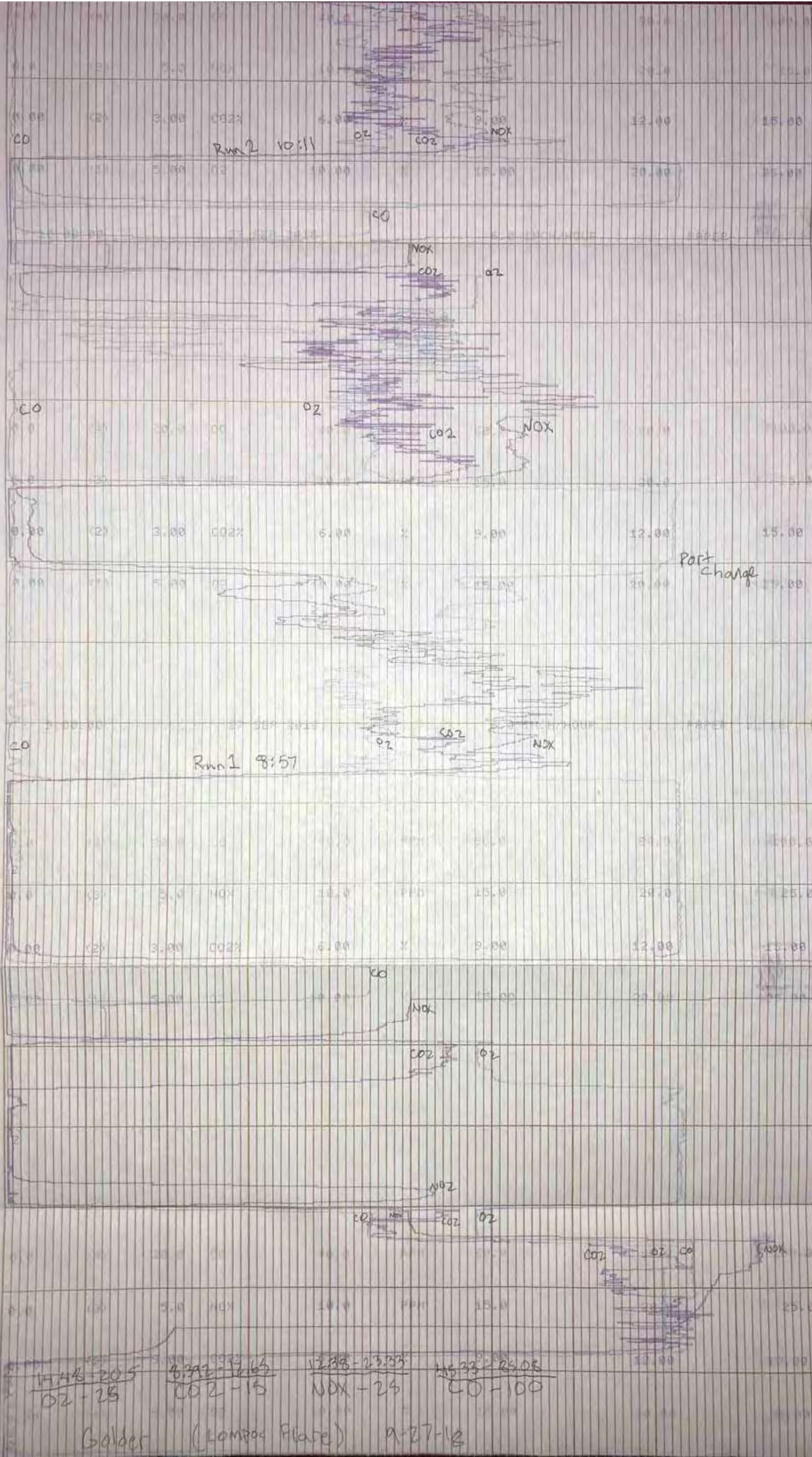
10:59:02	14.50	8.26	0.27	-0.4
11:03:03	0.10	-0.18	12.41	
11:06:03				44.7

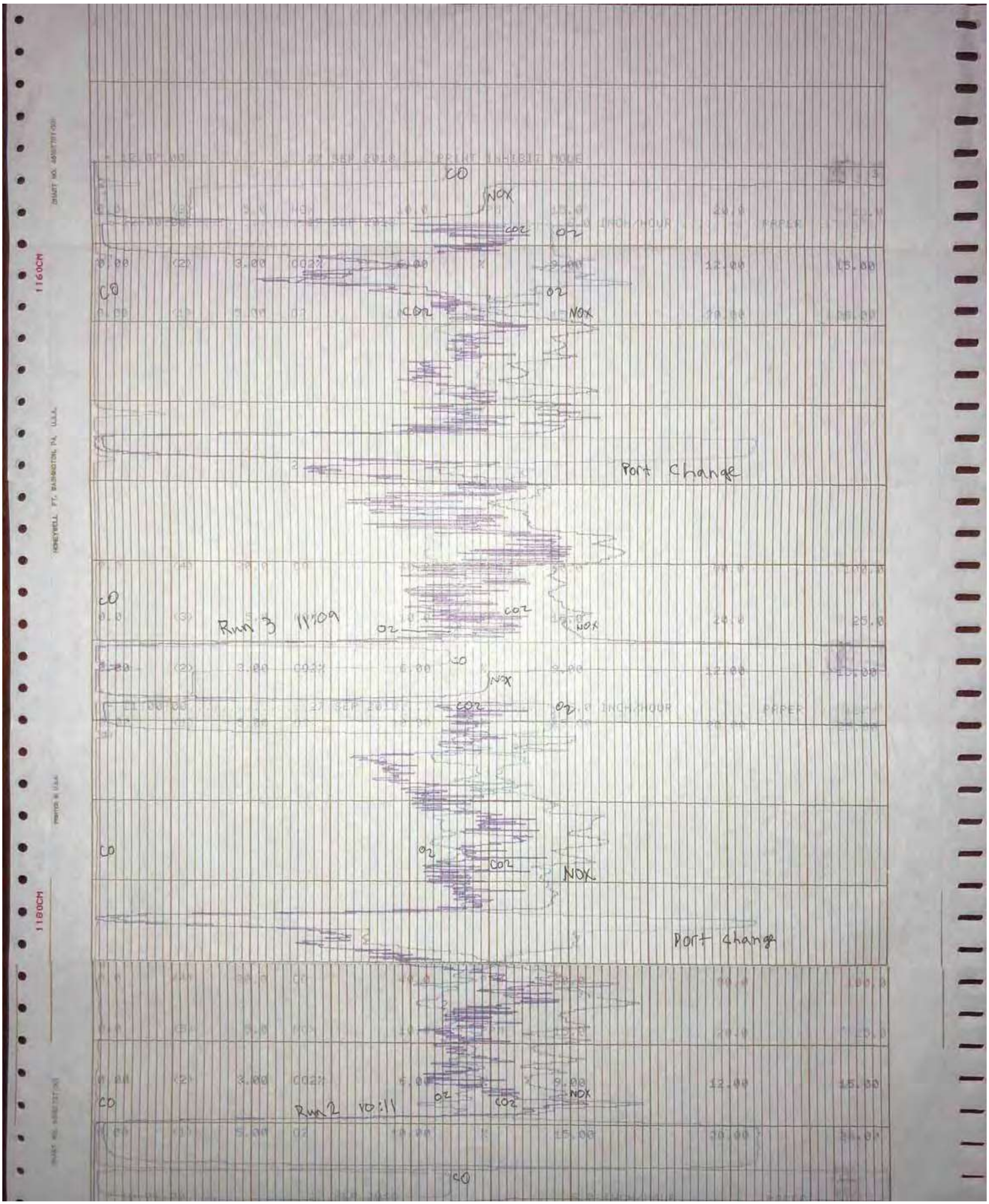
RUN 3	O_2	CO_2	NO_X	CO
TIME	%	%	PPM	PPM
11:11:04	11.34	8.21	14.92	0.0
11:12:04	11.31	8.41	15.32	0.0
11:13:05	11.66	8.15	14.75	0.0
11:14:05	11.81	8.00	14.44	-0.1
11:15:05	11.57	8.13	14.72	0.0
11:16:05	11.68	8.20	14.58	0.0
11:17:05	11.62	8.13	14.54	0.0
11:18:05	10.91	8.64	15.63	0.1
11:19:06	10.43	9.15	16.62	0.1
11:20:06	10.74	9.03	16.33	0.0
11:21:06	10.63	8.95	16.29	0.0
11:22:06	11.75	8.35	14.64	-0.2
11:23:06	12.04	7.82	13.71	-0.3
11:24:06	12.12	7.76	13.64	-0.4
11:25:07	12.55	7.48	12.93	-0.3
11:26:07	12.02	7.71	13.32	-0.4
11:27:07	11.74	8.11	14.12	-0.4
11:28:07	12.30	7.79	13.60	-0.4
11:29:07	13.55	6.66	11.32	-0.3
11:30:08	13.06	6.90	11.68	0.7
PORT CHANGE				
11:34:08	12.37	5.83	11.00	0.2
11:35:08	11.82	8.21	14.41	-0.4
11:36:09	11.47	8.35	14.97	5.2
11:37:09	11.77	7.97	14.48	0.8
11:38:09	12.14	7.87	14.01	0.0
11:39:09	11.22	8.26	14.89	0.0
11:40:09	11.98	8.17	14.55	0.1
11:41:09	12.28	7.55	13.30	-0.1
11:42:10	12.26	7.68	13.52	-0.1
11:43:10	11.85	7.82	13.84	-0.1
11:44:10	11.70	8.13	14.69	-0.1
11:45:10	11.42	8.28	14.84	-0.1
11:46:10	11.40	8.26	14.74	-0.2
11:47:10	10.97	8.72	15.70	-0.3
11:48:11	11.83	8.23	14.64	-0.3
11:49:11	12.74	7.28	12.55	-0.2
11:50:11	12.44	7.50	13.16	-0.1
11:51:11	13.35	6.90	11.98	-0.2
11:52:11	14.65	5.88	10.01	-0.3
11:53:12	16.03	4.22	7.13	-0.2
AVERAGE	**12.01**	**7.82**	**13.89**	**0.0**

11:58:12	14.50	8.36	0.23	-0.4
12:03:13	0.07	-0.19	12.35	
12:06:14				44.6

E

Strip Chart Records


Run 2 10:11
CO
O_2
CO_2
NOX
Port change
Run 1 8:57
14.48-20.5
O2-25
8.392-12.63
CO2-15
12.38-23.33
NOX-25
45.33-25.08
CO-100
Golder (Lompoc Flare) 9-27-18



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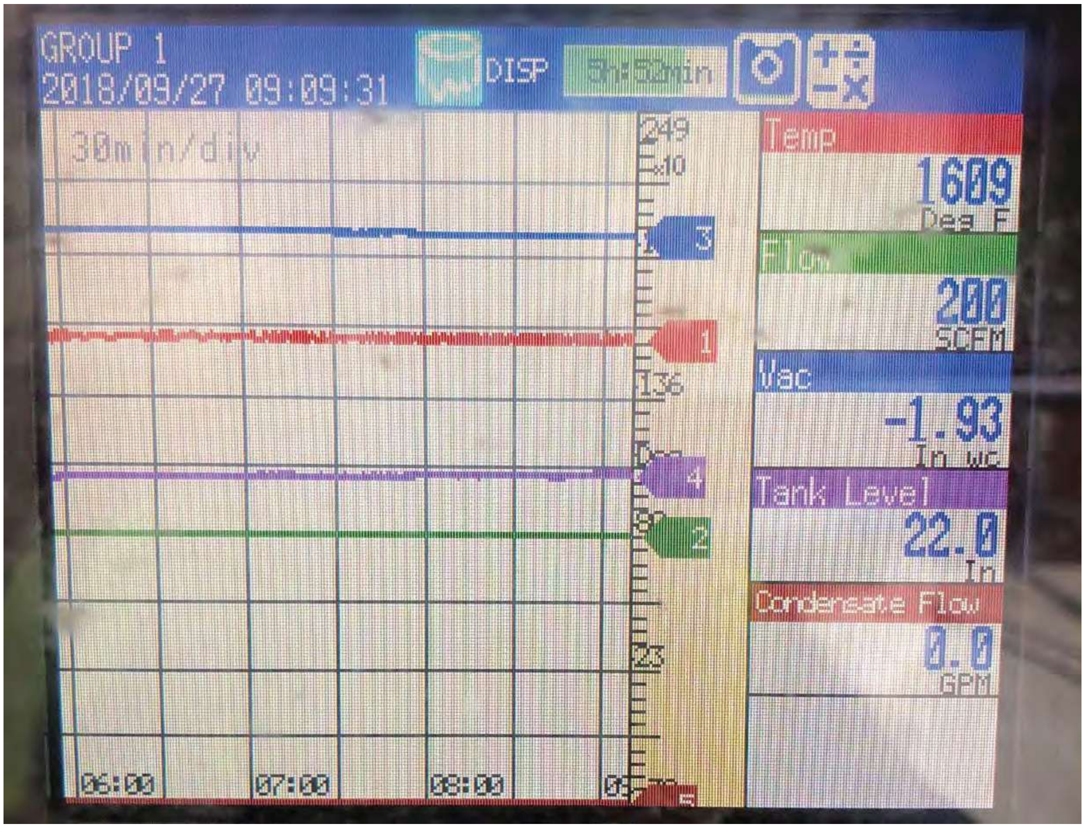
CO
NOX
CO2
O2
Port Change
Run 3 11:09
Run 2 10:11

F
Process Information



Run 1 – 9:00 – 1609 degrees F. – 200 SCFM

Run 2 – 10:12 – 1603 degrees F. – 200 SCFM

Run 3 – 11:10 – 1600 degrees F. – 200 SCFM

G
Calibration Certifications & QC Records

Airgas Specialty Gases
Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI77E15A4189	Reference Number:	153-401143038-1
Cylinder Number:	XC025491B	Cylinder Volume:	150.3 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72018	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Mar 05, 2018

Expiration Date: Mar 05, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	8.250 %	8.392 %	G1	+/- 0.9% NIST Traceable	03/05/2018
OXYGEN	14.50 %	14.48 %	G1	+/- 0.7% NIST Traceable	03/05/2018
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060410	CC413504	7.489 % CARBON DIOXIDE/NITROGEN	0.6%	Jan 14, 2019
NTRM	06120104	CC195919	9.898 % OXYGEN/NITROGEN	0.7%	Jul 26, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA-510 SV4MEUTJ CO2	CO2 NDIR (Dixon)	Feb 21, 2018
Horiba MPA-510 X9A4UGL8 O2	O2 Paramagnetic (Dixon)	Feb 21, 2018

Triad Data Available Upon Request

Signature on file
Approved for Release

Airgas Specialty Gases
Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI67E15A4187	Reference Number:	153-401108367-1
Cylinder Number:	ALM-018279	Cylinder Volume:	153.8 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72018	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Jan 23, 2018

Expiration Date: Jan 23, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	12.50 %	12.65 %	G1	+/- 0.6% NIST Traceable	01/23/2018
OXYGEN	20.50 %	20.50 %	G1	+/- 0.5% NIST Traceable	01/23/2018
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060633	CC413752	13.359 % CARBON DIOXIDE/NITROGEN	0.6%	May 09, 2019
NTRM	09061433	CC282486	22.53 % OXYGEN/NITROGEN	0.4%	Mar 08, 2019

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA-510 SV4MEUTJ CO2	CO2 NDIR (Dixon)	Jan 09, 2018
Horiba MPA-510 X9A4UGL8 O2	O2 Paramagnetic (Dixon)	Jan 08, 2018

Triad Data Available Upon Request

Signature on file

Approved for Release

Airgas Specialty Gases
Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI99E15A1274	Reference Number:	153-401108366-1
Cylinder Number:	CC412574	Cylinder Volume:	144.3 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72018	Valve Outlet:	660
Gas Code:	CO,NO,NOX,BALN	Certification Date:	Feb 02, 2018

Expiration Date: Feb 02, 2021

Certification performed in accordance with “EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)” document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	12.50 PPM	12.38 PPM	G1	+/- 1.0% NIST Traceable	01/23/2018, 02/02/2018
CARBON MONOXIDE	12.50 PPM	12.64 PPM	G1	+/- 0.5% NIST Traceable	01/23/2018
NITRIC OXIDE	12.50 PPM	12.37 PPM	G1	+/- 1.0% NIST Traceable	01/23/2018, 02/02/2018
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12062816	CC366702	9.766 PPM CARBON MONOXIDE/NITROGEN	0.3%	Sep 07, 2018
NTRM	16060749	CC465093	10.08 PPM NITRIC OXIDE/NITROGEN	1.0%	Jun 28, 2018
NTRM	16060749	CC465093-NOX	10.08 PPM NOx/NITROGEN	1.0%	Jun 28, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Thermo 48i-TLE 1163640031 CO	CO NDIR (Mason)	Jan 11, 2018
Thermo 42i-LS 1123749327 NO	Chemiluminescence (Mason)	Jan 25, 2018
Thermo 42i-LS 1123749327 NOx	Chemiluminescence (Mason)	Jan 25, 2018

Triad Data Available Upon Request

Signature on file

Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI99E15AC356	Reference Number:	153-401035643-1
Cylinder Number:	EB0067697	Cylinder Volume:	144.3 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72017	Valve Outlet:	660
Gas Code:	CO,NO,NOX,BALN	Certification Date:	Nov 03, 2017

Expiration Date: Nov 03, 2020

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	22.50 PPM	23.33 PPM	G1	+/- 1.2% NIST Traceable	10/27/2017, 11/03/2017
CARBON MONOXIDE	22.50 PPM	23.29 PPM	G1	+/- 0.7% NIST Traceable	10/27/2017
NITRIC OXIDE	22.50 PPM	23.27 PPM	G1	+/- 1.1% NIST Traceable	10/27/2017, 11/03/2017
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM/CM	09061838	CC282657	24.35 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	May 24, 2019
NTRM	12061642	CC344934	20.23 PPM NITRIC OXIDE/NITROGEN	0.9%	Apr 27, 2018
NTRM	12061642	CC344934-NOX	20.28 PPM NOx/NITROGEN	0.9%	Apr 27, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Thermo 48i-TLE 1163640031 CO	CO NDIR (Mason)	Oct 19, 2017
Thermo 42i-LS 1123749327 NO	Chemiluminescence (Mason)	Nov 01, 2017
Thermo 42i-LS 1123749327 NOx	Chemiluminescence (Mason)	Nov 01, 2017

Triad Data Available Upon Request

Signature on file

Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI99E15A0259	Reference Number:	153-401089611-1
Cylinder Number:	CC705507	Cylinder Volume:	144.3 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72018	Valve Outlet:	660
Gas Code:	CO,NO,NOX,BALN	Certification Date:	Jan 09, 2018

Expiration Date: Jan 09, 2021

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	45.00 PPM	44.92 PPM	G1	+/- 1.2% NIST Traceable	01/02/2018, 01/09/2018
CARBON MONOXIDE	45.00 PPM	45.33 PPM	G1	+/- 0.7% NIST Traceable	01/02/2018
NITRIC OXIDE	45.00 PPM	44.88 PPM	G1	+/- 1.2% NIST Traceable	01/02/2018, 01/09/2018
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	14060751	CC434416	49.88 PPM CARBON MONOXIDE/NITROGEN	0.6%	Feb 22, 2020
PRM	12367	APEX1099237	9.82 PPM NITROGEN DIOXIDE/NITROGEN	1.6%	May 29, 2016
NTRM	13010406	KAL003990	97.6 PPM NITRIC OXIDE/NITROGEN	0.8%	May 09, 2019
GMIS	1114201604	CC507567	4.955 PPM NITROGEN DIOXIDE/NITROGEN	2.0%	Nov 14, 2019

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900119 CO LCO	FTIR	Dec 05, 2017
Nicolet 6700 AMP0900119 NO LNO	FTIR	Dec 20, 2017
Nicolet 6700 AMP0900119 NO2 impurity	FTIR NO2 impurity	Dec 20, 2017

Triad Data Available Upon Request

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Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI99E15A0457	Reference Number:	153-401043914-1
Cylinder Number:	CC496625	Cylinder Volume:	144.3 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72017	Valve Outlet:	660
Gas Code:	CO,NO,NOX,BALN	Certification Date:	Nov 13, 2017

Expiration Date: Nov 13, 2025

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	85.00 PPM	85.63 PPM	G1	+/- 1.0% NIST Traceable	11/06/2017, 11/13/2017
CARBON MONOXIDE	85.00 PPM	85.08 PPM	G1	+/- 1.0% NIST Traceable	11/06/2017
NITRIC OXIDE	85.00 PPM	85.50 PPM	G1	+/- 1.0% NIST Traceable	11/06/2017, 11/13/2017
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	14060751	CC434416	49.88 PPM CARBON MONOXIDE/NITROGEN	0.6%	Feb 22, 2020
PRM	12367	APEX1099237	9.82 PPM NITROGEN DIOXIDE/NITROGEN	1.6%	May 29, 2016
NTRM	1	KAL003990	97.6 PPM NITRIC OXIDE/NITROGEN	0.8	May 09, 2019
GMIS	1114201604	CC507567	4.955 PPM NITROGEN DIOXIDE/NITROGEN	2.0%	Nov 14, 2019

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900119 CO LCO	FTIR	Oct 10, 2017
Nicolet 6700 AMP0900119 NO LNO	FTIR	Oct 26, 2017
Nicolet 6700 AMP0900119 NO2 impurity	FTIR NO2 impurity	Oct 26, 2017

Triad Data Available Upon Request

Signature on file

Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
11711 S. Alameda Street
Los Angeles, CA 90059
Airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02NI99E15W01S4	Reference Number:	48-124581878-1
Cylinder Number:	CC503908	Cylinder Volume:	146.0 CF
Laboratory:	124 - Los Angeles (SAP) - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32016	Valve Outlet:	660
Gas Code:	NO2,BALN	Certification Date:	Oct 20, 2016

Expiration Date: Oct 20, 2019

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NITROGEN DIOXIDE	12.50 PPM	12.93 PPM	G1	+/- 2.0% NIST Traceable	10/12/2016, 10/20/2016
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
GMIS	0528201604	CC503470	15.22 PPM NITROGEN DIOXIDE/NITROGEN	+/- 1.6%	May 28, 2019
PRM	12364	APEX1099237	10.00 PPM NITROGEN DIOXIDE/AIR	+/- 1.5%	May 29, 2016

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801551 NO2	FTIR	Oct 11, 2016

Triad Data Available Upon Request

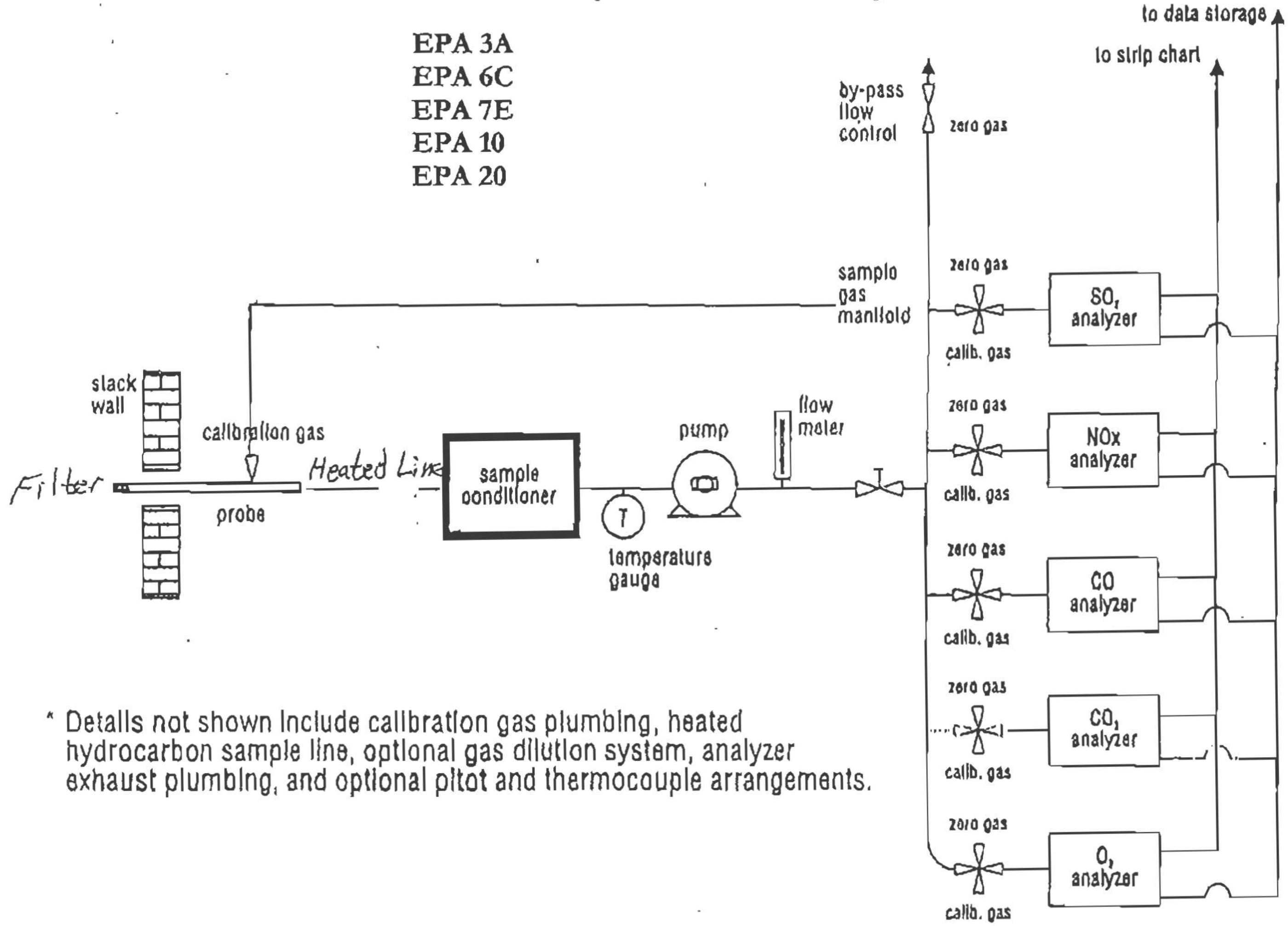
Signature on file

Approved for Release

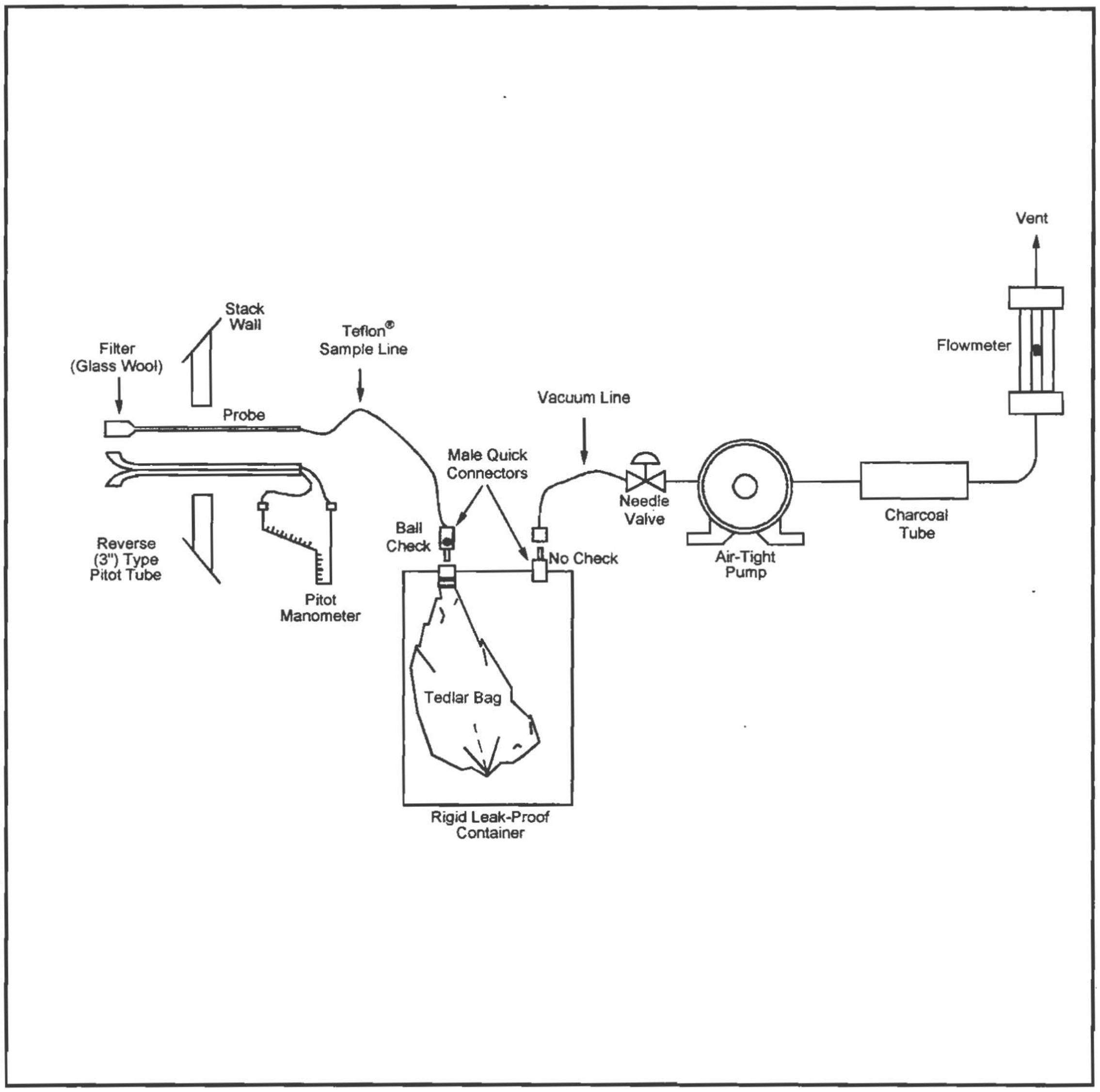
H
Sample Train Configuration and Stack Diagrams

Method 100 Sample Train Assembly

EPA 3A
EPA 6C
EPA 7E
EPA 10
EPA 20



* Details not shown include calibration gas plumbing, heated hydrocarbon sample line, optional gas dilution system, analyzer exhaust plumbing, and optional pitot and thermocouple arrangements.



18 Integrated Bag Sampling Train.

12.010 MMBtu/hr LOMPOC Flare S/N 2541

Exhaust Gas sample location

I
Related Correspondence (Source Test Plan)

Blue Sky Environmental, Inc
624 San Gabriel Avenue
Albany, California 94706
Cell (510) 508-3469
Office (510) 525-1261
blueskyenvironmental@yahoo.com

August 31st, 2018

Attn.: Will Sarraf
Santa Barbara County APCD
260 N. San Antonia Rd., Ste. A
Santa Barbara, CA 93110
LuongA@sbcapcd.org

Scheduled Source Test
Date September 27th, 2018

Re: Source Test Plan (STP) to perform testing as required on the LFG Specialties enclosed flare, located at Lompoc Municipal Solid Waste Landfill.

Blue Sky Environmental is pleased to present this Source Test Plan for the above referenced sampling project. Testing will include the following:

1) Three 40-minute test runs will be performed at the Flare exhaust for NO_X, CO, CO_2 and O_2 using CARB Method 100. The stack will be traversed according to the method to check for stratification. NMOC will be measured either by CARB 100 or from integrated Tedlar Bag (or SUMMA Canisters) using EPA MM18 GC Analysis.
2) Integrated Tedlar bag or SUMMA canister samples of the Landfill Gas (LFG) will be collected during every test run and will be analyzed for HHV (Btu/scf), CO_2, N_2, O_2, NMOC and CH_4, using ASTM 1945/3588 & EPA 25C. Also, the LFG samples will be analyzed for TRS and sulfur species by ASTM 1072, D-5504 or SCAQMD 307-91 (within 24 hours if in Tedlar or 72 hours if in SILCO Canisters). The ASTM 1945 and 25C samples will be analyzed within 72 hours.
3) Fuel flowrate and Flare Temperature will be recorded by the facility monitor. The exhaust flowrate will be determined by EPA 19 based on fuel analysis and stack oxygen.

Test Parameters	**Inlet**	**Outlet**	**Limits**
O_2, CO_2	ASTM 1945	CARB 100	
CO		CARB 100	CO 0.20 lbs/MMBtu
NO_X		CARB 100	NO_X 0.06 lbs/MMBtu
SO_2	ASTM 1072 or ASTM 5504	Calculated	Total Sulfur Content
VOC (NMOC)	M25C	MM18 or CARB 100	VOC D.E. 98% or 30 ppm as Methane @3%O_2
CH_4	ASTM 1945	MM18 or CARB 100	CH_4 D.E. >99%
Flow	Facility	M19	
Moisture	M4 WBDB	N/A	

4) A report will be submitted to the client within four weeks of test program completion (meeting all APCD/AQMD requirements). The report will include a test description and tables presenting emission concentrations, emission factors and/or rates (lbs/hr) for all compliance parameters. All supporting documentation will be included (strip charts, field data sheets, calibrations, calculations, etc.).

The facility liaison is Melissa St. John who may be reached at 805-674-2483. If you have any questions, please contact Guy Worthington at 510-508-3469 or Jeramie Richardson at 810-923-3181.

Sincerely,

Guy Worthington

J
Permit to Operate

APPENDIX C

Unpaved Road Testing Protocol

UNPAVED ROAD SAMPLING AND ANALYSIS PLAN

The sampling plan for unpaved roads at the City of Lompoc Landfill will generally follow the procedures for sampling surface/bulk dust loading in AP42, Appendix C.1 and procedures for laboratory analysis of surface/bulk dust loading samples in AP42, Appendix C.2.

The overall objective in an unpaved road sampling program is to inventory the mass of particulate matter (PM) emissions from the roads and moisture content of the samples. This is typically done by:

1) Collecting "representative" samples of the loose surface material from the road;
2) Weighing the samples moist and dry to determine the overall moisture content of material less than 2 inches in diameter;
3) Analyzing the samples to determine silt fractions; and
4) Using the results in the predictive emission factor model given in AP-42, Section 13.2.2, Unpaved Roads, together with traffic data (e.g., number of vehicles traveling the road each day).

Sample Collection

Samples will be collected from the travel lanes of the unpaved road at the landfill. As recommended in AP42, Appendix C.1, the samples will be collected about every one-half mile along the roadway. Please refer to Diagram B-1 for sample areas. Sampling events will begin before watering starts for the day and will continue throughout a typical weekday at the landfill. Weekdays have higher traffic volumes and represent worst case conditions as roadways tend to dry faster with increased traffic volumes.

Samples will be collected 30 minutes after watering to avoid pools of water on the roadway and again one hour after watering. Samples will then be collected every hour until watering occurs again. A minimum of 3 sampling events (runs) will occur with one event occurring during the forecasted high temperature of the day. The first sampling event will start before initial watering occurs for the day.

The following steps describe the collection method for samples).

1) Ensure that the site offers an unobstructed view of traffic and that sampling personnel are visible to drivers. If the road is heavily traveled, use 1 person to "spot" and route traffic safely around another person collecting the surface sample.
2) Using string or other suitable markers, mark a 0.3 meters (m) (1 foot [ft]) wide portion across the road. The use of duct tape is recommended for marking sampling areas. The tape will provide a straight line to delineate the area and avoid collecting loose material along the borders of the area. (WARNING: *Do not mark the collection area with a chalk line or in any other method likely to introduce fine material into the sample*.)
3) With a whisk broom and dustpan, remove the loose surface material from the hard road base. Do not abrade the base during sweeping. Sweeping should be performed slowly so that fine surface material is not injected into the air. NOTE: *Collect material only from the portion of the road over which the wheels and carriages routinely travel* (i. e., not from berms or any "mounds" along the road centerline).
4) Periodically deposit the swept material into a clean, labeled container of suitable size, such as a metal or plastic 19-liter (L) (5 gallon [gal]) bucket, having a sealable polyethylene liner. Increments may be mixed within this container. The lid of the container should remain closed whenever material is not actively being placed inside the container.

5) Record the required information on the sample collection sheet (Figure 2).

Sample Specifications

For uncontrolled unpaved road surfaces, a gross sample of 1 to 4 pounds is desired. Samples of this size should not require splitting to a size amenable for analysis. In general, a minimum of 400 grams (g) (1 lb) is required for silt and moisture analysis. Additional increments should be taken from heavily controlled unpaved surfaces, until the minimum sample mass has been achieved.

It is important that samples be collected as quickly as possible. If additional areas need to be swept to collect enough sample for measurements to be taken, the additional material must be collected in the same general area and in the same time frame of the previous watering event. For example, if the sample is to be representative of moisture content within 30 minutes of watering, the additional sample must also be collected 30 minutes after a watering event.

LABORATORY ANALYSIS

Moisture Analysis

Samples are oven dried to determine moisture content before sieving.

Procedure -

6) Heat the oven to approximately 110°C (230°F). Record oven temperature. (See Figure C.2-3.)

7) Record the make, capacity, and smallest division of the scale.

8) Weigh the empty laboratory sample containers which will be placed in the oven to determine their tare weight. Weigh any lidded containers with the lids. Record the tare weight(s). Check zero before each weighing.

9) Weigh the laboratory sample(s) in the container(s). For materials with high moisture content, assure that any standing moisture is included in the laboratory sample container. Record the combined weight(s). Check zero before each weighing.

10) Place sample in oven and dry overnight. Materials composed of hydrated minerals or organic material such as coal and certain soils should be dried for only 1.5 hours.

11) Remove sample container from oven and (a) weigh immediately if uncovered, being careful of the hot container; or (b) place a tight-fitting lid on the container and let it cool before weighing. Record the combined sample and container weight(s). Check zero before weighing.

12) Calculate the moisture, as the initial weight of the sample and container, minus the oven- dried weight of the sample and container, divided by the initial weight of the sample alone. Record the value.

13) Calculate the sample weight to be used in the silt analysis, as the oven-dried weight of the sample and container, minus the weight of the container. Record the value. An example moisture analysis form is presented in Figure 3.

Silt Analysis

Several open dust emission factors have been found to be correlated with the silt content (< 200 mesh) of the material being disturbed. The basic procedure for silt content determination is mechanical, dry sieving. The same sample which was oven-dried to determine moisture content is then mechanically sieved.

Procedure -

14) Select the appropriate 20-cm (8-in.) diameter, 5-cm (2-in.) deep sieve sizes. Recommended U. S. Standard Series sizes are 3/8 in., No. 4, No. 40, No. 100, No. 140, No. 200, and a pan. Comparable Tyler Series sizes can also be used. The No. 20 and the No. 200 are mandatory. The others can be varied if the recommended sieves are not available, or if buildup on 1 particulate sieve during sieving indicates that an intermediate sieve should be inserted.

15) Obtain a mechanical sieving device, such as a vibratory shaker or a Roto-Tap® without the tapping function.

16) Clean the sieves with compressed air and/or a soft brush. Any material lodged in the sieve openings or adhering to the sides of the sieve should be removed, without handling the screen roughly, if possible.

17) Obtain a scale (capacity of at least 1600 grams [g] or 3.5 lb) and record make, capacity, smallest division, date of last calibration, and accuracy. (See Figure 4.)

18) Weigh the sieves and pan to determine tare weights. Check the zero before every weighing. Record the weights.

19) After nesting the sieves in decreasing order of size, and with pan at the bottom, dump dried laboratory sample (preferably immediately after moisture analysis) into the top sieve. The sample should weigh between □ 400 and 1600 g (□ 0.9 and 3.5 lb). This amount will vary for finely textured materials, and 100 to 300 g may be sufficient when 90% of the sample passes a No. 8 (2.36 mm) sieve. Brush any fine material adhering to the sides of the container into the top sieve and cover the top sieve with a special lid normally purchased with the pan.

20) Place nested sieves into the mechanical sieving device and sieve for 10 minutes (min). Remove pan containing minus No. 200 and weigh. Repeat the sieving at 10-min intervals until the difference between 2 successive pan sample weighing (with the pan tare weight subtracted) is less than 3.0%. Do not sieve longer than 40 minutes.

21) Weigh each sieve and its contents and record the weight. Check the zero before every weighing.

22) Calculate the percent of mass less than the 200 mesh screen (75 micrometers [μm]). This is the silt content.

REFERENCES

23) *Compilation of Air Pollutant Emissions Factors, Volume 1: Stationary Point and Area Sources (AP42)*, Fifth Edition, United States Environmental Protection Agency, 1993.

24) *"Standard Method of Preparing Coal Samples for Analysis", Annual Book of ASTM Standards, 1977,* D2013-72, American Society for Testing And Materials, Philadelphia, PA, 1977.

25) *L. Silverman, et al., Particle Size Analysis in Industrial Hygiene*, Academic Press, New York, 1971.

SAMPLING DATA FOR UNPAVED ROADS

Date Collected____________________ Recorded by ____________________

Road Material (e.g., gravel, slag, dirt, etc.):* ____________________

Ambient Temperature____________________

Cloud Cover____________________

Solar Radiation____________________

Site of Sampling (Mark on Map as Well as Describe): ____________________

Watering Event Description

Volume of water used for watering event in gallons	
Area watered in yd^2	
Water intensity in gal/yd^2	
Time of day of watering event	

SAMPLING DATA COLLECTED:

Sample No.	Time of Sample	Location	Surf. Area	Depth	Mass of Sample	Minutes Since Last Watering Event

* Indicate and give details if roads are controlled.

\+ Use code given on plant or road map for segment identification. Indicate sampling location on map.

TRAFFIC COUNTS:

Sample No.	Time of Sample	Mark Number of Vehicles in Each Category				
		Route Trucks	Other Heavy Duty Trucks	Pickup Trucks	Passenger Vehicles	Total Vehicles Between Samples

FIGURE 2. EXAMPLE DATA FORM FOR UNPAVED ROAD SAMPLES.

MOISTURE ANALYSIS

Date:________________________ By:________________________

Sample No:________________________ Oven Temperature:________________________

Material:________________________ Date In:__________ Date Out: __________

Time In:__________ Time Out:__________

Split Sample Balance:________________________ Drying Time: ________________________

Make ________________________

Capacity ________________________ Sample Weight (after drying)

Smallest Division ________________________ Pan + Sample: ________________________

Pan: ________________________

Total Sample Weight:________________________ Dry Sample:________________________
(Excl> Container)

Number of Splits:________________________ MOISTURE CONTENT:________________________

(A) Wet Sample Wt. ________________________

Split Sample Weight (before dying) (B) Dry Sample Wt. ________________________

Pan + Sample:________________ Pan:________________ Wet:________________

(C) Difference Wt. ________________ C x 100

A =________% Moisture

FIGURE 3. EXAMPLE MOISTURE ANALYSIS FORM.

SILT ANALYSIS

Date:________________________________ By:________________________________

Sample No:___________________________ Sample Weight (after drying)

Material:_____________________________ Pan + Sample:________________________

Pan:________________________________ Split

Sample Balance:_______________________ Dry Sample:__

Make________________________________ Capacity:___________________________

Smallest Division Final Weight:________________________

Net Weight <200 Mesh

% Slit = Total Net Weight X 100 = %

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	
10 min:	
20 min:	
30 min:	
40 min:	

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.				
4 mesh				
10 mesh				
20 mesh				
40 mesh				
100 mesh				
140 mesh				
200 mesh				
Pan				

FIGURE 4. EXAMPLE SILT ANALYSIS FORM.

SAMPLING DATA FOR UNPAVED ROADS

Date Collected______________________________ Recorded by __________________________________

Road Material (e.g., gravel, slag, dirt, etc.):* ____

Ambient Temperature____

Cloud Cover____

Solar Radiation____

Site of Sampling (Mark on Map as Well as Describe): ____

____

____

Watering Event Description

Volume of water used for watering event in gallons	
Area watered in yd^2	
Water intensity in gal/yd^2	
Time of day of watering event	

SAMPLING DATA COLLECTED:

Sample No.	Time of Sample	Location	Surf. Area	Depth	Mass of Sample	Minutes Since Last Watering Event

* Indicate and give details if roads are controlled.

\+ Use code given on plant or road map for segment identification. Indicate sampling location on map.

TRAFFIC COUNTS

Sample No.	Time of Sample	Mark Number of Vehicles in Each Category				
		Route Trucks	Other Heavy Duty Trucks	Pickup Trucks	Passenger Vehicles	Total Vehicles Between Samples

Figure 2. Example data form for unpaved road samples.

MOISTURE ANALYSIS

Date:______________________________ By: ______________________________

Sample No:______________________________ Oven Temperature:

Material:______________________________ Date In:__________ Date Out:__________

Time In:__________ Time Out:__________

Split Sample Balance:____________________ Drying Time:____________________

Capacity______________________________ Sample Weight (after drying)

Smallest division:______________________ Pan + Sample: ____________________

Pan: ______________________________

Total Sample Weight:____________________ Dry Sample: ____________________

(Excl. Container)______________________

Number of Splits:______________________ MOISTURE CONTENT:

(A) Wet Sample Wt.____________________

Split Sample Weight (before drying)

(B) Dry Sample Wt.____________________

Pan + Sample: __________ Pan: __________ Wet Sample: ____________________

(C) Difference Wt. __________ C x 100

A = __________ % Moisture

Figure 3. Example moisture analysis form.

SILT ANALYSIS

Date:______________________________ By: ______________________________

Sample No:______________________________ Sample Weight (after drying)

Material:______________________________ Pan + Sample:______________________________

Pan: ______________________________

Split Sample Balance:______________________________

Dry Sample:______________________________

Make:______________________________ Capacity:______________________________

Smallest division :______________________________

Final Weight:______________________________

Net Weight <200 Mesh

% Silt = Total Net Weight X 100 = %

SIEVING

Time: Start:	Weight (Pan Only)
Initial (Tare):	
10 min:	
20 min:	
30 min:	
40 min:	

Screen	Tare Weight (Screen)	Final Weight (Screen + Sample)	Net Weight (Sample)	%
3/8 in.				
4 mesh				
10 mesh				
20 mesh				
40 mesh				
100 mesh				
140 mesh				
200 mesh				
Pan				

Figure 4. Example silt analysis form.

APPENDIX D

2018 City of Lompoc Sanitary Landfill Traffic and Load Data

Material Testing Foundation Engineering Construction Inspection

S/G TESTING LABORATORIES

308 North First Street Lompoc, California 93436 805 735-3454 LOMPOC

514 South Western Santa Maria, California 93454 805 922-3981 SANTA MARIA

October 16, 1990

City of Lompoc
100 Civic Center Plaza
Lompoc, CA 93436

Exam. #109-9586

Attention: Mr. Jim Darrah
Street and Sanitation Department

PROJECT: **SANITARY LANDFILL**
Avalon Street
Lompoc, California

SUBJECT: **COMPACTION, PERCOLATION AND PERMEABILITY TESTS FOR "ALTERNATE COVER" MATERIAL**

Gentlemen:

In accordance with the request of Mr. Jim Darrah, we have provided field testing of material designated as an "alternate cover". This material is a mixture of approximately one (1) part native soils (silt) and one (1) part white sludge from the Lompoc Water Treatment Plant. The field tests were performed on a test strip area where the native soil and sludge had been mixed and compacted with the equipment normally used at the landfill.

For the compaction test, the field density was determined in accordance with ASTM D1556 and D2216 (Sand Cone Method), while the Moisture Density Relations were determined in accordance with ASTM D1557-78, modified to three (3) layers. Relative compaction was found to be 85.1%. This alternate cover material is compactable by the equipment normally used at the landfill.

The field percolation test was performed on a 12 inch square hole excavated manually to a depth of 14 inches. All loose soils were then removed from the bottom of the hole where a base consisting of 2 inches of clean gravel was placed. After the soaking period, the percolation rate was established on a 6 inch depth of clear water in the hole. The rate was determined to be 129 minutes per inch.

Continued on Page 2

A sample of the mixture of native soils and water treatment sludge was secured from the test area and sent to The Earth Technology Corporation for permeability testing. The test method utilized was EPA 9100, triaxial permeability. The permeability was found to be 9.58×10^{-7} cm/sec for a sample remolded to 59.2 pcf. This remolded sample represents the mixture compacted to approximately 85 to 86 percent of the maximum density.

Soils with permeability values slower than 1×10^{-6} cm/sec are generally considered impervious. Additionally the Regional Water Quality Control Board, Central Coast Basin, has generally considered materials to be impervious when percolation rates are slower than 120 minutes per inch. This alternate cover mixture, when compacted, is therefore considered to be relatively impervious. For the most part, rain water falling on this compacted mixture should run off.

Results of the tests described above are attached. Thank you for this opportunity to be of service. Should you have additional questions concerning this report, please call.

Respectfully submitted,

S/G TESTING LABORATORIES, INC.

L. A. Bean

L. A. Bean, CE 36135

REGISTERED PROFESSIONAL ENGINEER
LESLIE A. BEAN
No. 36135
Exp 6-30-9
CIVIL
STATE OF CALIFORNIA

Attachments (3)

Distribution:

Addressee (2)
Metcalf and Eddy, Barry Keller

LB:L/CtyLpc.586:mg

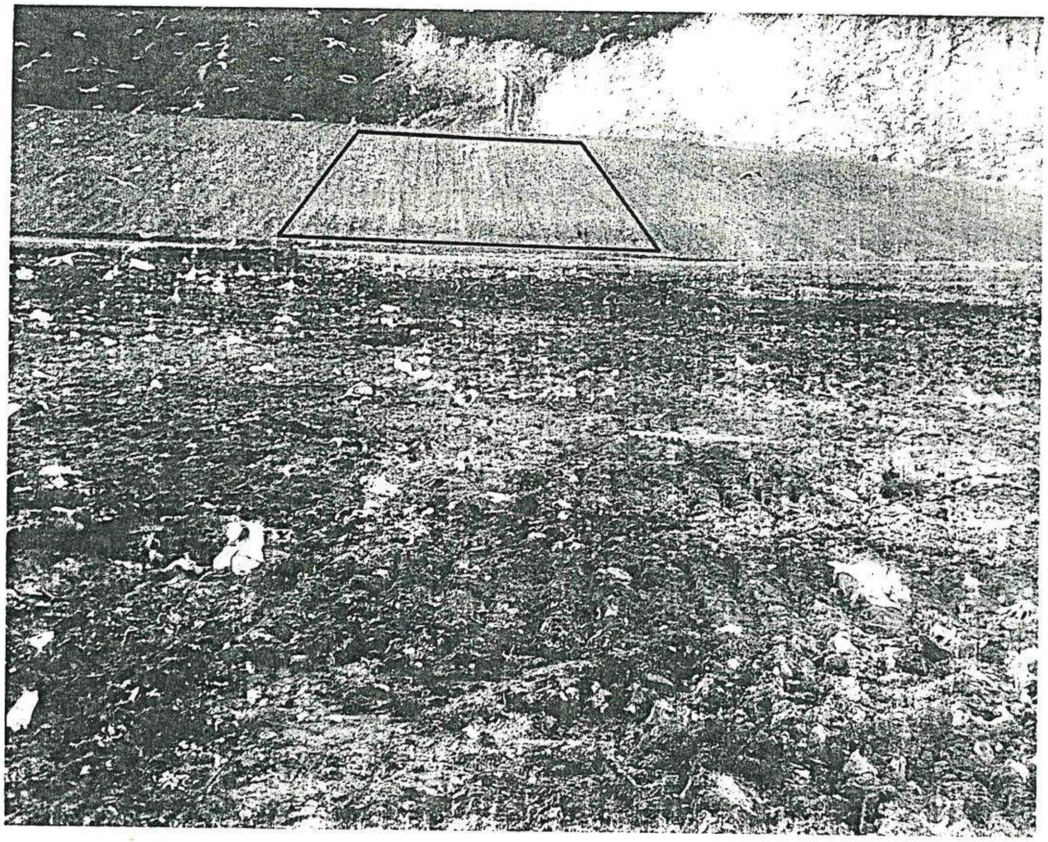


Figure 6-1. Test Plot area following February 1990 rainfall.

	RESULTS OF FIELD DENSITY TEST AND MOISTURE DENSITY RELATIONS
Location	Fenced Test Area
Material	Compacted "Alternate Cover" (One Part Native and One Part Water Treatment Plant Sludge)
Depth	6 to 12± inches
Moisture Content (%)	46.2
*Optimum Moisture (%)	49.0
**Dry Density (pcf)	58.7
*Max. Dry Density (pcf)	69.0
Relative Compaction (% of Max. Dry Density)	85.1

*ASTM D1557-78, modified to 3 layers
**ASTM D1556-82

Attachment #1
Exam. #109-9586

S/G TESTING LABORATORIES, INC.

RESULTS OF PERCOLATION TESTS

FOR COMPACTED MIXTURE OF ONE PART NATIVE SOIL AND ONE PART WATER TREATMENT PLANT SLUDGE

Percolation Test Number	Depth Below Existing Grade	Percolation Rate Min./Inch*
P-1	14 inches	129

*12 Inch Square Hole with a 6 Inch Depth of Clear Water

Attachment #2
Exam. #109-9586

S/G TESTING LABORATORIES, INC.

SUMMARY OF TRIAXIAL PERMEABILITY
EPA 9100

PROJECT NAME:	S/G Testing Laboratories III	TETC #:	91-210-4403
PROJECT NO.:		CLIENT:	S/G Testing Laboratories
DATE:	October 5, 1990	SUMMARIZED BY:	Kean Tan
		LAB MANAGER:	(Arul) K. Arulmoli

SAMPLE NO.	DEPTH (ft)	USCS CLASSIFI-CATION	INITIAL MOISTURE CONTENT (%)	FINAL MOISTURE CONTENT (%)	INITIAL DRY DENSITY (pcf)	EFFECTIVE STRESS (psi)	HYDRAULIC CONDUCTIVITY (cm/sec)
SLF9-90	-		60.99	63.54	59.2	3	9.58 X 10-7

Attachment #3
Exam #109-9586

EXHIBIT "D"

COUNTY OF SANTA BARBARA • HEALTH CARE SERVICES

315 CAMINO DEL REMEDIO • SANTA BARBARA, CALIFORNIA 93110 • (805) 681-5200

LAWRENCE HART, M.D., F.A.C.P.M.
DIRECTOR AND HEALTH OFFICER

January 25, 1990

Mr. John T. Welbourn
Assistant Director of Public Works
City of Lompoc
100 Civic Center Plaza
Lompoc, CA 93438-8001

Dear Mr. Welbourn:

Regarding your letter of January 10, 1990, in which you requested a determination by the Local Enforcement Agency (LEA) that the City of Lompoc Landfill be permitted to use a prescribed mixture of soil and water plant sludge (W.P.S.) as alternative cover, this response is provided.

Since the California Waste Management Board (CWMB) has issued guidelines for the use of alternative cover (enclosed), it is not possible for the LEA to approve the use of alternative cover unless the city first obtains a waiver of cover requirements from the CWMB.

In order to obtain such a waiver, it is recommended that the city submit an application including the items provided in the guidelines. The city should provide a report justifying the waiver, results of tests of properties of the proposed cover, project methodology and documentation of CEQA compliance. (The City Planning Department should be able to provide such documentation.)

Please note that the tests should be performed in accordance with ASTM standards. Such tests should be performed by a State of California certified laboratory or the city operated facilities which are certified for water testing, etc.

This Department wishes to encourage the city to continue performing field tests of various blends of soil and W.P.S. at the landfill in order to observe a test plot for those factors itemized in the CWMB guidelines, such as infiltration and compaction. Please keep the RWQCB informed regarding the progress of your project.

Mr. John T. Welbourn
Assistant Director of Public Works
City of Lompoc
January 22, 1990
Page 2

We are not aware of any regulations which would prevent you from using the soil and W.P.S. blend to develop the internal roadway system.

Regarding the required monitoring of the performance of your proposed alternative cover material by the LEA, this Department is committed to assisting the City of Lompoc in obtaining a cover requirement waiver if the proposed alternative cover is indeed a viable substitute for soil cover.

Very truly yours,

Lawrence Hart, M.D.
Director and Health Officer

Lynn Fultz

Lynn Fultz
Program Manager

LF:lh

cc: RWQCB

enc.

SW-104

Paved Unload/Load Area

Vehicle Types	# Vehicles	Tons	Avg. Tons	Material Types
Route/Roll-off Trucks	269	858	3.19	Metal, Tires, Cardboard, Mattresses, TWW
Commercial (2 Axle Trailers, Dump/Box Trucks)	442	425	0.96	Refuse, Metal, Ewaste, Tires, Cardboard, TWW, Auto Batteries
Small (Cars, Pickups, Single Axle Trailers)	5929	1402	0.24	Refuse, Metal, Ewaste, Tires, Cardboard, TWW, Auto Batteries
Paved Area Totals:	**6,640**	**2,685**		

Unpaved Unload Area

Vehicle Types	# Vehicles	Tons	Avg. Tons	Material Types
End Dumps with WTPFM only	819	18437	22.51	Water Treatment Plant Filter Material (WTPFM)
Route/Roll-off Trucks	5075	32528	6.41	Refuse
Commercial (2 Axle Trailers, Dump/Box Trucks)	2334	3287	1.41	Refuse
Small (Cars, Pickups, Single Axle Trailers)	6486	2141	0.33	Refuse
Route/Roll-off Trucks	790	3666	4.64	GW/WW, soil, asphalt, concrete
Commercial (2 Axle Trailers, Dump/Box Trucks)	1911	1922	1.01	GW/WW, soil, asphalt, concrete
Small (Cars, Pickups, Single Axle Trailers)	11033	3157	0.29	GW/WW, soil, asphalt, concrete
Unpaved Area Totals:	**28,448**	**65,138**		
Paved and Unpaved Area Total:	**35,088**	**67,823**		

Notes:

1) Vehicle/Tons include all incoming transactions of refuse, recyclables, cover and beneficial use materials
2) Outbound recyclable materials are also included from the paved area

APPENDIX E

Chemical Profile for WTPFM

WATER ANALYSIS

CITY OF LOMPOC WATER TREATMENT PLANT

Laboratory No. 815
ate Sampled 6/8/88
ampled By RW

Chlorine Residual —
°C When Sampled —
Sample From SEE BELOW

Description SLUDGE ANA
Date of Analysis 6/8/8

ONSTITUENT	1*	2*	3*
H	6.6	8.4	7.6
Saturation Index			
tability Index			
olor			
dor			
aste			
mperature °C			
urbidity	0.11	0.33	0.30
ecific Conductance	0.7	1310	1021
	mg/l	mg/l	mg/l
lkalinity, Total	3.0	24.	20.
kalinity, Phenol			
kalinity, Caustic			
lorine, Residual			
lorine Demand			
rdness, Total	<0.1	102.	72.
rdness, Carbonate			
rdness, Non-Carb			
idity			
uminum			
senic			
rium			
ryllium			
on			
omide			
mium			
cium	<0.1	9.6	9.6
bon Dioxide			
oride	<0.1	136.	94.
omium, Hexavalent			
omium, Total			
per	<0.05	<0.05	<0.05
nide			
oride	<0.1	0.3	0.2
ide			
n, Filterable			
n, Total	<0.1	<0.1	<0.1

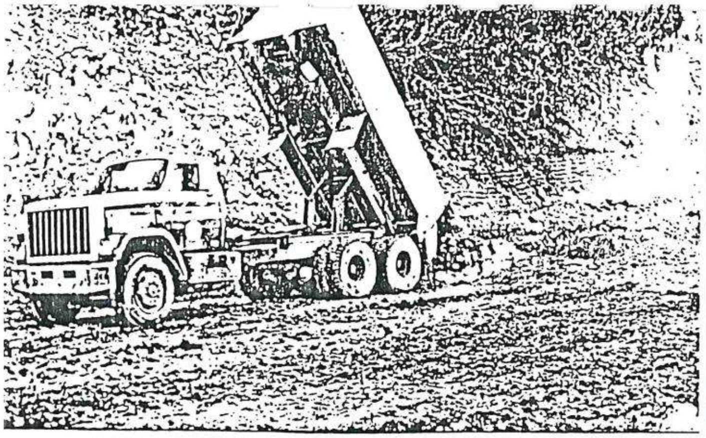
CONSTITUENT	1*	2*	3*
Lithium			
Magnesium	<0.1	23.5	20.
Manganese, Total	<0.03	<0.03	<0.0
Mercury			
Nitrogen, Ammonia			
Nitrogen, Nitrate as N	<0.1	<0.1	<0.
Nitrogen, Nitrite			
Nitrogen, Organic			
Nitrogen, Total			
Oil & Grease			
Organic Contaminants			
Oxygen, Dissolved			
Oxygen Demand, Chem			
Oxygen Demand, Biochem			
Pesticides			
Phenols			
Phosphate, Acid Hydro.			
Phosphate, Organic			
Phosphate, Ortho			
Phosphate, Total			
Potassium			
Residue, Filterable			
Residue, Nonfilterable			
Residue, Total	<1.0	930.	720.
Residue, Fixed			
Selenium			
Silica, Molybdate Reac.			
Silver			
Sodium	<0.1	237.	190.
Strontium			
Sulfate	<0.1	387.	306.
Sulfide			
Sulfite			
Surfactants, Anionic			
Tannin & Lignin			
Vanadium			
Zinc	<0.05	<0.05	<0.05

mple No.

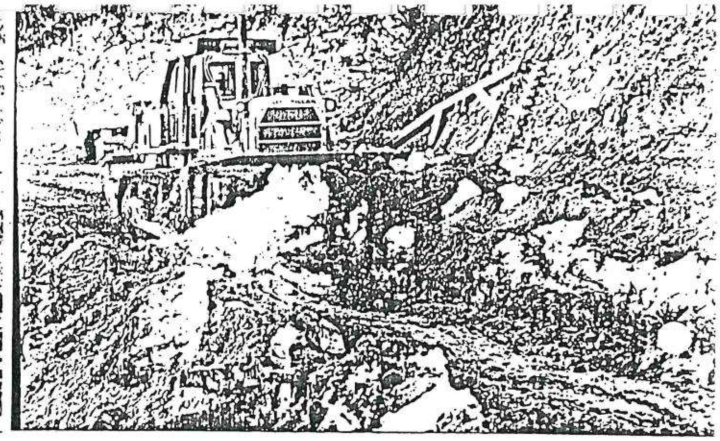
DISTILLED - DEIONIZED WATER USED AS ELUTION SOLUTE

1ST RUN ELUATE FROM COLUMN

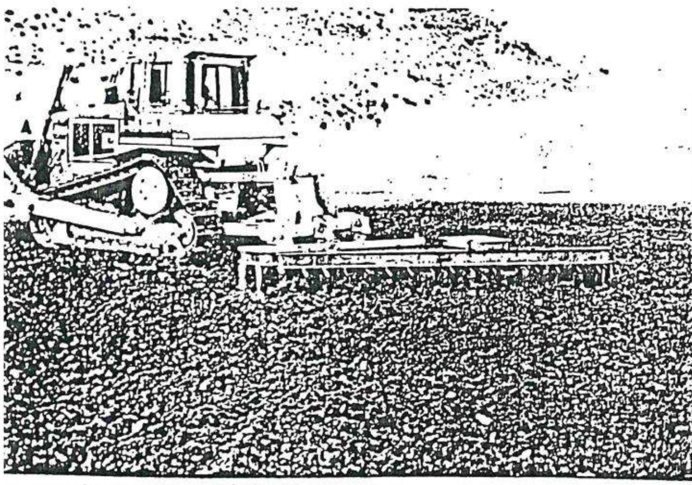
2ND RUN ELUATE FROM COLUMN



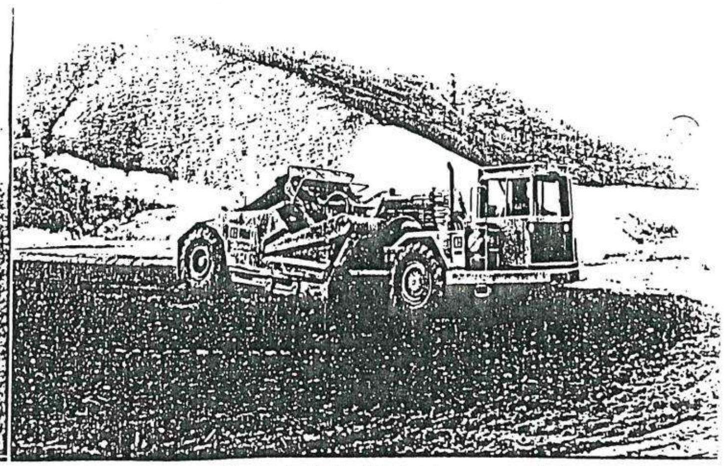
Fresh Water Plant Sludge (Soil Amendment)
being placed on site



First pass on fresh Water Plant
Sludge with bulldozer



Final pass with disk



Amended Soil being moved to working

EXHIBIT "A"

SEE BACK FOR PROCEDURAL NOTES.

LOMPOC WATER TREATMENT PLANT

COLIFORM BACTERIAL REPORT - MPN

LOCATION SLUDGE BLOWDOWN LAB. NO. 931

DATE SAMPLED 3/5/90 BY McCULLOUGH

DATE RUN 3/5/90 BY McCULLOUGH

Station	Five Tubes 10ml.	Presump L.Broth 24	48	Confirmed Brill.Gr. 24	48	Coliform MPN 100ml.	Station	Five Tubes 10 ml	Presump L.Broth 24	48	Confirmed Bril.Gr. 24	48	Coliform MPN 100ml.
Plant	1						10 ml	1	—	—			
Influ.	2							2	—	—			
	3							3	—	—			
	4						Cl_2 —	4	—	—			
Cl_2	5							5	—	—			
PLANT	1						1 ml	1	—	—			
Efflu.	2							2	—	—			
	3							3	—	—			
	4						Cl_2 —	4	—	—			
Cl_2	5							5	—	—			
Well	1						0.1 ml	1	—	—			
No.___	2							2	—	—			
	3							3	—	—			
	4						Cl_2 —	4	—	—			
Cl_2	5							5					
Well	1							1					
No.___	2							2					
	3							3					
	4							4					
Cl_2	5						Cl_2	5					
Well	1							1					
No.___	2							2					
	3							3					
	4							4					
Cl_2	5						Cl_2	5					
Well	1							1					
No.___	2							2					
	3							3					
	4							4					
Cl_2	5						Cl_2	5					
	1							1					
	2							2					
	3							3					
	4							4					
Cl_2	5						Cl_2	5					
	1							1					
	2							2					
	3							3					
	4							4					
Cl_2	5						Cl_2	5					
	1							1					
	2							2					
	3							3					
	4							4					
Cl_2	5						Cl_2	5					
	1							1					
	2							2					
	3							3					
	4							4					
Cl_2	5						Cl_2	5					
	1							1					
	2							2					
	3							3					
	4							4					
Cl_2	5						Cl_2	5					
	1							1					
	2							2					
	3							3					
	4							4					
Cl_2	5						Cl_2	5					

MPN INDEX < 2.

DATE REPORTED 3/7/90 Dm

. Material Testing

EXHIBIT "B"

Foundation Engineering

Construction Inspection

S/G TESTING LABORATORIES

308 North First Street Lompoc, California 93436 805 735-3454 LOMPOC

514 South Western Santa Maria, California 93454 805 922-3981 SANTA MARIA

February 20, 1990

City of Lompoc
100 Civic Center Plaza
Lompoc, CA 93436

Exam #109-7867

Attention: Mr. Jim Darrah
Street and Sanitation Department

PROJECT: SANITARY LANDFILL
Avalon Street
Lompoc, California

SUBJECT: COMPACTION AND PERCOLATION TEST RESULTS FOR NATIVE SOIL

Gentlemen:

In accordance with the request of Mr. Jim Darrah, we have provided field testing of the insitu native soil.

For the compaction test, the field density was determined in accordance with ASTM D1556 and D2216 (Sand Cone Method), while the Moisture Density Relations were determined in accordance with ASTM D1557-78, modified to three (3) layers. Relative compaction was found to be 61.1%.

The percolation test was performed on a 12 inch square hole excavated manually to a depth of 12 inches. All loose soils were then removed from the bottom of the hole where a base consisting of 2 inches of clean gravel was placed. After a soaking period, the percolation rate was established on a 6" depth of clear water in the hole. The rate was determined to be 10 minutes per inch.

Continued on Page 2

City of Lompoc
Sanitary Landfill

Exam #109-7867
Page 2

The test results are attached. Thank you for this opportunity to be of service. Should you have additional questions concerning this report, please call.

Respectfully submitted,

S/G TESTING LABORATORIES, INC.

L. A. Bean, CE 36135

LB:rrg

cc: Addressee (3)

Attachments (2)

	RESULTS OF FIELD DENSITY TEST AND MOISTURE DENSITY RELATIONS
Material	Native Soil (insitu)
Depth	6 to 12 inches
Moisture Content (%)	54.3
*Optimum Moisture (%)	62.0
**Dry Density (pcf)	34.2
*Max. Dry Density (pcf)	56.0
Relative Compaction (% of Max. Dry Density)	61.1

*ASTM D1557-78, modified to 3 layers
**ASTM D1556-82

S/G TESTING LABORATORIES, INC.

RESULTS OF PERCOLATION TESTS

FOR NATIVE SOIL (INSITU)

Percolation Test Number	Depth Below Existing Grade	Percolation Rate Min./Inch*
P-1	12 inches	10

*12 Inch Square Hole with a 6 Inch Depth of Clear Water

S/G TESTING LABORATORIES, INC.

EXHIBIT "C"

Material Testing *Foundation Engineering* *Construction Inspection*

S/G TESTING LABORATORIES

308 North First Street Lompoc, California 93436 805 735-3454 LOMPOC

514 South Western Santa Maria, California 93454 805 922-3981 SANTA MARIA

February 20, 1990

RECEIVED
CITY OF LOMPOC
DEPARTMENT OF PUBLIC WORKS

City of Lompoc
100 Civic Center Plaza
Lompoc, CA 93436

Exam #109-7866

Attention: Mr. Jim Darrah
Street and Sanitation Department

PROJECT: SANITARY LANDFILL
Avalon Street
Lompoc, California

SUBJECT: COMPACTION AND PERCOLATION TEST RESULTS
FOR "ALTERNATE COVER" MATERIAL

Gentlemen:

In accordance with the request of Mr. Jim Darrah, we have provided field testing of material designated as an "alternate cover". This material is a mixture of approximately one (1) part native soils (silt) and one (1) part white sludge from the Lompoc Water Treatment Plant. The field tests were performed on a test strip area where the native soil and sludge had been mixed and compacted with the equipment normally used at the landfill.

For the compaction test, the field density was determined in accordance with ASTM D1556 and D2216 (Sand Cone Method), while the Moisture Density Relations were determined in accordance with ASTM D1557-78, modified to three (3) layers. Relative compaction was found to be 87.0%. This alternate cover material is compactable by the equipment normally used at the landfill.

The percolation test was performed on a 12 inch square hole excavated manually to a depth of 10 inches. All loose soils were then removed from the bottom of the hole where a base consisting of 2 inches of clean gravel was placed. After a soaking period, the percolation rate was established on a 6" depth of clear water in the hole. The rate was determined to be 261 minutes per inch.

Continued on Page 2

The Regional Water Quality Control Board, Central Coast Basin, has generally considered materials to be impervious when percolation rates are slower than 120 minutes per inch. This alternate cover mixture, when compacted, is therefore considered to be relatively impervious. For the most part, rain water falling on this compacted mixture should run off.

The test results are attached. Thank you for this opportunity to be of service. Should you have additional questions concerning this report, please call.

Respectfully submitted,

S/G TESTING LABORATORIES, INC.

L. A. Bean

L. A. Bean, CE 36135

LB:rrg

cc: Addressee (3)

Attachments (2)

	RESULTS OF FIELD DENSITY TEST AND MOISTURE DENSITY RELATIONS
Material	Compacted "Alternate Cover" (One Part Native and One Part Water Treatment Plant Sludge)
Depth	Surface to 6± inches
Moisture Content (%)	51.4
*Optimum Moisture (%)	48.5
**Dry Density (pcf)	59.5
*Max. Dry Density (pcf)	68.4
Relative Compaction (% of Max. Dry Density)	87.0

*ASTM D1557-78, modified to 3 layers
**ASTM D1556-82

S/G TESTING LABORATORIES, INC.

APPENDIX F

Bulk Material and Analysis Plan

BULK MATERIAL SAMPLING AND ANALYSIS PLAN

The sampling plan for bulk materials at the City of Lompoc Landfill will generally follow the procedures for sampling surface/bulk dust loading in AP42, Appendix C.1 and procedures for laboratory analysis of surface/bulk dust loading samples in AP42, Appendix C.2.

The overall objective of the sampling program is to determine the moisture content of the samples. This is typically done by:

26) Collecting "representative" samples of the material;

27) Weighing the samples moist and dry to determine the overall moisture content of material less than 2 inches in diameter;

28) Analyzing the samples to determine silt fractions; and

29) Presenting the results to SBCAPCD for control factor development.

Sample Collection

Samples will be collected from the following sources:

- Open areas of the landfill
- Cover soil moved by scraper

Sampling events will begin before watering starts for the day and will continue throughout a typical weekday at the landfill, including when the highest ambient temperature is forecasted to occur. Cover soil is not transported on weekend days so sampling will not occur on weekends. Bulk samples for open areas will be collected at several locations throughout the landfill as indicated on the attached map. The samples will be combined to determine the overall moisture content. Samples will be collected every hour throughout the working day. Water application will be noted and samples will be collected immediately before a watering event. Samples will not be collected within 30 minutes of a watering event. A minimum of 3 sets of samples will be collected.

Cover soil moved by the scraper will be sampled before the first watering of the day and hourly thereafter during the time period the scraper operates. Watering events will be noted and samples will be collected immediately before a watering event. Samples will not be collected within 30 minutes of a watering event. A minimum of 6 samples (3 events) will be collected.

Open Areas of the Landfill

The overall objective of open area loose material sampling is to inventory particulate matter which may be subject to wind re-entrainment.

This is done typically by:

30) Collecting "representative" samples of the material;

31) Analyzing the samples to determine moisture and silt contents; and

32) Combining analytical results with loose material area and meteorological information in an emission factor model.

Most of the area without vegetation at the City of Lompoc landfill is stabilized and not subject to wind erosion. However, areas recently disturbed may be unstable for a small period of time.

At the beginning of the sampling day, before watering has occurred, the site will be reviewed to determine where areas of loose material are located. Each area will be marked on a site map and measured. A representative sample will be collected from each location. At least 30 minutes after watering a second sample will be collected. Samples will be collected hourly until the next watering event. A sample will be collected immediately before the next watering event for each area. The next sample will be collected at least 30 minutes after each watering event and continue hourly until the next watering event and then be sampled as described. All samples will be marked and collected from areas representative of the characteristics of the overall area.

Procedure -

The following steps describe the method for collecting samples from storage piles:

1) Sketch the dimensions and elevation (if there are elevation changes) of the area to be sampled. Indicate if any portion is not accessible. Use the sketch to plan where the N increments will be taken by dividing the longest dimension of the area into N-1 roughly equivalent segments. A sample should be a minimum of 6 increments, evenly distributed throughout the area. Do not sample the same exact location in subsequent sampling events but in the same segment.

2) Collect material with a clean whisk broom dustpan. Do not loosen any material that is secured to the surface. Store the increments in a clean, labeled container of suitable size (such as a metal or plastic 19 L [5 gal] bucket) with a sealable polyethylene liner. Collect the increments by skimming the surface in an upwards direction. The depth of the sample should be 2.5 cm (1 in), or the diameter of the largest particle, whichever is less. Do not deliberately avoid collecting larger pieces of material present on the surface.

3) Record the required information on the sample collection sheet (Figure C.1-5). Note the space for deviations from the summarized method.

Sample Specifications -

The sample mass collected should be at least 5 kg (10 lb). Depending on the amount of loose material on the surface of the landfill, larger samples may be collected. These samples usually require splitting to a size more amenable to laboratory analysis. A sample of 1 to 4 pounds is desired for laboratory analysis. The sample should be mixed within the sample container to make the sample as homogeneous as possible without losing moisture.

Cover Material Storage Pile

The overall objective of a storage pile sampling and analysis program is to inventory particulate matter emissions from the storage and handling of materials. This is done typically by:

1) Collecting "representative" samples of the material;

2) Analyzing the samples to determine moisture and silt contents; and

3) Combining analytical results with material throughput and meteorological information in an emission factor model.

The cover material pile at the City of Lompoc landfill can be accessed by a person with a bucket and a shovel. This is considered a small pile for sampling purposes. Material is removed from the cover material pile and not added to it. Therefore, this process is referred to as a “load-out” process. Representative samples for load-out emissions should be collected from areas that are worked by load-out equipment, in this case a scrapper. For the City of Lompoc, the cover material emissions are from load-out and wind erosion. Wind erosion material samples should be representative of the surfaces exposed to the wind.

Procedure -

The following steps describe the method for collecting samples from small storage piles:

1) Sketch plan and elevation views of the pile. Indicate if any portion is not accessible.

2) Use the sketch to plan where the N increments will be taken by dividing the perimeter into N-1 roughly equivalent segments. A sample should be a minimum of 6 increments, evenly distributed among the top, middle, and bottom.

3) Collect material with a straight-point shovel or a small garden spade, and store the increments in a clean, labeled container of suitable size (such as a metal or plastic 19 L

4) [5 gal] bucket) with a sealable polyethylene liner. Take increments from the portions of the pile which most recently had material removed. Collect the material with a shovel to a depth of 10 to 15 centimeters (cm) (4 to 6 inches [in]). Do not deliberately avoid larger pieces of material present on the surface.

5) Record the required information on the sample collection sheet (Figure C.1-5). Note the space for deviations from the summarized method.

Sample Specifications -

The sample mass collected should be at least 5 kg (10 lb). The collection of 6 increments will normally result in a sample of at least 30 pounds. Note that storage pile samples usually require splitting to a size more amenable to laboratory analysis. A sample of 1 to 4 pounds is desired for laboratory analysis. The sample should be mixed within the sample container to make the sample as homogeneous as possible without losing moisture.

LABORATORY ANALYSIS

Moisture Analysis

Samples are oven dried to determine moisture content before sieving.

Procedure -

1) Heat the oven to approximately 110°C (230°F). Record oven temperature. (See Figure C.2-3.)

2) Record the make, capacity, and smallest division of the scale.

3) Weigh the empty laboratory sample containers which will be placed in the oven to determine their tare weight. Weigh any lidded containers with the lids. Record the tare weight(s). Check zero before each weighing.

4) Weigh the laboratory sample(s) in the container(s). For materials with high moisture content, assure that any standing moisture is included in the laboratory sample container. Record the combined weight(s). Check zero before each weighing.

5) Place sample in oven and dry overnight. Materials composed of hydrated minerals or organic material such as coal and certain soils should be dried for only 1.5 hours.

6) Remove sample container from oven and (a) weigh immediately if uncovered, being careful of the hot container; or (b) place a tight-fitting lid on the container and let it cool before weighing. Record the combined sample and container weight(s). Check zero before weighing.

7) Calculate the moisture, as the initial weight of the sample and container, minus the oven- dried weight of the sample and container, divided by the initial weight of the sample alone. Record the value.

8) Calculate the sample weight to be used in the silt analysis, as the oven-dried weight of the sample and container, minus the weight of the container. Record the value. An example moisture analysis form is presented in Figure 3.

Silt Analysis

Several dust emission factors have been found to be correlated with the silt content (< 200 mesh) of the material being disturbed. The basic procedure for silt content determination is mechanical, dry sieving. The same sample which was oven-dried to determine moisture content is then mechanically sieved.

Procedure -

1) Select the appropriate 20-cm (8-in.) diameter, 5-cm (2-in.) deep sieve sizes. Recommended U.S. Standard Series sizes are 3/8 in., No. 4, No. 40, No. 100, No. 140, No. 200, and a pan. Comparable Tyler Series sizes can also be used. The No. 20 and the No. 200 are mandatory. The others can be varied if the recommended sieves are not available, or if buildup on 1 particulate sieve during sieving indicates that an intermediate sieve should be inserted.

2) Obtain a mechanical sieving device, such as a vibratory shaker or a Roto-Tap® without the tapping function.

3) Clean the sieves with compressed air and/or a soft brush. Any material lodged in the sieve openings or adhering to the sides of the sieve should be removed, without handling the screen roughly, if possible.

4) Obtain a scale (capacity of at least 1600 grams [g] or 3.5 lb) and record make, capacity, smallest division, date of last calibration, and accuracy. (See Figure 4.)

5) Weigh the sieves and pan to determine tare weights. Check the zero before every weighing. Record the weights.

6) After nesting the sieves in decreasing order of size, and with pan at the bottom, dump dried laboratory sample (preferably immediately after moisture analysis) into the top sieve. The sample should weigh between □ 400 and 1600 g (□ 0.9 and 3.5 lb). This amount will vary for finely textured materials, and 100 to 300 g may be sufficient when 90% of the sample passes a No. 8 (2.36 mm) sieve. Brush any fine material adhering to the sides of the container into the top sieve and cover the top sieve with a special lid normally purchased with the pan.

7) Place nested sieves into the mechanical sieving device and sieve for 10 minutes (min). Remove pan containing minus No. 200 and weigh. Repeat the sieving at 10-min intervals until the difference between 2 successive pan sample weighings (with the pan tare weight subtracted) is less than 3.0%. Do not sieve longer than 40 minutes.

8) Weigh each sieve and its contents and record the weight. Check the zero before every weighing.

9) Calculate the percent of mass less than the 200 mesh screen (75 micrometers [μm]). This is the silt content.

SAMPLING DATA FOR STORAGE PILES AND OPEN AREAS

Date Collected ________________ Recorded by ___________

Type of material sampled ____

Sampling location*(Indicate on map or drawing)

____

Ambient Temperature____
Cloud Cover____
Solar Radiation____

METHOD:

1) Sampling device (circle one): pointed shovel whisk broom and dustpan

2) Sampling depth:_________

For material handling of inactive piles: 1 m (3 ft)
For wind erosion samples: 2.5 cm (1 in.) or depth of the largest particle (whichever is less)

3) Sample container (number and description) :_____________
(Bucket with sealable lid or other)

4) Gross sample specifications: _________________
Minimum of 6 increments with total sample weight of 5 kg (10 lb)

Indicate any deviations from the above:

____

Watering Event Description

Volume of water used for watering event in gallons	
Area watered in yd^2	
Water intensity in gal/yd^2	
Time of day of watering event	

SAMPLING DATA COLLECTED:

Sample No.	Time	Minutes Since Last Watering Event	Location* of Sample Location	Shovel or Whisk Broom	Depth	Mass of Sample

* Use code on area map for pile/sample identification. Indicate each sampling location on map.

REFERENCES

1) *Compilation of Air Pollutant Emissions Factors, Volume 1: Stationary Point and Area Sources (AP42)* , Fifth Edition, United States Environmental Protection Agency, 1993.

2) "Standard Method Of Preparing Coal Samples For Analysis", *Annual Book Of ASTM Standards, 1977*, D2013-72, American Society For Testing And Materials, Philadelphia, PA, 1977.

3) *L. Silverman, et al., Particle Size Analysis In Industrial Hygiene,* Academic Press, New York, 1971.

APPENDIX G

Moisture Content of WTPFM

RESULTS OF PERCOLATION TESTS

FOR COMPACTED MIXTURE OF ONE PART NATIVE SOIL AND ONE PART WATER TREATMENT PLANT SLUDGE

Percolation Test Number	Depth Below Existing Grade	Percolation Rate Min./Inch*
P-1	10 inches	261

*12 Inch Square Hole with a 6 Inch Depth of Clear Water

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