777 12th Street, Third Floor

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Sacramento, CA 95814

BEST AVAILABLE CONTROL TECHNOLOGY & TOXIC BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

DETERMINATION NO.: 223

DATE: 2/8/19

ENGINEER: Felix Trujillo, Jr.

Category/General Equip Description: Spark Ignited Engine – Prime Power

Equipment Specific Description: Bio Gas Fired – Non Agricultural Application

Equipment Size/Rating: Minor Source BACT

Previous BACT Det. No.: 120

This BACT determination will update Determination #120 (3/2/16) for spark ignited prime power engines fired on digester gas.

This BACT was determined under the project for A/C 26066 (Generate Galt Digester, LLC DBAMaas Energy Works).

BACT ANALYSIS

Pursuant to the District's BACT Guidelines (2016), a review of the EPA, CARB, SCAQMD, SJVAPCD, BAAQMD and SDAPCD BACT Clearinghouses was performed. The District also reviewed any applicable rules from the aforementioned air districts that apply to these types of engines. The review of these sources showed no change in the rules or BACTs that were previously evaluated for minor sources under BACT No. 120. Therefore, there is no change in requirements as was previously determined under BACT No. 120. BACT No. 120 (Appendix A) will be attached as a reference for this BACT determination (see Attachment A).

C. SELECTION OF BACT & T-BACT:

BACT # 223 FOR SPARK IGNITED BIOGAS ENGINES		
Pollutant	**Standard**	**Source**
VOC	20 ppmvd @ 15% O_2 (A) for lean burn engines or 30 ppmvd @ 15% O_2 for rich burn engines	SJVAPCD, SCAQMD, SMAQMD
NOx	11 ppm at 3% O_2	SCAQMD, SMAQMD
SOx	40 ppmv of H_2S in the fuel stream	SCAQMD, SJVAPCD, SMAQMD
PM10	40 ppmv of H_2S in the fuel stream	SCAQMD, SJVAPCD, SMAQMD
PM2.5	40 ppmv of H_2S in the fuel stream	SMAQMD
CO	1.8 g/bhp-hr	BAAQMD, SCAQMD

(A) The SJVAPCD BACT Guideline 3.3.15 lists the BACT standard for VOC as 0.1 g/hp-hr. According to the BACT determination for this guideline (http://www.valleyair.org/notices/Docs/2013/07-08-13%(W-1120734)/Prelim%20(S-1120734).pdf) Appendix A page 8, this emission factor is equivalent to 20 ppmvd @ 3% O_2. In order to be consistent with the VOC standard for rich burn engines, the BACT standard will be listed as a concentration.

TOXICS BEST CONTROL TECHNOLOGIES ACHIEVED		
Pollutant	**Standard**	**Source**
Formaldehyde	Use of an oxidation catalyst	BAAQMD
Ammonia Slip	10 ppmvd @ 15 O_2	BAAQMD

APPROVED BY: _____ **DATE:** _____

Attachment A

BACT No. 120

77 12th Street, Third Floor

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Sacramento, CA 95814

TOXIC BEST AVAILABLE CONTROL & BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

DETERMINATION NO.:	120
EFFECTIVE DATE:	3/2/16
ENGINEER:	Venk Reddy
Category/General Equip Description:	Spark ignited engine
Equipment Specific Description:	Bio Gas Fired – Non Agricultural application
Equipment Size/Rating:	Minor Source BACT
Previous BACT Det. No.:	67

This BACT determination will update Determination #67 for spark ignited engines fired on digester gas.

This BACT was determined under the project for A/C 24710 & 24711.

To compare on a consistent unit value, if necessary, the following will be used to convert the given ppmvd value to a g/bhp-hr value. The values were derived based on information provided by the applicant and the engine manufacturer, and confirmed by District staff.

Engine HP = 268 HP
Fuel F-Factor = 9409.1 dscf/mmBTU (55% CH_4, 45% CO_2)
Fuel HHV = 557 mmBTU/mmscf (55% CH_4, 45% CO_2)
BSFC = 6754 BTU/bhp-hr
SOx in exhaust if fuel is at 50 ppmvd H_2S = 1.490 E-2 lb of SOx/MMBTU
SOx with 100 % Conversion of H_2S = 4.57E-2 g/bhp-hr (50 ppmvd H_2S)

The conversion of VOC is typically measured as CH_4; however, SCAQMD measures VOCs as Carbon, and both are shown for comparison purposes.

BACT ANALYSIS

A: ACHIEVED IN PRACTICE (Rule 202, §205.1a)

The following control technologies are currently employed as BACT for spark ignited engines fired on landfill or digester gas.

<table>
<tr><th>District/Agency</th><th>Best Available Control Technology (BACT)/Requirements</th></tr>
<tr><td>US EPA</td><td>

BACT

Source: EPA RACT/BACT/LAER Clearinghouse

<table>
<tr><td colspan="2">Landfill Gas, 1468 HP – J&A – Santa Maria LLC</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>VOC</td><td>0.4 g-bhp/hr</td></tr>
<tr><td>NOx</td><td>0.6 g-bhp/hr</td></tr>
<tr><td>SOx</td><td>N/A – No BACT determinations found</td></tr>
<tr><td>PM10</td><td>N/A – No BACT determinations found</td></tr>
<tr><td>PM2.5</td><td>N/A – No BACT determinations found</td></tr>
<tr><td>CO</td><td>2.5 g-bhp/hr</td></tr>
</table>

RULE REQUIREMENTS:

NSPS under 40 CFR, Part 60: The list of all adopted New Source Emission Standards SUBPART **JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines.**

For an engine rated less than 500 HP and operation on landfill/digester gas

<table>
<tr><th></th><th>Rule Value</th><th>Converted Value (A)</th></tr>
<tr><td>VOC</td><td>1 g/bhp-hr or 80 ppmvd @ 15% O2</td><td>0.338 g/bhp-hr at 80ppmvd @ 15% O2 measured as CH4</td></tr>
<tr><td>NOx</td><td>2 g/bhp-hr or 150 ppmvd @ 15% O2</td><td>1.818 g/bhp-hr at 150 ppmvd @ 15% O2</td></tr>
<tr><td>SOx</td><td>Not addressed</td><td>Not addressed</td></tr>
<tr><td>PM10</td><td>Not addressed</td><td>Not addressed</td></tr>
<tr><td>PM2.5</td><td>Not addressed</td><td>Not addressed</td></tr>
<tr><td>CO</td><td>5 g/bhp-hr or 610 ppmvd @ 15% O2</td><td>4.5 g/bhp-hr at 610 ppmvd @ 15% O2</td></tr>
</table>

(A) For this specific project to determine which is the lower value the given ppmvd value of the pollutants are converted to g/bhp-hr.

NESHAP under 40 CFR Part 63 – Subpart ZZZZ – National Emission standard for Hazardous Air Pollutants for Stationary Reciprocating Interal Combustion Engines.

Subpart ZZZZ establishes national emission limitations and operating limitations for hazardous air pollutants (HAP) emitted from stationary reciprocating internal combustion engines (RICE) located at both major and area sources of HAP emissions.

This subpart is intended to address HAP emissions from new and reconstructed stationary RICE less than or equal to 500 HP located at major sources and all new and reconstructed stationary RICE located at area sources.

</td></tr>
</table>

District/Agency	Best Available Control Technology (BACT)/Requirements
	The requirements of this NESHAP subpart is that the engine complies with the requirements specified in 40 CFR 60 Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines).

ARB

BACT
Source: ARB BACT Clearinghouse

ARB BACT Clearinghouse*		
	Published Value	Converted Value
VOC	0.4 g/bhp-hr	
NOx	0.43 g/bhp-hr	
SOx	0.1 lb/hr	0.2 g/bhp-hr
PM10	0.2 lb/hr	0.33 g/bhp-hr
PM2.5	No standard	
CO	308 ppmvd @ 15% O2	2.3 g/bhp-hr

* This BACT determination was found to be the most stringent Achieved in Practice BACT determination published in the ARB clearinghouse.

RULE REQUIREMENTS:
None

CARB RACT/BARCT Guidelines for Stationary Spark-Ignited Internal Combustion Engines

The following are recommendations CARB has made to assist in rulemaking.

BARCT Emissions Limits from the CARB RACT/BARCT Guidelines		
	Published Value	Converted Value
VOC Rich Burn	250 ppmvd at 15% O2	1.1 g/bhp-hr, measured as CH4
VOC Lean Burn	750 ppmvd at 15% O2	3.17 g/bhp-hr, Measured as CH4
NOx Rich Burn	90 % Control or 25 ppmvd at 15% O2	0.302 g/bhp-hr
NO x Lean Burn	90 % Control or 65 ppmvd at 15% O2	0.79 g/bhp-hr
SOx	Not addressed	Not addressed
PM10	Not addressed	Not addressed
PM2.5	Not addressed	Not addressed
CO	4500 ppmvd @ 15% O2	33.2 g/bhp-hr

SMAQMD

BACT

SMAQMD BACT Determination # 67		
	Published Values	Converted Values
VOC	0.2 g/bhp-hr	
NOx	0.15 g/bhp-hr	
SOx	50 ppmvd (H2S Concentration in the fuel)	4.57E-02 g/bhp-hr
PM10	50 ppmvd (H2S Concentration in fuel, used as a surrogate for PM)	
PM2.5	No standard	
CO	No standard	

RULE REQUIREMENTS:
None

SMAQMD Rule 412 Stationary Internal Combustion Engines Located at Major Stationary Sources of NOx

BARCT Standards		
	Published Value	Converted Value
VOC	250 ppmvd @ 15% O2 for Rich Burn 750 ppmvd @ 15% O2 for Lean Burn	1.1 g/bhp-hr(measured as methane) 3.2 g/bhp-hr(measured as methane)
NOx	25 ppmvd at 15% O2 for Rich Burn or 90% reduction of emissions 65 ppmvd @ 15% O2 for Lean Burn or 90% reduction of emissions	0.3 g/bhp-hr 0.8 g/hp-hr
SOx	Not addressed	Not addressed
PM10	Not addressed	Not addressed
PM2.5	Not addressed	Not addressed
CO	2000 pmvd	14.8 g/bhp-hr

South Coast AQMD

BACT

Source: SCAQMD BACT Guidelines for Major Polluting Facilities.

Application No.: 391009	
VOC	0.8 g-bhp/hr
NOx	0.6 g/bhp-hr
SOx	No standard
PM10	No standard
PM2.5	No standard
CO	2.5 g/bhp-hr

RULE REQUIREMENTS:

SCAQMD Rule 1110.2 – Emissions From Gaseous and Liquid Fueled Engines. - Waste Gas Fueled, current limits

SCAQMD Rule 1110.2 Emissions Limits[A]		
	Published Value ppmvd @ 15% O2	Converted Value
VOC	Digester Gas: 250 x ECF[B]	VOC = 0.80 g/bhp-hr (measured as carbon) 1.1 g/bhp-hr measured as CH4
	30 ppmvd Effective January 1, 2017	0.09 g/bhp-hr (measured as Carbon) 0.13 g/bhp-hr (measured as Methane)
NOx	bhp < 500: 45 x ECF[B]	0.55 g/bhp-hr
	11 ppmvd Effective January 1, 2017	0.13 g/bhp-hr
SOx	Not addressed	Not addressed
PM10	Not addressed	Not addressed
PM2.5	Not addressed	Not addressed
CO	2000 pmvd	14.76 g/bhp-hr
	250 ppmvd Effective January 1, 2017	1.84 g/bhp-hr

[A] Emission limits are in ppmvd @ 15% O_2 unless noted
[B] ECF is the efficiency correction factor. This value is 1 unless the engine's net specific energy consumption is measured.

South Coast revised Rule 1110.2 on December 4, 2015. This modification to the rule extended the effective date of the reduced NOx, VOC and CO emissions by one year for biogas fired engines (from Jan 2016 to Jan 2017). The delay was to allow stake holders more time to retrofit the engines to meet the new emission requirements. SCAQMD has identified 3 technologies that will allow biogas fired engines to meet the revised emission limits. Per the SCAQMD the use of an SCR with an oxidization catalyst has been shown to be achieved in practice and is able to meet the revised emission limits. E-mail communications are located in attachment B near the South Coast rule.

<table>
<tr>
<td>San Diego County APCD</td>
<td>

BACT
Source: NSR Requirements for BACT.

None

RULE REQUIREMENTS:

Rule 69.4.1 **STATIONARY RECIPROCATING INTERNAL COMBUSTION ENGINES**
BEST AVAILABLE RETROFIT CONTROL TECHNOLOGY (BARCT)

<table>
<tr><th></th><th>Published Value</th><th>Converted Value</th></tr>
<tr><td>VOC Rich Burn</td><td>250 ppmvd at 15% O2</td><td>1.1 g/bhp-hr, measured as CH4</td></tr>
<tr><td>VOC Lean Burn</td><td>Not Addressed</td><td></td></tr>
<tr><td>NOx Rich Burn</td><td>90 % Control or 50 ppmvd at 15% O2</td><td>0.61 g/bhp-hr</td></tr>
<tr><td>NOx Lean Burn</td><td>90 % Control or 65 ppmvd at 15% O2</td><td>0.79 g/bhp-hr</td></tr>
<tr><td>SOx</td><td>Not addressed</td><td>Not addressed</td></tr>
<tr><td>PM10</td><td>Not addressed</td><td>Not addressed</td></tr>
<tr><td>PM2.5</td><td>Not addressed</td><td>Not addressed</td></tr>
<tr><td>CO</td><td>4500 ppmvd @ 15% O2</td><td>33.2 g/bhp-hr</td></tr>
</table>

</td>
</tr>
<tr>
<td>Bay Area AQMD</td>
<td>

BACT
Source: BAAQMD BACT Guideline

<table>
<tr><td colspan="3">Document #: 96.2.4</td></tr>
<tr><td></td><td>Published Values</td><td>Converted Values</td></tr>
<tr><td>VOC</td><td>0.16 g/bhp-hr</td><td></td></tr>
<tr><td>NOx</td><td>0.15 g/bhp-hr</td><td></td></tr>
<tr><td>SOx</td><td>100 ppmvd of total sulfur in the fuel
(> 80% H2S reduction in fuel)</td><td>0.91 g/bhp-hr</td></tr>
<tr><td>PM10</td><td>Gas pretreatment
0.1 g/bhp-hr</td><td></td></tr>
<tr><td>PM2.5</td><td>No standard</td><td></td></tr>
<tr><td>CO</td><td>1.8 g/bhp-hr</td><td></td></tr>
</table>

T-BACT: Ammonia slip at 10 ppmvd of NH3 at 15% O2 or less and the use of an oxidation catalyst is considered T-BACT.

</td>
</tr>
</table>

RULE REQUIREMENTS:
Reg 9, Rule 8 – NITROGEN OXIDES AND CARBON MONOXIDE FROM STATIONARY INTERNAL COMBUSTION ENGINES

	Published Value	Converted Value
VOC	Not Addressed	
NOx Lean or Rich Burn	70 ppmvd at 15% O2	0.85 g/bhp-hr
Sox	Not addressed	Not addressed
PM10	Not addressed	Not addressed
PM2.5	Not addressed	Not addressed
CO	2000 ppmvd @ 15% O2	14.8 g/bhp-hr

San Joaquin Valley APCD

BACT
Source: SJVUAPCD BACT Guideline

Best Available Control Technology (BACT) Guideline 3.3.15		
	Published Value	Converted Value
VOC	0.10 g/bhp-hr, lean burn	
NOx	0.15 g/bhp-hr	12.3 ppmvd at 15% O2
Sox	40 ppmvd as H2S	3.7E-2 g/bhp-hr
PM10	Control of H2S to 40 ppmvd	
PM2.5	No standard	
CO	2.0 gb/bhp-hr	

Ammonia(NH3) Slip < or = 10 ppmvd @ 15% O2

RULE REQUIREMENTS:

SJVUAPCD Rule 4702 Current limits for Spark-Ignited Engines		
	Published Value	Converted Value
VOC Rich Burn	250 ppmvd at 15% O2	1.1 g/bhp-hr, measured as CH4
VOC Lean Burn	750 ppmvd at 15% O2	3.2 g/bhp-hr, measured as CH4
NOx Rich Burn	50 ppmvd at 15% O2	0.61 g/bhp-hr
NOx Lean Burn	65 ppmvd at 15% O2	0.79 g/bhp-hr
Sox	Not addressed	Not addressed
PM10	Not addressed	Not addressed
PM2.5	Not addressed	Not addressed
CO	2000 ppmvd @ 15% O2	14.8 g/bhp-hr

The following control technologies have been identified and are ranked based on stringency:

SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES		
	Published Values	Converted Values
VOC	1. 0.1 g/bhp-hr lean burn & 750 ppmvd at 15% O2 rich burn (SJVUAPCD) 2. 30 ppmvd @ 15% O2 (SCAQMD) 3. 0.16 g/bhp-hr (BAAQMD) 4. 0.2 g/bhp-hr (SMAQMD) 5. 0.4 g/bhp-hr (US EPA, ARB) 6. 250 ppmvd (SDCAPCD)	0.1 g/bhp-hr lean burn & 3.2 gb/bhp-hr for rich burn 0.13g/bhp-hr (measured as methane)
NOx	1. 11 ppmvd @ 15% O2 – (SCAQMD) 2. 0.15 g/bhp-hr – (SMAQMD, BAAQMD, SJVUAPCD) 3. 90 % Control or 25 ppmvd (rich burn) or 65 ppmvd (lean burn) at 15% O2 (ARB) 4. 0.6 g/bhp-hr – (US EPA) 5. 90% control or 50 ppmvd (rich burn or 65 ppmvd (lean burn)– (SDCAPCD)	0.13 g/bhp-hr 12.3 ppmvd at 15% O2 25 ppmvd = 0.302 g/bhp-hr 65 ppmvd = 0.79 g/bhp-hr 50 ppmvd = 0.61 g/bhp-hr 65 ppmvd = 0.79 g/bhp-hr
SOx	1. 40 ppmvd of H2S in the fuel– (SJVUAPCD) 2. 50 ppmvd of H2S in the fuel – (SMAQMD) 3. 0.1 lb/hr (ARB) 4. >80% H2S reduction or 100 ppmvd of total sulfur in fuel or (BAAQMD)	0.0306 g/bhp-hr 0.0457 g/bhp-hr 0.17 g/bhp-hr 0.091 g/bhp-hr
PM10	1. Control of PM achieved through the control of H2S in the fuel – (SMAQMD) 2. Gas pretreatment 0.10 g/bhp-hr (BAQAMD)	
PM2.5	N/A – (SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVUAPCD)	
CO	1. 1.8 g/bhp-hr (BAAQMD) 2. 250 ppmvd at 15% O2 3. 2.0 g/bhp-hr (SJVUAPCD) 4. 2.3 g/bhp-hr (ARB) 4. 2.5 g/bhp-hr (US EPA, ARB) 5. 4500 ppmvd @15% O2 (SDCAPCD)	1.84 g/bhp-hr 33.2 g/bhp-hr

The SJVUAPCD BACT determination is set at 0.15 g/bhp-hr for NOx emissions. Due to different engine efficiencies and various types of biogas with different F Factor values and different heat content, the 0.15 g/bhp-hr standard when converted to a ppmvd will vary for a specific application. However, a lean burn biogas engine will have a nominal concentration of 11 ppmvd at 15% O2. A copy of an e-mail from SJUAPCD concerning the derivation of the standard can be found in the BACT portion from SJVAPCD

The following control technologies have been identified as the most stringent, achieved in practice control technologies:

BEST CONTROL TECHNOLOGIES ACHIEVED		
Pollutant	**Standard**	**Source**
VOC	0.1 g/bhp-hr (lean burn) or 30 ppmvd@ 15% O2, measured as carbon. (rich burn or lean burn)	SJVUAPCD, SCAQMD
NOx	11 ppmvd at 15% O2	SCAQMD
SOx	40 ppmvd of H2S in the fuel stream	SJVUAPCD
PM10	40 ppmvd of H2S in the fuel stream	SJVUAPCD
PM2.5	No standard	
CO	1.8 g/bhp-hr	BAAQMD

Since the majority of prime power engines are lean burn and the 11 ppmvd standard has been achieved in practice for a lean burn engine with Selective Catalytic Reduction, the District's achieved in practice standard of 11 ppmvd will be applied to both rich and lean burn engines.

TOXIC BEST CONTROL TECHNOLOGIES ACHIEVED		
Pollutant	**Standard**	**Source**
Formaldehyde	Use of an Oxidation Catalyst	BAAQMD
Ammonia Slip	10 ppmvd at 15% O2	BAAQMD

B. TECHNOLOGICALLY FEASIBLE AND COST EFFECTIVE (Rule 202, §205.1.b.):

Technologically Feasible Alternatives:
Any alternative basic equipment, fuel, process, emission control device or technique, singly or in combination, determined to be technologically feasible by the Air Pollution Control Officer.

As discussed above, SCR is considered to be the achieved in practice BACT for NOx. Staff have identified two other NOx control technologies that may be technologically feasible. One system, NOxTech, is being evaluated in the South Coast. This system is similar to SCR but achieves the NOx reductions without the use of a catalyst. The manufacturer claims similar NOx reduction efficiencies to SCR but at a lower cost. The second technology is the HALO/POGT, which is still under construction in the South Coast. This technology utilizes hydrogen enrichment to lean the engine further (add more air) to achieve NOx reductions. The project in the South Coast is designed to show compliance with the South Coast's Rule 1110.2 limits in a cost effective manner. In either case, the technologies are expected to achieve NOx reductions that are similar to those achieved using SCR.

Control of SOx is done through the control of H2S in the fuel. The control of the H2S is by a carbon bed or iron sponge absorption. The use of an iron sponge has been shown to be technologically feasible, by the applicant.

Per SCAQMD Rule 1110.2, the following is considered technologically feasible

SCAQMD Rule 1110.2 Emissions Limits[A] – Table III-A/B			
Engine Type	**NOx**	**VOC**	**CO**
(Effective January 1, 2016)	11	30	250

[A] Emission limits are in ppmvd @ 15% O_2 unless noted

For the purpose of this project
Fuel F-Factor = 9409.1 dscf/mmBTU (55% CH4, 45% CO2)
Fuel HHV = 557 mmBTU/mmcf (55% CH4, 45% CO2)
Engine HP = 268 HP
NOx = 0.133 g/bhp-hr (11 ppmvd @15% O2)
CO = 1.84 g/bhp-hr (250 ppmvd @15% O2)
VOC = 0.095 g/bhp-hr (measured as carbon) 0.13 g/bhp-hr measured as CH4

Cost Effective Determination:

Since the identified technologically feasible controls are intended to meet the same emission standards that have been identified and achieved with SCR controls, a cost analysis is not required.

C. SELECTION OF BACT & T-BACT:

Pollutant	Standard	Source
VOC	0.1 g/bhp-hr lean burn or 30 ppmvd at 15% O2 rich burn or lean burn	SJVAPCD, SCAQMD
NOx	11 ppmvd at 15% O2	SCAQMD
SOx	40 ppmvd of H2S in the fuel stream	SMAQMD, SJVAPCD
PM10	40 ppmvd of H2S in the fuel stream	SMAQMD, SJVAPCD
PM2.5	40 ppmvd of H2S in the fuel stream	
CO	1.8g/bhp-hr or 250 ppmvd @ 15% O2	BAAQMD, SCAQMD

TOXIC BEST CONTROL TECHNOLOGIES ACHIEVED		
Pollutant	**Standard**	**Source**
Formaldehyde	Use of an Oxidation Catalyst	BAAQMD
Ammonia Slip	10 ppmvd at 15% O2	BAAQMD

REVIEWED BY: _____ **DATE:** _____

APPROVED BY: _____ **DATE:** _____

Attachment A

Review of BACT Determinations As Published

http://cfpub.epa.gov/rblc/index.cfm?action=PermitDetail.ProcessInfo&facility_id=26786&PROCESS_ID=106448
Last updated on 10/27/2015

Technology Transfer Network
Clean Air Technology Center

Process Information - Details

For information about the pollutants related to this process, click on the specific pollutant in the list below.

RBLC Home | New Search | Search Results | Facility Information | Process List | Process Information

Help

FINAL

RBLC ID: CA-1162
Corporate/Company:
Facility Name: J&A - SANTA MARIA, LLC
Process: ICE: LANDFILL OR DIGESTED GAS FIRED

Primary Fuel: NATURAL GAS
Throughput: 1468.00 1468 BHP ENGINE (1.0
Process Code: 12.320

Pollutant Information - List of Pollutants

Help

Pollutant	Primary Emission Limit	Basis	Verified
Carbon Monoxide	2.5000 G/B-HP-H	BACT-PSD	UNKNOWN
Nitrogen Oxides (NOx)	0.6000 G/B-HP-H	BACT-PSD	UNKNOWN
Volatile Organic Compounds (VOC)	0.4000 G/B-HP-H	BACT-PSD	UNKNOWN

Process Notes: EQUIP: RECIPROCATING IC ENGINE. PROVIDES ELECTRICITY AND HOT WATER., MFR: GE JENBACHER, TYPE: COGENERATION, MODEL: TYPE 3 MODEL J320 GS-C82, FUNC EQUIP: COGENERATION SYSTEM LOCATED AT MARIAN MEDICAL CENTER, FUEL_TYPE: , SCHEDULE: CONTINUOUS, H/D: 24, D/W: 7, W/Y: 52, NOTES: NOX AND CO CEMS REQUIRED WITH INFORMATION TELEMETERED TO THE APCDS DAS SYSTEM. OTHER SYSTEM DATA (STACK O2, STACK TEMP, STACK FLOW RATE, FUEL FLOW RATE AND ENGINE MODE) TO BE RECORDED VIA DATA LOGGER. LANDFILL GAS FROM THE SANTA MARIA LANDFILL IS ROUTED 4+ MILES VIA PIPELINE TO THIS COGENERATION PLANT LOCATED AT THE MARIAN MEDICAL CENTER (HOSPITAL). COGEN UNIT PROVIDES ELECTRICTY AND HOT WATER TO THE HOSPITAL. HOT WATER SUPPLY REDUCES LOAD ON HOSPITALS OWN BOILERS. SOURCE TEST RESULTS:

http://cfpub.epa.gov/rblc/index.cfm?action=PermitDetail.ProcessInfo&facility_id=27692&PROCESS_ID=109473
Last updated on 10/27/2015

Technology Transfer Network
Clean Air Technology Center
RACT/BACT/LAER Clearinghouse RBLC Basic Search RBLC Search Results Process Information - Details

Process Information - Details

For information about the pollutants related to this process, click on the specific pollutant in the list below.

RBLC Home | New Search | Search Results | Facility Information | Process List | Process Information

Help

DRAFT

RBLC ID: IN-0184
Corporate/Company: GENERAL MOTORS LLC FORT WAYNE ASSEMBLY
Facility Name: GENERAL MOTORS LLC FORT WAYNE ASSEMBLY
Process: LANDFILL GAS-FIRED GENERATORS

Primary Fuel: LANDFILL GAS
Throughput: 2242.00 HP
Process Code: 12.320

Pollutant Information - List of Pollutants

Help

Pollutant	Primary Emission Limit	Basis	Verified
Carbon Monoxide	4.2200 G/B-PH-H	OTHER CASE-BY-CASE	NO
Nitrogen Oxides (NOx)	0.6000 G/B-PH-H	OTHER CASE-BY-CASE	NO
Particulate matter, total < 2.5 µ (TPM2.5)	0.1300 G/B-PH-H	OTHER CASE-BY-CASE	NO
Volatile Organic Compounds (VOC)	0.5600 G/B-PH-H	OTHER CASE-BY-CASE	NO

Process Notes: USING LANDFILL GAS TO FIRE POWER GENERATORS FOR THE FACILITY.

Summary of ARB Clearing House

	NOx	VOC	CO	PM10	PM2.5	SOx
City of San Diego, Public Utilities Dept. – San Diego	0.5 g/hp-hr	20 ppm @ 15% O2 (as hexane) =0.45 g/hp-hr				
J&A – Santa Maria, LLC – Santa Barbara	0.6 g/hp-hr	0.4 g/hp-hr	2.5 g/hp-hr			
City of Santa Maria Waste Water Treatment Plant – Santa Barbara	0.43 g/hp-hr		2.5 g/hp-hr			
CHP Clean Energy, LLC – San Diego	0.5 g/hp-hr	0.8 g/hp-hr				
City of Santa Maria Landfill, Santa Barbara	38 PPM @ 15% O2 0.46 g/hp-hr	86 PPM @ 15% O2 0.36 g/hp-hr measured as CH4	308 PPMVD @ 15% O2 2.3 g/hp-hr			
MM San Bernardino Energy, LLC, South Coast	0.6 g/hp-hr	0.8 g/hp-hr	2.5 g/hp-hr	0.2 lb/hr = 0.33 g/hp-hr		0.12 lb/hr = 0.2 g/hp-hr
Chino Basin Desalter Authority, South Coast	0.6 g/hp-hr	0.8 g/hp-hr	2.5 g/hp-hr	0.2 lb/hr = 0.33 g/hp-hr		0.1 lb/hr = 0.2 g/hp-hr

California Environmental Protection Agency
Air Resources Board

BACT Determination Detail

Category

Source Category:	ICE: Landfill or Digested Gas Fired
SIC Code	
NAICS Code	

Emission Unit Information

Manufacturer:	Caterpillar
Type:	
Model:	3520
Equipment Description:	landfill gas fired engine
Capacity / Dimentions	2233 BHP
Fuel Type	Landfill Gas
Multiple Fuel Types	
	Continuous (24/365/52)

Operating Schedule (hours/day)/(days/week)/ (weeks/year)e	
Function of Equipment	utilize landfill gas for electricity generation

Bact Information

NOx Limit	0.5
NOx Limit Units	g/BHP-hr
NOx Average Time	
NOx Control Method	Pollution Prevention
NOx Control Method Desc	
NOx Percent Control Efficiency	
NOx Cost Effectiveness (%/ton)	
NOx Incremental Cost Effectiveness (%/ton)	
NOx Cost Verified (Y/N)	
NOx Dollar Year	
VOC Limit	20
VOC Limit Units	ppm@15%O2 (as hexane
VOC Average Time	

VOC Control Method	Pollution Prevention
VOC Control Method Desc	engine design
VOC Percent Control Efficiency	
VOC Cost Effectiveness (%/ton)	
VOC Incremental Cost Effectiveness (%/ton)	
VOC Cost Verified (Y/N)	
VOC Dollar Year	

Project / Permit Information

Application/Permit No.:	APCD2011-APP-001659
Application Completeness Date:	
New Construction/Modification:	New Construction
ATC Date:	03-22-2012
PTO Date:	
Startup Date:	09-25-2013
Technology Status:	BACT Determination
Source Test Available:	Yes
Source Test Results:	NOx: 0.3 g/BHP-hr VOC: 8 ppm @ 15%O2 (as hexane)

Facility / District Information

Facility Name:	City of San Diego, Public Utilities Dept.
Facility Zip Code:	92121
Facility County:	San Diego
District Name:	San Diego County APCD
District Contact:	Arthur Carbonell
Contact Phone No.:	(858) 586-2741
Contact E-Mail:	arthur.carbonell@sdcounty.ca.gov

Notes

Notes:

Report Error In Determination

California Environmental Protection Agency
Air Resources Board

BACT Determination Detail

Category

Source Category:	ICE: Landfill or Digested Gas Fired
SIC Code	49
NAICS Code	2211

Emission Unit Information

Manufacturer:	GE Jenbacher
Type:	Cogeneration
Model:	Type 3 Model J320 GS-C82
Equipment Description:	Reciprocating IC Engine. Provides electricity and hot water.
Capacity / Dimentions	1468 bhp engine (1.030 MW generator)
Fuel Type	Natural Gas
Multiple Fuel Types	
	Continuous (24/7/52)

Operating Schedule (hours/day)/(days/week)/ (weeks/year)e	
Function of Equipment	Cogeneration system located at Marian Medical Center

Bact Information

NOx Limit	0.6
NOx Limit Units	g/bhp-hr
NOx Average Time	6-minutes
NOx Control Method	Add-on
NOx Control Method Desc	LEANNOX lean combustion. 43 ppmvd at 15% O2
NOx Percent Control Efficiency	
NOx Cost Effectiveness (%/ton)	
NOx Incremental Cost Effectiveness (%/ton)	
NOx Cost Verified (Y/N)	
NOx Dollar Year	
CO Limit	2.5
CO Limit Units	g/bhp-hr
CO Average Time	6-minutes

CO Control Method	Add-on
CO Control Method Desc	LEANNOX lean combustion. 293 ppmvd at 15% O2
CO Percent Control Efficiency	
CO Cost Effectiveness (%/ton)	
CO Incremental Cost Effectiveness (%/ton)	
CO Cost Verified (Y/N)	
CO Dollar Year	
VOC Limit	0.4
VOC Limit Units	g/bhp-hr
VOC Average Time	
VOC Control Method	Add-on
VOC Control Method Desc	LEANNOX lean combustion. 83 ppmvd at 15% O2
VOC Percent Control Efficiency	
VOC Cost Effectiveness (%/ton)	
VOC Incremental Cost Effectiveness (%/ton)	
VOC Cost Verified (Y/N)	
VOC Dollar Year	

Project / Permit Information

Application/Permit No.:	ATC 12038
Application Completeness Date:	
New Construction/Modification:	New Construction
ATC Date:	12-18-2006
PTO Date:	
Startup Date:	
Technology Status:	BACT Determination
Source Test Available:	No
Source Test Results:	

Facility / District Information

Facility Name:	J&A - Santa Maria, LLC
Facility Zip Code:	93456
Facility County:	Santa Barbara
District Name:	Santa Barbara County APCD
District Contact:	Mike Goldman
Contact Phone No.:	(805) 961-8821

Contact E-Mail: mfg@sbcapcd.org

Notes

Notes: NOx and CO CEMS required with information telemetered to the APCD's DAS system. Other system data (stack O2, stack temp, stack flow rate, fuel flow rate and engine "mode") to be recorded via data logger. Landfill gas from the Santa Maria Landfill is routed 4+ miles via pipeline to this cogeneration plant located at the Marian Medical Center (hospital). Cogen unit provides electricty and hot water to the hospital. HOt water supply reduces load on hospital's own boilers.

Report Error In Determination

California Environmental Protection Agency
Air Resources Board

BACT Determination Detail

Category

Source Category:	ICE: Landfill or Digested Gas Fired
SIC Code	4952
NAICS Code	22132

Emission Unit Information

Manufacturer:	MAN
Type:	V-12 gas-fired ICE
Model:	E 2842 LE 322
Equipment Description:	V-12 gas-fired ICE
Capacity / Dimentions	510 BHP
Fuel Type	Digester Gas
Multiple Fuel Types	No
	Continuous (24/7/52)

Operating Schedule (hours/day)/(days/week)/(weeks/year)e	
Function of Equipment	Electrical Power Generation

Bact Information

NOx Limit	0.43
NOx Limit Units	g/bhp-hr
NOx Average Time	40 minutes
NOx Control Method	Pollution Prevention
NOx Control Method Desc	Lean-burn IC engine with an air-fuel ratio controller
NOx Percent Control Efficiency	
NOx Cost Effectiveness (%/ton)	
NOx Incremental Cost Effectiveness (%/ton)	
NOx Cost Verified (Y/N)	
NOx Dollar Year	
CO Limit	2.5
CO Limit Units	g/bhp-hr
CO Average Time	40 minutes

CO Control Method	Pollution Prevention
CO Control Method Desc	Lean-burn IC engine with an air-fuel ratio controller
CO Percent Control Efficiency	
CO Cost Effectiveness (%/ton)	
CO Incremental Cost Effectiveness (%/ton)	
CO Cost Verified (Y/N)	
CO Dollar Year	

Project / Permit Information

Application/Permit No.:	ATC 12875
Application Completeness Date:	
New Construction/Modification:	New Construction
ATC Date:	04-07-2010
PTO Date:	
Startup Date:	
Technology Status:	BACT Determination
Source Test Available:	Yes
Source Test Results:	20.4 ppmvd NOx @ 15% O2 0.16 lb NOx/hr 194 ppmvd CO @ 15% O2 0.96 lb CO/hr

Facility / District Information

Facility Name:	City of Santa Maria Wastewater Treatment Plant
Facility Zip Code:	93454
Facility County:	Santa Barbara
District Name:	Santa Barbara County APCD
District Contact:	Ben Ellenberger
Contact Phone No.:	(805) 961-8800
Contact E-Mail:	cbe@sbcapcd.org

Notes

Notes:	Gas System LMF-MF-2D1 air fuel ratio controller and Bosch heated oxygen sensor. Emission rates equivalent to 35 ppmvd NOx @ 15% O2 and 333 ppmvd CO @ 15% O2

Report Error In Determination

California Environmental Protection Agency
Air Resources Board

BACT Determination Detail

Category

Source Category:	ICE: Landfill or Digested Gas Fired
SIC Code	
NAICS Code	

Emission Unit Information

Manufacturer:	Guascor
Type:	
Model:	SFGLD 560
Equipment Description:	Prime engine
Capacity / Dimentions	789 bhp
Fuel Type	Digester Gas
Multiple Fuel Types	Digester gas and natural gas
	Continuous (24/7/52)

Operating Schedule (hours/day)/(days/week)/(weeks/year)e	
Function of Equipment	Producing electricity

Bact Information

NOx Limit	0.5
NOx Limit Units	g/bhp-hr
NOx Average Time	
NOx Control Method	Pollution Prevention
NOx Control Method Desc	Lean burn low emission
NOx Percent Control Efficiency	
NOx Cost Effectiveness (%/ton)	
NOx Incremental Cost Effectiveness (%/ton)	
NOx Cost Verified (Y/N)	
NOx Dollar Year	
VOC Limit	0.8
VOC Limit Units	g/bhp-hr
VOC Average Time	

VOC Control Method	Pollution Prevention
VOC Control Method Desc	Lean burn low emission
VOC Percent Control Efficiency	
VOC Cost Effectiveness (%/ton)	
VOC Incremental Cost Effectiveness (%/ton)	
VOC Cost Verified (Y/N)	
VOC Dollar Year	

Project / Permit Information

Application/Permit No.:	000453
Application Completeness Date:	
New Construction/Modification:	New Construction
ATC Date:	06-17-2009
PTO Date:	03-08-2010
Startup Date:	11-09-2009
Technology Status:	BACT Determination
Source Test Available:	Yes
Source Test Results:	

Facility / District Information

Facility Name:	CHP Clean Energyl, LLC
Facility Zip Code:	92057
Facility County:	San Diego
District Name:	San Diego County APCD
District Contact:	Camqui Nguyen
Contact Phone No.:	(858) 586-2747
Contact E-Mail:	camqui.nguyen@sdapcd.org

Notes

Notes:

Report Error In Determination

California Environmental Protection Agency
Air Resources Board

BACT Determination Detail

Category

Source Category:	ICE: Landfill or Digested Gas Fired
SIC Code	4953
NAICS Code	562212

Emission Unit Information

Manufacturer:	GE Jenbacher
Type:	
Model:	J 420 GS-A82
Equipment Description:	Lean-burn 4-stroke reciprocating IC engine
Capacity / Dimentions	1966 bhp
Fuel Type	Landfill Gas
Multiple Fuel Types	
	Continuous (24/7/52)

Operating Schedule (hours/day)/(days/week)/ (weeks/year)e	
Function of Equipment	Generate 1.426 MW electricity

Bact Information

NOx Limit	38
NOx Limit Units	ppmvd @ 15% O2
NOx Average Time	6 minutes
NOx Control Method	Pollution Prevention
NOx Control Method Desc	Lean-burn engine with air-fuel ratio controller
NOx Percent Control Efficiency	
NOx Cost Effectiveness (%/ton)	
NOx Incremental Cost Effectiveness (%/ton)	
NOx Cost Verified (Y/N)	
NOx Dollar Year	
CO Limit	308
CO Limit Units	ppmvd @ 15% O2
CO Average Time	6 minutes

CO Control Method	Pollution Prevention
CO Control Method Desc	Lean-burn engine with air-fuel ratio controller
CO Percent Control Efficiency	
CO Cost Effectiveness (%/ton)	
CO Incremental Cost Effectiveness (%/ton)	
CO Cost Verified (Y/N)	
CO Dollar Year	
VOC Limit	86
VOC Limit Units	ppmvd @ 15% O2
VOC Average Time	6 minutes
VOC Control Method	Pollution Prevention
VOC Control Method Desc	Lean-burn engine with air-fuel ratio controller
VOC Percent Control Efficiency	
VOC Cost Effectiveness (%/ton)	
VOC Incremental Cost Effectiveness (%/ton)	
VOC Cost Verified (Y/N)	
VOC Dollar Year	

Project / Permit Information

Application/Permit No.:	ATC 13281
Application Completeness Date:	
New Construction/Modification:	New Construction
ATC Date:	08-26-2011
PTO Date:	
Startup Date:	09-02-2011
Technology Status:	BACT Determination
Source Test Available:	Yes
Source Test Results:	33.7 ppmvd NOx @ 15% O2 249.1 ppmvd CO @ 15% O2 16.3 ppmvd VOC @ 15% O2

Facility / District Information

Facility Name:	City of Santa Maria Landfill
Facility Zip Code:	93454
Facility County:	Santa Barbara
District Name:	Santa Barbara County APCD
District Contact:	Ben Ellenberger
Contact Phone No.:	(850) 961-8800

Contact E-Mail: cbe@sbcapcd.org

Notes

Notes: Limits equivalent to 0.5 g NOx/hp-hr, 0.4 g VOC/hp-hr, and 2.5 g CO/hp-hr

Report Error In Determination

California Environmental Protection Agency
Air Resources Board

BACT Determination Detail

Category

Source Category:	ICE: Landfill or Digested Gas Fired
SIC Code	4941
NAICS Code	221

Emission Unit Information

Manufacturer:	Waukesha
Type:	Spark iginition, 4-cycle
Model:	L7042GL
Equipment Description:	
Capacity / Dimentions	10.75 MMBtu/hr, 1408 bhp
Fuel Type	Digester Gas
Multiple Fuel Types	Natural Gas
	Continuous (24/7/52)

Operating Schedule (hours/day)/(days/week)/(weeks/year)e	
Function of Equipment	Power generation

Bact Information

NOx Limit	0.6
NOx Limit Units	gr/bhp-hr
NOx Average Time	1-hr
NOx Control Method	
NOx Control Method Desc	turbocharged,intercooled,lean-burn,air/fuel controller
NOx Percent Control Efficiency	
NOx Cost Effectiveness (%/ton)	
NOx Incremental Cost Effectiveness (%/ton)	
NOx Cost Verified (Y/N)	
NOx Dollar Year	
CO Limit	2.5
CO Limit Units	gr/bhp-hr
CO Average Time	1-hr

CO Control Method	
CO Control Method Desc	turbocharged,intercooled,lean-burn,air/fuel controller
CO Percent Control Efficiency	
CO Cost Effectiveness (%/ton)	
CO Incremental Cost Effectiveness (%/ton)	
CO Cost Verified (Y/N)	
CO Dollar Year	
VOC Limit	0.8
VOC Limit Units	gr/bhp-hr
VOC Average Time	1-hr
VOC Control Method	
VOC Control Method Desc	turbocharged,intercooled,lean-burn,air/fuel controller
VOC Percent Control Efficiency	
VOC Cost Effectiveness (%/ton)	
VOC Incremental Cost Effectiveness (%/ton)	
VOC Cost Verified (Y/N)	
VOC Dollar Year	

PM10 Limit	**0.2**
PM10 Limit Units	**lb/hr**
PM10 Average Time	
PM10 Control Method	
PM10 Control Method Desc	
PM10 Percent Control Efficiency	
PM10 Cost Effectiveness (%/ton)	
PM10 Incremental Cost Effectiveness (%/ton)	
PM10 Cost Verified (Y/N)	
PM10 Dollar Year	

SOx Limit	**0.12**
SOx Limit Units	**lb/hr**
SOx Average Time	
SOx Control Method	
SOx Control Method Desc	
SOx Percent Control Efficiency	
SOx Cost Effectiveness (%/ton)	

SOx Incremental Cost Effectiveness (%/ton)

SOx Cost Verified (Y/N)

SOx Dollar Year

Project / Permit Information

Application/Permit No.:	391009
Application Completeness Date:	
New Construction/Modification:	New Construction
ATC Date:	05-16-2002
PTO Date:	
Startup Date:	
Technology Status:	BACT Determination
Source Test Available:	No
Source Test Results:	

Facility / District Information

Facility Name:	MM San Bernardino Energy, LLC
Facility Zip Code:	91761

Facility County:	San Bernardino
District Name:	South Coast AQMD
District Contact:	Martin Kay
Contact Phone No.:	(909) 396-3115
Contact E-Mail:	mkay@aqmd.gov

Notes

Notes:	PPMVD@15%O2: NOx-46, CO-360, HC-79. g/hp-hr: ROG <.02, PM-10 <.05 (Based on 34% (HHV) engine efficiency used by the manufacture in his calculations, the PPMVD limits correspond to the following g/hp-hr: NOx-0.61, CO-2.9, HC-0.36 (as methane).

Report Error In Determination

California Environmental Protection Agency
Air Resources Board

BACT Determination Detail

Category

Source Category:	ICE: Landfill or Digested Gas Fired
SIC Code	4953
NAICS Code	562212

Emission Unit Information

Manufacturer:	Duetz
Type:	turbocharged/intercooled
Model:	TBG620V16K
Equipment Description:	
Capacity / Dimentions	14.7 MMBtu/hr, 1850 bhp
Fuel Type	Landfill Gas
Multiple Fuel Types	
	Continuous (24/7/52)

Operating Schedule (hours/day)/(days/week)/ (weeks/year)e	
Function of Equipment	Power generation

Bact Information

NOx Limit	0.6
NOx Limit Units	g/bhp-hr
NOx Average Time	
NOx Control Method	
NOx Control Method Desc	turbocharged,intercooled air/fuel controller
NOx Percent Control Efficiency	
NOx Cost Effectiveness (%/ton)	
NOx Incremental Cost Effectiveness (%/ton)	
NOx Cost Verified (Y/N)	
NOx Dollar Year	
CO Limit	2.5
CO Limit Units	g/bhp-hr
CO Average Time	

CO Control Method	
CO Control Method Desc	turbocharged,intercooled air/fuel controller
CO Percent Control Efficiency	
CO Cost Effectiveness (%/ton)	
CO Incremental Cost Effectiveness (%/ton)	
CO Cost Verified (Y/N)	
CO Dollar Year	
VOC Limit	0.8
VOC Limit Units	g/bhp-hr
VOC Average Time	
VOC Control Method	
VOC Control Method Desc	turbocharged,intercooled air/fuel controller
VOC Percent Control Efficiency	
VOC Cost Effectiveness (%/ton)	
VOC Incremental Cost Effectiveness (%/ton)	
VOC Cost Verified (Y/N)	
VOC Dollar Year	

PM Limit	0.2
PM Limit Units	lb/hr
PM Average Time	
PM Control Method	
PM Control Method Desc	
PM Percent Control Efficiency	
PM Cost Effectiveness (%/ton)	
PM Incremental Cost Effectiveness (%/ton)	
PM Cost Verified (Y/N)	
PM Dollar Year	

SOx Limit	**0.1**
SOx Limit Units	**lb/hr**
SOx Average Time	
SOx Control Method	
SOx Control Method Desc	
SOx Percent Control Efficiency	
SOx Cost Effectiveness (%/ton)	

SOx Incremental Cost Effectiveness (%/ton)	
SOx Cost Verified (Y/N)	
SOx Dollar Year	

Project / Permit Information

Application/Permit No.:	388050
Application Completeness Date:	
New Construction/Modification:	New Construction
ATC Date:	06-18-2002
PTO Date:	
Startup Date:	
Technology Status:	BACT Determination
Source Test Available:	No
Source Test Results:	

Facility / District Information

Facility Name:	Chino Basin Desalter Authority
Facility Zip Code:	91710

Facility County:	San Bernardino
District Name:	South Coast AQMD
District Contact:	Martin Kay
Contact Phone No.:	(909)-396-3115
Contact E-Mail:	mkay@aqmd.gov

Notes

Notes:

Report Error In Determination

SMAQMD BACT CLEARINGHOUSE

CATEGORY: **IC ENGINE SPARK - PRIME**

BACT Size: Minor Source BACT

IC ENGINE PRIME POWER

BACT Determination Number:	67	**BACT Determination Date:**	**6/11/2012**

Equipment Information

Permit Number: 23352

Equipment Description: IC ENGINE PRIME POWER

Unit Size/Rating/Capacity: 939 hp dairy digester gas fired IC engine

Equipment Location: MAAS ENERGY WORKS
12127 MCKENZIE RD
GALT, CA

BACT Determination Information

ROCs	**Standard:**	0.2 g/hp-hr
	Technology Description:	
	Basis:	Achieved in Pactice
NOx	**Standard:**	0.15 g/hp-hr
	Technology Description:	
	Basis:	Cost Effective
SOx	**Standard:**	50 ppmv
	Technology Description:	
	Basis:	Achieved in Pactice
PM10	**Standard:**	50 ppmv
	Technology Description:	
	Basis:	Achieved in Pactice
PM2.5	**Standard:**	
	Technology Description:	
	Basis:	
CO	**Standard:**	
	Technology Description:	
	Basis:	
LEAD	**Standard:**	
	Technology Description:	
	Basis:	

Comments:

District Contact: Felix Trujillo Phone No.: (916) 874 - 7357 email: ftrujillo@airquality.org

Printed: 10/27/2015

Section I: AQMD BACT Determinations

Application No.: 391009

Equipment Category – I.C. Engine, Landfill Gas-Fired

1. GENERAL INFORMATION

DATE: 2/20/2003

A. MANUFACTURER: Deutz

B. TYPE:

C. MODEL: TBG620V16K

D. STYLE:

E. APPLICABLE AQMD RULES: 1110.2, 1150.1, 431.1

F. COST: $ (NA) SOURCE OF COST DATA:

G. OPERATING SCHEDULE: 24 HRS/DAY 7 DAYS/WK 52 WKS/YR

2. EQUIPMENT INFORMATION

APP. NO.: 391009

A. FUNCTION: Power Generation

B. MAXIMUM HEAT INPUT: 14.7 MMBtu/hr

C. MAXIMUM THROUGHPUT: 1850 bhp

D. BURNER INFORMATION: NO.: TYPE:

E. PRIMARY FUEL: Landfill Gas

F. OTHER FUEL: None

G. OPERATING CONDITIONS: Expected to be steady, at or near full capacity.

3. COMPANY INFORMATION

APP. NO.: 391009

A. NAME: MM San Bernardino Energy, LLC

B. SIC CODE: 4953

C. ADDRESS: Milliken Landfill, 2050 S. Milliken Ave.
CITY: Ontario STATE: CA ZIP: 91761

D. CONTACT PERSON: Ben Huiser

E. PHONE NO.: 612-373-5464

4. PERMIT INFORMATION

APP. NO.: 391009

A. AGENCY: SCAQMD

B. APPLICATION TYPE: new construction

C. AGENCY CONTACT PERSON: Ted Kowalczyk

D. PHONE NO.: 909-396-2592

E. PERMIT TO CONSTRUCT/OPERATE INFORMATION: P/C NO.: 391009 ISSUANCE DATE: 5/16/2002
☐ CHECK IF NO P/C P/O NO.: ISSUANCE DATE:

F. START-UP DATE:

5. EMISSION INFORMATION

APP. NO.: 391009

A. PERMIT

A1. PERMIT LIMIT: Lb/hr (g/bhp-hr): ROG-3.27 (0.8), NO2-2.44 (0.6), CO-10.2 (2.5), SO2-0.10, PM-0.20. Engine must be equipped with air/fuel ratio controller, and flue gas O2 must be checked weekly. Heat input to the engine not to exceed 14.7 MMBtu/hr.

A2. BACT/LAER DETERMINATION: g/bhp-hr: NOx- 0.6, VOC- 0.8, CO- 2.5.

A3. BASIS OF THE BACT/LAER DETERMINATION: SCAQMD BACT Guidelines, Part D.

5. EMISSION INFORMATION

APP. NO.: 391009

B. CONTROL TECHNOLOGY

B1. MANUFACTURER/SUPPLIER: Duetz

B2. TYPE: Engine Design

B3. DESCRIPTION: Engine is turbocharged and intercooled and has an air/fuel ratio controller.

B4. CONTROL EQUIPMENT PERMIT APPLICATION DATA: P/C NO.: ISSUANCE DATE:
P/O NO.: ISSUANCE DATE:

B5. WASTE AIR FLOW TO CONTROL EQUIPMENT: FLOW RATE:
ACTUAL CONTAMINANT LOADING: BLOWER HP:

B6. WARRANTY: PPMVD@15%O2: NOx-46, CO-360, HC-79. g/hp-hr: ROG <.02, PM-10 <.05 (Based on 34% (HHV) engine efficiency used by the manufacture in his calculations, the PPMVD limits correspond to the following g/hp-hr: NOx-0.61, CO-2.9, HC-0.36 (as methane).

B7. PRIMARY POLLUTANTS: NOx, CO, VOC, PM, SOx

B8. SECONDARY POLLUTANTS:

B9. SPACE REQUIREMENT:

B10. LIMITATIONS: B11. UNUSED

B12. OPERATING HISTORY:

B13. UNUSED B14. UNUSED

C. CONTROL EQUIPMENT COSTS

C1. CAPITAL COST: ☐ CHECK IF INSTALLATION COST IS INCLUDED IN EQUIPMENT COST
EQUIPMENT: $ INSTALLATION: $ (NA) SOURCE OF COST DATA:

C2. ANNUAL OPERATING COST: $ (NA) SOURCE OF COST DATA:

D. DEMONSTRATION OF COMPLIANCE

D1. STAFF PERMFORMING FIELD EVALUATION:
ENGINEER'S NAME: INSPECTOR'S NAME: DATE:

D2. COMPLIANCE DEMONSTRATION:

D3. VARIANCE: NO. OF VARIANCES: DATES:
CAUSES:

D4. VIOLATION: NO. OF VIOLATIONS: DATES:
CAUSES:

D5. MAINTENANCE REQUIREMENTS: D6. UNUSED

D7. SOURCE TEST/PERFORMANCE DATA RESULTS AND ANALYSIS:
DATE OF SOURCE TEST: Source test is required within 120 days following startup. CAPTURE EFFICIENCY:
DESTRUCTION EFFICIENCY: OVERALL EFFICIENCY:
SOURCE TEST/PERFORMANCE DATA:
OPERATING CONDITIONS:
TEST METHODS:

6. COMMENTS

APP. NO.: 391009

BAY AREA AIR QUALITY MANAGEMENT DISTRICT Best Available Control Technology (BACT) Guideline

Source Category

Source:	**IC Engine – Biogas Fired**	**Revision:**	**1**
		Document #:	**96.2.4**
Class:	**≥ 50 Hp Output**	**Date:**	**5/30/2013**

Pollutant	BACT 1. Technologically Feasible/Cost Effective 2. Achieved in Practice	TYPICAL TECHNOLOGY
POC	1. 0.12 g/bhp-hr [a, c, e, f, g, k] 2. 0.16 g/bhp-hr [l, k]	1. Gas Pre-Treatment (filtration, refrigeration & carbon adsorption) + Oxidation Catalyst [a, c, e, f, g, k] 2. Low POC Waste Gas or Gas Pre-Treatment or Gas Pre-Treatment + Oxidation Catalyst [l, k]
NO_x	1. n/s 2. 0.15 g/bhp-hr [a, c, d, e, f, g, i, j, l]	1. Gas Pre-Treatment + Selective Catalytic Reduction (SCR) [f, g, l] 2. Gas Pre-Treatment + Selective Catalytic Reduction (SCR) [a, c, d, f, i, j, l] or NOxTech [e, i, j]
CO	1. 0.89 g/bhp-hr [b, c, f] 2. 1.8 g/bhp-hr [a]	1. Gas Pre-Treatment + Oxidation Catalyst [b, c, f] 2. Gas Pre-Treatment + Oxidation Catalyst [a]
SO_2	1. 100 ppmv of total sulfur in Biogas [c, g] 2. 150 ppmv of total sulfur in Biogas [a, b, h]	1. Low Sulfur Biogas [c] or Gas Pre-Treatment with >80% H_2S Removal [g] 2. Low Sulfur Biogas or Gas Pre-Treatment [a, b, h]
PM_{10}	1. 0.07 g/bhp-hr [b] 2. 0.10 g/bhp-hr [a, c]	1. Gas Pre-Treatment (filtration and condensation) [b] 2. Gas Pre-Treatment [a, c]
NPOC	1. n/d 2. n/s	1. n/d 2. Same as POC

References and Notes for BACT Determination

a. BAAQMD Application # 12649 (Ameresco Half Moon Bay, LLC)
b. BAAQMD Application # 23333 (Potrero Hills Energy Producers)
c. BAAQMD Application # 24388 (Zero Waste Energy)
d. San Joaquin Valley APCD: Ameresco Foothill and Forward Energy Projects
e. San Joaquin Valley APCD: Cambrian Energy Woodville, LLC Energy Projects
f. South Coast AQMD: Orange County Sanitation District Demonstration Project
g. Georgia Dept. of Natural Resources: MAS ASB Cogen, LLC CHP Facility
h. South Coast AQMD: Rule 431.1, amended 6/12/98.
i. South Coast AQMD: Rule 1110.2, Table III-B, amended 9/7/12.
j. San Joaquin Valley APCD: Rule 4702, Table 2, amended 8/18/11.
k. Formaldehyde is both a POC and a toxic air contaminant (TAC) and is typically the largest contributor to the health risks resulting from biogas fired engines. Oxidation catalysts typically achieve 50% or greater control of formaldehyde emissions. Use of an oxidation catalyst will satisfy the Regulation 2-5-301 TBACT requirement.
l. For SCR systems, ammonia emissions are typically limited to an exhaust concentration 10 ppmv of NH_3 at 15% O_2 or less. [c, f]

VENK REDDY

From: Ramon Norman <Ramon.Norman@valleyair.org>
Sent: Tuesday, January 26, 2016 7:27 PM
To: VENK REDDY
Subject: RE: Biogas fired Engines at San Joaquin

Hello Venk,

The District's current Achieved in Practice Best Available Control Technology (BACT) limit for NOx emissions from biogas-fueled IC engines is 0.15 g-NOx/bhp-hr. The District's BACT limit is generally ≤ 11 ppmvd @ 15% O_2; however, the actual ppmvd will depend on the F-Factor of the biogas and the efficiency of the engines (generally assumed to be 30-35%). The District's BACT limit for NO_X from biogas-fueled IC engines is approximately equivalent to the proposed NO_X emission limit of 11 ppmvd @ 15% O_2 that is contained in South Coast Air Quality Management District's Rule (SCAQMD) 1110.2 - Emissions From Gaseous- and Liquid-Fueled Engines.

The District's current Achieved in Practice BACT limit for VOC emissions from biogas-fueled IC engines is 0.10 g-VOC/bhp-hr. The 0.10 g-VOC/bhp-hr limit was based on the 20 ppmvd VOC @ 15% O_2 emission limit identified in the ARB document Air Quality Guidance for Siting Biorefineries (November 2011) (http://www.arb.ca.gov/fuels/lcfs/bioguidance/biodocs/finalbiorefineryguidenov2011.pdf). The District's previous Achieved in Practice BACT limit for VOC emissions from biogas-fueled IC engines was 0.15 g-VOC/bhp-hr, but this was revised based on the Air Quality Guidance for Siting Biorefineries. The District's previous Achieved in Practice BACT limit of 0.15 g-VOC/bhp-hr 0.15 g-VOC/bhp-hr appears to be approximately equivalent to the proposed VOC emission limit of 30 ppmvd @ 15% O_2 that is contained in SCAQMD 1110.2

The District has a permitted a number of biogas-fueled engines that are subject to the District's BACT limit for biogas-fueled engines and a number are operational and have passed the required source tests.

Please let me know if you have any questions or if we can help with anything else.

Ramon Norman
Air Quality Engineer
San Joaquin Valley Air Pollution Control District
1990 E. Gettysburg Ave
Fresno, CA 93726-0244
Phone: (559) 230-5909
FAX: (559) 230-6061

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www.healthyairliving.com
Make one change for clean air!

From: VENK REDDY [mailto:VReddy@airquality.org]
Sent: Friday, January 22, 2016 11:37 AM
To: Ramon Norman
Subject: Biogas fired Engines at San Joaquin

Hi Ramon,

I am currently revising SMAQMD's BACT for Biogas engines. I am trying to resolve SCAQMD rule limit of 11 ppm for NOx and 30 ppm for VOC. Based on the SJV BACT published determinations the limit for NOx looks like 0.15 g/hp-hr and 0.1 g/hp-hr for VOCs.

Can you please tell me if you guys have an engine fired on biogas that is rated at 11 ppm for NOx and 30 PPM for VOCs?

Thanks

Venk – SMAQMD

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 3.3.15*

Last Update: 3/6/2013

Waste Gas-Fired IC Engine**

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	0.10 g/bhp-hr (lean burn and positive crankcase ventilation (PCV) or a 90% efficient crankcase control device or equivalent)		Fuel Cells (<0.02 lb-VOC/MW-hr as CH4)
Sox	Sulfur content of fuel gas < or = 40 ppmv (as H2S) (dry absorption, wet absorption, chemical H2S reduction, water scrubber, or equivalent) (may be averaged up to 24 hours for compliance)		
PM10	Sulfur content of fuel gas < or = 40 ppmv (as H2S)		
Nox	0.15 g/bhp-hr (lean-burn engine with SCR, rich-burn engine with 3-way catalyst, or other equivalent)		1. Fuel Cells (<0.05 lb/MW-hr) 2. Microturbines (<9 ppmv @ 15% O2) 3. Gas Turbine (<9 ppmv @ 15% O2) (Note: gas turbines only ABE for projects > or = to 3 MW)
CO	2.0 g/bhp-hr		1. Fuel Cells (<0.10 lb/MW-hr) 2. Microturbines (<60 ppmv @ 15% O2) 3. Gas Turbine (<60 ppmv @ 15% O2) (Note: gas turbines only ABE for projects > or = 3 MW)
Ammonia (NH3) Slip	< or = 10 ppmv @ 15% O2		

**For the purposes of this determination, waste gas is a gas produced from the digestion of material excluding municipal sources such as waste water treatment plants, landfills, or any source where siloxane impurities are a concern

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in s a state implementation plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

***This is a Summary Page for this Class of Source**

Attachment B
Rule Languages from other California Air Districts

VENK REDDY

From: Kevin Orellana <korellana@aqmd.gov>
Sent: Wednesday, January 20, 2016 3:10 PM
To: VENK REDDY
Cc: Gary Quinn
Subject: RE: Biogas Engines at SCAQMD

Hi Venk,
The final rule has not been posted on our website yet (it will soon, hopefully this week). I can assure you, however, that the amendments pertaining to the compliance deadline were adopted. Here is a link to the December 4, 2015 Governing Board package:

http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2015/2015-Dec4-031.pdf?sfvrsn=7

Regarding the technology, the system installed at OCSD is considered achieved in practice. The NOxTech system is still undergoing demonstration testing, while the HALO/POGT project is still under construction. I don't have exact costs for the HALO/POGT system yet, but we did do a cost analysis for the rulemaking conducted in 2012. Here is the link to that analysis:

http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2012/2012-sep7-032.pdf?sfvrsn=2

Attachment A of the Technology Assessment contains the cost tables for oxidation catalyst/SCR/gas cleanup and for NOxTech (page 167 of the pdf). More details and discussion are presented beginning on page 145 of the pdf.

Let me know if you have any other questions or if you need further details.

Sincerely,

Kevin Orellana
Air Quality Specialist
Planning, Rule Development, and Area Sources
South Coast Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765
(909)396-3492

From: VENK REDDY [mailto:VReddy@airquality.org]
Sent: Wednesday, January 20, 2016 1:52 PM
To: Kevin Orellana
Subject: Biogas Engines at SCAQMD

Hi Kevin, Thanks for answering my call.

In regards to Rule 1110.2 I cannot find on the SCAQMD website where it shows that the amendment to the rule that extended the ratcheted limits for Biogas engines by until 1-2017. Can you please confirm this?

I did find a preliminary draft staff report for rule 1110.2 dated 7-2015 and regards to biogas engines I see there are three options to meet the reduced limits. Biogas cleanup with an oxidation catalyst and SCR from Orange County Sanitation District, NOxTech system at Eastern Municipal Water District's Temecula plant and hydrogen assisted lean operation (HALO) with partial oxidation gas turbine (POGT) at the City of San Bernardino Municipal Water Department.
Have you found these systems to be achieved in practice yet? Or technologicly feasible?
Do you by any chance have an cost info on these three systems?

All these questions revolve on a BACT I am writing for a biogas engine here in Sacramento.

Thanks again for your help

Venk

(Adopted August 3, 1990)(Amended September 7, 1990)(Amended August 12, 1994)
(Amended December 9, 1994)(Amended November 14, 1997)(Amended June 3, 2005)
(Amended February 1, 2008)(Amended July 9, 2010)(Amended September 7, 2012)
(Amended December 4, 2015)

RULE 1110.2. EMISSIONS FROM GASEOUS- AND LIQUID-FUELED ENGINES

(a) Purpose

The purpose of Rule 1110.2 is to reduce Oxides of Nitrogen (NO_x), Volatile Organic Compounds (VOCs), and Carbon Monoxide (CO) from engines.

(b) Applicability

All stationary and portable engines over 50 rated brake horsepower (bhp) are subject to this rule

(c) Definitions

For the purpose of this rule, the following definitions shall apply:

(1) AGRICULTURAL STATIONARY ENGINE is a non-portable engine used for the growing and harvesting of crops of the raising of fowl or animals for the primary purpose of making a profit, providing a livelihood, or conducting agricultural research or instruction by an educational institution. An engine used for the processing or distribution of crops or fowl or animals is not an agricultural engine.

(2) APPROVED EMISSION CONTROL PLAN is a control plan, submitted on or before December 31, 1992, and approved by the Executive Officer prior to November 14, 1997, that was required by subdivision (d) of this rule as amended September 7, 1990.

(3) BREAKDOWN is a physical or mechanical failure or malfunction of an engine, air pollution control equipment, or related operating equipment that is not the result of operator error, neglect, improper operation or improper maintenance procedures, which leads to excess emissions beyond rule related emission limits or equipment permit conditions.

(4) CERTIFIED SPARK-IGNITION ENGINE means engines certified by California Air Resources Board (CARB) to meet emission standards in accordance with Title 13, Chapter 9, Article 4.5 of the California Code of Regulations (CCR).

(5) EMERGENCY STANDBY ENGINE is an engine which operates as a temporary replacement for primary mechanical or electrical power during periods of fuel or energy shortage or while the primary power supply is under repair.

(6) ENGINE is any spark- or compression-ignited internal combustion engine, including engines used for control of VOC's, but not including engines used for self-propulsion.

(7) EXEMPT COMPOUNDS are defined in District Rule 102 – Definition of Terms.

(8) FACILITY means any source or group of sources or other air contaminant emitting activities which are located on one or more contiguous properties within the District, in actual physical contact or separated solely by a public roadway or other public right-of-way, and are owned or operated by the same person (or by persons under common control), or an outer continental shelf (OCS) source as determined in Section 55.2 of Title 40, Part 55 of the Code of Federal Regulations (40 CFR Part 55). Such above-described groups, if noncontiguous, but connected only by land carrying a pipeline, shall not be considered one facility. Sources or installations involved in crude oil and gas production in Southern California Coastal or OCS Waters and transport of such crude oil and gas in Southern California Coastal or OCS Waters shall be included in the same facility which is under the same ownership or use entitlement as the crude oil and gas production facility on-shore.

(9) LEAN-BURN ENGINE means an engine that operates with high levels of excess air and an exhaust oxygen concentration of greater than 4 percent.

(10) LOCATION means any single site at a building, structure, facility, or installation. For the purpose of this definition, a site is a space occupied or to be occupied by an engine. For engines which are brought to a facility to perform maintenance on equipment at its permanent or ordinary location, each maintenance site shall be a separate location.

(11) NET ELECTRICAL ENERGY means the electrical energy produced by a generator, less the electrical energy consumed by any auxiliary equipment necessary to operate the engine generator and, if applicable, any heat recovery equipment, such as heat exchangers.

(12) NON-ROAD ENGINE is any engine, defined under 40 CFR Part 89, that does not remain or will not remain at a location for more than 12

consecutive months, or a shorter period of time where such period is representative of normal annual source operation at a stationary source that resides at a fixed location for more than 12 months (e.g., seasonal operations such as canning facilities), and meets one of the following:

(A) Is used in or on a piece of equipment that is self-propelled or serves a dual purpose by both propelling itself and performing another function (such as a mobile crane); or

(B) Is used in or on a piece of equipment that is intended to be propelled while performing its function (such as lawn mowers and string trimmers); or

(C) By itself, or in or on a piece of equipment, is portable or transportable, meaning designed to be and capable of being carried or moved from one location to another. Transportability includes, but is not limited to, wheels, skids, carrying handles, dolly, trailer, platform or mounting.

(13) OPERATING CYCLE means a period of time within which a round of regularly recurring events is completed, and cannot be stopped without the risk of endangering public safety or health, causing material damage to the equipment or product, or cannot be stopped due to technical constraints. Economic reasons alone will not be sufficient to extend this time period. The operating cycle includes batch processes that may start and finish several times within a twenty-four hour period, in which case each start to finish interval is considered a complete cycle.

(14) OXIDES OF NITROGEN (NOx) means nitric oxide and nitrogen dioxide.

(15) PORTABLE ENGINE is an engine that, by itself or in or on a piece of equipment, is designed to be and capable of being carried or moved from one location to another. Indications of portability include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, platform or mounting. The operator must demonstrate the necessity of the engine being periodically moved from one location to another because of the nature of the operation.

An engine is not portable if:

(A) the engine or its replacement remains or will reside at the same location for more than 12 consecutive months. Any engine, such as a back-up or stand-by engine, that replaces an engine at a location and is intended to perform the same function as the engine

being replaced, will be included in calculating the consecutive time period. In that case, the cumulative time of both engines, including the time between the removal of the original engine and installation of the replacement engine, will be counted toward the consecutive time period; or

(B) the engine remains or will reside at a location for less than 12 consecutive months where such a period represents the full length of normal annual source operations such as a seasonal source; or

(C) the engine is removed from one location for a period and then it or its equivalent is returned to the same location thereby circumventing the portable engine residence time requirements.

The period during which the engine is maintained at a designated storage facility shall be excluded from the residency time determination.

(16) RATED BRAKE HORSEPOWER (bhp) is the rating specified by the manufacturer, without regard to any derating, and listed on the engine nameplate.

(17) RICH-BURN ENGINE WITH A THREE-WAY CATALYST means an engine designed to operate near stoichiometric conditions with a catalytic control device that simultaneously reduces emissions of NOx, CO and VOC.

(18) STATIONARY ENGINE is an engine which is either attached to a foundation or if not so attached, does not meet the definition of a portable or non-road engine and is not a motor vehicle as defined in Section 415 of the California Vehicle Code.

(19) TIER 2 AND TIER 3 DIESEL ENGINES mean engines certified by CARB to meet Tier 2 or Tier 3 emission standards in accordance with Title 13, Chapter 9, Article 4 of the CCR.

(20) USEFUL HEAT RECOVERED means the waste heat recovered from the engine exhaust and/or cooling system that is put to productive use. The waste heat recovered may by assumed to be 100% useful unless the hot water, steam or other medium is vented to the atmosphere, or sent directly to a cooling tower or other unproductive use.

(21) VOLATILE ORGANIC COMPOUND (VOC) is as defined in Rule 102.

(d) Requirements

(1) Stationary Engines:

(A) Operators of stationary engines with an amended Rule 1110.1 Emission Control Plan submitted by July 1, 1991, or an Approved Emission Control Plan, designating the permanent removal of engines or the replacement of engines with electric motors, in accordance with subparagraph (d)(1)(B), shall do so by December 31, 1999, or not operate the engines on or after December 31, 1999 in a manner that exceeds the emission concentration limits listed in Table I:

TABLE I ALTERNATIVE TO ELECTRIFICATION CONCENTRATION LIMITS		
NO_x	VOC	CO
(ppmvd)[1] 11	(ppmvd)[2] 30	(ppmvd)[1] 70

[1] Parts per million by volume, corrected to 15% oxygen on a dry basis and averaged over 15 minutes.

[2] Parts per million by volume, measured as carbon, corrected to 15% oxygen on a dry basis and averaged over the sampling time required by the test method.

(B) The operator of any other stationary engine not covered by (d)(1)(A) and not exempt from this rule shall

(i) Remove such engine permanently from service or replace the engine with an electric motor, or

(ii) Not operate the engine in a manner that exceeds the applicable emission concentration limits listed in either Table II or Table III-A or B.

TABLE II CONCENTRATION LIMITS		
NO_x (ppmvd)[1]	VOC (ppmvd)[2]	CO (ppmvd)[1]
bhp ≥ 500: 36 bhp < 500: 45	250	2000
CONCENTRATION LIMITS EFFECTIVE JULY 1, 2010		
NO_x (ppmvd)[1]	VOC (ppmvd)[2]	CO (ppmvd)[1]
bhp ≥ 500: 11 bhp < 500: 45	bhp ≥ 500: 30 bhp < 500: 250	bhp ≥ 500: 250 bhp < 500: 2000
CONCENTRATION LIMITS EFFECTIVE JULY 1, 2011		
NO_x (ppmvd)[1]	VOC (ppmvd)[2]	CO (ppmvd)[1]
11	30	250

1 Parts per million by volume, corrected to 15% oxygen on a dry basis and averaged over 15 minutes.

2 Parts per million by volume, measured as carbon, corrected to 15% oxygen on a dry basis and averaged over the sampling time required by the test method.

The concentration limits effective on and after July 1, 2010 shall not apply to engines that operate less than 500 hours per year or use less than 1 x 10^9 British Thermal Units (Btus) per year (higher heating value) of fuel.

If the operator of a two-stroke engine equipped with an oxidation catalyst and insulated exhaust ducts and catalyst housing demonstrates that the CO and VOC limits effective on and after July 1, 2010 are not achievable, then the Executive Officer may, with United States Environmental Protection Agency (EPA) approval, establish technologically achievable, case-by-case CO and VOC limits in place of the concentration limits effective on and after July 1, 2010. The case-by-case limits shall not exceed 250 ppmvd VOC and 2000 ppmvd CO.

If the operator of an engine that uses non-pipeline quality natural gas demonstrates that due to the varying heating value of the gas a longer averaging time is necessary, the Executive Officer may establish for the engine a longer averaging time, not to exceed six hours, for any of the concentration limits of Table II. Non-pipeline quality natural gas is a gas that does not meet the gas specifications of the local gas utility and is not supplied to the local gas utility.

(C) The operator of any stationary engine fired by landfill or digester gas (biogas) shall not operate the engine in a manner that exceeds the emission concentration limits of Table III-A, provided that the facility monthly average biogas usage by the biogas engine is 90% or more, based on the higher heating value of the fuels used. The calculation of the monthly facility biogas use percentage may exclude natural gas fired during: any electrical outage at the facility; a Stage 2 or higher electrical emergencies called by the California Independent System Operator Corporation; and when a sewage treatment plant activates an Emergency Operations Center or Incident Command System, as part of an emergency response plan, because of either high influent flows caused by precipitation or a disaster.

TABLE III-A CONCENTRATION LIMITS FOR LANDFILL AND DIGESTER GAS (BIOGAS)-FIRED ENGINES		
NO_x (ppmvd)[1]	VOC (ppmvd)[2]	CO (ppmvd)[1]
bhp ≥ 500: 36 x ECF[3] bhp < 500: 45 x ECF[3]	Landfill Gas: 40 Digester Gas: 250 x ECF[3]	2000
TABLE III-B CONCENTRATION LIMITS EFFECTIVE JANUARY 1, 2017		
NO_x (ppmvd)[1]	VOC (ppmvd)[2]	CO (ppmvd)[1]
11	30	250

1 Parts per million by volume, corrected to 15% oxygen on a dry basis and averaged over 15 minutes.

2 Parts per million by volume, measured as carbon, corrected to 15% oxygen on a dry basis and averaged over the sampling time required by the test method.

3 ECF is the efficiency correction factor.

The ECF shall be 1.0 unless:

(i) The engine operator has measured the engine's net specific energy consumption (q_a), in compliance with ASME Performance Test Code PTC 17 -1973, at the average load of the engine; and

(ii) The ECF-corrected emission limit is made a condition of the engine's permit to operate.

The ECF is as follows:

$$ECF = \frac{9250 \text{ Btus/hp-hr}}{\text{Measured } q_a \text{ in Btus/hp-hr}}$$

Measured q_a shall be based on the lower heating value of the fuel. ECF shall not be less than 1.0.

The Executive Officer may approve the burning of more than 10% natural gas in a landfill or digester gas-fired engine, when it is necessary, if: the only alternative to limiting natural gas to 10% would be shutting down the engine and flaring more landfill or

digester gas; or the engine requires more natural gas in order for a waste heat recovery boiler to provide enough thermal energy to operate a sewage treatment plant, and other boilers at the facility are unable to provide the necessary thermal energy.

(D) Notwithstanding the provisions of subparagraph (d)(1)(B), the operator of any stationary engine fired by landfill or digester gas (biogas) shall not operate the engine in a manner that exceeds the emission concentration limits of Table III.

(E) Biogas engine operators that establish to the satisfaction of the Executive Officer that they have complied with the emissions limits of Table III-B by January 1, 2015 will have their respective engine permit application fees refunded.

(F) For the City of San Bernardino, Orange County Sanitation District, and Eastern Municipal Water District that commenced and implemented technology demonstration projects prior to January 1, 2015, all their biogas engines shall have until January 1, 2018 to comply with the requirements of Table III-B.

(G) Once an engine complies with the concentration limits as specified in Table III-B, there shall be no limit on the percentage of natural gas burned.

(H) The concentration limits effective as specified in Table III-B shall not apply to engines that operate fewer than 500 hours per year or use less than 1×10^9 Btus per year (higher heating value) of fuel.

(I) An operator of a biogas engine may determine compliance with the NOx and/or CO limits of Table III-B by utilizing a longer averaging time as set forth below, provided the operator demonstrates through CEMS data that the engine is achieving a concentration at or below 9.9 ppmv for NOx and 225 ppmv for CO (if CO is elected for averaging), each corrected to 15% O_2, over a 4 month time period. An operator may utilize a monthly fixed interval averaging time for the first 4 months of the retrofitted engine's operation and up to a 24 hour fixed interval averaging time thereafter. For purposes of determining compliance using a longer averaging time:

(i) An operator shall not average data during one-minute periods in which the underlying equipment is not operated or when the CEMS is undergoing zero or calibration checks, cylinder gas audits, or routine maintenance in accordance with the provisions in Rules 218 and 218.1.

(ii) Notwithstanding the requirements of Rules 218 and 218.1, for one-minute time periods where NOx and/or CO CEMS data are greater than 95 percent of the Rule 218.1 Full Scale Range while the underlying equipment is operating, an operator shall use substitute data. A concentration equivalent to 3 times the NOx and/or CO emission limits in Table III-B (each corrected to 15% O2) shall be used as substitute data.

(iii) The intentional shutdown of a CEMS to circumvent the emission limits of Table III-B while the underlying equipment is in operation shall constitute a violation of this rule.

(iv) The averaging provisions of this subparagraph shall not apply to CEMS that are time shared by multiple biogas engines.

(J) The operator of any new engine subject to subparagraph (e)(1)(B) shall:

(i) Comply with the requirements of Best Available Control Technology in accordance with Regulation XIII if the engine requires a District permit; or

(ii) Not operate the engine in a manner that exceeds the emission concentration limits in Table I if the engine does not require a District permit.

(K) By February 1, 2009, the operator of a spark-ignited engine without a Rule 218-approved continuous emission monitoring system (CEMS) or a Regulation XX (RECLAIM)-approved CEMS shall equip and maintain the engine with an air-to-fuel ratio controller with an oxygen sensor and feedback control, or other equivalent technology approved by the Executive Officer, CARB and EPA.

(L) New Non-Emergency Electrical Generators

(i) All new non-emergency engines driving electrical-generators shall comply with the following emission standards:

TABLE IV EMISSION STANDARDS FOR NEW ELECTRICAL GENERATION DEVICES	
Pollutant	**Emission Standard (lbs/MW-hr)[1]**
NOx	0.070
CO	0.20
VOC	0. 10[2]

[1] The averaging time of the emission standards is 15 minutes for NOx and CO and the sampling time required by the test method for VOC, except as described in the following clause.

[2] Mass emissions of VOC shall be calculated using a ratio of 16.04 pounds of VOC per lb-mole of carbon.

(ii) Engines subject to this subparagraph that produce combined heat and electrical power may include one megawatt-hour (MW-hr) for each 3.4 million Btus of useful heat recovered (MW_{th}-hr), in addition to each MW-hr of net electricity produced (MW_e-hr). The compliance of such engines shall be based on the following equation:

$$\frac{\text{Lbs}}{\text{MW-hr}} = \frac{\text{Lbs}}{\text{MW}_e\text{-hr}} \times \text{Electrical Energy Factor (EEF)}$$

Where:

Lbs/MW-hr = The calculated emissions that shall comply with the emission standards in Table IV

Lbs/MW_e-hr = The short-term engine emission limit in pounds per MWe-hr of net electrical energy produced, averaged over 15 minutes. The engine shall comply with this limit at all times.

EEF = The annual MW_e-hrs of net electrical

energy produced divided by the sum of annual MW_e-hrs plus annual MW_{th}-hrs of useful heat recovered. The engine operator shall demonstrate annually that the EEF is less than the value required for compliance.

(iii) For combined heat and power engines, the short-term emission limits in lbs/MW_e-hr and the maximum allowed annual EEF must be selected by operator and stated on the operating permit.

(iv) Notwithstanding Rule 2001, the requirements of this subparagraph shall apply to NOx emissions from new non-emergency engines driving electrical-generators subject to Regulation XX (RECLAIM).

(v) This subparagraph does not apply to: engines installed prior to February 1, 2008; engines issued a permit to construct prior to February 1, 2008 and installed within 12 months of the date of the permit to construct; engines for which an application is deemed complete by October 1, 2007; engines installed by an electric utility on Santa Catalina Island; engines installed at remote locations without access to natural gas and electric power; engines used to supply electrical power to ocean-going vessels while at berth, prior to January 1, 2014; or landfill or digester gas-fired engines that meet the requirements of subparagraph (d)(1)(C).

(2) Portable Engines:

(A) The operator of any portable engine generator subject to this rule shall not use the portable generator for:

(i) Power production into the electric grid, except to maintain grid stability during an emergency event or other unforeseen event that affects grid stability; or

(ii) Primary or supplemental power to a building, facility, stationary source, or stationary equipment, except during unforeseen interruptions of electrical power from the serving utility, maintenance and repair operations, and remote operations where grid power is unavailable. For

interruptions of electrical power, the operation of a portable generator shall not exceed the time of the actual interruption of power.

This subparagraph shall not apply to a portable generator that complies with emission concentration limits of Table I and the other requirements in this rule applicable to stationary engines.

(B) The operator of any portable diesel engine shall comply with the applicable requirements of the Subchapter 7.5 Airborne Toxic Control Measures for diesel particulate matter in Chapter 1, Division 3, Title 17 of the California Code of Regulations.

(C) The operator of any portable spark-ignited engine shall comply with the applicable requirements of the Large Spark Ignition Engine Fleet Requirements, Article 2, Chapter 15, Division 3, Title 13 of the California Code of Regulations.

(e) Compliance

(1) Agricultural Stationary Engines:

(A) The operator of any agricultural stationary engine subject to this rule and installed or issued a permit to construct prior to June 3, 2005 shall comply with subparagraph (d)(1)(B) and the other applicable provisions of this rule in accordance with the compliance schedules in Table V:

TABLE V COMPLIANCE SCHEDULES FOR STATIONARY AGRICULTURAL ENGINES		
Action Required	**Tier 2 and Tier 3 Diesel Engines, Certified Spark-Ignition Engines, and All Engines at Facilities with Actual Emissions Less Than the Amounts in the Table of Rule 219(q)**	**Other Engines**
Submit notification of applicability to the Executive Officer	January 1, 2006	January 1, 2006
Submit to the Executive Officer applications for permits to construct engine modifications, control equipment, or replacement engines	March 1, 2009	September 1, 2007
Initiate construction of engine modifications, control equipment, or replacement engines	September 30, 2009, or 30 days after the permit to construct is issued, whichever is later	March 30, 2008, or 30 days after the permit to construct is issued, whichever is later
Complete construction and comply with applicable requirements	January 1, 2010, or 60 days after the permit to construct is issued, whichever is later	July 1, 2008, or 60 days after the permit to construct is issued, whichever is later
Complete initial source testing	March 1, 2010, or 120 days after the permit to construct is issued, whichever is later	September 1, 2008, or 120 days after the permit to construct is issued, whichever is later

The notification of applicability shall include the following for each engine:

(i) Name and mailing address of the operator

(ii) Address of the engine location

(iii) Manufacturer, model, serial number, and date of manufacture of the engine

(iv) Application number

(v) Engine type (diesel, rich-burn spark-ignition or lean-burn spark-ignition)

(vi) Engine fuel type

(vii) Engine use (pump, compressor, generator, or other)

(viii) Expected means of compliance (engine replacement, control equipment installation, or electrification)

(B) The operator of any new agricultural stationary engine that is not subject to the compliance schedule of subparagraph (e)(1)(A) for existing engines shall comply with the requirements of subparagraph (d)(1)(J) immediately upon installation.

(2) Non-Agricultural Stationary Engines:

(A) The operator of any stationary engine not meeting the requirements of subparagraphs (d)(1)(B) or (d)(1)(C) that go into effect in 2010 or later, shall comply with the compliance schedule in Table VI:

TABLE VI
COMPLIANCE SCHEDULE FOR NON -AGRICULTURAL STATIONARY ENGINES

Action Required	Applicable Compliance Date
Submit to the Executive Officer applications for permits to construct engine modifications, control equipment, or replacement engines	Twelve months before the final compliance date
Initiate construction of engine modifications, control equipment, or replacement engines	Three months before the final compliance date, or 60 days after the permit to construct is issued, whichever is later
Complete construction and comply with applicable requirements	The final compliance date, or 120 days after the permit to construct is issued, whichever is later
Complete initial source testing	60 days after the final compliance date in (d)(1)(B) or (d)(1)(C), or 180 days after the permit to construct is issued, whichever is later

(B) The operator of any stationary engine that elects to amend a permit to operate to incorporate ECF-adjusted emission limits shall submit to the Executive Officer an application for a change of permit conditions by August 1, 2008, and comply with emission limits of the previous version of this rule until February 1, 2009 when the engine shall be in compliance with the emission limits of this rule.

(C) The operator of any stationary engine that is required to add operating restrictions to a permit to operate to meet the requirements of this rule shall submit to the Executive Officer an application for a change of permit conditions by August 1, 2008.

(3) Stationary Engine CEMS

(A) The operator of any stationary engine with an existing CEMS shall commence the reporting required by Rule 218 Subdivision (f) on January 1, 2008. The first summary report for the six months ending June 30, 2008 shall be due on July 30, 2008.

(B) The operator of any stationary engine that is required to modify an existing CEMS or install a CEMS on an existing engine shall comply with the compliance schedule in Table VII. Public agencies shall be allowed one year more than the dates in Table VII, except for biogas engines.

TABLE VII
COMPLIANCE SCHEDULE FOR NEW OR MODIFIED CEMS ON EXISTING ENGINES

	Applicable Compliance Dates For:		
Action Required	**Non-Biogas Engines Rated at 750 bhp or More**	**Non-Biogas Engines Rated at Less than 750 bhp**	**Biogas Engines***
Submit to the Executive Officer applications for new or modified CEMS	August 1, 2008	August 1, 2009	January 1, 2011
Complete installation and commence CEMS operation, calibration, and reporting requirements	Within 180 days of initial approval	Within 180 days of initial approval	Within 180 days of initial approval
Complete certification tests	Within 90 days of installation	Within 90 days of installation	Within 90 days of installation

TABLE VII COMPLIANCE SCHEDULE FOR NEW OR MODIFIED CEMS ON EXISTING ENGINES			
	Applicable Compliance Dates For:		
Action Required	**Non-Biogas Engines Rated at 750 bhp or More**	**Non-Biogas Engines Rated at Less than 750 bhp**	**Biogas Engines***
Submit certification reports to Executive Officer	Within 45 days after tests are completed	Within 45 days after tests are completed	Within 45 days after tests are completed
Obtain final approval of CEMS	Within 1 year of initial approval	Within 1 year of initial approval	Within 1 year of initial approval

* A biogas engine is one that is subject to the emission limits of Table III.

(4) Stationary Engine Inspection and Monitoring (I&M) Plans:

The operator of stationary engines subject to the I&M plan provisions of subparagraph (f)(1)(D) shall:

(A) By August 1, 2008, submit an initial I&M plan application to the Executive Officer for approval;

(B) By December 1, 2008, implement an approved I&M plan or the I&M plan as submitted if the plan is not yet approved.

Any operator of 15 or more stationary engines subject to the I&M plan provisions shall comply with the above schedule for at least 50% of engines, and for the remaining engines shall:

(C) By February 1, 2009, submit an initial I&M plan application to the Executive Officer for approval;

(D) By June 1, 2009, implement an approved I&M plan or the I&M plan as submitted if the plan is not yet approved.

(5) Stationary Engine Air-to-Fuel Ratio Controllers

(A) The operator of any stationary engine that does not have an air-to-fuel ratio controller, as required by subparagraph (d)(1)(K), shall comply with those requirements in accordance with the compliance schedule in Table V, except that the application due date is no later than May 1, 2008 and the initial source testing may be conducted at the time of the testing required by subparagraph (f)(1)(C).

(B) The operator of any stationary engine that has the air-to-fuel ratio controller required by subparagraph (d)(1)(K), but it is not listed on

the permit to operate, shall submit to the Executive Officer an application to amend the permit by April 1, 2008.

(C) The operator of more than five engines that do not have air-to-fuel ratio controllers may take an additional three months, to May 1, 2009, to install the equipment on up to 50% of the affected engines.

(6) New Stationary Engines

The operator of any new stationary engine issued a permit to construct after February 1, 2008 shall comply with the applicable I&M or CEMS requirements of this rule when operation commences. If applicable, the operator shall provide the required information in subparagraph (f)(1)(D) to the Executive Officer prior to the issuance of the permit to construct so that the I&M procedures can be included in the permit. A separate I&M plan application is not required.

(7) Biogas Engines

For any biogas engine for which the operator applies to the Executive Officer by April 1, 2008 for a change of permit conditions for ECF-corrected emission limits, or the approval to burn more than 10 percent natural gas in accordance with subparagraph (d)(1)(C), the biogas engine shall not be subject to the initial concentration limits of Tables II or III until August 1, 2008, provided the operator continues to comply with all emission limits in effect prior to February 1, 2008.

(8) Compliance Schedule Exception

If an engine operator submits to the Executive Officer an application for an administrative change of permit conditions to add a permit condition that causes the engine permit to expire by the effective date of any requirement of this rule, then the operator is not required to comply with the earlier steps required by this subdivision for that requirement. The effective date for the CEMS requirements shall be one year after the date that a CEMS application is due.

(9) Exceedance of Usage Limits

(A) If an engine was initially exempt from the new concentration limits in subparagraph (d)(1)(B) or subparagraph (d)(1)(C) that take effect on or after July 1, 2010 because of low engine use but later exceeds the low-use criteria, the operator shall bring the engine into compliance with the rule in accordance with the schedule in

Table VI with the final compliance date in Table VI being twelve months after the conclusion of the first twelve-month period for which the engine exceeds the low-use criteria.

(B) If engines that were initially exempt from new CEMS by the low-use criterion in subclause (f)(1)(A)(ii)(I) later exceed that criterion, the operator shall install CEMS on those engines in accordance with the schedule in Table VII, except that the date for submitting the CEMS application in Table VII shall be six months after the conclusion of the first twelve-month period for which the engines exceed the criterion.

(f) Monitoring, Testing, Recordkeeping and Reporting

(1) Stationary engines:

The operator of any engine subject to the provisions of paragraph (d)(1) of this rule shall meet the following requirements:

(A) Continuous Emission Monitoring

(i) For engines of 1000 bhp and greater and operating more than two million bhp-hr per calendar year, a NO_x and CO continuous emission monitoring system (CEMS) shall be installed, operated and maintained in calibration to demonstrate compliance with the emission limits of this rule.

(ii) (I) For facilities with engines subject to paragraph (d)(1), having a combined rating of 1500 bhp or greater at the same location, and having a combined fuel usage of more than 16×10^9 Btus per year (higher heating value), CEMS shall be installed, operated and maintained in calibration to demonstrate compliance of those engines with the applicable NO_x and CO emission limits of this rule.

(II) Any engine that as of October 1, 2007 is located within 75 feet of another engine (measured from engine block to engine block) is considered to be at the same location. Operators of new engines shall not install engines farther than 75 feet from another engine unless the operator demonstrates to the

Executive Officer that operational needs or space limitations require it.

(III) The following engines shall not be counted toward the combined rating or required to have a CEMS by this clause: engines rated at less than 500 bhp; standby engines that are limited by permit conditions to only operate when other primary engines are not operable; engines that are limited by permit conditions to operate less than 1000 hours per year or a fuel usage of less than 8×10^9 Btus per year (higher heating value of all fuels used); engines that are used primarily to fuel public natural gas transit vehicles and that are required by a permit condition to be irreversibly removed from service by December 31, 2014; and engines required to have a CEMS by the previous clause. A CEMS shall not be required if permit conditions limit the simultaneous use of the engines at the same location in a manner to limit the combined rating of all engines in simultaneous operation to less than 1500 bhp.

(IV) For engines rated below 1000 bhp, the CEMS may be time shared by multiple engines.

(V) Operation of engines by the electric utility in the Big Bear Lake area during the failure of a transmission line to the utility may be excluded from an hours-per-year or fuel usage limit that is elected by the operator pursuant to subclause (f)(1)(A)(ii)(III).

(VI) In lieu of complying with subclause (f)(1)(A)(ii)(I), an operator that is a public agency, or is contracted to operate engines solely for a public agency, may comply with the Inspection and Monitoring Plan requirements of subparagraph (f)(1)(D), except that the operator shall conduct diagnostic emission checks at least weekly or every 150 operating hours,

whichever occurs later. If any such engine is found to exceed an applicable NOx or CO limit by a source test required by subparagraph (f)(1)(C) or District test using a portable analyzer on three or more occasions in any 12-month period, the operator shall comply with the CEMS requirements of this subparagraph for such engine in accordance with the compliance schedule of Table VII, except that the operator shall submit a CEMS application to the Executive Officer within six months of the third exceedance.

(iii) All CEMS required by this rule shall:

(I) Comply with the applicable requirements of Rule 218 and 218.1, including equipment specifications and certification, operating, recordkeeping, quality assurance and reporting requirements, except as otherwise authorized by this rule;

(II) Include equipment that measures and records exhaust gas concentrations, both uncorrected and corrected to 15 percent oxygen on a dry basis; and

(III) Have data gathering and retrieval capability approved by the Executive Officer

(iv) The operator of an engine that is required to install CEMS may request the Executive Officer to approve an alternative monitoring device (or system components) to demonstrate compliance with the emission limits of this rule. The applicant shall demonstrate to the Executive Officer that the proposed alternative monitoring device is at a minimum equivalent in relative accuracy, precision, reliability, and timeliness to a CEMS for that engine, according to the criteria specified in 40 CFR Part 75 Subpart E. In lieu of the criteria specified in 40 CFR Part 75 Subpart E, substitute criteria is acceptable if the applicant demonstrates to the Executive Officer that the proposed alternative monitoring device is at minimum equivalent in

relative accuracy, precision, reliability, and timeliness to a CEMS for that engine. Upon approval by the Executive Officer, the substitute criteria shall be submitted to EPA as an amendment to the State Implementation Plan (SIP).

If the alternative monitoring device is denied or fails to be recertified, a CEMS shall be required.

(v) Notwithstanding the requirements of Rules 218 and 218.1, operators of engines that are required to install a CEMS by clause (f)(1)(A)(ii) of this subparagraph may:

(I) Store data electronically without a strip chart recorder, but there shall be redundant data storage capability for at least 15 days of data. The operator must demonstrate that both sets of data are equivalent.

(II) Conduct relative accuracy testing on the same schedule for source testing in clause (f)(1)(C)(i), instead of annually. The minimum sampling time for each test is 15 minutes.

(vi) Notwithstanding the requirements of Rules 218 and 218.1, operators of engines that are required to install a CEMS by clause (ii) of this subparagraph, and that are to be monitored by a timeshared CEMS, may:

(I) Monitor an engine with the CEMS for 15 consecutive minutes, purge for the minimum required purge time, then monitor the next engine for 15 consecutive minutes. The CEMS shall operate continuously in this manner, except for required calibrations.

(II) Record the corrected and uncorrected NOx, CO and diluent data at least once per minute and calculate and record the 15-minute average corrected concentrations for each sampling period.

(III) Have sample lines to each engine that are not the same length. The purge time will be based on the sample line with the longest response time. Response times shall be checked during cylinder

gas audits. Sample lines shall not exceed 100 feet in length.

(IV) Conduct a minimum of five tests for each engine during relative accuracy tests.

(V) Perform a cylinder gas audit every calendar quarter on each engine, except for engines for which relative accuracy testing was conducted that quarter.

(VI) Exclude monitoring of nitrogen dioxide (NO_2) for rich-burn engines, unless source testing demonstrates that NO_2 is more than 10 percent of total NOx.

(VII) Conduct daily calibration error (CE) tests by injecting calibration gases at the analyzers, except that at least once per week the CE test shall be conducted by injecting calibration gases as close to the probe tip as practical.

(VIII) Stop operating and calibrating the CEMs during any period that the operator has a continuous record that the engine was not in operation.

(vii) A CO CEMS shall not be required for lean-burn engines or an engine that is subject to Regulation XX (RECLAIM), and not required to have a NOx CEMS by that regulation.

(viii) Notwithstanding the requirements of this paragraph and paragraph (c)(2) of Rule 2012, an operator may take an existing NOx CEMS out of service for up to two weeks (cumulative) in order to modify the CEMS to add CO monitoring.

(B) Elapsed Time Meter

Maintain an operational non-resettable totalizing time meter to determine the engine elapsed operating time.

(C) Source Testing

(i) Effective August 1, 2008, conduct source testing for NO_x, VOC reported as carbon, and CO concentrations (concentrations in ppm by volume, corrected to 15 percent oxygen on dry basis) at least once every two years, or every 8,760 operating hours, whichever occurs first. Relative

accuracy tests required by Rule 218.1 or 40 CFR Part 75 Subpart E will satisfy this requirement for those pollutants monitored by a CEMS. The source test frequency may be reduced to once every three years if the engine has operated less than 2,000 hours since the last source test. If the engine has not been operated within three months of the date a source test is required, the source test shall be conducted when the engine resumes operation for a period longer than either seven consecutive days or 15 cumulative days of operation. The operator of the engine shall keep sufficient operating records to demonstrate that it meets the requirements for extension of the source testing deadlines.

(ii) Conduct source testing for at least 30 minutes during normal operation (actual duty cycle). This test shall not be conducted under a steady-state condition unless it is the normal operation. In addition, conduct source testing for NOx and CO emissions for at least 15 minutes at: an engine's actual peak load, or the maximum load that can be practically achieved during the test, and; at actual minimum load, excluding idle, or the minimum load that can be practically achieved during the test. These additional two tests are not required if the permit limits the engine to operating at one defined load, ± 10%. No pre-tests for compliance are permitted. The emission test shall be conducted at least 40 operating hours, or at least 1 week, after any engine servicing or tuning. If an emission exceedance is found during any of the three phases of the test, that phase shall be completed and reported. The operator shall correct the exceedance, and the source test may be immediately resumed.

(iii) Use a contractor to conduct the source testing that is approved by the Executive Officer under the Laboratory Approval Program for the necessary test methods.

(iv) Submit a source test protocol to the Executive Officer for written approval at least 60 days before the scheduled date of the test. The source test protocol shall include the name,

address and phone number of the engine operator and a District-approved source testing contractor that will conduct the test, the application and permit number(s), emission limits, a description of the engine(s) to be tested, the test methods and procedures to be used, the number of tests to be conducted and under what loads, the required minimum sampling time for the VOC test, based on the analytical detection limit and expected VOC levels, and a description of the parameters to be measured in accordance with the I&M plan required by subparagraph (f)(1)(D). The source test protocol shall be approved by the Executive Officer prior to any testing. The operator is not required to submit a protocol for approval if: there is a previously approved protocol that meets these requirements; the engine has not been altered in a manner that requires a permit alteration; and emission limits have not changed since the previous test. If the operator submits the protocol by the required date, and the Executive Officer takes longer than 60 days to approve the protocol, the operator shall be allowed the additional time needed to conduct the test.

(v) Provide the Executive Officer at least 30 days prior notice of any source test to afford the Executive Officer the opportunity to have an observer present. If after 30 days notice for an initially scheduled performance test, there is a delay (due to operational problems, etc.) in conducting the scheduled performance test, the engine operator shall notify the Executive Officer as soon as possible of any delay in the original test date, either by providing at least seven days prior notice of the rescheduled date of the performance test, or by arranging a rescheduled date with the Executive Officer by mutual agreement.

(vi) Submit all source test reports, including a description of the equipment tested, to the Executive Officer within 60 days of completion of the test.

(vii) By February 1, 2009, provide, or cause to be provided, source testing facilities as follows:

(I) Sampling ports adequate for the applicable test methods. This includes constructing the air pollution control system and stack or duct such that pollutant concentrations can be accurately determined by applicable test methods;

(II) Safe sampling platform(s), scaffolding or mechanical lifts, including safe access, that comply with California General Safety Orders. Agricultural stationary engines are excused from this subclause if they are in remote locations without electrical power;

(III) Utilities for sampling and testing equipment. Agricultural stationary engines are exempt from this subclause if they are on wheels and moved to storage during the off season.

(D) Inspection and Monitoring (I&M) Requirements

(i) I&M Plan. The operator shall:

(I) Submit to the Executive Officer for written approval an I&M plan. One plan application is required for each facility that does not have a NOx and CO CEMS for each engine. The I&M plan shall include all items listed in Attachment 1.

(II) Upon written approval by the Executive Officer, implement the I&M plan as approved.

(III) Submit an I&M plan for approval to the Executive Officer for a plan revision before any change in I&M plan operations can be implemented. The operator shall apply for a plan revision prior to any change in emission limits or control equipment.

(ii) Diagnostic emission checks by a portable NOx, CO, and oxygen analyzer shall be conducted at least weekly or every 150 engine operating hours, whichever occurs later.

(I) If an engine is in compliance for three consecutive diagnostic emission checks, without any adjustments to the oxygen sensor set points, then the engine may be checked monthly or every 750 engine operating

hours, whichever occurs later, until there is a noncompliant diagnostic emission check or, for rich-burn engines with three-way catalysts, until the oxygen sensor is replaced. When making adjustments to the oxygen sensor set points that are not within 72 hours prior to the diagnostic emission check, returning to a more frequent diagnostic emission check schedule is not required if the engine is in compliance with the applicable emission limits prior to and after the set point adjustments.

(II) For diesel engines and other lean-burn engines that are subject to Regulation XX or have a NOx CEMs, and that are subject to a CO limit more stringent than the 2000 ppmvd limit of Tables II or III, a CO diagnostic emission check shall be performed at least quarterly, or every 2,000 engine operating hours, whichever occurs later.

(III) For diesel engines and other lean-burn engines that are subject to Regulation XX or have a NOx CEMs, and that are not subject to a CO limit more stringent than the 2000 ppmvd limit of Tables II or III, diagnostic emission checks are not required.

(IV) No engine or control system maintenance or tuning may be conducted within 72 hours prior to the diagnostic emission check, unless it is an unscheduled, required repair.

(V) The portable analyzer shall be calibrated, maintained and operated in accordance with the manufacturer's specifications and recommendations and the Protocol for the Periodic Monitoring of Nitrogen Oxides, Carbon Monoxide, and Oxygen from Stationary Engines Subject to South Coast Air Quality Management District Rule 1110.2, approved on February 1, 2008, or subsequent protocol approved by EPA and the Executive Officer.

(iii) Requirements for responding to, diagnosing and correcting breakdowns, faults, malfunctions, alarms, diagnostic emission checks finding emissions in excess of rule or permit limits, and parameters out-of-range.

(I) For any diagnostic emission check or breakdown that results in emissions in excess of those allowed by this rule or a permit condition, the operator shall correct the problem as soon as possible and demonstrate compliance with another diagnostic emission check, or shut down an engine by the end of an operating cycle, or within 24 hours from the time the operator knew of the breakdown or excess emissions, or reasonably should have known, whichever is sooner.

(II) For excess emissions due to breakdowns that result in NOx or CO emissions greater than the concentrations specified in Table VIII, the operator shall not be considered in violation of this rule if the operator demonstrates the all of the following: (1) compliance with subclause (f)(1)(D)(iii)(I), (2) compliance with the reporting requirements of subparagraph (f)(1)(H), and (3) the engine with excess emissions has no more than three incidences of breakdowns with emissions exceeding Table VIII limits in the calendar quarter.

TABLE VIII

Excess Emission Concentration Thresholds for Breakdowns

	NO_x (ppmvd)[1]	CO (ppmvd)[1]
Lean-Burn Engines	45	250
Rich-Burn Engines	150	2000
Biogas Engines[2]	185	2000

[1] Corrected to 15% oxygen.

[2] Effective up to the time of compliance with the limits specified in Table III-B, after which the thresholds revert to the applicable lean or rich-burn engine limits.

(III) Any emission check conducted by District staff that finds excess emissions will be treated as a violation.

(IV) For other problems, such as parameters out-of-range, an operator shall correct the problem and demonstrate compliance with another diagnostic emission check within 48 hours of the operator first knowing of the problem.

(iv) If an engine has a NOx CEMS and does not have a CO CEMS, it is subject to this subparagraph (f)(1)(D) as it pertains to CO only.

(E) Operating Log

Maintain a monthly engine operating log that includes:

(i) Total hours of operation;

(ii) Type of liquid and/or type of gaseous fuel;

(iii) Fuel consumption (cubic feet of gas and gallons of liquid); and

(iv) Cumulative hours of operation since the last source test required in subparagraph (f)(1)(C).

Facilities subject to Regulation XX may maintain a quarterly log for engines that are designated as a process unit on the facility permit.

(F) New Non-Emergency Electrical Generating Engines

Operators of engines subject to the requirements of subparagraph (d)(1)(L) shall also meet the following requirements.

(i) The engine generator shall be monitored with a calibrated electric meter that measures the net electrical output of the engine generator system, which is the difference between the electrical output of the generator and the electricity consumed by the auxiliary equipment necessary to operate the engine generator.

(ii) For engines monitored with a CEMS, the emissions of the monitored pollutants in ppmvd corrected to 15% O2, lbs/hr, and lbs/MW_e-hr and the net MW_e-hrs produced shall be calculated and recorded for the four 15-minute periods of each hour of operation. The mass emissions of NOx shall be calculated based on the measured fuel flow and one of

the F factor methods of 40 CFR 60, Appendix A, Method 19, or other method approved by the Executive Officer. Mass emissions of CO shall be calculated in the same manner as NOx, except that the ppmvd CO shall be converted to lb/scf using a conversion factor of 0.727×10^{-7}.

(iii) For NOx and CO emissions from engines not monitored with a CEMS and VOC emissions from all engines, the emissions of NOx, CO and VOC in lbs/MW_e-hr shall be calculated and recorded whenever the pollutant is measured by a source test or diagnostic emission check. Mass emissions of NOx and CO shall be calculated in the same manner as the previous clause. Mass emissions of VOC shall be calculated in the same manner, except that the ppmvd VOC as carbon shall be converted to lb/scf using a conversion factor of 0.415×10^{-7}.

(iv) For engines generating combined heat and power that rely on the EEF to comply with Table IV emission standards, the daily and annual useful heat recovered (MW_{th}-hrs), net electrical energy generated (MW_e-hrs) and EEF shall be monitored and recorded.

(v) Other methods of calculating mass emissions than those specified, such as by direct measurement of exhaust volume, may be used if approved by the Executive Officer. All monitoring, calculation, and recordkeeping procedures must be approved by the Executive Officer.

(vi) Operators of combined heat and power engines shall submit to the Executive Officer the reports of the following information within 15 days of the end of the first year of operation, and thereafter within 15 days of the end of each calendar year: the annual net electrical energy generated (MW_e-hrs); the annual useful heat recovered (MW_{th}-hrs), the annual EEF calculated in accordance with clause (d)(1)(L)(ii); and the maximum annual EEF allowed by the operating permit. If the actual annual EEF exceeds the allowed EEF, the report shall also include the time periods

and emissions for all instances where emissions exceeded any emission standard in Table IV.

(G) Portable Analyzer Operator Training

The portable analyzer tests required by the I&M Plan requirements of subparagraph (f)(1)(D) shall only be conducted by a person who has completed an appropriate District-approved training program in the operation of portable analyzers and has received a certification issued by the District.

(H) Reporting Requirements

(i) The operator shall report to the Executive Officer, by telephone (1-800-CUT-SMOG or 1-800-288-7664) or other District-approved method, any breakdown resulting in emissions in excess of rule or permit emission limits within one hour of such noncompliance or within one hour of the time the operator knew or reasonably should have known of its occurrence. Such report shall identify the time, specific location, equipment involved, responsible party to contact for further information, and to the extent known, the causes of the noncompliance, and the estimated time for repairs. In the case of emergencies that prevent a person from reporting all required information within the one-hour limit, the Executive Officer may extend the time for the reporting of required information provided the operator has notified the Executive Officer of the noncompliance within the one-hour limit.

(ii) Within seven calendar days after the reported breakdown has been corrected, but no later than thirty calendar days from the initial date of the breakdown, unless an extension has been approved in writing by the Executive Officer, the operator shall submit a written breakdown report to the Executive Officer which includes:

(I) An identification of the equipment involved in causing, or suspected of having caused, or having been affected by the breakdown;

(II) The duration of the breakdown;

(III) The date of correction and information

demonstrating that compliance is achieved;

(IV) An identification of the types of excess emissions, if any, resulting from the breakdown;

(V) A quantification of the excess emissions, if any, resulting from the breakdown and the basis used to quantify the emissions;

(VI) Information substantiating whether the breakdown resulted from operator error, neglect or improper operation or maintenance procedures;

(VII) Information substantiating that steps were immediately taken to correct the condition causing the breakdown, and to minimize the emissions, if any, resulting from the breakdown;

(VIII) A description of the corrective measures undertaken and/or to be undertaken to avoid such a breakdown in the future; and

(IX) Pictures of any equipment which failed, if available.

(iii) Within 15 days of the end of each calendar quarter, the operator shall submit to the Executive Officer a report that lists each occurrence of a breakdown, fault, malfunction, alarm, engine or control system operating parameter out of the acceptable range established by an I&M plan or permit condition, or a diagnostic emission check that finds excess emissions. Such report shall be in a District-approved format, and for each incident shall identify the time of the incident, the time the operator learned of the incident, specific location, equipment involved, responsible party to contact for further information, to the extent known the causes of the event, the time and description of corrective actions, including shutting an engine down, and the results of all portable analyzer NOx and CO emissions checks done before or after the corrective actions. The operator shall also report if no incidents occurred.

(2) Portable engines:

The operator of any portable engine shall maintain a monthly engine operating log that includes:

(i) Total hours of operation; or

(ii) Type of liquid and/or type of gaseous fuel; and

(iii) Fuel consumption (cubic feet of gas and gallons of liquid).

Facilities subject to Regulation XX may maintain a quarterly log for engines that are designated as a process unit on the facility permit.

(3) Recordkeeping for All Engines

All data, logs, test reports and other information required by this rule shall be maintained for at least five years and made available for inspection by the Executive Officer.

(g) Test Methods

Testing to verify compliance with the applicable requirements shall be conducted in accordance with the test methods specified in Table IX, or any test methods approved by CARB and EPA, and authorized by the Executive Officer.

TABLE IX
TESTING METHODS

Pollutant	Method
NO_x	District Method 100.1
CO	District Method 100.1
VOC	District Method 25.1* or District Method 25.3*

* Excluding ethane and methane

A violation of any standard of this rule established by any of the specified test methods, or any test methods approved by the CARB or EPA, and authorized by the Executive Officer, shall constitute a violation of this rule.

(h) Alternate Compliance Option

(1) In lieu of complying with the applicable emission limits by the effective date specified in Table III-B or subparagraph (d)(1)(F), owners or operators of biogas-fired units may elect to defer compliance in quarterly increments up to one additional year, provided the owner or operator:

(A) Submits an alternate compliance plan and pays a Compliance Flexibility Fee, as provided for in paragraph (h)(2), to the Executive Officer at least 60 days prior to the applicable compliance date in either Table III-B or subparagraph (d)(1)(F) for qualified biogas technology demonstration project engines, and

(B) Maintains on-site a copy of verification of Compliance Flexibility Fee payment and AQMD approval of the alternate compliance plan that shall be made available upon request to AQMD staff.

(2) Plan Submittal

The alternate compliance plan submitted pursuant to paragraph (h)(1) shall include:

(A) A completed AQMD Form 400A with company name, AQMD Facility ID, identification that application is for a compliance plan (Section 7a of form), and identification that request is for Rule 1110.2 Compliance Flexibility Fee option (Section 9 of form);

(B) Attached documentation of unit permit ID, unit rated brake horsepower (bhp), and fee calculation;

(C) Filing Fee payment; and

(D) Compliance Flexibility Fee payment as calculated by the following equation:

CFF = bhp x R x Q

Where,

CFF = Compliance Flexibility Fee, $

bhp = rated brake horsepower of unit

R = Fee Rate = $11.75 per brake horsepower per quarter

Q = Number of quarters (up to four)

(3) Usage of Compliance Flexibility Fee funds

The funds collected from the Compliance Flexibility Fee will be applied to AQMD NOx reduction programs pursuant to protocols approved under District rules.

(i) Exemptions

The provisions of subdivision (d) shall not apply to:

(1) All orchard wind machines powered by an internal combustion engine.

(2) Emergency standby engines, engines used for fire-fighting and flood control, and any other emergency engines approved by the Executive Officer, which have permit conditions that limit operation to 200 hours or less per year as determined by an elapsed operating time meter, and agricultural emergency standby engines that are exempt from a District permit and operate 200 hours or less per year as determined by an elapsed operating time meter.

(3) Laboratory engines used in research and testing purposes.

(4) Engines operated for purposes of performance verification and testing of engines.

(5) Auxiliary engines used to power other engines or gas turbines during start-ups.

(6) Portable engines that are registered under the state registration program pursuant to Title 13, Article 5 of the CCR.

(7) Nonroad engines, with the exception that subparagraph (d)(2)(A) shall apply to portable generators.

(8) Engines operating on San Clemente Island; and engines operated by the County of Riverside for the purpose of public safety communication at Santa Rosa Peak in Riverside County, where the site is located at an elevation of higher than 7,400 feet above sea level and is without access to electric power and natural gas.

(9) Agricultural stationary engines provided that:

(A) The operator submits documentation to the Executive Officer by the applicable date in Table V when permit applications are due that the applicable electric utility has rejected an application for an electrical line extension to the location of the engines, or the Executive Officer determines that the operator does not qualify, due to no fault of the operator, for funding authorized by California Health and Safety Code Section 44229; and

(B) The operator replaces the engines, in accordance with the compliance schedule of Table X, with engines certified by CARB to meet the Tier 4 emission standards of 40 CFR Part 1039 Section 1039.101, Table 1. These Tier 4 replacement engines shall be considered to comply with Best Available Control Technology; and

(C) The operator does not operate the Tier 4 engines in a manner that exceeds the not-to-exceed standards of 40 CFR Section 1039.101, Paragraph (e), as determined by the test methods of subdivision (g) of this rule.

TABLE X COMPLIANCE SCHEDULE FOR INSTALLATION OF NEW TIER 4 STATIONARY AGRICULTURAL ENGINES	
Action Required	**Due Date**
Submit to the Executive Officer applications for permits to construct engine modifications, control equipment, or replacement engines	March 1, 2013
Initiate construction of engine modifications, control equipment, or replacement engines	September 30, 2013, or 30 days after the permit to construct is issued, whichever is later
Complete construction and comply with applicable requirements	January 1, 2014, or 60 days after the permit to construct is issued, whichever is later
Complete initial source testing	March 1, 2014, or 120 days after the permit to construct is issued, whichever is later

(10) An engine start-up, until sufficient operating temperatures are reached for proper operation of the emission control equipment, and an engine shutdown period. The periods shall not exceed 30 minutes, unless the Executive Officer approves a longer period not exceeding 2 hours for an engine and makes it a condition of the engine permit.

(11) An engine start-up, after an engine overhaul or major repair requiring removal of a cylinder head, for a period not to exceed four operating hours.

(12) The initial commissioning of a new engine for a period specified by permit conditions, provided the operator takes measures to reduce emissions and the duration of the commissioning to the extent possible. The commissioning period shall not exceed 150 operating hours.

ATTACHMENT 1

An I&M Plan submitted to the Executive Officer for approval and implementation, pursuant to the requirements of (e)(4), (e)(6), and (f)(1)(D) of the rule, shall include:

A. Identification of engine and control equipment operating parameters necessary to maintain pollutant concentrations within the rule and permit limits. This shall include, but not be limited to:

1. Procedures for using a portable NOx, CO and oxygen analyzer to establish the set points of the air-to-fuel ratio controller (AFRC) at 25%, 60% and 95% load (or fuel flow rate), ± 5%, or the minimum, midpoint and maximum loads that actually occur during normal operation, ± 5%, or at any one load within the ± 10% range that an engine permit is limited to in accordance with clause (f)(1)(C)(ii) of the rule;
2. Procedures for verifying that the AFRC is controlling the engine to the set point during the daily monitoring required by subdivision D of this attachment;
3. Procedures for reestablishing all AFRC set points with a portable NOx, CO and oxygen analyzer whenever a set point must be readjusted, within 24 hours of an oxygen sensor replacement, and, for rich-burn engines with three way catalysts, between 100 and 150 engine operating hours after an oxygen sensor replacement;
4. For engines with catalysts, the maximum allowed exhaust temperature at the catalyst inlet, based on catalyst manufacturer specifications;
5. For lean-burn engines with selective catalytic control devices, the minimum exhaust temperature at the catalyst inlet required for reactant flow (ammonia or urea), and procedures for using a portable NOx and oxygen analyzer to establish the acceptable range of reactant flow rate, as a function of load.

Parameter monitoring is not required for diesel engines without exhaust gas recirculation and catalytic exhaust control devices.

B. Procedures for alerting the operator to emission control malfunctions. Engine control systems, such as air-to-fuel ratio controllers, shall have a malfunction indicator light and audible alarm.

C. Procedures for diagnostic emission checks conducted by a portable NOx, CO, and oxygen analyzer per the requirements of clause (f)(1)(D)(ii) of the rule.

D. Procedures for at least daily monitoring, inspection and recordkeeping of:

1. engine load or fuel flow rate;

2. the set points, maximums and acceptable ranges of the parameters identified by subdivision A of this attachment, and the actual values of the same parameters;
3. the engine elapsed time meter operating hours;
4. the operating hours since the last diagnostic emission check required by clause (f)(1)(D)(ii) of the rule;
5. for rich-burn engines with three-way catalysts, the difference of the exhaust temperatures (ΔT) at the inlet and outlet of the catalyst (changes in the ΔT can indicate changes in the effectiveness of the catalyst);
6. engine control system and AFRC system faults or alarms that affect emissions.

The daily monitoring and recordkeeping may be done in person by the operator, or by remote monitoring.

E. Procedures for responding to, diagnosing and correcting breakdowns, faults, malfunctions, alarms, diagnostic emission checks finding emissions in excess of rule or permit limits, and parameters out-of-range, per the requirements of clause (f)(1)(D)(iii) of the rule.

F. Procedures and schedules for preventive and corrective maintenance.

G. Procedures for reporting noncompliance to the Executive Officer in accordance with subparagraph (f)(1)(H) of the rule.

H. Procedures and format for the recordkeeping of monitoring and other actions required by the plan.

RULE 69.4.1. STATIONARY RECIPROCATING INTERNAL COMBUSTION ENGINES - BEST AVAILABLE RETROFIT CONTROL TECHNOLOGY (BARCT) (Adopted & Effective 11/15/00)

(a) APPLICABILITY

(1) Except as provided in Section (b), this rule shall apply to stationary internal combustion engines with a brake horsepower (bhp) rating of 50 or greater.

(2) An engine subject to this rule and located at a major stationary source of oxides of nitrogen (NOx) is also subject to the applicable requirements of Rule 69.4.

(3) An engine subject to this rule shall not be subject to Rule 68.

(b) EXEMPTIONS

(1) This rule shall not apply to the following:

(i) Engines used exclusively in connection with a structure designed for and used as a dwelling for not more than four families.

(ii) Engines used exclusively in agricultural operations for the growing of crops or the raising of fowl or animals.

(iii) Any engine when operated exclusively within a permitted test cell solely for the research, development, or testing of gas turbine engines or their components.

(iv) Any engine when operated exclusively within a permitted test cell solely for the research, development, or testing of reciprocating internal combustion engines or their components.

(v) Any engine used exclusively in conjunction with military tactical support equipment.

(2) The provisions of Subsections (d)(1) through (d)(3), (e)(1), (e)(2), (f)(1), (f)(3), (g)(3), (g)(4), (g)(5) and (i)(1) of this rule shall not apply to the following:

(i) Any existing engine which operates less than 200 hours per calendar year, as determined by a non-resettable meter that measures elapsed operating time.

(ii) Any existing emergency standby engine provided that operation of the engine for non-emergency purposes does not exceed 52 hours per calendar year. Operation for testing or maintenance purposes may be allowed for not more than 100 hours per year, with written authorization from the Air Pollution Control Officer, provided that an owner or operator demonstrates to the satisfaction of the Air Pollution Control Officer that such additional operation is necessary.

(iii) Any existing emergency standby engine at a nuclear power generating station subject to the requirements of the Nuclear Regulatory Commission provided that operation of the engine for non-emergency purposes does not exceed 200 hours per calendar year.

(3) The provisions of Subsections (e)(1), (e)(2), (f)(1), (g)(3), (g)(4), (g)(5) and (i)(1) of this rule shall not apply to:

(i) Any new or replacement emergency standby engine, provided that operation of the engine for non-emergency purposes does not exceed 52 hours per calendar year. Operation for testing or maintenance purposes may be allowed for not more than 100 hours per year, with written authorization from the Air Pollution Control Officer, provided that an owner or operator demonstrates to the satisfaction of the Air Pollution Control Officer that such additional operation is necessary.

(ii) Any new or replacement engine which operates less than 200 hours per calendar year, as determined by a non-resettable meter that measures elapsed operating time.

(4) The provisions of Subsections (d)(1) through (d)(3) of this rule shall not apply to existing low-use diesel engines equipped with any two of the following: turbocharger, aftercooler, or injection timing retard by 4 degrees.

An owner or operator of an engine who is claiming an exemption pursuant to Subsections (b)(2), (b)(3) or (b)(4) shall maintain records in accordance with Subsections (g)(1) and (g)(2) of this rule.

(c) **DEFINITIONS**

For the purposes of this rule, the following definitions shall apply:

(1) **"Add-on Control Equipment"** means any technology that is used to reduce emissions from the exhaust gas stream of an engine and is installed downstream of the engine.

(2) **"Best Available Retrofit Control Technology (BARCT)"** means an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source.

(3) **"Brake Horsepower Rating, (bhp)"** means the maximum continuous brake horsepower rating as specified by the engine manufacturer and listed on the engine nameplate, if available, regardless of any derating.

(4) **"Calendar Year"** means the same as defined in Rule 2.

(5) **"California Diesel Fuel"** means any fuel that is commonly or commercially known, sold or represented as diesel fuel No. 1-D or No. 2-D, and which meets the requirements specified in Sections 2281 and 2282 of Title 13 of the California Code of Regulations.

(6) **"Capacity Factor"** means the ratio, expressed as a percentage, of the annual fuel consumption to the manufacturer's specified maximum annual fuel consumption or manufacturer's specified maximum hourly fuel consumption times 8760 hours, whichever is less.

(7) **"Certified Engine"** means an engine certified to comply with the Tier 1, Tier 2, or Tier 3 emission standards specified in Section 89.112 of the Code of Federal Regulations (40 CFR Part 89) - Control of Emissions of Air Pollution from Non-Road Diesel Engines or with the Tier 1, Tier 2, or Tier 3 emission standards specified in Section 2423 of Title 13 of the California Code of Regulations - California Regulations for New 1996 and Later Off-Road Compression-Ignition Engines.

(8) **"Cyclic Engine"** means an engine, such as gantry cranes, having an external load which varies by approximately 40 percent or more of rated capacity under normal operating conditions during any load cycle.

(9) **"Emergency Standby Engine"** means an engine used exclusively in emergency situations, except as provided in Subsections (b)(2)(ii), (b)(2)(iii) and (b)(3)(i), to drive an electrical generator, an air compressor or a water pump.

(10) **"Emergency Situation"** means any one of the following:

(i) An unforeseen electrical power failure from the serving utility or of on-site electrical transmission equipment.

(ii) An unforeseen flood or fire, or a life-threatening situation.

(iii) Operation of emergency generators for Federal Aviation Administration licensed or military airports for the purpose of providing power in anticipation of a power failure due to severe storm activity.

Emergency situation shall not include operation for purposes of supplying power for distribution to an electrical grid, operation for training purposes, or other foreseeable events.

(11) **"Engine Family"** means a group of engines expected to have similar emission and other characteristics throughout their useful life as specified in Section 89.116, 40 CFR 89.

(12) **"Engine Tampering"** means removing or rendering inoperative any device or design element of the engine or its emission control system; or the manufacturing or installation of a part or a component which objective is to bypass, defeat, or render inoperative a device or design element of the engine or its emission control system.

(13) **"Existing Engine"** means an engine which commenced operation in San Diego County on or before November 15, 2000.

(14) **"Fossil Derived Gaseous Fuel"** means gaseous fuel including, but not limited to, natural gas, methane, ethane, propane, butane, and gases stored as liquids at high pressure such as liquefied petroleum gas, but excluding waste derived gaseous fuel.

(15) **"High-use Engine"** means an engine operating at a capacity factor of greater than 15%.

(16) **"Lean-burn Engine"** means an engine that is designed to operate with an air-to-fuel ratio that is more than 1.1 times the stoichiometric air-to-fuel ratio.

(17) **"Load Cycle"** means the time interval between consecutive commencement of application of external load to an engine.

(18) **"Low-use Engine"** means an engine operating at a capacity factor of 15% or less.

(19) **"Military Tactical Support Equipment"** means the same as defined in Rule 2.

(20) **"New Engine"** means an engine which commenced operation in San Diego County after November 15, 2000.

(21) **"Portable Emission Unit"** means the same as defined in Rule 20.1.

(22) **"Replacement Engine"** means an engine that meets the definition of a replacement emission unit in Rule 20.1.

(23) **"Rich-Burn Engine"** means an engine that is designed to operate with an air-to-fuel ratio less than or equal to 1.1 times the stoichiometric air-to-fuel ratio.

(24) **"Stationary Internal Combustion Engine" or "Engine"** means a spark or compression ignited, reciprocating internal combustion engine which is not a portable emission unit.

(25) **"Stationary Source"** means the same as defined in Rule 2.

(26) **"Stoichiometric Air-to-Fuel Ratio"** means the chemically balanced air-to-fuel ratio at which all fuel and all oxygen in the air and fuel mixture are theoretically consumed by combustion.

(27) **"Uncontrolled NOx Emissions"** means NOx emissions from an engine before application of add-on control equipment.

(28) **"Volatile Organic Compound (VOC)"** means the same as defined in Rule 2.

(29) **"Waste Derived Gaseous Fuel"** means gaseous fuel including, but not limited to, digester gas and landfill gas, but excluding fossil derived gaseous fuel.

(d) **STANDARDS**

(1) A person shall not operate a stationary internal combustion engine subject to this rule unless:

(i) Uncontrolled NOx emissions from the following engines are reduced with add-on control equipment by not less than the following:

	Weight Percent Engine Category Reduction
Rich-burn engines using fossil derived gaseous fuel or gasoline	96
Lean-burn engines using fossil derived gaseous fuel	90
Engines using exclusively waste derived gaseous fuel	90
Engines using diesel or kerosene fuel	90

or

(ii) The emissions of NOx, in parts per million by volume (ppmv), calculated as nitrogen dioxide at 15% oxygen on a dry basis, or in grams of NOx per brake horsepower-hour, as indicated, are not greater than the following:

Engine Category	Concentration of NOx
Rich-burn engines using fossil derived gaseous fuel or gasoline	25 ppmv
Rich-burn engines using exclusively waste derived gaseous fuel	50 ppmv
Lean-burn engines using gaseous fuel	65 ppmv
Existing low-use engines using diesel or kerosene fuel	9.0 g/bhp-hr or 700 ppmv
Existing cyclic engines using diesel or kerosene fuel	9.0 g/bhp-hr or 700 ppmv
High-use engines using diesel or kerosene fuel	6.9 g/bhp-hr or 535 ppmv
New or replacement low-use engines using diesel or kerosene fuel	6.9 g/bhp-hr or 535 ppmv
New or replacement cyclic engines using diesel or kerosene fuel	6.9 g/bhp-hr or 535 ppmv

(2) For all engines subject to Subsection (d)(1) of this rule, emissions of carbon monoxide (CO), calculated at 15% oxygen on a dry basis, shall not exceed 4,500 ppmv.

(3) For all rich-burn engines subject to Subsection (d)(1) of this rule, emissions of VOC, calculated as methane at 15% oxygen on a dry basis, shall not exceed 250 ppmv.

(4) Any engine subject to this rule and operating on diesel fuel shall use only California Diesel Fuel.

(e) **MONITORING REQUIREMENTS**

(1) An owner or operator of an engine without add-on control equipment, except engines specified in Subsections (b)(2) or (b)(3), shall monitor the operating parameters recommended by the engine manufacturer and any additional operating parameters identified by the Air Pollution Control Officer. Such operating parameters may include, but are not limited to:

(i) engine air-to-fuel ratio;

(ii) engine inlet manifold temperature and pressure; and

(iii) oxygen content of the exhaust gas.

Where the Air Pollution Control Officer determines that it is not feasible to monitor operating parameters of an engine or such monitoring may not be indicative of air contaminant emissions, the requirements of this subsection may be waived provided that periodic inspection and maintenance are conducted as specified in Section (f).

(2) An owner or operator of an engine with add-on control equipment shall install, operate and maintain in calibration, devices that continuously monitor the operational characteristics of the engine and any NOx emission reduction system as determined necessary to ensure compliance by the Air Pollution Control Officer. Such operational characteristics may include, but are not limited to:

(i) engine air-to-fuel ratio;

(ii) temperature of exhaust gas at the inlet and outlet of the add-on control equipment;

(iii) oxygen content of exhaust gas at the inlet and outlet of the add-on control equipment; and

(iv) flow rate of NOx reducing agent added to the engine exhaust gas.

(3) An owner or operator of an engine subject to this rule shall install a non-resettable totalizing fuel meter and/or non-resettable meter that measures elapsed operating time as determined appropriate by the Air Pollution Control Officer.

(f) INSPECTION AND MAINTENANCE REQUIREMENTS

(1) An owner or operator of an engine subject to this rule, except engines specified in Subsections (b)(2) or (b)(3), shall conduct periodic inspections of the engine and any add-on control equipment, as applicable, to ensure that the engine and control equipment is operated in compliance with the provisions of this rule. Inspections shall be conducted at least once every 4000 hours of operation, or every six months, whichever is less.

(2) An owner or operator of an engine subject to this rule shall conduct periodic maintenance of the engine and any add-on control equipment, as applicable, as recommended by the engine and control equipment manufacturers or as specified by any other maintenance procedure approved in writing by the Air Pollution Control Officer. The periodic maintenance shall be conducted at least once each calendar year.

(3) Notwithstanding the frequencies specified in Subsections (f)(1)and (f)(2), the Air Pollution Control Officer may require an owner or operator of an engine to conduct inspections and/or maintenance of the engine and any associated add-on control equipment more frequently if deemed necessary to assure compliance with this rule.

(g) RECORDKEEPING REQUIREMENTS

(1) An owner or operator of an engine subject to this rule shall keep the following records and shall maintain these records on-site for at least the same period of time as the engine to which the records apply is located at the site:

(i) engine manufacturer name and model number;

(ii) brake horsepower rating;

(iii) combustion method (i.e. rich-burn or lean-burn);

(iv) fuel type;

(v) California Diesel Fuel certification, if applicable; and

(vi) a manual of recommended maintenance as provided by the engine manufacturer, or other maintenance procedure as approved in writing by the Air Pollution Control Officer.

Where the information specified in Subsections (g)(1)(i) through (g)(1)(iv) is contained in a District Permit to Operate or Certificate of Registration, and is the most current information, an additional record of this information shall not be required.

(2) An owner or operator of an engine exempt pursuant to Subsections (b)(2) or (b)(3) shall maintain an operating log containing, at a minimum, the following:

(i) dates and times of engine operation. If applicable, indicate whether the operation was for non-emergency purposes or during an emergency situation and the nature of the emergency, if available;

(ii) total cumulative hours of operation per calendar year, based on actual readings of engine hour or fuel meter; and

(iii) records of periodic engine maintenance, including dates maintenance was performed.

The records specified in Subsection (g)(2)(i) are not required if total engine operations for any purpose, including emergency situations, do not exceed 52 hours in a calendar year.

(3) An owner or operator of an engine subject to this rule, except engines specified in Subsections (b)(2) or (b)(3), shall maintain a log containing at a minimum, the following:

(i) records of engine inspection, including dates an inspection was performed; and

(ii) records of engine maintenance, including dates maintenance was performed and the nature of the maintenance.

(4) An owner or operator of an engine subject to this rule, except engines specified in Subsections (b)(2) or (b)(3), shall measure and record at least once each calendar month the applicable operating parameters identified pursuant to Subsections (e)(1) or (e)(2).

(5) An owner or operator of a low-use engine operating on diesel or kerosene fuel and subject to the requirements of Section (d)(1) shall maintain records of total cumulative hours of operation or total fuel consumption per calendar year, as applicable.

(6) All records required by Subsections (g)(2) through (g)(5) shall be retained on-site for at least three years and made available to the District upon request.

(h) TEST METHODS

(1) All testing performed to determine compliance with the emission limits of Subsections (d)(1), (d)(2) and/or (d)(3), except as provided in Subsection (h)(3), shall be conducted in accordance with the following procedures:

(i) Measurement of NOx, CO, carbon dioxide (CO_2) and oxygen content of exhaust gas shall be determined in accordance with the San Diego County Air Pollution Control District Test Method 100, Air Resources Board (ARB) Test Method 100 or equivalent Environmental Protection Agency (EPA) Test Method.

(ii) Measurement of VOC emissions shall be determined in accordance with EPA Test Methods 25A and/or 18.

(iii) NOx, VOC, and CO emission concentrations shall be calculated as an average of three subtests. The averaging period to calculate NOx and CO emission concentrations and to determine compliance shall be at least 30 minutes and not more than 60 minutes unless otherwise specified in writing by the Air Pollution Control Officer.

(2) Specifications for California Diesel Fuel, if not provided by a vendor, shall be determined by the test methods specified in Sections 2281 and 2282 of Title 13 of the California Code of Regulations.

(3) For an engine operating on diesel or kerosene fuel without add-on control equipment and certified by EPA or ARB at an emission rate equal to or below the applicable emission rate limits of Section (d), measurements of NOx, CO, CO_2, and oxygen content of exhaust gas shall be conducted in accordance with a test method approved by the District and ARB. Until such test method is approved, such engine shall be deemed in compliance with the emission rate limits of Section (d), provided the requirements of Subsection (i)(4) are met.

(4) If a portable emission analyzer is used to provide emission data, the analyzer shall be calibrated and operated in accordance with a protocol approved in writing by the Air Pollution Control Officer.

(i) SOURCE TEST REQUIREMENTS

Except as provided in Subsection (i)(4), source tests shall be conducted according to the following:

(1) After initial compliance has been determined, any engine subject to the requirements of Subsections (d)(1), (d)(2) and/or (d)(3), except engines specified in Subsection (b)(3), shall be source tested at least once every 24 months, unless otherwise specified in writing by the Air Pollution Control Officer.

(2) Emissions source testing shall be conducted using the test methods specified in Section (h) and a source test protocol approved in writing by the Air Pollution Control Officer prior to testing.

(3) Emissions source testing shall be performed at no less than 80 percent of the brake horsepower rating. If an owner or operator of an engine demonstrates to the satisfaction of the Air Pollution Control Officer that the engine does not operate at these conditions, then emissions source testing shall be performed at the highest achievable continuous brake horsepower rating, or under the typical duty cycle or operational mode of the engine.

(4) Notwithstanding the requirements of Subsection (i)(1), any engine operating on diesel or kerosene fuel without add-on control and certified by EPA or ARB at emission rates equal to or below the applicable emission rate limits of Section (d) shall not require an initial or periodic source test, until an appropriate test method is approved by the District and ARB, provided the following requirements are met:

(i) The engine family has been tested and certified according to an EPA or ARB approved procedure, and the certification documents are provided to the District.

(ii) The engine family does not participate in the federal ABT program specified in 40 CFR 89, Subpart C and adopted by reference by ARB.

(iii) The engine and its emission control system are maintained as specified in Section (f).

(iv) There is no evidence of engine tampering.

(j) **COMPLIANCE SCHEDULE**

(1) For an engine operating on diesel fuel, comply with the requirements of Subsection (d)(4) by May 15, 2001.

(2) The owner or operator of an existing engine subject to the requirements of this rule shall meet the following increments of progress:

(i) By May 15, 2001, submit to the Air Pollution Control Officer an application to modify conditions on the Permit to Operate or to convert a Certificate of Registration to a Permit to Operate, as necessary to comply with the applicable requirements of this rule. The application shall include the following information for the engine that will be evaluated for compliance with this rule:

(A) The information required by Section (g)(1),

(B) emission rate data and source of such data, and

(C) description of how compliance will be achieved (e.g. retrofit, replacement).

(ii) By November 15, 2002, submit to the Air Pollution Control Officer documentation which demonstrates that the engine is in compliance with the Section (d)(1) through (d)(3) emission limits for NOx, CO and VOC, and all other applicable requirements of this rule.

(3) For a new or replacement engine, including a new or replacement engine operating less than 200 hours per calendar year or a new or replacement emergency standby engine, comply with all applicable requirements of this rule upon installation and startup.

REGULATION 9
INORGANIC GASEOUS POLLUTANTS
RULE 8
NITROGEN OXIDES AND CARBON MONOXIDE FROM STATIONARY INTERNAL COMBUSTION ENGINES

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REGULATION 9
INORGANIC GASEOUS POLLUTANTS
RULE 8
NITROGEN OXIDES AND CARBON MONOXIDE FROM STATIONARY INTERNAL COMBUSTION ENGINES

(Adopted January 20, 1993)

9-8-100 GENERAL

9-8-101 Description: This rule limits the emissions of nitrogen oxides and carbon monoxide from stationary internal combustion engines with an output rated by the manufacturer at more than 50 brake horsepower

(Amended 8/1/01; 7/25/07)

9-8-110 Exemptions: The requirements of Sections 9-8-301 through 305, 501 and 503 shall not apply to the following:

110.1 Until January 1, 2012, engines rated by the manufacturer at less than 250 brake horsepower output rating.

110.2 Engines rated by the manufacturer at 50 brake horsepower output rating or less. Effective January 1, 2012.

110.3 Until January 1, 2012, engines fired exclusively by liquid fuels including, but not limited to, diesel fuel, gasoline, and methanol.

110.4 Engines used directly and exclusively for the growing of crops or the raising of animals.

110.5 Emergency standby engines.

(Amended 8/1/01; 7/25/07)

9-8-111 Limited Exemption for Low Usage: The requirements of Sections 9-8-301, 302, 303, 304, and 305 shall not apply to the following low use operations provided the requirements of Sections 9-8-502.1 and 9-8-530 are met:

111.1 Until January 1, 2012, engines rated at, or below, 1000 brake horsepower that operate less than 200 hours, exclusive of any emergency use, in any 12-consecutive-month period.

111.2 Until January 1, 2012, engines rated above 1000 brake horsepower that operate less than 100 hours, exclusive of any emergency use, in any 12-consecutive-month period.

111.3 Effective January 1, 2012, engines that operate less than 100 hours, exclusive of any emergency use, in any 12-consecutive-month period

(Amended July 25, 2007)

9-8-112 Registered Portable Equipment: The requirements of this section shall not apply to an internal combustion engine registered as portable pursuant to the Statewide Portable Engine and Equipment Registration Program, Sections 2450-2465, Article 5, Title 13, California Code of Regulations.

(Adopted July 25, 2007)

9-8-200 DEFINITIONS

9-8-201 Gaseous Fuels: For the purposes of this rule, gaseous fuels include, but are not limited to:

201.1 Fossil derived fuel gas such as natural gas, methane, ethane, propane, refinery fuel gas, and butane, including gases stored as liquids such as liquified petroleum gas (LPG).

201.2 Waste derived fuel gas such as sewage sludge digester gas or landfill gas.

9-8-202 Nitrogen Oxide (NO_x) Emissions: The sum of nitric oxide (NO) and nitrogen dioxide (NO_2) in the engine exhaust, collectively expressed as nitrogen dioxide.

9-8-203 Rated Brake Horsepower: The maximum brake horsepower rating at maximum revolutions per minute (RPM) specified for the engine by the manufacturer or indicated on the engine nameplate.

9-8-204 **Stationary Internal Combustion Engine (Engine):** Any spark or compression ignited internal combustion engine that is operated, or intended to be operated, at a specific site for more than one year or is attached to a foundation at that site.

9-8-205 **Rich-Burn Engine:** Any spark or compression ignited internal combustion engine that is designed to be operated with an exhaust stream oxygen concentration of less than 4 percent, by volume. The exhaust gas oxygen content shall be determined from the uncontrolled exhaust stream.

9-8-206 **Lean-Burn Engine:** Any spark or compression ignited internal combustion engine that is designed to be operated with an exhaust stream oxygen concentration of 4 percent, by volume, or greater. The exhaust gas oxygen content shall be determined from the uncontrolled exhaust stream.

9-8-230 **Emergency Standby Engine:** Any engine that is exclusively operated:

230.1 For emergency use; and

230.2 For reliability-related activities.

(Adopted August 1, 2001)

9-8-231 **Emergency Use:** The use of an emergency standby or low usage engine during any of the following:

231.1 In the event of unforeseeable loss of regular natural gas supply;

231.2 In the event of unforeseeable failure of regular electric power supply;

231.3 Mitigation or prevention of an imminent flood;

231.4 Mitigation of or prevention of an imminent overflow of sewage or waste water;

231.5 Fire or prevention of an imminent fire;

231.6 Failure or imminent failure of a primary motor or source of power, but only for such time as needed to repair or replace the primary motor or source of power; or

231.7 Prevention of the imminent release of hazardous material.

(Adopted 8/1/01; Amended 7/25/07)

9-8-232 **Reliability-related Activities:** Either:

232.1 Operation of an emergency standby engine to test its ability to perform for an emergency use; or

232.2 Operation of an emergency standby engine during maintenance of a primary motor.

(Adopted August 1, 2001)

9-8-233 **Essential Public Service:**

233.1 A sewage treatment facility, and associated collection system, which is publicly owned and operated;

233.2 Water treatment and delivery operations;

233.3 Public transit;

233.4 Police or fire fighting facility;

233.5 Airport runway lights; or

233.6 Hospital or other medical emergency facility.

(Adopted August 1, 2001)

9-8-234 **Best Available Control Technology (BACT)**: As defined in Regulation 2, Rule 2, Section 2-2-206

(Adopted July 25, 2007)

9-8-235 **Dual Fuel Pilot Compression-Ignited Engine**: Any dual-fueled engine that uses diesel fuel as a pilot ignition source at an annual average ratio of less then 5 parts diesel fuel to 100 parts total fuel on an energy equivalent basis.

(Adopted July 25, 2007)

9-8-236 **Portable:** Designed for and capable of being carried or moved from one location to another. Indications of portability include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, or platform.

(Adopted July 25, 2007)

9-8-237 **Unforeseeable:** Not able to be reasonably anticipated and demonstrated by the owner or operator to the satisfaction of the APCO to have been beyond the reasonable control of the owner or operator. The enforcement of a contractual obligation the owner or operator has with a third party or any other party is foreseeable.

(Adopted July 25, 2007)

9-8-300 STANDARDS

9-8-301 Emission Limits - Spark-Ignited Engines Powered by Fossil Derived Fuels: Effective January 1, 1997, a person shall not operate a stationary internal combustion engine fired exclusively on fossil derived fuels, unless the following emission limits are met:

301.1 Rich-Burn Engines: Nitrogen oxide (NOx) emissions shall not exceed 56 ppmv as corrected to 15% oxygen, dry basis. Effective January 1, 2012, nitrogen oxide (NOx) emissions shall not exceed 25 ppmv as corrected to 15% oxygen, dry basis.

301.2 Lean-Burn Engines: Nitrogen oxide (NOx) emissions shall not exceed 140 ppmv as corrected to 15% oxygen, dry basis. Effective January 1, 2012, nitrogen oxide (NOx) emissions shall not exceed 65 ppmv as corrected to 15% oxygen, dry basis.

301.3 Carbon monoxide (CO) emissions shall not exceed 2000 ppmv as corrected to 15% oxygen, dry basis.

(Amended July 25, 2007)

9-8-302 Emission Limits - Spark-Ignited Engines Powered by Waste Derived Fuels: Effective January 1, 1997, a person shall not operate a spark-ignited stationary internal combustion engine fired on waste derived fuels or any combination of waste- and fossil-derived gaseous fuels and liquid fuels unless the following emission limits are met:

302.1 Lean-Burn Engines: Nitrogen oxide (NO_x) emissions shall not exceed 140 ppmv as corrected to 15% oxygen, dry basis. Effective January 1, 2012, nitrogen oxide (NOx) emissions shall not exceed 70 ppmv as corrected to 15% oxygen, dry basis.

302.2 Rich-Burn Engines: Nitrogen oxide (NO_x) emissions shall not exceed 210 ppmv as corrected to 15% oxygen, dry basis. Effective January 1, 2012, nitrogen oxide (NOx) emissions shall not exceed 70 ppmv as corrected to 15% oxygen, dry basis.

302.3 Carbon monoxide (CO) emissions shall not exceed 2000 ppmv as corrected to 15% oxygen, dry basis.

(Amended July 25, 2007)

9-8-303 Emissions Limits – Delayed Compliance, Existing Spark-Ignited Engines, 51 to 250 bhp or Model Year 1996 or Later: In lieu of compliance with Section 9-8-301 or 302, a person may operate a stationary internal combustion, spark-ignited engine until January 1, 2016 provided:

303.1 The brake horsepower rating of the engine is between 51 and 250 bhp or the model year of the engine is 1996 or later;

303.2 The requirements of Section 9-8-402 are met;

303.3 The engine complies with Best Available Control Technology requirements for a stationary internal combustion, spark-ignited engines no later than January 1, 2016.

(Adopted July 25, 2007)

9-8-304 Emission Limits – Compression-Ignited Engines: Effective January 1, 2012, a person shall not operate a stationary internal combustion compression-ignited engine unless one the applicable emission limit in ppmv corrected 15% oxygen, dry basis set forth below for NOx and CO is met:

	Existing Compression-Ignited Engine (bhp)	**Emission Standards** (ppmvd)	
		NOx	**CO**
304.1	51 to 175	180	440
304.2	Greater than 175	110	310

(Adopted July 25, 2007)

9-8-305 **Emission Limits – Delayed Compliance, Existing Compression-Ignited Engines, Model Year 1996 or Later:** In lieu of compliance with Section 9-8-304, a person may operate a stationary internal combustion compression-ignited engine of model year 1996 or later provided the requirements of Section 9-8-402 are met and one of the following conditions is met no later than January 1, 2016:

305.1 The NOx and CO emissions shall not exceed Best Available Control Technology limits for a stationary internal combustion, compression-ignited engines, or

305.2 the NOx emissions shall not exceed 22 ppmv corrected 15% oxygen, dry basis and the CO emissions shall not exceed 310 ppmv corrected 15% oxygen, dry basis.

(Adopted July 25, 2007)

9-8-306 **Requirements for Dual Fuel Pilot Compression-Ignited Engines:** Effective January 1, 2012, compression-ignited engines powered by diesel fuel and waste gas shall comply with spark-ignited waste-derived fuel emission limits in Section 9-8-302, provided the diesel fuel use does not exceed five percent on an energy basis of the total fuel consumption in any calendar year.

(Adopted July 25, 2007)

9-8-330 **Emergency Standby Engines, Hours of Operation:** A person may only operate an emergency standby engine under the following circumstances:

330.1 For emergency use for an unlimited number of hours; and

330.2 Until January 1, 2012, for reliability-related activities so long as total hours of operation for this purpose do not exceed 100 hours in a calendar year, or limitations contained in a District permit, whichever is lower.

330.3 Effective January 1, 2012, for reliability-related activities so long as total hours of operation for this purpose do not exceed 50 hours in a calendar year, or limitations contained in a District permit, whichever is lower. Hours of operation for reliability-related activities may exceed these limits only as necessary to comply with testing requirements of National Fire Protection Association (NFPA) 25 – "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 1998 edition.

(Adopted 8/1/01; Amended 7/25/07)

9-8-331 **Essential Public Service, Hours of Operation:** An essential public service may only operate an emergency standby engine under the following circumstances:

331.1 For emergency use for an unlimited number of hours; and

331.2 Until January 1, 2012, for reliability-related activities so long as total hours of operation for this purpose do not exceed 200 hours per calendar year, or limitations contained in a District permit, whichever is lower.

331.3 Effective January 1, 2012, for reliability-related activities so long as total hours of operation for this purpose do not exceed 100 hours in a calendar year, or limitations contained in a District permit, whichever is lower.

(Adopted 8/1/01; Amended 7/25/07)

9-8-400 **ADMINISTRATIVE REQUIREMENTS**

9-8-401 **Compliance Schedule:** A person subject to the requirements of Section 9-8-301, 302, 303, 304, 305 or 306 shall submit an application for any Authority to Construct, necessary to achieve compliance with such requirements no later than one year prior to the applicable compliance date listed in Section 9-8-301, 302, 303, 304, 305 or 306.

(Amended July 25, 2007)

9-8-402 **Reporting Requirements for Delayed Compliance:** A person opting to comply with one of the delayed compliance options set forth in Section 9-8-303 or 305 shall notify the APCO in writing no later than January 1, 2012 that the owner or operator of a stationary engine has elected to comply with requirements of Section 9-8-303 in lieu of Section 9-8-301 or 302, or to comply with the requirements of Section 9-8-305 in lieu of Section 9-8-304. The report shall include the following information about the engine: source number; plant number, name, contact, phone number, address; and engine make, model, model year, and size.

(Amended July 25, 2007)

9-8-500 MONITORING AND RECORDS

9-8-501 **Initial Demonstration of Compliance:** A person who must modify existing sources or install new control equipment shall conduct a District approved source test, pursuant to Sections 9-8-601 and 602 according to the schedule listed in the following table:

Engines Operated to Comply with Section	Date that the Initial Source Test Must Be Completed	Date that the Initial Source Test Results Must Be Submitted to the District
9-8-301, 302, 304 or 306	March 31, 2012	May 31, 2012
9-8-303 or 305	March 31, 2016	May 31, 2016

(Amended July 25, 2007)

9-8-502 **Recordkeeping:** Any person who operates any engine subject to Section 9-8-300 shall comply with the following recordkeeping requirements:

502.1 Any person who operates any engine that is exempt from the requirements of Section 9-8-301, 302, 303, or 304 by Section 9-8-110 or 111 shall keep records of the number of hours the engine is fired on a monthly basis. Such records shall be retained for a minimum of 24 months from the date of entry and made available to District staff upon request.

502.2 Any person who operates a dual fuel pilot compression-ignited engines in accordance to Sections 9-8-306 shall keep records of fuel usage for each type of fuel used for a minimum of 24 months and make them available to the District staff upon request.

502.3 Any person who conducts either an initial demonstration of compliance according to Sections 9-8-501 and 9-8-601, 9-8-602, a quarterly demonstration of compliance according to Section 9-8-503, or an annual demonstration of compliance according to Sections 9-8-504 and 9-8-601 shall keep records of the compliance demonstration for a minimum of 24 months from the date of creation and made available to the District staff upon request.

502.4 Any person who operates an engine pursuant to Section 9-8-305 shall keep records verifying the certification of that engine for a minimum of 24 months.

(Amended July 25, 2007)

9-8-503 **Quarterly Demonstration of Compliance:** Any person who must comply with Section 9-8-301, 302, 303, 304, 305, or 306 shall use a portable analyzer to take NOx and CO emission readings to verify compliance with the applicable emission limits in Sections 9-8-301 through 305 at least once during each calendar quarter in which a source test is not performed. All emission readings shall be taken with the engine operating either at conditions representative of normal operations or conditions specified in the permit-to-operate. The analyzer shall be calibrated, maintained, and operated in accordance with the manufacturer's specifications and recommendations. NOx emission readings taken pursuant to this section shall be averaged over a consecutive 15-minute period.

(Adopted July 25, 2007)

9-8-530 **Emergency Standby and Low Usage Engines, Monitoring and Recordkeeping:** Each emergency standby and low usage engine shall be equipped with a non-resettable totalizing meter that measures hours of operation or fuel usage. All records shall be kept for at least two years, and shall be available for inspection by District staff upon request. The operator shall keep a monthly log of usage that shall indicate the following:

530.1 Hours of operation (total)

530.2 Hours of operation (emergency)

530.3 For each emergency, the nature of the emergency condition.

For low usage engines, these provisions become effective on January 1, 2012.

(Adopted 8/1/01; Amended 7/25/07)

9-8-600 MANUAL OF PROCEDURES

9-8-601 Determination of Nitrogen Oxides: The methods by which samples of exhaust gases are collected and analyzed to determine concentrations of nitrogen oxides are set forth in the District's Manual of Procedures, Volume IV, ST-13 A.

(Amended July 25, 2007)

9-8-602 Determination of Carbon Monoxide and Stack Gas Oxygen: The methods by which samples of exhaust gases are collected and analyzed to determine concentrations of carbon monoxide and stack gas oxygen are set forth in the District's Manual of Procedures, Volume IV, ST-6 (carbon monoxide) and ST-14 (oxygen).

RULE 4702 INTERNAL COMBUSTION ENGINES (Adopted August 21, 2003; Amended June 16, 2005; Amended April 20, 2006; Amended January 18, 2007; Amended August 18, 2011; Amended November 14, 2013)

1.0 Purpose

The purpose of this rule is to limit the emissions of nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOC), and sulfur oxides (SOx) from internal combustion engines.

2.0 Applicability

This rule applies to any internal combustion engine rated at 25 brake horsepower or greater.

3.0 Definitions

3.1 Agriculture Operations (AO): the growing and harvesting of crops or the raising of fowl or animals, for the primary purpose of earning a living, or of conducting agricultural research or instruction by an educational institution.

3.2 Air Pollution Control Officer (APCO): the Air Pollution Control Officer of the San Joaquin Valley Unified Air Pollution Control District, or any person authorized to act on behalf of the APCO.

3.3 ARB: California Air Resources Board.

3.4 California Reformulated Diesel: diesel fuel meeting 15 ppmv sulfur content limit as required by the California Diesel Fuel Regulations as specified in the California Code of Regulations, Title 13, Division 3, Chapter 5 (Standards for Motor Vehicle Fuels), Article 2 (Standards for Diesel Fuel), Section 2281- Sulfur content of Diesel Fuel.

3.5 California Reformulated Gasoline: gasoline meeting ARB requirements for motor vehicle fuel as specified in California Code of Regulations, Title 13, Division 3, Chapter 5, Article 1, Subarticle 2 - Standards for gasoline sold beginning March 1, 1996.

3.6 Certified Compression-Ignited Engine: a Tier 1, Tier 2, Tier 3, or Tier 4 compression-ignited engine that is EPA certified as specified in Title 40 Code of Federal Regulations Part 89 or in Title 40 Code of Federal Regulations Part 1039.

3.7 Certified Spark-Ignited Engine: a spark-ignited engine that is used exclusively in agricultural operations and that is ARB certified as specified in Title 13, Division 3, Chapter 9, Article 4.5, Section 2433 of the California Code of Regulations and that has been certified to meet a Certification Level for hydrocarbon plus NOx emissions of 0.6 grams/bhp-hr (40.2 ppmv) or less.

3.8 CO: carbon monoxide.

3.9 Compression-Ignited Internal Combustion Engine: an engine that uses the heat of compression to initiate combustion.

3.10 Cyclic Loaded Engine: an internal combustion engine that, under normal operating conditions, varies in shaft load by 40% or more of rated brake horsepower during recurrent periods of 30 seconds or less or is used to power an oil well reciprocating pump unit.

3.11 De-rated Engine: an internal combustion engine which has been physically limited and restricted by permit condition to an operational level of less than 50 horsepower.

3.12 Diesel Engine: a compression-ignited internal combustion engine.

3.13 Disaster or State of Emergency: a fire, flood, earthquake, or other similar natural catastrophe.

3.14 Distributed Generation (DG): relatively small power plants, such as internal combustion engine generator sets, which are used to generate electrical power that is either fed into the power grid or used on-site. DG units are located throughout the grid and are usually sited in or close to load centers or utility customers' sites. Distributed Generation also refers to a mechanical drive system consisting of one or more internal combustion engines and electric motors, where use of the internal combustion engines or electric motors is interchangeable.

3.15 Emergency Standby Engine: an internal combustion engine which operates as a temporary replacement for primary mechanical or electrical power during an unscheduled outage caused by sudden and reasonably unforeseen natural disasters or sudden and reasonably unforeseen events beyond the control of the operator. An engine shall be considered to be an emergency standby engine if it is used only for the following purposes: (1) periodic maintenance, periodic readiness testing, or readiness testing during and after repair work; (2) unscheduled outages, or to supply power while maintenance is performed or repairs are made to the primary power supply; and (3) if it is limited to operate 100 hours or less per calendar year for non-emergency purposes. An engine shall not be considered to be an emergency standby engine if it is used: (1) to reduce the demand for electrical

power when normal electrical power line service has not failed, or (2) to produce power for the utility electrical distribution system, or (3) in conjunction with a voluntary utility demand reduction program or interruptible power contract.

3.16 EPA: U.S. Environmental Protection Agency.

3.17 Exhaust Control: device or technique used to treat an engine's exhaust to reduce NOx, VOC, or CO emissions, and includes, but is not limited to, catalysts, afterburners, reaction chambers, and chemical injectors.

3.18 Flood: a sudden and reasonably unforeseen rising and overflowing of a body of water especially onto normally dry land.

3.19 Gaseous Fuel: a fuel which is a gas at standard conditions including but not limited to natural gas, methane, ethane, propane, butane and liquefied petroleum gas (LPG).

3.20 Higher Heating Value (hhv): the total heat liberated per mass or volume of fuel burned (expressed as Btu per pound, Btu per cubic foot, or Btu per gallon), when fuel and dry air at Standard Conditions undergo complete combustion and all resulting products are brought to their standard states at Standard Conditions. If certification of hhv is not provided by the fuel supplier, it shall be determined by the applicable test methods specified in Section 6.4.

3.21 Installation Date: the date that an internal combustion engine is initially placed at a location in order to be operated for the first time in its lifetime.

3.22 Internal Combustion Engine: a spark- or compression-ignited reciprocating engine.

3.23 Lean-Burn Engine: a spark-ignited internal combustion engine that is operated with an exhaust stream oxygen concentration of four (4) percent by volume, or greater, prior to any exhaust stream control device.

3.24 Limited Use Engine: an internal combustion engine that is limited by a permit condition to be operated no more than 4,000 hours per calendar year and provided the following requirements are met:

3.24.1 The engine is operated with an operating nonresettable elapsed time meter;

3.24.2 In lieu of an operating nonresettable elapsed time meter, the operator may use an alternative device, method, or technique, in determining operating time, provided that the alternative is approved by the APCO and EPA and is allowed by the Permit-to-Operate. The operator must demonstrate

that the alternative device, method, or technique is equivalent to using a nonresettable elapsed time meter;

3.24.3 The operator shall properly maintain and operate the nonresettable elapsed time meter or alternative device in accordance with the manufacturer's instructions; and

3.24.4 The engine operator maintains records of the annual operating hours and makes the records available to the APCO upon request.

3.25 Location: a single site at a building, structure, facility, or installation.

3.26 Low-use Engine: an internal combustion engine that is limited by a permit condition to be operated no more than 200 hours per calendar year and the engine is not used to perform any of the functions specified in Section 3.26.1 through Section 3.26.3.

3.26.1 Generate electrical power that is either fed into the electrical utility power grid or used to reduce electrical power purchased by a stationary source;

3.26.2 Generate mechanical power that is used to reduce electrical power purchased by a stationary source; or

3.26.3 Is used in a distributed generation application.

3.27 Military Tactical Equipment: a transportable engine operated by the United States armed forces or National Guard which is designed specifically for military use in an off-road, dense terrain; hostile environment; or aboard military combat vessels.

3.28 Mobile Agricultural Equipment: equipment at an agricultural operation which is towed or mounted on a vehicle and is continuously moved during the operation of the equipment. Mobile Agricultural Equipment includes, but is not limited to sprayers, balers, and harvest equipment.

3.29 NOx: oxides of nitrogen, calculated as equivalent nitrogen dioxide (NO_2).

3.30 Operator: includes but is not limited to any person who owns, leases, supervises, or operates a facility and/or equipment.

3.31 Public Utilities Commission (PUC) Quality Natural Gas: high methane gas (at least 80% methane by volume) as specified in PUC General Order 58-A.

3.32 Rated Brake Horsepower: the continuous brake horsepower rating specified for the engine by the manufacturer or listed on the nameplate of the unit, unless

otherwise physically limited and specified by a condition on the engine's Permit-to-Operate or Permit-Exempt Equipment Registration.

3.33 Replacement Engine: an engine that is installed to replace an engine that was in place as of August 18, 2011, and that such replacement is performed solely for the purpose of complying with the requirements of Section 5.2 of this rule.

3.34 Rich-Burn Engine: a spark-ignited internal combustion engine that is operated with an exhaust stream oxygen concentration of less than four (4) percent by volume prior to any exhaust stream control device.

3.35 Spark-Ignited Internal Combustion Engine: a liquid or gaseous fueled engine designed to ignite its air/fuel mixture by a spark across a spark plug.

3.36 Stationary Source: as defined in Rule 2201 (New and Modified Stationary Source Review Rule).

3.37 Tier 1 Engine, Tier 2 Engine, Tier 3 Engine, and Tier 4 Engine: an EPA-certified compression-ignited engine that meets the Tier 1, Tier 2, or Tier 3 emission standards of Table 1 (Emission Standards in g/kW-hr (g/hp-hr)) on page 56970 of the Final Rule (63 Fed. Reg. 205, October 23, 1998) or the Tier 4 emission standards of Table II.A2. (Tier 4 NOx and NMHC Standards and Schedule) on page 38971 of the Final Rule (69 Fed. Reg. 124, June 29, 2004) or Table II.A-4 (Tier 4 Standards for Engines Over 750 hp (g/bhp-hr)) on page 38980 of the Final Rule (69 Fed. Reg. 124, June 29, 2004), respectively.

3.38 VOC: volatile organic compounds, as defined in Rule 1020 (Definitions).

3.39 Waste Gas: an untreated, raw gas derived through a natural process, such as anaerobic digestion, from the decomposition of organic waste at municipal solid waste landfills or publicly owned wastewater treatment facility. Waste gas includes landfill gas which is generated at landfills, digester gas which is generated at sewage treatment facilities, or a combination of the two.

3.40 Wind Machine: a machine consisting of a large fan mounted on a tower powered by an internal combustion engine, used exclusively to provide protection to crops, including, but not limited to oranges, lemons, and grapes, from cold weather by effecting a heat transfer by moving warmer atmospheric air downward and mixing it with the colder air surrounding a crop.

4.0 Exemptions

4.1 The requirements of this rule shall not apply to the following engines:

4.1.1 An engine used to propel implements of husbandry, as that term is defined in Section 36000 of the California Vehicle Code, as that section existed on January 1, 2003.

4.1.2 An engine used exclusively to power a wind machine.

4.1.3 A de-rated spark-ignited engine not used in agricultural operations, provided the de-rating occurred before June 1, 2004.

4.1.4 A de-rated spark-ignited engine used in agricultural operations or a de-rated compression-ignited engine, provided the de-rating occurred before June 1, 2005.

4.1.5 An engine used exclusively to power Mobile Agricultural Equipment.

4.1.6 An internal combustion engine registered as a portable emissions unit under the Statewide Portable Equipment Registration Program pursuant to California Code of Regulations Title 13, Division 3, Chapter 9, Article 5, Sections 2450-2465.

4.1.7 An internal combustion engine registered as a portable emissions unit under Rule 2280 (Portable Equipment Registration).

4.2 Except for the requirements of Sections 5.9 and 6.2.3, the requirements of this rule shall not apply to an emergency standby engine or a low-use engine, provided that the engine is operated with an operating nonresettable elapsed time meter.

4.2.1 In lieu of operating a nonresettable elapsed time meter, the operator may use an alternative device, method, or technique, in determining operating time, provided that the alternative is approved by the APCO and EPA and is allowed by the Permit-to-Operate or Permit-Exempt Equipment Registration. The operator must demonstrate that the alternative device, method, or technique is equivalent to using a nonresettable elapsed time meter.

4.2.2 The operator shall properly maintain and operate the nonresettable elapsed time meter or alternative device in accordance with the manufacturer's instructions.

4.3 Except for the administrative requirements of Section 6.2.3, the requirements of this rule shall not apply to the following:

4.3.1 An internal combustion engine that meets the following conditions:

4.3.1.1 The engine is operated exclusively to preserve or protect property, human life, or public health during a disaster or state of emergency, such as a fire or flood; and

4.3.1.2 Except for operations associated with Section 4.3.1.1, the engine is limited to operate no more than 100 hours per calendar year as determined by an operational nonresettable elapsed time meter, for periodic maintenance, periodic readiness testing, and readiness testing during and after repair work of the engine; and

4.3.1.3 The engine is operated with an operational nonresettable elapsed time meter. In lieu of installing a nonresettable elapsed time meter, the operator of an engine may use an alternative device, method, or technique, in determining operating time provided that the alternative is approved by the APCO and EPA. The operator of the engine shall properly maintain and operate the nonresettable elapsed time meter or alternative device in accordance with the manufacturer's instructions.

4.3.2 Military Tactical Equipment and engines used to retract military aircraft arresting gear cables.

4.4 For existing facilities, a replacement unit installed for the sole purpose of complying with the requirements of this rule shall be considered to be an emission control technique and shall be exempt from the Best Available Control Technology (BACT) and offsets requirements of District Rule 2201 (New and Modified Stationary Source Review Rule) provided that all other requirements of Rule 2201 are met.

4.5 Except for the requirements of Section 5.1, the requirements of this rule shall not apply to stationary engines rated at least 25 Brake Horsepower, up to, and including 50 Brake Horsepower.

5.0 Requirements

5.1 Stationary Engines Rated at Least 25 Brake Horsepower, Up To, and Including 50 Brake Horsepower and Used in Non-Agricultural Operations (Non-AO)

5.1.1 On and after July 1, 2012, no person shall sell or offer for sale any non-AO spark-ignited engine or any non-AO compression-ignited engine unless the engine meets the applicable requirements and emission limits specified in 40 Code of Federal Regulation (CFR) 60 Subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines) and 40 CFR 60 Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines) for the year in which the ownership of the engine changes.

5.1.2 By January 1, 2013, the operator shall submit a one-time report that includes the number of engines at the stationary source, and the following information for each engine:

5.1.2.1 Location of each engine,
5.1.2.2 Engine manufacturer,
5.1.2.3 Model designation and engine serial number,
5.1.2.4 Rated brake horsepower,
5.1.2.5 Type of fuel and type of ignition,
5.1.2.6 Combustion type: rich-burn, lean-burn, or compression ignition,
5.1.2.7 Purpose, and intended use, of the engine,
5.1.2.8 Typical daily operating schedule, and
5.1.2.9 Fuel consumption (cubic feet for gas or gallons for liquid fuel) for the previous one-year period.

5.2 Engines Rated at Greater than 50 Brake Horsepower (>50 bhp)

5.2.1 Spark Ignited Engines Used in non-AO - Table 1 Emission Limits/Standards

The operator of a spark-ignited internal combustion engine rated at >50 bhp that is used exclusively in non-AO shall not operate it in such a manner that results in emissions exceeding the limits in Table 1 for the appropriate engine type until such time that the engine has demonstrated compliance with Table 2 emission limits pursuant to the compliance deadlines in Section 7.5. In lieu of complying with Table 1 emission limits, the operator of a spark-ignited engine shall comply with the applicable emission limits pursuant to Section 8.0.

Table 1 Emission Limits/Standards for a Spark-Ignited Internal Combustion Engine rated at >50 bhp Used Exclusively in Non-AO (All ppmv limits are corrected to 15% oxygen on a dry basis.).			
Engine Type	NOx	CO	VOC
1. Rich-Burn			
a. Waste gas fueled	50 ppmv or 90% reduction	2000 ppmv	250 ppmv
b. Cyclic loaded, field gas fueled	50 ppmv	2000 ppmv	250 ppmv
c. All other engines	25 ppmv or 96% reduction	2000 ppmv	250 ppmv
2. Lean-Burn			
a. Two stroke, gaseous fueled, less than 100 horsepower	75 ppmv or 85% reduction	2000 ppmv	750 ppmv
b. All other engines	65 ppmv or 90% reduction	2000 ppmv	750 ppmv

5.2.2 Spark-Ignited Engines Used in non-AO - Table 2 Emission Limits/Standards

On and after the compliance schedule specified in Section 7.5, the operator of a spark-ignited engine > 50 bhp that is used in non-AO shall comply with all the applicable requirements of the rule and one of the following, on an engine-by-engine basis:

5.2.2.1 On and after the compliance schedule specified in Section 7.5, the operator of a spark-ignited engine that is used exclusively in non-AO shall comply with Sections 5.2.2.1.1 through 5.2.2.1.3 on an engine-by-engine basis:

5.2.2.1.1 NOx, CO, and VOC emission limits pursuant to Table 2;

5.2.2.1.2 SOx control requirements of Section 5.7, pursuant to the deadlines specified in Section 7.5; and

5.2.2.1.3 Monitoring requirements of Section 5.10, pursuant to the deadlines specified in Section 7.5.

5.2.2.2 In lieu of complying with the NOx emission limit requirement of Section 5.2.2.1.1, an operator may pay an annual fee to the District, as specified in Section 5.6, pursuant to Section 7.6.

5.2.2.2.1 Engines in the fee payment program shall have actual emissions not greater than the applicable limits in

Table 1 during the entire time the engine is part of the fee payment program.

5.2.2.2.2 Compliance with Section 5.7 and 5.10, pursuant to the deadlines specified in Section 7.5, is also required as part of the fee payment option.

5.2.2.3 In lieu of complying with the NOx, CO, and VOC limits of Table 2 on an engine-by-engine basis, an operator may elect to implement an alternative emission control plan pursuant to Section 8.0. An operator electing this option shall not be eligible to participate in the fee payment option outlined in Section 5.2.2.2 and Section 5.6.

Table 2 Emission Limits for a Spark-Ignited Internal Combustion Engine Rated at >50 bhp Used Exclusively in Non-AO (All ppmv limits are corrected to 15% oxygen on a dry basis). Emission Limits are effective according to the compliance schedule specified in Section 7.5.

Engine Type	NOx Limit (ppmv)	CO Limit (ppmv)	VOC Limit (ppmv)
1. Rich-Burn			
a. Waste Gas Fueled	50	2000	250
b. Cyclic Loaded, Field Gas Fueled	50	2000	250
c. Limited Use	25	2000	250
d. Rich-Burn Engine, not listed above	11	2000	250
2. Lean-Burn Engines			
a. Two-Stroke, Gaseous Fueled, >50 bhp and < 100 bhp	75	2000	750
b. Limited Use	65	2000	750
c. Lean-Burn Engine used for gas compression	65 ppmv or 93% reduction	2000	750
d. Waste Gas Fueled	65 ppmv or 90% reduction	2000	750
e. Lean-Burn Engine, not listed above	11	2000	750

5.2.3 Spark-Ignited Engines Used Exclusively in Agricultural Operations (AO)

5.2.3.1 The operator of a spark-ignited internal combustion engine rated at >50 bhp that is used exclusively in AO shall not operate it in such a manner that results in emissions exceeding the limits in Table 3 for the appropriate engine type on an engine-by-engine basis.

5.2.3.2 In lieu of complying with the NOx, CO, and VOC limits of Table 3 on an engine-by-engine basis, an operator may elect to implement an alternative emission control plan pursuant to Section 8.0.

5.2.3.3 An operator of an AO spark-ignited engine that is subject to the applicable requirements of Table 3 shall not replace such engine with an engine that emits more emissions of NOx, VOC, and CO, on a ppmv basis, (corrected to 15% oxygen on a dry basis) than the engine being replaced.

Table 3 Emission Limits/Standards and Compliance Schedule for a Spark-Ignited Internal Combustion Engine >50 bhp Used Exclusively in AO (All ppmv limits are corrected to 15% oxygen on a dry basis).

Engine Type	NOx Limit	CO Limit	VOC Limit
1. Rich-Burn	90 ppmv or 80% reduction	2000 ppmv	250 ppmv
2. Lean-Burn	150 ppmv or 70% reduction	2000 ppmv	750 ppmv
3. Certified and installed on or before June 16, 2005	Meet a Certified Spark-Ignited Engine Standard of HC + NOx < 0.6 g/bhp-hr		

5.2.4 Certified Compression-Ignited Engines (AO and non-AO)

The operator of a certified compression-ignited engine rated >50 bhp shall comply with the following requirements:

5.2.4.1 Repower, replace, or control the engine's emissions to comply with the applicable limits/standards in Table 4 on an engine-by-engine basis by the compliance dates as specified in Table 4.

5.2.4.2 The annual hours of operation shall be determined on a calendar year basis.

5.2.4.3 In lieu of complying with the NOx, CO, and VOC limits of Table 4 on an engine-by-engine basis, an operator may elect to implement an alternative emission control plan pursuant to Section 8.0.

5.2.4.4 An operator of an AO compression-ignited engine that is subject to the applicable requirements of Table 4 shall not replace such engine with an engine that emits more emissions of NOx, VOC, and CO, on a ppmv basis, (corrected to 15% oxygen on a dry basis) than the engine being replaced.

5.2.4.5 Non-AO compression-ignited engines shall be operated in such a manner to comply with the SOx control requirements of Section 5.7 and the SOx monitoring requirements of Section 5.10.

Table 4 Emission Limits/Standards and Compliance Schedule for Compression-Ignited Internal Combustion Engine (corrected to 15% oxygen on a dry basis)		
Engine Type	Emission Limit/ Standard	Compliance Date
1. Non-Certified Compression-Ignited Engine Installed on or before June 1, 2006		
a. Greater than 50 bhp but not more than 500 bhp	EPA Tier 3 or Tier 4	1/1/2010
b. Greater than 500 bhp but not more than 750 bhp and less than 1000 annual operating hours	EPA Tier 3	1/1/2010
c. Greater than 750 bhp and less than 1000 annual operating hours	EPA Tier 4	7/1/2011
d. Greater than 500 bhp and greater than or equal to 1000 annual operating hours	80 ppmv NOx, 2,000 ppmv CO, 750 ppmv VOC	1/1/2008 or, if owner has an agreement to electrify, comply by 1/1/2010
2. Certified Compression-Ignited Engine		
a. EPA Certified Tier 1 or Tier 2 Engine	EPA Tier 4	1/1/2015 or 12 years after installation date, but not later than 6/1/2018
b. EPA Certified Tier 3 or Tier 4 Engine	Meet Certified Compression-Ignited Engine Standard in effect at time of installation	At time of installation

5.2.5 Non-Certified Compression-Ignited Engines (AO and Non-AO)

The operator of a non-certified compression-ignited engine, in place on or before June 1, 2006, shall comply with the Emission Limit/Standard and Compliance Date in Table 4 based on the non-certified compression-ignited engine that was in place on June 1, 2006, unless the operator meets one of the following conditions:

5.2.5.1 Replace the non-certified compression-ignited engine with a non-modified Tier 3 or a non-modified Tier 4 engine after June 1, 2006;

5.2.5.2 Control the non-certified compression-ignited engine after June 1, 2006, to emit emissions less than, or equal to, 80 ppmv NOx, 2,000 ppmv CO, and 750 ppmv VOC (corrected to 15% oxygen on a dry basis); or

5.2.5.3 Replace the non-certified compression-ignited engine after June 1, 2006, with an engine or other source with emissions less than, or equal to, 80 ppmv NOx, 2,000 ppmv CO, and 750 ppmv VOC (corrected to 15% oxygen on a dry basis).

5.3 All continuous emission monitoring systems (CEMS) emissions measurements shall be averaged over a period of 15 consecutive minutes. Any 15-consecutive-minute block average CEMS measurement exceeding the applicable emission limits of this rule shall constitute a violation of this rule.

5.4 Percent emission reductions, if used to comply with the NOx emission limits of Section 5.2, shall be calculated as follows:

5.4.1 For engines with external control devices that are not operated in combination with a second emission control device or technique, percent reduction shall be calculated using emission samples taken at the inlet and outlet of the control device.

5.4.2 For engines without external control devices and for engines with an external control device in combination with a second emission control device or technique, percent reduction shall be based on source test results for the uncontrolled engine and the engine after the control device or technique has been employed. In this situation, the engine's typical operating parameters, loading, and duty cycle shall be documented and repeated at each successive post-control source test to ensure that the engine is meeting the percent reduction limit. When representative source sampling prior to the application of an emissions control technology or technique is not available, the APCO may approve the use of a manufacturer's uncontrolled emissions information or source sampling from a similar, uncontrolled engine.

5.5 The operator of an internal combustion engine that uses percent emission reduction to comply with the NOx emission limits of Section 5.2 shall provide an accessible inlet and outlet on the external control device or the engine as appropriate for taking emission samples and as approved by the APCO.

5.6 Payment of an Annual Fee In Lieu of Complying with a NOx Emission Limit

The operator of a non-AO spark-ignited engine who elects to comply under Section 5.2.2.2 shall comply with the requirements of Sections 5.6 by the schedule specified in Section 7.6 and all other applicable provisions of this rule.

5.6.1 An operator shall pay a total annual fee to the District based on the total NOx emissions from those engines that will be subject to Section 5.2.2.2. The annual fee shall be calculated in the following manner:

5.6.1.1 The operator shall calculate the total emissions for all engines operating at a stationary source that will comply with Section 5.2.2.2. The total NOx emissions shall be calculated in accordance with Section 5.6.1.3.

5.6.1.2 The total annual fee shall be calculated in accordance with Section 5.6.1.4. These calculations include only the units that have been identified to comply with Section 5.2.2.2.

5.6.1.3 Total Emissions (TE) Calculation

$$E_{(engine)} = A \times B \times C \times D \times 2.147 \times 10^{-16}$$

Where:

$E_{(engine)}$ = Annual NOx emissions for each unit, in tons/year.

A = NOx emission limit for the Permit-to-Operate, in ppmvd corrected to 15% oxygen.

B = Annual fuel use (ft3/year)

C = Fuel higher heating value (Btu/ft3) for natural gas use 1,000 Btu/ft3

D = Fuel F-Factor at 60°F (Dscf/MMBtu) for natural gas use 8,579 Dscf/MMBtu

$$TE = \sum E(engine)$$

Where:

$\sum E(engine)$ = Sum of all NOx emissions from all units in the annual fee program, in tons per year.

5.6.1.4 Total Annual Fee Calculation

Total Annual Fee = (TE x FR) + Administrative Fee

Where:

TE = Total Emissions, in tons per year, as calculated in Section 5.6.1.3.

FR (Fee Rate) = the cost of NOx reductions, in dollars per ton, as established by District Rule 9510. Under no circumstances shall the cost per ton of NOx reductions exceed the cost effectiveness threshold for the Carl Moyer Cost Effectiveness, as established by the applicable state law.

Administrative Fee = 4% x (TE x FR)

5.7 Sulfur Oxides (SOx) Emission Control Requirements

On and after the compliance schedule specified in Section 7.5, operators of non-AO spark-ignited engines and non-AO compression-ignited engines shall comply with one of the following requirements:

5.7.1 Operate the engine exclusively on PUC-quality natural gas, commercial propane, butane, or liquefied petroleum gas, or a combination of such gases; or

5.7.2 Limit gaseous fuel sulfur content to no more than five (5) grains of total sulfur per one hundred (100) standard cubic feet; or

5.7.3 Use California Reformulated Gasoline for gasoline-fired spark-ignited engines; or

5.7.4 Use California Reformulated Diesel for compression-ignited engines; or

5.7.5 Operate the engine on liquid fuel that contains no more than 15 ppm sulfur, as determined by the test method specified in Section 6.4.6; or

5.7.6 Install and properly operate an emission control system that reduces SO_2 emissions by at least 95% by weight as determined by the test method specified in Section 6.4.6.

5.8 Monitoring Requirements: Non-AO Spark-Ignited Engines and Engines in an AECP (Section 8.0)

The operator of a non-AO spark-ignited engine subject to the requirements of Section 5.2 or any engine subject to the requirements of Section 8.0 shall comply with the following requirements:

5.8.1 For each engine with a rated brake horsepower of 1,000 bhp or greater and which is allowed by Permit-to-Operate or Permit-Exempt Equipment Registration condition to operate more than 2,000 hours per calendar year, or with an external emission control device, either install, operate, and maintain continuous monitoring equipment for NOx, CO, and oxygen, as identified in Rule 1080 (Stack Monitoring), or install, operate, and maintain APCO-approved alternate monitoring. The monitoring system may be a continuous emissions monitoring system (CEMS), a parametric emissions monitoring system (PEMS), or an alternative monitoring system approved by the APCO. APCO-approved alternate monitoring shall consist of one or more of the following:

5.8.1.1 Periodic NOx and CO emission concentrations,
5.8.1.2 Engine exhaust oxygen concentration,
5.8.1.3 Air-to-fuel ratio,
5.8.1.4 Flow rate of reducing agents added to engine exhaust,
5.8.1.5 Catalyst inlet and exhaust temperature,
5.8.1.6 Catalyst inlet and exhaust oxygen concentration, or
5.8.1.7 Other operational characteristics.

5.8.2 For each engine not subject to Section 5.8.1, monitor operational characteristics recommended by the engine manufacturer or emission control system supplier, and approved by the APCO.

5.8.3 For each engine with an alternative monitoring system, submit to, and receive approval from the APCO, adequate verification of the alternative monitoring system's acceptability. This would include data demonstrating the system's accuracy under typical operating conditions for the specific application and any other information or data deemed necessary in assessing the acceptability of the alternative monitoring system.

5.8.4 For each engine with an APCO approved CEMS, operate the CEMS in compliance with the requirements of 40 Code of Federal Regulations

(CFR) Part 51, 40 CFR Parts 60.7 and 60.13 (except subsection h), 40 CFR Appendix B (Performance Specifications), 40 CFR Appendix F (Quality Assurance Procedures), and applicable provisions of Rule 1080 (Stack Monitoring).

5.8.5 For each engine, have the data gathering and retrieval capabilities of an installed monitoring system described in Section 5.8 approved by the APCO.

5.8.6 For each engine, install and operate a nonresettable elapsed time meter.

5.8.6.1 In lieu of installing a nonresettable elapsed time meter, the operator may use an alternative device, method, or technique, in determining operating time provided that the alternative is approved by the APCO and EPA and is allowed by a Permit-to-Operate or Permit-Exempt Equipment Registration condition.

5.8.6.2 The operator shall properly maintain and operate the nonresettable elapsed time meter or alternative device in accordance with the manufacturer's instructions.

5.8.7 For each engine, implement the Inspection and Monitoring (I&M) plan, if any, submitted to and approved by the APCO pursuant to Section 6.5.

5.8.8 For each engine, collect data through the I&M plan in a form approved by the APCO.

5.8.9 For each engine, use a portable NOx analyzer to take NOx emission readings to verify compliance with the emission requirements of Section 5.2 or Section 8.0 during each calendar quarter in which a source test is not performed and the engine is operated.

5.8.9.1 If an engine is operated less than 120 calendar days per calendar year, take one NOx emission reading during the calendar year in which a source test is not performed and the engine is operated.

5.8.9.2 All emission readings shall be taken with the engine operating either at conditions representative of normal operations or conditions specified in the Permit-to-Operate or Permit-Exempt Equipment Registration.

5.8.9.3 The analyzer shall be calibrated, maintained, and operated in accordance with the manufacturer's specifications and recommendations or a protocol approved by the APCO.

5.8.9.4 All NOx emissions readings shall be reported to the APCO in a manner approved by the APCO.

5.8.9.5 NOx emission readings taken pursuant to this section shall be averaged over a 15 consecutive-minute period by either taking a cumulative 15 consecutive-minute sample reading or by taking at least five (5) readings evenly spaced out over the 15 consecutive-minute period.

5.8.10 The APCO shall not approve an alternative monitoring system unless it is documented that continued operation within ranges of specified emissions-related performance indicators or operational characteristics provides a reasonable assurance of compliance with applicable emission limits. The operator shall source test over the proposed range of surrogate operating parameters to demonstrate compliance with the applicable emission standards.

5.8.11 For each engine subject to Section 8.0, install and operate a nonresettable fuel meter.

5.8.11.1 In lieu of installing a nonresettable fuel meter, the operator may use an alternative device, method, or technique in determining daily fuel consumption provided that the alternative is approved by the APCO and EPA.

5.8.11.2 The operator shall properly maintain, operate, and calibrate the required fuel meter in accordance with the manufacturer's instructions.

5.9 Monitoring Requirements: All Other Engines

5.9.1 The operator of any of the following engines shall comply with the requirements specified in Section 5.9.2 through Section 5.9.5 below:

5.9.1.1 An AO spark-ignited engine subject to the requirements of Section 5.2;

5.9.1.2 A compression-ignited engine subject to the requirements of Section 5.2; or

5.9.1.3 An engine subject to Section 4.2.

5.9.2 Properly operate and maintain each engine as recommended by the engine manufacturer or emission control system supplier.

5.9.3 Monitor the operational characteristics of each engine as recommended by the engine manufacturer or emission control system supplier.

5.9.4 Install and operate a nonresettable elapsed time meter.

5.9.4.1 In lieu of installing a nonresettable elapsed time meter, the operator may use an alternative device, method, or technique, in determining operating time provided that the alternative is approved by the APCO and EPA and is allowed by a Permit-to-Operate or Permit-Exempt Equipment Registration condition.

5.9.4.2 The operator shall properly maintain and operate the nonresettable elapsed time meter or alternative device in accordance with the manufacturer's instructions.

5.9.5 The operator of an AO spark-ignited engine that has been retro-fitted with a NOx exhaust control that has not been certified in accordance with Section 9.0 Exhaust Control System Certification Requirements, or a compression-ignited engine that has been retro-fitted with a NOx exhaust control shall comply with the following:

5.9.5.1 Use a portable NOx analyzer to take NOx emission readings to demonstrate compliance with the emission requirements of Section 5.2.

5.9.5.2 The operator of a compression-ignited engine that is subject to the limits/standards of Section 5.2 Table 4 Category 1.d shall use a portable NOx analyzer to take NOx emission readings at least once every six (6) months that the engine is operated.

5.9.5.3 The operator of any other engine that has been retro-fitted with a NOx exhaust control shall use a portable NOx analyzer to take NOx emission readings at least once every 24 months that the engine is operated.

5.9.5.4 All emission readings shall be taken with the engine operating either at conditions representative of normal operations or conditions specified in the Permit-to-Operate or Permit-Exempt Equipment Registration.

5.9.5.5 The portable NOx analyzer shall be calibrated, maintained, and operated in accordance with the manufacturer's specifications and recommendations or a protocol approved by the APCO.

5.9.5.6 All NOx emissions readings shall be reported to the APCO in a manner approved by the APCO.

5.9.5.7 NOx emission readings taken pursuant to this section shall be averaged over a 15 consecutive-minute period by either taking a cumulative 15 consecutive-minute sample reading or by taking at least five (5) readings evenly spaced out over the 15 consecutive-minute period.

5.10 SOx Emissions Monitoring Requirements

On and after the compliance schedule specified in Section 7.5, an operator of a non-AO engine shall comply with the following requirements:

5.10.1 An operator of an engine complying with Sections 5.7.2 or 5.7.5 shall perform an annual sulfur fuel analysis in accordance with the test methods in Section 6.4. The operator shall keep the records of the fuel analysis and shall provide it to the District upon request,

5.10.2 An operator of an engine complying with Section 5.7.6 by installing and operating a control device with at least 95% by weight SOx reduction efficiency shall submit for approval by the APCO the proposed key system operating parameters and frequency of the monitoring and recording not later than July 1, 2013, and

5.10.3 An operator of an engine complying with Section 5.7.6 shall perform an annual source test unless a more frequent sampling and reporting period is included in the Permit-to-Operate. Source tests shall be performed in accordance with the test methods in Section 6.4.

5.11 Permit-Exempt Equipment Registration Requirements

The operator of an engine used exclusively in agricultural operations shall register such engine pursuant to Rule 2250 (Permit-Exempt Equipment Registration), except for an engine that meets any one of the following conditions:

5.11.1 The engine is required to have a Permit-to-Operate pursuant to California Health and Safety Code Section 42301.16; or

5.11.2 The engine is not required to comply with Section 5.2 of this rule.

6.0 Administrative Requirements

6.1 Emission Control Plan

The operator of an engine subject to the requirements of Section 5.2 of this rule shall submit to the APCO an APCO-approvable emission control plan of all actions to be taken to satisfy the emission requirements of Section 5.2 and the compliance schedules of Section 7.0. If there is no change to the previously-approved emission control plan, the operator shall submit a letter to the District indicating that the previously approved plan is still valid.

6.1.1 The requirement to submit an emission control plan shall apply to the following engines:

6.1.1.1 Engines that have been retrofitted with an exhaust control device, except those certified per Section 9.0;

6.1.1.2 Engines subject to Section 8.0;

6.1.1.3 An AO spark-ignited engine that is subject to the requirements of Section 8.0;

6.1.1.4 An AO spark-ignited engine that has been retrofitted with a catalytic emission control and is not subject to the requirements of Section 8.0.

6.1.2 Such emission control plan shall contain the following information, as applicable for each engine:

6.1.2.1 Permit-to-Operate number, Authority-to-Construct number, or Permit-Exempt Equipment Registration number,
6.1.2.2 Engine manufacturer,
6.1.2.3 Model designation and engine serial number,
6.1.2.4 Rated brake horsepower,
6.1.2.5 Type of fuel and type of ignition,
6.1.2.6 Combustion type: rich-burn or lean-burn,
6.1.2.7 Total hours of operation in the previous one-year period, including typical daily operating schedule,
6.1.2.8 Fuel consumption (cubic feet for gas or gallons for liquid) for the previous one-year period,
6.1.2.9 Stack modifications to facilitate continuous in-stack monitoring and to facilitate source testing,
6.1.2.10 Type of control to be applied, including in-stack monitoring specifications,
6.1.2.11 Applicable emission limits,

6.1.2.12 Documentation showing existing emissions of NOx, VOC, and CO, and

6.1.2.13 Date that the engine will be in full compliance with this rule.

6.1.3 The emission control plan shall identify the type of emission control device or technique to be applied to each engine and a construction/removal schedule, or shall provide support documentation sufficient to demonstrate that the engine is in compliance with the emission requirements of this rule.

6.1.4 For an engine being permanently removed from service, the emission control plan shall include a letter of intent pursuant to Section 7.2.

6.2 Recordkeeping

6.2.1 The operator of an engine subject to the requirements of Section 5.2 of this rule shall maintain an engine operating log to demonstrate compliance with this rule. This information shall be retained for a period of at least five years, shall be readily available, and be made available to the APCO upon request. The engine operating log shall include, on a monthly basis, the following information:

6.2.1.1 Total hours of operation,

6.2.1.2 Type of fuel used,

6.2.1.3 Maintenance or modifications performed,

6.2.1.4 Monitoring data,

6.2.1.5 Compliance source test results, and

6.2.1.6 Any other information necessary to demonstrate compliance with this rule.

6.2.1.7 For an engine subject to Section 8.0, the quantity (cubic feet of gas or gallons of liquid) of fuel used on a daily basis.

6.2.2 The data collected pursuant to the requirements of Section 5.8 and Section 5.9 shall be maintained for at least five years, shall be readily available, and made available to the APCO upon request.

6.2.3 An operator claiming an exemption under Section 4.2 or Section 4.3 shall maintain annual operating records. This information shall be retained for at least five years, shall be readily available, and provided to the APCO upon request. The records shall include, but are not limited to, the following:

6.2.3.1 Total hours of operation,

6.2.3.2 The type of fuel used,

6.2.3.3 The purpose for operating the engine,

6.2.3.4 For emergency standby engines, all hours of non-emergency and emergency operation shall be reported, and

6.2.3.5 Other support documentation necessary to demonstrate claim to the exemption.

6.3 Compliance Testing

The operator of an engine subject to the requirements of Section 5.2 or the requirements of Section 8.0 shall comply with the following requirements:

6.3.1 The requirements of Section 6.3.2 through Section 6.3.4 shall apply to the following engines:

6.3.1.1 Engines that have been retrofitted with an exhaust control device, except those certified per Section 9.0;

6.3.1.2 Engines subject to Section 8.0;

6.3.1.3 An AO spark-ignited engine that is subject to the requirements of Section 8.0;

6.3.1.4 An AO spark-ignited engine that has been retrofitted with a catalytic emission control and is not subject to the requirements of Section 8.0.

6.3.2 Demonstrate compliance with applicable limits, ppmv or percent reduction, in accordance with the test methods in Section 6.4, as specified below:

6.3.2.1 By the applicable date specified in Section 5.2, and at least once every 24 months thereafter, except for an engine subject to Section 6.3.2.2.

6.3.2.2 By the applicable date specified in Section 5.2 and at least once every 60 months thereafter, for an AO spark-ignited engine that has been retro-fitted with a catalytic emission control device.

6.3.2.3 A portable NOx analyzer may be used to show initial compliance with the applicable limits/standards in Section 5.2 for AO spark-ignited engines, provided the criteria specified in Sections 6.3.2.3.1 to 6.3.2.3.5 are met, and a source test is conducted in accordance with Section 6.3.2 within 12 months from the required compliance date.

6.3.2.3.1 A minimum of 15 minutes of runtime must be measured with data recorded at a minimum of 15, evenly spaced time intervals. Compliance is to be determined with the arithmetic average of the oxygen-corrected data;

6.3.2.3.2 The analyzer shall be calibrated, maintained, and operated in accordance with the manufacturer's specifications and recommendations or a protocol approved by the APCO. Analyzer calibration records shall be made available at the District's request;

6.3.2.3.3 The analyzer shall be checked with EPA protocol span gas at the beginning and end of each test day. The results of these checks shall be recorded and copies submitted to the District with each engine test. If the analyzer exhibits more than a 10% deviation from the span check, the instrument must be re-calibrated. Any analysis performed prior to an end-of-day span check failure shall be void;

6.3.2.3.4 The test results of each engine, including span check results, shall be submitted to the District within 30 days of the test date. Test results shall clearly identify the engine tested including operator, location, permit or registration number, manufacturer, model, and serial number; and

6.3.2.3.5 The analyzer utilized for each check shall be clearly identified in the material submitted with the test results. Identification shall include manufacturer and serial number of the analyzer used, and the last calibration date.

6.3.3 Conduct emissions source testing with the engine operating either at conditions representative of normal operations or conditions specified in the Permit-to-Operate or Permit-Exempt Equipment Registration. For emissions source testing performed pursuant to Section 6.3.2 for the purpose of determining compliance with an applicable standard or numerical limitation, the arithmetic average of three (3) 30-consecutive-minute test runs shall apply. If two (2) of three (3) runs are above an applicable limit, the test cannot be used to demonstrate compliance with an applicable limit. VOC shall be reported as methane. VOC, NOx, and CO

concentrations shall be reported in ppmv, corrected to 15 percent oxygen. For engines that comply with a percent reduction limit, the percent reduction of NOx emissions shall also be reported.

6.3.4 In addition to other information, the source test protocol shall describe which critical parameters will be measured and how the appropriate range for these parameters shall be established. The range for these parameters shall be incorporated into the I&M plan.

6.3.5 Engines that are limited by Permit-to-Operate or Permit-Exempt Equipment Registration condition to be fueled exclusively with PUC quality natural gas shall not be subject to the reoccurring source test requirements of Section 6.3.2 for VOC emissions.

6.3.6 Representative Testing

For spark-ignited engines, in lieu of compliance with the applicable requirements of Section 6.3.2, compliance with the applicable emission limits in Section 5.2 shall be demonstrated by submittal of annual emission test results, within 30 days of the test date, to the District, from a unit or units that represents a specified group of units, provided all of the following requirements are satisfied:

6.3.6.1 The units are located at the same stationary source;

6.3.6.2 The units were produced by the same manufacturer, have the same model number or other manufacturer's designation in common, and have the same rated capacity and operating specifications;

6.3.6.3 The units are operated and maintained in a similar manner; and

6.3.6.4 At least 20% of the total number of units are tested during each annual test cycle.

6.3.6.5 The District, based on documentation submitted by the stationary source:

6.3.6.5.1 Determines that the margin of compliance for the identical units tested is significant and can be maintained on an on-going basis; or

6.3.6.5.2 Determines based on a review of sufficient emissions data that, though the margin of compliance is not

substantial, other factors allow for the determination that the variability of emissions for identical tested units is low enough for confidence that the untested unit will be in compliance. These factors may include, but are not limited to, the following:

6.3.6.5.2.1 Historical records at the tested unit showing consistent invariant load;

6.3.6.5.2.2 Fuel characteristics yielding low variability and therefore assurance that emissions will be constant and below allowable levels;

6.3.6.5.2.3 Statistical analysis of a robust emissions data set demonstrating sufficiently low variability to convey assurance that the margin of compliance, though small, is reliable.

6.3.6.6 Should any of the representative units exceed the required emission limits, or if the District notifies the operator that the criteria in Sections 6.3.6.1 through 6.3.6.5 have not been fulfilled, each of the units in the group shall individually demonstrate compliance by emissions testing. Failure to complete emissions testing within 90 days of the failed test shall result in the untested units being in violation of this rule. After compliance with the requirements of this section has been demonstrated, subsequent source testing shall be performed pursuant to Sections 6.3.2 or 6.3.6.

6.4 Test Methods

Compliance with the requirements of Section 5.2 shall be determined, as required, in accordance with the following test procedures or any other method approved by EPA and the APCO:

6.4.1 Oxides of nitrogen - EPA Method 7E, or ARB Method 100.

6.4.2 Carbon monoxide - EPA Method 10, or ARB Method 100.

6.4.3 Stack gas oxygen - EPA Method 3 or 3A, or ARB Method 100.

6.4.4 Volatile organic compounds - EPA Method 25A or 25B, or ARB Method 100. Methane and ethane, which are exempt compounds, shall be excluded from the result of the test.

6.4.5 Operating horsepower determination - any method approved by EPA and the APCO.

6.4.6 SOx Test Methods

6.4.6.1 Oxides of sulfur - EPA Method 6C, EPA Method 8, or ARB Method 100.

6.4.6.2 Determination of total sulfur as hydrogen sulfide (H_2S) content - EPA Method 11 or EPA Method 15, as appropriate.

6.4.6.3 Sulfur content of liquid fuel - American Society for Testing and Materials (ASTM) D 6920-03 or ASTM D 5453-99.

6.4.6.4 The SOx emission control system efficiency shall be determined using the following:

$$\% \text{ Control Efficiency} = [(C_{SO2,\ inlet} - C_{SO2,\ outlet}) / C_{SO2,\ inlet}] \times 100$$

Where:

$C_{SO2,\ inlet}$ = concentration of SOx (expressed as SO_2) at the inlet side of the SOx emission control system, in lb/Dscf

$C_{SO2,\ outlet}$ = concentration of SOx (expressed as SO_2) at the outlet side of the SOx emission control system, in lb/Dscf

6.4.7 The Higher Heating Value (hhv) of the fuel shall be determined by one of the following test methods:

6.4.7.1 ASTM D 240-02 or ASTM D 3282-88 for liquid hydrocarbon fuels.

6.4.7.2 ASTM D 1826-94 or ASTM 1945-96 in conjunction with ASTM D 3588-89 for gaseous fuel.

6.5 Inspection and Monitoring (I&M) Plan

The operator of an engine that is subject to the requirements of Section 5.2 or the requirements of Section 8.0 shall submit to the APCO for approval, an I&M plan that specifies all actions to be taken to satisfy the following requirements and the requirements of Section 5.8. The actions to be identified in the I&M plan shall include, but are not limited to, the information specified below. If there is no change to the previously approved I&M plan, the operator shall submit a letter to the District indicating that previously approved plan is still valid.

6.5.1 The requirements of Section 6.5.2 through Section 6.5.9 shall apply to the following engines:

6.5.1.1 Engines that have been retrofitted with an exhaust control device, except those certified per Section 9.0;

6.5.1.2 Engines subject to Section 8.0;

6.5.1.3 An AO spark-ignited engine that is subject to the requirements of Section 8.0.

6.5.1.4 An AO spark-ignited engine that has been retrofitted with a catalytic emission control and is not subject to the requirements of Section 8.0.

6.5.2 Procedures requiring the operator to establish ranges for control equipment parameters, engine operating parameters, and engine exhaust oxygen concentrations that source testing has shown result in pollutant concentrations within the rule limits.

6.5.3 Procedures for monthly inspections as approved by the APCO. The applicable control equipment parameters and engine operating parameters will be inspected and monitored monthly in conformance with a regular inspection schedule listed in the I&M plan.

6.5.4 Procedures for the corrective actions on the noncompliant parameter(s) that the operator will take when an engine is found to be operating outside the acceptable range for control equipment parameters, engine operating parameters, and engine exhaust NOx, CO, VOC, or oxygen concentrations.

6.5.5 Procedures for the operator to notify the APCO when an engine is found to be operating outside the acceptable range for control equipment

parameters, engine operating parameters, and engine exhaust NOx, CO, VOC, or oxygen concentrations.

6.5.6 Procedures for preventive and corrective maintenance performed for the purpose of maintaining an engine in proper operating condition.

6.5.7 Procedures and a schedule for using a portable NOx analyzer to take NOx emission readings pursuant to Section 5.8.9.

6.5.8 Procedures for collecting and recording required data and other information in a form approved by the APCO including, but not limited to, data collected through the I&M plan and the monitoring systems described in Sections 5.8.1 and 5.8.2. Data collected through the I&M plan shall have retrieval capabilities as approved by the APCO.

6.5.9 Procedures for revising the I&M plan. The I&M plan shall be updated to reflect any change in operation. The I&M plan shall be updated prior to any planned change in operation. An engine operator that changes significant I&M plan elements must notify the District no later than seven days after the change and must submit an updated I&M plan to the APCO no later than 14 days after the change for approval. The date and time of the change to the I&M plan shall be recorded in the engine operating log. For new engines and modifications to existing engines, the I&M plan shall be submitted to and approved by the APCO prior to issuance of the Permit-to-Operate or Permit-Exempt Equipment Registration. The operator of an engine may request a change to the I&M plan at any time.

7.0 Compliance Schedules

7.1 Loss of Exemption

The operator of an engine which becomes subject to the emission limits/standards of this rule through loss of exemption shall not operate the subject engine, except as required for obtaining a new or modified Permit-to-Operate or Permit-Exempt Equipment Registration for the engine, until the operator demonstrates that the subject engine is in full compliance with the requirements of this rule.

7.2 Permanent Removal of an Engine

The operator of an engine who elects to permanently remove the engine from service shall comply with all of the following conditions:

7.2.1 Comply with all applicable requirements of this rule until the engine is permanently removed from service;

7.2.2 Submit a letter to the APCO no later than 14 days before the engine is permanently removed from service, stating the intent to permanently remove the engine from service. The engine removal letter can be submitted with the emission control plan, if any; and

7.2.3 Permanently remove the engine from service and officially surrender the Permit-to-Operate or Permit-Exempt Equipment Registration, if any, to the APCO no later than 30 days after the engine is permanently removed from service.

7.3 AO Compression-Ignited Engine

7.3.1 The operator of an AO compression-ignited engine that is subject to Section 5.2 and that is required to submit an Authority-to-Construct application in order to comply with the requirements of this rule, shall submit the Authority-to-Construct application, and any required Emission Control Plan or I&M Plan, no later than six months before the engine is required to be in compliance with the requirements of Section 5.2.

7.3.2 The operator of an AO compression-ignited engine that is subject to Section 5.2 and that is required to submit a Permit-Exempt Equipment Registration application in order to comply with the requirements of Rule 4702, shall submit the Permit-Exempt Equipment Registration application, and any required Emission Control Plan or I&M Plan, no later than three months before the engine is required to be in compliance with the requirements of Section 5.2.

7.3.3 Unless otherwise specified, the operator of an engine that is subject to the requirements of Section 5.2 of Rule 4702 shall be in full compliance with Rule 4702 by the indicated dates in Table 4.

7.4 Non-AO Compression-Ignited Engine

7.4.1 The operator of a non-AO compression-ignited engine that is subject to Section 5.2 and that is required to submit an Emission Control Plan, an I&M Plan, or an Authority-to-Construct in order to comply with rule requirements, shall submit such document(s) no later than six months before the engine is required to be in compliance with the requirements of Section 5.2.

7.4.2 Unless otherwise specified, the operator of an engine that is subject to the requirements of Section 5.2 shall be in full compliance with Rule 4702 by the indicated dates in Table 4.

7.5 Non-AO Spark-Ignited Engine

7.5.1 An operator with non-AO spark-ignited engines at a stationary source subject to Table 2 or Section 8.0 emission limits, SOx control requirements of Section 5.7, and the SOx monitoring requirements of Section 5.10 shall comply with the schedule specified in Table 5.

Table 5 Compliance Schedule for Non-AO Spark-Ignited Engines Subject to Table 2 Emission Limits, and SOx Control and Monitoring Requirements

Engines to be in Compliance at a Stationary Source	Emission Control Plan	Authority to Construct and Inspection and Monitoring Plan	Full Compliance
Operator with a single engine at a stationary source			
Single Engine	1/1/12	1/1/13	1/1/14
Operator with at least two engines, but less than 12 engines at a stationary source			
33% or more of the engines subject to Table 2 emission limits as of August 18, 2011	7/1/12	1/1/13	1/1/14
66% or more of the engines subject to Table 2 emission limits as of August 18, 2011	7/1/12	1/1/14	1/1/15
100% of the engines subject to Table 2 emission limits	7/1/12	1/1/15	1/1/16
Operator with at least 12 engines at a stationary source			
25% or more of the engines subject to Table 2 emission limits as of August 18, 2011	7/1/12	1/1/13	1/1/14
50% or more of the engines subject to Table 2 emission limits as of August 18, 2011	7/1/12	1/1/14	1/1/15
75% or more of the engines subject to Table 2 emission limits as of August 18, 2011	7/1/12	1/1/15	1/1/16
100% of the engines subject to Table 2 emission limits	7/1/12	1/1/16	1/1/17

7.5.2 As shown in Table 5, the column labeled:

7.5.2.1 "Emission Control Plan" identifies the date by which the operator shall submit an emission control plan pursuant to the applicable provisions of Section 6.1. The emission control plan shall identify all the Non-AO spark-ignited engines subject to Table 2 emission limits, and SOx control and monitoring requirements. The emission control plan shall identify all the steps to be taken to comply with this rule. If there is no change to the previously approved emission control plan, the operator does not need to submit a new emission control plan. However, the operator shall submit a letter to the District indicating that previously approved plan is still valid.

7.5.2.2 "Authority to Construct and Inspection and Maintenance Plan" identifies the date by which the operator shall submit an Authority to Construct (if needed) and an Inspection and Monitoring Plan as specified in the applicable provisions of Section 6.5 for each engine subject to Table 2 emission limits, SOx control and monitoring requirements. If there is no change to the previously approved I&M plan, the operator does not need to submit a new I&M Plan. However, the operator shall submit a letter to the District indicating that previously approved I&M plan is still valid.

7.5.2.3 "Full Compliance" identifies the date by which the operator shall demonstrate that each unit is in compliance with Table 2 emission limits, SOx control and monitoring requirements.

7.6 Operator of Non-AO Spark-Ignited Engine Who Elects to Pay Fees

In lieu of complying with Table 2 NOx emission limits, the operator of a non-AO spark-ignited engine who elects to pay annual fees under Section 5.2.2.2 and Section 5.6 shall comply with the following requirements:

7.6.1 By the date specified in Table 5, submit an Emission Control Plan which includes the following information:

7.6.1.1 Number of engines at a stationary source that will comply under Section 5.2.2.2,

7.6.1.2 Location of each engine,

7.6.1.3 Engine manufacturer, model designation, engine serial number, and Permit-to-Operate number, and

7.6.1.4 Each engine's rated brake horsepower, fuel type, and type of ignition.

7.6.2 The total annual fees shall be paid to the District in the following manner:

7.6.2.1 Payment shall be paid no later than June 30 of each year, for the emissions of the previous calendar year,

7.6.2.2 The first payment is due to the District no later than June 30 of the year in which full compliance is required for the specified percent of engines at a stationary source as specified in Table 5 that the operator has opted to pay the annual fees,

7.6.2.3 Should June 30 fall on a day when the District is closed, the payment shall be made by the next District working day after June 30, and

7.6.2.4 Payments shall continue annually until the engine either is permanently removed from use in the San Joaquin Valley Air Basin and the Permit-to-Operate is surrendered or the operator demonstrates compliance with the applicable Table 2 emission limits.

7.6.2.5 The emissions fee for units that operate for less than the full calendar year before demonstrating compliance under Section 5.2, shall be based on the actual fuel used during the portion of the calendar year prior to demonstrating compliance or removing the unit from operation within the San Joaquin Valley Air Basin.

8.0 Alternative Emission Control Plan (AECP)

An operator may comply with the NOx emission requirements of Section 5.2 for a group of engines by meeting the requirements below. An operator that is subject to the requirements below shall also comply with all the applicable requirements of Sections 5.0, 6.0, and 7.0. Only engines subject to Section 5.2 are eligible for inclusion in an AECP.

8.1 During any seven (7) consecutive calendar day period, the operator shall operate all engines in the AECP to achieve an actual aggregate NOx emission level that is not greater than 90 percent of the NOx emissions that would be obtained by controlling the engines to comply individually with the NOx limits in Section 5.2. The operator shall operate engines in the AECP such that

$$AE_{Actual} \leq 0.90\ (AE_{Limit})$$

and shall notify the APCO within 24 hours of any violation of this section.

8.1.1 The actual aggregate NOx emissions (AE_{Actual}) is the sum of the actual NOX emissions, over a seven (7) consecutive calendar day period, from all engines in the AECP which were actually operated during that period. AE_{Actual} shall be calculated as follows:

$$AE_{Actual} = \sum_{i} (EF_i)(F_i)(k_i)$$

where:

i identifies each engine in the AECP.

EF_i is the NOx emission factor of the engine established pursuant to Section 8.2 and approved by the APCO.

F_i is the actual total fuel used by the engine during the seven (7) consecutive calendar day period.

k_i is a constant used to convert an engine's fuel use and NOx emission factor to the amount of NOx emitted. k_i is dependent on the engine and the pollutant emitted. Calculation of k_i shall be accomplished using 40 CFR Part 60, Appendix A, Method 19, or an equivalent method approved by EPA, ARB and the APCO.

8.1.2 The estimated aggregate NOx emissions limit (AE_{Limit}) is the sum of the NOx emissions, over a seven (7) consecutive calendar day period, for the same engines in the AECP which were actually operated during the same period as considered in Section 8.1.1, calculated with the NOx limits of Section 5.2 and the actual fuel usage during that seven (7) consecutive calendar day period. AE_{Limit} shall be calculated as follows:

$$AE_{Limit} = \sum_{i} (EL_i)(F_i)(k_i)$$

where:

i = identifies each engine in the AECP.

EL_i = the NOx emission limit from Section 5.2 for each engine.

F_i = the actual total fuel used by the engine during the seven (7) consecutive calendar day period.

k_i = a constant used to convert an engine's fuel use and NOx emission limit to the amount of NOx emitted. k_i is dependent on the engine and the pollutant emitted. Calculation of k_i shall be accomplished using 40 CFR Part 60, Appendix A, Method 19, or an equivalent method approved by EPA, ARB and the APCO.

8.1.3 Only engines in the AECP which were operated during the seven (7) consecutive calendar day period shall be included in the calculations of AE_{Limit} and AE_{Actual}.

8.1.4 The operator shall, at least one time each day the AECP is used, calculate and record the actual aggregate NOx emissions (AE_{Actual}) and the aggregate NOx emission limit (AE_{Limit}) for the preceding seven (7) consecutive calendar day period.

8.2 The operator shall establish a NOx emission factor limit for each engine. The established NOx emission factor of an engine shall be no less than the NOx emission factor of the engine from the most recent source test conducted pursuant to Section 6.3 and approved by the APCO. The operator shall not operate an AECP engine in such a manner that NOx emissions exceed the established NOx emission factor of the engine.

8.3 The operator shall submit the AECP to the APCO at least 18 months before compliance with the emission limits in Section 5.2 is required. The AECP shall:

8.3.1 Not be implemented prior to APCO approval.

8.3.2 Be enforceable on a daily basis by the District.

8.3.3 Contain any information necessary to determine eligibility of the engines for alternative emission control, including, but not limited to:

8.3.3.1 A list of engines subject to the AECP. All engines in an AECP shall be under the operational control of a single operator and shall be located at a single stationary source,

8.3.3.2 The NOx emission factor established by the engine operator for each engine pursuant to Section 8.2, and

8.3.3.3 The estimated aggregate NOx emissions calculated according to Section 8.1.2.

8.3.4 Present the methodology for determining equivalency of actual NOx emissions under the proposed AECP as compared to the estimated NOx emissions allowed by this rule.

8.3.5 Detail the method of recording and verifying daily compliance with the AECP.

8.3.6 Demonstrate to the satisfaction of the APCO that the difference between the NOx emission limits of this rule and any lower actual NOx emissions will not be used to increase emissions from the same or another source.

8.3.7 Demonstrate that the engines subject to the requirements of Section 5.2 are in compliance with or on an approved schedule for compliance with all applicable District rules.

8.4 The operator shall submit an updated or modified AECP for approval by the APCO prior to any of the following:

8.4.1 Modification of the engine(s) which would require an Authority-to-Construct;

8.4.2 When new or amended rules are adopted which regulate the emissions from the engines; or

8.4.3 When the NOx emission factor established by the engine operator for an engine pursuant to Section 8.2 is modified.

8.5 In addition to the records kept pursuant to Section 6.2, the operator shall maintain records, on a daily basis, of the parameters needed to demonstrate compliance with the applicable NOx emission limits when operating under the AECP. These records shall be retained for at least five years, shall be readily available, and be made available to the APCO upon request. The records shall include, but are not limited to, the following for each engine unless otherwise indicated:

8.5.1 Total hours of operation,

8.5.2 Type and quantity (cubic feet of gas or gallons of liquid) of fuel used,

8.5.3 The actual NOx emissions limits to be included in the calculation of AE_{Actual} pursuant to Section 8.1.1,

8.5.4 The actual aggregate NOx emissions (AE_{Actual}) for all the engines in the AECP calculated pursuant to Section 8.1.1,

8.5.5 The estimated NOx emissions limits to be included in the calculation of AE_{Limit} pursuant to Section 8.1.2,

8.5.6 The estimated aggregate NOx emissions (AE_{Limit}) for all the engines in the AECP calculated pursuant to Section 8.1.2,

8.5.7 The comparison of the actual aggregate NOx emissions (AE_{Actual}) for all the engines in the AECP and 90 percent of the estimated aggregate NOx emissions (AE_{Limit}) for all the engines in the AECP to demonstrate compliance with Section 8.1, and

8.5.8 Any other parameters needed to demonstrate daily compliance with the applicable NOx emission limits when operating under the AECP.

8.6 For the purpose of determining the quantity of spark-ignited engines in compliance pursuant to Section 7.5, a spark-ignited engine in an AECP shall not be considered to be in compliance until all spark-ignited engines in the AECP that have been designated to meet more stringent NOx emission factors pursuant to Section 8.2 are in compliance with the rule.

9.0 Exhaust Control System Certification Requirements

9.1 To be considered for APCO certification, the manufacturer or operator shall comply with all of the following requirements:

9.1.1 Certification shall be based upon the emission source testing results of a specific exhaust control system,

9.1.2 A source testing protocol shall be submitted in accordance with the provisions of Rule 1081 (Source Sampling) for approval by the APCO prior to conducting the source test. The source testing protocol approved by the APCO shall be strictly adhered to during certification source testing,

9.1.3 Source testing shall be conducted over the range of operating parameters for which the unit(s) will be operated,

9.1.4 The source testing results shall demonstrate compliance with the emission limits of this rule for each model of exhaust control system(s) to be certified,

9.1.5 The source testing procedure and reports shall be prepared by an ARB-approved independent testing laboratory, and shall contain all the elements identified in the APCO-approved source testing protocol,

9.1.6 Source testing shall be conducted no more than 90 days prior to the date of submission of request for certification by the APCO, and

9.1.7 Any additional supporting information required by the APCO to address other performance parameters.

9.2 The manufacturer or operator requesting certification shall submit to the APCO the following information:

9.2.1 Copies of the source testing results conducted pursuant to the requirements of Section 9.1, and other pertinent technical data to demonstrate compliance with the emission limits of this rule,

9.2.2 The applicant shall sign and date the statement attesting to the accuracy of all information in the statement, and

9.2.3 Name and address of the exhaust control system manufacturer or operator, brand name of the exhaust control unit, model number, and description of model of system(s) being certified.

9.3 The APCO will only approve an application for certification to the extent that the requirements of Sections 9.1 through 9.2 are met and the source testing results demonstrate that the emission limits of this rule are met.

9.4 The APCO-approved certification is valid only for the range of operating parameters and conditions for which certification is issued.

9.5 The APCO shall publish a list of certified exhaust control systems after the certification process is completed.

1) Calculate flow rate in moles.

Given

BioGas flow rate = 30 scf/min for flare

1 lb-mol = 453.592 mol

Standard Temp = 68°F = 527.67°R

Standard Pressure = 1 ATM

BSFC = 6,754 BTU/(hp·hr)

1 lb = 453.9 g

1) $PV = nRT$

$$n = \frac{PV}{RT}$$

$$= \left(\frac{1\,ATM}{1}\right)\left(\frac{30\,scf}{min}\right)\left(\frac{R\ lb\text{-}mol}{0.730241\,ft^3 ATM}\right)\left(\frac{1}{527.67\,R}\right)\left(\frac{453.592\,mol}{lb\text{-}mol}\right)$$

$$= 35.31489\,\frac{mol}{min}$$

2) Calculate mol of H_2S in gas stream

50 ppm H_2S

$$(50\,ppm)(1\times10^{-6})(35.31489\,mol/min) = 1.7657E-3\ mol/min$$

3) Calculate SO_x in exhaust stream in lb/min

Given

SO_x is measured as SO_2

100% conversion of H_2S to SO_2

Molecular Weight of SO_2 = 63.962 g/mol

$$\left(\frac{1.7657E-3\,mol\,H_2S}{min}\right)\left(\frac{1\,mol\,SO_2}{1\,mol\,H_2S}\right)\left(\frac{63.962\,g}{mol\,SO_2}\right)\left(\frac{1\,lb}{453.592\,g}\right) = \frac{2.4899E-4\,lb}{min}$$

4) Calculate SOx in exhaust stream in lb/mmbtu

$$\left(\frac{2.4899E-4\,lb}{min}\right)\left(\frac{1\,min}{30\,scf}\right)\left(\frac{1\,SCF}{557\,BTU}\right)\left(\frac{1E6\,BTU}{1\,MMBTU}\right) = \boxed{1.490E-2\ lb/mmBTU\ of\ SO_x}$$

$$\left(\frac{1.490E-2\,lb}{MMBTU}\right)\times\left(\frac{453.9\,g}{lb}\right)\times\left(\frac{6,754\,BTU}{HP\cdot HR}\right)\times\left(\frac{1\,MMBTU}{1E6\,BTU}\right) = \boxed{4.57E-2\,g}$$

$\boxed{hp\cdot hr}$ of SO_x @ 50 PPM of H_2S