



YAKIMA REGIONAL CLEAN AIR AGENCY

Order of Approval Permit No NSRP-26-ARNGLLC-19

New Source Review Order of Approval for Augean RNG LLC for Upgrading/Converting Biogas from GDR Power to a Renewable Natural Gas (RNG) Using Two Stages of Hydrogen Sulfide Removal (primary and secondary units), Bio-Gas Cleaning Unit (GCU) and Enclosed Emergency Flare

IN THE MATTER OF approving a project which establishes a new air contaminant source at Augean RNG LLC, WA. THIS ORDER OF APPROVAL IS HEREBY ISSUED TO:

Applicant/Permittee: Augean RNG LLC
Biogas/Energy

Located at: 5121 Dekker Rd.
Outlook, WA. 98938

Responsible Official: Andrew T. Nekus, Vice President
Augean RNG LLC
235 Pine St. Suite 1100
San Francisco, CA. 94104

Contact at the site: Brandon Casas, Maintenance and Construction Coordinator, Regenix
brandonc@regenix.net
Phone: 509-840-7023

IN COMPLIANCE WITH THE PROVISIONS OF THE STATE OF WASHINGTON CLEAN AIR ACT (Revised Code of Washington (RCW)) CHAPTER 70.94.152, WASHINGTON ADMINISTRATIVE CODE (WAC) 173-400-110, 173-460-040:

ISSUE DATE: January 30, 2020

THIS ORDER OF APPROVAL PERMIT IS SUBJECT TO THE FOLLOWING CONDITIONS:

Installation/modification of the equipment must be conducted in compliance with all data and specifications submitted with the New Source Review (NSR) application under which this Order of Approval is issued unless otherwise specified herein. The conditions and limitations of this NSR Order of Approval are attached as follows:

1.0 DESCRIPTION OF THE SOURCE

- 1.1 Augean RNG LLC; hereafter referred to as the Permittee, the Facility, ARNG or the Source is the owner and operator of a renewable biogas cleaning facility. The Permittee submitted a New Source Review (NSR) application proposing to install a bio-gas cleaning facility adjacent to GDR Power manure digester facility at 5121 Dekker Rd, Outlook.
- 1.2 The Permittee is proposing to take all the biogas generated by the GDR Power manure digester facility, scrub the Hydrogen Sulfide (H_2S) and other unwanted gases from the biogas prior to injection into a nearby Natural Gas (NG) pipeline. The optimal production rate is at about 525 standard cubic feet per minute ((scfm). The biogas at the injection point into the NG pipeline will meet the NG pipeline required quality in accordance with the application. The finished products (scrubbed biogas) will be compressed into long vessels/tanks and transported few miles down the road to a newly built station connected to the natural gas pipeline for injection into the NG pipeline. Once the RNG pipeline to the 5121 Dekker road installation is completed and linked to the Northwest Pipeline LLC gas transmission line, RNG will be conveyed from the project site to the interconnect via the RNG pipeline instead of using trucked vessels.
- 1.3 The Permittee is proposing to install two stages of H_2S removal primary (Eco-Tec BgPur removal system) and secondary (two tanks in a series which contains SulfurTrap EX adsorbent) control units considered as (bio-scrubbers control units), bio-Gas Cleaning Unit (GCU) which utilizes pressure swing adsorption (PSA) which separates the scrubbed biogas into two main gas streams and an emergency enclosed flare. The raw biogas comes from the GDR Power facility. The process flow diagram is shown in Figure 1 below. The raw biogas enters into the primary H_2S control unit which is the Eco-Tec BgPur H_2S removal system. The H_2S from this primary unit is converted into solid elemental sulfur, which will be stored temporarily in a dedicated bin until sold. From the flow chart, the primary H_2S control unit can handle H_2S concentration influent up to 5000 parts per million by volume (ppmv). The primary H_2S control unit scrubs H_2S to output of 6.5 ppmv, but it could be higher up to 10 ppmv, then followed by the secondary H_2S control unit which consists of two standing tanks in a series, which scrub H_2S to less than 1 ppmv. The two standing tanks containing the Sulfur Trap EX adsorbent to remove the majority of the H_2S . Spent sulfur trap materials from this secondary unit are disposed of as non-hazardous materials according to Permittee. There are no air emissions discharges to the atmosphere from the primary and the secondary H_2S bio-scrubbers control units.
- 1.4 The scrubbed biogas from secondary H_2S control unit goes to the GCU. The GCU will recover 97.5% of the Methane (CH_4) concentration and the H_2S will be less than 1 ppm by volume of H_2S . The scrubbed biogas from the GCU is injected into a natural gas pipeline (for now, into the vessel/tank to be transported to the NG pipeline). The GCU is equipped with Pressure Swing Adsorption (PSA) to separate the biogas coming from the secondary H_2S control unit into two gas streams (based on molecular weight): a methane enriched stream which is injected into the NG pipeline, while the second stream is CO_2 enriched vented through the stack to the atmosphere. The stack is part of the GCU



(manufactured by Green lane) venting the mostly CO₂ to the atmosphere and some H₂S which shall not exceed 10ppmv at any time.

- 1.5 An enclosed flare will be installed to mainly destroy any out of specification scrubbed RNG biogas that does not meet the NG mainline specifications, and in the event of an emergency, excess biogas which may arise including those coming from the GDR Power digester and during any maintenance can also be destroyed. However, the biogases will pass-through the secondary H₂S control unit prior to flaring in the enclosed flare in case of emergency or out of specification biogas as shown in Figure 1 below.
- 1.6 In addition to the above installation, the Permittee included the GDR Power NG fired boiler (190 Hp fired Parker boiler that provides heat to the GDR Power digester, permitted under Order of Approval Number-03-GDRP-19), but air emissions from the boiler are included in the ambient air impacts review of this project (The Augean project is also referred to as Stage 2).
- 1.7 This NSR application is for two stages of H₂S removal, the primary and secondary H₂S control units, the GCU and the emergency enclosed flare (Stage 2). The NG permanent 190 HP boiler will be installed as part of this Augean RNG LLC project; as stated above it is covered under Order of Approval number NSRP-03-GDRP-19 and GDR is the responsible party, unless ARNG LLC is taking the responsibility through a contract.
- 1.8 Air emissions from operation of this project after installation, hereafter known as Stage 2, are in the form of small Particulate Matter (PM₁₀, PM_{2.5}), Oxides of Nitrogen and Sulfur (NO_x, SO_x), CH₄, H₂S, Volatile Organic Compounds (VOCs) some of which are known as Hazardous Air Pollutants (HAPs) and Toxic Air Pollutants (TAPs) in accordance with the Federal Clean Air Act (FCAA) or Washington Administrative Code (WAC), respectively.
- 1.9 Air emissions are emitted mostly from the GCU, the enclosed flare, and the permanent NG boiler. The City of Yakima, issued a DNS for this installation for the State Environmental Policy Act (SEPA) requirement on March 3, 2016. A public notice for this NSR was published in accordance with the Washington Clean Air Act (RCW) 70.94.152 and section 173-400-171 of the Washington Administrative Code.
- 1.10 The layout and specifications of this Stage 2 facility and any modification to this project were submitted with the NSR application and any additional submitted information are enclosed in the NSR review as provided by the Permittee. A summary are shown in the Figures attached to this Order of Approval (Order/Permit) below.
- 1.11 New emissions process units of this operations are considered installation of air contaminants requiring a NSR and an Order of Approval pursuant to the Revised Code of Washington (RCW) 70.94.152 and the Washington Administrative Code (WAC) 173-400-110 and 173-460-040



- 1.12 The delivery of the primary H₂S control (the Eco-Tec BgPur system) has been delayed to late February 2020. The Permittee submitted a letter on December 16, 2019 proposing to add two 25-yard vacuum boxes that will be filled with the same medium used in the secondary H₂S control unit to increase the adsorption capacity. These 25-yard vacuum boxes are shown in Figure 5 below. YRCAA will accept this temporary solution for the primary Eco-Tec BgPur system until March 19, 2020 only. The original primary H₂S control Eco-Tec BgPur system must be installed and operational before March 19, 2020. This temporary solution shall be accepted provided that H₂S shall not exceed 10 ppmv from the secondary control system and less than 4.5 ppmv from the GCU steam going to the NG pipeline for injections. At the NG pipeline injections, there shall be no release to the atmosphere. The H₂S limits at the NG pipeline injection point, is a stipulation between Augean RNG LLC and Northwest Pipeline. The H₂S from the second stream going to the GCU discharge stack shall not exceed 10 ppmv at any time. All other operational and approval conditions within this Order of Approval shall remain the same and applicable at any time.

2.0 DETERMINATIONS

In relation to the above installation, YRCAA determines that the Source shall comply with the federal, state and local regulations and laws including but not limited to the following determination:

- 2.1 The Facility is located in an area that is in attainment with all state and federal air quality standards for all criteria pollutants;
- 2.2 The Facility is not a major stationary source as of the date of issuance of this Order and is not subject to the Prevention of Significant Deterioration (PSD) permitting requirements of WAC 173-400-700 through 173-400-750;
- 2.3 The permanent proposed 190 Hp natural gas-fired boiler meets the definition of gas-fired boiler in accordance with 40 CFR Part 63, Subpart JJJJJ, therefore, not subject to this Subpart according to 63.11195(e). No other NESHAPs apply to the permanent boiler, however, the boiler is the responsibility of GDR Power, unless ARNG is taking the responsibility through a contract;
- 2.4 This installation Stage 2 project is subject to the requirements of WAC 173-400-110 General Regulation for Air Pollution Sources- New Source Review (NSR) for Sources and Portable Sources and WAC 173-460-040 Controls for New Sources of Toxic Air Pollutants- New Source Review, thus, this NSR being processed;
- 2.5 This installation Stage 2 project, is subject to the requirements of WAC 173-441 and WAC 173-476 Reporting of Emissions of Greenhouse Gases and Ambient Air Quality Standards, respectively;
- 2.6 This installation Stage 2 project, is subject to the requirements of 40 CFR Part 50 National ambient Air quality Standards and 40 CFR Part 60 NSPS New Source



Performance Standards, general requirements, 40 CFR Part 98 Mandatory Greenhouse Gas Reporting at a the required threshold of the regulations;

- 2.7 The Facility is subject to the annual Registration Program as outlined in WAC 173-400-099 –and YRCAA Regulation 1, 4.01. Thus, the Facility shall submit their annual report including the annual air emissions with the required fees to YRCAA as specified in the forms by YRCAA on or before the specified date from the previous calendar year; and
- 2.8 The recommended model by Environmental Protection Agency (EPA) AERSCREEN Model was used for modeling the ambient air impact. The model results showed that all potential air emissions will comply with the NAAQS and the Acceptable Source Impact Level (ASIL) of WAC 173-460-150

THEREFORE, it is hereby ordered that the project as described above, in the NSR application, and in detailed plans, specifications and other information submitted in reference thereto, is **APPROVED** for operation, **PROVIDED** the specification submitted with the application and the following conditions are met:

3.0 OPERATIONAL APPROVAL CONDITIONS

- 3.1 This Order is for the Stage 2 operation as defined above. It is composed of the primary and secondary H₂S control units, GCU and an enclosed flare as described above. The Facility is located at 5121 Dekker Rd., Outlook, Washington, in accordance with the plan and specifications submitted with the NSR application to YRCAA. The specification for these units and equipment are shown in Table 1 of this Order below.
- 3.2 Best Available Control Technology (BACT) and Toxic BACT (t-BACT) pursuant to RCW 70.94.152, WAC 173-400-113 and WAC 173-460-060 shall be satisfied for any proposed new facility or modified air emission source to control air emissions. YRCAA finds BACT to be satisfied as follows:
 - 3.2.1 Hydrogen sulfide concentration shall not exceed 10 (ten) parts per million by volume (ppmv) from the primary H₂S control unit and shall not exceed 10 (ten) ppmv from the secondary H₂S control units including the GCU;
 - 3.2.2 There shall be no air emissions discharged from the primary and the secondary H₂S control units to the atmosphere at any time. However, the GCU and the gas compressors are equipped with standard safety pressure relief valve (PRV). These valves may pop open in case of overpressures to prevent any catastrophic failure. These momentarily relief valves pressures are not part of the normal operation, it is exceptional during emergency only.
 - 3.2.3 At minimum, the continuous H₂S monitoring system location shown in the Figure 3 below shall be install and working all the time during normal operation;



- 3.2.4 The GCU shall have at least 96% CH₄ recovery;
- 3.2.5 The raw biogas, in case of emergency, must be routed through the secondary H₂S control unit prior to the enclosed flare. In no event shall the biogas during any abnormal operation be released directly to the ambient atmosphere;
- 3.2.6 The maximum air emission limits for H₂S and other air pollutants shall be limited, per the submitted specifications with this NSR application and specified in the emission limit Section 5.0 below and Appendix A;
- 3.2.7 An Operation and Maintenance (O&M) plan for the primary and secondary H₂S control units, the GCU and the enclosed flare, shall be developed in accordance with the manufacturers recommended standards;
- 3.2.8 The primary and secondary H₂S control units, the GCU and the enclosed flare must be operated per manufacturer specifications and written instruction including the pH level, tune-ups, maintenance and any required certification;
- 3.2.9 TAP air emissions shall always be below the Acceptable Source Impact Levels (ASIL);
- 3.2.10 The permanent 190Hp boiler will use only NG as the sole source of fuel for the boiler as specified in Order of Approval number NSRP-03-GDRP-19, unless ARNG is taking the responsibility for this boiler through a contract; and
- 3.2.11 The air emissions from the flare and the GCU shall meet the ASIL of WAC 173-460 and the National Ambient Air Standards (NAAQs) of 40 CFR Part 50 and as also specified in this Order.
- 3.3 The pH from primary and the secondary H₂S bio-scrubbers control units shall be maintained at the indicated manufactures written instruction which shall be submitted to YRCAA.
- 3.4 All air emissions from this Facility shall be in compliance with air emission standards at all times. It is the responsibility of the owner to make sure that air emissions are within all known and future applicable federal and state rules and regulation standards, including but not limited to 40 CFR Part 50, WAC 173-400-040 and 173-460.
- 3.5 The primary and the secondary H₂S bio-scrubbers control units must be inspected at least monthly for system integrity and replaced any parts if needed. The record must be designed by the Permittee and maintained at the Facility site.

3.6 This Order authorizes the operation of the following equipment:

Table 1 List of authorized Equipment to be installed (Stage 2).

Units	Unit Type	Manufacturer	Model/ Serial number and/or Size	Motor Hp (Capacity)
1	Primary Hydrogen Sulfide Unit	Eco-Tec	Serial #: S-7049 Model #: 301-102.	107 HP
1	Secondary Hydrogen Sulfide Unit	Chemical Products Industries, Inc.	-	-
1	Bio-Gas cleaning Unit (GCU)	Greenlane	Model: TKC51672 – C1D1 Serial #: TKC51672	Stack 6 inches diameter 30 foot tall- (252 SCFM)
1	Enclosed flare	Aereon	Model: 1CP800 Serial # : EOZCFO	-
1	Industrial Boiler	Parker Industrial boiler	T6800L- Natural Gas only	190 Hp

- 3.7 Upon installation and the start of operation of this Facility, no raw biogas from the digester shall be released directly into the atmosphere. It shall be the responsibilities of GDR Power to have all the biogas collected and send it over to Augean RNG LLC, unless another contract exist between the two facilities. The Augean RNG LLC shall pass the raw biogas through the primary and the secondary H₂S control units, then to the GCU unit except during maintenance or repair, in which case the biogas shall pass at minimum, through either the primary or the secondary H₂S control units prior to sending it to the enclosed flare. During normal operation and maintenance activities, the H₂S concentration in the biogas must not exceed 10 ppmv. In case of emergency, maintenance or repair or any out of specification biogas, the biogas must be routed to the enclosed flare after passing by the primary or the secondary H₂S cleaning units at minimum and the H₂S concentration in the biogas shall not exceed a maximum of 10 ppmv.
- 3.8 The Permittee shall install and operate the biogas flow meters to measure and record the incoming biogas from GDR Power to the Permittee's Facility, before the enclosed flare and prior to injection to the NG pipeline. The record must be maintained at the facility and reported to YRCAA monthly to YRCAA for the first six months and annually after that with the registration program.
- 3.9 Concentration of the hydrogen sulfide from the primary and the secondary H₂S control units must not exceed a maximum of 10 ppmv and 4.5 ppmv from the GCU stream going to the NG pipeline injection and a maximum of 10 ppmv to the GCU stream going to the discharge stack. The H₂S concentration shall be monitored and tested using the following methods:
- 3.9.1 The Permittee shall measure and monitor the concentration of H₂S in ppmv in the biogas at the influents and effluents of the primary and secondary H₂S



control units and at the effluent of the GCU prior to stack discharge and prior to the enclosed flare. This may be done by using gas detection tubes with a concentration range designed to accurately measure the concentration of H₂S to less than 1 ppmv; or by the continuous monitoring method similar to the one shown in Figure 3 below;

- 3.9.2 The measurement of the H₂S concentration method stated above (3.9.1) must be approved in advance prior to implementation and/or operation in writing from YRCAA. The approved method shall be attached to this Order and become part of this Order;
- 3.9.3 Measurements of H₂S in the biogas shall be accurately measured as specified above in 3.9.1 at minimum once per calendar day or on another measurement schedule approved as a continuous monitoring method by YRCAA. Such written approval must be attached and be part of this Order.
- 3.9.4 The monitoring and measurement of the concentration of H₂S at the specified locations stated in 3.9.1 shall start immediately at the initial start-up period.
- 3.9.5 The Permittee shall submit a written Quality Assurance Plan (QAP) including the written approved method for the monitoring and testing of H₂S at the specified location. If an alternative monitoring methods than those stated above, these methods then must be approval in writing first, by YRCAA and they must be included in the QAP.
- 3.9.6 The Permittee shall report all H₂S measurements in excess of the limits established in conditions 3.9 to our agency within 12 hours of measurement or discovery, the probable cause of such deviations, and any corrective actions or preventative measures taken must also be reported to YRCAA.
- 3.10 If no approved method by YRCAA to measure the H₂S as stated in the above conditions, a source test to verify the concentration of H₂S at the effluent of the primary and the secondary H₂S control units and the GCU shall be conducted upon normal operation, but no latter then 60 days from the issuance of this Order in accordance with 40 CFR Part 60, Appendix A, Method 15 to demonstrate compliance with the H₂S limits in this Order. The source test protocol shall be submitted to YRCAA at least 15 days prior to the source test date. Results of the source test must be submitted to the YRCAA within 30 days after the source test date.
- 3.11 If the Permittee, choose continuous monitoring method which has been approved by YRCAA, the Permittee shall maintain information on all H₂S monitors used in the facility, but they must be part of the approved method in writing by YRCAA. This information must be compiled in one place and shall include the following for each monitor: monitor manufacturer and model number, date of monitor installation, range of H₂S concentration the monitor can accurately measure, description of maintenance,



- calibration, and accuracy verification, the date of the last maintenance, calibration, and accuracy verification, and the name of the person performing the action. This information shall also be available to YRCAA to review during site inspections and upon request.
- 3.12 The Permittee shall maintain all H₂S monitor measurements for a period of at least five (5) years after each measurement. Monitor data must be readily available to YRCAA for review during site inspections and upon request.
- 3.13 If and when a source test is required, the Permittee shall conduct the source test every five years pursuant to the current WAC 173-400. This requirement may change or be waived to 10 years with a written approval from YRCAA, only if the H₂S concentration as specified in this Order has not been exceeded for the previous five years. If more than one exceedance has been recorded above the specified concentration in this Order, the source test requirement will revert back to every five years.
- 3.14 The enclosed flare shall be installed as submitted with the NSR application. In no event shall, the biogas be vented directly to the ambient air even during an emergency. The flare shall be operational at all times and shall be equipped with thermocouple at the flame tip to monitor that the flame is working.
- 3.15 The enclosed flare height shall be at least 45 feet high from the ground level and shall not operate more than 440 hours per 12 rolling consecutive months.
- 3.16 The incoming biogas from GDR Power shall never be released directly to the atmosphere.
- 3.17 The Permittee must develop and implement a site-specific O&M plan based on the manufacturers and designers experience as part of the BACT above. The O&M Plan shall contain at minimum four sections: general information, operation plan (i.e., key operating parameters), maintenance plan and any other additional information. The Permittee must develop the O&M plan within 90 days after the issuance of this Order and shall include, but not be limited to the following:
- 3.17.1 The Permittee shall provide appropriate training in operating all units including the enclosed flare to all operators;
- 3.17.2 The QAP, the H₂S monitoring systems shall be included in O&M plan; and
- 3.17.3 Check all units for signs of damage as per designers or manufacturers recommended intervals. If no recommended intervals, it shall be done at least monthly. The Log of any major repairs or replacements to any of the installed equipment shall be reported to YRCAA within 10 days.



- 3.18 Within 90 days from the date of issuance of this Order, the Permittee shall submit notification to YRCAA indicating that the O&M plan is completed and in place. If the Permittee needs to make any future modification or the method of operating the units beyond those approved in this Order, an approval in writing from YRCAA must be obtained before such modification takes place.
- 3.19 No emissions shall be released from this operation beyond the property boundary in a quantity that interferes unreasonably with the use and enjoyment of the property owner upon which the material is deposited or is detrimental to the health, safety or welfare of any person or causes damage to any property or business.
- 3.20 Opacity as measured by 40 CFR Part 60, Appendix A, Method 9, July 1, 2004 from the enclosed flare, must be conducted within 30 days from the startup of the flare and shall not exceed five percent (5%), average for six consecutive minutes in any given one hour period. The Permittee shall maintain the 5% or less at all times when the flare is on, except during periods of startup, shutdown or malfunction as provided in WAC 173-400-081.
- 3.21 In addition to the initial opacity reading above, once a month, the Permittee shall conduct and record visual opacity from the rest of the Facility. If the observer sees any kind of visible emissions aside from the enclosed flare smoke which shall not exceed 5%, the Permittee shall immediately take corrective action as directed in the O&M plan until there are no visible emission from that the unit. If opacity is greater than the limit, corrective actions shall be taken which may include the following:
 - 3.21.1 Certify that the enclosed flare is performing according to its design functions within the acceptable design parameters and is being operated according to O&M procedures. The enclosed flare must be checked against all operational conditions that have resulted in compliance in the past. If the enclosed flare is not performing according to its design and O&M procedures, the Permittee must take corrective action within 48 hours to correct the problem; or
 - 3.21.2 Conduct an opacity evaluation by a certified opacity reader in accordance with 40 CFR 60, Appendix A, Method 9 within 48 hours of the malfunction correction to verify compliance with the 5% opacity limit. If opacity is greater than 5% appropriate and timely corrective action must be taken no later than 48 hours to identify and correct the problem causing the opacity. If the Permittee has no certified reader on site, the Permittee should call YRCAA and will be advised accordingly.
- 3.22 In accordance with WAC 173-400-105(4) and YRCAA Regulation 1, Article V, Section 5.11(c), the Permittee shall conduct a source test when deemed necessary by YRCAA to demonstrate compliance for any air pollutant, specific to this Order.
- 3.23 The YRCAA Air Pollution Control Officer (APCO) or his designated staff shall be



allowed to enter the Facility at reasonable times to inspect for compliance with applicable laws, regulations and the conditions on this Order.

4.0 GENERAL APPROVAL CONDITIONS

- 4.1 All units including the primary and the secondary H₂S control units, the GCU and the enclosed flare shall comply with all other requirements specified in all current federal, state and local air pollution laws and regulations, including, but not limited to, RCW 70.94 Washington Clean Air Act, WAC 173-400 General Regulations for Air Pollution Sources, WAC 173-460 Controls for New Sources of Toxic Air Pollutants, applicable parts of 40 CFR Part 60 and the YRCAA Regulation 1.
- 4.2 All plans, specifications or other information submitted to YRCAA and any further authorizations, approvals, or denials in relation to this project, shall be incorporated herein and made a part of the YRCAA file and this Order.
- 4.3 Nothing in this approval shall be construed as obviating compliance with any requirement(s) of law including those imposed pursuant to the Washington Clean Air Act, and rules and regulations thereunder. Any violation(s) of such rules and regulations are penalized in accordance with RCW 70.94.430 and YRCAA Regulation 1, Article 5, Compliance and Enforcement.
- 4.4 Authorization may be modified, suspended or revoked in whole or part for cause including, but not limited to, the following:
 - 4.4.1 Violation of any terms or conditions of this authorization; or,
 - 4.4.2 Obtaining this authorization by misrepresentation or failure to disclose fully all relevant facts.
- 4.5 The provisions of this authorization are severable and, if any provision of this authorization, or application of any provisions of this authorization to any circumstance, is held invalid, the application of such provision to their circumstances, and the remainder of this authorization, shall not be affected thereby.
- 4.6 This Order and its requirements apply to the Facility owner and/or operator(s) and any contractor or subcontractor performing any activity authorized under this Order. Any persons, including contractors and/or subcontractors, not in compliance with the applicable requirements in this Order are in violation of federal, state and local laws and regulations and subject to appropriate civil and criminal penalties. The Facility owner and/or operator, and all contractors or subcontractors are liable for the actions and violations of their employees. Any violation committed by a contractor or subcontractor shall be considered a violation by the Facility owner and/or operator, and is also a violation by the contractor and/or any subcontractors.



- 4.7 Laws, rules and regulations may be superseded or revised without notice. It is the Permittee's responsibility to stay current with laws, rules and regulations governing their business and therefore is expected to comply with all new laws, rules and regulations immediately upon their effective date. New laws, rules and regulation updates will be incorporated into existing Orders or upon renewal of said Orders.
- 4.8 All air emissions from the operations of this Facility shall be in compliance with all air emission standards at all times. It is the responsibility of the owner to make sure that air emissions are within all known and promulgated laws, rules and regulations standards.
- 4.9 If, or whenever the Permittee wants to change the quantity of air emissions set forth in this Order or any modification to the Facility, another NSR must be filed with YRCAA before any change takes place and BACT requirements must be satisfied.
- 4.10 This Order is invalid without paying the required fees to YRCAA, pursuant to RCW 70.94.152 within the specified time on the invoice.

5.0 EMISSION LIMITS

- 5.1 Hydrogen sulfide shall not exceed 10 ppmv from the effluent of the primary and secondary H₂S control units, and not exceed 4.5 ppmv from the GCU stream going to the injection NG pipeline.
- 5.2 Air emissions discharge from the GCU after the secondary H₂S control unit shall be not exceed a maximum of 10 ppmv of H₂S at the GCU discharge stack as stated and specified in the above conditions.
- 5.3 Biogas sent to the enclosed flare shall not exceed 10 ppmv at any time.
- 5.4 Pursuant to WAC 173-400-113(2), the enclosed flare shall use the specified burner as stated in the NSR application.
- 5.5 Air emissions from this Stage 2 Facility operation, are estimated to generate small particulate matters (PM₁₀, PM_{2.5}), CO, VOC, NO_x, SO_x and others as shown in Appendix A. These maximum emissions shall not be exceeded as specified in the Appendix.
- 5.6 TAPs air emissions shall always be below the Acceptable Source Impact Levels (ASIL).
- 5.7 In addition to those specified limit on this Order, the Permittee shall comply with all applicable general standards for maximum air emissions as specified in WAC 173-400-040, WAC 173-460 and WAC 173-400-075.



6.0 MONITORING AND RECORDKEEPING REPORTING REQUIREMENTS

- 6.1 The Permittee shall record and maintain the daily concentration of H₂S from the primary and secondary H₂S control units at the influent and effluents in addition to the concentration at the effluent of the GCU. Concentration in ppmv shall not exceed the limits stated above.
- 6.2 The Permittee shall record and maintain the data from the facility's H₂S monitors as per the approved method in writing from YRCAA and shall be part of this Order as described in the above conditions.
- 6.3 The Facility shall submit their annual registration forms (report) including the annual air emissions with the required fees to YRCAA and including the sent-out specified forms by YRCAA on or before the specified date on the form which is 60 days from the beginning of each calendar year. Annual air emissions and production shall be based on the previous calendar year.
- 6.4 This Order and its conditions shall remain in effect in the event of any change in control of ownership or operation of the Facility. In the event of any such change in control of ownership or operation, the Permittee shall notify the succeeding owner of this Order and conditions and shall notify the YRCAA of the change by filing an "Ownership or Name Change" form within fifteen (15) days of that change. The form can be obtained or requested from YRCAA's office or the website.
- 6.5 If any other source test is ever required for this operation, except as specified in the approval conditions above, the results of the source test shall be submitted to the YRCAA within 30 days following the completion date of the source test.
- 6.6 The final source test results must be reported to YRCAA in units of ppmv, pounds per hour and potential tons per year for each pollutant.
- 6.7 The Permittee shall keep all records including this Order on site. Records shall include, at minimum, the monthly number of hours of operation of all units, H₂S concentration in ppmv, the daily biogas production, and the O&M items performed. Forms for recordkeeping must be designed by the Permittee and shall include the date and time of maintenance performed and the operator's name. An electronic H₂S concentration from the primary, secondary H₂S control and the effluent of the GCU may only be accepted if approved by YRCAA in writing.
- 6.8 The required records, logs and O&M plan for this Facility shall be kept on site and shall always be available to the APCO of the YRCAA or his designated staff during inspections or upon request. The O&M plan shall be updated to reflect any changes in operating procedures.
- 6.9 Records shall be maintained and kept at the site for the most recent five year period, and be made available during inspections or when requested by YRCAA.



- 6.10 Any application form, report, compliance certification, monthly record and the annual consumption report submitted to YRCAA pursuant to this Order must be signed by the responsible official.
- 6.11 Total air emissions for each air pollutant including HAPs/TAPs, and the number of hours of operation must be calculated and reported to YRCAA on an annual basis as specified in the annual registration documents provided by YRCAA to the Facility, as long as the Facility is not a Title V source.

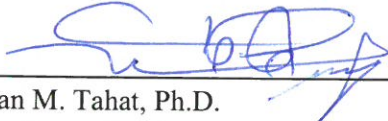
You may appeal this Order to the Pollution Control Hearings Board (PCHB) within 30 days of the date of receipt of this Order. The appeal process and applicable requirements is governed by Chapter 43.21B RCW. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do all of the following within 30 days of the date of receipt of this Order:

- File your appeal and a copy of this Order with the PCHB, P.O. Box 40903, Olympia, WA, 98504-0903. Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this Order on YRCAA in paper form - by mail or in person. E-mail is not accepted.

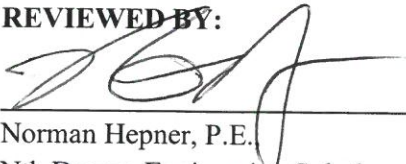
DATED at the City of Yakima, Washington this 30th day of January, 2020.

PREPARED and REVIEWED BY:



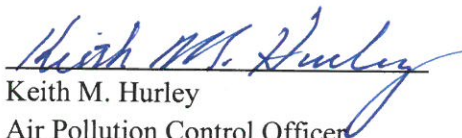
Hasan M. Tahat, Ph.D.
Compliance, Engineering and Planning Division Supervisor
Yakima Regional Clean Air Agency

REVIEWED BY:



Norman Hepner, P.E.
Nth Degree Engineering Solutions

ISSUED BY:



Keith M. Hurley
Air Pollution Control Officer
Yakima Regional Clean Air Agency

Potential to Emit (PTE)

Sources	PM	PM10	PM2.5	SO2	NOx	VOC	CO	Pb	HAPs	TAPs	CO2e
	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	MT/yr
Gas Cleaning Unit (GCU) Exhaust Gas	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00E+00	0.00	*	12,482
Emergency Flare, max 5% to flare	0.090	0.090	0.090	0.620	1.20	3.95	2.40	2.94E-06	8.76E-04	*	1,079
TOTAL	0.090	0.090	0.090	0.620	1.20	3.95	2.40	2.94E-06	0.001	>de min**	13,561

* See the Flare page for individual TAP PTE

** See the Flare page for individual TAPs above de minimis

General Notes:

-- Fugitive emissions are negligible and are not included

New Source Review Emission Thresholds		PM	PM10	PM2.5	SO2	NOx	VOC	CO	Pb	HAPs	TAPs	CO2e
Emission Thresholds		(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	MT/yr
			0.75	0.5	2.0	2.0	2.0	5.0	0.005		>de min	

Gas Cleaning Unit (GCU)

Peak digester gas flowrate 625 scfm
Peak Gas Cleaning Unit flowrate 800 scfm
Peak Hourly biogas production 37,500 scfh
Maximum hours of production 8,760 hr/yr
Maximum gas production 328,50 mmscf/yr
Maximum percentage of time to flare 5.00%
Maximum hours to flare 438

Standard Conditions per WAC 173-400-030(88)

68 F = 527.67 R
760 mmHg = 1 atm
Ideal gas constant

0.7302 ft³ atm / (lbmol R)

Standard molar volume: 385.3 scf/lbmol

34 lb H2S/lbmol H2S

64 lb SO2/lbmol SO2

1 lbmol SO2/lbmol H2S

Peak H2S content of digester gas: 7000 ppm

Gas volume at standard conditions 385.3 scf/lbmol

Conversions
60 min/hr
1,000,000 scf/mmscf
1,000,000 Btu/MMBtu
2,000 lb/ton
0.907 metric ton/ton

Key
Blue values Entered data
Red values Calculated data
Green values Referenced data

100-year GWP, Table A-1 of WAC 173-441-040

1 CO2
25 CH4
298 N2O

Digester Gas Composition, unburned

Temp 101 deg F
Flow 800 scfm (max)
48,000 scfh

Component	Given	Units	% by vol	scfh	M.W.	Peak lb/hr	PTE tpy
CH4	55-60%	(57 avg)	57.00%	27,360	16	1136	4,976
CO2	38-44%	(40 avg)	40.00%	19,200	44	2,193	9,603
N2	1.0%		1.0%	480	28	34.9	152.8
O2	0.2%		0.2%	96	32	8.0	35
H2O	2.0% saturated		2.0%	960	18	44.8	196.4
H2S, Raw	5000	ppmv	0.5%	240	34	21.2	92.8
			100.7%	48,336			15,057

Product Stream Composition

Temp 48 F
Flow 450 scfm (max)
27,000 scfh

56% of total biogas

236.52 MMscf/year RNG maximum

	Given	Units	% by vol	scfh	(lb/lbmol)	lb/hr	tpy
CH4	97.54%		97.54%	26,336	16	1,093.6	4,790.0
CO2	0.58%		0.58%	157	44	17.9	78.3
N2	1.74%		1.74%	470	28	34.1	149.5
O2	0.14%		0.14%	38	32	3.1	13.8
H2O	0.00%		0.00%	0	18	0.0	0.0
H2S	4	ppmv	0.0004%	0	34	9.53E-03	4.17E-02
			100.00%	27,000		1,149	5,032
				27,000 (check)		450.0	scfm

Slip Stream/Discharge Gas

CH4

4.0% of total methane leaves in slip stream

45.4 lb/hr CH4 in slip stream

199.1 ton/yr CH4 in slip stream =

4.976 CO2e ton/yr (but not Metric Ton/Year)

14.3 scfm CH4 slip

1094.4 scfh CH4 slip

7.49 mmcf CH4 slip/year

CO2 40.0% of total biogas; assume all goes to slip stream

2.193 lb/hr CO2 in slip stream

9.603 ton/yr CO2 in slip stream

250.0 scfm CO2 slip

19,200 scfh CO2 slip

131 mmcf CO2 slip/year

Vol% CH4 in slip stream: 5.4% by volume - the explosive range for methane - 5.0 to 15.0% by volume

Slip Stream Composition									
Temp	67 F								
Flow	350 scfm (max)			44%					
	21,000 scfh								
Given	Units	% by vol	scfh	M.W.	lb/hr	tpy	metric tpy	CO2e	
CH4	2.5-4.0%	4.0%	840	16	34.9	152.8	138.6	3,465.0	
CO2	94.63%	94.63%	19,872	44	2,269.3	9,939.6	9,017.2	9,017.2	
N2	0.11%	0.11%	23	28	1.7	7.4			
O2	0.25%	0.25%	53	32	4.4	19.1			
H2O	0.20%	0.20%	42	18	2.0	8.6			
H2S	10 ppmv	0.0010%	2.10E-01	34	1.85E-02	8.12E-02			
Total		99.19%	20,830		2,312	10,128		12,482.2	
Other gas?		0.81%							

347 scfm

Sum of flows: 800 scfm

Unit	Pollutant	Emission Rates (lb/hr)	PTE Emission (lb/yr)	TAPs (tpy)	TAP (lb/24 hr)	De Minimis (lb/avg period)	Flag, >De Min	SQER (lb/avg period)	Flag, >SQER	ASL (ug/m^3)	Notes
Discharge stack	Hydrogen Sulfide (H2S)	1.85E-02	162.33	8.12E-02	0.4447	0.0131	permit	0.263	model	2	Calculated by mass balance, not emission factor
flare	Hydrogen Sulfide (H2S)	2.96E-02	2.84	1.42E-03	0.7116	0.0131	permit	0.263	model	2	Copied from Flare worksheet
total H2S		0.0482	165.2	0.0826	1.1563						

Total isn't relevant since the flare and the discharge stack won't operate at the same time

GDR POWER 6.3 MMBTU/HR NATURAL GAS-FIRED BOILER

Heat input rating	6.3 MMBtu/hr		
Peak hourly gas production	6,176 scf/hr	Standard molar volume:	385.3 scf/lbmol
Maximum operating hours	8,760 hr/yr		
Assumed Heat Content	1,020 Btu/scf		34 lb H2S/lbmol H2S
Peak hourly heat	6.30 MMBtu/hr		64 lb SO2/lbmol SO2
Maximum annual heat	55,188 MMBtu/yr		1 lbmol SO2/lbmol H2S
H2S	1 ppmv (parts per million by volume)		
Peak natural gas feed rate:	0.00618 MMscf/hr		

Pollutant	PTE Emissions		Emission Factor		
	lb/hr	tpy	value	units	reference
PM ₁₀ /PM _{2.5}	0.047	0.206	7.6	lb/mmcsf	AP-42, Table 1.4-2, 7/98
Sulfur Dioxide (SO ₂)	0.0037	0.016	0.6	lb/mmcsf	AP-42 Table 1.4-2, 7/98
Nitrogen Oxides (NO _x)	0.31	1.35	50	lb/mmcsf	AP-42 Table 1.4-1, 7/98, small boiler - low Nox burners
Volatile Organic Compounds (VOC)	0.034	0.15	5.5	lb/mmcsf	AP-42 Table 1.4-2, 7/98
Carbon Monoxide (CO)	0.52	2.27	84	lb/mmcsf	AP-42 Table 1.4-1, 7/98
Lead (Pb)	3.1E-06	1.35E-05	5.0E-04	lb/mmcsf	AP-42 Table 1.4-2, 7/98
Carbon Dioxide (CO ₂)	741.2	3,246	120,000	lb/mmcsf	AP-42 Table 1.4-2, 7/98
Nitrous Oxide (N ₂ O)	1.36E-02	5.95E-02	2.2	lb/mmcsf	AP-42 Table 1.4-2, 7/98
Methane (CH ₄)	1.42E-02	6.22E-02	2.3	lb/mmcsf	AP-42 Table 1.4-2, 7/98

6.3 MMBtu/hr NATURAL GAS-FIRED BOILER - HAPs & TAPs
THESE ARE NOT INCREASED EMISSIONS AND DO NOT EFFECT THE TAP PERMITTING ANALYSIS
HAP and TAP Emission factor source: AP-42 Tables 1.4-3 & 4 (07/98)
Potential Toxic Air Pollutant Emissions with Annual Averaging Periods

CAS Nbr.	Pollutant	Emission Factor (lb/mmcsf)	Emission Factor (lb/mmBtu)*	Emission Rates (lb/hr)	PTE Emission (lb/yr)	TAPs (tpy)	HAPs (tpy)
91576	2-Methylnaphthalene	2.40E-05	2.35E-08	1.48E-07	1.30E-03		6.49E-07
56495	3-Methylcholanthrene	1.80E-06	1.76E-09	1.11E-08	9.74E-05		
57976	7,12-Dimethylbenz(a)anthracene	1.60E-05	1.57E-08	9.88E-08	8.66E-04		
83329	Acenaphthene	1.80E-06	1.76E-09	1.11E-08	9.74E-05		
203968	Acenaphthylene	1.80E-06	1.76E-09	1.11E-08	9.74E-05		
120127	Anthracene	2.40E-06	2.35E-09	1.48E-08	1.30E-04		
7440382	Arsenic	2.00E-04	1.96E-07	1.24E-06	1.08E-02	5.41E-06	5.41E-06
56553	Benzo(a)anthracene	1.80E-06	1.76E-09	1.11E-08	9.74E-05		
71432	Benzene	2.10E-03	2.06E-06	1.30E-05	1.14E-01	5.68E-05	5.68E-05
50328	Benzo(a)pyrene	1.20E-06	1.18E-09	7.41E-09	6.49E-05		
205992	Benzo(b)fluoranthene	1.80E-06	1.76E-09	1.11E-08	9.74E-05		
191242	Benzo(g,h,i)perylene	1.20E-06	1.18E-09	7.41E-09	6.49E-05		
207089	Benzo(k)fluoranthene	1.80E-06	1.76E-09	1.11E-08	9.74E-05		
7440417	Beryllium	1.20E-05	1.18E-08	7.41E-08	6.49E-04		
7440439	Cadmium	1.10E-03	1.08E-06	6.79E-06	5.95E-02	2.98E-05	2.98E-05
7440473	Chromium	1.40E-03	1.37E-06	8.65E-06	7.57E-02	3.79E-05	3.79E-05
218019	Chrysene	1.80E-06	1.76E-09	1.11E-08	9.74E-05		
53703	Dibenz(a,h)anthracene	1.20E-06	1.18E-09	7.41E-09	6.49E-05		
106467	1,4-Dichlorobenzene (para)**	1.20E-03	1.18E-06	7.41E-06	6.49E-02	3.25E-05	3.25E-05
206440	Fluoranthene	3.00E-06	2.94E-09	1.85E-08	1.62E-04		8.12E-08
86737	Fluorene	2.80E-06	2.75E-09	1.73E-08	1.51E-04		7.57E-08
50000	Formaldehyde	7.50E-02	7.35E-05	4.63E-04	4.06E+00	2.03E-03	2.03E-03
193395	Indeno(1,2,3-cd)pyrene	1.80E-06	1.76E-09	1.11E-08	9.74E-05		
91203	Naphthalene	6.10E-04	5.98E-07	3.77E-06	3.30E-02	1.65E-05	1.65E-05
7440020	Nickel	2.10E-03	2.06E-06	1.30E-05	1.14E-01		5.68E-05
85018	Phenanthrene	1.70E-05	1.67E-08	1.05E-07	9.20E-04		4.60E-07
129000	Pyrene	5.00E-06	4.90E-09	3.09E-08	2.71E-04		1.35E-07

* Divide lb/mmcsf factor by 1020 Btu/scf as per AP-42 Tables 1.4-3 & 4.

** 1,4-Dichlorobenzene (para) is a TAP; the EF is for cas no. 25321-22-6, which is a mixture of dichlorobenzene isomers, so this EF is conservative.

Boiler Potential Toxic Air Pollutant Emissions with 24-hour Averaging Periods

CAS Nbr.	Pollutant	Emission Factor (lb/mmcsf)	Emission Factor (lb/mmBtu)*	Emission Rates (lb/hr)	PTE Emission (lb/yr)	TAPs (tpy)	HAPs (tpy)
7440484	Cobalt	8.40E-05	8.24E-08	5.19E-07	7.21E-04	3.61E-07	3.61E-07
7439965	Manganese	3.80E-04	3.73E-07	2.35E-06	3.26E-03	1.63E-06	1.63E-06
7439976	Mercury	2.60E-04	2.55E-07	1.61E-06	2.23E-03	1.12E-06	1.12E-06
110543	n-Hexane	1.80E+00	1.76E-03	1.11E-02	1.55E+01	7.73E-03	7.73E-03
7782492	Selenium	2.40E-05	2.35E-08	1.48E-07	2.06E-04		
108883	Toluene	3.40E-03	3.33E-06	2.10E-05	2.92E-02	1.46E-05	1.46E-05

* Divide lb/mmcsf factor by 1020 Btu/scf as per AP-42 Tables 1.4-3 & 4.

Boiler Potential Toxic Air Pollutant Emissions with 1-hour Averaging Periods

CAS Nbr.	Pollutant	Emission Factor (lb/mmcsf)	Emission Factor (lb/mmBtu)*	Emission Rates (lb/hr)	PTE Emission (lb/yr)	TAPs (tpy)	HAPs (tpy)
630080	Carbon Monoxide			0.52	19,907	2.3	
10102440	Nitrogen Dioxide			0.31	2,705	1.35	
74460905	Sulfur Dioxide			0.004	32.46	0.02	

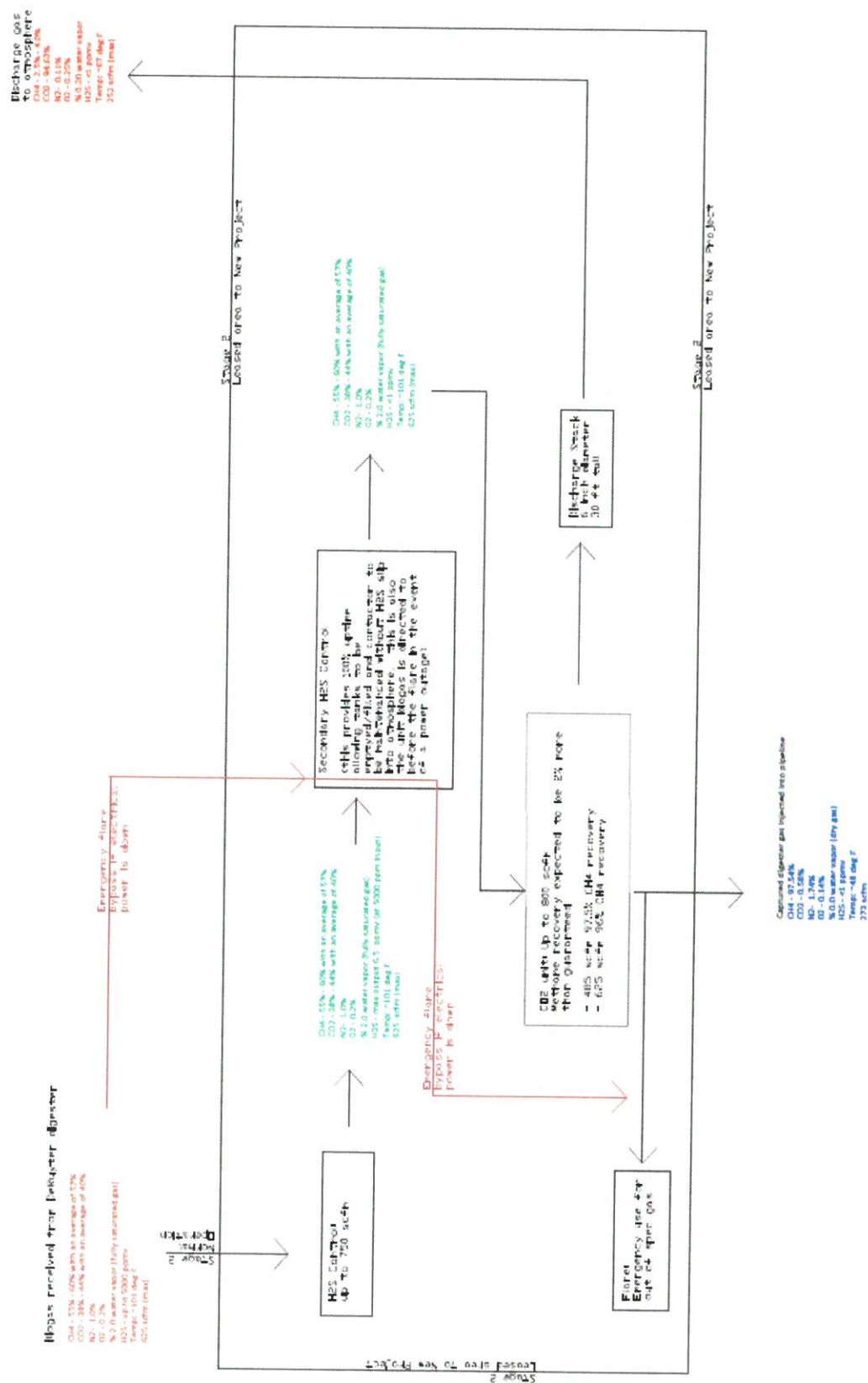
* Divide lb/mmcsf factor by 1020 Btu/scf as per AP-42 Tables 1.4-3 & 4.

TOTALS (tpy): 3.6513 0.0100**

** Pollutants listed as below detection in AP-42 Tables 1.4-3 & 4 (denoted by "<" before the emission factor) are not included in the totals.

NOTE and a REMINDER:

**AUGEAN RNG LLC HYDROGEN SULFIDE
MONITORING PLAN IS AN INTEGRAL PART OF
THIS ORDER OF APPROVAL AND SHALL BE
ATTACHED TO THIS ORDER OF APPROVAL**







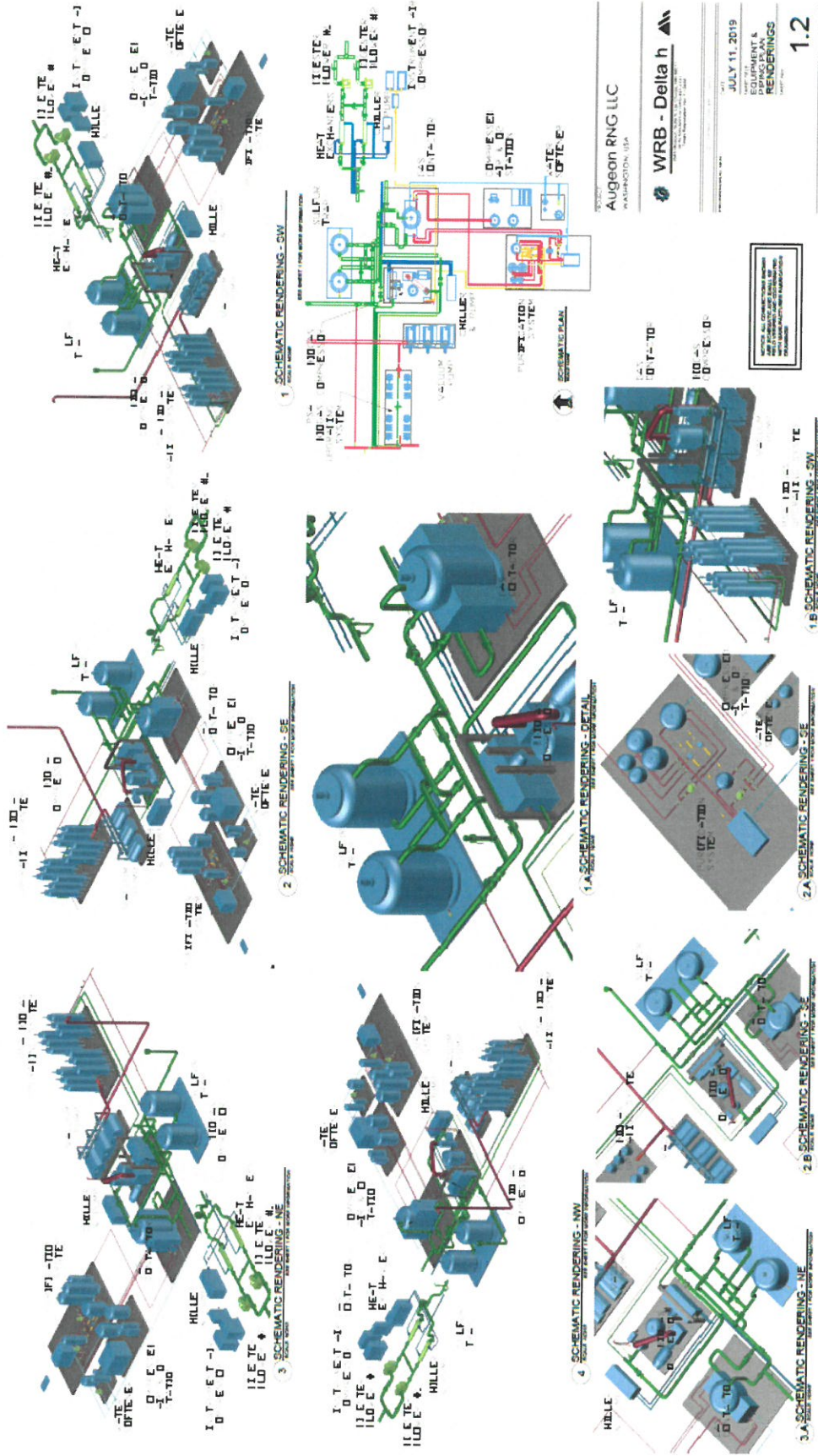


Figure 4. Piping schematic details 3-D





YAKIMA REGIONAL CLEAN AIR AGENCY

Order of Approval Permit No NSRP-03-GDRP-19

New Source Review Order of Approval for GDR Power for an Anaerobic Digester, Flare system, Small 34.5 Horsepower (Hp) Portable Generator, 150 Hp Temporary Boiler and 190 HP Permanent Boiler (Stage 1)

IN THE MATTER OF approving a project which establishes a new air contaminant source at GDR Power, in Outlook, WA. THIS ORDER OF APPROVAL IS HEREBY ISSUED TO:

Applicant/Permittee: GDR Power
Dairy Manure Anaerobic Digester Operation

Located at: 5121 Dekker Rd.
Outlook, WA. 98938

Responsible Official: Dan DeRuyter
GDR Power
5121 Dekker Rd.
Outlook, WA. 98938

Contact at the site: Regen
Attn: Phil Losier or Dan DeRuyter

IN COMPLIANCE WITH THE PROVISIONS OF THE STATE OF WASHINGTON CLEAN AIR ACT (Revised Code of Washington (RCW)) CHAPTER 70.94.152, WASHINGTON ADMINISTRATIVE CODE (WAC) 173-400-110, 173-460-040:

ISSUE DATE: March 19, 2019

THIS ORDER OF APPROVAL PERMIT IS SUBJECT TO THE FOLLOWING CONDITIONS:

Modification/Installation of the equipment must be conducted in compliance with all data and specifications submitted with the New Source Review (NSR) application under which this Order of Approval is issued unless otherwise specified herein. The conditions and limitations of this NSR Order of Approval are attached as follows:



1.0 DESCRIPTION OF THE SOURCE

- 1.1 GDR Power; hereafter referred to as the Permittee, the Facility, GDR or the Source is the owner and operator of a dairy operation and a dairy manure anaerobic digester at the above site. The Permittee applied and was issued a New Source Review (NSR) Permit in 2006 (NSRP-02-GDSD-06) for anaerobic digester (3,125,000 gallons), 2 generator sets and a biogas flare to combust any excess (unused) methane produced by the digester. The Permittee submitted a NSR application on January 10, 2019 proposing to remove the generators sets and to combust biogas in the flare (temporarily), heat the digester with a temporary boiler (less than 365 days from the issuance of this Order) and later a permanent Natural gas-fired boiler (stage 1). Eventually (within a year at most) all the biogas will be sent to adjacent Augean Renewable Natural Gas (RNG) LLC facility (stage 2). The Augean RNG LLC will operate under a separate NSR permit which will inject the upgraded generated methane gas after scrubbing it into a nearby Natural Gas (NG) pipeline.
- 1.2 This NSR application is for stage 1 of the project. The proposed project (stage 1) is to make minor modification to the existing plug flow anaerobic digester and the existing flare, install one temporary 150 Hp boiler (Parker), one 34.5 Hp generator, one NG permanent boiler 190 Hp (Parker). The NG permanent boiler will be installed after the Augean RNG LLC project is complete (Stage 2). The current existing flare is a candlestick type manufactured by Andgar Corporation (open flare). The two electrical generator-set will be removed from the site. Stage 2, to be proposed soon, through another NSR application, is to install and operate the Augean RNG LLC facility to receive all produced biogas from the GDR power, scrub the Hydrogen Sulfide (H_2S), and remove the Carbon Dioxide (CO_2) and other gases from the biogas prior to injection into a nearby NG pipeline.
- 1.3 Air emissions from this operation hereafter known as stage 1 are in the form of small Particulate Matter (PM_{10} , $PM_{2.5}$), Oxides of Nitrogen and Sulfur (NO_x , SO_x), Methane, H_2S , Volatile Organic Compounds (VOCs) some of which are known as Hazardous Air Pollutants (HAPs) and Toxic Air Pollutants (TAPs) in accordance with the Federal Clean Air Act (FCAA) or Washington Administrative Code (WAC), respectively.
- 1.4 Air emissions are emitted from the flare, the temporary boiler (less than 365 days) and permanent NG boiler and the small generator combustion operations. The City of Yakima, issued a DNS for this installation for the State Environmental Policy Act (SEPA) requirement on March 3, 2016.
- 1.5 The layout and specifications of stage 1 were submitted with the NSR application and are enclosed in the NSR review as provided by the Permittee and are shown in the Figures below.
- 1.6 New emissions units and modifications of operations at the anaerobic digester are considered installation and a modification of air contaminants requiring a NSR and an



Order of Approval (Order/Permit) pursuant to the Revised Code of Washington (RCW) 70.94.152 and the Washington Administrative Code (WAC) 173-400-110 and 173-460-040

2.0 DETERMINATIONS.

In relation to the above installation and modification, YRCAA determines that the Source shall comply with the federal, state and local regulations and laws including but not limited to the following determination:

- 2.1 The Facility is located in an area that is in attainment with all state and federal air quality standards for all criteria pollutants;
- 2.2 The Facility is not a major stationary source as of the date of issuance of this Order nor this modification is subject to the Prevention of Significant Deterioration (PSD) permitting requirements of WAC 173-400-700 through 173-400-750;
- 2.3 The temporary and the permanent boilers have a heat capacity of less than 10 MMBtu/hr and therefore neither boiler is subject to 40 CFR Part 60 New Source Performance Standards (NSPS) for Area Sources: Subpart Dc, Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units pursuant to 40 CFR 60.40c(a);
- 2.4 The permanent proposed 190 Hp natural gas-fired boiler meets the definition of gas-fired boiler in Subpart 6J is, therefore, not subject to Subpart 6J according to 63.11195(e). No other NESHAPs apply to the permanent boiler.
- 2.5 The temporary boiler will be permanently disconnected from any fuel supply and water source within 30 days of the date that the permanent boiler first supplies useful heat to the anaerobic digester. Operation of the temporary boiler shall not exceed 364 days from the start of the operation.
- 2.6 The modification and installation for this stage 1 project, is subject to the requirements of WAC 173-400-110 "General Regulation for air pollution Sources- New source review (NSR) for sources and portable sources" and WAC 173-460-040 "Controls for new sources of toxic air pollutants- New Source Review", thus, this NSR being processed;
- 2.7 The Facility is subject to the annual Registration Program as outlined in WAC 173-400-099 –and YRCAA Regulation 1, 4.01. Thus, the Facility shall submit their annual report including the annual air emissions with the required fees to YRCAA on the sent out specified forms by YRCAA on or before the specified date from the previous year.



THEREFORE, it is hereby ordered that the project (stage 1) as described above, in the NSR application, and in detailed plans, specifications and other information submitted in reference thereto, is **APPROVED** for operation, **PROVIDED** the specification submitted with the application and the following conditions are met:

3.0 OPERATIONAL APPROVAL CONDITIONS.

- 3.1 This Order is for stage 1 operation, which shall not continue beyond one year from the date of issuance of this Order of this project as specified in 1.1 above. After one year, and thereafter, only the anaerobic digester, NG boiler and the emergency backup generator will continue to operate, provided all biogas are delivered to Augean RNG LLC (stage2). The Facility is located at 5121 Dekker Rd., Outlook, Washington, in accordance with the plan and specifications submitted with the NSR application to YRCAA. The specification for the digester and equipment are shown in Table 1 of this Order.
- 3.2 Best Available Control Technology (BACT) and Toxic BACT (t-BACT) pursuant to RCW 70.94.152, WAC 173-400-113 and WAC 173-460-060 shall be satisfied for any proposed new facility or modified air emission source to control air emissions. YRCAA finds BACT to be satisfied as follows:
 - 3.2.1 Hydrogen sulfide concentration shall not exceed 350 parts per million (ppm) after air injection on a 30 day rolling average inside the digester as measured immediately prior to any combustion unit i.e., flare. In no case or event, shall the raw biogas be released directly to the ambient atmosphere.
 - 3.2.2 The permanent boiler (Parker) rated at 6.3 MMBTU/hr) will be equipped with the burner as stipulated in the manufacturer's technical specifications submitted to YRCAA and run on natural gas only;
 - 3.2.3 The temporary boiler (Parker boiler Model #GO-5000)- rated at 5 MMBTU/hr is dual fuel diesel #2 and NG/LPG with capacity of 36 gallon /hr diesel. Only Ultra Low Sulfur Diesel (ULSD) shall be used and only during the initial startup of the digester. Once there is enough biogas available to fuel the boiler, only biogas or NG/LPG i.e., propane shall be used. The temporary boiler will be permanently disconnected from any fuel supply and water source within 30 days of the date that the permanent boiler first supplies useful heat to the anaerobic digester. Operation of the temporary boiler shall not exceed 364 days from the start of the operation. GDR power shall submit a notification within 7 days from the date of permanently disconnecting the temporary boiler from service;
 - 3.2.4 The maximum air emission limits for NO_x, CO, PM and other air emissions shall be limited, as per the submitted specifications with this NSR application and specified in the emission limit Section 5.0 below;
 - 3.2.5 An Operation and Maintenance (O&M) plan for the flare, boilers shall be



developed in accordance with the manufacturers recommended standards;

- 3.2.6 The flare, boilers must be operated as per manufacturer specifications, tune-ups, maintenance and any required certification;
- 3.2.7 TAP air emissions shall always be below the Acceptable Source Impact Levels (ASIL);
- 3.2.8 The permanent 190Hp boiler will use only NG as the sole source of fuel for the boiler;
- 3.2.9 The flare and air emissions from the boiler and backup generator shall meet the ASIL of WAC 173-460 and the National Ambient Air Standards (NAAQs) of 40 CFR Part 50 and as specified in this Order; and
- 3.2.10 The flare shall not operate more than one year for stage 1 of the project. Stage 2 (Augean RNG LLC) project, shall be completed within one year from the issuance date of this Order and all the biogas shall be diverted to it. The flare at that point in time shall not be used except, in emergency conditions and with a prior approval by YRCAA. Prior approval should be obtained from YRCAA in writing. Emergency shall have the mean an "Act of God" or as defined in the U.S. Federal Clean Air Act.

3.3 All air emissions from this Facility shall be in compliance with air emission standards at all times. It is the responsibility of the owner to make sure that air emissions are within all known rules and regulatory standards, including but not limited to 40 CFR Part 50, WAC 173-400-040 and 173-460.

3.4 This Order authorizes the operation of the following equipment:

Table 1 List of authorized Equipment to be installed/modified (Stage 1).

Units	Unit Type	Manufacturer	Model/ Serial number and/or Size	Motor Hp (Capacity)
1	Anaerobic Digester (plug flow)	Built by Andgar Corporation	Capacity 3.125MM gallons-plug flow reactor	
1	Open elevated flare- Candlestick Built by Andgar Corp.	At the end of the digester		10 inches diameter- (650 SCFM)
1	Industrial Boiler	Parker Industrial boiler	GO-5000, Dual Fuel diesel and biogas	150 Hp Temporary for <365 days.
1	Industrial Boiler	Parker Industrial boiler	T6800L- Natural Gas only	190 Hp
1	Backup generator			34.5 Hp



- 3.5 Concentration of the Hydrogen sulfide (H_2S) in the biogas (inside the digester) downstream of the air injection and prior to the flare shall not exceed a maximum of 350 ppm on a thirty day rolling average based on the daily measurement or weekly measurement if approved.
- 3.6 Concentration of the hydrogen sulfide in condition 3.5 of this Order shall be determined and continue the testing during and after the startup period. Startup period is defined by the time that mature biogas is built up and the flare is going (this period may vary, but shall not to exceed 6 to 8 weeks), by monitoring and testing methods as follows:
- 3.6.1 The Permittee shall measure the concentration of H_2S in ppm in the biogas immediately prior going to flare and after the air injections using gas detection tubes with a concentration range designed to accurately measure the concentration of H_2S in the biogas at the time of the measurement as submitted with the NSR application or by using a handheld Sewerin Multitec 540 H_2S gas analyzer.
- 3.6.2 The H_2S measurement of the biogas must be made prior to venting of biogas to the flare and upstream of the air injections. Thereafter, the total H_2S in the biogas shall be accurately measured prior to the combustion by the flare once per calendar day unless less frequent monitoring has been approved according to the terms of this Order.
- 3.6.3 During and after the initial start-up period not to exceed 6 to 8 weeks as defined above, the Permittee shall submit a report to the YRCAA once per week. Reports are due within 3 days from the end of the seven days. Each report shall at minimum; include the daily H_2S measurements in ppm, the means by which the measurements were made, and the biogas production in standard cubic feet per day.
- 3.6.4 The Permittee shall report all H_2S measurements in excess of the limits established in conditions 3.5 to our agency within 12 hours of measurement, the probable cause of such deviations, and any corrective actions or preventative measures taken.
- 3.6.5 All measured biogas shall not be released to the ambient air and shall be routed to the flare during stage 1 of the project or to Augean RNG LLC (stage 2) facility once completed, which shall occur within one year from the issuance of this Order.
- 3.6.6 After 90 consecutive days from the startup, as defined above, during which every H_2S measurement indicates compliance with condition 3.5 the Permittee may submit a written request that the H_2S monitoring frequency



reduced from daily to once a week (7 days). The request must include an analysis of the H₂S monitoring data collected during the previous 90 days and an explanation as to why these data support the request. Only upon written approval by YRCAA of the request, the Permittee may test at the reduced frequency of once a week until such time as the results indicate noncompliance with condition 3.5. If this occurs, the Permittee shall revert to the daily testing frequency for at least another 90 consecutive days, at which time the Permittee may request to reduce testing frequency again using the same process as above.

- 3.7 The flame from the flare shall always be burning at all times during stage 1 (this project). In no event, the biogas shall be vented directly to the ambient air. The flare shall be operational at all times and shall be equipped with thermocouple at the flare tip to monitor that the flame is working.
- 3.8 The flame from the flare shall not be used after the establishment of stage 2 of the Augean RNG LLC. In another words, all biogas will be delivered to Augean RNG LLC stage 2 within a period not to exceed one year from the issuance date of this Order. The flare may be used in case of emergency condition as defined above with a prior approval by YRCAA. Prior approval should be obtained from YRCAA in writing.
- 3.9 The flare height shall be at least 28 feet high from the ground level.
- 3.10 The Permittee shall assure that the digester gas is combusted either in the flare or in the digester gas boiler or in an approved method by YRCAA, in writing, prior to implementation. In addition, to the maximum extent possible provided plant safety and safety to the surrounding community is assured, The Permittee shall maximize combustion of digester gas in the flare for stage 1.
- 3.11 The Permittee must develop and implement a site-specific O&M plan based on the manufacturers, designer experience as part of the BACT above. The O&M Plan shall contain at least four sections: general information, operation plan (i.e., key operating parameters), maintenance plan and any other additional information. The Permittee must develop the O&M plan within 60 days after the issuance of this Order and shall include, but not be limited to the following:
 - 3.11.1 The Permittee shall provide appropriate training in operating the digester and the flare to all operators; and
 - 3.11.2 Check the digester, flare for signs of damage as per designer's recommended intervals. If no recommended intervals, it shall be done at least monthly. The Log of any repairs or replacements to any installed equipment shall be reported to YRCAA within 10 days.



- 3.12 Within 60 days from the date of issuance of this Order, the Permittee shall submit notification to YRCAA indicating that the O&M plan is completed and in place. If the Permittee needs to make any future modification to the digester, flare, boiler, emergency generator or the method of operating the units beyond those approved in this Order, an approval in writing from YRCAA must be obtained before such modification takes place.
- 3.13 No emissions shall be released from this operation beyond the property boundary in a quantity that interferes unreasonably with the use and enjoyment of the property owner upon which the material is deposited or is detrimental to the health, safety or welfare of any person or causes damage to any property or business.
- 3.14 An initial opacity as measured by 40 CFR Part 60, Appendix A, Method 9, July 1, 2004 from the flare, the temporary boiler and the permanent boiler must be conducted within 30 days of startup of each emission unit and shall not exceed five, five (when using diesel otherwise 0% for biogas) zero percent (5%, (5%, 0%) and 0%), respectively, average for six consecutive minutes in any given one hour period. The Permittee shall maintain the 5% or less for the flare and 0% opacity from the boilers using biogas, NG/LPG or 5% when using ULSD at all times, except during periods of startup, shutdown or malfunction as provided in WAC 173-400-081.
- 3.15 In addition to the initial opacity reading above, once a month, the Permittee shall conduct and record visual opacity from the flare (5%) and the boiler stack (0%). Zero percent (0%) opacity means no visible smoke may be seen. Heat waves are acceptable, only heat wave may be seen. If the observer sees any kind of smoke, the Permittee shall immediately take corrective action as directed in the O&M plan until visible emissions are 5% and 0% opacity, respectively. Corrective actions may include the following:
 - 3.16.1 Certify that the flare and boilers is performing according to its design functions within the acceptable design parameters and are being operated according to O&M procedures. The flare and boiler must be checked against all operational conditions that have resulted in compliance in the past. If the boiler is not performing according to its design and O&M procedures, the Permittee must take corrective action within 48 hours to correct the problem; or
 - 3.16.2 Conduct an opacity evaluation by a certified opacity reader in accordance with 40 CFR 60, Appendix A, Method 9 within 48 hours of the malfunction correction to verify compliance with the 5% and 0% opacity limit. If opacity is greater than 5% and 0%, appropriate and timely corrective action must be taken no later than 48 hours to identify and correct the problem causing the opacity. If the Permittee has no certified reader on site, the Permittee should call YRCAA and will be advised accordingly.
- 3.16 In accordance with WAC 173-400-105(4) and YRCAA Regulation 1, Article V, Section 5.11(c), the Permittee shall conduct a source test when deemed necessary by YRCAA to demonstrate compliance for any air pollutant, specific to this Order. YRCAA will inform



the Permittee of the source test requirement and method at that time, if deemed necessary.

- 3.17 The YRCAA Air Pollution Control Officer (APCO) or his designated staff shall be allowed to enter the Facility at reasonable times to inspect for compliance with applicable laws, regulations and the conditions on this Order.

4.0 GENERAL APPROVAL CONDITIONS.

- 4.1 The flare and the boilers shall comply with all other requirements specified in all current federal, state and local air pollution laws and regulations, including, but not limited to, RCW 70.94 (Washington Clean Air Act), WAC 173-400 (General Regulations for Air Pollution Sources), WAC 173-460 (Controls for New Sources of Toxic Air Pollutants), 40 CFR Part 60 and the YRCAA Regulation 1.
- 4.2 All plans, specifications or other information submitted to YRCAA and any further authorizations, approvals, or denials in relation to this project, shall be incorporated herein and made a part of the YRCAA file and this Order.
- 4.3 Nothing in this approval shall be construed as obviating compliance with any requirement(s) of law including those imposed pursuant to the Washington Clean Air Act, and rules and regulations thereunder. Any violation(s) of such rules and regulations are penalized in accordance with RCW 70.94.430 and YRCAA Regulation 1, Article 5, Compliance and Enforcement.
- 4.4 Authorization may be modified, suspended or revoked in whole or part for cause including, but not limited to, the following:
- 4.4.1 Violation of any terms or conditions of this authorization; or,
- 4.4.2 Obtaining this authorization by misrepresentation or failure to disclose fully all relevant facts.
- 4.5 The provisions of this authorization are severable and, if any provision of this authorization, or application of any provisions of this authorization to any circumstance, is held invalid, the application of such provision to their circumstances, and the remainder of this authorization, shall not be affected thereby.
- 4.6 This Order and its requirements apply to the Facility owner and/or operator(s) and any contractor or subcontractor performing any activity authorized under this Order. Any persons, including contractors and/or subcontractors, not in compliance with the applicable requirements in this Order are in violation of State and local laws and subject to appropriate civil and criminal penalties. The Facility owner and/or operator, and all contractors or subcontractors are liable for the actions and violations of their employees. Any violation committed by a contractor or subcontractor shall be considered a violation by the Facility owner and/or operator, and is also a violation by the contractor and/or any



subcontractors.

- 4.7 Laws, rules and regulations may be superseded or revised without notice. It is the Permittee's responsibility to stay current with laws, rules and regulations governing their business and therefore is expected to comply with all new laws, rules and regulations immediately upon their effective date. New laws, rules and regulation updates will be incorporated into existing Orders or upon renewal of said Orders.
- 4.8 All air emissions from the operations of this Facility shall be in compliance with all air emission standards at all times. It is the responsibility of the owner to make sure that air emissions are within all known and promulgated laws, rules and regulations standards.
- 4.9 If, or whenever the Permittee wants to change the quantity of air emissions set forth in this Order or any modification to the digester, boiler, another NSR must be filed with YRCAA before any change takes place and BACT requirements must be satisfied.
- 4.10 This Order is invalid without paying the required fees to YRCAA, pursuant to RCW 70.94.152 within the specified time on the invoice.

5.0 EMISSION LIMITS

- 5.1 Hydrogen sulfide shall not exceed 350 ppm (inside the digester prior to flare combustion) as stated and specified in the above conditions.
- 5.2 Pursuant to WAC 173-400-113(2), the flare and the boilers shall use the specified burner as stated in the NSR application and the specified emission limit.
- 5.3 Air emissions from this operation stage 1, are estimated to generate small PM₁₀, PM_{2.5}, CO, VOC's, NO_x, SO_x and others as shown in Appendix A. These maximum emissions shall not be exceeded as specified in the Appendix.
- 5.4 Only ULSD will be used with a sulfur content of less than 0.0015% (15ppm) by weight;
- 5.5 Emissions of NO_x from the boiler shall not exceed 30 parts per million by volume, dry and corrected to three percent oxygen (30 ppmvd @ 3% O₂) using NG fuel.
- 5.6 Emissions of CO from the boiler shall not exceed fifty parts per million by volume, dry and corrected to three percent oxygen (50 ppmvd @ 3% O₂) using NG fuel.
- 5.7 TAPs air emissions shall always be below the Acceptable Source Impact Levels (ASIL);



6.0 MONITORING AND RECORDKEEPING REPORTING REQUIREMENTS.

- 6.1 The Permittee shall record the daily amount of biogas generated and used, NG used, the number of hours the digester was running, and dates of use for each boiler and report to YRCAA as stated in the above condition.
- 6.2 The Facility shall submit their annual registration forms (report) including the annual air emissions with the required fees to YRCAA on the sent-out specified forms by YRCAA on or before the specified date from the previous year.
- 6.3 This Order and its conditions shall remain in effect in the event of any change in control of ownership or operation of the Facility. In the event of any such change in control of ownership or operation, the Permittee shall notify the succeeding owner of this Order and conditions and shall notify the YRCAA of the change by filing an "Ownership or Name Change" form within fifteen (15) days of that change. The form can be obtained or requested from YRCAA's office or the website.
- 6.4 If any other source test is ever required for this operation, except as specified in the approval conditions above, the results of the source test shall be submitted to the YRCAA within 30 days following the completion date of the source test.
- 6.5 The final source test results must be reported to YRCAA in units of ppmvd, pounds per hour and potential tons per year for each pollutant.
- 6.6 The Permittee shall keep all records including this Order on site. Records shall include, at minimum, the monthly number of hours of operation of all units, the daily biogas production, the NG usage, and the O&M items performed. Forms for recordkeeping must be designed by the Permittee and shall include the date and time of maintenance performed and the operator's name.
- 6.7 The required records, logs and O&M plan for this Facility shall be kept on site and shall always be available to the APCO of the YRCAA or his designated staff during inspections or upon request. The O&M plan shall be updated to reflect any changes in operating procedures and such changes shall be routinely implemented.
- 6.8 Records shall be maintained and kept at the site for the most recent three year period, and be made available during inspections or when requested by YRCAA.
- 6.9 Any application form, report, compliance certification, monthly record and the annual consumption report submitted to YRCAA pursuant to this Order must be signed by the responsible official.
- 6.10 Total air emissions for each air pollutant including HAPs/TAPs, and the number of hours of operation must be calculated and reported to YRCAA on an annual basis as specified in the annual registration documents provided by YRCAA to the Facility, as long as the Facility is not a Title V source.



You may appeal this Order to the Pollution Control Hearings Board (PCHB) within 30 days of the date of receipt of this Order. The appeal process and applicable requirements is governed by Chapter 43.21B RCW. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do all of the following within 30 days of the date of receipt of this Order:

- File your appeal and a copy of this Order with the PCHB, P.O. Box 40903, Olympia, WA, 98504-0903. Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this Order on YRCAA in paper form - by mail or in person. E-mail is not accepted.

DATED at the City of Yakima, Washington this 19th day of March 2019.

PREPARED and REVIEWED BY:

A blue ink signature of Hasan M. Tahat, written over a horizontal line.

Hasan M. Tahat, Ph.D.
Compliance, Engineering and Planning Division Supervisor
Yakima Regional Clean Air Agency

REVIEWED BY:

A blue ink signature of Norman Hepner, written over a horizontal line.

Norman Hepner, P.E.,
Nth Degree Engineering Solutions

ISSUED BY:

A blue ink signature of Keith M. Hurley, written over a horizontal line.

Keith M. Hurley
Air Pollution Control Officer
Yakima Regional Clean Air Agency



Appendix A

GDR Power
NSRP-03-GDRP-19
Page 13 of 25

Potential to Emit Emission Inventory (tons per year)

Stage 1 Potential to Emit (PTE)

Sources	PM (ton/yr)	PM10 (ton/yr)	PM2.5 (ton/yr)	SO2 (ton/yr)	NOx (ton/yr)	VOC (ton/yr)	CO (ton/yr)	Pb (ton/yr)	HAPS (ton/yr)	CO2e MT/yr
Biogas Flare	0.698	0.698	0.698	13.84	6.37	13.11	34.64	4.77E-05	0.17	16,637
Temporary Dual-fuel Boiler, 5 MMBtu/hr										
Fuel Oil	0.520	0.520	0.520	0.03	3.15	0.04	0.79	2.38E-04	0.04	3,206
Biogas	0.163	0.163	0.163	3.24	2.15	0.12	1.80	1.07E-05		2,356
34.5 Hp Backup Emergency Generator	3.80E-03	3.80E-03	3.80E-03	3.54E-03	1.55E-03	4.34E-03	1.15E-02	5.92E-09	7.79E-05	
TOTAL	1.222	1.222	1.222	17.079	9.521	13.230	36.455	2.86E-04	0.218	19,844

Stage 2 Potential to Emit (PTE)

Sources	PM (ton/yr)	PM10 (ton/yr)	PM2.5 (ton/yr)	SO2 (ton/yr)	NOx (ton/yr)	VOC (ton/yr)	CO (ton/yr)	Pb (ton/yr)	HAPS (ton/yr)	CO2e MT/yr
Biogas Flare (only used in upset situation)										
Natural Gas-Fired Boiler, 6.3 MMBtu/hr	0.206	0.206	0.206	0.02	2.71	0.15	2.27	2.23E-03	0.01	2,969
34.5 Hp Backup Emergency Generator	3.80E-03	3.80E-03	3.80E-03	3.54E-03	1.55E-03	4.34E-03	1.15E-02	5.92E-09	7.79E-05	
TOTAL	0.209	0.209	0.209	0.020	2.707	0.153	2.284	2.23E-03	0.008	2,969

General Notes:

-- Fugitive emissions are negligible and are not included

Appendix A

GDR Power

NSRP-03-GDRP-19

Page 14 of 25

The emissions source is the digester. H2S emissions are reduced in Stage 1 using									
aeration in the digester.									
Peak digester gas flow rate			625	scfm					
Peak Hourly gas production			37,500	scfh					
Maximum hours of production			8,760	hr/yr					
Maximum PTE gas produced			328.5	mmscf/yr					
Biogas Heat Content			570	Btu/scf					
Peak Hourly Heat in Biogas			21.38	MMBtu/hr					
Maximum PTE Heat in Biogas			187,245	MMBtu/yr					
Peak H2S content of digester gas			500	ppm, controlled by aeration					
Digester Gas Composition, unburned									
			Peak	PTE					
Component	% by vol.	M.W.. (lb/lbmol)	lb/hr	tpy	Combustion Gas, for modeling				
CH4	57.0%	16	888	3,888	528.1	lbmol/ hr, combustion products plus N2			
CO2	38.5%	44	1,649	7,221	37.5	lbmol/ hr, pass through			
O2	0.5%	32	16	68	0.5	lbmol/hr, pass through			
N2	1.5%	28	40.9	179.0	1.5	lbmol/hr, pass through			
H2S, Raw	0.050%	34	1.7	7.2	0.5	lbmol/hr, combustion products plus N2			
H2O	2.4%	18	42.0	184.2	2.3	lbmol/hr, pass through			
	100.0%				570.3	lbmol/hr, Total			
					3,663	scfm, std. conditions			
					16,401	acfm @ 1832°F and 0.97 atm			
Standard Conditions per WAC 173-400-030(84)									
68 F =		527.67	R						
760 mmHg =		1	atm						
Standard molar volume:		385.3	scf/lbmol						
Ideal gas constant									
0.7302	ft^3 atm / (lbmol R)								

Appendix A
GDR Power
NSRP-03-GDRP-19
Page 15 of 25

Peak Hourly gas production 37,500 scf/hr
 Maximum hours of production 8,760 hr/yr
 Peak Hourly Heat in Biogas 21.38 MMBtu/hr
 Maximum PTE Heat in Biogas 187,245 MMBtu/yr
 Stage 1 digester gas H₂S 500 ppmv (parts per million by volume)
 Stage 2 digester gas H₂S not flared under normal operations

Pollutant	PTE Emissions		Emission Factor		
	lb/hr	tpy	value	units	reference
PM/PM ₁₀ /PM _{2.5}			7.6	lb/mmcsf	AP-42, Table 1.4-2
	0.159	0.698	7.45E-03	lb/mmBtu	Divide by 1020 Btu/scf as per AP-42
S1 - Sulfur Dioxide (500 ppmv H ₂ S)			0.05	mol% H ₂ S	AP-42, Table 5.3-1. Updated 1/95
	3.16	13.8	84.25	lb/mmcsf	SO ₂ (lb/mmcsf) = 1685 (mol% H ₂ S)
Nitrogen Oxides (NO _x)	1.45	6.37	0.068	lb/mmBtu	AP-42 Table 13.5-1
Volatile Organic Compounds (VOC)	2.99	13.1	0.14	lb/mmBtu	AP-42 Table 13.5-1
Carbon Monoxide (CO)	7.91	34.6	0.370	lb/mmBtu	AP-42 Table 13.5-1
Lead (Pb)			5.2E-04	lb/mmcsf	AP-42 Table 1.4-2
	1.09E-05	4.77E-05	5.10E-07	lb/mmBtu	Divide by 1020 Btu/scf as per AP-42
H ₂ S, Flare removes 98%	0.0331	0.145	2% of the aerated digester H ₂ S output		
Carbon Dioxide (CO ₂)			120,000	lb/mmcsf	AP-42, Table 1.4-2
	2,515	11,014	118	lb/mmBtu	Divide by 1020 Btu/scf as per AP-42
Nitrous Oxide (N ₂ O)			2.2	lb/mmcsf	AP-42, Table 1.4-2
	0.046	0.202	2.16E-03	lb/mmBtu	Divide by 1020 Btu/scf as per AP-42
Methane (CH ₄)			2.3	lb/mmcsf	AP-42, Table 1.4-2
	0.048	0.211	2.25E-03	lb/mmBtu	Divide by 1020 Btu/scf as per AP-42

BIOGAS FLARE - HAPs & TAPs

HAP and TAP Emission factor source: AP-42 Tables 1.4-3 & -4 (07/98).

Flare Potential Toxic Air Pollutant Emissions with Annual Averaging Periods

CAS Nbr.	Pollutant	Emission Factor (lb/mmcsf)	Emission Factor (lb/mmBtu)*	Emission Rates (lb/hr)	PTE Emission (lb/yr)	HAPs (tpy)
7440382	Arsenic	2.00E-04	1.96E-07	4.19E-06	3.67E-02	1.84E-05
71432	Benzene	2.10E-03	2.06E-06	4.40E-05	3.86E-01	1.93E-04
7440417	Beryllium	1.20E-05	1.18E-08	2.51E-07	2.20E-03	1.10E-06
7440439	Cadmium	1.10E-03	1.08E-06	2.31E-05	2.02E-01	1.01E-04
7440473	Chromium	1.40E-03	1.37E-06	2.93E-05	2.57E-01	1.29E-04
106467	1,4-Dichlorobenzene (para-)	1.20E-03	1.18E-06	2.51E-05	2.20E-01	1.10E-04
50000	Formaldehyde	7.50E-02	7.35E-05	1.57E-03	1.38E+01	6.88E-03
91203	Naphthalene	6.10E-04	5.98E-07	1.28E-05	1.12E-01	5.60E-05
7440020	Nickel	2.10E-03	2.06E-06	4.40E-05	3.86E-01	1.93E-04
56495	3-Methylcholanthrene	1.80E-06	1.76E-09	3.77E-08	3.30E-04	1.65E-07
57977	7,12-Dimethylbenz(a)anthracene	1.60E-05	1.57E-08	3.35E-07	2.94E-03	1.47E-06
56553	Benz(a)anthracene	1.80E-06	1.76E-09	3.77E-08	3.30E-04	1.65E-07
205992	Benzo(b,k)fluoranthene	1.80E-06	1.76E-09	3.77E-08	3.30E-04	1.65E-07
53703	Dibenz(a,h)anthracene	1.20E-06	1.18E-09	2.51E-08	2.20E-04	1.10E-07
218019	Chrysene	1.80E-06	1.76E-09	3.77E-08	3.30E-04	1.65E-07
193395	Indeno(1,2,3-cd)pyrene	1.80E-06	1.76E-09	3.77E-08	3.30E-04	1.65E-07
50328	Benzo(a)pyrene	1.20E-06	1.18E-09	2.51E-08	2.20E-04	1.10E-07

* Divide lb/mmcsf factor by 1020 Btu/scf as per AP-42 Tables 1.4-3 & 4.

Flare Potential Toxic Air Pollutant Emissions with 24-hour Averaging Periods

CAS Nbr.	Pollutant	Emission Factor (lb/mmcsf)	Emission Factor (lb/mmBtu)*	Emission Rates (lb/hr)	PTE Emission (lb/yr)	HAPs (tpy)
7440484	Cobalt	8.40E-05	8.24E-08	1.76E-06	1.54E-02	7.71E-06
7783064	Hydrogen Sulfide (H ₂ S)			3.31E-02	290	
7439965	Manganese	3.80E-04	3.73E-07	7.96E-06	6.98E-02	3.49E-05
7439976	Mercury	2.60E-04	2.55E-07	5.45E-06	4.77E-02	2.39E-05
110543	n-Hexane	1.80E+00	1.76E-03	3.77E-02	3.30E+02	1.65E-01
7782492	Selenium	2.40E-05	2.35E-08	5.03E-07	4.41E-03	2.20E-06
108883	Toluene	3.40E-03	3.33E-06	7.13E-05	6.24E-01	3.12E-04

* Divide lb/mmcsf factor by 1020 Btu/scf as per AP-42 Tables 1.4-3 & 4.

HAPs (tpy) 1.73E-01

Flare Potential Toxic Air Pollutant Emissions with 1-hour Averaging Periods

CAS Nbr.	Pollutant	Emission Factor (lb/mmcsf)	Emission Factor (lb/mmBtu)*	Emission Rates (lb/hr)	PTE Emission (lb/yr)	HAPs (tpy)
7440484	Carbon Monoxide			7.91	69,281	
10102440	Nitrogen Dioxide			1.45	12,733	
74460905	Sulfur Dioxide			3.16	27,676	

* Divide lb/mmcsf factor by 1020 Btu/scf as per AP-42 Tables 1.4-3 & 4.

GREENHOUSE GAS POLLUTANTS

Based on CH₄ combustion and un-combusted biogas

Compound	PTE Emission (tpy)	PTE Emission (MT/yr)	Global Warming Potential	CO ₂ e* (MT/yr)
Carbon Dioxide (CO ₂)				—
Biogas Pass-thru	7,221	6,565	1	6,565
Combustion Product	11,014	10,013	1	10,013
Methane (CH ₄)	2.11E-01	1.92E-01	25	5
Nitrous Oxide (N ₂ O)	2.02E-01	1.84E-01	298	55
TOTAL				16,637

Appendix A

GDR Power
NSRP-03-GDRP-19
Page 16 of 25

TEMP BOILER - CRITERIA POLLUTANTS

Fuel Oil

Peak Heat Input 5 MMBtu/hr
Potential Hours of Operation 8,760 hr/yr
Peak Fuel Oil Feed Rate 36 gal/hr

Pollutant	PTE Emissions		Emission Factor		
	lb/hr	tpy	value	units	reference
PM/PM ₁₀ /PM _{2.5}	0.12	0.520	3.3	lb/1000 gal	AP-42, Table 1.3-1, boiler<100 mmBtu, distillate oil
Sulfur Dioxide (low-sulfur) ⁽¹⁾	7.56E-03	0.033	0.21	lb/1000 gal	AP-42, Table 1.3-1, boiler<100 mmBtu, distillate oil
Nitrogen Oxides (NOx)	0.72	3.15	20	lb/1000 gal	AP-42, Table 1.3-1, boiler<100 mmBtu, distillate oil
Volatile Organic Compounds (VOC)	9.07E-03	0.040	0.252	lb/1000 gal	AP-42, Table 1.3-1, boiler<100 mmBtu, distillate oil
Carbon Monoxide (CO)	0.18	0.79	5	lb/1000 gal	AP-42 Table 1.3-1
Lead (Pb)	5.44E-05	2.38E-04	1.5E-03	lb/1000 gal	AP-42 Table 1.3-11
Carbon Dioxide (CO ₂)	802.80	3516.26	22,300	lb/1000 gal	AP-42 Table 1.3-12
Nitrous Oxide (N ₂ O)	0.01	0.04	0.23	lb/1000 gal	AP-42 Table 1.3-8
Methane (CH ₄)					

(1) 142*wt%S, S=0.0015%

GREENHOUSE GAS POLLUTANTS

Compound	PTE Emission (tpy)	PTE Emission (MT/yr)	Global Warming Potential	CO ₂ e* (MT/yr)
Carbon Dioxide (CO ₂)	3.52E+03	3,197	1	3,197
Methane (CH ₄)			25	
Nitrous Oxide (N ₂ O)	3.63E-02	3.30E-02	298	10
TOTAL				3,206

Biogas

Peak Heat Input 5 MMBtu/hr
Potential Hours of Operation 8,760 hr/yr
Peak biogas feed rate 8,772 scfh

Pollutant	PTE Emissions		Emission Factor		
	lb/hr	tpy	value	units	reference
PM/PM ₁₀ /PM _{2.5}	0.04	0.163	7.45E-03	lb/mmBtu	AP-42, Table 1.4-2
Sulfur Dioxide (500 ppmv H ₂ S)	0.74	3.237	84.25	lb/mmBtu	AP-42, Table 5.3-1. Updated 1/95
Nitrogen Oxides (NOx)	0.49	2.147	9.80E-02	lb/mmBtu	AP-42, Table 1.4-1
Volatile Organic Compounds (VOC)	0.03	0.118	5.39E-03	lb/mmBtu	AP-42, Table 1.4-2
Carbon Monoxide (CO)	0.41	1.804	8.24E-02	lb/mmBtu	AP-42, Table 1.4-1
Lead (Pb)	2.45E-06	0.000	4.90E-07	lb/mmBtu	AP-42 Table 1.4-2
Carbon Dioxide (CO ₂)	588	2,576	118	lb/mmBtu	AP-42, Table 1.4-2
Nitrous Oxide (N ₂ O)	0.01	0.047	2.16E-03	lb/mmBtu	AP-42, Table 1.4-2
Methane (CH ₄)	0.01	0.049	2.25E-03	lb/mmBtu	AP-42, Table 1.4-2

(1) 142*wt%S, S=0.0015%

GREENHOUSE GAS POLLUTANTS

Compound	PTE Emission (tpy)	PTE Emission (MT/yr)	Global Warming Potential	CO ₂ e* (MT/yr)
Carbon Dioxide (CO ₂)	2.58E+03	2,342	1	2,342
Methane (CH ₄)	4.94E-02	4.49E-02	25	1
Nitrous Oxide (N ₂ O)	4.72E-02	4.29E-02	298	13
TOTAL				2,356

Appendix A

GDR Power
NSRP-03-GDRP-19
Page 17 of 25

Temporary Boiler Burning Fuel Oil or Biogas

Fuel Oil factors from AP-42 Section 1.3

Biogas factors from AP-42 Section 1.4

Only included HAP/TAPs that are also emitted from flare because it is the dominant source.

Design Parameters

Peak Heat Input 5 MMBtu/hr
Peak Fuel Oil Feed Rate 36 gal/hr
Potential Hours of Operation 8,760 hr/yr

Boiler Potential Toxic Air Pollutant Emissions with Annual Averaging Periods

CAS Nbr.	Pollutant	Fuel Oil		Biogas			Max Emission Rate (lb/hr)	Permitted Emission (tpy)
		E. F. (lb/1000 gal or lb/mmBtu for metals)	Emission Rate (lb/hr)	Emission Factor (lb/mmBtu)	Emission Factor (lb/mmBtu)*	Emission Rate (lb/hr)		
7440382	Arsenic	4.E-06	2.00E-05	2.00E-04	1.96E-07	9.80E-07	2.00E-05	8.76E-05
71432	Benzene	2.14E-04	7.70E-06	2.10E-03	2.06E-06	1.03E-05	1.03E-05	4.51E-05
7440417	Beryllium	3.E-06	1.50E-05	1.20E-05	1.18E-08	5.88E-08	1.50E-05	6.57E-05
7440439	Cadmium	3.E-06	1.50E-05	1.10E-03	1.08E-06	5.39E-06	1.50E-05	6.57E-05
7440473	Chromium	3.E-06	1.50E-05	1.40E-03	1.37E-06	6.86E-06	1.50E-05	6.57E-05
106467	1,4-Dichlorobenzene (para-)			1.20E-03	1.18E-06	5.88E-06	5.88E-06	2.58E-05
50000	Formaldehyde	3.30E-02	1.19E-03	7.50E-02	7.35E-05	3.68E-04	1.19E-03	5.20E-03
91203	Naphthalene	1.13E-03	4.07E-05	6.10E-04	5.98E-07	2.99E-06	4.07E-05	1.78E-04
7440020	Nickel	3.E-06	1.50E-05	2.10E-03	2.06E-06	1.03E-05	1.50E-05	6.57E-05
56495	3-Methylcholanthrene			1.80E-06	1.76E-09	8.82E-09	8.82E-09	3.86E-08
57977	7,12-Dimethylbenz(a)anthracene			1.60E-05	1.57E-08	7.84E-08	7.84E-08	3.44E-07
56553	Benz(a)anthracene	4.01E-06	1.44E-07	1.80E-06	1.76E-09	8.82E-09	1.44E-07	6.32E-07
205992	Benzo(b,k)fluoranthene	1.48E-06	5.33E-08	1.80E-06	1.76E-09	8.82E-09	5.33E-08	2.33E-07
53703	Dibenz(a,h)anthracene	1.67E-06	6.01E-08	1.20E-06	1.18E-09	5.88E-09	6.01E-08	2.63E-07
218019	Chrysene	2.38E-06	8.57E-08	1.80E-06	1.76E-09	8.82E-09	8.57E-08	3.75E-07
193395	Indenol(1,2,3-cd)pyrene	2.14E-06	7.70E-08	1.80E-06	1.76E-09	8.82E-09	7.70E-08	3.37E-07
50328	Benzo(a)pyrene			1.20E-06	1.18E-09	5.88E-09	5.88E-09	2.58E-08

* Divide lb/mmBtu factor by 1020 Btu/scf as per AP-42 Tables 1.4-3 & 4.

Boiler Potential Toxic Air Pollutant Emissions with 24-hour Averaging Periods

CAS Nbr.	Pollutant	Fuel Oil		Biogas			Max. Emission Rate (lb/hr)	Permitted Emission (tpy)
		E. F. (lb/1000 gal or lb/mmBtu for metals)	Emission Rates (lb/hr)	Emission Factor (lb/mmBtu)	Emission Factor (lb/mmBtu)*	Emission Rates (lb/hr)		
7440484	Cobalt			8.40E-05	8.24E-08	4.12E-07	4.12E-07	1.80E-06
7783064	Hydrogen Sulfide (H2S)							
7439965	Manganese	6.E-06	3.00E-05	3.80E-04	3.73E-07	1.86E-06	3.00E-05	1.31E-04
7439976	Mercury	3.E-06	1.50E-05	2.60E-04	2.55E-07	1.27E-06	1.50E-05	6.57E-05
110543	n-Hexane			1.80E+00	1.76E-03	8.82E-03	8.82E-03	3.86E-02
	1,1,1-Trichloroethane	2.36E-04	8.50E-06				8.50E-06	3.72E-05
7782492	Selenium			2.40E-05	2.35E-08	1.18E-07	1.18E-07	5.15E-07
108883	Toluene			3.40E-03	3.33E-06	1.67E-05	1.67E-05	7.30E-05

* Divide lb/mmBtu factor by 1020 Btu/scf as per AP-42 Tables 1.4-3 & 4.

HAPS (tpy)

4.48E-02

Boiler Potential Toxic Air Pollutant Emissions with 1-hour Averaging Periods

CAS Nbr.	Pollutant	E. F. (lb/1000 gal or lb/mmBtu for metals)	Emission Rates (lb/hr)			Emission Rates (lb/hr)	Max. Emission Rate (lb/hr)
7440484	Carbon Monoxide		1.80E-01			1.80E+00	1.80E+00
10102440	Nitrogen Dioxide		7.20E-01			2.15E+00	
74460905	Sulfur Dioxide		7.56E-03			3.24E+00	3.24E+00
7440508	Copper	6.E-06	3.00E-05				3.00E-05

Appendix A

GDR Power
NSRP-03-GDRP-19
Page 18 of 25

PERMANENT BOILER

Burns pipeline natural gas, heat content = 1020 Btu/scf
Peak Heat Input 6.3 MMBtu/hr
Potential Hours of Operation 8,760 hr/yr
Peak natural gas feed rate 6,176 scfh

Pollutant	PTE Emissions		Emission Factor		
	lb/hr	tpy	value	units	reference
PM ₁₀ /PM _{2.5}	0.05	0.206	7.45E-03	lb/mmBtu	AP-42, Table 1.4-2
Sulfur Dioxide	0.0037	0.016	0.60	lb/mmBtu	AP-42, Table 1.4-2
Nitrogen Oxides (NO _x)	0.62	2.705	9.80E-02	lb/mmBtu	AP-42, Table 1.4-1
Volatile Organic Compounds (VOC)	0.03	0.149	5.39E-03	lb/mmBtu	AP-42, Table 1.4-2
Carbon Monoxide (CO)	0.52	2.272	8.24E-02	lb/mmBtu	AP-42, Table 1.4-1
Lead (Pb)	0.0005	0.002	8.07E-05	lb/mmBtu	AP-42 Table 1.4-2
Carbon Dioxide (CO ₂)	741	3,246	118	lb/mmBtu	AP-42, Table 1.4-2
Nitrous Oxide (N ₂ O)	0.01	0.060	2.16E-03	lb/mmBtu	AP-42, Table 1.4-2
Methane (CH ₄)	0.01	0.062	2.25E-03	lb/mmBtu	AP-42, Table 1.4-2

(1) 142*wt%S, S=0.0015%

GREENHOUSE GAS POLLUTANTS

Compound	PTE Emission (tpy)	PTE Emission (MT/yr)	Global Warming Potential	CO ₂ e* (MT/yr)
Carbon Dioxide (CO ₂)	3,246	2,951	1	2,951
Methane (CH ₄)	6.22E-02	5.66E-02	25	1
Nitrous Oxide (N ₂ O)	5.95E-02	5.41E-02	298	16
TOTAL				2,969

NATURAL GAS BOILER - HAPs & TAPs

HAP and TAP Emission factor source: AP-42 Tables 1.4-3 & -4 (07/98).

Potential Toxic Air Pollutant Emissions with Annual Averaging Periods

CAS Nbr.	Pollutant	Emission Factor (lb/mmBtu)	Emission Factor (lb/mmBtu)*	Emission Rates (lb/hr)	PTE Emission (lb/yr)	HAPs (tpy)
7440382	Arsenic	2.00E-04	1.96E-07	1.24E-06	1.72E-03	8.59E-07
71432	Benzene	2.10E-03	2.06E-06	1.30E-05	1.80E-02	9.02E-06
7440417	Beryllium	1.20E-05	1.18E-08	7.41E-08	1.03E-04	5.15E-08
7440439	Cadmium	1.10E-03	1.08E-06	6.79E-06	9.45E-03	4.72E-06
7440473	Chromium	1.40E-03	1.37E-06	8.65E-06	1.20E-02	6.01E-06
106467	1,4-Dichlorobenzene (para-)	1.20E-03	1.18E-06	7.41E-06	1.03E-02	5.15E-06
50000	Formaldehyde	7.50E-02	7.35E-05	4.63E-04	6.44E-01	3.22E-04
91203	Naphthalene	6.10E-04	5.98E-07	3.77E-06	5.24E-03	2.62E-06
7440020	Nickel	2.10E-03	2.06E-06	1.30E-05	1.80E-02	9.02E-06
56495	3-Methylcholanthrene	1.80E-06	1.76E-09	1.11E-08	1.55E-05	
57977	7,12-Dimethylbenz(a)anthracene	1.60E-05	1.57E-08	9.88E-08	1.37E-04	
56553	Benzo(a)anthracene	1.80E-06	1.76E-09	1.11E-08	1.55E-05	
205992	Benzo(b,k)fluoranthene	1.80E-06	1.76E-09	1.11E-08	1.55E-05	
53703	Dibenz(a,h)anthracene	1.20E-06	1.18E-09	7.41E-09	1.03E-05	
218019	Chrysene	1.80E-06	1.76E-09	1.11E-08	1.55E-05	
193395	Indeno(1,2,3-cd)pyrene	1.80E-06	1.76E-09	1.11E-08	1.55E-05	
50328	Benzo(a)pyrene	1.20E-06	1.18E-09	7.41E-09	1.03E-05	

* Divide lb/mmBtu factor by 1020 Btu/scf as per AP-42 Tables 1.4-3 & 4.

Potential Toxic Air Pollutant Emissions with 24-hour Averaging Periods

CAS Nbr.	Pollutant	Emission Factor (lb/mmBtu)	Emission Factor (lb/mmBtu)*	Emission Rates (lb/hr)	PTE Emission (lb/yr)	HAPs (tpy)
7440484	Cobalt	8.40E-05	8.24E-08	5.19E-07	7.21E-04	3.61E-07
7783064	Hydrogen Sulfide (H ₂ S)					
7439965	Manganese	3.80E-04	3.73E-07	2.35E-06	3.26E-03	1.63E-06
7439976	Mercury	2.60E-04	2.55E-07	1.61E-06	2.23E-03	1.12E-06
110543	n-Hexane	1.80E+00	1.76E-03	1.11E-02	1.55E+01	7.73E-03
7782492	Selenium	2.40E-05	2.35E-08	1.48E-07	2.06E-04	1.03E-07
108883	Toluene	3.40E-03	3.33E-06	2.10E-05	2.92E-02	1.46E-05

* Divide lb/mmBtu factor by 1020 Btu/scf as per AP-42 Tables 1.4-3 & 4.

HAPS (tpy) 8.11E-03

Potential Toxic Air Pollutant Emissions with 1-hour Averaging Periods

CAS Nbr.	Pollutant	Emission Factor (lb/mmBtu)	Emission Factor (lb/mmBtu)*	Emission Rates (lb/hr)	PTE Emission (lb/yr)	HAPs (tpy)
7440484	Carbon Monoxide			0.52	2.27	
10102440	Nitrogen Dioxide			0.62	2.71	
74460905	Sulfur Dioxide			0.00	0.02	

* Divide lb/mmBtu factor by 1020 Btu/scf as per AP-42 Tables 1.4-3 & 4.

Appendix A
GDR Power
NSRP-03-GDRP-19
Page 19 of 25
Backup Generator

		34.5 horsepower			
Pump used to power digester blower in the event of a power outage. Tested monthly.			100	Hours of Operation non-emergency	Testing and during power outages
PM/ PM10/PM2.5					
	Emission Factor:		2.20E-03	lb/hp-hr	AP-42, Section 3.3, Table 3.3-1
	Emissions:		3.80E-03	tons/year	
			0.08	lb/hr	
Sulfur Dioxide:					
	Emission Factor:		2.05E-03	lb/hp-hr	AP-42, Section 3.3, Table 3.3-1
	Emissions:		3.54E-03	tons/year	
			0.07	lb/hr	
Nitrogen Oxides (NOx)					
	Emission Factor:		3.10E-02	lb/hp-hr	AP-42, Section 3.3, Table 3.3-1
	Emissions:		1.55E-03	tons/year	
			1.07	lb/hr	
Volatile Organic Compounds (VOC) - Total Organic Compounds					
	Emission Factor:		2.51E-03	lb/hp-hr	AP-42, Section 3.3, Table 3.3-1
	Emissions:		4.34E-03	tons/year	
Carbon Monoxide (CO)					
	Emission Factor:		6.68E-03	lb/hp-hr	AP-42, Section 3.3, Table 3.3-1
	Emissions:		1.15E-02	tons/year	
Total HAPS					
	Emission Factor:		6.45E-03	lb/MMBtu	AP-42, Section 3.3, Table 3.3-2
			4.52E-05	lb/hp-hr	
	Emissions:		7.79E-05	tons/year	
			1.56E-03	lb/hr	
Lead (Pb)					
	Emission Factor:		4.90E-07	lb/MMBtu	AP-42, Section 3.3, Table 3.3-2
			3.43E-09	lb/hp-hr	
	Emissions:		5.92E-09	tons/year	
			1.18E-07	lb/hr	

Appendix A

GDR Power
NSRP-03-GDRP-19
Page 20 of 25

Boiler Potential Toxic Air Pollutant Emissions with Annual Averaging Periods

CAS Nbr.	Pollutant	Flare	Boiler	Total Emission (lb/yr)	De-Minimis (lb/yr)	SQER (lb/yr)	> Deminimis (y/n)	>SQER (y/n)
		Permitted Emission Rate (lb/yr)	Permitted Emission Rate (lb/yr)					
7440382	Arsenic	3.67E-02	1.75E-01	2.12E-01	0.00291	0.0581	y	y
71432	Benzene	3.86E-01	9.02E-02	4.76E-01	0.331	6.62	y	n
7440417	Beryllium	2.20E-03	1.31E-01	1.34E-01	0.004	0.08	y	y
7440439	Cadmium	2.02E-01	1.31E-01	3.33E-01	0.00228	0.0457	y	y
7440473	Chromium	2.57E-01	1.31E-01	3.88E-01	6.40E-05	1.28E-03	y	y
106467	1,4-Dichlorobenzene (para-)	2.20E-01	5.15E-02	2.72E-01	0.872	17.4	n	n
50000	Formaldehyde	1.38E+01	1.04E+01	2.42E+01	1.6	32	y	n
91203	Naphthalene	1.12E-01	3.56E-01	4.68E-01	0.282	5.64	y	n
7440020	Nickel	3.86E-01	1.31E-01	5.17E-01	0.0403	0.806	y	n
56495	3-Methylcholanthrene	3.30E-04	7.73E-05	4.08E-04	0.00153	0.0305	n	n
57977	7,12-Dimethylbenz(a)anthracene	2.94E-03	6.87E-04	3.62E-03	0.000135	0.00271	y	y
56553	Benz(a)anthracene	3.30E-04	1.26E-03	1.60E-03	0.0872	1.74	n	n
205992	Benzo(b,k)fluoranthene	3.30E-04	4.67E-04	7.97E-04	0.0872	1.74	n	n
53703	Dibenz(a,h)anthracene	2.20E-04	5.27E-04	7.47E-04	0.00799	0.16	n	n
218019	Chrysene	3.30E-04	7.51E-04	1.08E-03	0.872	17.4	n	n
193395	Indeno(1,2,3-cd)pyrene	3.30E-04	6.75E-04	1.01E-03	0.0872	1.74	n	n
50328	Benzo(a)pyrene	1.10E-07	5.15E-05	5.16E-05	0.00872	0.174	n	n

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Boiler Potential Toxic Air Pollutant Emissions with 24-hour Averaging Periods

CAS Nbr.	Pollutant	Flare	Boiler	Total Emission (lb/24-hr)	De-Minimis (lb/24-hr)	SQER (lb/24-hr)	> Deminimis (y/n)	>SQER (y/n)
		Permitted Emission Rate (lb/24-hr)	Permitted Emission Rate (lb/24-hr)					
7440484	Cobalt	4.22E-05	4.94E-09	4.23E-05	0.000657	0.013	n	n
7783064	Hydrogen Sulfide (H2S)	7.94E-01		7.94E-01	0.0131	0.263	y	y
7439965	Manganese	1.91E-04	3.60E-07	1.91E-04	0.000263	0.00526	n	n
7439976	Mercury	1.31E-04	1.80E-07	1.31E-04	0.000591	0.0118	n	n
110543	n-Hexane	9.05E-01	1.06E-04	9.05E-01	4.6	92	n	n
	1,1,1-Trichloroethane		1.02E-07	1.02E-07	6.57	131	n	n
7782492	Selenium	1.21E-05	1.41E-09	1.21E-05	0.131	2.63	n	n
108883	Toluene	1.71E-03	2.00E-07	1.71E-03	32.9	657	n	n

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Boiler Potential Toxic Air Pollutant Emissions with 1-hour Averaging Periods

CAS Nbr.	Pollutant	Flare	Boiler	Total Emission (lb/hr)	De-Minimis (lb/hr)	SQER (lb/hr)	> Deminimis (y/n)	>SQER (y/n)
		Permitted Emission Rate (lb/hr)	Permitted Emission Rate (lb/hr)					
7440484	Carbon Monoxide	7.91	0.18	8.09	1.14	50.4	y	n
10102440	Nitrogen Dioxide	1.45	0.72	2.17	0.457	1.03	y	y
74460905	Sulfur Dioxide	3.16	0.0076	3.17	0.457	1.45	y	y
7440508	Copper		3.00E-05	3.00E-05	0.011	0.219	n	n

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Appendix A

GDR Power
NSRP-03-GDRP-19
Page 21 of 25

AERSCREEN Modeling of Flare and Boiler
Each source modeled separately and the results added

Flare Modeled Emission Result 13.06 ug/m3 per lb/hr
Boiler Modeled Emission Result 114.6 ug/m3 per lb/hr

Pollutant	Flare		Boiler		Background (ug/m3)	Total (ug/m3)	Limit (ug/m3)		
	Emission Rate (lb/hr)	Modeled Impact (ug/m3)	Emission Rate (lb/hr)	Modeled Impact (ug/m3)					
PM10/PM2.5 (uncontrolled):									
24-hour NAAQS (PM ₁₀)	0.159	1.25	0.12	8.17	54.0	63.42	150	NAAQS, 2nd highest per year	good
24-hour NAAQS (PM _{2.5})	0.159	1.25	0.12	8.17	25.0	34.42	35	NAAQS, mean of maximum 8th highest	good
Annual (PM _{2.5})	0.159	0.21	0.12	1.36	6.60	8.17	12	NAAQS, not to be exceeded	good
Sulfur Dioxide:									
1-hour NAAQS, Wash. Std.	3.159	41.26	0.74	84.69	4.97	130.92	196	NAAQS, mean of maximum 4th highest	good
1-hour Washington TAP	3.159	41.26	0.74	84.69		125.95	660	Washington Toxic, not to be exceeded	good
3-hour NAAQS, Wash. Std.	3.159	41.26	0.74	84.69	3.92	129.87	1300	2nd highest in year	good
24-hour Wash. Std.	3.159	24.76	0.74	50.82	1.83	77.40	365	2nd highest in year	good
Annual	3.159	4.13	0.74	8.47	0.52	13.12	52	Not to be exceeded	good
Nitrogen Oxides (NOx)									
1-hour, NAAQS, Wash. Std.	1.45	18.98	0.72	82.51	22.60	124.09	188	NAAQS, mean of maximum 8th highest	good
Annual, NAAQS, Wash. Std.	1.45	1.90	0.72	8.25	3.77	13.92	100	Not to be exceeded	good
Carbon Monoxide (CO)									
1-hour, NAAQS, Wash. Std.	7.91	1.03E+02	0.41	47.19		150.48	40,000	NAAQS, 2nd highest per year	good
8-hour, NAAQS, Wash. Std.	7.91	9.30E+01	0.41	47.19		140.15	10,000	NAAQS, 2nd highest per year	good
Arsenic	4.19E-06	5.47E-06	2.00E-05	2.29E-04		2.35E-04	0.116	Washington Toxic, not to be exceeded	good
Cadmium	2.31E-05	3.01E-05	1.50E-05	1.72E-04		2.02E-04	2.38E-04	Washington Toxic, not to be exceeded	good
Chromium	2.93E-05	3.83E-05	1.50E-05	1.72E-04		2.10E-04	1.28E-05	Washington Toxic, not to be exceeded	over
Hydrogen Sulfide	0.03	0.26				0.26	2.00	Washington Toxic, not to be exceeded	good
7,12-Dimethylbenz(a)anthracene	3.35E-07	4.38E-07	7.84E-08	8.99E-07		1.34E-06	1.41E-05	Washington Toxic, not to be exceeded	good

AERSCREEN Factors
Convert 1-hour to 3-hour: 1.00
Convert 1-hour to 8-hour: 0.90
Convert 1-hour to 24-hour: 0.60
Convert 1-hour to Annual: 0.10

GDR POWER

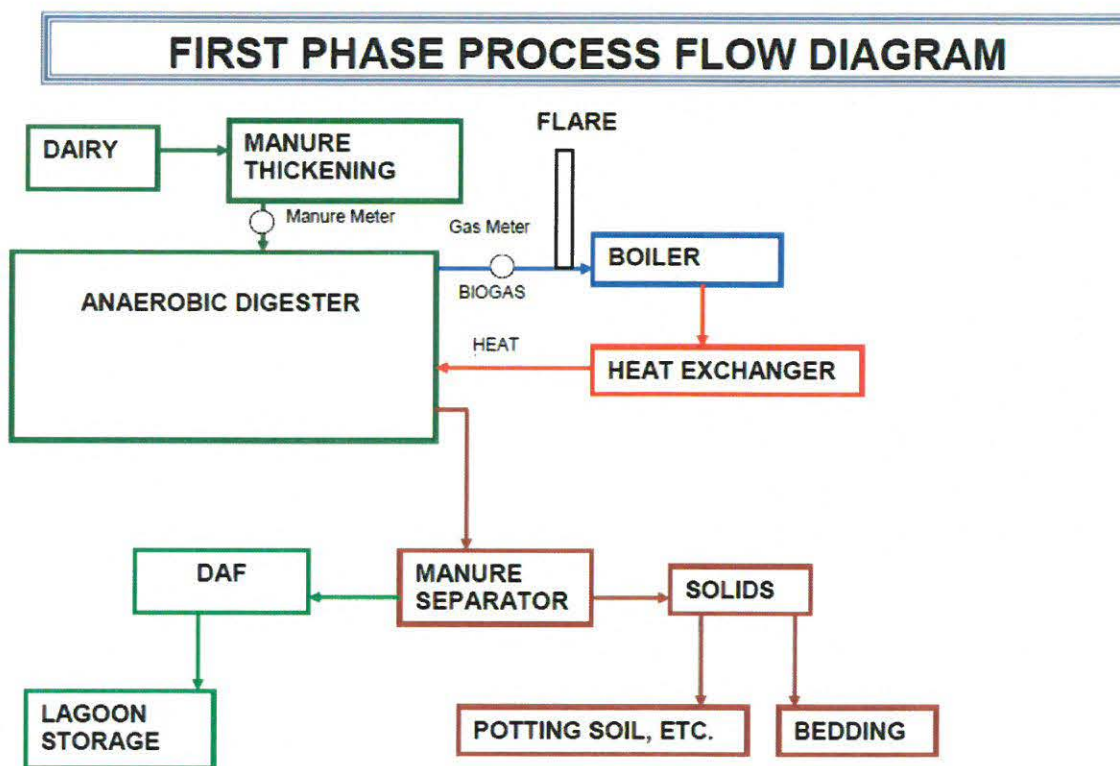
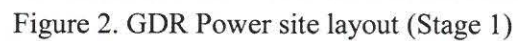


Figure 1. The anaerobic digester process for the GDR Power system (Stage 1)



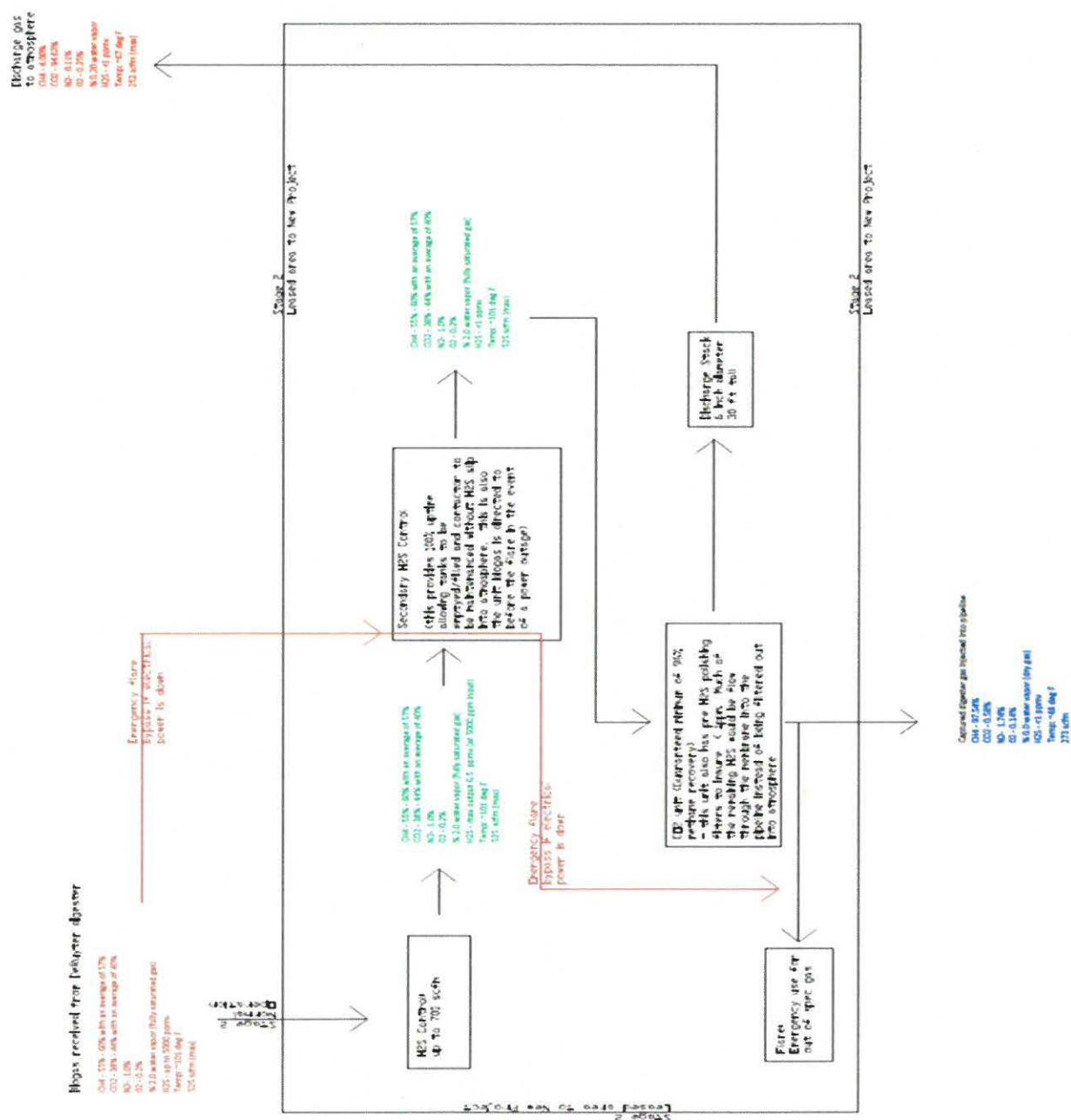


Figure 3. Future process flow diagram for Augean RNG LLC (Stage 2). This figure is used to show the biogas coming from GDR Power (Stage 1)

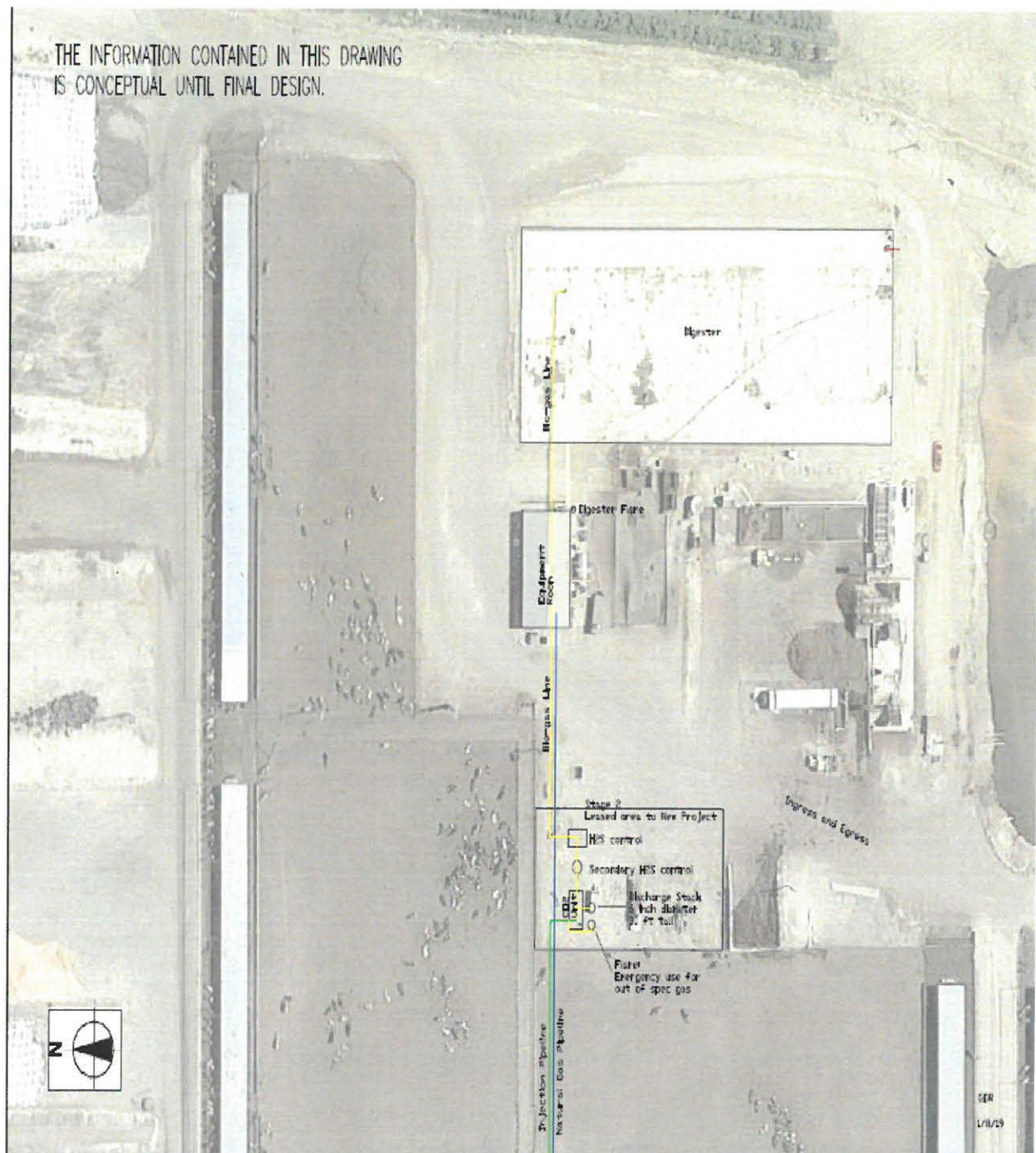


Figure 4. Location and the overall layout of the project for Stage 1 (GDR Power) and eventually Stage 2 (Augean RNG LLC)