

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION PERMIT APPLICATION EVALUATION AND CALCULATIONS	PAGES 7	PAGE 1
	APPL NO 526292 & 526293	DATE 3/15/2012
	PROCESSED BY AS08	CHECKED BY

Permit to Construct (Change of Conditions)

Applicant Eastern Municipal Water District (EMWD) –Temecula Valley Regional Water Reclamation Facility (TVRWRF)

Mailing Address 2270 Trumble Road,
P.O. Box 8300
Perris, CA 92572

Equipment Location 42565 Avenida Alvarado
Temecula, CA 92590

Equipment Description
APPLICATION 526292, FACILITY ID 001703

INTERNAL COMBUSTION ENGINE, NON-EMERGENCY, WAUKESHA, MODEL H24 GLD, SPARK IGNITION, FOUR CYCLE, 8-CYLINDER, 530 BHP, LEAN BURN, TURBOCHARGED, AFTERCOOLED, FUELED WITH DIGESTER GAS, A DIGESTER GAS/ NATURAL GAS BLEND, OR A NATURAL GAS/ AIR BLEND, WITH AN EXHAUST HEAT RECOVERY SYSTEM, AND AN AIR-TO-FUEL RATIO CONTROLLER, WAUKESHA, MODEL CEC, DRIVING AN AERATION BLOWER.

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Background/Process Description

The above applications were submitted on Augusts 18, 2011 as Change of Conditions applications to modify condition no. 3 in the two existing permits for identical digester gas(DG)/natural gas (NG) fired engines to indicate that the use of natural gas/air fuel blend shall not exceed a specified fixed heating value (Btu/scf). The existing condition no. 3 indicates that the natural gas/air fuel blend shall have an equivalent heating value of the digester gas, which may be difficult to maintain, since the digester gas heating value fluctuates. Also these applications will be used to change the air to ratio controller (AFRC) from Altronic EPC-150 back to their previous configuration with Waukesha CEC devices. EMWD use the Altronic AFRCs for all of their rich burn NG engines and wanted to implement them in theses DG/NG engines to allow for electronic recordkeeping of Rule 1110.2 values (set points, actual, hours, etc.) But the Altronic AFRCs do not have two set point maps which are needed for engines. The existing permits to construct are A/N 518818 and 518819 and the existing permits to operate are A/N 485849, Permit G5390 and A/N 485850, Permit G5391, respectfully. Permits to construct A/Ns 518818 and 518818 will be superseded and replaced with permits to construct A/Ns 526293 and 526292, respectively.

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The facility is a municipal water district which accepts and treats municipal sewage at Eastern Municipal Water District-Temecula Valley Regional Water Reclamation Facility (EMWD-TVRRWF). There shall be no change of emissions for these applications. These engines (along with another permitted natural gas fired ICE Permit G13883, A/N 518817 equipped with non-selective catalytic reduction (NSCR)) are used as the only source of air to the aeration tanks at the facility. In order to provide enough air in the aeration tanks, two engines shall be driving two blowers at all times. One engine may be used to drive an aeration blower alone for a minimum amount of time (1-2 hours) for maintenance without diminishing the effluent discharge quality. The current wastewater influent throughput for the facility is 18 million gallons per day (MGD). There is no school within 1000 feet of emission source. No violations have been issued and no complaints have been received against the facility in the past 2 years.

These engines were approved to burn more than 10% natural gas according to Rule 1110.2(d)(1)(C) under previous applications 480859 & 480864. Currently these engines are permitted to operate on digester gas, digester gas/natural gas blend, or natural gas/air blend such that 1) the two digester gas engines may only be operated at the same time if the available digester gas is greater than 100% of the total heat input (HHV) for one engine, unless the third engine used to drive an aeration blower if temporarily out of service for repair, maintenance, or testing and 2) the digester gas engines shall be operated with at least 50% of the total heat input supplied by digester gas (HHV) for the facility average each calendar month. This allows for operational flexibility with the engines. The expected modes of operation are 1) to operate the third engine on 100% NG and one engine on 100% digester gas and 2) split the amount of digester gas between the two engines with the rest of the fuel supplemented with natural gas. These operational scenarios allow for one engine available to serve as backup.

Month	Monthly Average DG Heating Value (BTU/scf)	Monthly Maximum DG Heating Value (BTU/scf)
July 2010	560	566
August 2010	563	585
September 2010	561	566
October 2010	575	581
November 2010	566	586
December 2010	551	574
January 2011	580	585
February 2011	576	586
March 2011	596	621
April 2011	586	586
May 2011	564	576
June 2011	559	572
July 2011	555	566.61
Average	569	581

Btu content of digester gas was sampled using a BTU analyzer by EMWD Plant Operations staff.

The average BTU value of the digester gas is ~570 Btu/scf. The applicant requested the natural gas/air fuel blend BTU value limit of 650 Btu/scf to allow for operational flexibility to ensure that the blend has an adequate heating value to be used in the engines without excessive natural gas use to fire the engines.

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Emissions

Horizon Air Measurement Services, Inc. had conducted a source test on December 22, 2009 and May 19, 2010 for DG/NG engines under A/N 518818 and 518819, respectively. The two engines were tested using two (2) different fuels (digester gas and natural gas/air blend). Source test results summary is shown below.

Source Test Results: Horizon Air Measurement Services, Inc. Source Test

¹Test Date: December 22, 2009, Horizon Test No. E26-070-FR-208

²Test Date: May 19, 2010, Horizon Test No. E26-073-FR-171

³Test Date: November 2, 2011, Horizon Test No. E26-081-FR-210DG

Pollutant	A/N 526293 (to be issued) A/N 518818 (current) A/N 480859 (previous)		A/N 526292 (to be issued) A/N 518819 (current) A/N 480864 (previous)	
	Digester gas (DG)	Natural gas/air (NG)	Digester gas (DG)	Natural gas/air (NG)
CO, lbs/hr	1.07 ¹	1.13 ¹	1.73 ³	1.33 ²
CO, ppmv @ 15% O ₂	81.9 ¹	95.2 ¹	127 ³	105 ²
NOx, lbs/hr	0.681 ¹	0.581 ¹	0.513 ³	0.609 ²
NOx ppmv @ 15% O ₂	32.2 ¹	29.8 ¹	22.8 ³	29.8 ²
TNMOC, lbs/hr	0.223 ¹	0.194 ¹	0.158 ³	0.193 ²
TNMOC, ppmv (as carbon) @ 15% O ₂	29.7 ¹	28.5 ¹	20.4 ³	26.4 ²
Stack flow rate, dscfm	1217 ¹	1247 ¹	1325 ³	1330 ²
Oxygen %	6.68 ¹	8.21 ¹	7.29 ³	7.99 ²
Fuel Usage, scfh	7614	8780 ¹	9231 ³	7326 ²

Assume Source Test was conducted at maximum achievable firing rates and power outputs (530 bhp) as indicated in Source Test Reports listed above.

Please note that there is no increase of emissions for this application. The emission calculations shown below are replicated from the previous engineering evaluation and are for illustration purposes only. Emissions listed in **bold font** below are used for NSR purposes.

CO emissions

Previous permitted emission: = 2.42 lbs/hr = 58 lb/day (NSR)

Emission based on Source Test: 1.73 lbs/hr = 1.73 lbs/hr = 41.52 lbs/day

BACT requirement: 2.5 g/bhp-hr
 2.5g/bhp-hr x 530 bhp x 11b/453.6g = 2.92 lbs/hr = 70.08 lbs/day

Rule 1110.2 requirement: 2000 ppmvd @ 15% O₂ > 127 ppmv @ 15% O₂ (from Source Test)

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NOx emissions

Previous permitted emission: = 0.70 lbs/hr = 17 lb/day (NSR)

Emission based on Source Test: 0.681 ~0.68 lbs/hr = 0.68 lbs/hr = 16.32 lbs/day

BACT requirement: 0.60 g/bhp-hr
0.60g/bhp-hr x 530 bhp x 11b/453.6g = 0.70 lbs/hr = 16.80 lbs/day

Rule 1110.2 requirement: 36 ppmvd @ 15% O2 > 32.2 ppmv @ 15% O2 (from Source Test)

PM10 emissions

Previous permitted emission: = 0.04 lbs/hr = 1 lb/day (NSR)

ROG emissions

Previous permitted emission: = 0.29 lbs/hr = 7 lb/day (NSR)

Emission based on Source Test: 0.223 ~ 0.22 lbs/hr = 0.22 lbs/hr = 5.28 lbs/day

BACT requirement: 0.80 g/bhp-hr
0.8g/bhp-hr x 530 bhp x 11b/453.6g = 0.93 lbs/hr = 22.32 lbs/day

Rule 1110.2 requirement: 250 ppmvd as carbon @ 15% O2 > 28.5 ppmv as carbon @ 15% O2

SOx emissions

Previous permitted emission: = 0.0 lbs/hr = 0 lb/day (NSR)

BACT requirement: Rule 431.1 compliance: 1) Facility wide emission < 5 lbs/day
1) 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 2010) SOx emission: 0.118 tons/yr
0.118 tons/yr x 2000lbs/ton x 1yr/365days = 0.65 lbs/day SOx
= 0.03 lbs/hr SOx

Toxic Risk Analysis for A/Ns 526292 & 526293

For Rule 1401 Risk Calculations, please see previous applications' engineering evaluations. Maximum MICR is 5.14×10^{-9} and 5.13×10^{-9} for A/Ns 526292 and 526293 respectively.

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.

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- 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(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)).
Compliance is expected.
- Rule 53A: Riverside County – Specific Contaminants (Contained in Addendum to Reg IV)
There is no increase of emissions. 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 are not being tested at an engine test cell/stand.
60.4230(f)- These ICEs are not temporary units.
- 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).

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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)(B)- Stationary DG engines shall not exceed concentration limits: NOx 36 ppmvd 15% O2, VOC 250 ppmvd 15% O2, CO 2000 ppmvd 15% O2.

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. AFRC is equipped on the engines.

Rule 1110.2(e)(3)(B)- CEMS is not 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 been submitted. Determination has not yet been made for this application.

Rule 1110.2(f)(1)(A)(ii)(I)- CEMS is not required for these engines. Combined rating is not 1500 BHP or greater at the same location.

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 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)-I&M Plan application has been submitted. Determination has not yet been made for this application.

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 (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, BACT is not required, but already applied to the equipment.

Rule 1303(b)(1)- There are no increases of emissions, modeling is not required.

Furthermore, modeling for VOC and SOx is not required (1303 Appendix A). NOx, CO and PM10 are less than the allowable emissions in Table A-1 based on previous evaluation, no further analysis is required (1301 Appendix A).

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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 impose a fixed heating value for the use of natural gas/air fuel blend and update the air to fuel ratio controllers is considered a Title V Minor permit revision under Rule 3000(b)(12), 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 526292 and 526293. For Permit Conditions please see Sample Permit. A revised Title V permit is recommended after EPA review.

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TITLE V PERMIT (REV No. 08) EVALUATION

Applicant's Name Eastern Municipal Water District (EMWD)
Temecula Valley Regional Water Reclamation Facility

Mailing Address 2270 Trumble Road
P.O. Box 8300
Perris, CA 92580-8300

Equipment Location 42565 Avenida Alvarado
Temecula, CA 92590

FACILITY ID 001703
APPLICATION 522636- Title V Minor Permit Revision
Background

Eastern Municipal Water District (EMWD) A/N 522636 was submitted for Title V permit revision (08). Applications 526292 and 526293 were submitted to impose a fixed BTU value for the natural gas/air fuel blend used to fire the engines and update the air to fuel ratio controllers. The equipment is located at Eastern Municipal Water District Temecula Valley Regional Water Reclamation Facility (EMWD-TVRRWF) in Temecula. For additional information please refer to the attached evaluation prepared for the EPA review.

Note: Title V Revision 07 (A/N 513154) was issued November 18, 2011.

Rules Evaluation

Reg. XXX:
Imposing a fixed BTU value for the natural gas/air fuel blend used to fire the engines and update the air to fuel ratio controllers is considered a Title V Minor permit revision under Rule 3000(b)(12), since there is no emission increase and the modification 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. An EPA 45 day review will be imposed. Compliance is expected.

Conclusions and Recommendations

A Permit to Construct is recommended for applications 526292 & 526293. A revised Title V permit is recommended after the completion of EPA review.