

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION PERMIT APPLICATION EVALUATION AND CALCULATIONS	PAGES	PAGE
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	APPL NO 536396 & 536397	DATE 11/2/2012
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Permit to Construct (Change of Conditions)

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 536396, FACILITY ID 147371

MODIFICATION TO THE COGENERATION SYSTEM UNDER A/N 449691 TO CONSIST OF:

1. BLENDED FUEL GAS STORAGE TANK (DIGESTER GAS, DIGESTER GAS/NATURAL GAS).
2. INTERNAL COMBUSTION ENGINE, NO. 1, CATERPILLAR, MODEL NO. G3608, FOUR CYCLE, 8 CYLINDERS, LEAN BURN, TURBOCHARGED, AFTERCOOLED, FIRED WITH DIGESTER GAS OR DIGESTER GAS/NATURAL GAS BLEND, 2131 BHP, WITH HEAT RECOVERY SILENCER UNIT AND DRIVING A 1.5 MW ELECTRICAL GENERATOR.
3. HEAT EXCHANGERS, PUMPS, AIR COMPRESSORS, ORGANIC RANKINE CYCLE (ORC) SYSTEM, THERMAL ENERGY STORAGE AND ABSORPTION CHILLER SYSTEM, AND ORC BY-PASS.
4. EXHAUST STACK, 2'- 6" DIA. X 43' H. MINIMUM (COMMON TO ENGINE NO. 1 AND 2).

APPLICATION 536397, FACILITY ID 147371

MODIFICATION TO THE COGENERATION SYSTEM UNDER A/N 449691 TO CONSIST OF:

1. BLENDED FUEL GAS STORAGE TANK (DIGESTER GAS, DIGESTER GAS/NATURAL GAS).
2. INTERNAL COMBUSTION ENGINE, NO. 2, CATERPILLAR, MODEL NO. G3608, FOUR CYCLE, 8 CYLINDERS, LEAN BURN, TURBOCHARGED, AFTERCOOLED, FIRED WITH DIGESTER GAS OR DIGESTER GAS/NATURAL GAS BLEND, 2131 BHP, WITH HEAT RECOVERY SILENCER UNIT AND DRIVING A 1.5 MW ELECTRICAL GENERATOR.
3. HEAT EXCHANGERS, PUMPS, AIR COMPRESSORS, ORGANIC RANKINE CYCLE (ORC) SYSTEM, THERMAL ENERGY STORAGE AND ABSORPTION CHILLER SYSTEM, AND ORC BY-PASS.
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Background/Process Description

The above applications were submitted on May 10, 2012 for expedited permit processing (XPP) as a Change of Conditions applications to include initial commissioning provisions in the permits of these two existing permits for identical digester gas(DG)/natural gas (NG) fired engines. Also these applications are to be used to update previous permit condition no. 5 concerning the amount of natural gas used in the fuel blend to current requirements and included reporting requirements pursuant to Rule 1110.2. The existing permits to construct are A/Ns 449691 and 449694, which will be superseded with proposed permits to construct A/Ns 536396 and 536397, respectively.

These engines are to be equipped with heat exchanger, Organic Rankine Cycle (ORC) system, thermal energy storage, and absorption chilling system. The heat recovery system and ORC system are common to both engines. Each engine shall be equipped with a CEMS to monitor flow rate and NOx and O2 emission concentrations. IEUA shall submit separate applications for CEMS approval and certifications.

A/Ns 449691 & 449694 were issued Permits to Construct on August 28, 2006. The engines were checked for rotation using natural gas on July 23, 2007 and began engine testing on natural gas on July 24, 2007 and July 26, 2007 for engine no. 1 and engine no. 2, respectively. The engines were then not operated from August 23, 2007 until January 10, 2008 due to a pending clarification of the gas cleanup/treatment system used. January 10, 2008 the two engines were started up to begin the initial commissioning process. Subsequent delays transpired due to deficiencies, operation (commissioning) was expected to resume November 2008 at the earliest. IEUA submitted a petition for an Order for Abatement Case NO. 5209-1 on April 15, 2008 due to miscommunication of equipment and fuel used in the engine permits. Conditions of the permit imply that digester gas from the sewage treatment plant will be treated in used in the engines, which is incorrect. Also the permits do not allow for pure natural gas initial commissioning, which is recommended by the manufacturer. Additionally the engines were not source tested due to these operational issues. The following hearing date was pushed back several times until it was determined that the Order for Abatement was no longer needed due to the complete shutdown of the solids handling facility on February 18, 2009.

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 these 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. There shall be no change of emissions for these engine applications. There is no school within 1000 feet of the emission source. No public notice is required. There are 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 first obtaining a permit revision allowing such construction and operation. The facility is currently operating under a Stipulated Order for Abatement 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.

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These engines are not approved to burn more than 10% natural gas pursuant to Rule 1110.2(d)(1)(C). These engines shall be operated on digester gas and digester gas/natural gas blend such that the natural gas shall not exceed 10% of the total monthly higher heating value of the fuels used.

Emissions

Please note that there is no increase of emissions for this application, because the emissions during the natural gas commissioning will be less than emissions from operating the engine on digester gas or digester gas blend. The emission calculations shown below are replicated from the previous engineering evaluations (A/Ns 449691 & 449694) and are for illustration purposes only. Emissions listed in **bold font** below are used for NSR purposes.

CO emissions

Previous permitted emission LAER requirement: 2.1 g/bhp-hr
2.10 g/bhp-hr x 2131 BHP x lb/453.6g = 9.86 lbs/hr = 240 lb/day (NSR)

Rule 1110.2 requirement: 2000 ppmvd @ 15% O2

NOx emissions

Previous permitted emission (<LAER): 0.50 g/bhp-hr
0.50 g/bhp-hr x 2131 BHP x lb/453.6g = 2.35 lbs/hr = 57 lb/day (NSR)

Rule 1110.2 requirement: 36 ppmvd @ 15% O2

PM10 emissions

Previous permitted emission based on EF from RP-1 Waukesha June 7&9, 2000 source test results:
0.049 g/bhp-hr
0.049 g/bhp-hr x 2131 BHP x lb/453.6g = 0.23 lbs/hr = 6 lb/day (NSR)

ROG emissions

Previous permitted emission LAER requirement: 0.216 g/bhp-hr
0.216 g/bhp-hr x 2131 BHP x lb/453.6g = 1.01 lbs/hr = 25 lb/day (NSR)

Rule 1110.2 requirement: 250 ppmvd as carbon @ 15% O2

SOx emissions

Previous permitted emission based on 40 ppmv H2S in fuel, 0.0134 lb/mmBtu or 6.75 lbs/mmcf:
0.0432 g/bhp-hr
0.0432 g/bhp-hr x 2131 BHP x lb/453.6g = 0.20 lbs/hr = 5 lb/day (NSR)

Rule 431.1 compliance:

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 2011) SOx emission: 0.004 tons/yr
0.004 tons/yr x 2000lbs/ton x 1yr/365days = 0.02 lbs/day SOx
= 0.00 lbs/hr SOx

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Toxic Risk Analysis

There is no increase of emissions since the issuance of the previous Permit to Construct. No increase of risk, cancer burden, HIA, or HIC is expected due to the natural gas fired initial commissioning hours, since natural gas firing is expected to result in less than or equivalent risk, cancer burden, HIA, and HIC.

Under previous applications 449691 & 449694, the applicant had conducted Tier 4 risk analysis using HARP software and ISCST3 dispersion modeling. The following are the summarized results.

	One-engine	Two engines
MICR (Residential Receptor)	1.92E-07	2.02E-7
MICR (Commercial Receptor)	4.12E-7	4.31E-7
HIC (Residential Receptor)	0.01	0.015
HIC (Commercial Receptor)	0.054	0.057
HIA (Residential Receptor)	9.7E-03	1.14E-02
HIA (Commercial Receptor)	1.89E-02	2.58E-02

Rules Evaluation

- Rule 212: Rule 212 (c)(1)- There is no school within 1000 feet of the facility.
Rule 212 (c)(2)- There is no increase of emissions.
Rule 212(c)(3)(A)- There is no increase of emissions.
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
There is no increase of emissions. Compliance is expected.
- Rule 407: Liquid and Gaseous Air Contaminants
Rule 407 (b)- Provisions of this rule shall not apply to emissions from stationary ICES.
- Rule 409: Combustion Contaminants
Provisions of this rule shall not apply to emissions from ICES.
- Rule 431.1: Sulfur Content of Gaseous Fuels
Rule 431.1(c)(1)- Natural gas contains ≤ 16 ppmv sulfur compounds as H₂S.
Rule 431.1(c)(2)- Other gases ≤ 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

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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 specified above 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.

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 must 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)

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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.

Reg IX:

Standards of Performance for New Stationary Sources

Part 60, Chapter I, Title 40 of Code of Federal Regulations, Subpart JJJJ Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

60.4230-Applicability: not applicable.

60.4230(a)- Construction for these ICEs did not commence nor was the ICE modified or reconstructed after June 12, 2006.

60.4230(b)- These ICEs is not being tested at an engine test cell/stand.

60.4230(f)- These ICEs is not a temporary unit.

Reg IX:

Part 63, Chapter I, Title 40 of Code of Federal Regulations, Subpart ZZZZ- National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

63.6585- Applicability: Applicable. Engines are stationary RICE at an area source of HAP emissions.

63.6595(a)(1)- Existing stationary SI RICE located at an area source of HAP shall comply with the applicable emission limitations and operating limitations no later than October 19, 2013.

63.6660(a)- Your records must be in a form suitable and readily available for expeditious review according to 63.10(b)(1).

63.6660(b)- Keep each record for 5 years following the date of each occurrence, measurement, maintenance, corrective action, report or record.

63.6660(c)- Keep each record readily accessible in hard copy or electronic form for at least 5 years after the date of the occurrence, measurement, maintenance, corrective action, report, or record.

Compliance with this Regulation is expected.

Rule 1110.2:

Emissions From Gaseous and Liquid-Fueled Engines

Rule 1110.2(d)(1)(C)- Stationary DG engines shall not exceed concentration limits: NO_x 36 ppmvd 15% O₂, VOC 250 ppmvd 15% O₂, CO 2000 ppmvd 15% O₂, provided that the facility monthly average biogas usage by biogas ICEs is 90% or more, based on higher heating value of the fuels used. The calculation of the monthly facility biogas use percentage may exclude NG fired during : any electrical outage at the facility; a Stage 2 or higher electrical emergencies called by the California Independent System Operator Corporation; and when a sewage treatment plant activates an Emergency operations Center or Incident Command System, as part of an emergency response plan, because of either high influent flows caused by precipitation or a disaster.

Rule 1110.2(d)(1)(J)- Engine without Rule 218 approved CEMS shall equip and maintain engine w/ air-to-fuel ratio controller with an oxygen sensor and feedback control, or equivalent technology approved by the Executive Officer, CARB and EPA. These

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engines shall be equipped with Rule 218 approved CEMS, therefore AFRCs are not required.

Rule 1110.2(e)(3)- CEMS is required. CEMS installation, operation, calibration, reporting, certification tests, and application submittal for certification per Rule 218 is required. see Rule 1110.2(f)(1)(A)(ii)(I).

Rule 1110.2(e)(4)- Stationary Engine Inspection and Monitoring (I&M) Plans: I&M plan application has not been submitted and is not required pursuant to (f)(1)(D)(x).

Rule 1110.2(f)(1)(A)(i)- ICEs >1000 BHP & >2mmBtu/hr per calendar year, NOx & CO CEMS is required to be installed, operated, and maintained in calibration to demonstrate compliance with the emission limits of this rule for these engines.

Rule 1110.2(f)(1)(A)(iii)- All CEMS required by this rule shall:

- (I) Comply with applicable requirements of Rule 218, including equipment specifications and certification, operating, recordkeeping, quality assurance and reporting requirements, except as otherwise authorized by this rule;
- (II) Include equipment that measures and records exhaust gas concentrations, both uncorrected and corrected to 15 percent oxygen on a dry basis; and
- (III) Have data gathering and retrieval capability approved by Executive Officer.

Rule 1110.2(f)(1)(A)(iv)- The operator of an engine that is required to install CEMS may request the Executive Officer to approve an alternative monitoring device (or system components) to demonstrate compliance with the emission limits of this rule. The applicant shall demonstrate to the Executive Officer that the proposed alternative monitoring device is at a minimum equivalent in relative accuracy, precision, reliability, and timeliness to a CEMS for that engine, according to the criteria specified in 40 CFR Part 75 Subpart E. In lieu of the criteria specified in 40 CFR Part 75 Subpart E, substitute criteria is acceptable if the applicant demonstrates to the Executive Officer that the proposed alternative monitoring device is at minimum equivalent in relative accuracy, precision, reliability, and timeliness to a CEMS for that engine. Upon approval by the Executive Officer, the substitute criteria shall be submitted to EPA as an amendment to the State Implementation Plan (SIP).

If the alternative monitoring device is denied or fails to be recertified, a CEMS shall be required.

Rule 1110.2(f)(1)(A)(vii)-CO CEMS shall not be required for lean-burn engines.

Rule 1110.2(f)(1)(B)- Maintain operational non-resettable totalizing time meter to determine engine elapsed operating time.

Rule 1110.2(f)(1)(C)(i)-Effective August 1, 2008 shall conduct source test for NOx, VOC as carbon, and CO (ppmvd, 15% O2) every two years, or every 8,760 operating hours, whichever occurs first. Relative accuracy tests required by Rule 218.1 or 40 CFR Part 75 Subpart E will satisfy this requirement for those pollutants monitored by a CEMS. Or every three years if engine operated less than 2000 hours since last test. If engine has not operated within 3 months of required source test date, source test shall be conducted when operation resumes for 7 consecutive days or 15 cumulative days.

Rule 1110.2(f)(1)(D)(x)-I&M Plan application has not been submitted. The applicant shall submit an I&M plan unless the engines are required by this rule to have a NOx and CO CEMS.

Rule 1110.2(f)(1)(E)- Maintain a monthly engine operating log that includes: (i) Total hours of operation, (ii) Types of liquid and/or type of gaseous fuel, (iii) fuel consumption

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(cubic feet of gas and gallons of liquid), and (iv) Cumulative hours of operation since the last source test required in (f)(1)(C).

Rule 1110.2(f)(3)- All data, logs, test reports and other information required by this rule shall be maintained for at least five years and made available for inspection.

Compliance with Rule 1110.2 is expected.

- Rule 1147 NOx Reductions From Miscellaneous Sources
Rule 1147(a)- Applicability: not applicable to internal combustion engines subject to District Rule 1110.2.
- Reg XIII: Rule 1303(a)- There is no increase of emissions, LAER/BACT is not required, but was already applied to the equipment at the time of the previous Permit to Construct.
Rule 1303(b)(1)- There are no increases of emissions, modeling is not required.
Rule 1303(b)(2)- There is no increase of emissions for these engines. Although, since the facility is an essential public service, any required offsets shall be provided through priority reserve.
Compliance with Regulation XIII is expected.
- Rule 1401: Toxic Air Contaminants
Rule 1401(d)(1)(A)- MICR 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) and 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: The change of conditions for the IC engines to include a natural gas fired initial commissioning period and update applicable Rule 1110.2 requirements is considered a Title V Minor permit revision under Rule 3000(b)(15), since there is no 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 Construct is recommended for applications 536396 and 536397. For Permit Conditions please see Sample Permit. A revised Title V permit is recommended after EPA review.