Draft Preliminary Engineering Evaluation

Authority to Construct
and
Prevention of Significant Deterioration
(PSD) Permit

Ameresco Half Moon Bay, LLC
Landfill Gas-to-Energy Facility
at the
Ox Mountain Landfill
Half Moon Bay, California

Bay Area Air Quality Management District
Permit Application Number 12649

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Contents

I. Background

This is the Bay Area Air Quality Management District (BAAQMD) Preliminary Engineering Evaluation of an Authority to Construct and federal Prevention of Significant Deterioration (PSD) Permit for the Ameresco Half Moon Bay, LLC, Landfill Gas-to-Energy Facility at the Ox Mountain Landfill in Half Moon Bay, California. Ameresco Half Moon Bay, LLC (Ameresco) intends to purchase and burn landfill gas (LFG) in spark-ignited reciprocating internal combustion engines to produce electrical power for sale. The Ameresco facility will have a total nominal generating capacity of 11.4 MW. The existing landfill gas flares will remain under the ownership of the landfill and may be used to prevent excess landfill gas from being released untreated into the atmosphere.

The project includes six GE Jenbacher JGS 616 GS-L.L gensets; each genset includes a GE Jenbacher model J 616 GS-E22 engine rated at 2677 bhp that drives a generator to produce approximately 1.9 MW. Each engine is abated by a CO oxidation catalyst and one engine is abated by a Selective Catalytic Reduction (SCR) system. Since these catalytic abatement devices have not been successfully used on LFG fired engines, the BAAQMD is providing limited flexibility in this permit for engines to be operated without being abated by these additional controls. Ameresco is installing a landfill gas treatment system to remove moisture and contaminants, especially including volatile siloxanes that accelerate catalyst failure. A small flare is being included as part of the landfill gas treatment system and is being permitted as a separate source.

This report describes how the facility will comply with applicable federal, state, and BAAQMD regulations, including the Best Available Control Technology and emission offset requirements of the District New Source Review regulation. Permit conditions necessary to ensure compliance with applicable rules and regulations are also included. This document includes a health risk assessment that estimates the impact of the project emissions on public health, and a PSD air quality impact analysis to demonstrate that the project will not interfere with the attainment or maintenance of applicable ambient air quality standards.

Because this Preliminary Engineering Evaluation documents the preliminary decision of the Air Pollution Control Officer (APCO) to issue a PSD permit, it is subject to the public notice requirements of BAAQMD Regulation 2-2-405.

II. Project Description

1. Permitted Equipment

Ameresco Half Moon Bay, LLC (Ameresco) has entered into an agreement to both purchase landfill gas from the Ox Mountain Landfill, District Plant Number 2266, located at 12310 San Mateo Road in Half Moon Bay and to site a landfill gas to energy facility at the landfill. Ameresco submitted this application to request an Authority to Construct and Permit to Operate for 6 new IC Engine-Gensets that will burn landfill gas and produce electricity. Some electricity will be used on-site, but most electricity will be sold for off-site use. The proposed IC Engine-Gensets are described below.

Source 1 IC Engine-Genset, GE Jenbacher JGS 616 GS-L.L, 6090 in^3 displacement, 2677 bhp, 21.3 MM BTU/hour, burning landfill gas, 1.9 MW nominal power output, abated by A1 Selective Catalytic Reduction System, Miratech CBL ACIS 20 for NOx abatement, and A2 Oxidation Catalyst, Miratech IQ-34-20 for CO abatement

Source 2 IC Engine-Genset, GE Jenbacher JGS 616 GS-L.L, 6090 in^3 displacement, 2677 bhp, 21.3 MM BTU/hour, burning landfill gas, 1.9 MW nominal power output, abated by A3 Oxidation Catalyst, Miratech IQ-34-20 for CO abatement

Source 3 IC Engine-Genset, GE Jenbacher JGS 616 GS-L.L, 6090 in^3 displacement, 2677 bhp, 21.3 MM BTU/hour, burning landfill gas, 1.9 MW nominal power output, abated by A4 Oxidation Catalyst, Miratech IQ-34-20 for CO abatement

Source 4 IC Engine-Genset, GE Jenbacher JGS 616 GS-L.L, 6090 in^3 displacement, 2677 bhp, 21.3 MM BTU/hour, burning landfill gas, 1.9 MW nominal power output, abated by A5 Oxidation Catalyst, Miratech IQ-34-20 for CO abatement

Source 5 IC Engine-Genset, GE Jenbacher JGS 616 GS-L.L, 6090 in^3 displacement, 2677 bhp, 21.3 MM BTU/hour, burning landfill gas, 1.9 MW nominal power output, abated by A6 Oxidation Catalyst, Miratech IQ-34-20 for CO abatement

Source 6 IC Engine-Genset, GE Jenbacher JGS 616 GS-L.L, 6090 in^3 displacement, 2677 bhp, 21.3 MM BTU/hour, burning landfill gas, 1.9 MW nominal power output, abated by A7 Oxidation Catalyst, Miratech IQ-34-20 for CO abatement

The specific engine model for these sources is GE Jenbacher model J 616 GS-E22 engine. Sources 1 through 6 will initially be operated with the abatement devices described above and their removal is conditionally allowed in this evaluation.

Landfill gas (LFG) will be delivered to Ameresco's Plant # 17040 from the Ox Mountain Landfill, Plant # 2266, and processed in a custom LFG Treatment System prior to being used as a fuel. The LFG Treatment System includes water separators, particulate filters, gas compressors, chillers and a GE Jenbacher TSA activated carbon filter system (for the removal of volatile organic silicon compounds from the LFG). The activated carbon in the LFG Treatment System will be regenerated in-place with the flush gas being incinerated by a flare identified as Source 7 described below:

Source 7 Flare, Perennial Energy, Model EGFS-12-400, 400 scfm LFG, 12 MM BTU/hr

The applicant has agreed to make a reasonable attempt to abate the emissions from each engine with the abatement devices identified above. Ameresco will be required to abate these engines unless the catalysts fail prematurely. This permit evaluation conditionally allows the removal of one or more of the abatement devices. This permit evaluation limits Siloxane content in LFG when a catalyst abates any engine. If all catalysts are removed from service, Siloxane content in LFG will not be regulated so Ameresco may remove Source 7 Flare from service and remove the GE Jenbacher TSA activated carbon filter system from the LFG Treatment System.

The Ox Mountain Landfill is currently abated by landfill gas flares. The landfill operator is retaining those flares and those flares are not the responsibility of Ameresco.

2. Equipment Operating Scenarios

There are at least two diverse equipment-operating scenarios that could be evaluated. The equipment-operating scenario that is used to project maximum emissions assumes operation without any postcombustion NOx and CO catalytic abatement plus operation of a new landfill gas flare.

Another possible and desirable equipment operating scenario includes operating the six IC engines with one abated for NOx reduction and all six abated for CO reduction. This option could be expanded to consider operation with some of the catalysts removed or operation with reduced abatement efficiency or limited initial operation without abatement. Since this equipment operating scenario results in lower maximum annual emissions than the above scenario, it is not further evaluated.

Ameresco has requested that each engine be permitted to operate at full load for 96.5% of the year. Each engine needs some downtime for maintenance. Ameresco has also requested that its flare be permitted to operate at an annual average firing rate of 75% of full fire, which is 12 million BTU per hour. The following projected operating scenario was used to calculate maximum annual air pollutant emissions from the new engines and flare:

8,453.4 hours (96.5% of 8,760 hours) per year of baseload (100% load) operation for each engine without catalytic abatement
an average flare firing rate of 75% of 12 MM BTU/hr of LFG for 8,760 hours per year

This operating scenario assumes that the one flare has toxic air contaminant emissions representative of a landfill gas flare. Since the flare will also incinerate toxic air contaminants adsorbed by the GE Jenbacher TSA activated carbon filter system, flare toxic air contaminant emissions could be slightly higher than calculated. However, from a project perspective, this is still a conservative assumption since: (1) calculated engine toxic air contaminant emissions are not being reduced even though more contaminants going to a flare, and (2) concentrated contaminants incinerated at the flare will be destructed at a higher rate than contaminants incinerated in an engine

III. Emissions

1. Subject to NSR for BACT

Engines:
Ameresco reported that the maximum fuel consumption rate for each proposed engine is 21.3 MM BTU/hour of landfill gas at 50% methane. All District calculations are based on landfill gas containing 50% methane. The proposed operating times for each engine are 24 hours/day, 365 days/year and 96.5% availability, resulting in maximum heat input rates of 511.2 MM BTU/day per engine and 180,057 MM BTU/year per engine. For landfill gas at 50% methane, the maximum landfill gas throughput rates are 1.008 MM scf per day per engine and 355 MM scf per year per engine.

Flare:
Ameresco reported that the maximum fuel consumption rate for the proposed flare is 400 scfm and 12 MM BTU/hour. All District calculations are based on landfill gas containing 50% methane. The proposed operating times for this flare are 24 hours/day, 365 days/year and 75% annual average firing rate. For calculation purposes, the average composition of the gas to the flare is assumed to be identical to that of the LFG, resulting in maximum heat input rates of 288 MM BTU/day and 78,840 MM BTU/year. For landfill gas at 50% methane, the maximum landfill gas throughput rates are 0.576 MM scf per day and 157.7 MM scf per year.

All emission calculations are based on the maximum LFG throughput rates listed above and the maximum permitted emission rates discussed below. Detailed maximum criteria emissions are shown in Tables 1 and 2 for engines and the flare, respectively. The emission calculation formulas follow each table. Project criteria pollutant emissions are summarized in Table 3.

Table 1. Summary of Maximum Criteria Pollutant Emissions from Sources 1 through 6, IC Engines

	Emission Factor, g/bhp-hr	Maximum concentration in LFG as S1	IC Engine Emissions, lbs/hr	IC Engine Emissions, lbs/day	IC Engine Emissions, tons/yr	Emissions for 6 IC Engines, lbs/hr	Emissions for 6 IC Engines, lbs/day	Emissions for 6 IC Engines, tons/yr
NO_x (as NO_2)	0.6		3.54	84.98	14.97	21.25	509.90	89.80
CO	2.1		12.39	297.44	52.38	74.36	1784.67	314.30
POC (as CH_4)	0.2		1.18	28.33	4.99	7.08	169.97	29.93
NPOC					0.05			0.29
SO_2		150 ppm	1.05	25.14	4.43	6.28	150.83	26.56
PM_{10} without flare	0.1		0.59	14.16	2.49	3.54	84.98	14.97
PM_{10} with flare	0.095		0.56	13.46	2.37	3.36	80.73	14.22

Engine Emission Calculations for Table 1:

For NOx, CO, POC and PM10:
Single engine emissions, lbs/hr = emission factor in g/bhp-hr * 2677 bhp/453.6 g/lb
Single engine emissions, lbs/day = 24 * Single engine emissions, lbs/hr
Single engine emissions, tpy = 0.965 utilization factor * 365 * Single engine emissions, lbs/day/2000 lbs/ton
Emissions for six engines = Single engine emissions * 6

For SO2:
Single engine emissions, lbs/hr = (150 parts S/1,000,000 parts LFG) * 700 scfm LFG * 60 min/hr * 64.06 lbs SO2/lb-mole SO2 / 385.3 scf/lb-mole
Single engine emissions, lbs/day = 24 * Single engine emissions, lbs/hr
Single engine emissions, tpy = 0.965 utilization factor * 365 * Single engine emissions, lbs/day/2000 lbs/ton
Emissions for six engines = Single engine emissions * 6

For NPOC:
Single engine emissions, tpy = NPOC emissions from Table for TACs for 6 engines in lbs/yr divided by (6 engines * 2000 lbs/ton)
Emissions for six engines, tpy = NPOC emissions from Table for TACs for 6 engines in lbs/yr / 2000 lbs/ton

Table 2. Summary of Flare Criteria Pollutant Emissions

	Emission Factors	Maximum Concentration in LFG or exhaust as noted	Flare Emissions, lbs/hr	Flare Emissions, lbs/day	Flare Emissions, tons/year
NO_x (as NO_2)	0.06 lbs/million BTU		0.72	17.28	2.37
CO	0.20 lbs/million BTU		2.40	57.60	7.88
POC (as CH_4)		30 ppmv as CH4 in exhaust	0.15	3.54	0.48
NPOC					0.08
SO_2		150 ppmv in LFG as S1	0.60	14.36	1.97
PM_{10}	17 lbs/million scf CH4 in LFG		0.20	4.90	0.67

Flare Emission Calculations:

For NOx and CO:
Flare emissions, lbs/hr = Emission Factor in lbs/MM BTU/hr * 12 MM BTU/hr
Flare emissions, lbs/day = 24 * Flare emissions, lbs/hr
Flare emissions, tpy = 0.75 utilization factor * 365 * Flare emissions, lbs/day/2000 lbs/ton

For SO2:
Flare emissions, lbs/hr = (150 parts S/1,000,000 parts LFG) * 400 scfm LFG * 60 min/hr * 64.06 lbs SO2/lb-mole SO2 / 385.3 scf/lb-mole
Flare emissions, lbs/day = 24 * Flare emissions, lbs/hr
Flare emissions, tpy = 0.75 utilization factor * 365 * Flare emissions, lbs/day/2000 lbs/ton

For POC:
Flare emissions, lbs/hr = (30 parts as CH4/1,000,000 parts exhaust) * Dry Exhaust flow in lb-moles/hr at 3% oxygen * MW CH4/lb-mole CH4
Flare emissions, lbs/day = 24 * Flare emissions, lbs/hr
Flare emissions, tpy = 0.75 utilization factor * 365 * Flare emissions, lbs/day/2000 lbs/ton
Flare input = 400 scfm LFG at 50% CH4 and 50% inert by volume.
Lb-moles/hr of CH4 = 400 scfm LFG * 50%/100% * 60 min/hr/385.3 cf/lb-mole = 31.14456268
Lb-moles of O2 required per lb-mole of CH4 = 2
Lb-moles/hr of O2 = 2 * lb-moles/hr of CH4 = 62.28912536
Lb-moles of CO2 from combustion = Lb-moles of CH4
Lb-moles/hr of N2 = 79.05 N2/20.95 O2 * lb-moles/hr of O2 = 235.0336687

Dry Exhaust flow in lb-moles/hr at 0% oxygen = Lb-moles/hr of inerts in LFG + lb-moles/hr of CO2 from combustion + lb-moles/hr of N2 =297.323
Dry Exhaust flow in lb-moles/hr at 3% oxygen = Lb-moles/hr of exhaust at 0 % O2 * 1.03 = 306.242

For NPOC:
Flare emissions, tpy = NPOC emissions from Table for TACs for flare in lbs/yr divided by 2000 lbs/ton

For PM10:
Flare emissions, lbs/hr = Emission factor from AP-42 in lbs/MM scf CH4 * 400 scfm LFG * 50% CH4 by vol/100% LFG * 60 min/hr/ 1000000
Flare emissions, lbs/day = 24 * Flare emissions, lbs/hr
Flare emissions, tpy = 0.75 utilization factor * 365 * Flare emissions, lbs/day/2000 lbs/ton

Table 3. Summary of Maximum Criteria Pollutant Emissions from the Project

	Six engines, pounds/day	Six engines, tons/year	Flare, pounds/day,	Flare, tons/year,	Project, pounds/day	Project, tons/year
NO_x (as NO_2)	510	89.80	17.28	2.37	527	92.17
CO	1785	314.30	57.60	7.88	1842	322.19
POC (as CH_4)	170	29.93	3.54	0.48	174	30.42
NPOC		0.29		0.08		0.37
SO_2	151	26.56	14.36	1.97	165	28.53
PM_{10} without flare	85	14.97	0	0	84.98	14.97
PM_{10} with flare	81	14.22	4.900	0.67	86	14.89

Nitrogen Oxides (NO_x) Emission Limit:

Engines:
Ameresco has agreed that unabated NOx emissions be limited to 0.6 grams/bhp-hour. The engine manufacturer indicated that the engines would comply with this emission limit. Ameresco has also agreed that the NOx emissions for the one engine abated by SCR be limited to 0.15 grams/bhp-hour. Since the SCR is conditionally removable if the technology does not prove out on landfill gas, NOx emissions are calculated not assuming the use of the SCR (on the one engine).

Flare:
Ameresco has agreed that NOx emissions be limited to 0.06 lb/MM BTU. The flare manufacturer provided a guarantee for this emission limit.

Carbon Monoxide (CO) Emission Limit:

Engines:
Ameresco has agreed that unabated CO emissions be limited to 2.1 grams/bhp-hour. The engine manufacturer indicated that the engines would comply with this emission limit. Ameresco has also agreed that the CO emissions for the engines abated by catalytic oxidation be limited to 0.52 grams/bhp-hour. Since oxidation catalysts are conditionally removable if the technology does not prove out on landfill gas, CO emissions are not calculated assuming the use of an oxidation catalysts on one, some or all six engines.

Flare:
Ameresco has agreed that CO emissions be limited to 0.2 lb/MM BTU. The flare manufacturer provided a guarantee for this emission limit.

Precursor Organic Compounds (POC) Emission Limit:

Engines:
Ameresco has agreed that unabated POC emissions be limited to 0.2 grams/bhp-hour in order to meet the NMOC exhaust standard from a landfill gas control device other than a flare. The engine manufacturer indicated that the engines would comply with this emission limit. NMOC emissions from landfill gas engines are also limited by Regulation 8-34-301.4. The NMOC limit is EITHER a minimum of 98% by weight NMOC destruction efficiency or a maximum outlet concentration of 120 ppmv NMOC, expressed as methane at 3% O_2, dry basis, and the unabated POC emissions cannot exceed the higher of these. Ameresco has not requested that the POC emissions for the engines abated by oxidation catalysts be lowered but the District expects about a 50% reduction (to 0.1 grams/bhp-hour). Since oxidation catalysts are conditionally removable if the technology does not prove out on landfill gas, POC emissions are not calculated assuming the use of an oxidation catalysts on one, some or all six engines.

Flare:
NMOC emissions from landfill gas flares are limited by Regulation 8-34-301.3. The NMOC limit is EITHER a minimum of 98% by weight NMOC destruction efficiency or a maximum outlet concentration of 30 ppmv NMOC, expressed as methane at 3% O_2, dry basis. Ameresco has requested that POC emissions from the flare be limited to 0.014 lb/MM BTU (0.17 lb/hr). Since the flare manufacturer has guaranteed POC flare emissions to be less than 30 ppm as C1, flare emissions have been recalculated independently for this limit and a POC emission limit of 0.012 lb/MM BTU (0.15 lb/hr) has been applied.

Non-Precursor Organic Compounds (NPOC) Emission Limit:

Engines:
The NPOC emission limit is the sum of the abated emission rates that were calculated for individual NPOCs using the higher of the emissions based on LFG composition with 93% destruction or CATEF emission factors. (See the TAC Emissions section below for a more detailed explanation.) The following compounds are NPOCs: methylene chloride, perchloroethylene, chlorodifluoro-methane, dichlorodifluoromethane, dichlorofluoromethane, fluorotrichloromethane, 1,1,1-trichloro-ethane and 1,1,2,2-tetrachloroethane. The NPOC emission (after combustion) was determined to be 585 pounds per year.

Flare:
The NPOC emission limit is the sum of the abated emission rates that were calculated for individual NPOCs listed above for engines using the higher of the emissions based on LFG composition with 98% destruction or CATEF emission factors. (Again, see the TAC Emissions section below for a more detailed explanation.) The NPOC emission (after combustion) was determined to be 159 pounds per year.

Sulfur Dioxide (SO_2) Emission Limit:

Engines and Flare:
The typical RACT limit for landfill gas flares is a landfill gas sulfur content limit of 150 ppmv (expressed as H_2S). There is not currently a BACT limit for landfill gas flares. The 150 ppmv is also the BACT limit for landfill gas fired gas turbines. Assuming the landfill gas contains 50% methane and all sulfur in the landfill gas is converted to SO_2, this limit is equal to 0.05 pounds SO_2/MM BTU. The current BAAQMD BACT limit listed in the BACT/TBACT Handbook for engines is 0.3 grams SO_2/bhp-hour, which is equivalent to 0.08 pounds/MM BTU for the proposed engine. Since the typical RACT landfill gas sulfur content limit is lower than the applicable BAAQMD BACT Handbook limit, the proposed engine will be limited to the landfill gas sulfur content limit of 150 ppmv.

Particulate Matter (PM_{10}) Emission Limit:

Engines:

Ameresco has requested that unabated PM10 emissions be limited to 0.095 grams/bhp-hour with the above described LFG Treatment System but be limited to 0.1 grams/bhp-hour with the above described LFG Treatment System excluding the GE Jenbacher TSA activated carbon filter system. Ameresco has represented that it has source test data to support the engines emitting less than 0.1 grams/bhp-hour with untreated LFG and that Ameresco expects even lower PM10 emissions with the use of the LFG Treatment System including the GE Jenbacher TSA activated carbon filter system. Since the GE Jenbacher TSA activated carbon filter system is conditionally removable, PM10 emissions are calculated using the 0.1 grams/bhp-hour emission factor with the with the use of the LFG Treatment System *excluding* the GE Jenbacher TSA activated carbon filter system and using the 0.095 grams/bhp-hour emission factor with the with the use of the LFG Treatment System *including* the GE Jenbacher TSA activated carbon filter system. (Siloxane limits are only imposed when one or more engines are abated by SCR and/or oxidation catalyst(s).)

Flare:
According to AP-42 (fifth edition), Chapter 2.4 (November 1998), page 2.4-15, the particulate emission rate for a LFG fired flare is 17 pounds/MM dscf of methane. This emission rate is equivalent to 0.20 pounds PM_{10}/hr.

2. Subject to NSR for TAC

The emission rates for toxic air contaminants (TACs) are based on:

a. Site-specific landfill gas concentration measurements provided by the applicant and the typical destruction efficiencies achieved by landfill gas fired engines (86.1% for non-halogenated species and 93.0% for halogenated species) and flares (98% minimum for non-halogenated and halogenated species) from Chapter 2.4 of AP-42.
b. California Air Resources Board's California Air Toxic Emission Factor (CATEF) database for LFG combustion in IC engines and flares. The CATEF median emission factor was used if it was higher than the corresponding factor in part (a). The emission factors for metals were not used since the emission factors are based on a few source tests with metals below the detection level. CARB did provide specific instructions on its website to *not* use any acrolein emission factor.
c. Secondary emissions of hydrogen chloride assuming all chlorine compounds found in the landfill gas are converted to HCl.

Emission rates and calculations are summarized in Table 4. If the emission of a TAC was calculated two ways, the higher emission rate was used in the risk analysis. Several TACs were emitted above the annual risk screen trigger levels in Table 2-5-1 of District Regulation 2, Rule 5, New Source Review of Toxic Air Contaminants. More detailed spreadsheets are attached in Appendix A.

Table 4. Summary of Toxic Air Contaminant Emissions from the Project

CAS No.	Toxic Air Contaminant	Emissions for Six engines in lbs/yr	Flare Emissions in lbs/yr	TAC Chronic Trigger Level in lbs/yr
71-55-6	1,1,1-Trichloroethane (methyl chloroform)	**5.2E-01**	1.4E1	3.9E4
79-34-5	1,1,2,2-Tetrachloroethane	**9.9E-01**	2.1E-2	3.2E0
75-34-3	1,1-Dichloroethane (ethylidene dichloride)	2.6E+00	1.64E1	1.1E2
75-35-4	1,1-Dichloroethane (vinylidene chloride)	5.7E-01	1.2E-2	2.7E3
107-06-2	1,2-Dichloroethane (ethylene dichloride)	1.2E+01	8.18E0	8.9E0

78-87-5	1,2-Dichloropropane (propylene dichloride)	6.7E-01	1.4E-2	na
67-63-0	IPA	3.7E+02	3.9E0	2.7E5
107-13-1	Acrylonitrile	2.1E+00	3.39E2	6.4E-1
71-43-2	Benzene	2.1E+02	1.54E1	6.4E0
75-25-2	Bromodichloromethane	2.0E+01	4.2E-1	na
75-15-0	Carbon disulfide	4.9E+00	5.2E-2	3.1E4
56-23-5	Carbon tetrachloride	9.1E-01	3.17E0	4.3E0
108-90-7	Chlorobenzene	3.8E+00	6.26E0	3.9E4
46-358-1	Carbonyl sulfide	8.0E+00	8.5E-2	na
75-45-6	Chlorodifluoromethane	**1.2E+01**	2.5E-1	1.9E6
75-00-3	Chloroethane	2.9E+00	6.1E-2	1.2E6
67-66-3	Chloroform	4.7E-01	4.19E0	3.4E1
74-87-3	Chloromethane	4.7E+00	9.9E-2	na
106-46-7	Dichlorobenzene	1.3E+03	2.8E1	1.6E1
75-71-8	Dichlorodifluoromethane	**7.2E+01**	1.5E0	na
75-43-4	Dichlorofluoromethane	**1.1E-01**	2.2E-3	2.7E4
75-09-2	Methylene chloride	**3.5E+00**	1.42E2	1.8E2
64-17-5	Ethanol	9.8E+02	1.0E1	na
100-41-4	Ethylbenzene	7.6E+02	8.1E0	7.7E4
106-93-4	Ethylene dibromide	1.1E+00	2.3E-2	2.6E0
75-69-4	Fluorotrichloromethane	**3.6E+00**	7.7E-2	2.7E4
110-54-3	Hexane	5.5E+03	5.9E1	2.7E5
2148-87-8	Hydrogen Sulfide	3.2E+03	3.4E1	3.9E2
7439-97-6	Mercury	3.3E-01	2.4E-2	5.6E-1
78-93-3	MEK	6.0E+02	6.3E0	3.9E4
108-10-1	MIK	5.9E+01	6.2E-1	na
127-18-4	Perc	**3.2E+01**	6.9E-1	3.0E1
108-88-3	Toluene	1.2E+04	4.9E2	1.2E4
79-01-6	TCE	1.1E+01	4.64E0	9.1E1
75-01-4	Vinyl chloride	9.4E+00	5.61E0	2.4E0
	Xylenes	1.6E+03	4.94E1	2.7E4
7647-01-0	HCl	3.34E+03	3.11E4	3.5E2
83-32-9	Acenaphthene	3.83E-01	na	na
208-96-8	Acenaphthylene	1.73E-01	na	na
120-12-7	Anthracene	3.30E-01	na	na
56-55-3	Benzo(a)anthracene	4.39E-01	7.24E-02	See PAHs
50-32-8	Benzo(a)pyrene	6.82E-01	1.18E-02	See PAHs
205-99-2	Benzo(b)fluoranthene	6.94E-01	2.57E-02	See PAHs
191-24-2	Benzo(g,h,i)perylene	6.05E-01	1.18E-02	na
207-08-9	Benzo(k)fluoranthene	8.78E-01	1.18E-02	See PAHs
218-01-9	Chrysene	7.20E-01	9.35E-02	See PAHs

53-70-3	Dibenz(a,h)anthracene	4.07E-02	1.18E-02	See PAHs
206-44-0	Fluoranthene	1.38E+00	na	na
86-73-7	Fluorene	1.12E+00	na	na
50-00-0	Formaldehyde	1.48E+03	3.74E+03	3.0E0
193-39-5	Indeno(1,2,3-cd)pyrene	2.71E-01	1.18E-02	See PAHs
91-20-3	Naphthalene	3.88E+01	5.61E+00	5.3E0
85-01-8	Phenanthrene	4.26E+00	na	na
129-00-0	Pyrene	2.62E+00	na	na
	PAHs as Benzo(a)pyrene			1.1E-2
123-91-1	1,4-Dioxane		1.70E+01	2.4E1
75-07-0	Acetaldehyde		1.05E+01	6.4E1
7664-39-3	HF		2.22E+04	5.4E2
192-97-2	Benzo(e)pyrene		1.17E-02	na

3. Plant Cumulative Increase:

Since this is a new facility, the cumulative emission increases for this application and this facility are identical and as presented above in Table 3 using the higher of the two annual emission rates for PM10. Since this facility will emit more than 10 tons/year of POC and more than 10 tons/year of NO_x, offsets are required as discussed under Statement of Compliance.

IV. STATEMENT OF COMPLIANCE

1. CEQA Requirements (Regulation 2, Rule 1):

According to the applicant, the CEQA review for this project is being handled by the San Mateo County Planning Department, the local lead agency for this project. San Mateo County filed a Notice of Exemption on May 1, 2006. The applicant submitted CEQA related information using our form "Appendix H." A copy of the Notice of Exemption and "Appendix H" is in Appendix D. This project, therefore, satisfies the District's CEQA requirements by meeting the District CEQA exemption in Regulation 2-1-312.9

2. Public Notification Requirements (Regulation 2, Rule 1):

The project is over 1000 feet from the nearest school and is therefore not subject to the public notification requirements of Regulation 2-1-412.

3. New Source Review (Regulation 2, Rule 2, BACT:)

Engines:
As shown in Table 1, the proposed emissions of NO_x, CO, POC, SO_2, and PM_{10} from each IC Engine will each exceed 10 pounds per highest day. Therefore, BACT is required for each of these pollutants. As discussed in Permit Applications # 3821, # 6875, # 9220, #9222 and #9851 for new landfill gas fired IC engines at other facilities, the current BACT requirements are as follows in Table 5 below.

Table 5. 2006 BACT Requirements for Landfill Gas Fired IC Engines

Pollutant	BACT(1)	Typical Technology	BACT(2)	Typical Technology
POC	ND	NS	120 ppmv of NMOC (as CH_4) at 3% O_2 or	Lean Burn Technology (compliance with

			98% by weight removal of NMOC	Regulation 8-34-301.4)
NO_x	0.6 g/bhp-hr	Lean Burn Technology	0.6 g/bhp-hr	Lean Burn Technology
SO_2	NS	Fuel Gas Treatment with $\geq$ 80% S removal	LFG: 150 ppmv of S (as H_2S) in LFG DiGas: 0.3 g/bhp-hr	No Control for LFG or Addition of Iron Salts to Digester Sludge
CO	2.1 g/bhp-hr	Lean Burn Technology	2.1 g/bhp-hr	Lean Burn Technology
PM_{10}	ND	NS	NS	Fuel Gas Pretreatment

BACT(1) - BACT that is Technologically Feasible/Cost Effective
BACT(2) - BACT that is Achieved in Practice
ND – not determined
NS – not specified

NO_x BACT Limit: The applicant proposed to meet the District's BACT(2) limit for NO_x of 0.6 grams (as NO_2)/bhp-hour. Since this is a vendor guaranteed emission rate, S1 through S6 are expected to comply with this limit. The applicant has proposed the installation of an SCR unit on one engine to reduce NOx emissions to 0.15 g/bhp-hr. This technology has not been successfully demonstrated on an engine fueled solely with LFG. However, if successfully demonstrated at this facility, it will establish a new BACT(1) and BACT(2). Since the successful operation has not been demonstrated, Ameresco may request approval to increase the abated emissions level if the SCR performance results in NOx emissions above 0.15 g/bhp-hr and/or Ameresco may request approval to remove the SCR unit if it fails before 12,000 hours of operation. The District is also allowing limited operation without the SCR unit during initial startup and SCR unit maintenance. The applicant is initially installing the LFG System including the GE Jenbacher TSA, which will remove volatile siloxanes. This system must successfully remove siloxanes or the SCR unit (and oxidation catalysts discussed below) will likely prematurely fail by becoming "glass" coated. The addition of a TSA unit to treat LFG for an IC engine has not been attempted elsewhere in the US. The applicant has represented that the use of activated carbon without regeneration would be too expensive and that also has not been done on LFG in the US.

CO BACT Limit: The applicant proposed to meet the District's BACT(2) limit for CO of 2.1 grams/bhp-hour. Since this is the vendor guaranteed emission rate, S1 through S6 are expected to comply with this limit. The applicant has also proposed the installation of an oxidation catalyst on each engine to reduce CO emissions to 0.52 g/bhp-hr. This technology has not been successfully demonstrated on an engine fueled solely with LFG. However, if successfully demonstrated at this facility, it will establish a new BACT(1) and BACT(2). Since the successful operation has not been demonstrated, Ameresco may request approval to increase the abated emissions level if the oxidation catalysts performance results in CO emissions above 0.52 g/bhp-hr and/or Ameresco may request approval to remove the oxidation catalysts if fails prematurely. The District is also allowing limited operation without an oxidation catalyst during initial startup and oxidation catalyst maintenance.

POC BACT Limit: The District's BACT(1) limit listed in Document # 96.2.1 is 0.6 grams POC/bhp-hour (which is the same as the CARB recommended limit). However, this proposed engine must comply with Regulation 8-34-301.4, which limits NMOC emissions to either a minimum destruction efficiency of 98% by weight or a maximum outlet concentration of 120 ppmv of NMOC (as methane) at 3% oxygen, dry basis. The NMOC emissions from landfill gas fired IC engines are essentially all POCs. The Regulation 8, Rule 34 limit is equivalent to approximately 0.2 grams NMOC/bhp-hour (or 0.2 grams POC/bhp-hour). Since the BACT(1) limit is less stringent than the current regulatory limit, this POC BACT limit is not applicable for landfill gas fired engines. The Regulation 8-34-301.4 limit has been effective since July 1, 2002, and numerous IC engines have met it. Therefore, the Regulation 8-34-301.4 limit constitutes a BACT(2) "achieved in practice" emission limit. Since the 0.2 grams POC/bhp-hour is a vendor guaranteed emission rate, S1 through S6 are expected to comply with this limit. The oxidation catalysts installed to reduce emissions of CO should also reduce emissions of POC but the applicant has not quantified any reduction at this time.

SO_2 BACT Limit: The District's BACT(2) limit listed in Document # 96.2.1 is 0.3 grams SO_2/bhp-hour, which was based on using iron salts in digester sludge to reduce H_2S content in the digester gas. This limit is not appropriate for landfill gas fired engines. From the District's BACT/TBACT Workbook Document # 89.3.1 (June 1999) for landfill gas fired gas turbines, an appropriate BACT(2) emission limit for landfill gas fired combustion equipment is a landfill gas sulfur content limit of 150 ppmv of sulfur (expressed as H_2S). The Ox Mountain Landfill is the source of LFG for the proposed project. Sampling and analysis of the LFG yielded a sulfur content of 120 ppmv or less total reduced sulfur with essentially all the sulfur present as H_2S. Therefore, the engines are expected to comply with the BACT(2) limit of 150 ppmv of sulfur in the landfill gas.

PM_{10} BACT Limit: Particulate emissions due to landfill gas combustion are typically similar to PM_{10} emissions from natural gas combustion. Minimizing the sulfur content of the fuel and the use of a fuel pretreatment system (filters and condensate knock-out pots) have been sufficient to satisfy PM_{10} BACT(2) for landfill gas combustion equipment. The applicant has requested an emission limit of 0.095 grams PM10/bhp-hour with the use of the LFG Treatment System including GE Jenbacher TSA unit and an emission limit of 0.10 grams PM10/bhp-hour with the use of the LFG Treatment System excluding the GE Jenbacher TSA unit. The engine vendor has guaranteed the latter PM10 emission rate and the applicant believes that the additional fuel gas treatment will reduce PM10 emission rates even more. If the SCR unit and CO oxidation catalysts fail excessively, we will not require that the GE Jenbacher TSA unit remain in service. Hence, we will accept as PM_{10} BACT the initial requested emission limit of 0.10 grams PM10/bhp-hour with the with the use of the LFG Treatment System *excluding* the GE Jenbacher TSA unit and 0.095 grams PM10/bhp-hour with the use of the LFG Treatment System *including* GE Jenbacher TSA unit.

Flares:

NO_x RACT Limit: In accordance with Regulation 2-2-112, NOx is a secondary pollutant from the flare and subject to a RACT (Reasonably Available Control Technology) limit rather than a BACT limit. The current RACT limit for a LFG flare is 0.06 pounds of NOx per MM BTU/hr and the flare vendor has provided this as a guaranteed emission rate.

CO RACT Limit: In accordance with Regulation 2-2-112, CO is a secondary pollutant from the flare and subject to a RACT limit. The current RACT limit for a LFG flare is 0.2 pounds of CO per MM BTU/hr and the flare vendor has provided this as a guaranteed emission rate.

POC BACT Limit: The proposed flare must comply with Regulation 8-34-301.3, which limits NMOC emissions to either a minimum destruction efficiency of 98% by weight or a maximum outlet concentration of 30 ppmv of NMOC (as methane) at 3% oxygen, dry basis. The NMOC emissions from a LFG flare are essentially all POCs. Since the applicant is requesting the vendor guarantee of 30 ppmv of NMOC (as methane) at 3% oxygen, dry basis, as a limit and since the maximum daily emissions are less than 10 pounds, BACT is not triggered for the flare.

SO_2 RACT Limit: In accordance with Regulation 2-2-112, SO_2 is a secondary pollutant from the flare and subject to a RACT limit. The sulfur limit of 150 ppmv of sulfur (expressed as H_2S) in LFG for engines is also considered to be a RACT limit for a landfill gas flare. The Ox Mountain Landfill is the source of LFG for the proposed project. Sampling and analysis of the LFG yielded a sulfur content of 120 ppmv or less total reduced sulfur with essentially all the sulfur present as H_2S. Therefore, the engines are expected to comply with the RACT limit of 150 ppmv of sulfur in the landfill gas.

PM_{10} RACT Limit: In accordance with Regulation 2-2-112, PM_{10} is a secondary pollutant from the flare and subject to a RACT limit. Emissions are calculated based on an AP-42 emission factor for a LFG flare and since the maximum daily emissions are less than 10 pounds, RACT is not triggered for the flare.

4. New Source Review (Regulation 2, Rule 2, Offsets)

Because the cumulative increase for POC of 30.42 tpy is greater than 10 tons/year of POC but less than 35 tons/year, offsets will be provided by the Small Facility Banking Account at an offset ratio of 1 to 1.

Because the cumulative increase for NOx of 92.17 tpy is greater than 35 tons/year, offsets must be provided at an offset ratio of 1.15 to 1 for a total of 106.00 tpy. The applicant has demonstrated that the minimum cost of NOx offsets is $20,000 per ton of NOx, which is above the threshold of $17,500 used by the APCO to determine that emission reduction credits are not "reasonably available." Consistent with Section 42314 of the California Health and Safety Code, which allows an exemption for resource recovery projects if offsets are not reasonable available, the applicant will not be required to provide offsets. The APCO will provide the offsets from the Small Facility Banking Account.

5. New Source Review (Regulation 2, Rule 2, PSD)

Since this facility will be permitted to emit more than 250 tons/year of a regulated air pollutant, CO, it is a major facility subject to PSD. Pursuant to District Regulation 2-2-414.1, the applicant has submitted a modeling analysis that adequately estimates the air quality impacts of the Ameresco Half Moon Bay, LLC Landfill Gas-to-Energy Facility at the Ox Mountain Landfill. The applicant's analysis was based on EPA-approved models and was performed in accordance with District Regulation 2-2-414. The District reviewed the modeling analysis and has prepared a report to summarize its findings.

Pursuant to District Regulation 2-2-414.2, the District has found that the modeling analysis has demonstrated that the allowable emission increases from the Facility, in conjunction with all other applicable emissions, will not cause or contribute to a violation of applicable ambient air quality standards for CO and NO2 or an exceedance of any applicable PSD increment.

Pursuant to District Regulation 2-2-417, the applicant has submitted an analysis of the impact of the proposed source and source-related growth on visibility, soils, and vegetation. The entire PSD air quality impact analysis and the District review are contained in Appendix C.

Because the maximum-modeled project impacts, as shown in Table 6, for 1-hour average CO did not exceed the significance level for air quality impacts per District Regulation 2-2-313, further analysis to determine if the corresponding ambient air quality standard will be exceeded per District Regulation 2-2-414 is not required. Table 7 summarizes the applicable ambient air quality standards, the maximum background concentrations, and the contribution from the proposed facility. As shown in Table 7, the worst-case 8-hour average CO and the 1-hour and annual average NO2 will not cause or contribute to an exceedance of the California and/or National ambient air quality standard for 8-hour average CO and the 1-hour and annual average NO2, as appropriate. A PSD Increment Consumption analysis was performed for annual average NO2 and the results are shown in Table 8.

TABLE 6
Maximum predicted ambient impacts of proposed project ($\mu g/m^3$)
[Overall maximum in bold type]

Pollutant	Avg. Time	ISCST3 Modeled Impact	Significant Air Quality Impact Level
CO	1-hour 8-hour	**1323** **581**	2000 500
NO_2	1-hour annual	**378**[a] **6.2**[b]	19 1.0

[a] For 1-hour NO2 it is conservatively assumed all NOx is NO_2
[b] The EPA default annual ambient NO_2/NOx ratio of 0.75 was used to adjust from NOx To NO_2

TABLE 7
California and national ambient air quality standards and
ambient air quality levels from the proposed project($\mu g/m^3$)

Pollutant	Averaging Time	Maximum Background	Maximum project impact	Maximum project impact plus maximum background	California Standard	National Standard
CO	8-hour	2,412	581	2,993	10,000	10,000
NO_2	1-hour annual	64 7.5	191 6.2	255 13.7	470 —	— 100

TABLE 8
Maximum modeled increment consumption for NO_2

Averaging Period	Maximum modeled increment consumed($\mu g/m^3$)	Class II Increment($\mu g/m^3$)
annual	6.5	25

The results of the PSD air quality impact analysis indicate that the proposed project would not interfere with the attainment or maintenance of applicable national ambient air quality standards for CO and NO_2. Again, this analysis was based on EPA approved models and calculation procedures and was performed in accordance with Section 414 of the District's NSR Rule.

Pursuant to District Regulation 2-2-306, a non-criteria pollutant PSD analysis is required for sulfuric acid mist emissions if the proposed facility will emit H2SO4 at rates in excess of 38 pounds per day and 7 tons per year. A permit condition is proposed to require periodic source testing to quantify H2SO4 emissions. If the total facility emissions ever exceed 7 tons per year, then the applicant must utilize air dispersion modeling to determine the impact (in µg/m3) of the sulfuric acid mist emissions.

6. Toxics New Source Review (Regulation 2, Rule 5 and MACT)

Regulation 2, Rule 5: Pursuant to District Regulation 2, Rule 5, Section 401, a Health Risk Screening Analysis (HRSA) is required for a proposed facility if emission equal or exceed any trigger levels in Table 2-5-1. As shown in Table 4, the proposed emissions of some toxic air contaminants exceed their respective trigger levels. Since the applicant did not submit a HRSA, the District performed the HRSA. For this proposed facility, the maximum increased carcinogenic risk is 1.0 in a million, the maximum chronic hazard index is 0.044, and the maximum acute hazard index is 0.268. The proposed facility complies with the source limits for carcinogenic risk and chronic hazard index in Section 301 and the project limits for carcinogenic risk, chronic hazard index and acute hazard index in Section 302. A TBACT analysis was not required as part of this analysis. The HRSA report is in Appendix B.

MACT: Total HAP emissions from this facility will not exceed 10 tons/year of any single HAP or 25 tons/year for all HAPs combined. Therefore, this facility is not considered to be a major facility for HAP emissions, and Regulation 2-2-317 does not apply.

7. Major Facility Review (Regulation 2, Rule 6):

This facility is a major facility of regulated air pollutants or HAPs. Therefore, Regulation 2, Rule 6 does apply to this facility and a Major Facility Review permit application is required to be submitted within one year of becoming subject to Regulation 2, Rule 6, when the potential to emit a regulated air pollutant exceeds 100 tons per year. Ameresco will be required to submit a Title V application within one year of startup of any of Sources 1 through 6 IC Engines.

8. Other Applicable District Rules and Regulations

Regulation 6:
The Sources 1 through 6 IC Engines and Source 7 Flare are expected to comply with the Ringelmann 1 limit of Regulation 6-301 because they should have no visible emissions. The grain-loading rate from LFG fired engines and flares are expected to be less than the Regulation 6-310 limit of 0.15 grains/dscf.

Regulation 8, Rule 34 “Solid Waste Disposal Sites”:
Since Sources 1 through 6, IC Engines and Source 7 Flare will be using landfill gas as a fuel and the source of this landfill gas is subject to Regulation 8, Rule 34, then Sources 1 through 7 must comply with any applicable requirements of Regulation 8, Rule 34. The applicable emission limit for the flare is Regulation 8-34-301.3 (minimum of 98% by weight destruction of NMOC or maximum outlet concentration of 30 ppmv of NMOC as methane at 3% oxygen. The applicable emission limit for the engines is Regulation 8-34-301.4 (minimum of 98% by weight destruction of NMOC or maximum outlet concentration of 120 ppmv of NMOC as methane at 3% oxygen). The proposed project is designed to comply with these limits. The Permit Holder will monitor the landfill gas flow rate to Sources 1 through 6 plus Source 7 to comply with Regulation 8-34-508. The Permit Holder will be required to submit a monitoring proposal for compliance with Regulation 8-34-507 (continuous temperature monitor and recorder) and 509 (key emission control system operating parameter monitoring requirements) prior to initial operation of Sources 1 through 7. The Permit Holder will maintain all records required by Regulation 8-34-501.2, 501.3, 501.4, 501.10, 501.11, and 501.12.

Regulation 9, Rule 1:
Regulation 9-1-302 limits sulfur dioxide in the exhaust from Sources 1 through 7 to 300 ppmv. With a landfill gas sulfur content limit of 150 ppmv, the exhaust from these sources will comply with the 300

ppmv limit. Since these sources will comply with Regulation 9-1-302, they are also expected to comply with the ground level SO_2 limits of Regulation 9-1-301.

Regulation 9, Rule 2:
The proposed project will emit about 3,200 pounds/year of hydrogen sulfide (H_2S) based on an 86.1 percent destruction efficiency for Sources 1 through 6 IC Engine and a 98 percent destruction efficiency for Source 7 Flare. At this emission rate, Sources 1 through 7 are expected to comply with Regulation 9-2-301 (30 ppb H_2S over 60 minutes and 60 ppb H_2S over 3 minutes).

Regulation 9, Rule 8:
The Sources 1 through 6 IC Engine are also subject to Regulation 9, Rule 8. Since these engines will only be burning waste derived fuel gases (no fossil fuels), Regulation 9-8-301 is not applicable. Regulation 9-8-302.2 only applies to rich burn engines and is therefore not applicable. These IC Engines are subject to Regulation 9-8-302.1, which limits NO_x emissions to 140 ppmv at 15% O_2, and Regulation 9-8-302.3, which limits CO emissions to 2000 ppmv at 15% O_2. The BACT limits for NO_x and CO are far below the Regulation 9, Rule 8 limits. Sections 330 and 331 (concerning standby emergency engines) are not applicable.

9. MSW Landfill NSPS and NESHAP Requirements:

Since Ameresco Half Moon Bay, LLC is a separate owner/operator from the generator of the LFG (Ox Mountain Landfill), the MSW Landfill NSPS and NESHAP requirements do not apply to Ameresco's proposed use of the Ox Mountain's LFG as a fuel for Sources 1 through 7. However, these sources will meet all applicable federal control and monitoring requirements by complying with Regulation 8, Rule 34.

V. PERMIT CONDITIONS

The proposed conditions for Sources 1 through 7 are listed below.

Condition ID # tbd
For: Sources 1 through 6 IC Engine-Genset and Source 7 Flare for LFG Treatment System

1. Sources 1 through 6 IC Engine-Genset shall be fired exclusively on landfill gas from the Ox Mountain Landfill. The landfill gas throughput to Sources 1 through 6 shall not exceed 355 million standard cubic feet per engine (expressed as 50% methane) during any consecutive 12-month period. Source 7 Flare shall be fueled with landfill gas from the Ox Mountain Landfill to incinerate the flush gas from the LFG Treatment System. The landfill gas throughput to Source 7 shall not exceed 157.7 million standard cubic feet (expressed as 50% methane) during any consecutive 12-month period. (Basis: Regulation 2-5-301 and Cumulative Increase)

2. District approved flow meters, to measure the total landfill gas flow rate into each Source 1 through 6 IC Engine and Source 7 Flare, shall be installed prior to any operation and shall be maintained in good working condition. (Basis: Regulation 8-34-508 and Cumulative Increase)

3. The concentration of total reduced sulfur compounds in the landfill gas burned at Sources 1 through 7 shall not exceed 150 ppmv, expressed as H_2S. (Basis: BACT and Cumulative Increase)

4. Except as further limited by Part 22, Nitrogen Oxide (NO_X) emissions from each of the IC engines, Sources 1 through 6, shall not exceed 0.6 grams of NO_X (calculated as NO_2) per brake-horsepower-hour. (Basis: BACT and Cumulative Increase)

5. Nitrogen Oxide (NO_X) emissions (calculated as NO_2) from Source 7 Flare shall not exceed 0.06 lbs/MM BTU. (Basis: RACT and Cumulative Increase)

6. Except as further limited by Part 22, Carbon Monoxide (CO) emissions from each of the IC engines, Sources 1 through 6, shall not exceed 2.1 grams of CO per brake-horsepower-hour. (Basis: BACT and Cumulative Increase)

7. Carbon Monoxide (CO) emissions from Source 7 Flare shall not exceed 0.2 lbs/MM BTU. (Basis: RACT and Cumulative Increase)

8. Precursor Organic Compound (POC) emissions from each of the IC engines, Sources 1 through 6, shall not exceed 0.2 grams of POC per brake-horsepower-hour. Sources 1 through 6 IC Engine shall also comply with either the non-methane organic compound (NMOC) destruction efficiency requirements or the NMOC outlet concentration limit specified in Regulation 8-34-301.4. (Basis: Regulation 8-34-301.4, BACT, and Cumulative Increase).

9. Precursor Organic Compound (POC) emissions from Source 7 Flare shall not exceed 0.15 lb/hr at a firing rate of 12 MMBTU/hr. Source 7 Flare shall also comply with either the non-methane organic compound (NMOC) destruction efficiency requirements or the NMOC outlet concentration limit specified in Regulation 8-34-301.3. (Basis: Regulation 8-34-301.3, BACT, and Cumulative Increase).

10. PM10 emissions from Sources 1 through 6 IC Engine shall not exceed 0.095 grams of PM10 per brake-horsepower-hour when Source 7 Flare is a permitted source and 0.1 grams of PM10 per brake-horsepower-hour if the permit for Source 7 Flare is surrendered. (Basis: BACT and Cumulative Increase)

11. PM10 emissions from Source 7 Flare shall not exceed 0.20 pounds per any hour. (Basis: Cumulative Increase)

12. The Permit Holder shall:
    a. Install and operate continuous emission monitors (CEMS) for Source 1 IC Engine to monitor continuously the emissions of NOx, CO and O2. CEMS shall comply with the provisions of Volume V of the Manual of Procedures and Regulation 1-522, Continuous Emission Monitoring and Procedures.
    b. Monitor at least quarterly CO and NOx emissions from each Source 2 through 6 using a portable analyzer approved by the APCO.

    (Basis: Regulations 1-521 and 2-1-403, BACT, cumulative increase)

13. At least 60 days prior to initial operation of IC engines, Sources 1 through 6, the Permit Holder shall submit an updated monitoring plan identifying how Sources 1 through 6 plus Flare, Source 7, will comply with Regulation 8-34-507 (continuous temperature monitor and recorder) and 509 (key emission control system operating parameter monitoring requirements). This plan shall be submitted to the Engineering Division, referenced to Application # 12649, and shall include the following information:
    a. Identify one or more key emission control system operating parameters that will be monitored on a routine basis (between annual source tests) to demonstrate on-going compliance with the NMOC limit in Regulation 8-34-301.4.
    b. Specify the expected operating ranges for each key parameter (minimum, typical, and maximum), and identify the minimum and/or maximum operating rate that will ensure the engine is complying with the NMOC limit.
    c. Propose a monitoring frequency for each key parameter (i.e. continuous, daily, weekly, or monthly).
    d. Provide descriptions, specifications, and locations for each type of monitoring device that will be used, and identify all analysis methods and/or test methods that will be used (if the proposed monitoring procedure involves a chemical analysis or test procedure).
    f. Describe how the key parameter minimum/maximum operating rate will be either identified or verified during the initial compliance demonstration source test.

    The specific key parameter(s), minimum and/or maximum operating rates, type and location of monitors, and monitoring frequency will be added to this part and Part 16 via an administration

permit amendment after the District has received the results of the initial compliance demonstration source test. (Basis: Regulation 8-34-507 and 509)

14. The Permit Holder shall submit a Major Facility Review permit application within twelve months of becoming subject to Regulation 2-6, which shall be deemed to be the startup of any of the IC engines, Sources 1 through 6. (Basis: Regulation 2-6-404.1)

15. Source and project health risk shall remain in compliance with Regulation 2-5-301 and 302, as appropriate. If a landfill gas analysis or source test indicates that any of the toxic air contaminant emission rates listed below will be or have been exceeded, the Permit Holder shall submit within 30 days of receiving the test results all information necessary for the District to conduct an updated risk screening analysis for this project.

Toxic Air Contaminant	Emissions in pounds per consecutive 12-months from	
	Total of Sources 1 through 6	Source 7
Acrylonitrile	na	339
Benzene	388	15
Dichlorobenzene	1300	28
Formaldehyde	1480	3740
Specified PAHs	0.95	0.04

The polycyclic aromatic hydrocarbons (PAHs) listed below shall be considered to be Specified PAHs for these permit conditions. Any emission limits for Specified PAHs refer to the sum of the emissions for all six of the following compounds as Benzo[a]pyrene-equivalents.

Benzo[a]anthracene
Benzo[b]fluoranthene
Benzo[k]fluoranthene
Benzo[a]pyrene
Dibenz[a,h]anthracene
Indeno[1,2,3-cd]pyrene

(Basis: Regulation 2-5-501)

16. In order to demonstrate compliance with Parts 3 through 11 above and/or Part 22a and b below, as appropriate, and Regulations 8-34-301.4, 9-8-302.1, and 9-8-302.3, the Permit Holder shall ensure that a District approved source test is conducted within 60 days of initial start-up of the Sources 1 through 6 IC Engine-Genset or within 30 days following the initial commissioning period allowed by Part 22c and annually thereafter. The Source Test Section of the District shall be contacted to obtain their approval of the source test procedures at least 14 days in advance of each source test. The Source Test Section shall be notified of the scheduled test date at least 7 days in advance of each source test. The source test report shall be submitted to the Compliance and Enforcement Division within 45 days of the test date. The initial and annual source tests shall determine or report the following:
    a. landfill gas flow rate to each IC Engine (at standard conditions);
    b. concentrations (dry basis) of carbon dioxide (CO_2), nitrogen (N_2), oxygen (O_2), methane (CH_4), and non-methane organic compounds (NMOC) in the landfill gas burned by each IC Engine;
    c. exhaust gas flow rate from each IC Engine (dry basis);
    d. concentrations (dry basis) and mass flow of NO_x, CO, NMOC, O_2, SO_2, SO_3, and H_2SO_4 in the exhaust gas from each IC Engine;
    e. concentration (dry basis) of benzene, dichlorobenzene, formaldehyde and specified PAHs in the exhaust from each IC Engine, and benzene, dichlorobenzene, formaldehyde and specified PAHs emission rates in units of pounds/MM scf of landfill gas burned (during initial compliance demonstration test and once every four years thereafter)
    f. NMOC destruction efficiency achieved by each IC Engine; and
    g. minimum, maximum, and average rates for each key emission control system operating parameter (identified per Part 13) during the test period.

(Basis: BACT, Cumulative Increase, Regulation 2-5-501, and Regulations 8-34-301.4, 8-34-412, 9-8-302.1, and 9-8-302.3)

17. In order to demonstrate compliance with Parts 3, 15 and 16b above, the Permit Holder shall ensure that a landfill characterization analysis is conducted concurrently with the initial compliance demonstration test and at least once every four years thereafter. The landfill gas shall be analyzed for each of the compounds identified in Parts 15 and 16b and for the following reduced sulfur compounds: hydrogen sulfide, methyl mercaptan, ethyl mercaptan, carbon disulfide, and dimethyl sulfide. The Source Test Section of the District shall be contacted to obtain their approval of the source test procedures and analysis methods at least 14 days in advance of each source test. The Source Test Section shall be notified of the scheduled test date at least 7 days in advance of each source test. The laboratory report shall be submitted to the Compliance and Enforcement Division along with the source test report required by Part 16, within 45 days of the test date. (Basis: BACT, Cumulative Increase, Regulation 2-5-501, and AB-2588 Air Toxics Hot Spots Act)

18. The Permit Holder shall not allow cumulative combined emissions from Sources 1 through 6, IC Engines, plus Source 7, Flare, to exceed any of the following limits:

	Pounds per hour	Pounds per day	Tons per consecutive 12-month period
a. NOx (as NO2)	22.0	527	92.17
b. CO	76.8	1842	322.19
c. POC	7.23	174	30.42
d. PM10	3.57	85	14.97
e. SO2	6.88	165	28.53

(Basis: PSD, Offsets, Cumulative Increase)

19 The Permit Holder shall maintain the following records in a District approved logbook:
   a. Dates and times of all startups and shutdowns of Sources 1 through 6 and the reason for each shutdown;
   b. On a monthly basis, record the total landfill gas flow rate to Sources 1 through 7 (corrected to standard conditions and 50% methane) for the month and for the previous 12-month period. Show any calculations needed to report the flow rate measured pursuant to Part 2 in units of standard cubic feet at 50% methane;
   c. On a monthly basis, record the [minimum/maximum] [key operating parameter] measured pursuant to Part 14.
   d. Maintain records of all compliance demonstration test results and laboratory analyses.
   e. Mass emissions of NOx and CO from each of the Sources 1 through 7 and from the sources combined, both on a monthly basis and for the previous consecutive 12-month period. Emissions shall be determined using CEMs data for Source 1 and emission factors derived from the most recent source test and the throughput information required under Part 19b above.

   All records shall be kept on site and shall be made available to the District staff upon request. All records shall be retained for at least 5 years from the date of entry. (Basis: BACT, Cumulative Increase, Regulation 2-5-501, AB-2588 Air Toxics Hot Spots Act, and Regulations 8-34-501.2, 501.4, 501.10, 501.11, and 501.12)

Additional Abatement Conditions

20. The District acknowledges that the selective catalytic reduction (SCR) and oxidation catalyst abatement technology has not been commercially proven as working on landfill gas fired IC engines. Therefore:
   a. If the technologies fail to meet the NOx and CO emission limits as specified in Part 22 and as measured by source tests and CEMS or PEMS, as appropriate, the District upon request by the Permit Holder will review the operating data to determine if it is appropriate to allow to the reasonable satisfaction of the APCO an alternative (higher) permitted emission rate(s) not to exceed the respective limits specified in Parts 4 and 6.
   b. If the technologies fail to continuously meet the NOx and CO emission limits as specified in Part 22 and as measured by source tests and CEMS or PEMS, as appropriate, due to a Permit

Holder perceived premature catalyst failure(s), the District upon request by the Permit Holder will review the operating data to determine if premature catalyst failure has occurred. Premature catalyst failure shall be defined as necessary first-time catalyst replacement (and specific by type of catalyst for Source 1) with less than 12,000 hours of service and shall be determined on a source-by-source basis for Sources 1 through 6. Catalyst failure deemed by the APCO to be due to landfill gas not meeting the specifications in Parts 3 and 24 or deemed by the APCO to be due to improper catalyst design or fabrication or maintenance shall not constitute premature catalyst failure.

i. If the APCO concurs that premature catalyst failure has occurred, the APCO will allow the Permit Holder to permanently remove the catalyst(s) which has failed.
ii. If the APCO does not concur that premature catalyst failure has occurred, the APCO will continue to require that the Permit Holder maintain and operate the catalyst(s) subject to Part 22.

c. The District shall allow operation above the NOx and CO emission limits as specified in Part 22, but not to exceed the respective limits specified in Parts 4 and 6, while the District evaluates a request for relief per Part 20a or Part 20b above.

(Basis: BACT)

21. Operation of any of Sources 1 through 6 for 12,000 hours without catalyst replacement (but allowing replacement of a “Guard Bed” upstream of the catalyst) shall demonstrate that the catalytic abatement technology is technologically feasible on a landfill gas fired IC engine.
(Basis: BACT)

22. Except if modified by Part 20 above, Sources 1 through 6 shall be conditionally abated as follows:
a. Source 1 shall be abated by a SCR system that reduces NOx to not exceed 0.15 g/bhp-hr; and
b. Sources 1 through 6 shall each be abated by an oxidation catalyst that reduces CO to not exceed 0.52 g/bhp-hr; and
c. This abatement is not required during an initial commissioning period for each source not to exceed 60 days; and
d. This abatement is not required during a period following catalyst failure but prior to catalyst replacement provided this period does not exceed 30 days

(Basis: BACT)

23. Ammonia slip shall not exceed 10 ppmvd at 15% O2 for Source 1 when being abated by a SCR system.
(Basis: Regulation 2-5, BACT)

24. Whenever one or more of Sources 1 through 6 are being abated by a SCR system and/or an Oxidation Catalyst, the Permit Holder shall fuel all Sources 1 through 6 with landfill gas that continuously meets either of the following specifications:
a. At least 90% of volatile organic silicon compounds have been removed from the landfill gas by the Permit Holder; or
b. Concentration of volatile organic silicon compounds does not exceed 0.55 ppmv, dry basis, as Si.

(Basis: BACT)

25. The Permit Holder shall demonstrate compliance with Part 24 at least quarterly. The Source Test Section of the District shall be contacted to obtain their approval of the source test procedures and analysis methods at least 14 days in advance of each source test. The Source Test Section shall be notified of the scheduled test date at least 7 days in advance of each source test. The laboratory report shall be submitted to the Compliance and Enforcement Division along with the source test report required by Part 16, within 45 days of the test date. (Basis: BACT, Cumulative Increase)

VI. RECOMMENDATION

The APCO has concluded that the proposed Ameresco Half Moon Bay, LLC Landfill Gas-to-Energy Facility at the Ox Mountain Landfill in Half Moon Bay, California, which is composed of the sources listed below, will comply with all applicable federal, state, and District rules and regulations. Therefore, the APCO intends to issue an Authority to Construct and a federal PSD Permit for the Ameresco Half Moon Bay Facility that is composed of the following sources that will be subject to the permit conditions and BACT and offset requirements discussed previously.

Source 1 IC Engine-Genset, GE Jenbacher JGS 616 GS-L.L, 6090 in^3 displacement, 2677 bhp, 21.3 MM BTU/hour, burning landfill gas, 1.9 MW nominal power output, abated by A1 Selective Catalytic Reduction System, Miratech CBL ACIS 20 for NOx abatement, and A2 Oxidation Catalyst, Miratech IQ-34-20 for CO abatement

Source 2 IC Engine-Genset, GE Jenbacher JGS 616 GS-L.L, 6090 in^3 displacement, 2677 bhp, 21.3 MM BTU/hour, burning landfill gas, 1.9 MW nominal power output, abated by A3 Oxidation Catalyst, Miratech IQ-34-20 for CO abatement

Source 3 IC Engine-Genset, GE Jenbacher JGS 616 GS-L.L, 6090 in^3 displacement, 2677 bhp, 21.3 MM BTU/hour, burning landfill gas, 1.9 MW nominal power output, abated by A4 Oxidation Catalyst, Miratech IQ-34-20 for CO abatement

Source 4 IC Engine-Genset, GE Jenbacher JGS 616 GS-L.L, 6090 in^3 displacement, 2677 bhp, 21.3 MM BTU/hour, burning landfill gas, 1.9 MW nominal power output, abated by A5 Oxidation Catalyst, Miratech IQ-34-20 for CO abatement

Source 5 IC Engine-Genset, GE Jenbacher JGS 616 GS-L.L, 6090 in^3 displacement, 2677 bhp, 21.3 MM BTU/hour, burning landfill gas, 1.9 MW nominal power output, abated by A6 Oxidation Catalyst, Miratech IQ-34-20 for CO abatement

Source 6 IC Engine-Genset, GE Jenbacher JGS 616 GS-L.L, 6090 in^3 displacement, 2677 bhp, 21.3 MM BTU/hour, burning landfill gas, 1.9 MW nominal power output, abated by A7 Oxidation Catalyst, Miratech IQ-34-20 for CO abatement

Source 7 Flare, Perennial Energy, Model EGFS-12-400, 400 scfm LFG, 12 MM BTU/hr

This document is subject to the public notice, public comment, and public inspection requirements of District Regulation 2-2-405, 2-2-406, and 2-2-407. Accordingly, a notice inviting written public comment will be published in a newspaper of general circulation in the area of the proposed Ameresco Half Moon Bay, LLC, Landfill Gas-to-Energy Facility. The public inspection and comment period will end 30 days after the date of such publication.

Jack P. Broadbent
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Appendix A

Toxic Air Contaminants

Appendix B

Health Risk Screening Analysis

Appendix C

PSD Air Quality Impact Analysis

Appendix D

CEQA-Related Information