OWNER/OPERATOR:

COID: 19159

EASTERN MUNICIPAL WATER DISTRICT
PO BOX 8300
PERRIS, CA 92572

CONTACT: CASEY CORLISS
(951)928-3777

EQUIPMENT LOCATION:

SAN JACINTO VALLEY REGIONAL WATER RECLAMATION FACILITY
770 N. SANDERS AVE.
SAN JACINTO, CA 92582

EQUIPMENT DESCRIPTION:

BOILER, DIGESTER GAS FIRED, RATED AT 5.3 MMBTU PER HOUR, WITH ULTRA LOW NO_X BURNER.

HISTORY/PROCESS DESCRIPTION:

A Class I application was received on October 23, 2009, for a digester gas fired boiler with natural gas supplemental fuel. A second Class I application (A/N 503053) was also received for a natural gas fired boiler. Both boilers are to be used to provide hot water for the facility. This facility is a Title V facility. An application to amend the Title V permit was also received.

The digester gas boiler will be one of the following:

1. Johnston Boiler, Model 509, 5.3 MMBTU/hr, digester gas fired, with ultra-low NOx burner.
2. Hurst Boiler, Series 500, 5.3 MMBTU/hr, digester gas fired, with ultra-low NOx burner.
3. Or an equivalent boiler of a different make and model.

The emissions calculations submitted by the applicant is based on a 5.3 MMBtu/hr rating input capacity. For this Permit to Construct, 5.3 MMBtu/hr will be used to estimate emissions. The output capacity is rated at 4.2 MMBtu/hr. The estimated construction date is December 1, 2009, but applicant is awaiting a Permit to Construct prior to purchasing and installing a boiler. The boiler will operate 18 hours a day, 7 days a week.

Last facility inspection was conducted on May 14, 2009, and the facility was found to be in compliance.

EMISSION CALCULATION:

MAX HOURS PER DAY: 24 AVERAGE HOURS PER DAY: 18
MAX DAYS PER WEEK: 7 AVERAGE DAYS PER WEEK: 7
MAX DAYS PER MONTH: 30 AVERAGE DAYS PER MONTH: 30
MAX WEEKS PER YEAR: 52 AVERAGE WEEKS PER YEAR: 52

MAIN FUEL: DIGESTER GAS
BACK-UP FUEL: NATURAL GAS
BURNER INPUT: 5.3 MMBTU/HR
AVERAGE LOAD: 75.00 %
ANNUAL ACTUAL HEAT INPUT: 75 % * MMBTU/HR per boiler = 3.975 MMBTU/HR
EXCESS OXYGEN PERCENTAGE: 3 %

EMISSION FACTORS FOR DIGESTER GAS

POLLUTANT	EMISSION FACTORS	UNITS
CO	48.21	Lb/mmcf
NOX	11.88	Lb/mmcf
PM	7.6	Lb/mmcf
PM10	7.6	Lb/mmcf
ROG	7.0	Lb/mmcf
SOX	0.83	Lb/mmcf

EMISSION FACTORS FOR NATURAL GAS

POLLUTANT	EMISSION FACTORS	UNITS
CO	38.27	Lb/mmcf
NOX	11.32	Lb/mmcf
PM	7.6	Lb/mmcf
PM10	7.6	Lb/mmcf
ROG	5.5	Lb/mmcf
SOX	0.60	Lb/mmcf

Calculations will be based on digester gas emission factors to estimate the maximum emissions.

NSR CALCULATIONS FOR NOx AND CO:

Maximum limits for 30 ppm NOx and 100 ppm CO are used.

Burner rating in Btu per hour = 5.3×10^6
Average load = 75% x 5.3 MMBtu/hr = 3.975 MMBtu/hr
Estimated exhaust flow rate = 1061 dscfm
Estimated O2 concentration = 5.28%

For Digester Gas:
Emission Rate for CO = 1061 dscfm x (20.9 - 5.28)/(20.9 - 3) x 28 x 60 x 100 / 379 x e^{-6}

= 0.41 lb/hr max

Avg = Max x 75% = 0.41 x 75% = 0.31 lb/hr

Emission Rate for NO_X = 1061 dscfm x (20.9 - 5.28)/(20.9 - 3) x 46 x 60 x 30 / 379 x e^{-6}

= 0.20 lb/hr max

Avg = Max x 75% = 0.20 x 75% = 0.15 lb/hr

For Natural Gas: (Limits are for a Fire Tube Boiler)

Emission Rate for CO = 1061 dscfm x (20.9 - 5.28)/(20.9 - 3) x 28 x 60 x 50 / 379 x e^{-6}

= 0.20 lb/hr max

Avg = Max x 75% = 0.20 x 75% = 0.15 lb/hr

Emission Rate for NOx = 0.036 lbs/10^6 Btu x 5.3 MMBtu/hr

= 0.19 lb/hr max

Avg = Max x 75% = 0.19 x 75% = 0.14 lb/hr

FOR ROG AND SOX

See emissions estimate provided by applicant.

PM AND PM10

Emissions provided by applicant are very high. To estimate emissions, the emission factors for natural gas are used.

EMISSION RATE = BTU/hr x EF / HHV

EF = EMISSION FACTOR
HHV = HIGHER HEATING VALUE
HHV for DIGESTER GAS = 9,026 BTU/CF

Lb/hr is calculated based on 75% load.
Lb/day = lb/hr x 18 hours/day
Max lb/day = 100% load and 24 hours/day
30 day average = max lb/day x 7 days/wk x 4.33 wks/mo / 30 days/mo
Lb/year = max lb/day x 365 days/year

	CO	NOx	PM	PM10	ROG	SOx
lb/hr	0.31	0.15	0.004	0.004	0.03	0.07
lb/day	5.58	2.7	0.072	0.072	0.63	1.27
max lb/day	9.84	4.8	0.096	0.096	1.12	2.26
30 day avg	9.94	4.8	0.097	0.097	1.13	2.28
lb/year	3592	1752	35	35	409	826

RULE 1401

See attached calculations.

RULE EVALUATION:

Rules:

212: This application is not considered a Significant Project. No Public Notice is required.
401: Visible emissions are not expected.
402: Nuisance is not expected.
403: Fugitive dust is not expected.
404: This rule does not apply to boilers.
407: Based on the above calculations, this boiler complies with Rule 407.
409: Based on the above calculations, this boiler complies with Rule 409.
1109: This boiler is not used in a refinery. Therefore, this rule does not apply.
1146: This boiler is in compliance with Rule 1146. The boiler meets the January 1, 2015, limit of 15 ppm NOx.
Reg XIII: Equipment is equipped with an ultra low NO_X burner, thus complying with BACT requirement. Equipment is exempt from modeling requirement as NOx, CO and PM10 emissions are within allowable limits of Rule 1303(b)(1), Table A-1. Emission offsets will be requested from the Priority Reserve account.
NSR calculations were based on current maximum allowable limit of 30 ppm NOx and and 100 ppm CO.
Facility is not subject to sensitive zone requirements.
Reg XIV: Health risk screening indicates a risk of less than one in a million.

CONCLUSION:

Emission calculations and equipment analyses show that this equipment is in compliance with all the applicable Rules and Regulations of the District. A Permit to Construct is recommended.

CONDITIONS:

1. OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN COMPLIANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT TO CONSTRUCT 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 BOILER SHALL BE PRIMARILY FIRED ON DIGESTER GAS. NATURAL GAS MAY BE USED AS A STANDBY FUEL AS ALLOWED PER RULE 1146.
[RULE 204, 1146]

5. NON-RESETTABLE, TOTALIZING FUEL METERS SHALL BE INSTALLED AND MAINTAINED IN EACH FUEL SUPPLY LINE TO MEASURE AND RECORD THE AMOUNT OF FUEL BURNED.
RULE 1303(b)(1), 1303(b)(2) – MODELING & OFFSET]

6. WHEN IN OPERATION, TOTAL HEAT INPUT FOR THIS EQUIPMENT SHALL NOT EXCEED 5.3 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 ATTACHMENT I OF RULE 1146.
[RULE 1146]

8. EMISSIONS SHALL NOT EXCEED THE FOLLOWING LIMITS AND SHALL BE MEASURED BY VOLUME AT 3% O2, DRY BASIS.

FUEL USED	NOX AS NO2	CO
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 NOX 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 FIVE YEARS THEREAFTER, UNDER THE FOLLOWING CONDITIONS AND PER RULE 1146:

    A. TESTING SHALL BE CONDUCTED BY AN APPROVED CONTRACTOR UNDER THE SCAQMD LABORATORY APPROVAL PROGRAM AND IN COMPLIANCE WITH DISTRICT RULE 304 (NO CONFLICT OF INTEREST).

    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 DESCRIPTIONS OF ALL SAMPLING AND ANALYTICAL PROCEDURES TO BE USED.

    C. SOURCE TESTS 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. SOURCE TESTS SHALL BE PERFORMED WHEN THE BOILER IS OPERATING AT MAXIMUM, MINIMUM AND AVERAGE LOADS FOR EACH FUEL (DIGESTER GAS AND NATURAL GAS). THE SAMPLING TIME AT EACH LOAD SHALL BE FOR A MINIMUM OF 15 CONSECUTIVE MINUTES.

    E. TWO COPIES OF THE SOURCE TEST RESULTS SHALL BE SUBMITTED TO AQMD WITHIN 60 DAYS OF TESTING. THE REPORT SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING:

    FUEL FLOW RATE FOR EACH FUEL
    FLUE GAS FLOW RATE FOR EACH FUEL
    METHANE CONTENT FOR DIGESTER GAS
    TOTAL NON-METHANE ORGANICS FOR DIGESTER GAS AND EXHAUST GAS
    SPECIATED TRACE ORGANICS FOR DIGESTER GAS AND EXHAUST GAS
    TOTAL PARTICULATES OF EXHAUST GAS
    OXIDES OF NITROGEN FOR EXHAUST GAS
    CARBON MONOXIDE FOR EXHAUST GAS
    OXYGEN FOR EXHAST GAS
    HIGHER HEATING VALUE FOR DIGESTER GAS
    TOTAL SULFUR CONTENT, AS H2S, PPMV FOR DIGESTER GAS

[RULE 217, RULE 404, RULE 1146, RULE 1303(a)1), 1303(b)(1), 1303(b)(2)-BACT, MODELING AND OFFSET, RULE 1401]

1. EMISSIONS FROM THIS EQUIPMENT SHALLNOT EXCEED THE FOLLOWING:

POLLUTANT	POUNDS PER HOUR
CO	0.41 (0.2 FOR NATURAL GAS)
NOX	0.20 (0.19 FOR NATURAL GAS)
PM10	0.004
ROG	0.047
SOX	0.095

[RULE 404, RULE 431.1, RULE 1303(a)(1)-BACT, RULE 1303(b)(2)-OFFSET]

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

3. ALL RECORDS REQURIED 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)]

Periodic Monitoring:

4. THE OPERATOR SHALL DETERMINE COMPLIANCE WITH THE EMISSION LIMIT(S) IN CONDITION NO. 11, AT LEAST ONCE EVERY FIVE YEARS USING AQMD-APPROVED TEST METHODS. THE TEST SHALL BE CONDUCTED WHENTHE EQUIPMENT IS OEPRATING UNDER NORMAL CONDITIONS. THE OPERATOR SHALL COMPLY WITH ALL GENERAL TESTING, REPORTING AND RECORDKEEPING REQURIEMENTS IN SECTIN E AND K OF THIS PERMIT.

Emissions And Requirements:

5. THIS EQUIPMENT IS SUBJECT TO THE APPLICALBE REQUIREMENTS OF THE FOLLOWING RULE AND REGULATIONS:

CO: 2000 PPMV, RULE 407
CO: 400 PPMV @ 3% O2, DRY BASIS, RULE 1146
PM: 0.1 GR/SCF, RULE 409