

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION PERMIT APPLICATION EVALUATION AND CALCULATIONS	PAGES	PAGE
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	APPL NO 494460 REV	DATE 12/12/2009
	PROCESSED BY GCR	CHECKED BY CDT

PERMIT TO CONSTRUCT EVALUATION

APPLICANT'S NAME: ORANGE COUNTY SANITATION DISTRICT (OCS D)

MAILING ADDRESS: 10844 ELLIS AVENUE
FOUNTAIN VALLEY, CA 92708-7018
ATTN.: TERRY AHN, REGULATORY SPECIALIST

EQUIPMENT ADDRESS: 10844 ELLIS AVENUE (PLANT NO. 1)
FOUNTAIN VALLEY, CA 92708

FACILITY ID NO.: 017301

EQUIPMENT DESCRIPTION:

BOILER, HURST BOILER AND WELDING COMPANY, MODEL S5-250-125W OR EQUIVALENT, FIRE-TUBE TYPE, WITH POWER FLAME INC., MODEL NVC8-G-30 LOW NO_x BURNER OR EQUIVALENT, 10,500,000 BTU PER HOUR, WITH DIGESTER GAS AS PRIMARY FUEL, AND NATURAL GAS AS STAND-BY FUEL.

PERMIT CONDITIONS:

1. OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN COMPLIANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED, UNLESS OTHERWISE NOTED BELOW.
[RULE 204]
2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITION AT ALL TIMES.
[RULE 204]
3. THE OWNER OR OPERATOR OF THIS EQUIPMENT SHALL PROVIDE TO SCAQMD FINAL BOILER DESIGN DRAWINGS, P & I DIAGRAMS, CONTROLS, EQUIPMENT SPECIFICATIONS (MAKE, MODEL, DIMENSIONS, SIZE AND MAXIMUM CAPACITY) PRIOR TO INSTALLATION OF THE EQUIPMENT.
[RULE 204]
4. THIS EQUIPMENT SHALL BE PRIMARILY FIRED WITH DIGESTER GAS. NATURAL GAS MAY BE USED AS A STANDBY FUEL, IN THE EVENT DIGESTER GAS IS NOT AVAILABLE.
[RULE 204, 1146]
5. A FUEL METER SHALL BE INSTALLED AND MAINTAINED IN THE FUEL SUPPLY LINE(S) TO MEASURE, INDICATE AND RECORD THE AMOUNT OF FUEL(S) (SCFM) BURNED IN THIS EQUIPMENT.
[RULE 1303 (b) (1) & 1303 (b) (2) – MODELING & OFFSET]

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6. WHEN IN OPERATION, TOTAL HEAT INPUT FOR THIS EQUIPMENT SHALL NOT EXCEED 10.5 MMBTU/HR. A LOG SHALL BE KEPT INDICATING THE TOTAL HEATING VALUE (BTU/SCF) OF FUEL GAS BURNED IN THIS EQUIPMENT BASED ON THE RECORDED FLOW RATE (SCFM) AND THE LATEST MONTHLY BTU CONTENT READING.
[RULE 1303 (b) (1) & 1303 (b) (2) – MODELING & OFFSET]

7. THIS EQUIPMENT SHALL BE EQUIPPED WITH A CONTROL SYSTEM TO AUTOMATICALLY REGULATE THE COMBUSTION AIR AND FUEL RATE AS THE BOILER LOAD VARIES. THIS AUTOMATIC CONTROL SYSTEM SHALL BE ADJUSTED AND TUNED PERIODICALLY, ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS TO ASSURE ITS ABILITY TO REPEAT THE SAME PERFORMANCE AT THE SAME BURNER FIRING RATE.
[RULE 1146]

8. EMISSIONS FOR OXIDES OF NITROGEN (NO_x) AND CARBON MONOXIDE (CO) SHALL NOT EXCEED THE FOLLOWING LIMITS AND SHALL BE MEASURED BY VOLUME, ON A DRY BASIS, AT 3% O₂.

<u>FUEL USED</u>	<u>NO_x AS NO₂</u>	<u>CO</u>
DIGESTER GAS	30 PPMV	≤100 PPMV
NATURAL GAS	12 PPMV	≤50 PPMV

[RULE 1146, RULE 1303 (a) (1) – BACT/LAER]

9. ON AND AFTER JANUARY 1, 2015, EMISSIONS OF NO_x SHALL NOT EXCEED 15 PPMV (CORRECTED TO 3% O₂, DRY) WHILE FIRING ON DIGESTER GAS
[RULE 1146]

10. THE OWNER OR OPERATOR OF THIS EQUIPMENT SHALL CONDUCT AN INITIAL SOURCE TEST, AND SUBSEQUENT SOURCE TESTS ONCE EVERY THREE YEARS THEREAFTER, UNDER THE FOLLOWING CONDITIONS:

- A. A TESTING LABORATORY CERTIFIED BY THE CALIFORNIA AIR RESOURCES BOARD AND IN COMPLIANCE WITH DISTRICT RULE 304 (NO CONFLICT OF INTEREST) SHALL CONDUCT THIS TEST.
- B. A SOURCE TEST PROTOCOL SHALL BE SUBMITTED TO AQMD WITHIN 30 DAYS OF INITIAL START UP AND SHALL BE APPROVED BY AQMD BEFORE THE TEST COMMENCES. THE PROTOCOL SHALL INCLUDE PROPOSED OPERATING CONDITIONS OF THE EQUIPMENT DURING THE TEST, AND A DESCRIPTION OF ALL SAMPLING AND ANALYTICAL PROCEDURES TO BE USED.
- C. SOURCE TESTING SHALL BE CONDUCTED WITHIN 60 CALENDAR DAYS AFTER NORMAL OPERATION OF THE EQUIPMENT HAS BEEN ESTABLISHED, BUT NO LATER THAN 180 DAYS AFTER INITIAL START UP.
- D. THE SOURCE TESTS SHALL BE PERFORMED WHEN THE BOILER IS OPERATING AT MAXIMUM, MINIMUM AND AVERAGE LOAD FOR EACH FUEL (DIGESTER GAS AND NATURAL GAS) TO BE BURNED. THE SAMPLING TIME AT EACH LOAD SHALL BE FOR A MINIMUM OF 15 CONSECUTIVE MINUTES.

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- E. TWO COPIES OF THE SOURCE TEST RESULTS SHALL BE SUBMITTED TO AQMD, ATTN. GAURANG RAWAL, WITHIN 60 DAYS OF THE TESTS COMPLETION. THE REPORT SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING:

FUEL FLOW RATE (EACH FUEL)
FLUE GAS FLOW RATE (EACH FUEL)
METHANE (INLET DIGESTER GAS)

TOTAL NON-METHANE ORGANICS (EXHAUST & INLET DIGESTER GAS)
SPECIATED TRACE ORGANICS (EXHAUST, DIGESTER GAS)
TOTAL PARTICULATES (EXHAUST)
OXIDES OF NITROGEN (EXHAUST)
CARBON MONOXIDE (EXHAUST)
OXYGEN
DIGESTER GAS BTU (HHV), AND TOTAL SULFUR CONTENT (AS H₂S, PPMV)

THE REPORT SHALL PRESENT THE EMISSIONS DATA IN PARTS PER MILLION (PPMV) ON A DRY BASIS, POUNDS PER HOUR, AND LBS/MMBTU.
[RULE 217, RULE 404, RULE 1146, RULE 1303(A) (1), 1303 (B) (1), 1303(B) (2) - BACT, MODELING AND OFFSET, 1401]

10. MONITORING AND TESTING OF THE BOILER SHALL BE PERFORMED ACCORDING TO RULE 1146. [RULE 1146]

11. EMISSIONS RESULTING FROM THIS EQUIPMENT SHALL NOT EXCEED THE FOLLOWING:

<u>POLLUTANT</u>	<u>POUNDS PER HOUR</u>
CO	0.90 (0.43 WITH NATURAL GAS)
NO _x	0.44 (0.17 WITH NATURAL GAS)
PM ₁₀	0.056
ROG	0.083
SO _x	0.13
[RULE 404, 431.1, 1303(a) (1)-BACT, 1303(b) (2) - OFFSET]	

12. THIS EQUIPMENT SHALL BE OPERATED IN COMPLIANCE WITH APPLICABLE REQUIREMENTS OF 40 CFR 63 SUBPART DDDDD. [40 CFR 63 SUBPART DDDDD]

13. ALL RECORDS REQUIRED BY THIS PERMIT SHALL BE KEPT AND MAINTAINED FOR A MINIMUM OF FIVE YEARS AND SHALL BE MADE AVAILABLE TO AQMD PERSONNEL UPON REQUEST. [RULE 3004 (a) (1)]

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Periodic Monitoring:

14. THE OPERATOR SHALL DETERMINE COMPLIANCE WITH THE EMISSION LIMIT(S) IN CONDITION NO. 11, AT LEAST ONCE EVERY FIVE YEARS USING AQMD-APPROVED TEST METHOD. THE TEST SHALL BE CONDUCTED WHEN THE EQUIPMENT IS OPERATING UNDER NORMAL CONDITIONS. THE OPERATOR SHALL COMPLY WITH ALL GENERAL TESTING, REPORTING, AND RECORDKEEPING REQUIREMENTS IN SECTIONS E AND K OF THIS PERMIT.
[RULE 1303 – OFFSET, 3004 (a) (4)]

Emissions And Requirements:

15. THIS EQUIPMENT IS SUBJECT TO THE APPLICABLE REQUIREMENTS OF THE FOLLOWING RULES AND REGULATIONS:
- CO: 2000 PPMV, RULE 407
CO: 400 PPMV, @ 3% O2, DRY BASIS, RULE 1146
PM: 0.1 GR/SCF, RULE 409

BACKGROUND:

On December 30, 2008, Orange County Sanitation District (OCSD) submitted this A/N 494460 for the new construction of a boiler (hot water).

Initial Title V permit was issued 12/18/2008.
Title V Revision 01, A/N 495837, (ECF based NOx, VOC con. for CGS engines), was issued May 28, 2009.

PROCESS DESCRIPTION:

The proposed boiler will be used to provide additional heating capacity for the existing anaerobic sludge digestion system. Digester gas, with an average heating value is 600 BTU/SCF, will be used as a primary fuel, with natural gas as standby fuel. The boiler design heat input rating is 10.5 MMBTU/Hr and is equipped with low-NOx burner. Boiler emission controls will be designed to achieve 15 ppmv NOx using DG (full compliance requirement by January 1, 2015, per Rule 1146 (c) (1) (D), Table 1146-1), and 9 ppmv NOx using NG.

Note: Current BACT using Digester Gas is ≤ 100 ppmv CO (fire tube) and ≤ 30 ppmv NOx.

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EMISSIONS:

Calculated NOx and CO emissions: (Please also refer to the memo dated 10/07/09, in folder)
 DG fuel: Exhaust flow rate = 2625 scfm @ 7% O2 (given per Mfgr emission guarantee letter)
 NG fuel: Exhaust flow rate = 2500 scfm @ 7% O2 (given per Mfgr emission guarantee letter)

$$\text{NOx (DG)} = (2625 \text{ scfm}) \frac{(20.9 - 7.0) (30\text{E-}06) (46) (60)}{(20.9 - 3.0) (379)} = 0.44 \text{ lbs NOx/hr} = 10.6 \text{ lbs NOx /day}$$

$$\text{CO (DG)} = (2625 \text{ scfm}) \frac{(20.9 - 7.0) (100 \text{ E-}06) (28) (60)}{(20.9 - 3.0) (379)} = 0.90 \text{ lbs CO/hr} = 21.6 \text{ lbs CO /day}$$

$$\text{NOx (NG)} = (2500 \text{ scfm}) \frac{(20.9 - 7.0) (12\text{E-}06) (46) (60)}{(20.9 - 3.0) (379)} = 0.17 \text{ lbs NOx/hr} = 4.08 \text{ lbs NOx /day}$$

$$\text{CO (NG)} = (2500 \text{ scfm}) \frac{(20.9 - 7.0) (50 \text{ E-}06) (28) (60)}{(20.9 - 3.0) (379)} = 0.43 \text{ lbs CO/hr} = 10.32 \text{ lbs CO /day}$$

PM10, ROG and SOx emissions are estimated based on PC issued under A/N 450019, digester gas fired boiler, 3.77 mmbtu/hr [PC emissions were prorated from reference - Horizon Test # L01-028-FR, test date 4/10/2000-4/12/2000, report date 5/5/00, Reference P/O R-F9092, A/N 326919].

<u>POLLUTANT</u>	<u>lbs/hr , 3.77 mmbtu/hr</u>	<u>LBS/HR FOR 10.5 MMBTU/HR</u>
CO	0.45 (0.12 WITH NATURAL GAS, @ 50 ppmv)	0.90 (DG, 100 ppmv CO limit)-calc. (0.43 WITH NG @ 50 ppmv)-calc.
NOx	0.11 (0.054 WITH NATURAL GAS)	0.22 (DG, 15 ppmv NOx limit)-calc. (0.13 WITH NG @ 9 ppmv limit)-calc.
PM10	0.02	0.056 (OR 0.0125 gr/dscf)
ROG	0.03	0.083
SOx*	0.046	0.13

* at 40 ppmv H2S in DG

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Maximum Daily Emissions:

Pollutant	Llbs/day
CO	21.6 (10.3 WITH NATURAL GAS)
NOx	10.6 (4.1 WITH NATURAL GAS)
PM10	1.34
ROG	2.0
SOx	3.12

RULES EVALUATION:

Rule 212: This is not a significant project and there is no school within 1000' of the emission source. Criteria pollutant daily emissions are below R212 (g) limits. Maximum risk is estimated less than one in a million (3.19 E-07). Compliance is expected.

Rule 401, 402, 404, 407, 409: Compliance is expected based on other permitted boilers fired with DG and natural gas. Final compliance can be determined once S/T results are available.

Rule 431.1: Digester gas is expected to have < 40 ppmv total sulfur as H₂S. Compliance is expected.

Rule 1146: Compliance with this rule is expected. Application states that boiler emission controls will be designed for NOx con. of 15 ppmv and 9 ppmv using DG and NG. Condition #8 is imposed for such limit for the respective fuel, at 3% O₂. CO limit is imposed for less than 100 ppmv (DG) and < 50 ppmv (NG), at 3% O₂, dry basis. Rule CO limit = 400 ppmv. Southern California Boiler has provided emission guarantee letter for the proposed boiler (See letter dated April 27, 2009, in folder).

Rule 1146 (c) (1) (D), Table 1146-1 requires compliance with 15 ppmv NOx, at 3% O₂, by January 2015. Compliance can be determined upon receipt of the S /T results.

REG XIII:

BACT-

Boiler emission controls will be designed to meet 15 ppmv NOx @ 3% O₂ (9 ppmv NOx with natural gas). Boiler is equipped with low NOx burner. BACT for DG fired boiler (<75 MM Btu/hr) is 100 ppmv CO. Based on other DG fired boiler (Inland Umpire Utilities Agency, 4.73 MMBtu/hr, Burnham, A/N 328181), source tests have demonstrated CO < 100 ppmv, @3% O₂. CO of < 50 ppmv can be expected for NG fuel. Compliance is expected.

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HOURLY EMISSIONS

For the NO_x, CO, and PM₁₀, hourly emissions, at rated heat input, are estimated to be within the allowable emission limit under Rule 1303, Table A-1, and therefore, no further analysis is required.

OFFSETS

This is a POTW facility, an Essential Public Service and facility is qualified to obtain offsets for NO_x, PM₁₀, ROG and SO_x (daily emission > 0.5 lb/day).

CO is in-attainment and, therefore, no offset is required for CO.

Required offsets from PR;

Lbs/day

CO = 22 (in-attainment)

NO_x = 5 11

PM10= 1

ROG = 2

SO_x = 3

Rule 1401:

Toxic Emissions Estimate:

For PC stage, TACs emissions are prorated from previously permitted boiler F66343 (A/N 420790), 3.77 MMBTU/HR (10.5 MMBTU/HR x SCF DG/600 BTU = 0.0175 MMSCF DG/HR)

<u>TACs</u>	<u>lbs/hr (for 3.77 MMBTU/HR)</u>	<u>lbs/hr for proposed boiler @ 10.5 MMBTU/HR</u>
Methylene chloride	9.24 E-06	2.57 E-05
1, 1, 1 TCA	2.35 E-06	6.54 E-06
Benzene	2.55 E-06	7.10 E-06
Toluene	5.74 E-06	1.60 E-05
Xylenes	1.77 E-06	4.93 E-06
P-Dichlorobenzene	1.99 E-06	5.54 E-06
Formaldehyde	EF* = 0.0123 lbs/MMSCF	2.15 E-04
PAHs	EF* = 0.0004 lbs/MMSCF	7.00 E-06
Ammonia	EF* = 3.2 lbs/MMSCF	5.60E-02

* EF Reference, AQMD Published default emission factors for DG combustion, Boiler (Used for AER).

Using SCREEN 3 analysis, max. ground level con. of 16.83 mcg/cu. m was determined at 86 meters (Nearest residence = 213 m, commercial = 335 m).

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Worst-case MICR_R = 3.19 E-07

Worst-case MICR_C = 3.08 E-08

HIC and HIA indices are < 1.

REG XIII: Title V Permits

Compliance with Reg. XXX is expected. A/N 499793 for Title V revision is submitted. Addition of a new boiler is considered a de minimis significant revision and, upon EPA 45-day review, approved boiler permit will be included under Title V revision (No. 2), Section H.

40 CFR 63 SUBPART DDDDD: (NESHAP)

Facility's reported 2008 TAC emissions data revealed that Formaldehyde emission is 20720.24 lbs/yr (10.20 TPY, thus the facility meets the definition for the HAP emissions standards for NESHAP.

Since this is a new boiler construction at the HAP major source, it is subject to 40 CFR 63 subpart DDDDD. Also, the equipment is rated at > 10 MMBTU/hr, classified as industrial boiler, uses biogas fuel, and therefore, subject to applicable requirements for compliance.

Fire tube boilers are classified as small units, regardless of size (Small units not subject to CO emission limit). However, boiler is rated at > 10 MMBTU/hr, gaseous fuel, classified as Population III category and, hence, subject to CO performance test.

For New or reconstructed limited use gaseous fuel CO limit is 400 ppmv @ 3% O₂, dry (3-run average).

NOTE: Permit condition for CO limit = ≤100 PPMV (DG) and ≤50 PPMV (NG).

Compliance is expected. A condition is added for compliance with applicable requirements of this subpart.

CONCLUSIONS/RECOMMENDATION:

The above boiler is expected to comply with all applicable AQMD's Rules and Regulations. A Permit to Construct is recommended subject to conditions listed on Pg. 1 through 4, and upon 45-day EPA review for the Title V FP revision.