

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING AND COMPLIANCE DIVISION

APPLICATION PROCESSING AND CALCULATIONS

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APPLICATIONS NO. 474001 THROUGH 474004 (IDENTICAL EQUIPMENT)

RESOURCE RECOVERY/LANDFILL GAS TO ENERGY SYSTEM [NO.1, 2, 3, AND 4]
CONSISTING OF:

1. GAS TURBINE, SOLAR, MODEL TAURUS 60 7900 SERIES, LANDFILL GAS FIRED, 72 MMBTU/HR, DRIVING A 5.6 MW GENERATOR.
2. HEAT RECOVERY STEAM GENERATOR.
3. STEAM TURBINE/GENERATOR [COMMON TO SYSTEMS NO.1, 2, 3, AND 4].

APPLICATIONS NO. 474005 THROUGH 474008 (IDENTICAL EQUIPMENT)

AIR POLLUTION CONTROL SYSTEM [NO.1, 2, 3, AND 4] CONSISTING OF:

1. OXIDATION CATALYST.
2. AMMONIA INJECTION GRID.
3. SELECTIVE CATALYTIC REDUCTION UNIT, PEERLESS, WITH A HONEYCOMB CERAMIC VANADIUM/TITANIUM TYPE CATALYST AND UREA INJECTION.
4. EXHAUST STACK.

APPLICATION NO.487106

STORAGE TANK, AQUEOUS AMMONIA, 12'-6" DIA. X 15'-0" H., 12,000 GALLONS CAPACITY.

APPLICATION NO.476209

APPLICATION FOR A SIGNIFICANT REVISION TO TITLE V FACILITY PERMIT TO OPERATE ISSUED ON OCTOBER 1, 2007

CONDITIONS: (See Sample permit)

BACKGROUND

Ridgewood Power Management, LLC, ID No. 113518, filed applications No. 474001 through 474009, on September 27, 2007, for a permit to construct a Landfill Gas (LFG) fired co-generation facility consisting of four identical landfill gas fired turbines, each vented to an Air Pollution Control System (APCS) consisting of a Selective Catalytic Reduction (SCR) and Oxidation Catalyst, and a LFG Treatment System . Application No.475036 was filed on October 30, 2007, for a permit to construct a Flare venting the LFG treatment system. Application No. 476209 was filed on December 7, 2007, for a significant revision to the Title V Facility Permit. An additional application for an aqueous ammonia storage tank was filed on August 20, 2008.

The Landfill Gas (LFG) fuel cogeneration facility is owned by Brea Power (II) LLC, and operated by Ridgewood Power Management LLC which receives LFG from the Brea/Olinda Landfill. A Notice of Determination was completed on August 7, 2007, after an Initial Study was completed on June 22, 2007. A subsequent Notice of Intent to Adopt a Negative Declaration was published on June 22, 2007, with a 30 day comment period which ended on July 22, 2007. A supplemental Notice of Determination was completed on November 4, 2009, which indicated that the proposed project will not have a significant impact.

PROCESS DESCRIPTION

The Olinda-Alpha Landfill gas collection system recovers approximately 12.4 MMSCF of LFG per day. Currently, Brea Power (I), the existing cogeneration system receives approximately 2.7 MMSCF of gas per day, and the remaining gas is burned in three existing flares. The proposed new cogeneration facility, Brea Power (II) consists of a LFG treatment system with a landfill gas fired flare, and four LFG fueled 72 mmBTU/hr turbines which are each vented to a SCR and oxidation catalyst emission control system. (See Figure 1) Each turbine is rated at 72 mmbtu/hr based on the HHV of the Biogas @40 degrees F.

The Landfill Gas Treatment System is designed treat an average of 8,667 scfm and a maximum of 12,000 scfm of landfill gas. Any excess gas will be burned in the existing power plant (Ridgewood Power I) or flares.

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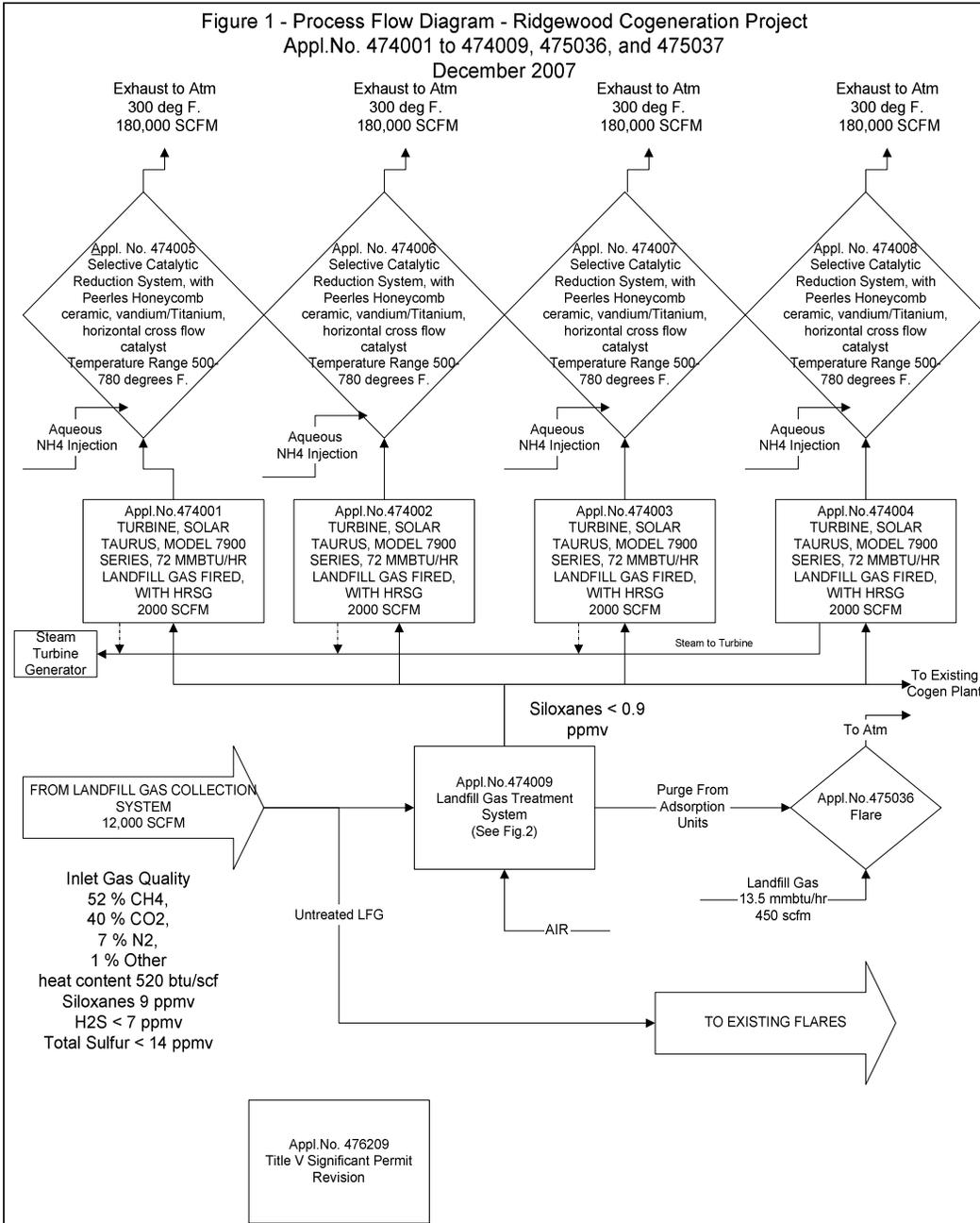
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The flare which is subject to application No. 475036, is an enclosed ground flare with guaranteed Nox, and CO emissions less than 0.025 lbNOx /mmbtu and 0.06 lb CO/mmbtu. The flare is rated at 13,500,000 btu/hr, and operates at 1800 degrees Fahrenheit with a residence time of 0.7 second according to the application. The flare is designed to vent a maximum of 7600 scfm of purge gas from each siloxane adsorber, and 450 scfm of landfill gas. The current design specifies a discharge height of 40 feet, and a diameter of 5 feet. At the time of filing the application, no final specifications for the flare were available and permit conditions will required the facility to provide the final specification for AQMD approval before the commencement of construction.

The cogeneration system consists of four Solar model Taurus 60 series 7900 LFG fired combustion turbines. Each turbine is rated at 72 mmbtu/hr (@40 deg.F, and HHV of Fuel) and connected to an electric generator rated at 5.6 Megawatts, and a Heat Recovery Steam Generator (HRSG). An electric motor is used to crank start the turbine until the fuel is ignited. The gas turbine manufacturer has guaranteed that the maximum Nox emissions will be less than 42 ppmd @ 15 percent oxygen. Each turbine will be vented to a separate SCR Nox emissions control system which will reduce Nox emissions to less than 25 ppmvd @ 15 percent oxygen. An oxidation catalyst will be installed upstream of the SCR catalyst to reduce CO and VOC emissions. The estimated CO destruction efficiency is about 95%.

Each SCR system will be manufactured by the Peerless Manufacturing Company. The SCR system uses a honeycomb ceramic vanadium/titanium type catalyst with an operating temperature range from 500 to 780 degrees Fahrenheit, with a horizontal gas flow. The catalyst is expected to reach the operational temperature of 500 degrees Fahrenheit within one hour before the reducing agent is injected into the catalyst. The reducing reagent is 19% aqueous ammonia. The exhaust from each SCR unit is vented to the atmosphere through a 50 foot exhaust stack with a diameter of 4 feet.

Each Turbine which is equipped with a heat recovery steam generator will be used to generate a total of 27,000 lb/hr of steam. The steam will be used to drive a steam turbine/generator which is expected to provide an additional 9.4 MW of electricity.



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EMISSIONS

Table 1A - Summary of Criteria Pollutant Emissions Estimated in Appendix B

Appl.No.		Rating mmbtu/hr	NOx lb/hr	CO lb/hr	ROG lb/hr	PM10 lb/hr	SOx lb/hr
Gas Turbine*							
474001-4	Cont	72.0	7.10	22.30	0.50	1.51	1.39
474001-4	UnCont	72.0	11.95	346.39	25.08	1.51	1.39
LFG Treatment System							
474009	Uncont	-----	-----	-----	2.24	-----	-----
475036	Cont	13.6	0.34	0.82	0.02	0.27	0.27
SCR							
474005-8		-----	-----	-----	-----	0.39	-----
STORAGE TANK	Cont	-----	-----	-----	-----	0.12	-----
* VOC emissions based on Fuel and 98% reduction							

Table 1B - NSR Emission Rates (Equal to 30 day average)

Appl.No.		Rating mmbtu/hr	NOx lb/day	CO lb/day	ROG lb/day	PM10 lb/day	SOx lb/day
Gas Turbine							
474001-4	Cont	72.0	170	535	12	36	33
474001-4	UnCont	72.0	287	8313	602	36	33
LFG Treatment System							
474009	Uncont	-----	-----	-----	54	-----	-----
475036	Cont	-----	8	20	1	6	6
SCR							
474005-8		-----	-----	-----	-----	9	-----
STORAGE TANK	Cont	-----	-----	-----	-----	0	-----

Toxic emissions from LFG Treatment system (Appl.No.475037)

	Inlet Mass			Outlet Mass		
	Emiss. Rate		lb/yr	Emission Rate		lb/yr
	lb/hr	lb/day		lb/hr	lb/day	
Benzene	0.0938	2.252	819.706	0.00188	0.045	16.394
Toluene	0.3320	7.968	2900.505	0.00664	0.159	58.010
Ethyl Benzene	0.1189	2.853	1038.511	0.00238	0.057	20.770
Xylenes	0.2551	6.124	2228.978	0.00510	0.122	44.580

Evaluation

Rule 212(c)(2)

Although, there is no school located within 1000 feet of this facility, the potential to emit criteria pollutants is expected to exceed the limits specified in subdivision (g) of this Rule. Therefore, a public notice is required under Rule 212(c)(2).

Rule 212(c)(3)

Since the estimated MICR for each Turbine is 0.03 in a million, and for the Landfill Flare is 0.02 in a million, the total risk is less than 0.14 in a million and no public notice is required under Rule 212(c)(3).

Rule 401

Under normal operating conditions, no visible emission is expected to be generated from the proper operation of this equipment. Therefore, compliance with Rule 401 is expected.

Rule 402

Under normal operating conditions, no nuisance is expected to be generated from the proper operation of this equipment. Therefore, compliance with Rule 402 is expected.

Rule 404

The operation of a gas turbine is exempt from the provisions of the Rule per 404(c) .

Rule 407

The maximum CO emissions are estimated at 130 ppmv @ 15% oxygen. Therefore compliance with 2000 ppmv CO concentration limit is expected. This project is exempt from the 500 ppmv Sox limit per 407(c)(2) [compliance is required for Rule 431.1 for H2S in the LFG.] Therefore compliance with the Sox limit is expected.

Rule 409

Since PM10 is estimated at 0.019 lb/mmmbtu, the PM10 concentration is expected to be less than 0.1 gr/scf @12% CO2 with a 15 minute averaging period. Therefore, compliance with Rule 409 is expected.

Rule 431.1

Based on the Landfill Gas Analysis the total sulfur content (calculated as H2S) is less than 150 ppm, and compliance with Rule 431.1 is expected.

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40 CFR 60 Subpart KKKK

Nox Standard

Since each proposed turbine is expected to meet the LAER limit of 25 ppmv Nox @ 15 % Oxygen, the proposed project is expected to comply with the Nox standard of 96 PPMV in Table 1.

Sox Standard

Since the proposed project is subject to a Rule 431.1 (150 ppmv H2S) limit, compliance with the Sox standard of 0.06 lb/mmbtu is expected.

Monitoring

Nox Monitoring - Each turbine/SCR control system will be equipped with a Continuous Emission Control System to monitor Nox and Oxygen concentrations to comply with section 60.4335(b).

Sox Monitoring - Compliance with AQMD Rule 431.1 will satisfy the monitoring requirements under section 60.4370.

Therefore, compliance with 40 CFR 60 subpart KKKK is expected.

40 CFR 60 Subpart WWW- Municipal Solid Waste Landfills

This project is subject to NSPS regulation. The LFG for this project is collected through an active gas collection system. Each gas turbine is expected to have a minimum 98% NMOC destruction efficiency of TNMOC emission < 20 ppmv as hexane, 3% O2 dry. The LFG will be treated prior to combustion in the gas turbines. Therefore compliance is expected.

Rule 1134

This Rule is applicable only to existing gas turbines >= 0.3 MW, as of August 4, 1989. Since this is a new construction, this Rule is not applicable.

Rule 1150.1

Since each gas turbine (and flare) is expected to have a NMOC destruction efficiency which exceed 98%, or a has an exhaust concentration less than 20 ppmv as hexane @ 3% Oxygen, dry basis, compliance with this Rule is expected. Permit conditions and Source testing will be required to verify compliance.

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Rule 1303 - BACT & Offsets

Based on the projected emissions, this proposed facility is a major source of criteria pollutants, and therefore, subject to the lowest achievable emissions rate (LAER) as BACT.

The LFG is treated by an inline treatment system to remove siloxanes contaminants and to improve the operation of the gas turbine and air pollution control systems (APCS). Each Turbine is equipped with a selective catalytic reduction system, and the controlled Nox emission rate is guaranteed to be less than 25 ppmv at 15% oxygen. However, lower levels of NOx are feasible.

Since the Nox emissions from the thermal oxidizer/flare is guaranteed to be less than 0.025 lbNOx/mmbtu, the thermal oxidizer/flare is expected to meet LAER.

Based on modeling the proposed project is not expected to significantly impact the ambient air quality. The maximum NO2 (1 hr) concentration from the Gas Turbine is estimated at 19.2 ug/m³. The maximum NO2 (1 hr) concentration from the Thermal Oxidizer/Flare is estimated at 11.1 ug/m³.

The proposed LFG to energy project meets the requirements of an Essential Public Service, as listed under Rule 1302(M)(7) "construction and operation of a landfill gas control or processing facility." The proposed project does not hold any Emission Reduction Credit (ERC). Therefore, offsets (1:1) listed below shall be provided from the Priority Reserve account per Rule 1309.1 (a)(3).

Emission Offsets:

The proposed LFG to energy project meets the requirements of an Essential Public Service, as listed under Rule 1302(M)(7) "construction and operation of a landfill gas control or processing facility." The proposed project does not hold any Emission Reduction Credit (ERC). Therefore, offsets (1:1) listed below shall be provided from the Priority Reserve account per Rule 1309.1 (a)(3).

* As of June 11, 2007 EPA has re-designated SCAQMD as attainment with respect to CO. Therefore, any increase of CO emissions from this project is exempt from offset requirement.

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Sensitive Zone Requirements:

No applicable requirements because emission reduction credits will be provided from the Priority Reserve.

Facility Compliance:

Currently, this facility is in compliance with all SCAQMD rules and regulations.

Major Polluting Facility:

Alternative Analysis:

A negative declaration has been filed for this project. No further analysis is required pursuant to 1303 (b)(5) (D)(ii). A supplemental Notice of Determination was completed on November 4, 2009, which indicated that the proposed project will not have a significant impact.

Protection of Visibility

Not applicable. The proposed project is not located near any specified Federal Class I area.

Therefore, compliance with Regulation XIII is expected.

Rule 1401

The maximum increase in Risk (HI) for the project is estimated at less than 1, based on the risk modeling submitted with the application. Permit conditions will require additional modeling if the required source test indicates that additional TACs are emitted from the equipment which were not covered in the approved Tier IV model.

Rule 1401.1

Not applicable because this is an existing facility.

Regulation XVII: Prevention of Significant Deterioration

The LFG is treated by an inline treatment system to remove siloxanes contaminants and to improve the operation of the gas turbine and air pollution control systems (APCS). Each Turbine is equipped with a CO oxidation catalyst.

A CO oxidation catalyst will be required as BACT based on transfer of control technology. An oxidation catalyst is considered technologically feasible because a source test demonstrated CO destruction efficiency greater than 95% for a LFG fired internal combustion engine (June 21, 2006, A/N 414941). Therefore, the guaranteed emission levels are accepted and lower levels of CO emissions may be imposed if they are demonstrated to be achieved through a two year testing/ evaluation program after the project is completed.

Since the CO emissions from the thermal oxidizer/flare is guaranteed to be less than 0.06 lbCO/mmBtu, the thermal oxidizer/flare is expected to meet BACT.

Although modeling is exempt under Rule 1704(a)(4) for resource recovery projects provided that BACT is employed, the maximum CO concentration (1 hr) from each gas turbine is estimated at 60.8 ug/m³, and the maximum CO concentration (1 hr) from the thermal oxidizer/flare is estimated at 27.8 ug/m³.

Regulation XX

This facility is exempt from RECLAIM per Rule 2001 (i)(1)(c). The construction and operation of landfill gas control processing or landfill gas energy recovery facilities, are prohibited from electing to enter RECLAIM.

Regulation XXX

The applicant has filed an application for a "significant permit revision" to their existing Title V permit, and therefore subject to a 45 day EPA review, and a 30 day public notice.

No Compliance Assurance Monitoring (CAM) Plan is required because CFR part 60 subpart GG requires a CEMS.

NESHAPS Requirements - 40 CFR Part 63- Subpart AAAAA

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This facility is subject to NESHAPS regulation under 40 CFR Part 63 Subpart AAAAA, which allows compliance with this regulation by meeting the requirements of 40 CFR Part 60, Subpart WWW. Therefore, compliance is expected.

40 CFR Part 72- Acid Rain Program

Each gas turbine/generator is a "non-utility Unit" which does not supply more than 25 MW output to any power distribution system for sale. Therefore, this project is exempt from this regulation.

RECOMMENDATION

The proposed project is expected to comply with the Rules and Regulation of the SCAQMD. Permits to Construct with the proposed descriptions and conditions are recommended for the equipment subject to this evaluation contingent upon completion of the required supplemental EIR, public notices (Rule 212 and Title V) and EPA and public commenting period.

APPENDIXES

- A. NSR TRANSACTION REPORT
- B. Emission Calculations
- C. Modeling