TECHNICAL SUPPORT DOCUMENT

Air Discharge Permit 23-3604
Air Discharge Permit Application CO-1058

Preliminary Issued: September 14, 2023

Divert, Inc

SWCAA ID – 2763

DRAFT

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ABBREVIATIONS

List of Acronyms

ADP .... Air Discharge Permit
AnMBR........ Anaerobic membrane bioreactor
AP-42 .... Compilation of Emission Factors, AP-42, 5th Edition, Volume 1, Stationary Point and Area Sources – published by EPA
ASIL............. Acceptable Source Impact Level
BACT........... Best available control technology
BART .... Best Available Retrofit Technology
BOD_5............ 5-day Biological Oxygen Demand
CAM .... Compliance Assurance Monitoring
CAS#............ Chemical Abstracts Service registry number
CFR.............. Code of Federal Regulations
COD............. Chemical Oxygen Demand
CSTR .... Continuous Stirred Tank Reactor
EPA.............. U.S. Environmental Protection Agency
EIIP .... Air Emissions Inventory Improvement Program
EU .... Emission Unit
GWP............. Greenhouse Warming Potential
LAER........... Lowest achievable emission rate
MACT.......... Maximum Achievable Control Technologies
MBBR.......... Moving bed biofilm reactor
Mfr .... Manufacturer
NESHAP...... National Emission Standards for Hazardous Air Pollutants
NOV............. Notice of Violation/
NSPS............ New Source Performance Standard
PSD .... Prevention of Significant Deterioration
RACT........... Reasonably Available Control Technology
RANS........... Return anaerobic sludge
RCW .... Revised Code of Washington
SCC.............. Source Classification Code
SQER .... Small Quantity Emission Rate listed in WAC 173-460
Standard .... Standard conditions at a temperature of 68°F (20°C) and a pressure of 29.92 in Hg (760 mm Hg)
SWCAA....... Southwest Clean Air Agency
T-BACT....... Best Available Control Technology for toxic air pollutants
WAC .... Washington Administrative Code
WANS.......... Waste anaerobic sludge

ABBREVIATIONS (cont.)

List of Units and Measures

°F .... Degrees Fahrenheit
°C .... Degrees Celsius
μg/m³ .... Microgram per cubic meter
μm .... Micrometer (10^{-6} meter)
acfm .... Actual cubic foot per minute
Btu .... British thermal unit
dscfm .... Dry Standard cubic foot per minute
g/dscm .... Gram per dry Standard cubic meter
gal/hr .... Gallon per hour
gal/min .... Gallon per minute
gr/dscf .... Grain per dry standard cubic foot
iwc .... Inches of water column
mg/L .... Milligram per liter
MMBtu .... Million British thermal unit
MMcf .... Million cubic feet
⌀ .... Diameter
pH .... Potential of hydrogen; pH = −log([H+])
ppm .... Part per million
ppmv .... Part per million by volume
ppmvd .... Part per million by volume, dry
ppmw .... Part per million by weight
psi .... Pound per square inch
psig .... Pound per square inch, gauge
rpm .... Revolution per minute
scf .... Standard cubic foot
scfm .... Standard cubic foot per minute
scfh .... Standard cubic foot per hour
MMscf .... Million Standard cubic foot
t .... Metric ton, equivalent to 2204.623 lb
tph .... Ton per hour
tpy .... Tons per year

ABBREVIATIONS (cont.)

List of Chemical Symbols, Formulas, and Pollutants

C_3H_8 .... Propane
CH_4............... Methane
Cl^- .... Chloride ion
CO .... Carbon monoxide
CO_2............... Carbon dioxide
CO_2e............. Carbon dioxide equivalent
$Fe(OH)_3$........ Ferric hydroxide; also hydrated $FeO(OH){\bullet}H_2O$
Fe_2S_3............. Ferric sulfide; Iron (III) sulfide
Fe^{2+}............... Ferrous ion; Iron (II) ion
$FeCl_2$ .... Ferrous chloride; Iron (II) chloride
FeO(OH) ...... Ferric oxyhydroxide; Iron (III) oxide-hydroxide
FeS .... Iron (II) sulfide
H^+ .... Hydrogen ion
H_2O .... Water
H_2S (aq)........ Hydrogen sulfide in aqueous solution
H_2S (g) .... Hydrogen sulfide, gas
H_2SO_4........... Sulfuric acid
HAP .... Hazardous air pollutant listed pursuant to Section 112 of the Federal Clean Air Act
HCl............... Hydrogen chloride; hydrochloric acid
Hg................. Mercury
HS^- .... Bisulfide ion
N_2 .... Nitrogen
N_2O ....Nitrous oxide
NaOH............Sodium hydroxide
NH_3 ....Ammonia
NH_4^+.............Ammonium ion
$(NH_4)_2SO_4$.....Ammonium sulfate
NMNEVOC ..Non-Methane, Non-Ethane Volatile Organic Compounds
NO ....Nitric oxide
NO_2 ....Nitrogen dioxide
NO_2^-.............Nitrite ion
NO_3^-.............Nitrate ion
NO_X..............Nitrogen oxides
O_2 ....Oxygen
O_3 ....Ozone
PM ....Particulate Matter with an aerodynamic diameter 100 µm or less
PM_{10}.............PM with an aerodynamic diameter 10 µm or less
$PM_{2.5}$ ....PM with an aerodynamic diameter 2.5 µm or less.
S ....Sulfur (elemental)
SO_2...............Sulfur dioxide
SO_x...............Sulfur oxides
TAP..............Toxic air pollutant pursuant to Chapter 173-460 WAC
TKN ....Total Kjeldahl Nitrogen (mg/L)
TSP ....Total Suspended Particulate
VOC.............Volatile organic compound

Terms not otherwise defined in the above sections have the meaning assigned to them in the referenced regulations or the dictionary definition, as appropriate.

1. FACILITY IDENTIFICATION

Applicant Name:	Divert, Inc
Applicant Address:	23 Bradford St Suite 3, Concord, MA 01742-2971
Facility Name:	Divert, Inc/Integrated Food Recovery Facility
Facility Address:	1800 Prudential Blvd, Longview, WA 98632-9826
SWCAA Identification:	2763
Contact Person:	David Mayer, EH&S Manager
Primary Process:	Manufacture of renewable natural gas
SIC/NAICS Code:	4925: Manufactured gas production and distribution 221210: Distribution of renewable natural gas (RNG)
Location:	46° 08' 44.94" N 122° 59' 06.86"
Facility Classification:	Natural Minor

2. FACILITY DESCRIPTION

Divert, Inc. (Divert) operates a food waste processing facility that uses anaerobic digesters to manufacture biogas, which contains a sizeable portion of methane for use as a renewable natural gas (RNG). RNG is separated from other gases produced in the anaerobic process, cleaned, and compressed prior to introduction into the nearby natural gas pipeline.

3. CURRENT PERMITTING ACTION

This permitting action is in response to Air Discharge Permit (ADP) application number CO-1058 dated August 29, 2022. Divert submitted ADP application CO-1058 requesting the following:

- Approval to construct and operation an anaerobic biogas/RNG facility, which includes:
  - De-packaging facilities;
  - Liquid, semisolid, and solid waste handling;
  - Equalization tanks;
  - An anaerobic digester with an anerobic membrane bioreactor;
  - A pressure swing adsorber for separating RNG from the biogas; and
  - Various other tanks, piping, and equipment related to the processing, cleaning, compressing and production of the RNG

This is the initial permitting action for this facility.

4. PROCESS DESCRIPTION

4.a. De-packaging and Food Waste Processing. Food waste feedstock, approximately 100,000 ton/yr (277 ton/day), arrives on site in trucks, which are expected to enter and exit the facility 24 hr/day, 7 day/week. Trucks deliver the feedstock through weather-sealed dock doors. At present, there are no plans for active negative airflow into the building, however, the building is equipped with six draft-induced fans and ten emergency smoke exhaust fans. The first step is to separate the feedstock from the packaging and add water (Fig. 1). This mixture is ground, pressed, or otherwise processed to create a homogenized slurry inside the building prior to being sent to the equalization tanks, located outside. This process occurs quickly, and food waste is not expected to sit within the building for very long. Liquid feedstock may be processed separately and sent to the equalization tank in a separate stream. Additional water is added to the feedstock as necessary to provide a consistent water flow or loading to the anaerobic digester.

4.b. Anaerobic Digestion. The feedstock is then sent to a single heated anaerobic digestion tank. Under aerobic conditions, the food waste would convert to carbon dioxide (CO_2) and water, but in the absence of oxygen, the food waste is converted to CO_2 and methane (CH_4), along

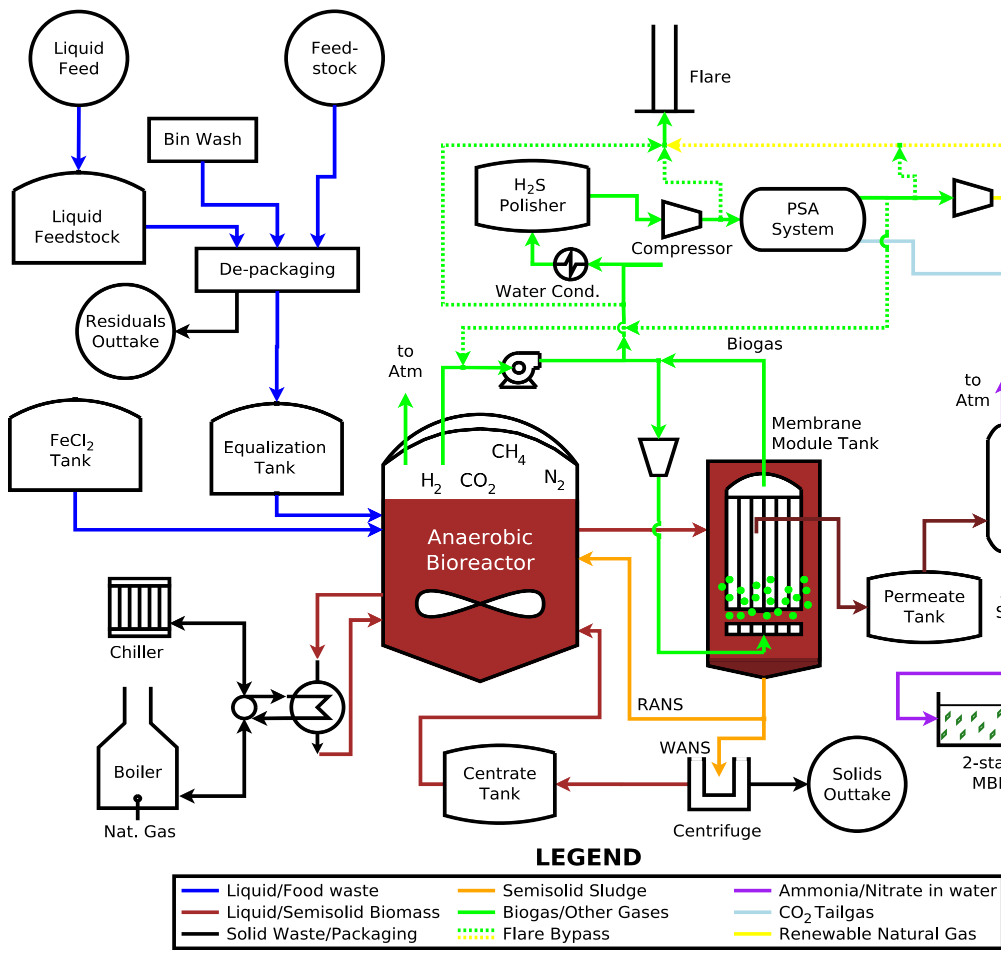

Fig. 1. General process flow for Divert, Inc.

with trace amounts of nitrogen (N_2) and H_2S. H_2S is released by microorganisms as they break down sulfur-containing compounds in the feedstock, primarily proteins and concentration in the biogas could be as high as 1,000 ppmv, based on maximum industry estimation. Partially decomposed feedstock is now digestate. In the digester, H_2S is in equilibrium between the headspace (biogas) and the digestate, and forms bisulfide ion (HS^-) in solution:

$$H_2S\ (g) \leftrightharpoons H_2S\ (aq) \leftrightharpoons HS^- + H^+$$

This reaction is dependent upon pH, which typically is in the range of 6.8 to 7.2, maintaining the equilibrium between H_2S and HS^-. The expectation is that ammonia and dissolved CO_2 provide a buffer to moderate the pH within this range; there is no plan to add pH balancers to the digester. The addition of the ferrous chloride ($FeCl_2$) solution, up to 500 gal/day of a 30% solution, is expected to reduce the H_2S by precipitating out HS^- as ferrous sulfide (FeS) by the following reaction:

$$FeCl_2 \rightarrow Fe^{2+} + 2\ Cl^-$$
$$Fe^{2+} + HS^- \rightarrow FeS\ (\downarrow) + H^+$$

or, overall

$$FeCl_2 + H_2S\ (aq) \rightarrow FeS\ (\downarrow) + 2\ HCl\ (aq)$$

This reaction is expected to provide about 90% control of the H_2S in the biogas, reducing the concentration to approximately 100 ppm. The FeS is removed in the solids stream after the sludge is sent to the centrifuge and is sent off site as a soil amendment.

The liquid digestate is pumped to an anaerobic membrane bioreactor (AnMBR), consisting of two tanks, physically separate from the anaerobic digester (externally submerged AnMBR). Several membranes are suspended within the AnMBR, which separate the liquid digestate into a liquid permeate stream and a sludge stream. Solids and biofilm form on the outsides of the membranes, which must be cleaned periodically to maintain flow through the membrane. Pressurized biogas is sent to diffusers located below the membranes and provides scouring. This scouring biogas is eventually recombined with the main biogas stream. The liquid permeate stream contains ammonia rich effluent and is treated (sewer pre-treatment) in an air stripper followed by moving bed biofilm reactors (MBBRs) prior to discharge to the main sewer line. The sludge stream is returned to the digester with a slipstream intermittently sent to the centrifuge for dewatering and disposal. Hydraulic retention time, which is a measure of how long material is stored in the digester, is approximately 30–50 days.

4.c. Biogas Processing. The biogas streams from the anaerobic digester and the AnMBR tanks are combined and is composed of approximately 60% CH_4 and 39% CO_2, with the remainder composed of H_2S, water vapor, trace N_2, volatile organic compounds (VOCs), and other trace contaminants. There are several steps required to increase the CH_4 concentration as described below. Total biogas production under ideal conditions could be as high as 407 MMscf/yr.

Hydrogen sulfide removal. Exiting the anaerobic digester and AnMBRs, the biogas contains CH_4, CO_2, H_2S, and trace amounts of H_2O, N_2, and other gases. During digestion in the anaerobic digester or the AnMBR, To remove H_2S, the biogas is passed through a the H_2S Polisher, which is a tank containing ferric oxyhydroxide [FeO(OH)] media, Which may also contain ferric hydroxide [$Fe(OH)_3$], which occurs when the ferric oxyhydroxide reacts with water. The ferric oxyhydroxide (which ultimately reacts to form ferric hydroxide) reacts with H_2S in the media to form iron (III) sulfide and possibly iron (II) sulfide and sulfur (S) that is disposed of offsite.

The exothermic reaction occurs according to the equation:

$$2\ FeO(OH) + 3\ H_2S \rightarrow Fe_2S_3 + 4\ H_2O$$
$$2\ Fe(OH)_3 + 3\ H_2S \rightarrow Fe_2S_3 + 6\ H_2O$$

In the presence of oxygen and water, Fe_2S_3 reverts to FeO(OH)/$Fe(OH)_3$ and elemental sulfur according to the following exothermic reactions:

$$2\ Fe_2S_3 + 3\ O_2 + 6\ H_2O \rightarrow 4\ Fe(OH)_3 + 6\ S$$
$$2\ Fe_2S_3 + 3\ O_2 + 2\ H_2O \rightarrow 4\ FeO(OH) + 6\ S$$

This may occur if the oxygen level is enhanced above 30% or when the media is replaced. No SO_2 is released in the process at ambient temperatures. Spent media is typically landfilled or land applied as a micronutrient fertilizer.

A single tank comprises the H_2S Polisher system with a continuous H_2S analyzer downstream of the tank used to determine if the media needs to be replaced. The flow is estimated at 775 acfm. The beds are typically kept at temperatures between 50–130 °F and pressure about 3 psi. The H_2S Polisher is expected to provide an additional 94–96% reduction of H_2S in the biogas, with 4 ppm or less expected in the final biogas prior to pipeline injection. The H_2S Polisher has a safety relief device that can vent directly to the atmosphere in emergencies. Its outlet gas can also be sent to the flare via the downstream compressor (upstream of the pressure swing adsorber) if high H_2S is detected. The media must be regenerated or replaced every 10–12 months and takes less than one day to replace. During such time, high-H_2S concentration (100 ppm) biogas will be sent to the flare.

Water Removal. Water is removed from the biogas stream by cooling the gas in a condenser. Condensed water is sent to the sanitary sewer.

Carbon Dioxide and Nitrogen Removal. The final product is CH_4, however considerable quantities of CO_2, and to a lesser extent N_2 and trace gases are "contaminants" that must be separated from the CH_4 in the biogas. This is achieved using a fast cycle pressure swing adsorption (PSA) system (Fig. 2). Several pressure vessels (12 vessels, R640-01 through R640-12)) filled with activated carbon and activated alumina, are alternately pressurized and depressurized. Under high pressure, the desired product, in this case CH_4, does not adsorb onto the media and passes through the media to collection, but the other components are adsorbed. When the pressure is released, the adsorbed components – CO_2, N_2, and residual water – are released. In this way, CH_4 may be increased from 60% in the biogas to upwards of 98% or more in the final product. The PSA vessels each have a safety relief valve that can vent directly to the atmosphere in an emergency. The gas leaving the PSA can also be sent directly to the flare.

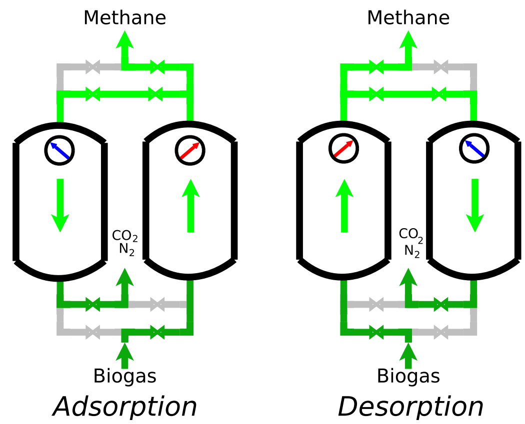

Fig 2. In this simplified diagram, the PSA system uses two vessels which switch from operating in adsorption phase (left) to desorption phase (right) when the gas flow direction changes. The high-pressure side (red) adsorbs contaminants while the low-pressure side (blue) discharges them. In either case, the CH_4 passes through.

The concentrated CH_4 after the PSA is compressed to the final product, RNG, prior to injection into the natural gas supply line. As with most facilities that handle gases under pressure, some leaks at connections, flanges, and valves will occur, though is expected to be small. Note that, for the most part, off-specification RNG, typically due to H_2S contamination above 4 ppm or low energy content of the cleaned biogas, cannot be reprocessed and is flared.

4.d. RANS, WANS, and Centrate Processing. The anaerobic processes generally will consume most of the available energy in the feedstock, leaving dilute energy sources in solution and inorganic or undigestible solids. The sludge, which contains concentrated biological material, is separated into two streams, a waste anaerobic sludge (WANS) stream and a return anaerobic sludge (RANS) stream. The WANS is dewatered in a centrifuge with the solids cake separated for off-site composting and the liquid stream (centrate) returned to the anaerobic digester. The RANS (typically about 90% of the sludge) is sent back to the anaerobic digester to provide biological activity.

Liquid leaks at connections, flanges, and valves may occur, though emissions are expected to be small.

4.e. Permeate Processing. From the ANMBR, the permeate is sent first to a holding tank and then to sewer pre-treatment. The sewer pre-treatment includes an ammonia removal system and an ammonia to nitrate conversion system using two MBBRs. Typical and maximum expected parameters for the permeate are:

Parameter	Typical	Maximum
pH	7.3	7.6
Biological oxygen demand (BOD_5)	170 mg/L	250 mg/L

Parameter	Typical	Maximum
Chemical oxygen demand (COD)	700 mg/L	1100 mg/L
Ammonia-nitrogen	1,350 mg/L	1,800 mg/L
Total Kjeldahl nitrogen (TKN)	1,350 mg/L	1,800 mg/L
Phosphorous	50 mg/L	80 mg/L

The permeate is sent through a primary heat exchanger (heated by returned permeate) and then through a second heat exchanger to raise the temperature to about 167–176 °F (70–80 °C). This heated permeate is then sent (at about 4,000 gal/hr) to the Byosis Byoflex 15 unit, which consists of three main components, an air stripper, a neutralizer, and an acid scrubber. Sodium hydroxide is added to the permeate to increase the pH to up to 10.5, which preferentially converts ammonium ion (NH_4^+) to NH_3. The air stripper volatilizes the NH_3 in the permeate, then the air stream is sent to the neutralizer and the acid scrubber, which are counterflow with sulfuric acid (H_2SO_4). The H_2SO_4 reacts with the NH_3 in the neutralizer and the acid scrubber to form aqueous ammonium sulfate, $(NH_4)_2SO_4$, which can be used as a fertilizer. The ByoFlex 15 is expected to reduce the NH_3 in the permeate from about 1,350 mg/L to 44 mg/L. The warm permeate can be used to preheat the incoming permeate in the first heat exchanger. The H_2SO_4 and NaOH are stored in two 10,000-gallon tanks.

After the ByoFlex 15, the permeate is sent to a two-stage MBBR, which is used for reduction of BOD_5, COD, and further reduction of residual NH_4^+ to nitrate (NO_3^-) prior to discharge to the sewer. Reduction of phosphate is also possible. The MBBR consists of two aerated tanks that contain small, perforated, or dimpled, plastic media similar to scrubber packing material. This media provides a high surface area for an aerobic biofilm to form. The biofilm reduces ammonia to nitrate in two steps:

$$2\ NH_4^+ + 3\ O_2 \rightarrow 2\ NO_2^- + 2\ H_2O + 4\ H^+$$
$$2\ NO_2^- + O_2 \rightarrow 2\ NO_3^-$$

Air is pumped through the system which both provides oxygen and agitation. This process also removes ammonia from the system by oxidizing NH_3 and other nitrogen compounds to nitrate. The effluent is sent to the municipal sewer. There is no denitrification step included in the process, so no additional carbon source is needed. In many MBBRs, the addition of a carbon source further reduces the NO_3^- to N_2 gas.

4.f. Boiler. A 2.0 MMBtu/hr natural gas-fired Lochinvar boiler provides process heat to the anaerobic digestor and maintains optimal temperature for biological activity.

4.g. Flare. A John Zink ZULE 28.0 MMBtu/hr enclosed flare is proposed for use as primarily an emergency control device. The production and injection of RNG to the natural gas pipeline is at the core of Divert's business and the use of the enclosed flare will be minimized as Divert will seek to maximize RNG production and injection. Divert estimates that under normal operation, the total flaring hours should be less than 300 hr/yr for both biogas and RNG, which is within the 876 hr/yr proposed maximum for normal operation.

Emergency use of the flare is not regulated by the ADP. There is some expectation that the flare may be used rarely on a case-by-case basis subject to SWCAA approval for non-emergency use, including plant commissioning and gas upgrade equipment maintenance beyond the 876 hr/yr limit. See section 11.b for more information about flare operating scenarios.

5. EQUIPMENT/ACTIVITY IDENTIFICATION

5.a. De-Packaging and Food Waste Processing. Food waste is delivered by truck into the building, where the food waste feedstock is separated into liquid and "semi-solid" lines, which, after the addition of waste and agitation, is sent to the equalization tank. The de-packaging and processing operation may be a potential source of odor (including ammonia and volatile sulfides), and to a lesser degree, quantifiable VOCs and H_2S (assuming intermittent anaerobic conditions). Draft-induced fans located along the roofline will create a minimal airflow through the building and may be a potential source of odors. The building will contain the following open top and atmospheric tanks, except for the Equalization tank, which is located outside:

Equipment List/Tank type	Contents	Volume (gal)	Dimensions
Dilution Tank (T220-01), non-pressurized, atmospheric tank	Process water	5,000	⌀ 9' by 11' high
Drain Sump (T340-01), open top tank	Process water/slurry mix	8,000	12' × 12' by 8' 3⅝" high
Accepts Tank (T350-01), open top tank	Process slurry	7,000	9' × 18' by 6' high
Buffer Tank (T370-01), non-pressurized, atmospheric tank	Process slurry	5,000	⌀ 9' by 11' high
Equalization Tank (R410-01), closed tank	Process slurry	250,000	⌀ 33' by 40' high

The open top tanks are not roofed, the non-pressurized atmospheric tanks have roofs but are equipped with large openings (e.g., process flange, manhole, gooseneck) with no safety valves and the closed tanks are equipped with safety valves but are not generally under pressure. The De-packaging and Food Waste Processing system is generally liquid-based and the likelihood of gaseous fugitive emissions from pumps, flanges, and connectors, other than due to a liquid leak are thought to be negligible, unless there is a liquid leak.

5.b. Anaerobic Digester and Biogas Processing. The food waste "slurry" from the equalization tanks is sent to the anaerobic digester, which is a continuous stirred tank reactor (CSTR), meaning that the feedstock is continuously fed into the reactor and the biogas (and waste) is continuously removed. Under anaerobic conditions, CH_4, H_2S, VOCs, and odors will be generated. The gas cleaning system is composed of several different systems held at different pressures and is designed to remove H_2S and to separate and discharge CO_2, N_2, and water, among other trace contaminants to the ambient air. Most of the equipment used in the anaerobic digestion and biogas processing systems is under pressure and there is the possibility of leaks through valves, flanges, and other components, depending on the pressure. The anaerobic digester, the H_2S polisher, and the PSA system have the capability to vent biogas or RNG directly to atmosphere (via safety relief valves) or directly to the flare. Venting unprocessed or off-specification biogas or RNG is not permitted under normal circumstances. The following tanks, which are equipped with pressure valves, are under varying positive pressures:

Equipment List ID	Contents	Type	Volume (gal)	Dimensions
Anaerobic Digester (R420-01)	Process slurry	<0.036 psi	3,500,000	⌀ 103' 11¾" by 58' 4$^{11}/_{16}$" high
AnMBR Filter Tank 1 (R510-01)	Process slurry	<0.036 psi	61,400	16' × 27' by 19' high
AnMBR Filter Tank 2 (R510-02)	Process slurry	<0.036 psi	61,400	16' × 27' by 19' high
H_2S Polisher (R620-01)	Iron hydroxide oxide media and biogas	<3 psi	12,000	⌀ 10' by 20' 6" high
PSA Vessels (R640-01 through R640-12)	Biogas	Varies 125 psig max	3,600	8' 6" × 19' by 15' high

The main source of H_2S, VOCs, and odor will be in the biogas produced by the anaerobic digester and will be present in the AnMBR equipment. Further processing by the H_2S Polisher, condenser, and PSA will reduce or remove these pollutants while concentrating the CH_4 for processed RNG.

5.c. Permeate and Centrate Processing. After the anaerobic digester, the permeate from the AnMBRs, which could have high NH_3 concentrations, is pretreated in the Byosis Byoflex 15 unit (air stripper, neutralizer, and acid scrubber) and MBBRs before being sent to the sewer discharge. The liquid portion of the semi-solid sludges are sent to the centrifuge for dewatering and are eventually sent back to the anaerobic digester, while the solids are sent to an offsite location. Both streams should have had most of the energy removed from the system (i.e., low BOD_5 and COD), However, there is a possibility of NH_3 emissions, as well as odor, since the addition of oxygen is part of the process. The following tanks are non-pressurized or open top tanks:

Equipment List ID	Contents	Type	Capacity (gal)	Dimensions
Centrate Tank (T720-01)	Process water	Domed	5,000	⌀ 9' by 11' high
Permeate Tank (T810-01)	Process water	Domed	10,000	⌀ 11' by 14' high
MBBR 1 (R860-01)	Process water	Open top	42,000	⌀ 18' 5½" by 20' 11⅜" high

Equipment List ID	Contents	Type	Capacity (gal)	Dimensions
MBBR 2 (R870-01)	Process water	Open top	28,000	⌀ 15' 4⁹⁄₁₆" by 19' 11¾" high

The Centrate Processing systems are generally liquid-based and the likelihood of gaseous fugitive emissions from pumps, flanges, and connectors, other than due to a liquid leak, are expected to be unlikely.

5.d. Boiler. The natural gas-fired boiler is primarily used to provide heat to the digester. The boiler is equipped with an ultralow nitrogen oxide (NO_X) burner and has a 25:1 turndown ratio. Exhaust gases are discharged to ambient air through an 8" diameter stack at approximately 23' above ground level.

Boiler Manufacturer:	Lochinvar
Model Number:	Crest FB*2001
Serial Number:	Not Yet Determined
Heat Rate:	2.0 MMBtu/hr
Burner Manufacturer:	Lochinvar
Burner Model Number:	100073283
Stack Diameter:	8 in
Stack Height:	23' 2"
Stack Flow:	400 acfm
Stack Temperature:	130 °F
40 CFR 60 Subpart Dc:	Not Applicable; does not meet size applicability.
40 CFR 63 Subpart JJJJJJ:	Not Applicable; exempted, only burns natural gas.

5.e. Flare. The enclosed flare is intended for use only in emergency situations or rare occurrences when the biogas or RNG is off-specification or unable to be delivered to the natural gas pipeline for injection. The retention time is 0.7 s at 1,400–1,800 °F and it has an expected destruction efficiency of 98–99%. The pilot is fired on pipeline natural gas and supplied at 50 scfh at 10–15 psig. The natural gas fired pilot light will always be on. In the case where either the flow volume or energy content of the biogas or RNG is below specification for the flare, additional natural gas may be blended with the biogas of RNG prior to flaring. The flare is equipped with a flame arrestor and has three burner tips.

Make:	John Zink
Model:	ZULE
Serial Number:	Not Yet Determined
Rating:	28.0 MMBtu/hr
Stack Diameter:	84"
Stack Height:	40'
Flare Gas Flow:	775 acfm (assuming 60% CH_4)
Flare Temperature:	1,400 – 1,800 °F during flaring event

5.f. Insignificant Emission Units. The following pieces of facility equipment have been determined to have insignificant emissions, and are not registered as emission units:

- The $FeCl_2$ tank (T450-01) is a 7,000-gal atmospheric vertical double-walled cylindrical tank (⌀ 9' 6" by 13' 6" high) located outside containing a 30% solution of $FeCl_2$. $FeCl_2$ is a listed toxic air pollutant (TAP) in the August 21, 1998, version of WAC 173-460 under "iron salts, soluble as Fe". However, in solution, $FeCl_2$ has a very low vapor pressure at ambient temperatures; PubChem[*] states 1 mm Hg at 381 °F (194 °C). It is unlikely that $FeCl_2$ will be emitted in sufficient quantities to cause an adverse ambient impact.
- The caustic tank (T825-01) is a 10,000-gal double-walled atmospheric vertical cylindrical tank (⌀ 11' by 14' high) located outside containing 30–50% solution of sodium hydroxide (NaOH). NaOH is a listed TAP in the August 21, 1998, and November 22, 2019, versions of WAC 173-460. However, in solution, NaOH has a negligible vapor pressure (often assumed to be zero) and it is unlikely that NaOH will be emitted in sufficient quantities to cause an adverse ambient impact.
- The sulfuric acid tank (T840-01) is a 10,000-gal double walled atmospheric vertical cylindrical tank (⌀ 11' by 14' high) located outside containing a 96–98% solution of sulfuric acid (H_2SO_4). H_2SO_4 is a listed TAP in the August 21, 1998, and November 22, 2019, versions of WAC 173-460. However, despite the high concentration, the vapor pressure is very low, 0.001 mm Hg at Standard conditions and it is unlikely that H_2SO_4 will be emitted in sufficient quantities to cause an adverse ambient impact.
- The ammonium sulfate tank (T845-01) is a 15,000-gal atmospheric vertical cylindrical tank (⌀ 14' by 14' high) tank located outside containing a 38% solution of ammonium sulfate [$(NH_4)_2SO_4$]. Ammonium sulfate is not a HAP or a TAP.

5.g. Equipment/Activity Summary.

ID No.	Equipment/Activity	Control Equipment/Measure
1	De-packaging and Food Waste Processing	Process Enclosure
2	Anaerobic Digester and Anaerobic Membrane Bioreactors	Ferric Chloride and Leak Detection and Repair Program
3	Biogas Processing, H_2S Polisher	Ferric Oxide Hydroxide and Leak Detection and Repair Program
4	Biogas Processing, Pressure Swing Adsorber	Leak Detection and Repair Program
5	Centrate Processing	Process Enclosure and Leak Detection and Repair Program

[*] National Center for Biotechnology Information. "PubChem Annotation Record for ferric chloride, Source: Hazardous Substances Data Bank (HSDB)" PubChem, https://pubchem.ncbi.nlm.nih.gov. Accessed 12 Dec 2022.

ID No.	Equipment/Activity	Control Equipment/Measure
6	Permeate Processing	Byoflex Air Stripper, Byoflex Neutralizer, Byoflex Acid Scrubber, Moving Bed Bio-film Reactors, and Leak Detection and Repair Program
7	Lochinvar Boiler, 2.0 MMBtu/hr	Ultralow Sulfur Fuel (Natural Gas)
8	John Zink ZULE Flare, 28.0 MMBtu/hr	Ultralow Sulfur Fuel (Natural Gas and Renewable Natural Gas) and Ultralow NO_X Technology

6. EMISSIONS DETERMINATION

Unless otherwise specified by SWCAA, actual emissions must be determined using the specified input parameter listed for each emission unit and the following hierarchy of methodologies:
(a) Continuous emissions monitoring system (CEMS) data;
(b) Source emissions test data (EPA reference method). When source emissions test data conflicts with CEMS data for the time period of a source test, source test data must be used;
(c) Source emissions test data (other test method); and
(d) Emission factors or methodology provided in this Technical Support Document (TSD).

6.a. De-packaging and Food Waste Processing. While food material is being supplied into the system and where oxygen is available, there is a potential for unquantifiable VOC emissions and a higher probability of odor being generated. Odor will be minimized by the Odor Management Plan. However, once in aqueous solution, it is expected that the potential for VOC, H_2S, and other odor emissions to decrease, unless there is a liquid leak.

6.b. Anaerobic Digester and Anaerobic Membrane Bioreactors. Generally, these processes occur in a closed, pressurized system. Emissions could result due to bypasses, upsets, or leaking components. Only the latter would be considered "normal" operation. Divert assumed, conservatively, that approximately 1% of the total flow through the system could be emitted through leaks. The composition of the emissions could be highly variable, but typically would be composed primarily of CH_4 and CO_2, with H_2S being of primary concern for odor. There would also be trace quantities of VOCs. A Leak Detection and Repair program will be used to minimize emissions. A worst-case maximum leakage rate of 1% of the total biogas production is assumed for 8,760 hr/yr from all leak points under pressure combined. The following represents the expected emissions using the 1% leakage rate and biogas profile data provided by Divert:

	Est. Conc. and Leak Rate [a]		Estimated Emissions		
Pollutant	ppm	lb/hr	lb/yr	tpy	Source [b]
VOC	0.0153	0.0153	133.9	0.067	Sum of VOC species
CO_2	380,000	20.20	177,000	88.500	Divert

Pollutant	Est. Conc. and Leak Rate [a] ppm	lb/hr	Estimated Emissions lb/yr	tpy	Source [b]
CO_2e [c]	—	320.2	2,804,952.	1,402.	Divert and 40 CFR 98
Acetone [67-64-1]	0.0415	2.91×10^{-6}	0.0255	1.28×10^{-5}	Divert TO-15
Benzene [71-43-2]	0.00536	5.05×10^{-7}	0.0044	2.20×10^{-6}	Divert TO-15
Ethylbenzene [100-41-4]	0.0172	2.20×10^{-6}	0.0193	9.65×10^{-6}	Divert TO-15
Hydrogen sulfide [7783-06-4]	100	4.11×10^{-3}	36.00	0.018	Divert
Heptane [142-82-5]	0.00618	7.47×10^{-7}	0.0065	3.25×10^{-6}	Divert TO-15
Hexane [110-54-3]	142	0.0148	129.65	0.065	Divert
Methanol [67-56-1]	0.0891	3.45×10^{-6}	0.0302	1.51×10^{-5}	Divert TO-15
Toluene [108-88-3]	0.021	2.33×10^{-6}	0.0204	1.02×10^{-5}	Divert TO-15

(a) The estimated leak rate assumes 1% of the total gas flow (775 scfm) could be emitted as leaks to the ambient air. The major constituents are CO_2 (estimated 177,000 lb/yr) and CH_4 (estimated 105,000 lb/yr).
(b) Divert provided two sources of biogas composition data, one which listed concentration of major species and another that was the result of an EPA TO-15 method, which listed additional species, although at much lower concentrations.
(c) Includes CO_2 with a greenhouse warming potential (GWP) of 1 and CH_4 with a GWP of 25 from 40 CFR 98 Subpart C (11/29/2013).

Note that the composition and quantity of emissions will vary considerably. It is expected that with the LDAR program, that leaks will be minimized to a level much lower than these calculations would indicate, but this represents a maximum expected upper limit. While biogas composition is expected to vary, the majority will be CH_4 and CO_2, with small amounts of H_2S and trace amounts of other pollutants.

6.c. H_2S Polisher. The H_2S Polisher is a single tank containing FeO(OH) used to control H_2S in the biogas. This unit does not emit to ambient air under normal operating conditions; however, it may vent directly to the flare and is equipped with an emergency bypass vent. When vented to the flare, the majority (98% or higher) of the H_2S will be converted to SO_2, otherwise, when not vented to the flare during an emergency, the H_2S would be directly vented. Although the H_2S concentration in biogas is expected to vary, an assumed maximum concentration of 100 ppmw is expected in untreated biogas. In situations where H_2S is directly vented, emissions must be determined using mass balance and the flow rate, H_2S concentration, biogas composition, time and any other variable needed to determine emissions. Venting directly to ambient air is prohibited by the ADP.

6.d. Biogas Processing, Pressure Swing Adsorber. The PSA separates CH_4 from the biogas, which is approximately 60% CH_4 and 40% CO_2 and trace contaminants. In addition to the primary vent, which discharges the separated CO_2 and trace contaminants, there is also a vacuum exhaust with a flow of 310 scfm that could contain up to 4.5% CH_4 vented to ambient air. It is expected that trace contaminants will be emitted from the PSA, however, large organic compounds (C_6+) are expected to condense in a chiller upstream of the PSA and will not be emitted. It is assumed that all organic that are not condensed, or emitted as fugitives will be released from the PSA. It is, however, a source of greenhouse gas emissions and reportable to WA Department of Ecology.

Pollutant	Emission Factors lb/hr	Emissions lb/yr	Emissions tpy	Source
VOC (as propane)	0.0496	434.5	0.22	Divert TO-15 [(a)]
CO_2	2,120	18,571,200.0	9,285.60	Divert [(b)]
CO_2e	3,094	18,876,048.0	9,438.02	Divert
Methane [74-82-8]	34.8	304,848.0	152.42	Divert

(a) The original estimation of total VOC is based on the sum of all detected VOC compounds adjusted to an "as propane" basis. This value was determined to be 9.32 ppmv as propane.
(b) The CO_2 emission factor assumes a total flow of 775 scfm, of which 40% of the volume is CO_2. The CH_4 emission factor assumes 310 acfm out the vent at 4.5% of the volume and a GWP of 25.

6.e. Permeate and Centrate Processing. Material from the AnMBR tanks (e.g., sludge and semisolids) is expected to have a high degree of biological and chemical oxygen demand available prior to being sent to the centrifuge. The liquid and semisolid streams from the centrifuge are expected to have similar energy characteristics. If exposed to air, there is a possibility for odors to occur, which will be minimized by the Oder Management Plan. However, once in aqueous solution, it is expected that the potential for VOC, H_2S, and other odor emissions to decrease, unless there is a liquid leak.

Air Stripper. The ByoFlex air stripper system is equipped with a breather/purge vent with a flow of 206 scfm that could contain up to 30 ppmv NH_3. The following lists the emission factors and expected emissions:

Pollutant	Emission Factor lb/hr [(a)]	Emissions tpy [(b)]	Source
Ammonia [7664-41-7]	0.0165	0.072	Mfr Estimation

(a) Assumes a flow rate of 206 scfm (from manufacturer, April 2, 2023).
(b) Assumes 8,760 hr/yr operation.

Permeate Tank (T810-01). The permeate tank may have significant quantities of NH_3, up to 1,350 ppmv, which could be emitted through the gooseneck opening due to working and standing losses. Using the permeate tank parameters and assuming an annual throughput of 35,000,000 gal/yr, the following lists the emission factors and expected emissions:

Pollutant	Emission Factor lb/hr [(a)]	Emissions tpy [(b)]	Source
Ammonia [7664-41-7]	0.21	0.920	AP-42 § 7.1
[(a)] Assumes 8,760 hr/yr operation.			

Centrate Tank (T720-01). Likewise, the centrate tank could contain up to 1,350 ppmv NH_3, which could also be emitted through the gooseneck opening. Using the centrate tank parameters and assuming an annual throughput of 19,600,000 gal/yr, the following lists the emission factors and expected emissions:

Pollutant	Emission Factor lb/hr [(a)]	Emissions tpy [(b)]	Source
Ammonia [7664-41-7]	0.12	0.526	AP-42 § 7.1
[(a)] Assumes 8,760 hr/yr operation.			

MBBRs. The MBBRs are designed to treat up to 150 mg/L ammonia to a level of 44 mg/L ammonia to meet sewer discharge requirements. The ammonia is treated in the aqueous phase and is not expected to be emitted to ambient air, however being open top tanks, there is the possibility of ammonia volatilization. Divert estimated the maximum ammonia emission rate from the MBBRs using EPA's "Air Emissions Inventory Improvement Program (EIIP)", Volume 2, Chapter 16, equation 3-24. In addition, due to the MBBRs having an operating pH below 8, the chemistry of ammonia at that level favors ammonium ion, not NH_3. Approximately 5.4% of the ammonia species is NH_3, which is applied to the evaporation rate calculated using EIIP. The following lists the emission factors and expected emissions:

Pollutant	Emission Factor lb/hr	Emissions tpy [(b)]	Source
Ammonia [7664-41-7]	0.155	0.679	EIIP v2, ch16, eq 3-24

6.f. Boiler. The boiler is approved to burn natural gas only. The following lists the emission factors and expected emissions:

Pollutant	Emission Factors lb/MMcf	Emission Factors lb/hr [(a)]	Emissions tpy	Source
NO_X	24.77	0.0486	0.213	SWCAA BACT (20 ppm) [(b)]
CO	37.70	0.0739	0.324	SWCAA BACT (50 ppm) [(b)]
VOC, as methane	1.50	0.00294	0.0013	Mfr Guarantee [(b)]
SO_2	0.60	0.0012	0.0060	AP-42 § 1.4 (7/1998)
PM	4.90	0.0096	0.042	Assumed equal to PM_{10}
PM_{10}	4.90	0.0096	0.042	Mfr Guarantee
$PM_{2.5}$	4.90	0.0096	0.042	Assumed equal to PM_{10}

Pollutant	Emission Factors lb/MMcf	lb/hr [(a)]	Emissions tpy	Source
CO_2e	119,400	234	1,026	40 CFR 98 [(c)]
Benzene [71-43-2]	0.0021	4.1×10^{-6}	1.8×10^{-5}	AP-42 § 1.4 (7/1998)
Formaldehyde [50-00-0]	0.075	1.5×10^{-4}	6.4×10^{-4}	AP-42 § 1.4 (7/1998)

(a) The calculation assumes maximum fuel rate is 2.0 MMBtu/hr.
(b) From Lochinvar: NO_X, 0.0189 lb/MMBtu; CO, 0.0285 lb/MMBtu; VOC, 0.0015 lb/MMBtu; and PM_{10}, 0.0048 lb/MMBtu. For NO_X and CO, SWCAA established a slightly higher rate based on BACT at 20 ppm NO_X and 50 ppm CO.
(c) The CO_2e emission factor is derived from 40 CFR 98 Subpart C (11/29/2013) for natural gas combustion with base factors of 117.0 lb/MMBtu CO_2, 0.0022 lb/MMBtu CH_4, and 0.0002 lb/MMBtu N_2O, including by the GWP multipliers of CO_2=1, CH_4=25, and N_2O=298.

Emissions must be determined by the fuel usage or total number of hours of operation multiplied by the emission factors above unless new emission factors are developed through source testing. Alternate emission calculation methodologies may be accepted or specified by SWCAA.

6.g. Flare. The flare is used 1) for destruction of off-specification biogas, 2) for destruction of off-specification RNG or when RNG is unable to be delivered to the natural gas pipeline, and 3) in the event of an emergency. It is expected to operate no more than 10% of the time in a typical year. In the first two cases, the energy content of the biogas and RNG will be dictated by the CH_4 content. For biogas, the energy content is approximately 600 Btu/scf and for RNG, it is approximately 1,000 Btu/scf, though in both cases; energy content will vary. The flare is capable of processing biogas, though in some cases where Btu content or flow rate is low, enrichment natural gas may be added to the biogas. Such operation is included in the 876 hr/yr operation assumption and, other than SO_2, which may be overestimated, emissions should be accounted for as listed in the table below. Depending on the concentration of H_2S in the gas being sent to the flare, the SO_2 emissions are expected to vary considerably to an upper maximum of 100 ppm H_2S in untreated biogas. Should the H_2S concentration exceed this assumption, the SO_2 emissions will be much higher. Pilot gas rate is assumed to be 50 scf/hr and total airflow to the flare is 775 scfm. In the second case, mostly processed RNG with CH_4 content up to 98% could be sent to the flare if it is off specification; the energy content would be closer to that of natural gas, so the flow would decrease to 515 scfm. The expectation is that at this stage the majority of the H_2S would have been removed. The application states that the VOC destruction efficiency is at least 98%. The following lists the emission factors and expected emissions:

Flare − Standby Mode
In standby mode, only natural gas in the pilot light is burned in the flare. The pilot gas rate is 50 scf/hr with an assumed heat content of 1,020 Btu/scf and is assumed to burn, worst-case, for 8,760 hr/yr. This is equivalent to 0.438 MMscf/yr. The following lists the emission factors and expected emissions:

Pollutant	Emission Factors [a] lb/MMBtu	lb/hr	Emissions tpy [b]	Source
NO_X	0.025	0.00128	0.0056	Mfr Guarantee
CO	0.060	0.00306	0.0134	Mfr Guarantee
VOC, as methane	0.025	0.00128	0.0056	SWCAA BACT
SO_2	5.9×10^{-4}	3.01×10^{-5}	1.3×10^{-4}	AP-42 § 1.4 (7/1998)
PM	0.015	7.65×10^{-4}	0.0034	Mfr Guarantee
PM_{10}	0.015	7.65×10^{-4}	0.0034	Assumed equal to PM
$PM_{2.5}$	0.015	7.65×10^{-4}	0.0034	Assumed equal to PM
CO_2e	117.1	5.97	26.16	40 CFR 98 [c]
Benzene [71-43-2]	2.1×10^{-6}	1.05×10^{-7}	4.7×10^{-7}	AP-42 § 1.4 (7/1998)
Formaldehyde [50-00-0]	7.4×10^{-5}	3.75×10^{-6}	1.7×10^{-5}	AP-42 § 1.4 (7/1998)

(a) Assumes maximum natural gas flow of 50 scf/hr and an energy content of 1020 Btu/scf.
(c) Total emissions only include the assumed operation of the pilot light for 8,760 hr/yr and does not include the burning of any enrichment natural gas.
(b) The CO_2e emission factor is derived from 40 CFR 98 Subpart C (11/29/2013) for natural gas combustion with base factors of 117.0 lb/MMBtu CO_2, 2.2×10^{-3} lb/MMBtu CH_4, and 2.0×10^{-4} lb/MMBtu N_2O, including by the greenhouse warming potential (GWP) multipliers of CO_2=1, CH_4=25, and N_2O=298.

Emissions must be determined by the fuel usage or total number of hours of operation multiplied by the emission factors above unless new emission factors are developed through source testing. H_2S monitoring may be used to determine SO_2 emissions on a short and long-term basis when in destruct mode as approved by SWCAA. Alternate emission calculation methodologies may be accepted or specified by SWCAA.

Flare − Biogas Destruct Mode. In this mode biogas with an energy content up to 665 Btu/scf (higher heating value given 600 Btu/scf lower heating value) along with pilot gas of 50 scf/hr with a heat content of 1,020 Btu/scf can be burned in the flare. During biogas destruct mode, the flare will not exceed the maximum heat release of 27.9 MMBtu/hr. The following lists the emission factors and expected emissions:

Pollutant	Emission Factors [a] lb/MMBtu	lb/hr	Emissions tpy [b]	Source
NO_X	0.025	0.698	0.306	Mfr Guarantee
CO	0.060	1.670	0.734	Mfr Guarantee
VOC, as methane	0.025	0.698	0.306	SWCAA BACT
SO_2	4.7×10^{-4}	0.118	0.052	Mass Balance [b]
PM	0.015	0.419	0.183	Mfr Guarantee
PM_{10}	0.015	0.419	0.183	Assumed equal to PM
$PM_{2.5}$	0.015	0.419	0.183	Assumed equal to PM
CO_2e	86.62	2,417.	1,059.	40 CFR 98 [c]

Pollutant	Emission Factors [(a)] lb/MMBtu	lb/hr	Emissions tpy [(b)]	Source
Benzene [71-43-2]	2.1×10^{-6}	5.86×10^{-5}	2.6×10^{-5}	AP-42 § 1.4 (7/1998)
Formaldehyde [50-00-0]	7.4×10^{-5}	2.06×10^{-3}	9.0×10^{-3}	AP-42 § 1.4 (7/1998)
Hydrogen sulfide [7783-06-4]	2.7×10^{-4}	7.42×10^{-3}	3.3×10^{-3}	Assumed 2% uncombusted [(e)]

(a) Based on a heat release rate of 27.9 MMBtu/hr and a biogas higher heating value of 665 Btu/scf (scaled lower heating value of 600 Btu/scf based on CH_4), a flare gas flow is calculated to be 699.3 scfm.
(b) Assumes a maximum normal operation of 876 hr/yr. This does not include emergency operation or additional hours approved by SWCAA on a case-by-case basis.
(c) The SO_2 emission factor is stoichiometrically derived as equivalent to 100 ppm H_2S in the inlet biogas (11.9 ppmv SO_2) plus the quantity present in the natural gas from the pilot (5.96 ppm S), for a total of 17.9 ppm SO_2, measured at 7% O_2, at the outlet.
(d) The CO_2e emission factor is derived from 40 CFR 98 Subpart C (11/29/2013) for natural gas combustion adjusted for the energy content of the stream, 117.1 lb/MMBtu × (600 Btu/scf / 1028 Btu/scf) = 68.35 lb/MMBtu, plus the amount of CO_2 passed through the system, which is stoichiometrically calculated to be 10.3%.
(e) Based on the application, the assumption is that the flare will be able to control 98% of the H_2S. This is likely an overestimation as at the flare conditions, SWCAA would expect all the H_2S to be converted to SO_2.

Emissions must be determined by the fuel usage or total number of hours of operation multiplied by the emission factors above unless new emission factors are developed through source testing. H_2S monitoring may be used to determine SO_2 emissions on a short and long-term basis when in destruct mode as approved by SWCAA. Alternate emission calculation methodologies may be accepted or specified by SWCAA.

Flare − RNG Destruct Mode. In this mode RNG with an energy content up to 1000 Btu/scf along with pilot gas of 50 scf/hr with a heat content of 1,020 Btu/scf can be burned in the flare. During RNG destruct mode, the flare will not exceed the maximum heat release of 27.9 MMBtu/hr. The following lists the emission factors and expected emissions:

Pollutant	Emission Factors [(a)] lb/MMBtu	lb/hr	Emissions tpy [(b)]	Source
NO_X	0.025	0.698	0.307	Mfr Guarantee
CO	0.060	1.67	0.736	Mfr Guarantee
VOC, as methane	0.025	0.698	0.307	SWCAA BACT
SO_2	1.1×10^{-3}	0.031	1.4×10^{-4}	Mass Balance [(b)]
PM	0.015	0.419	0.184	Mfr Guarantee
PM_{10}	0.015	0.419	0.184	Assumed equal to PM
$PM_{2.5}$	0.015	0.419	0.184	Assumed equal to PM
CO_2e	123.1	3,434.	1,504.	40 CFR 98 [(c)]

Pollutant	Emission Factors [(a)] lb/MMBtu	lb/hr	Emissions tpy [(b)]	Source
Benzene [71-43-2]	2.1×10^{-6}	5.86×10^{-5}	2.6×10^{-5}	AP-42 § 1.4 (7/1998)
Formaldehyde [50-00-0]	7.4×10^{-5}	2.06×10^{-3}	9.0×10^{-4}	AP-42 § 1.4 (7/1998)

(a) Based on a heat release rate of 27.9 MMBtu/hr and an RNG higher heating value of 1000 Btu/scf, a flare gas flow is calculated to be 465.0 scfm.
(b) Assumes a maximum normal operation of 876 hr/yr. This does not include emergency operation or additional hours approved by SWCAA on a case-by-case basis.
(c) The SO_2 emission factor is stoichiometrically derived as equivalent to 4 ppm H_2S in the inlet biogas (1.11 ppmv SO_2) plus the quantity present in the natural gas from the pilot (5.96 ppm S), for a total of 7.07 ppm SO_2, measured at 7% O_2, at the outlet.
(d) The CO_2e emission factor is derived from 40 CFR 98 Subpart C (11/29/2013) for natural gas combustion adjusted for the energy content of the stream, 117.1 lb/MMBtu × (901 Btu/scf / 1028 Btu/scf) = 102.6 lb/MMBtu, plus the amount of CO_2 passed through the system, which is stoichiometrically calculated to be 7.26%.

Emissions must be determined by the fuel usage or total number of hours of operation multiplied by the emission factors above unless new emission factors are developed through source testing. H_2S monitoring may be used to determine SO_2 emissions on a short and long-term basis when in destruct mode as approved by SWCAA. Alternate emission calculation methodologies may be accepted or specified by SWCAA.

6.h. Emissions Summary

Air Pollutant	Potential to Emit (tpy)	Project Impact (tpy)
NO_X	0.52	+0.52
CO	1.06	+1.06
VOC	0.54	+0.54
SO_2	0.06	+0.06
Lead [7439-92-1]	Not Applicable	Not Applicable
PM	0.23	+0.23
PM_{10}	0.23	+0.23
$PM_{2.5}$	0.23	+0.23
CO_2e, total	15,859	+15,859
Combustion and leaks	2,530	+2,530
Process (PSA)	13,329	+13,329
Ammonia [7664-47-7]	2.20	+2.20
Hydrogen sulfide [7783-06-4]	0.0033	+0.0033
Ozone (O_3) [10028-15-6]	Not Applicable	Not Applicable

Toxic/Hazardous Air Pollutant	Potential to Emit (lb/yr)	Project Impact (lb/yr)
Acetone [67-64-1]	0.025	+0.025
Ammonia [7664-47-7]	4,393.1	+4,393.1
Benzene [71-43-2]	0.092	+0.092
Ethylbenzene [100-41-4]	0.019	+0.019
Formaldehyde [50-00-0]	39.1	+39.1
Heptane [142-82-5]	0.0070	+0.0070
Hydrogen sulfide [7783-06-4]	6.5	+6.5
Methanol [67-56-1]	2.3	+2.3
Propene [115-04-1]	0.020	+0.020

7. REGULATIONS AND EMISSION STANDARDS

Regulations have been established for the control of emissions of air pollutants to the ambient air. Regulations applicable to the proposed facility that have been used to evaluate the acceptability of the proposed facility and establish emission limits and control requirements include, but are not limited to, the following regulations, codes, or requirements. These items establish maximum emissions limits that could be allowed and are not to be exceeded for new or existing facilities. More stringent limits are established in this Permit consistent with implementation of Best Available Control Technology (BACT):

7.a. 40 CFR 60 [§ 60.1 et seq] "Standards of Performance for New Stationary Sources" applies to specific source categories. requires that notification must be submitted to SWCAA, the delegated authority, for date construction commenced, anticipated initial startup, and initial startup. Based on the information supplied in the application, there are no New Source Performance Standards that apply to any unit at Divert; therefore, this regulation does not apply.

7.b. 40 CFR 60 Subpart Dc "Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units" applies to any steam generating unit with a heat input greater than or equal to 10 MMBtu/hr, but less than or equal to 100 MMBtu/hr constructed, modified, or reconstructed after June 9, 1989. The Lochinvar boiler is less than 10 MMBtu/hr; therefore, this regulation does not apply to the facility.

7.c. 40 CFR 60 Subpart VVa "Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006" applies to affected facilities within the synthetic organic chemicals manufacturing industry. Divert is manufacturing renewable natural gas biologically, not synthetically (definition §§ 60.481) and CH_4 is not listed as an affected facility chemical under §§ 60.489; therefore, this regulation does not apply to the facility.

7.d. 40 CFR 60 Subpart OOOOa [§ 60.5360a et seq] "Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced After September 18, 2015" establishes emission standards and compliance schedules for the control of VOC and SO_2 emissions from affected facilities in the crude oil and natural gas production source category. Although Divert could be considered an affected facility because it generates CH_4, it does not include a well and does not fall within the definition of the "crude oil and natural gas production" source category; therefore, this regulation does not apply to the facility.

7.e. 40 CFR 61 [§ 61.1 et seq] "National Emission Standards for Hazardous Air Pollutants" applies to facilities that emit or manufacture specific chemicals or specific facilities directly. Based on the information supplied in the application, Divert does not manufacture any chemical with an applicable NESHAP, nor any of the listed facilities; therefore, this regulation does not apply to the facility.

7.f. 40 CFR 63.9 "Notification Requirements" requires that the delegated authority be notified when any unit subject to 40 CFR 63 begins initial startup. Based on the information supplied in the application, Divert is not subject to any NESHAP or to any Maximum Emission Control Technology (MACT); therefore, this regulation does not apply.

7.g. 40 CFR 63 Subpart HH [§ 63.760 et sq] "National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities" applies to the owners and operators of triethylene glycol (TEG) dehydration unit that are located at oil and natural gas production facilities. Although an area source, Divert does not operate any TEG dehydration units; therefore, this regulation does not apply to the facility.

7.h. 40 CFR 63 Subpart HHH [§ 63.1270 et seq] "National Emission Standards for Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities" applies to owners and operators of natural gas transmission and storage facilities that transport or store natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company), and that are major sources of hazardous air pollutants (HAP) emissions. Divert is an area source of HAP emissions; therefore, this regulation does not apply to the facility.

7.i. 40 CFR 63 Subpart FFFF [§ 63.2430 et seq] "National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing" establishes standards for hazardous air pollutants (NESHAP) for miscellaneous organic chemical manufacturing at major sources of HAP emissions. Divert is an area source of HAP emissions; therefore, this regulation does not apply to the facility.

7.j. 40 CFR 63 Subpart JJJJJJ [§ 63.11193 et seq] "National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources" establishes national emission limitations and operating limitations for HAP emitted from boilers fired on specific fuels at area sources. Divert is an area source of HAP and the boiler is classified as a gas boiler. Gas-fired boilers, which burn gaseous fuel and only burn liquid fuel during periods of gas curtailment, gas supply interruption, and periodic testing up to 48 hr/yr, are not covered under the regulation; therefore, this regulation does not apply to the boiler.

7.k. 40 CFR 63 Subpart VVVVVV [§ 63.11494 et seq] "National Emission Standards for Hazardous Air Pollutants for Chemical Manufacturing Area Sources" applies to area and major sources of HAP emissions that own or operate a specific type of chemical manufacturing process unit (CMPU). Although an area source, Divert does not use as a feedstock any material listed in the applicability section [§ 63.11494(q)], nor any HAP above 0.1% w/w, therefore; this regulation does not apply to the facility.

7.l. 40 CFR 68 [§ 68.1 et seq] "Chemical Accident Prevention Provisions" requires affected stationary sources to compile and submit a risk management plan, as provided in Sections 68.150 to 68.185. Applicability is determined by the type and quantity of material stored at the facility. Because the facility handles CH_4 and H_2SO_4 above the listed thresholds, this regulation is applicable to the facility:

- CH_4 is a regulated flammable substance listed in § 68.130 Table 3 with a regulated quantity of 10,000 lb; and
- H_2SO_4 is a regulated toxic substance listed in § 68.130 Table 1 with a regulated quantity of 10,000 lb; the H_2SO_4 tank is a 10,000-gal, which is equivalent to approximately 15,300 lb.

7.m. 40 CFR 70 "State Operating Permit Programs" requires facilities with site emissions of any regulated air pollutant greater than 100 tpy, any single hazardous air pollutant greater than 10 tpy, any aggregate combination of hazardous air pollutants greater than 25 tpy, or more than 100,000 tpy of CO_2-e to obtain a Title V permit. Divert does not emit any criteria pollutants or HAP above major thresholds; therefore, this regulation does not apply to the facility.

7.n. Revised Code of Washington (RCW) 70A.15.2040 empowers any activated air pollution control authority to prepare and develop a comprehensive plan or plans for the prevention, abatement and control of air pollution within its jurisdiction. An air pollution control authority may issue such orders as may be necessary to effectuate the purposes of the Washington Clean Air Act (RCW 70A.15) and enforce the same by all appropriate administrative and judicial proceedings subject to the rights of appeal as provided in Chapter 62, Laws of 1970 ex. sess. This law applies to Divert.

7.o. RCW 70A.15.2210 provides for the inclusion of conditions of operation as are reasonably necessary to assure the maintenance of compliance with the applicable ordinances, resolutions, rules and regulations when issuing an ADP for installation and establishment of an air contaminant source. This law applies to Divert.

7.p. WAC 173-401 "Operating Permit Regulation" requires all major sources and other sources as defined in WAC 173-401-300 to obtain an operating permit. This regulation is not applicable because this source is not a potential major source and does not meet the applicability criteria set forth in WAC 173-401-300. Divert does not emit any criteria pollutants or HAP above major thresholds; therefore, this regulation does not apply.

7.q. Washington Administrative Code (WAC) 173-401-300(7) "Federally Enforceable Limits" provides that any source with the potential to emit exceeding the tonnage thresholds defined in WAC 173-401-200(18) can be exempted from the requirement to obtain an Operating Permit when federally enforceable conditions are established which limit that source's potential to emit to levels below the relevant tonnage thresholds. Divert's PTE for criteria pollutants or HAP does not exceed major thresholds; therefore, this regulation does not apply to the facility.

7.r. WAC 173-441 "Reporting of Emissions of Greenhouse Gases" establishes mandatory greenhouse gas (GHG) reporting requirements for owners and operators of certain facilities that directly emit GHG as well as for certain suppliers and electric power entities. Divert is expected to emit more than 10,000 t CO_2e/year (11,000 t CO_2e/yr); therefore, Divert is subject to this regulation. Note that WA Department of Ecology, not SWCAA, is the implementing agency for this regulation.

7.s. WAC 173-460 "Controls for New Sources of Toxic Air Pollutants" requires BACT for toxic air pollutants (T-BACT), identification and quantification of emissions of toxic air pollutants and demonstration of protection of human health and safety. Divert emits TAPs; therefore, this regulation applies to the facility.

7.t. WAC 173-476 "Ambient Air Quality Standards" establishes ambient air quality standards for PM_{10}, $PM_{2.5}$, lead, SO_2, NO_X, O_3, and CO in the ambient air, which must not be exceeded. The facility emits PM_{10}, $PM_{2.5}$, SO_x, NO_X, and CO; therefore, certain sections of this regulation apply. Divert does not emit lead; therefore, the lead regulation section does not apply.

7.u. SWCAA 400-040 "General Standards for Maximum Emissions" requires all new and existing sources and emission units to meet certain performance standards with respect to Reasonably Available Control Technology (RACT), visible emissions, fallout, fugitive emissions, odors, emissions detrimental to persons or property, SO_2, concealment and masking, and fugitive dust. This regulation applies to Divert.

7.v. SWCAA 400-040(1) "Visible Emissions" requires that emissions of an air contaminant from any emissions unit must not exceed twenty percent opacity for more than three minutes in any one hour at the emission point, or within a reasonable distance of the emission point. This regulation applies to Divert.

7.w. SWCAA 400-040(2) "Fallout" requires that emissions of PM from any source must not be deposited beyond the property under direct control of the owner(s) or operator(s) of the source in sufficient quantity to interfere unreasonably with the use and enjoyment of the property upon which the material is deposited. This regulation applies to Divert.

7.x. SWCAA 400-040(3) "Fugitive Emissions" requires that reasonable precautions be taken to prevent the fugitive release of air contaminants to the atmosphere. This regulation applies to Divert.

7.y. SWCAA 400-040(4) "Odors" requires any source which generates odors that may unreasonably interfere with any other property owner's use and enjoyment of their property to use recognized good practice and procedures to reduce these odors to a reasonable minimum. This source must be managed properly to maintain compliance with this regulation. This regulation applies to Divert.

7.z. SWCAA 400-040(6) "Sulfur Dioxide" requires that no person is allowed to emit a gas containing in excess of 1,000 ppmd of SO_2, corrected to 7% O_2 or 12% CO_2 as required by the applicable emission standard for combustion sources, as a 1-hr average. Biogas is estimated to have a maximum of 100 ppm H_2S (equivalent to 100 ppm SO_2), plus 6 ppm SO_2 in natural gas. The facility will emit SO_2; therefore, this regulation applies to Divert.

7.aa. SWCAA 400-040(8) "Fugitive Dust Sources" requires that reasonable precautions be taken to prevent fugitive dust from becoming airborne and minimize emissions. This regulation applies to Divert.

7.bb. SWCAA 400-050 "Emission Standards for Combustion and Incineration Units" requires that all provisions of SWCAA 400-040 be met, and that no person is allowed to cause or permit the emission of PM from any combustion or incineration unit more than 0.23 g/dscm (0.1 gr/dscf) of exhaust gas at standard conditions. Divert operates combustion units, including the boiler and the flare. The flare is an incinerator per SWCAA 400-010(59) during periods when it is not in emergency use. However, the VOC limit imposed by the ADP is more stringent than the carbonyl limit in SWCAA 400-050(3)(a). Divert will operate combustion units; therefore, this regulation applies to the facility.

7.cc. SWCAA 400-060 "Emission Standards for General Process Units" requires that all new and existing general process units do not emit PM more than 0.23 g/dscm (0.1 gr/dscf) of exhaust gas. Divert will operate general process units; therefore, this regulation applies to the facility.

7.dd. SWCAA 400-091 "Voluntary Limits on Emissions" allows sources to request voluntary limits on emissions and potential to emit by submittal of an ADP application as provided in SWCAA 400-109. Upon completing review of the application, SWCAA will issue a Regulatory Order that reduces the source's potential to emit to an amount agreed upon between SWCAA and the Permittee. Divert's PTE for criteria pollutants or HAP does not exceed major thresholds; therefore, this regulation does not apply to the facility.

7.ee. SWCAA 400-109 "Air Discharge Permit Applications" requires that an ADP application be submitted for all new installations, modifications, changes, or alterations to process and emission control equipment consistent with the definition of "new source". Sources wishing to modify existing permit terms may submit an ADP application to request such changes. An ADP must be issued, or written confirmation of exempt status must be received, before beginning any actual construction, or implementing any other modification, change, or alteration of existing equipment, processes, or permits. This regulation applies to Divert.

7.ff. SWCAA 400-110 "New Source Review" requires that SWCAA issue an ADP in response to an ADP application prior to establishment of the new source, emission unit, or modification. The new units meet the definition of a new source; therefore, this regulation applies to Divert.

7.gg. SWCAA 400-113 "Requirements for New Sources in Attainment or Nonclassifiable Areas" requires that no approval to construct or alter an air contaminant source will be granted unless it is evidenced that:
(1) The equipment or technology is designed and will be installed to operate without causing a violation of the applicable emission standards;
(2) BACT will be employed for all air contaminants to be emitted by the proposed equipment;
(3) The proposed equipment will not cause any ambient air quality standard to be exceeded; and
(4) If the proposed equipment or facility will emit any toxic air pollutant regulated under WAC 173-460, the proposed equipment and control measures will meet all the requirements of that Chapter.

Divert is in an area that is in attainment for PM, NO_X, CO, SO_2, and O_3; therefore, this regulation applies to the facility.

7.hh. SWCAA 490 "Emission Standards and Controls for Sources Emitting Volatile Organic Compounds" establishes emission standards and control requirements for sources of VOC located in ozone nonattainment or maintenance plan areas. Divert is not located in an ozone nonattainment or maintenance plan area; therefore, the standards in this section do not apply to the permittee.

8. RACT/BACT/BART/LAER/PSD/CAM DETERMINATIONS

The proposed equipment and control systems incorporate BACT for the types and amounts of air contaminants emitted by the processes as described below:

8.a. BACT Determination – Fugitive Leaks. The use of a leak detection and repair program will reduce the quantity of emissions, including odor, being emitted from equipment leaks from components, pumps, and compressors. The use of an LDAR program has been determined to meet the requirements of BACT for the types and quantities of emissions from fugitive leaks.

8.b. BACT Determination – Boiler. The manufacturer states that the boiler can meet a 16 ppm NO_X and 39 ppm CO standard. However, in SWCAA's experience, small boilers are unable to maintain these standards over the long-term. Therefore, SWCAA established limits at 20 ppm NO_X and 50 ppm CO, which, with the use of low-sulfur fuel (natural gas) and proper combustion controls, meets the requirements of BACT for the types and quantities of emissions from the boiler.

8.c. BACT Determination – Flare. The use of a flare was demonstrated by the applicant as an appropriate control measure for the destruction of off-specification biogas or RNG. A review of the RACT/BACT/LAER clearinghouse and SWCAA permit actions was performed to determine whether the proposed flare meets the definition of BACT for this application.

NO_X and CO

The proposed flare is guaranteed by the manufacturer to meet a minimum of 0.025 lb NO_X/MMBtu, which exceeds the expectation of BACT, and would therefore meet the definition of BACT for this application while burning biogas or RNG. While there are some facilities able to meet a lower CO limit, the proposed limit is within the range of similar facilities and applications. The proposed limit of 0.060 lb CO/MMBtu meets the definition of BACT for this application while burning biogas or RNG.

	NO_X Emission Rate	**CO Emission Rate**
AP42 § 13.5	0.068 lb/MMBtu	0.37 lb/MMBtu
Cowlitz Co Landfill, 14.4 MMBtu/hr, (ADP 92-1462R2)	0.13 lb/MMBtu (1)	0.024 lb/MMBtu (1)
Cowlitz Co Headquarters Landfill, 58.2 MMBtu/hr (ADP 22-3509)	0.060 lb/MMBtu (1)	0.10 lb/MMBtu (1)
Emerald Kalama Chemical, 10.1 MMBtu/hr (ADP 13-3041)	0.059 lb/MMBtu (1)	0.30 lb/MMBtu (1)
Clark Regional Wastewater - Salmon Creek WWTP, 8.8 MMBtu/hr (ADP 20-3379)	0.06 lb/MMBtu	0.30 lb/MMBtu
Monroe County Mill Seat Landfill	0.060 lb/MMBtu	0.0310 lb/MMBtu
Waste Management of New York LLC; High Acres Landfill & Recycling Center	0.060 lb/MMBtu	0.20 lb/MMBtu
Waste Management Service Center; Liberty Landfill, Inc.	0.068 lb/MMBtu	0.20 lb/MMBtu
Waste Management Disposal Services of Oregon, Inc.; Columbia Ridge Landfill and Recycling Center	0.60 lb/MMBtu	0.37 lb/MMBtu
(1) Calculated rate based on short-term limit in lb/hr		

VOC, SO_2, and PM

The proposed flare is guaranteed by the manufacturer to meet 0.025 lb VOC/MMBtu, 0.015 lb PM_{10}/MMBtu, 0.015 lb $PM_{2.5}$/MMBtu, and 0.034 lb SO_2/MMBtu. Based on the review of available data, VOC and PM emissions are in line with similarly sized units and would meet the definition of BACT for this application while burning biogas or RNG. SO_2 emissions are highly variable and based on the concentration of H_2S in the biogas inlet (RNG and natural gas have much lower emission rates by comparison). The limit of 0.052 lb SO_2/MMBtu was established based on worst-case control of H_2S from this facility.

Uncontrolled H_2S would not be acceptable and since the flare is being used to control off-specification biogas (in this instance), it meets the definition of BACT for this application while burning biogas. Since the emissions from RNG and natural gas would be on the order of 10 ppm or less, the flare would also meet the definition of BACT for this application while burning RNG and natural gas.

	VOC Emission Rate	**SO_2 Emission Rate**	**PM Emission Rate**
AP42 § 13.5	0.14 lb/MMBtu (1)	N/A	N/A
Clark Regional Wastewater - Salmon Creek WWTP, 8.8 MMBtu/hr (ADP 20-3379)	N/A	0.50 lb/MMBtu	N/A
Cowlitz Co Headquarters Landfill, 58.2 MMBtu/hr (ADP 22-3509)	0.025 lb/MMBtu (1)	0.076 lb/MMBtu (1)	N/A
Cowlitz Co Landfill, 14.4 MMBtu/hr, (ADP 92-1462R2)	0.010 lb/MMBtu (1)	0.056 lb/MMBtu (1)	0.069 lb/MMBtu (1)
Emerald Kalama Chemical, 10.1 MMBtu/hr (ADP 13-3041)	0.21 lb/MMBtu (1)	3.67 lb/MMBtu (1)	0.030 lb/MMBtu (1)
Green Bay Packaging, Inc; Mill Division, 29.0 MMBtu/hr	0.0050 lb/MMBtu	N/A	N/A
ND Paper, Inc; Biron Division, 29.40 MMBtu/hr	0.0050 lb/MMBtu	N/A	N/A

(1) VOC as CH_4 equivalent
(2) Calculated rate based on short-term limit in lb/hr
(3) Filterable PM

8.d. Prevention of Significant Deterioration (PSD) Applicability Determination. This permitting action will not result in a potential increase in emissions equal to or greater than the PSD thresholds. Therefore, PSD review is not applicable to this action.

8.e. Compliance Assurance Monitoring (CAM) Applicability Determination. CAM is not applicable to any emission unit at this facility because it is not a major source and is not required to obtain a Part 70 (Title V) permit.

9. AMBIENT IMPACT ANALYSIS

9.a. Criteria Air Pollutant Review. Emissions of NO_X, CO, PM, VOC (as a precursor to O_3), and SO_2 are emitted at levels where no adverse ambient air quality impact is anticipated.

9.b. Toxic Air Pollutant Review.
Based on the emission calculations in accordance with Section 6 for the emission units and activities described in ADP application CO-1058, none of the estimated emission rates, with the exceptions discussed below, exceed the Small Quantity Emission Rate (SQER) specified in WAC 173-460 (July 1998), therefore, no adverse ambient air quality impact is anticipated.

Nitrogen Dioxide (NO_2)
The original application stated that facility-wide NO emissions exceeded the SQER of 0.87 lb/hr as a 1-hr average as listed in WAC 173-460 (2019) at 2.40 lb/hr as NO_X, due mostly to the flare (96% of the total), and assuming that all NO_X was emitted as NO_2. However, an application revision included the use of the ZULE flare, which reduced the emission rate to 0.70 lb/hr. Divert modeled emissions for evaluation against the acceptable source impact level, assuming all the NO_X was emitted as NO_2, using EPA's AERSCREEN version 21112 model. However, due to BACT considerations, SWCAA reduced the emission rate to 1.57 lb/hr, so the model would represent a level higher than that implemented as BACT. The model showed an estimated concentration of 65 µg/m³ as a 1-hour average, which is below the ASIL of 470 µg/m³, therefore, no adverse ambient air quality impacts are anticipated for this pollutant.

Nitrogen Oxide (NO)
The application stated that NO emissions exceeded the SQER of 2.0 lb/hr as a 24-hr average as listed in WAC 173-460 (1998), due mostly to the flare (96% of the total), and assuming all NO_X was emitted as NO. However, an application revision included the use of the ZULE flare, which reduced the emission rate to 0.74 lb/hr, which would be below the SQER, therefore, no adverse ambient air quality impacts are anticipated for this pollutant.

Hydrogen Sulfide
The application stated that H_2S emissions exceed the SQER of 0.15 lb/hr as a 24-hr average listed in WAC 173-460 (2019), assuming a total 0.0128 lb/hr emission rate for 24-hr. Emissions are primarily from the flare (64%) and fugitives. At the temperatures and residence time specified for the flare, H_2S should be completely combusted to SO_2, however, the facility estimated a worst-case of 2% slip, which is equivalent to 8.48×10^{-3} lb/hr. In addition, the assumption is 1% of the total volume of biogas is leaking from the facility as fugitive emissions, including H_2S, which is also conservative. Divert modeled H_2S emissions for evaluation against the acceptable source impact level using these assumptions using EPA's AERSCREEN version 21112 model. The model showed an estimated concentration of 1.37 µg/m³ as a 24-hour average, which is below the ASIL of 2.0 µg/m³, therefore, no adverse ambient air quality impacts are anticipated for this pollutant.

Conclusions

9.c. The construction and operation of a renewable natural gas facility, as proposed in ADP Application CO-1058, will not cause the ambient air quality requirements of 40 CFR 50 "National Primary and Secondary Ambient Air Quality Standards" to be violated.

9.d. The construction and operation of a renewable natural gas facility, as proposed in ADP Application CO-1058, will not cause the requirements of WAC 173-460 "Controls for New Sources of Toxic Air Pollutants" or WAC 173-476 "Ambient Air Quality Standards" to be violated.

9.e. The construction and operation of a renewable natural gas facility, as proposed in ADP Application CO-1058, will not violate emission standards for sources as established under SWCAA General Regulations Sections 400-040 "General Standards for Maximum

Emissions," 400-050 "Emission Standards for Combustion and Incineration Units," and 400-060 "Emission Standards for General Process Units."

10. DISCUSSION OF APPROVAL CONDITIONS

SWCAA has decided to issue ADP 23-3604 in response to ADP Application CO-1058. ADP 23-3604 contains approval requirements deemed necessary to assure compliance with applicable regulations and emission standards as discussed below.

10.a. Supersession of Previous Permits. This is the initial permitting action for the facility.

10.b. Emission Limits. Emission limits are based on calculations and assumptions for approved equipment calculated in Section 6 of this TSD.

The Lochinvar Boiler and the ZULE Flare burn natural gas and biogas/RNG, respectively, both of which would be considered clean fuels and are not expected to produce any visible emissions when being operated properly, so a 0% opacity standard was set for both units.

10.c. Operational Limits and Requirements. Because of the probability of odor at this facility, SWCAA requires the implementation of an odor response plan. This plan is intended to provide a framework of response for the facility to follow should a complaint occur, as well as a plan of action to resolve the complaints. SWCAA's expectation is that the plan should minimize the occurrence of odor impacts on neighboring properties.

Various gas flow meters are required, mostly for emission inventory purposes.

The ZULE Flare is expected to maintain a minimum temperature of 1,600 °F (871 °C), which is consistent with BACT, and is expected to have a high destruction efficiency for both H_2S and VOCs. Due to the possibility of a breakdown of the ZULE Flare, SWCAA required that enough replacement parts be maintained on site to minimize the amount of downtime, should it occur.

10.d. Monitoring and Recordkeeping Requirements. ADP 23-3604 establishes monitoring and recordkeeping requirements sufficient to document compliance with applicable emission limits, ensure proper operation of approved equipment and provide for compliance with generally applicable requirements.

A monthly walkthrough to observe operating stacks for opacity is required. More frequent monitoring is recommended whenever there are changes at the facility that may cause opacity. It is also an opportunity to note any issues, such as odor problems, leaks, or maintenance issues that may otherwise be overlooked.

Various data elements are required for the operation of the Anaerobic Digestion system and the ZULE Flare. Such data may be used for emission inventory purposes or demonstration of compliance terms.

10.e. Reporting Requirements. ADP 23-3604 establishes general reporting requirements for annual air emissions, upset conditions and excess emissions.

11. START-UP AND SHUTDOWN/ALTERNATIVE OPERATING SCENARIOS/POLLUTION PREVENTION

11.a. Start-up and Shutdown Provisions. Pursuant to SWCAA 400-081 "Start-up and Shutdown", technology-based emission standards and control technology determinations must take into consideration the physical and operational ability of a source to comply with the applicable standards during start-up or shutdown. Where it is determined that a source is not capable of achieving continuous compliance with an emission standard during start-up or shutdown, SWCAA will include appropriate emission limitations, operating parameters, or other criteria to regulate performance of the source during start-up or shutdown.

To SWCAA's knowledge, this facility can comply with all applicable standards during startup and shutdown.

Startup is defined as the first ten (10) minutes that natural gas, biogas, or RNG is delivered to the flare but before flame temperature or residence time can be achieved. Shutdown occurs when natural gas, biogas, or RNG is no longer being fed to the flare.

11.b. Alternate Operating Scenarios. SWCAA conducted a review of alternate operating scenarios applicable to equipment affected by this permitting action.

"Emergency operation" would typically mean any situation arising from sudden and reasonably unforeseeable events beyond the control of the source, including acts of God, which requires immediate corrective action to restore normal operation, and that causes the source to exceed a technology-based emission limitation under the ADP, due to unavoidable increases in emissions attributable to the emergency and including events specifically beyond the control of the facility, such as pipeline maintenance (off-specification gas is generally thought to be under the control of the facility). An emergency would not include noncompliance to the extent caused by improperly designed equipment, lack of preventative maintenance, careless or improper operation, or operator error and would not include normal standby, normal flaring, or SWCAA-approved operation. Emergency operation is not restricted by the ADP.

"Normal standby operation" is defined as any time the flare is only burning natural gas from the pilot and no biogas or RNG is being flared.

"Normal flaring operation" is defined as a maximum of 876 hr/yr usage of the flare for any reason, including: maintenance, testing, minor restarts or shutdowns of equipment, disposal of off-specification biogas or RNG, and any other situation where flaring is desired or necessary and can be done within the 876 hr/yr limitation. There are two subcategories under this operation, biogas and RNG. In the former, lower-energy (~600 Btu/scf) biogas that contains H_2S is burned, in the latter, higher energy (~1000 Btu/scf) RNG that does not contain appreciable amounts of H_2S is burned. Emission characteristics of these two sub-categories are different.

Divert has identified the flowing scenarios where RNG may need to be sent to the flare under non-emergency circumstances. In these descriptions, "RNG" refers to any gas processed beyond biogas up to pipeline qualifying RNG:

1. During initial PSA startup, and after events where the utility "blocks Divert in", the gas must flow through the utility interconnect's analyzers and back to our flare to prove to the utility that it is on-specification. When blocked in, Divert cannot provide RNG to the pipeline and cannot control the duration of this flaring as it's in the utility's control.
2. During PSA startup, the biogas that is first processed by the PSA is flared until the system reaches normal operating pressure and the onstream analyzers verify that RNG is on-specification, at which point the RNG is directed to the utility interconnect. This is expected to occur for less than an hour per startup and likely much less time.
3. If over the course of normal operation, RNG goes off-specification per the PSA's on-stream analyzers, the RNG is automatically directed to the flare. Active feedback control of the PSA generally prevents the RNG from going off-specification, and if it somehow still does go off-specification, the feedback control works to bring it back on-specification. If this happens, a timer is initiated and if the RNG is not back on-specification by the time the timer runs out, the system is shut down, flaring RNG is stopped, and flaring biogas starts instead. This is expected to be rare and Divert can set the timer on virtually any time frame.
4. If over the course of normal operation, the utility interconnect detects the gas is off-specification, or must block Divert in for an emergency, the valve to the pipeline closes and the valve back to the flare opens. This is expected to be exceedingly rare as off-specification gas would generally be flared before it gets to the utility interconnect. Divert can shut down the entire PSA system and transition to flaring biogas in virtually any amount of time.

"SWCAA-approved operation" would include: any situation not covered under emergency or normal operation. A notification and written request to SWCAA provision has been provided in the ADP and SWCAA must be contacted prior to flaring. The expectation is that such requests would be infrequent. Such operation could include major startup and shutdown events (including initial plant operation and restarts after an extended shutdown), disposal of off-specification biogas if no other alternative for disposal is available on a limited basis, or any other circumstance that is not an emergency or normal operation that may cause the facility to go over the 876 hr/yr operating time. In the situation where multiple similar requests are made and an operational or physical change to the facility could minimize flaring on a more permanent or long-term basis, SWCAA may require an ADP application be submitted to modify the ADP.

11.c. Pollution Prevention Measures. SWCAA conducted a review of possible pollution prevention measures for the facility. No pollution prevention measures were identified by either the Permittee or SWCAA separately or in addition to those measures required under BACT considerations. Therefore, none were included in the approval conditions.

12. EMISSION MONITORING AND TESTING

12.a. Emission Testing Requirements – ZULE Flare. The flare is required to be tested for a variety of pollutants initially, within sixty (60) days of reaching maximum production, but no later than one hundred eighty (180) calendar days after initial construction. The testing month will vary depending on the initial operation date. Maximum production is defined as a minimum of 24-hours of RNG production delivered to the pipeline.

After this initial test, a subsequent test is required for flow, moisture, NO_X, CO, Non-Methane Non-Ethane Volatile Organic Compounds (NMNEVOC), SO_2, H_2S, visible emissions, and energy content every five (5) years thereafter. Emission testing conducted more than three (3) months prior to the due date does not fulfill the affected testing requirement unless approved in advance by SWCAA. This allows some operational flexibility to perform the test within the three-month window. The testing month listed in the ADP does not change if the test is performed early, or late (if approved by SWCAA), to provide a consistent testing expectation. Operation of the flare for testing purposes is included in the normal operation of the facility.

12.b. Emission Monitoring Requirements – Boiler. The boiler is required to be emission monitored annually to verify compliance with the emission limits specified in the ADP. Corrective action is required to be taken if the boiler is found to not be meeting the emission limit.

12.c. Emission Monitoring Requirements – General. SWCAA has established several operational parameters, such as pressure, flow, and gas composition for various steps in the RNG production process to provide information, mostly related to emissions, about how the process is functioning.

13. FACILITY HISTORY

13.a. General History. The facility has not been permitted in the past.

13.b. Previous Permitting Actions. There are no previously issued ADPs for this facility.

13.c. Compliance History. This is a new facility with no compliance history.

14. PUBLIC INVOLVEMENT OPPORTUNITY

14.a. Public Notice for ADP Application CO-1058. Public notice for ADP application CO-1058 was published on the SWCAA website for a minimum of fifteen (15) days beginning on September 15, 2023.

14.b. Public/Applicant Comment for ADP Application CO-1058. SWCAA received a request from the public for a comment period on the draft permit, therefore, a thirty (30) day public comment period will be provided for this permitting action pursuant to SWCAA 400-171(3). This section will be completed concurrent with the final permitting action.

14.c. State Environmental Policy Act. The City of Longview was the lead agency for SEPA and issued a Determination of Non-Significance for the project on September 22, 2022.