

<b>SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT</b>  <b>ENGINEERING AND COMPLIANCE DIVISION</b>  <b>PERMIT APPLICATION EVALUATION AND CALCULATIONS</b>	PAGES	PAGE 1
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PERMIT TO CONSTRUCT

APPLICANT'S NAME: LA CITY SANITATION BUREAU, TERMINAL ISLAND

MAILING ADDRESS: 445 FERRY ST., TERMINAL ISLAND  
SAN PEDRO, CA 90731

EQUIPMENT ADDRESS: 445 FERRY ST.  
SAN PEDRO, CA 90731

FACILITY ID. NO. : 10245

EQUIPMENT DESCRIPTION:

DIGESTER GAS FLARING SYSTEM CONSISTING OF TWO FLARES, STANDBY, COMBUSTION ENGINEERING LINKLATER CORP., MODEL GF-3000, EACH WITH 400 SCFM MAXIMUM RATING, 7'-1" DIA. X 24'-11" H., A HEX BURNER, AUTOMATIC IGNITION AND RE-START, FLARE FAILURE ALARM WITH AUTOMATIC FLARE SHUT-OFF, EXHAUST GAS TEMPERATURE INDICATOR, AND DIGESTER GAS FLOW INDICATOR.

BACKGROUND:

The subject application was filed as Class III for the modification of an existing waste digester gas firing system (P/O # D89982, A/N 259789) used to destruct waste gas generated by the digester at the above facility. It should be noted that the application 259789 was evaluated for only one flare with maximum total rating of 800 scfm (please see applicant's cover letter dated 10/26/07). Application 474645 will be evaluated to modify the existing permit D89982 to include both flares (identical) in the new permit to operate with no emissions increase.

Based on the data submitted & previous evaluation, there are no schools located within 1000 feet of the facility.

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PROCESS DESCRIPTION:

The existing waste digester gas firing system is used at this facility to burn off unused treated digester gas during periods when digester gas generated from the facility can not be stored or completely burned in the boilers.. The process begins when waste digester gas reaches a system start pressure set point. Pilot gas is then injected into the gas flare stack and ignited. Waste digester gas is then injected into the stack and ignited. The unit will continue to burn only waste digester gas until the pressure of the gas drops below a shut down set point.

EMISSIONS:

Emissions Factors (lb/mm btu):

NOX: 0.06

CO: 0.2

PM: 10 lbs/mmbtu

ROG: 5.82 lb/hr (based on the tests dated 12/11/07 for digester gas)

Blower capacity: 800 cfm (400 cfm each flare)  
Heating value: 800 ft<sup>3</sup>/min x 650 btu/ft<sup>3</sup> x 60 min./hr =  
= 31.2 mm btu/hr

NOX:

R2 = 0.06 lb/mm btu x 31.2 mm btu/hr  
= 1.88 lbs/hr  
= 45.12 lbs/day

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ROG (based on the test results dated 12/11/07 for flare # 1):

Flow rate: 83.6 scfm  
Control efficiency: 98%

$$\begin{aligned}
 R2 &= 5.82 \text{ lbs/hr} \times (1 - 0.98) \times 400 \text{ cfm} / 83.6 \text{ cfm} \\
 &= 0.55 \text{ lb/hr} \\
 &= 13.2 \text{ lbs/day}
 \end{aligned}$$

CO:

$$\begin{aligned}
 R2 &= 0.2 \text{ lb/mm btu} \times 31.2 \text{ mm btu/hr} \\
 &= 6.24 \text{ lbs/hr} \\
 &= 150 \text{ lbs/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{CO emiss. for each flare} &= 3.12 \text{ lbs/hr} \\
 &= 75 \text{ lbs/day}
 \end{aligned}$$

PM10:

$$\begin{aligned}
 R1 = R2 &= 10 \text{ lbs/mm ft}^3 \times 800 \text{ ft}^3/\text{min} \times 60 \text{ min/hr} \\
 &= 0.48 \text{ lb/hr} \\
 &= 11.5 \text{ lbs/day}
 \end{aligned}$$

SOX:

H2S concentration is limited to 40 ppm per Rule 431.1 (amended June 12, 1998). According to the oxidation of H2S to SO2, 1 lb-mole of H2S converts to 1 lb-mole of SO2.



$$\begin{aligned}
 \text{Therefore, SO}_2 \text{ emissions} &= 40 \text{ ppmv} / 379 \text{ ft}^3 \times 10^6 \times 64 \text{ lbs SOX} / 34 \text{ lbs H}_2\text{S} \times 400 \text{ cfm} \times 60 \\
 \text{min./hr} \times 24 \text{ hrs/day} &= 0.12 \text{ lb/day} \\
 &= 0.005 \text{ lb/hr}
 \end{aligned}$$

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Emiss. Increase (lbs/day):

A/N	CO	NOX	PM10	ROG	SOX
259789	2	16	4	2	1
474645	150	45	11.5	26	0
Increase	148	29	7.5	24	0

Health Risk Assessment:

Given:

Stack height: 18'

Nearest residential distance: 7000 ft

Nearest commercial distance: 500 ft

Exhaust flow rate: 4,630 scfm (based on the test results dated Dec. 11, 07)

Based on Tier II risk analysis with 98% control efficiency (using digester gas analysis provided for the fuel cell application 471518), the MICR for residential & commercial are  $0.00246 \times 10^{-6}$  &  $0.0228 \times 10^{-6}$ , respectively.

RULES EVALUATION:

Rule 212:

There are no schools within 1000 feet of the emissions source. No increase in MICR is expected. Not a significant source of emissions. Criteria pollutants' emissions are within maximum allowable daily threshold limits under Rule 212(g). Public notification is required. A permit condition to limit digester gas volume burned in this equipment will ensure continuous compliance.

Rule 401 (Visible Emissions):

With proper operation, maintenance and control of equipment compliance is expected.

Rule 402 (Nuisance):

Operation of this equipment is not expected to create a nuisance.

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Rule 404:

Based on the exhaust flow rate of 4630 cfm (277800 cfh, based on the test results dated 12/11/07), the PM grain loading is as follows:

$$\begin{aligned} \text{Grain Loading} &= \frac{0.48 \text{ lb/hr} \times 7,000 \text{ grains/lb}}{277800 \text{ cfh}} \\ &= 0.012 \text{ grain/cf} \end{aligned}$$

The rule allowed grain loading for 4630 cfm is 0.105 grain/cf. Therefore, compliance is expected.

Rule 407:

$$\begin{aligned} \text{CO} &= \frac{6.24 \text{ lbs/hr} \times 379 \text{ cf} \times 10^6}{4630 \text{ cfm} \times 60 \times 28 \text{ lbs/lb-mole}} \\ &= 304 \text{ ppm} < 2000 \text{ ppm allowed.} \end{aligned}$$

Therefore, compliance is expected.

SOX concentration will not exceed 40 ppm (subject to Rule 431.1). Allowed concentration is 500 ppm. Therefore, compliance is expected.

Rule 409:

Based on the previous flares evaluations, combustion contaminants emissions are expected to be less than 0.1 grain/scft. Therefore, compliance is expected.

Rule 431.1:

Sulfur compound calculated as H2S will be limited to maximum of 40 ppmv. Compliance with this rule is expected.

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Regulation XIII:

The flares serve as an air pollution device. NOX will not exceed 0.06 lb/mm btu. This system which operates at temp greater than 1400 °F is designed with a retention time of at least 0.6 sec, auto combustion air control, automatic shutoff gas valve and automatic re-start system which meets BACT requirement.

The above modification will result in emissions offsets requirement for NOX & ROG. However, since the facility is an essential public service facility, no offsets are required.

Rule 1401:

MICR based on Tier 2 analysis is below 1 x10-6 (see Risk Analysis). Compliance is expected.

Rule 1401.1:

This is an existing facility. Therefore, operation of the equipment is not subject to this rule.

Recommendations:

A conditional permit to operate is recommended with the proposed conditions stated in the Sample Permit.