

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION PERMIT APPLICATION EVALUATION AND CALCULATIONS	PAGES 8	PAGE 1
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Permit to Operate (PC → PO)

Applicant Inland Empire Utilities Agency (IEUA), Regional Plant 5 (RP-5), Solids Handling Facility (SHF)

Mailing Address P.O. Box 9020
Chino Hills, CA 91709

Equipment Location 6063 Kimball Avenue (contiguous facility)
Chino, CA 91708

16090 Mountain Avenue (physical address)
Chino, CA 91708

Equipment Description
APPLICATION 448345, FACILITY ID 147371

ENCLOSED FLARE, EMERGENCY STAND-BY, DAIRY MANURE/FOOD WASTE DIGESTER GAS (BIOGAS) FIRED, JOHN ZINK, MODEL ZINK ULTRA LOW EMISSIONS (ZULE), 7'-0" DIA. X 40' - 0" OVERALL H., WITH THREE 13.1 MMBTU/HR BURNERS (TOTAL 39.3 MMBTU PER HOUR CAPACITY), JOHN ZINK, CUSTOM, NATURAL GAS (OR PROPANE GAS) PILOT, A FLAME ARRESTER, AN AUTOMATIC COMBUSTION AIR CONTROL, AN AUTOMATIC FLARE SHUT-OFF VALVE, AND AN AUTOMATIC RESTART SYSTEM.

Background/Process Description

The above application was submitted on September 2, 2005 for expedited permit processing (XPP) for the new construction of a digester gas flare used to control digester gas produced from two food waste/manure anaerobic digesters at Inland Empire Utilities Agency (IEUA), Regional Plant 5 (RP-5), Solids Handling Facility (SHF).

IEUA RP-5 consists of a sewage treatment facility and solids handling facility (SHF) on a contiguous property. The sewage treatment facility accepts and treats municipal sewage and produces Title 22 recycled water. The solids handling facility is a manure and food waste processing plant that digests manure and food waste to produce digester gas to fuel two engines to produce power for the facility. The current sewage influent throughput for the facility is 12 million gallons per day (MGD), although an application A/N 534813 has been submitted to increase the permitted throughput to 15 MGD.

IEUA is working with Environ Strategies and Inland Bioenergy, LLC regarding their facility operations and application packages. Environ Strategies and Inland Bioenergy, LLC is in contract with IEUA to lease and the land and equipment of IEUA RP-5 SHF and operate the equipment and processes of the SHF. Inland Bioenergy, LLC is a LLC consisting of Burrtec and Environ Strategies.

The maximum operating schedule for this equipment is 24 hours/day, 7 days/week, 52 weeks/year. There is no school within 1000 feet of emission source. No public notice is required. There were no complaints filed or Notices to Comply or issued against the above facility in the last two years. A Notice of Violation was issued on September 19, 2012 for constructing and operating equipment at a Title V facility without

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first obtaining a permit revision allowing such construction and operation. The facility is currently operating under a Stipulated Order for Abatement (OA), Case No. 5209-4 concerning IEUA RP-5's restarted operations in January 2011 of the solids handling facility (SHF) since the February 2009 SHF shut down.

Emission Calculations

Maximum heat input rate: 32.4 mmBtu/hr
 Estimated digester gas HHV: 735 Btu/scf
 Estimated digester gas F-Factor: 8,900 dscf/mmBtu
 $8,900 \text{ dscf/mmBtu} \times 32.4 \text{ mmBtu/hr} = 288,360 \text{ dscfh} = 4,806 \text{ dscfm exhaust}$
 $32.4 \text{ mmBtu/hr} \times 1\text{E}6\text{Btu/mmBtu} / 735 \text{ Btu/scf} = 44,082 \text{ scfh digester gas flow rate}$
 $32.4 \text{ mmBtu/hr} \times 1\text{E}6\text{Btu/mmBtu} / 735 \text{ Btu/scf} / 60\text{mins/hr} = 735 \text{ scfm digester gas flow rate}$

Emissions listed in **bold font** below are used for NSR purposes.

Digester gas combustion emissions (R1=R2)

CO emissions

PC evaluation emission (based on Permit F7186, A/N 388297 manure digester gas source test) :
 $0.972 \text{ lbs/hr} / 7.28 \text{ mmBtu/hr} \times 32.4 \text{ mmBtu/hr} = 4.32 \text{ lbs/hr} = 105 \text{ lb/day (NSR)}$

Rule 407 requirement: 2,000 ppmvd

Rule 1303-BACT/LAER requirement: 0.06 lbs/mmBtu

$0.06 \text{ lbs/mmBtu} \times 32.4 \text{ mmBtu/hr} = 1.94 \text{ lbs/hr} = 47.21 \text{ lb/day (NSR)}$

Rule 1303 modeling requirement for $> 30, \leq 40$: $72.1 \text{ lbs/hr} > 1.94 \text{ lbs/hr}$.

NOx emissions

PC evaluation emission (based on Permit F7186, A/N 388297 manure digester gas source test) :
 $0.39 \text{ lbs/hr} / 7.28 \text{ mmBtu/hr} \times 32.4 \text{ mmBtu/hr} = 1.73 \text{ lbs/hr} = 72 \text{ lb/day (NSR)}$

Rule 1303-BACT/LAER requirement: 0.025 lbs/mmBtu

$0.025 \text{ lbs/mmBtu} \times 32.4 \text{ mmBtu/hr} = 0.81 \text{ lbs/hr} = 19.71 \text{ lb/day (NSR)}$

Rule 1303 modeling requirement for $> 30, \leq 40$: $1.31 \text{ lbs/hr} > 0.81 \text{ lbs/hr}$.

PM10 emissions

PC evaluation emission (based on Permit F7186, A/N 388297 manure digester gas source test) :
 $0.133 \text{ lbs/hr} / 7.28 \text{ mmBtu/hr} \times 32.4 \text{ mmBtu/hr} = 0.59 \text{ lbs/hr} = 14 \text{ lb/day (NSR)}$

Rule 404 requirement: Exhaust flow rate: 4,806 dcfm, 0.104 grains/scf
 $0.104 \text{ grains/scf} \times \text{lb}/7,000\text{grains} \times 4,806 \text{ dscfm} \times 60\text{min/hr} = 4.28 \text{ lbs/hr} > 0.59 \text{ lbs/hr}$

Rule 409 requirement: 0.1 grain/cf

$0.1 \text{ grain/cf} \times \text{lb}/7,000\text{grains} \times 4,806 \text{ dscfm} \times 60\text{mins/hr} = 4.12 \text{ lbs/hr} > 0.59 \text{ lbs/hr}$

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Rule 1303 modeling requirement for $> 30, \leq 40$: 7.9 lbs/hr > 0.59 lbs/hr.

ROG emissions

PC evaluation emission (based on Permit F7186, A/N 388297 manure digester gas source test) :
0.0522 lbs/hr / 7.28 mmBtu/hr x 32.4 mmBtu/hr = 0.23 lbs/hr = 6 lb/day (NSR)

Based on TNMNEOC content in DG fuel: ~100 ppmv
 100 ppmv x 735 scfm x 60mins/hr x lbmole/379E6cf x 16 lb/lbmole = 0.19 lbs/hr = 4.62 lbs/day (NSR)

SOx emissions

PC evaluation emission (based on Permit F7186, A/N 388297 manure digester gas source test) :
0.013 lbs/hr / 7.28 mmBtu/hr x 32.4 mmBtu/hr = 0.06 lbs/hr = 1 lb/day (NSR)

BACT requirement: Rule 431.1 compliance: 1) Natural gas ≤ 16 ppmv (flare is to operate with DG and only NG to assist, not applicable), 2) 40ppmv H2S in fuel, 3) Facility wide emission < 5 lbs/day

- 1) 16 ppmv x 50 scfm x 60mins/hr x lbmole/379E6 cf x 34.08 lbs/lbmole = 0.0043 lbs/hr > 0.0004 lbs/hr
- 2) 40 ppmv H2S x 735 scfm x 60mins/hr x lbmole/379E6 cf x 34.08 lbs/lbmole
 = 0.16 lbs/hr = 3.89 lbs/day(NSR)
- 3) 5 lbs/day H2S x lb-mole/34.08 lbsH2S x 64.07 lbsSOx/lb-mole = 9.40 lbs/day SOx (as SO2)
 = 0.39 lbs/hr SOx (as SO2)

Annual Emissions (AER 2012) SOx emission: 0.158 tons/yr
 0.158 tons/yr x 2,000lbs/ton x 1yr/365days = 0.87 lbs/day SOx = 0.04 lbs/hr SOx

CO2 emissions

1) The Climate Registry 2013 Default EFs Table 12.1 (DG): 52.07 kg/mmBtu
DG: 52.07 kg/mmBtu x 2.2046 lb/kg x 32.4 mmBtu/hr = 3,719.31 lbs/hr = 90,503.21 lbs/day (NSR)
2) Assume DG is 30% CO2.
30% x 44,082 scfhDG x lb-moleH2S/379 ft³ x 44.01 lbsCO2/lbmole CO2
= 1,535.66 lbs/hr = 37,367.73 lbs/day (NSR)

Total emissions
3,719.31 lbs/hr + 1,535.66 lbs/hr = 5,254.97 lbs/hr = 127,870.94 lbs/day (NSR)

CH4 emissions

The Climate Registry 2013 Default EFs Table 12.9 (DG): **0.0032 kg/mmBtu**
DG: 0.0032 kg/mmBtu x 2.2046 lb/kg x 32.4 mmBtu/hr = 0.23 lbs/hr = 5.60 lbs/day (NSR)

N2O emissions

The Climate Registry 2013 Default EFs Table 12.9 (DG): 0.00063 kg/mmBtu
DG: 0.00063 kg/mmBtu x 2.2046 lb/kg x 32.4 mmBtu/hr = 0.05 lbs/hr = 1.22 lbs/day (NSR)

Natural gas combustion emissions from pilot (R1=R2)

50 scfh NG 1050 Btu/scf x 50 scfh NG = 52,500 Btu/hr
 Emission Factors (based on the District's Annual Emission Inventory 2007 - 2008, Appendix A):
CO: 35 lbs/1E6 ft³ x 50 scfh = 0.002~ 0 lbs/hr = 0 lbs/day (NSR)
NOX: 130 lbs/1E6 ft³ x 50 scfh = 0.007~ 0.01 lbs/hr = 0.24 lbs/day (NSR)
PM10: 7.5 lbs/1E6 ft³ x 50 scfh = 0.0004~ 0 lbs/hr = 0 lbs/day (NSR)

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ROG: 7 lbs/1E6 ft³ x 50 scfh = 0.0004~ 0 lbs/hr = 0 lbs/day (NSR)

SOX: 0.6 lbs/1E6 ft³ x 50 scfh = 0.00003 ~ 0 lbs/hr = 0 lbs/day (NSR)

Emission Factors (based on The Climate Registry's 2013 Default EFs, Table s 12.1 & 12.9):

CO2: 53.06 kg/1E6Btu x 2.2046 lb/kg x 52,500 Btu/hr = 6.14 lbs/hr = 149.41 lbs/day (NSR)

CH4: 0.001 kg/1E6Btu x 2.2046 lb/kg x 52,500 Btu/hr = 0.0001 ~ 0 lbs/hr = 0 lbs/day (NSR)

N2O: 0.001 kg/1E6Btu x 2.2046 lb/kg x 52,500 Btu/hr = 0.0001 ~ 0 lbs/hr = 0 lbs/day (NSR)

Emissions Summary

Total emission = DG Combustion (waste gas) + NG Combustion (pilot)

CONTAMINANT	LBS/HR		LBS/DAY (NSR)	LBS/MONTH
	R1	R2	R2	R2
CO	1.94	1.94	47.21	1,416.2
NOX	0.82	0.82	19.95	598.6
PM10	0.59	0.59	14	430.7
ROG	0.23	0.23	6	167.9
SOX	0.06	0.06	1	43.8
CO2	5,261.11	5,261.11	128,020.34	3,840,610.3
CH4	0.23	0.23	5.6	167.9
N2O	0.05	0.05	1.22	36.5

Toxic Risk Analysis

Nearest Residential Receptor Distance: 3,404 ft. (1038 m)

Nearest Commercial Receptor Distance: 136 ft. (41 m)

Exhaust stack height: 40 ft. (12.2 m)

Exhaust stack inner diameter: 7 ft. (2.1 m)

Exhaust temperature: 1500°F

Exhaust flow rate: 4,806 dscfm

Exhaust flowrate (applicant provided): 76,493 acfm

Rain cap on exhaust stack: No

Compound	MW (lb/mole)	Outlet Emissions (lbs/hr)
Acetaldehyde	44.06	1.53E-04
Benzene	78.11	6.68E-05
Benzyl chloride	126.58	1.62E-04
Carbon Tetrachloride	153.24	1.31E-04
Chlorobenzene	112.56	1.20E-04
Chloroform	119.38	1.02E-04
1,2-Dibromomethane	187.88	2.00E-04
1,4-Dichlorobenzene	147.01	2.35E-04
1,1-Dichloroethane	98.96	1.06E-04
1,2-Dichloroethane	98.96	1.06E-04
1,1-Dichloroethylene	96.95	1.03E-04
Formaldehyde	30.03	2.58E-04
Hydrogen sulfide	34.08	7.27E-03

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Methylene chloride	84.94	9.06E-05
Tetrachloroethylene	165.83	1.41E-04
Toluene	92.13	1.08E-04
1,1,1,-Trichlorethane	133.42	1.14E-04
Trichloroethylene	130.4	8.46E-05
Vinyl chloride	62.5	5.33E-05
m/p-Xylenes	106.17	1.13E-04
o-Xylenes	106.18	1.13E-04

The above outlet emission rate is based on the sum of the TAC emission rates from the source test dated 11/9/2011 for a stationary Bekaert, Model CEB 350 digester gas flare under A/N 513835, ID 7417 proportioned up from 9.12mmBtu/hr (source test heat input) to 32.4 mmBtu/hr (permitted heat input) Tier II analysis was used since the nearest receptor is greater than 25m from the exhaust stack with no rain cap. Tier II risk analysis was based on the outlet emission listed in the above table. MICR was calculated to be 1.36×10^{-8} for residential and 2.36×10^{-7} for commercial receptors. HIC and HIA are less than 1 and Cancer Burden is less than 0.5.

Rules Evaluation

Rule 212: Rule 212 (c)(1)- There is no school within 1000 feet of the facility.
Rule 212 (c)(2)- On-site emission increases do not exceed the following:

Volatile Organic Compounds	30 lbs/day
Nitrogen Oxides	40 lbs/day
PM10	30 lbs/day
Sulfur Dioxide	60 lbs/day
Carbon Monoxide	220 lbs/day
Lead	3 lbs/day

Rule 212(c)(3)(A)(i)- MICR is below 1 in a million.
Public Notice is not required.

Rule 401: Visible Emissions
No violations are expected, limits are listed under Rule 401(b)(1).

Rule 402: Nuisance
Nuisance is not expected with proper operation, monitoring and maintenance. Based on previous operation of the facility for the last two years, compliance is expected. No complaints have been received in the last two years against the facility.

Rule 404: Particulate Matter
No violations are expected limits are listed under Rule 404 Table 404(a).

Rule 407: Liquid and Gaseous Air Contaminants
Rule 407 (a)(1)- CO < 2000 ppmvd.
Rule 407(a)(2)- SOx < 500 ppmvd.
Compliance is expected.

Rule 409: Combustion Contaminants
< 0.1 grains/cf of gas

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0.1 grain/cf x lb/7,000grains x 6,246 dscfm x 60mins/hr = 5.35 lbs/hr > 0.30 lbs/hr
Compliance is expected.

Rule 431.1: Sulfur Content of Gaseous Fuels

Rule 431.1(c)(1)- Natural gas contains \leq 16 ppmv sulfur compounds as H₂S.

Rule 431.1(c)(2)- Other gases \leq 40 ppmv sulfur compounds as H₂S, averaged over 4 hours.

Rule 431.1(d)(1)- If burning gaseous fuels, other than exclusively natural gas, in stationary equipment shall have a properly operating continuous fuel gas monitoring system (CFGMS) to determine the sulfur content, calculated as H₂S, of the fuel gas prior to burning; or a continuous emission monitoring system (CEMS) to determine SO_x emissions after burning. All continuous monitors require District approval, which shall be based on the requirements as specified in Attachment A.

Rule 431.1(d)(1)(B)- A person subject to paragraph (c)(4) of this rule shall comply with paragraphs (d)(1) & (d)(2) no later than 12 months after the date a Permit to Construct is issued by the District for a sulfur removal system or comply with paragraph (d)(3).

Rule 431.1(d)(1)(C)- Compliance with the Table 1 sulfur limits shall be determined based on readings obtained from an approved continuous monitor.

Rule 431.1(d)(2)- A person installing a continuous monitor shall submit to the District for approval, a quality assurance procedure as specified in U.S. EPA 40 CFR, Part 60, Appendix F, Procedure 1 for CEMS and, as applicable, for CFGMS.

Rule 431.1(d)(2)(A)- The quality assurance procedure shall be submitted to the District for written approval by the Executive Officer prior to the CFGMS or CEMS final certification.

Rule 431.1(d)(2)(B)- Any CFGMS or CEMS deemed to be out of control, as specified in Attachment A, according to the facility quality assurance procedure approved by the Executive Officer shall be corrected within 72 hours.

Rule 431.1(d)(2)(B)(i)- The person operating the CFGMS or CEMS shall notify the Executive Officer by telephone or facsimile of any breakdown(s) of the monitoring systems if the duration of the breakdown is in excess of 60 minutes or if there are three or more breakdowns in any one day within 24 hours of the occurrence of the breakdown which triggers notification. Such report shall identify the time, location, equipment involved, and contact person.

Rule 431.1(d)(2)(B)(ii)- The person who complies with the provisions of clause (d)(2)(B)(i) and paragraph (e)(3) shall not be considered in violation of this rule for the 72 hour period of breakdown provided that the breakdown did not result from operator error, neglect or improper operation or maintenance procedures.

Rule 431.1(d)(3)- A person burning landfill gas or sewage digester gas, or who is subject to paragraph (c)(4) of this rule may use an alternative monitoring method, in lieu of the requirements in paragraphs (d)(1) and (d)(2), that ensures compliance with the daily total sulfur content limitation as specified in Table 1. Alternative monitoring methods shall not be used unless first approved in writing by the Executive Officers of the District, the CARB, and the Regional Administrator of the EPA, Region IX, or their designees.

Rule 431.1(d)(3)(A)- At a minimum, the alternative monitoring method shall meet the guidelines of Attachment A, Section III.

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Rule 431.1(d)(3)(B)- A person subject to (c)(4) of this rule shall submit an alternative monitoring method for approval no later than 45 days after the date a Permit to Construct a sulfur removal system is issued.

Rule 431.1(d)(3)(C)- All monitoring shall comply with the approved alternative monitoring method.

Rule 431.1(g)(8)- Any facility which emits less than 5 pounds per day total sulfur compounds, calculated as H₂S from the burning of gaseous fuels other than natural gas (not applicable to (c)(1)).

This facility is expected to comply either with sulfur limits as required or exemption requirement under Rule 431.1(g)(8). Compliance is expected.

Rule 53A: San Bernardino County – Specific Contaminants (Contained in Addendum to Reg IV)
Rule 53A(a)- Sulfur compound emission limit, as SO₂ 500 ppmv. Compliance is expected due to biofilter H₂S surface emission limits.

Rule 53(b)- Combustion contaminants, this permit unit does not contain any combustion equipment, although the combustion equipment on site is expected to be in compliance.

Rule 53(c)- HF, HC, HBr, Br₂, Cl₂, F₂, and other fluorine compounds are to be controlled to the maximum degree technically feasible. There is no expected potential emission from the above listed compounds from this equipment. Compliance is expected.

Rule 1147 NOx Reductions From Miscellaneous Sources

Rule 1147(a)- Applicability: This equipment is exempt under Rule 1147(g)(3)(B) since the fuel (natural gas) is used only to maintain a pilot for vapor ignition.

Reg XIII: Rule 1303(a)- BACT is required, since emission increase is greater than 1.0 lbs/day.

BACT: CO: Ground level, shrouded, ≥ 0.6 sec. retention time at ≥ 1400 F, auto combustion air control; NO_x: 0.06 lbs/mmBtu; VOC: Ground level, shrouded, ≥ 0.6 sec. retention time at ≥ 1400 F, auto combustion air control, automatic shutoff gas valve and automatic restart system; and PM₁₀: knockout tank.

Rule 1303(b)(1)- Modeling for VOC and SO_x is not required (1303 Appendix A). NO_x, CO and PM₁₀ are within the allowable threshold based on further analysis.

Rule 1303(b)(2)- Since the facility is an essential public service, required offsets shall be provided through priority reserve.

Rule 1401: Toxic Air Contaminants

Rule 1401(d)(1)(A)- MICR is less than 1.0×10^{-6} based on previous evaluation.

Rule 1401(d)(1)(C)- Cancer burden is less than 0.5 based on previous evaluation.

Rule 1401(d)(2) & Rule 1401(d)(3)- HIC and HIA values are estimated to be less than 1 respectively based on previous evaluation.

Compliance is expected

Rule 1401.1: Rule 1401.1(b)- Equipment is exempt since it is located at an existing facility.

Reg. XXX: Converting the flare Permit to Construct (PC) to a Permit to Operate (PO), removing Permit to Construct requirements which are no longer applicable, revising source testing requirements, updating equipment description, and clarifying rule requirements is considered a Title V Minor permit revision under Rule 3000(b)(15), since there is no

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emission increase and the modification of the equipment does not result in new or additional NSPS or NESHAP requirements and will be subject to an EPA review (Rule 3003 (j)). A public notice is not required. Compliance is expected.

Conclusions & Recommendations

The equipment is in compliance with the Rules and Regulations of the SCAQMD. A Permit to Operate is recommended for application 448345. For Permit Conditions please see Sample Permit. A revised Title V permit is recommended after EPA review.