

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 1
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

TITLE V PERMIT (REV 05) EVALUATION

Applicant's Name Eastern Municipal Water District (EMWD)
San Jacinto Valley Regional Water Reclamation Facility (SJVRWRF)

Mailing Address 2270 Trumble Road
P.O. Box 8300
Perris, CA 92580-8300

Equipment Location 770 N Sanderson Avenue
San Jacinto, CA 92582

FACILITY ID 019159
APPLICATION 504394- Title V De Minimis Significant Permit Revision

Equipment Description
APPLICATION 504395

ALTERATION OF:

INTERNAL COMBUSTION ENGINE, CATERPILLAR, MODEL NO. G379 SI-TA-HCR, SERIAL NO. 72B01430, EIGHT CYLINDERS, SPARK IGNITION, 260 BHP, TURBOCHARGED AND AFTERCOOLED, DIGESTER GAS FIRED, WITH PRE-STRATIFIED CHARGE SYSTEM, AIR TO FUEL RATIO CONTROLLER, CUSTOM, AND HEAT RECOVERY SYSTEM DRIVING AN AERATION BLOWER.

BY ADDITION OF:

ENGINE NO. 41
LEAN BURN
VENTING TO A NOXTECH CONTROL SYSTEM

BY REMOVAL OF:

SERIAL NO. 72B1430
PRE-STRATIFIED CHARGE SYSTEM

APPLICATION 504396

ALTERATION OF:

INTERNAL COMBUSTION ENGINE, ENGINE NO. 113, CATERPILLAR, MODEL NO. G379 SI-NA-HCR, RICH BURN, FOUR-STROKE CYCLE, 8 CYLINDER, 330 B.H.P., NATURAL GAS FIRED, WITH AN AIR TO FUEL RATIO CONTROLLER, ALTRONIC EPC-100, AND JOHNSON MATTHEY NON-SELECTIVE CATALYTIC REACTOR, MODEL MX-40, DRIVING AN AERATION BLOWER.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 2
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

BY ADDITION OF:

SPARK IGNITION
VENTING TO A NOXTECH CONTROL SYSTEM

BY REMOVAL OF:

JOHNSON MATTHEY NON-SELECTIVE CATALYTIC REACTOR, MODEL MX-40

APPLICATION 504398

AIR POLLUTION CONTROL SYSTEM CONSISTING OF:

1. ONE NON-CATALYTIC REACTOR UNIT, NOXTECH, WITH A CENTRAL REACTOR UNIT SURROUNDED BY ANNULAR HEAT EXCHANGE TUBES.
2. ONE PRE-HEATER BURNER, WR MAXON, NATURAL GAS AND DIGESTER GAS FIRED, RATED AT 1,300,000 BTU PER HOUR.
3. UREA INJECTION SYSTEM.
4. SKID-MOUNTED DUPLEX BLOWER ASSEMBLY, WITH TWO BLOWERS (ONE FUNCTIONAL AND ONE BACK-UP), EACH AT 5 H.P. WITH DISCHARGE OF 1000 SCFM.
5. ONE NOXTECH MONITORING AND CONTROL UNIT, CONSISTING OF A NOX ANALYZER THAT MONITORS NOX LEVELS AT THE OUTLET OF THE NOXTECH REACTOR, AN OXYGEN ANALYZER, AND A PLC CONTROL UNIT THAT PROVIDES FEEDBACK CONTROL.
6. EXHAUST SYSTEM VENTING THREE INTERNAL COMBUSTION ENGINES (PERMITTED UNDER APPLICATION NUMBERS 504395, 504396, AND 504502).

APPLICATION 504502

ALTERATION OF:

INTERNAL COMBUSTION ENGINE, ENGINE NO. 33, CATERPILLAR, MODEL NO. G379, SERIAL NO. 72B456, EIGHT CYLINDERS, SPARK IGNITION, 330 BHP, NATURALLY ASPIRATED, NATURAL GAS FIRED, WITH A MIRATECH EQUINOX CATALYTIC SILENCER MODEL E1300-6-D, AN AIR/FUEL RATIO CONTROLLER, ALTRONIC EPC-100, AND A WASTE HEAT RECOVERY SYSTEM, DRIVING AN AIR BLOWER.

BY ADDITION OF:

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 3
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

RICH BURN
VENTING TO A NOXTECH CONTROL SYSTEM

BY REMOVAL OF:

SERIAL NO. 72B456
MIRATECH EQUINOX CATALYTIC SILENCER MODEL E1300-6-D

APPLICATION 511886

STORAGE TANK, FIXED ROOF, AQUEOUS UREA, ABOVE GROUND, 7'-10" DIA. X 16'-0.25" H., CYLINDRICAL, 5,000 GALLON CAPACITY.

Background/Process Description

Eastern Municipal Water District (EWMD) A/N 504394 was submitted for Title V permit revision (05) on December 10, 2009. The Title V permit revision includes five permit applications. Two (2) applications (504395 and 504396) were originally submitted for New Construction of stationary natural gas and digester fired engines. But A/Ns 504395 and 504396 were updated by the applicant to modify two existing stationary internal combustion engines to be vented to a NOx emission control system. One (1) application 504398 was submitted for New Construction of a NOxTech NOx emission control system for the engines. One (1) application (504502) was submitted for Proposed Alteration/Modification to Permitted Equipment of an existing stationary natural gas fired engine. One (1) application (511886) was submitted for New Construction for a 5,000 gallon aqueous urea storage tank. This project is being initiated to ensure that the engines will comply with the emission limits under Rule 1110.2 for natural gas and digester gas-fired engines (Table II- July 1, 2011 limits). The equipment will operate a maximum of 24 hr/day, 7 day/week, 52 weeks/year. The proposed equipment will be located at Eastern Municipal Water District (EWMD) San Jacinto Valley Regional Water Reclamation Facility (SJVRWRF). SJVRWRF collects and treats municipal sewage and produces recycled water for a 167 square mile area including the cities of Hemet and San Jacinto. The facility uses primary and secondary treatment processes.

A/N 504395 is to modify Permit G4347, A/N 485856, which is Engine No. 41, a 260 BHP Caterpillar engine that is digester gas fired only, to be vented to the NOxTech control system. The engine under A/N 504395 was manufactured in 1986. A/N 504396 is to modify Permit G4345, A/N 485853, which is Engine No. 113, a 330 BHP Caterpillar engine that is natural gas fired only, to be vented to the NOxTech control system. The engine under A/N 504396 was manufactured in 1987. A/N 504502 is to modify Permit G4346, A/N 485855, which is Engine No. 33, a 330 BHP Caterpillar engine that is natural gas fired only, to be vented to the NOxTech control system. The engine under A/N 504502 was manufactured in 1969. All three engines will be used to drive aeration blowers in the aerobic sewage treatment plant.

A/N 504398 was submitted for New Construction, Permit to Construct for one (1) selective non-catalytic reduction (SNCR) NOx air pollution control system. Emissions from the three above mentioned engines will be vented to this SNCR NOx air pollution control system. This NOxTech system is based on a combustion process that does not use a catalyst and generates a chemical and thermal environment that is

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION PERMIT APPLICATION EVALUATION AND CALCULATIONS	PAGES 25	PAGE 4
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
	PROCESSED BY AS08	CHECKED BY

optimum for the removal of nitrogen oxide (NOx), carbon monoxide (CO), particulate matter (PM), and unburned hydrocarbons (volatile organic compounds (VOC) from the exhaust of the internal combustion (IC) engines. A burner, in line with the exhaust, is used to initially raise the temperature of the reactor to the auto ignition point for the fuel being used. Injection of fuel is used to raise the reactor temperature (1400-1500 degrees F). Once the reactor reaches its optimum temperature for emission removal, the burner is shut down. Urea solution is injected into the reactor and controlled to reach the desired NOx levels in the treated exhaust. Carbon based emissions are also oxidized in the reactor. Exhaust from the NOxTech system is to meet the NOx, CO and VOC limits under Rule 1110.2. A/N 511886 was submitted for New Construction, Permit to Construct/ Operate for an aqueous urea (30% by weight) fixed roof storage tank used for the NOxTech system with a 5,000 gallon capacity.

The NOxTech system has one main exhaust line with three branches each with a valve to control each engine exhaust connection. For the aeration blowers to function properly two of the three engines must be operating at all times. To start up the system, two engines will be operated with their currently permitted control devices (catalyst or pre-stratified charge system), then the third engine will have its control device removed and will be connected to one branch of the NOxTech system exhaust. The NOxTech system will start up first and be brought up to 1450 degrees F using its own burner before any engine is started. When the NOxTech system is operating properly, the valve on the exhaust branch is opened and the engine will proceed to start-up. Once the third engine and NOxTech is operating properly, one of the other engines will be shut down, have its control device removed and connected to the NOxTech. When the second engine connected to the NOxTech is ready to start-up the exhaust branch valve will be opened. The same procedure is repeated for the third engine, until it is operating properly. Please note that there are exhaust bypass stacks associated with each engine exhaust that are programmed to open only during cold start to prevent backpressure to the engines and will shut right away.

There is no school within 1000 feet of any of these emission source(s). A Notice to Comply D11617 was issued on August 7, 2007 to provide the following information for Permit to Construct 446534: date the mist eliminator was ordered, final specifications submitted to AQMD, dates operated, duration of operations, quantity of digester gas consumed, and temperature of flare during operations. A Notice to Comply D04630 was issued on September 8, 2006 for the following compliance required: posting permits for flare Permit to Operate F80951, odor scrubber Permit to Operate F81078, portable flare A/N 457924, and sludge dewatering Permit to Operate F81077; place AQMD permit number on all recordkeeping forms & resubmit for approval; repair VPR recovery hose; and verify John Deere PWRD. There has been one complaint filed against the above facility in the past year (4/19/2009) regarding foul odors.

Title V revision 4, to include three ICEs, a NOx air pollution control system and a urea storage tank is considered a de minimis significant permit revision, since the cumulative emission increases of non-RECLAIM pollutants or HAPS exceed the emissions in Table 5-4 of the Draft Title V TDG March 2005 and the modification to the three engines and new installation of the air pollution control system does not result in new or additional NSPS or NESHAP requirements.

The initial Title V permit was issued February 1, 2007. Title V Revision 01 (A/N 485852) was issued September 11, 2009. Title V Revision 02 (A/N 475844) was issued January 1, 2010. Title V Revision 03 (A/N 503047) was issued March 9, 2010.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 5
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

Calculations for A/N 504395

The following information was supplied for the Caterpillar 260 BHP engine (Engine No. 41) from the most recent source test, May 12, 2009.

Fuel consumption rate = 3,092 scfh = 51.5 scfm
= 3,092 scfh x 617 Btu/scf (Digester Gas Analysis Results, 8/18/09)
= 1,907,764 Btu/hr ~ 1.908 MMBtu/hr
Exhaust flow rate = 586 dscfm

The following calculations for CO, NOx and ROG are based on the emissions from Source Test Results from May 12, 2009, previous application's emission calculations, and NOxTech Emissions Data. Assume R1 = R2. **The emission that will be used for NSR hourly and daily values will be in bold font. The emission that will be used for NSR daily average values will be in bold font.**

CO emissions (A/N 504395)

Emission based on Source Test 5/12/09: = 1.17 lbs/hr = 28.08 lbs/day

Previously permitted emission (Permit G4347, A/N 485856 & Permit F64103, A/N 416944):
2.5 g/bhp-hr x 260 bhp x 1lb/453.6g = 1.43 lbs/hr = 34.32 lbs/day

Rule 1110.2 requirement: 250 ppmvd CO @ 15% O2:

**R2 = 250 ppm @ 15% O2 x 586 dscfm x 60 min/hr x lb-mole/379x10⁶ ft³ x 28 lbs/lb-mole
= 0.65 lbs/hr = 15.60 lbs/day**

Emissions from initial commissioning: 1.1 g/bhp-hr (80 hours)
1.1 g/bhp-hr x 260 bhp x 1lb/453.6g = 0.63 lbs/hr < 0.65 lbs/hr
Assume CO = 0.65 lbs/hr for initial commissioning.

Rule 1303 BACT requirement: 2.5 g/bhp-hr = 1.43 lbs/hr > 0.65 lbs/hr

Rule 1303 Modeling Requirement (<2MMBTU), CO: 11.0 lbs/hr > 0.65 lbs/hr

NOx emissions (A/N 504395)

Emission based on Source Test 5/12/09: = 0.358 ~ 0.36 lbs/hr = 8.64 lbs/day

Previously permitted emission (Permit G4347, A/N 485856 & Permit F64103, A/N 416944):
0.60 g/bhp-hr x 260 bhp x 1lb/453.6g = 0.34 lbs/hr = 8.16 lbs/day

Rule 1110.2 requirement: 11 ppmvd NOx @ 15% O2:

**R2 = 11 ppm @ 15% O2 x 586 dscfm x 60 min/hr x lb-mole/379x10⁶ ft³ x 46 lbs/lb-mole
= 0.05 lbs/hr = 1.20 lbs/day**

Uncontrolled emissions for initial commissioning: 15.4 g/bhp-hr (80 hours)
15.4 g/bhp-hr x 260 bhp x 1lb/453.6g = 8.83 lbs/hr
24 hours/day x 365 days/year x year/12months = 730 hours/month
8.83 lbs/hr x 80 hours + 0.05 lbs/hr x 650 hours = 738.90 lbs/month

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION PERMIT APPLICATION EVALUATION AND CALCULATIONS	PAGES 25	PAGE 6
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
	PROCESSED BY AS08	CHECKED BY

738.90 lbs/months x month/30days = **24.63 lbs/day (NSR)**
24 hours/day x 365 days/year = 8760 hours/year
8.83 lbs/hr x 80 hours + 0.05 lbs/hr x 8680 hours = **1140.40 lbs/year (NSR)**

Rule 1303 BACT requirement: 0.60 g/bhp-hr = 0.34 lbs/hr \geq 0.05 lbs/hr

Rule 1303 Modeling requirement (<2MMBTU), NOx: 0.20 lbs/hr
Emission used for modeling evaluation is based on normal operation. Assume worst case emissions for 1 hour of normal operation, since the modeling required is a 1 hour average: Start-up/Shut-down
8.83 lbs/hr x hr/60min x 30min + 0.05 lbs/hr x hr/60min x 30min = 4.44 lbs/hr > 0.20 lbs/hr
Modeling analysis is required.
Emission rate: 4.44 lbs/hr x 453.6g/lb x hr/3600sec = 0.56 g/sec
Flow rate: 586 scfm x (460 + 550)/(460 + 60) = 1138 acfm
Screen3 maximum 1 hour concentration at receptor: 198.2 ug/m³
Modeled background (1 hour): 405 ug/m³ < 500 ug/m³ IN COMPLIANCE
Modeled background (annual): 46.2 ug/m³ < 100 ug/m³ IN COMPLIANCE

ROG emissions (A/N 504395)

Emission based on Source Test 5/12/09: = 0.224 lbs/hr = 5.376 lbs/day

Previously permitted emission (permit G4347, A/N 485856 & Permit F64103, A/N 416944):
0.80 g/bhp-hr x 260 bhp x 1lb/453.6g = 0.46 lbs/hr = 11.04 lbs/day

Rule 1110.2 requirement: 30 ppmvd ROG(as carbon) @ 15% O2:

**R2(as carbon) = 30 ppm @ 15% O2 x 586 scfm x 60 min/hr x lb-mole/379x10⁶ ft³ x 16 lbs/lb-mole
= 0.04 lbs/hr = 0.96 lbs/day**

Uncontrolled emissions for initial commissioning: 0.52 g/bhp-hr (80 hours)
0.52 g/bhp-hr x 260 bhp x 1lb/453.6g = 0.30 lbs/hr
24 hours/day x 365 days/year x year/12months = 730 hours/month
0.30 lbs/hr x 80 hours + 0.04 lbs/hr x 650 hours = 50.00 lbs/month
50.00 lbs/months x month/30days = **1.67 lbs/day (NSR)**
24 hours/day x 365 days/year = 8760 hours/year
0.30 lbs/hr x 80 hours + 0.04 lbs/hr x 8680 hours = **371.20 lbs/year (NSR)**

Rule 1303 BACT requirement: 0.80 g/bhp-hr = 0.46 lbs/hr > 0.04 lbs/hr

PM10 emissions (A/N 504395)

**0.011 lbs/MMBtu* x 1.908 MMBtu/hr x 0.994 PM10/PM(PM Fraction Stat. ICE-gas)
=0.02 lbs/hr = 0.48 lbs/day**

***Based on source test data from Temecula RWRf. The worst case PM10 emissions will be used for equipment emissions, which are based on digester gas (DG).**

Rule 404 PM requirement, PM: 0.196 grain/scf
0.196 grain/scf x 1lb/7000grains x 586 dscfm x 60min/hr = 0.98 lbs/hr > 0.02 lbs/hr

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 7
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

Rule 1303 Modeling requirement (<2MMBTU), PM10: 1.2 lbs/hr > 0.02 lbs/hr

SOx emissions (A/N 504395)

Previously permitted emission (Permit G4347, A/N 485856 & Permit F64103, A/N 416944):
1.05 g/bhp-hr x 260 bhp x 11b/453.6g = 0.60 lbs/hr = 14.40 lbs/day

There was 1.7 ppmv TRS as H2S measured in the digester gas or a mole percent of < 0.10%.

Please note SOx is calculated as SO2.

$$0.10 \text{ molH}_2\text{S} / 100 \text{ molDG} \times 1 \text{ molSO}_x / 1 \text{ mol H}_2\text{S} \times 64.07 \text{ lbsSO}_x / \text{molSO}_x \times \text{molDG} / 379 \text{ scf} / 617 \text{ Btu/scf} \times 1 \text{ E6Btu/MMBtu} = 0.27 \text{ lbs SO}_x / \text{MMBtu}$$

$$0.27 \text{ lbs SO}_x / \text{MMBtu}_{\text{DG}}^{**} \times \text{MMBtu}_{\text{DG}} / 1 \text{ E6Btu}_{\text{DG}} \times 617 \text{ Btu/scf} \times 3,092 \text{ scfh}_{\text{DG}} = 0.52 \text{ lbs/hr} = 12.48 \text{ lbs/day}$$

** Based on sulfur content of digester gas tested at SJVRWRF.

Rule 1303 BACT requirement: Compliance with Rule 431.1:

Rule 431.1 requirement, H2S: 40 ppmv. Source Test 5/12/2009 H2S; < 0.5 ppmv

Additionally, the facility wide condition of less than 5 lbs/day will continue to be imposed for the burning of gaseous fuels other than natural gas.

Calculations for A/N 504396

The following information was supplied for the Caterpillar 330 BHP engine (Engine No. 113) from the most recent source test, November 7, 2007.

$$\begin{aligned} \text{Fuel consumption rate} &= 2,517 \text{ scfh} &&= 42.0 \text{ scfm} \\ &= 2,517 \text{ scfh} \times 1050 \text{ Btu/scf (natural gas)} \\ &= 2,642,850 \text{ Btu/hr} \sim 2.643 \text{ MMBtu/hr} \end{aligned}$$

$$\text{Exhaust flow rate} = 426 \text{ dscfm}$$

The following calculations for CO, NOx and ROG are based on the emissions from Source Test Results from May 12, 2009, previous application's emission calculations, and NOxTech Emissions Data. Assume R1 = R2. **The emission that will be used for NSR hourly and daily values will be in bold font. The emission that will be used for NSR daily average values will be in bold font.**

CO emissions (A/N 504396)

$$\text{Emission based on Source Test 11/7/07:} = 0.038 \sim 0.04 \text{ lbs/hr} = 0.96 \text{ lbs/day}$$

Previously permitted emission (Permit G4345, A/N 485853 & Permit F21783, A/N 331495):
R2 = 0.60 g/bhp-hr x 330 bhp x 11b/453.6g = 0.44 lbs/hr = 10.56 lbs/day

Rule 1110.2 requirement: 250 ppmvd CO @ 15% O2:

$$250 \text{ ppm} @ 15\% \text{ O}_2 \times 426 \text{ dscfm} \times 60 \text{ min/hr} \times \text{lb-mole} / 379 \times 10^6 \text{ ft}^3 \times 28 \text{ lbs/lb-mole} = 0.47 \text{ lbs/hr} = 11.28 \text{ lbs/day}$$

Uncontrolled emissions for initial commissioning: 7.9 g/bhp-hr (35 hours)

$$7.9 \text{ g/bhp-hr} \times 330 \text{ bhp} \times 11\text{b}/453.6\text{g} = 5.75 \text{ lbs/hr}$$

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION PERMIT APPLICATION EVALUATION AND CALCULATIONS	PAGES 25	PAGE 8
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
	PROCESSED BY AS08	CHECKED BY

24 hours/day x 365 days/year x year/12months = 730 hours/month
 5.75 lbs/hr x 35 hours + 0.44 lbs/hr x 695 hours = 507.05 lbs/month
 507.05 lbs/months x month/30days = **16.90 lbs/day (NSR)**
 24 hours/day x 365 days/year = 8760 hours/year
 5.75 lbs/hr x 35 hours + 0.44 lbs/hr x 8725 hours = **4,040.25 lbs/year (NSR)**

Rule 1303 BACT requirement: 0.60 g/bhp-hr = 0.44 lbs/hr \geq 0.44 lbs/hr

Rule 1303 Modeling Requirement (>2 , <5 MMBTU), CO: 17.1 lbs/hr
 Emission used for modeling evaluation is based on normal operation. Assume worst case emissions for 1 hour of normal operation, since the modeling required is a 1 hour average: Start-up/Shut-down
 5.75 lbs/hr x hr/60min x 30min + 0.44 lbs/hr x hr/60min x 30min = 3.10 lbs/hr $<$ 17.1 lbs/hr
 Modeling analysis is not required.

NOx emissions (A/N 504396)

Emission based on Source Test 11/7/07: = 0.015 ~ 0.02 lbs/hr = 0.48 lbs/day

Previously permitted emission (Permit G4345, A/N 485853 & Permit F21783, A/N 331495):
 0.15 g/bhp-hr x 330 bhp x 1lb/453.6g = 0.11 lbs/hr = 2.64 lbs/day

Rule 1110.2 requirement: 11 ppmvd NOx @ 15% O2:

R2 = 11 ppm @ 15% O2 x 426 dscfm x 60 min/hr x lb-mole/379x10⁶ ft³ x 46 lbs/lb-mole
= 0.03 lbs/hr = 0.72 lbs/day

Uncontrolled emissions for initial commissioning: 8.7 g/bhp-hr (35 hours)
 8.7 g/bhp-hr x 330 bhp x 1lb/453.6g = 6.33 lbs/hr
 24 hours/day x 365 days/year x year/12months = 730 hours/month
 6.33 lbs/hr x 35 hours + 0.03 lbs/hr x 695 hours = 242.40 lbs/month
 242.40 lbs/months x month/30days = **8.08 lbs/day (NSR)**
 24 hours/day x 365 days/year = 8760 hours/year
 6.33 lbs/hr x 35 hours + 0.03 lbs/hr x 8725 hours = **483.30 lbs/year (NSR)**

Rule 1303 BACT requirement: 0.15 g/bhp-hr = 0.11 lbs/hr \geq 0.03 lbs/hr

Rule 1303 Modeling requirement (>2 , <5 MMBTU), NOx: 0.31 lbs/hr
 Emission used for modeling evaluation is based on normal operation. Assume worst case emissions for 1 hour of normal operation, since the modeling required is a 1 hour average: Start-up/Shut-down
 6.33 lbs/hr x hr/60min x 30min + 0.03 lbs/hr x hr/60min x 30min = 3.18 lbs/hr $>$ 0.31 lbs/hr
 Modeling analysis is required.

Emission rate: 3.18 lbs/hr x 453.6g/lb x hr/3600sec = 0.40 g/sec
 Flow rate: 426 scfm x (460 + 550)/(460 + 60) = 827 acfm
 Screen3 maximum 1 hour concentration at receptor: 154.4 ug/m³
 Modeled background (1 hour): 361 ug/m³ $<$ 500 ug/m³ IN COMPLIANCE
 Modeled background (annual): 46.2 ug/m³ $<$ 100 ug/m³ IN COMPLIANCE

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 9
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

ROG emissions (A/N 504396)

Emission based on Source Test 11/7/07: = 0.0082 ~ 0.01 lbs/hr = 0.24 lbs/day

Previously permitted emission (permit G4345, A/N 485853 & Permit F21783, A/N 331495):

0.15 g/bhp-hr x 330 bhp x 1lb/453.6g = 0.11 lbs/hr = 2.64 lbs/day

Rule 1110.2 requirement: 30 ppmvd ROG(as carbon) @ 15% O2:

**R2(as carbon) = 30 ppm @ 15% O2 x 426 scfm x 60 min/hr x lb-mole/379x10⁶ ft³ x 16 lbs/lb-mole
= 0.03 lbs/hr = 0.72 lbs/day**

Uncontrolled emissions for initial commissioning: 3.1 g/bhp-hr (35 hours)

3.1 g/bhp-hr x 330 bhp x 1lb/453.6g = 2.26 lbs/hr

24 hours/day x 365 days/year x year/12months = 730 hours/month

2.26 lbs/hr x 35 hours + 0.03 lbs/hr x 695 hours = 99.95 lbs/month

99.95 lbs/months x month/30days = **3.33 lbs/day (NSR)**

24 hours/day x 365 days/year = 8760 hours/year

2.26 lbs/hr x 35 hours + 0.03 lbs/hr x 8725 hours = **340.85 lbs/year (NSR)**

Rule 1303 BACT requirement: 0.15 g/bhp-hr = 0.11 lbs/hr > 0.03 lbs/hr

PM10 emissions (A/N 504396)

R2 = 10lbs/MMscf_{NG}* x MMscf_{NG}/1E6scf_{NG} x 2,517scfh_{NG} x 0.994 PM10/PM(PM Fraction Stat. ICE-gas) = 0.025 ~ 0.03 lbs/hr = 0.72 lbs/day**

***Based on SCAQMD AER Emission Factors for Natural Gas, 4-stroke, rich burn ICE.

Rule 404 PM requirement, PM: 0.196 grain/scf

0.196 grain/scf x 1lb/7000grains x 426 dscfm x 60min/hr = 0.72 lbs/hr > 0.03 lbs/hr

Rule 1303 BACT requirement: Clean Fuels Policy: This engine is natural gas fired.

Rule 1303 Modeling requirement (>2, <5MMBTU), PM10: 1.9 lbs/hr > 0.03 lbs/hr

SOx emissions (A/N 504396)

R2 = 0.6 lb/MMscf* x MMscf/1E6scf x 2,517 scfh = 0.0015 ~ 0.00 lbs/hr = 0.00 lbs/day**

***Based on SCAQMD AER Emission Factors for Natural Gas, 4-stroke, rich burn ICE.

0.0015 lbs_{SOx}/hr x lbmole_{SOx}/64lbs_{SOx} x lbmole_{H2S}/lbmole_{SOx} x 379cf/lbmole_{H2S} / 426dscfm / 60min/hr x 1E6/1 = 0.35 ppmv H2S

Rule 431.1 requirement, H2S: 16 ppmv > 0.35 ppmv H2S

Rule 1303 BACT requirement: Clean Fuels Policy: This engine is natural gas fired.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 10
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

Calculations for A/N 504502

The following information was supplied for the Caterpillar 330 BHP engine (Engine No. 33) from the most recent source test, May 12, 2009.

Fuel consumption rate = 2,400 scfh = 40.0 scfm
 = 2,400 scfh x 1050 Btu/scf (natural gas)
 = 2,520,000 Btu/hr ~ 2.520 MMBtu/hr
 Exhaust flow rate = 391 dscfm

The following calculations for CO, NOx and ROG are based on the emissions from Source Test Results from May 12, 2009, previous application's emission calculations, and NOxTech Emissions Data. Assume R1 = R2. **The emission that will be used for NSR hourly and daily values will be in bold font. The emission that will be used for NSR daily average values will be in bold font.**

CO emissions (A/N 504502)

Emission based on Source Test 5/12/09: = 0.389 ~ 0.39 lbs/hr = 9.36 lbs/day

Previously permitted emission (Permit G4346, A/N 485855 & Permit F64143, A/N 416831):
R2 = = 0.43 lbs/hr = 10.32 lbs/day

Rule 1110.2 requirement: 250 ppmvd CO @ 15% O2:

250 ppm @ 15% O2 x 391 dscfm x 60 min/hr x lb-mole/379x10⁶ ft³ x 28 lbs/lb-mole
 = 0.43 lbs/hr = 10.32 lbs/day

Uncontrolled emissions for initial commissioning: 7.9 g/bhp-hr (35 hours)

7.9 g/bhp-hr x 330 bhp x 11b/453.6g = 5.75 lbs/hr

24 hours/day x 365 days/year x year/12months = 730 hours/month

5.75 lbs/hr x 35 hours + 0.43 lbs/hr x 695 hours = 500.10 lbs/month

500.10 lbs/months x month/30days = **16.67 lbs/day (NSR)**

24 hours/day x 365 days/year = 8760 hours/year

5.75 lbs/hr x 35 hours + 0.43 lbs/hr x 8725 hours = **3953.00 lbs/year (NSR)**

Rule 1303 BACT requirement: 0.60 g/bhp-hr = 0.44 lbs/hr > 0.43 lbs/hr

Rule 1303 Modeling Requirement (>2, < 5MMBTU), CO: 17.1 lbs/hr

Emission used for modeling evaluation is based on normal operation. Assume worst case emissions for 1 hour of normal operation, since the modeling required is a 1 hour average: Start-up/Shut-down

5.75 lbs/hr x hr/60min x 30min + 0.43 lbs/hr x hr/60min x 30min = 3.09 lbs/hr < 17.1 lbs/hr

Modeling analysis is not required.

NOx emissions (A/N 504502)

Emission based on Source Test 5/12/09: = 0.0162 ~ 0.02 lbs/hr = 0.48 lbs/day

Previously permitted emission (Permit G4346, A/N 485855 & Permit F64143, A/N 416831):
= 0.06 lbs/hr = 1.44 lbs/day

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 11
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

Rule 1110.2 requirement: 11 ppmvd NOx @ 15% O2:

$$R2 = 11 \text{ ppm @ 15\% O}_2 \times 391 \text{ dscfm} \times 60 \text{ min/hr} \times \text{lb-mole}/379 \times 10^6 \text{ ft}^3 \times 46 \text{ lbs/lb-mole}$$

$$= 0.03 \text{ lbs/hr} \qquad \qquad \qquad = 0.72 \text{ lbs/day}$$

Uncontrolled emissions for initial commissioning: 8.7 g/bhp-hr (35 hours)

$$8.7 \text{ g/bhp-hr} \times 330 \text{ bhp} \times 1 \text{ lb}/453.6 \text{ g} = 6.33 \text{ lbs/hr}$$

$$24 \text{ hours/day} \times 365 \text{ days/year} \times \text{year}/12 \text{ months} = 730 \text{ hours/month}$$

$$6.33 \text{ lbs/hr} \times 35 \text{ hours} + 0.03 \text{ lbs/hr} \times 695 \text{ hours} = 242.40 \text{ lbs/month}$$

$$242.40 \text{ lbs/months} \times \text{month}/30 \text{ days} = \mathbf{8.08 \text{ lbs/day (NSR)}}$$

$$24 \text{ hours/day} \times 365 \text{ days/year} = 8760 \text{ hours/year}$$

$$6.33 \text{ lbs/hr} \times 35 \text{ hours} + 0.03 \text{ lbs/hr} \times 8725 \text{ hours} = \mathbf{483.30 \text{ lbs/year (NSR)}}$$

Rule 1303 BACT requirement: 0.15 g/bhp-hr:

$$0.15 \text{ g/bhp-hr} \times 330 \text{ bhp} \times 1 \text{ lb}/453.6 \text{ g} = 0.11 \text{ lbs/hr} \geq 0.03 \text{ lbs/hr}$$

Rule 1303 Modeling requirement (>2, <5MMBTU), NOx: 0.31 lbs/hr

Emission used for modeling evaluation is based on normal operation. Assume worst case emissions for 1 hour of normal operation, since the modeling required is a 1 hour average: Start-up/Shut-down

$$6.33 \text{ lbs/hr} \times \text{hr}/60 \text{ min} \times 30 \text{ min} + 0.03 \text{ lbs/hr} \times \text{hr}/60 \text{ min} \times 30 \text{ min} = 3.18 \text{ lbs/hr} > 0.31 \text{ lbs/hr}$$

Modeling analysis is required.

$$\text{Emission rate: } 3.18 \text{ lbs/hr} \times 453.6 \text{ g/lb} \times \text{hr}/3600 \text{ sec} = 0.40 \text{ g/sec}$$

$$\text{Flow rate: } 391 \text{ scfm} \times (460 + 550)/(460 + 60) = 759 \text{ acfm}$$

$$\text{Screen3 maximum 1 hour concentration at receptor: } 159 \text{ ug/m}^3$$

$$\text{Modeled background (1 hour): } 366 \text{ ug/m}^3 < 500 \text{ ug/m}^3 \text{ IN COMPLIANCE}$$

$$\text{Modeled background (annual): } 43.0 \text{ ug/m}^3 < 100 \text{ ug/m}^3 \text{ IN COMPLIANCE}$$

ROG emissions (A/N 504502)

$$\text{Emission based on Source Test 5/12/09:} \qquad \qquad = 0.0288 \sim 0.03 \text{ lbs/hr} \qquad \qquad = 0.72 \text{ lbs/day}$$

Previously permitted emission (Permit G4346, A/N 485855 & Permit F64143, A/N 416831):

$$= 0.08 \text{ lbs/hr} \qquad \qquad \qquad = 1.92 \text{ lbs/day}$$

Rule 1110.2 requirement: 30 ppmvd ROG(as carbon) @ 15% O2:

$$R2(\text{as carbon}) = 30 \text{ ppm @ 15\% O}_2 \times 391 \text{ scfm} \times 60 \text{ min/hr} \times \text{lb-mole}/379 \times 10^6 \text{ ft}^3 \times 16 \text{ lbs/lb-mole}$$

$$= 0.03 \text{ lbs/hr} \qquad \qquad \qquad = 0.72 \text{ lbs/day}$$

Rule 1303 BACT requirement: 0.15 g/bhp-hr:

$$0.15 \text{ g/bhp-hr} \times 330 \text{ bhp} \times 1 \text{ lb}/453.6 \text{ g} = 0.11 \text{ lbs/hr} \geq 0.03 \text{ lbs/hr}$$

Uncontrolled emissions for initial commissioning: 3.1 g/bhp-hr (35 hours)

$$3.1 \text{ g/bhp-hr} \times 330 \text{ bhp} \times 1 \text{ lb}/453.6 \text{ g} = 2.26 \text{ lbs/hr}$$

$$24 \text{ hours/day} \times 365 \text{ days/year} \times \text{year}/12 \text{ months} = 730 \text{ hours/month}$$

$$2.26 \text{ lbs/hr} \times 35 \text{ hours} + 0.03 \text{ lbs/hr} \times 695 \text{ hours} = 99.95 \text{ lbs/month}$$

$$99.95 \text{ lbs/months} \times \text{month}/30 \text{ days} = \mathbf{3.33 \text{ lbs/day (NSR)}}$$

$$24 \text{ hours/day} \times 365 \text{ days/year} = 8760 \text{ hours/year}$$

$$2.26 \text{ lbs/hr} \times 35 \text{ hours} + 0.03 \text{ lbs/hr} \times 8725 \text{ hours} = \mathbf{340.85 \text{ lbs/year (NSR)}}$$

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 12
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

PM10 emissions (A/N 504502)

$$R2 = 10\text{lbs/MMscf}_{\text{NG}}^{***} \times \text{MMscf}_{\text{NG}}/1\text{E6scf}_{\text{NG}} \times 2,400\text{scfh}_{\text{NG}} \times 0.994 \text{ PM10/PM(PM Fraction Stat. ICE-gas)} = 0.023 \sim 0.02 \text{ lbs/hr} = 0.48 \text{ lbs/day}$$

***Based on SCAQMD AER Emission Factors for Natural Gas, 4-stroke, rich burn ICE.

Rule 404 PM requirement, PM: 0.196 grain/scf

$$0.196 \text{ grain/scf} \times 1\text{lb}/7000\text{grains} \times 391 \text{ dscfm} \times 60\text{min/hr} = 0.66 \text{ lbs/hr} > 0.02 \text{ lbs/hr}$$

Rule 1303 BACT requirement: Clean Fuels Policy: This engine is natural gas fired.

Rule 1303 Modeling requirement (>2, <5MMBTU), PM10: 1.9 lbs/hr > 0.02 lbs/hr

SOx emissions (A/N 504502)

$$R2 = 0.6 \text{ lb/MMscf}^{***} \times \text{MMscf}/1\text{E6scf} \times 2,400 \text{ scfh} = 0.00144 \sim 0.00 \text{ lbs/hr} = 0.00 \text{ lbs/day}$$

***Based on SCAQMD AER Emission Factors for Natural Gas, 4-stroke, rich burn ICE.

$$0.00144 \text{ lbs}_{\text{SOx}}/\text{hr} \times \text{lbmole}_{\text{SOx}}/64\text{lbs}_{\text{SOx}} \times \text{lbmole}_{\text{H2S}}/\text{lbmole}_{\text{SOx}} \times 379\text{cf}/\text{lbmole}_{\text{H2S}} / 391\text{dscfm} / 60\text{min/hr} \times 1\text{E6}/1 = 0.36 \text{ ppmv H2S}$$

Rule 431.1 requirement, H2S: 16 ppmv > 4.63 ppmv H2S

Rule 1303 BACT requirement: Clean Fuels Policy: This engine is natural gas fired.

Calculations for A/N 504398

Maximum heat input rate: 1.3 mmBtu/hr

Natural gas HHV: 1,050 Btu/scf

Digester gas HHV: 617 Btu/scf

$$\begin{aligned} \text{Fuel consumption (NG)} &= 1,300,000 \text{ Btu/hr} \times \text{scf}/1,050 \text{ Btu} \times \text{hr}/60\text{min} \\ &= 20.6 \text{ scfm of NG} \\ &= 20.6 \text{ scfm natural gas} \times 13.5 \text{ scfm combustion products/scfm gas} \\ &= 278 \text{ scfm} \end{aligned}$$

$$\begin{aligned} \text{Fuel consumption (DG)} &= 1,300,000 \text{ Btu/hr} \times \text{scf}/630 \text{ Btu} \times \text{hr}/60\text{min} \\ &= 35.1 \text{ scfm of DG} \\ &= 35.1 \text{ scfm natural gas} \times 13.5 \text{ scfm combustion products/scfm gas} \\ &= 474 \text{ scfm (maximum exhaust flow rate) (used in TACs calculations)} \end{aligned}$$

Application materials provided by the manufacturer indicate “heat recovery minimizes the fuel injection requirement to self-sustain autocatalysis. The Noxtech reactor and heat exchanger preheat engine exhaust so autothermal. . . , fuel consumption is about 5-7% of the engine fuel, depending primarily on the reactor heat exchanger efficiency.” Since the Noxtech system may operate with all three engines operating, it is

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION PERMIT APPLICATION EVALUATION AND CALCULATIONS	PAGES 25	PAGE 13
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
	PROCESSED BY AS08	CHECKED BY

assumed that all 7% of the combined total fuel consumption flow rate is the flow rate of fuel combusted in the Noxtech continuously for emissions calculations.

	Fuel Consumption		
	BHP	scfh	scfm
504395 (DG)	260	3092	51.5
504396 (NG)	330	2517	42.0
504502 (NG)	330	2400	40.0
Total		8009	133.5
7% of Total		561	9.3

Natural gas combustion emissions for external combustion:

Emission Factors (based on the District's Annual Emission Inventory 2007 - 2008, Appendix A). R1=R2. Assume emission factors apply to digester gas external combustion as well.

CO:	$35 \text{ lbs/1E6 ft}^3 \times 9.3 \text{ scfm} \times 60\text{min/hr}$	= 0.020 lbs/hr	= 0.48 lbs/day
NOX:	$130 \text{ lbs/1E6 ft}^3 \times 9.3 \text{ scfm} \times 60\text{min/hr}$	= 0.073 lbs/hr	= 1.75 lbs/day
PM10:	$7.5 \text{ lbs/1E6 ft}^3 \times 9.3 \text{ scfm} \times 60\text{min/hr}$	= 0.004 lbs/hr	= 0.10 lbs/day
ROG:	$7 \text{ lbs/1E6 ft}^3 \times 9.3 \text{ scfm} \times 60\text{min/hr}$	= 0.004 lbs/hr	= 0.10 lbs/day
SOX:	$0.6\text{lbs/1E6 ft}^3 \times 9.3 \text{ scfm} \times 60\text{min/hr}$	= 0.000 lbs/hr	= 0.00 lbs/day

Rule 407 CO requirement, 2000 ppmvd

$$2000 \text{ ppmvd} \times 474 \text{ scfm} \times 60 \text{ min/hr} \times \text{lb-mole}/379 \times 10^6 \text{ ft}^3 \times 28 \text{ lbs/lb-mole} = 4.20 \text{ lbs/hr} < 0.02 \text{ lbs/hr}$$

Rule 1303 CO modeling requirement, 11.0 lbs/hr < 0.02 lbs/hr

Rule 1303 NOx modeling requirement, 0.20 lbs/hr < 0.07 lbs/hr

Rule 1147 NOx requirement, NOx: 60 ppm or 0.073 lb/mmBtu

$$60 \text{ ppm} \times 474 \text{ scfm} \times 60 \text{ min/hr} \times \text{lb-mole}/379 \times 10^6 \text{ ft}^3 \times 46 \text{ lbs/lb-mole} = 0.21 \text{ lbs/hr} = 5.04 \text{ lbs/day}$$

OR

$$0.073 \text{ lb/mmBtu} \times 1.3 \text{ mmBtu/hr} = 0.09 \text{ lbs/hr} = 2.16 \text{ lbs/day}$$

Rule 1303 PM10 modeling requirement, 1.20 lbs/hr < 0.00 lbs/hr

Calculations for A/N 511886

According to the MSDS sheet for urea, urea has the appearance of white crystals or powder and is very soluble in water. Also it indicates there is no information for the vapor pressure, vapor density, or evaporation rate of urea. Urea decomposes upon heating and can form products including ammonia, oxides of nitrogen, cyanuric acid, cyanic acid, biuret, and carbon dioxide. It is assumed the possible fugitive emissions are equivalent to ammonia for worst case scenario assessment even though unlikely. Breathing and losses have been calculated below.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION PERMIT APPLICATION EVALUATION AND CALCULATIONS	PAGES 25	PAGE 14
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
	PROCESSED BY AS08	CHECKED BY

Operation schedule

86,400 gallons/year / 5,000 gallons (working volume) = 17.28 ~ 17 fills/year

Assume 1hr/fill. The operating schedule will be 1 hour/day, 1 day/week, and 17 weeks/year.

Standing/breathing losses

The following equation is used by AQMD to evaluate the standing/breathing losses for aqueous ammonia during storage:

$$LB = V_o \times (\Delta T / T_{av}) \times (1 / V) \times (P / P_{atm}) \times M_v$$

where:

LB = breathing/standing loss from fixed roof tank (lb/day)

V_o = volume of vapor above the liquid surface (ft³)

v = volume of tank (gallons) = 5000 gallons

V_o = v x 30% x 0.1337ft³/1gallons

V_o = 5000gallons x 0.30 x 0.1337ft³/1gallons = 200.55 ft³

ΔT = average daily temperature change (°R or °F)

T_{av} = average daily temperature (°R)

V = molar volume (ft³/lb-mole)

$$= (10.73 \text{ft}^3\text{-psia/lbmole-}^\circ\text{R} \times 529.67^\circ\text{R} \times 1/14.7 \text{psia})$$

$$= 386.6 \text{ft}^3\text{/lb-mole}$$

P = true vapor pressure of urea (psia)

= assume 0.2 psia

P_{atm} = atmospheric pressure = 14.7 psia

M_v = molecular weight of vapor (lb/lb-mole) = 20.01 lbs/lbmole

$$LB = 200.55 \text{ft}^3 \times (20^\circ\text{R} / 529.67^\circ\text{R}) \times (1 / 386.6 \text{ft}^3\text{/lb-mole}) \times (0.2 \text{psia} / 14.7 \text{psia}) \times 20.01 \text{ lbs/lbmole}$$

$$R1 = R2 = 0.005 \text{ lbs/day} = 0.005 \text{ lbs/hr}$$

Filling losses

$$\text{Maximum filling loss} = (\text{ft}^3/7.48 \text{gallons}) \times (\text{lbmole}/380 \text{ft}^3) \times v \times P/14.7 \text{psia} \times M_v$$

$$= 2.4\text{E-}5 \text{lbmole/gallon-psia} \times 5000 \text{gallons} \times 0.2 \text{psia} \times 0.3 \times 20.01 \text{ lbs/lbmole}$$

$$R1 = R2 = 0.144 \text{ lbs/day} = 0.144 \text{ lbs/hr}$$

PM10 Emissions

Aqueous ammonia is a PM10 precursor.

Total emissions = standing/breathing loss + filling losses

$$R1 = 0.005 \text{ lbs/hr} + 0.144 \text{ lbs/hr} = 0.149 \sim 0.15 \text{ lbs/hr} = 0.15 \text{ lbs/day}$$

Toxic Risk Analysis

Ammonia slip emission

Discussion between Eastern Municipal Water District and AQMD staff have lead to the 10 ppmv corrected to 15% oxygen Ammonia outlet concentration. Below are the emission calculations and toxic risk analysis for a 10 ppmv Ammonia outlet concentration for worst case scenario calculations.

$$R1 = R2$$

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION PERMIT APPLICATION EVALUATION AND CALCULATIONS	PAGES 25	PAGE 15
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
	PROCESSED BY AS08	CHECKED BY

Total exhaust flow (ICES & NOxTech) = 586 dscfm + 426 dscfm + 391 dscfm + 474 scfm = 1877 dscfm
 $R1 = 10 \text{ ppm} \times 1877 \text{ dscfm} \times 60\text{min/hr} \times \text{lbmole}/379\text{E6 cf} \times 17.03 \text{ lbs/lbmole} = 0.0506 \text{ lbs/hr}$

Ammonia emission calculated from the engines = 0.0378 lbs/hr

Total ammonia emission from the control device outlet = 0.0506 lbs/hr + 0.0378 lbs/hr = 0.0884 lbs/hr

Nearest Residential Receptor Distance: 820 ft. (250 m)
 Nearest Commercial Receptor Distance: 590 ft. (180 m)
 Stack height: 20.0 ft. (6.10 m)
 Building height: 16 ft. (4.9 m)
 Building dimensions: 49 ft (15 m) x 59 ft. (18 m)

Compound	MW (lb/mole)	Outlet Emission (lbs/hr)
Acetaldehyde	44.06	2.89E-04
Acrolein	56.06	2.70E-04
Ammonia	17.03	8.84E-02
Arsenic	74.92	4.27E-06
Benzene	78.11	1.62E-04
1,3-Butadiene	54.09	6.84E-05
Cadmium	112.41	1.08E-06
Carbon tetrachloride	153.24	2.56E-06
Chloroform	119.38	2.04E-06
1,4-Dichlorobenzene	147.01	7.42E-07
Ethylbenzene	106.16	2.55E-06
Ethylene dibromide	187.88	2.18E-06
Ethylene dichloride	98.96	1.71E-06
Formaldehyde	30.03	2.11E-03
Lead	207.20	6.31E-06
Methanol	32.04	3.14E-04
Methylene chloride	84.94	4.71E-06
Naphthalene	128.17	9.97E-06
Nickel	58.71	3.71E-06
Selenium	78.96	2.04E-08
Styrene	104.16	1.22E-06
1,1,2,2-Tetrachloroethane	167.86	2.60E-06
Tetrachloroethylene	165.83	7.79E-07
Toluene	92.13	5.73E-05
1,1,2-Trichloroethane	133.42	1.57E-06
Trichloroethylene	130.40	6.68E-07
Vinyl chloride	62.50	2.07E-06
Xylenes	106.20	2.00E-05

Outlet concentration is based on applicant emission estimates using *SCAQMD Supplemental Instructions to the 2006-2007 reporting procedures for AB2588 Facilities for Reporting Their Quadrennial Air Toxics Emission Inventory*.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION PERMIT APPLICATION EVALUATION AND CALCULATIONS	PAGES 25	PAGE 16
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
	PROCESSED BY AS08	CHECKED BY

Tier II analysis was used since the nearest receptor is greater than 25m from the exhaust stack. Tier II risk analysis was based on the outlet emission listed in the above table. MICR was calculated to be 1.69E-7 for residential and 6.64E-8 for commercial receptors. HIC and HIA are less than 1 and Cancer Burden is less than 0.5. Please note: the cumulative HIC and HIA from both emission sources are less than 1.

Urea tank- ammonia emission

Nearest Residential Receptor Distance: 820 ft. (250 m)
 Nearest Commercial Receptor Distance: 590 ft. (180 m)
 Stack height: 16.0 ft. (4.88 m)

Compound	MW (lb/mole)	Outlet Emission (lbs/hr)
Ammonia	17.03	0.15

Tier II analysis was used since the nearest receptor is greater than 25m from the exhaust stack. Tier II risk analysis was based on the outlet emission listed in the above table. Ammonia is not a carcinogenic compound, no MICR was calculated. HIC and HIA are less than 1 and Cancer Burden is less than 0.5. Please note: the cumulative HIC and HIA from both emission sources are less than 1.

Rules Evaluation

Rule 212: Rule 212 (c)(1)- There is no school within 1000 feet of the facility.
 Rule 212 (c)(2)- On-site emission increases do not exceed the following:
 Volatile Organic Compounds 30 lbs/day
 Nitrogen Oxides 40 lbs/day
 PM10 30 lbs/day
 Sulfur Dioxide 60 lbs/day
 Carbon Monoxide 220 lbs/day
 Lead 3 lbs/day
 Rule 212 (c)(3)(A)(i)- MICR is below 1 in a million for this equipment.
Public Notice is not required.

Rule 401: Visible Emissions
 No violations are expected, limits are listed under Rule 401(b)(1).

Rule 402: Nuisance
 Nuisance is not expected.

Rule 404: Particulate Matter
 No violations are expected limits are listed under Rule 404 Table 404(a).

Rule 407: Liquid and Gaseous Air Contaminants
 Rule 407(a)- This rule is not subject to stationary ICEs under Rule407(b)(1).
 Rule 407(a)(1)- CO control system < 2000 ppmvd.
 Rule 407(a)(2)- This provision does not apply to the NOx control system, since it is subject to Rule 1147 under Rule 407(c)(1).
 Compliance is expected.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 17
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

- Rule 431.1: Sulfur Content of Gaseous Fuels
 Rule 431.1(c)(1)- Natural gas fueling the engine < 16 ppmv of sulfur compounds calculated as H₂S. A/Ns 504396 & 504502 H₂S < 16 ppmv.
 Rule 431.1(c)(2)- On or after May 4, 1994, the operator shall not burn any gaseous fuel containing sulfur compounds > 40 ppmv H₂S, as shown in Table 1 for Other Gases. A/N 504395 H₂S < 40 ppmv, although A/N 504395 is exempt under Rule 431.1(g)(8).
 Rule 431.1(g)(8)- Any facility which emits < 5 pounds per day total sulfur compounds, calculated as H₂S from the burning of gaseous fuels other than natural gas is exempt from this rule. Facility emission < 5 lbs/day, see facility-wide condition in Section D of facility permit pertaining to the Rule 431.1 exemption. Compliance is expected.
- Rule 53A: Riverside County – Specific Contaminants (Contained in Addendum to Reg IV)
 Rule 53(a)- Sulfur compound emission limit, as SO₂ 50,000 ppmv. Compliance can be expected based on other similar category ICE permits issued in SCAQMD.
 Rule 53(b)- Fluorine compounds to be controlled to the maximum degree technically feasible. No fluorine potential emission from this equipment. Compliance is expected.
- Reg IX: Standards of Performance for New Stationary Sources
 Part 60, Chapter I, Title 40 of Code of Federal Regulations, Subpart JJJJ Standards of Performance for Stationary Spark Ignition Internal Combustion Engines
 60.4230-Applicability: not applicable.
 60.4230(a)- Construction for these ICEs did not commence nor was the ICE modified or reconstructed after June 12, 2006.
 60.4230(b)-These ICEs is not being tested at an engine test cell/stand.
 60.4230(f)- These ICEs is not a temporary unit.
- Reg X: Part 63, Chapter I, Title 40 of Code of Federal Regulations, Subpart ZZZZ- National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines
 63.6585- Applicability: Applicable. Engines are stationary RICE at an area source of HAP emissions.
 63.6590(a)- An affected source is any existing, new, or reconstructed stationary RICE located at a major or area source or HAP emissions, excluding stationary RICE being tested at a stationary RICE test cell/stand.
 63.6590(a)(1)(iii)- Existing stationary RICE: stationary RICE > 500 HP located at an area source of HAP emissions if commenced construction or reconstruction before June 12, 2006. Previous application 195158 for the engine in A/N 504395 was to obtain a permit for the previous Rule 219 exempt engine; the PO was issued 8/20/1992. A/N 161921 for the engine in A/N 504396 was to install the engine; the PO was issued 2/10/1993. A/N 195157 for the engine in A/N 504502 was to obtain a permit for the previous Rule 219 exempt engine; the PO was issued 8/20/1992 Therefore these engines do not meet the definition of reconstruction see below.
 40 CFR 63 Subpart A: Reconstruction- the replacement of components of an affected or a previously nonaffected source to such an extent that:

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION PERMIT APPLICATION EVALUATION AND CALCULATIONS	PAGES 25	PAGE 18
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
	PROCESSED BY AS08	CHECKED BY

- 1) The fixed capital cost of the new components exceeds 50% of the fixed capital cost that would be required to construct a comparable new source, and
- 2) It is technologically and economically feasible for the reconstructed source to meet the relevant standards established by the Administer pursuant to section 112 of the Act. Upon reconstruction, an affected source, or a stationary source that becomes an affected source, is subject to relevant standards for new sources, including compliance dates, irrespective of any change in emissions of hazardous air pollutants from that source.

63.6595(a)(1)- Existing stationary SI RICE located at an area source of HAP shall comply with the applicable emission limitations and operating limitations no later than October 19, 2013.

63.6595(c)- Must meet applicable notification requirements in 63.6645 and in 40CFR63, subpart A.

63.6603(a)- Existing stationary RICE at an area source of HAP, must comply with requirements in Table 2d to this subpart and operating limitations in Table 2b to this subpart which apply to you.

Table 2d Requirements for existing RICE located at Area Sources of HAP
A/N 504395: (7) Non-emergency, non-black start 4SLB stationary RICE ≤ 500HP

- (a)- Change oil and filter every 1,440 hours of operation or annually, whichever comes first;
- (b)- Inspect spark plugs every 1,440 hours of operation or annually, whichever comes first; and
- (c)- Inspect all hoses and belts every 1,440 hours of operation or annually, whichever comes first and replace as necessary.

A/Ns 504396 & 504502: (9) Non-emergency, non-black start 4SRB stationary RICE ≤ 500 HP

- (a)- Change oil and filter every 1,440 hours of operation or annually, whichever comes first;
- (b)- Inspect spark plugs every 1,440 hours of operation or annually, whichever comes first; and
- (c)- Inspect all hoses and belts every 1,440 hours of operation or annually, whichever comes first and replace as necessary.

Table 2b- There are no operating limitations for these engines.

63.6612(a)- Existing stationary RICE located at area source of HAP must conduct any initial performance test or other initial compliance demonstration according to Tables 4 and 5 to this subpart that apply within 180 days after the compliance date (October 19, 2013) that is specified for your stationary RICE in 63.6595 and according to 63.7(a)(2).

Table 4: Requirements for Performance Tests

A/N 504395: (1) 2SLB, 4SLB, and CI stationary RICE

(a) Reduce CO emissions

A/Ns 504396 & 504502: (2) 4SRB stationary RICE

(a) Reduce formaldehyde emissions

A/Ns 504395, 504396, & 504502: (3) Stationary RICE

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 19
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

(a) Limit the concentration of formaldehyde or CO in the stationary RICE exhaust.

Table 5- There are no Initial Compliance With Emission Limitations and Operating Limitations requirements for these engines.

63.6615- Conduct subsequent performance tests as specified in Table 3.

Table 3- There are no Subsequent Performance Tests required for these engines.

63.6620(d)- Conduct three separate test runs for each performance test required in this section, as specified in 63.7(e)(3). Each test run must last at least 1 hour.

63.6620(f)- If you comply with the emission limitation to reduce CO and you are not using an oxidation catalyst, if you comply with the emission limitation to reduce formaldehyde and you are not using NSCR, or if you comply with the emission limitation to limit the concentration of formaldehyde in the stationary RICE exhaust and you are not using an oxidation catalyst or NSCR, you must petition the Administrator for operating limitations to be established during the initial performance test and continuously monitored thereafter or for approval of no operating limitations. You must not conduct the initial performance test until after the petition has been approved by the Administrator.

63.6620(g)- If you petition the Administrator for approval of operating limitations, your petition must include:

- (1)- Specific parameters to use as operating limitations;
- (2)- Discussion of the relationship between these parameters and HAP emissions, identifying how HAP emissions change with changes in these parameters, and how limitations on these parameters will serve to limit HAP emissions;
- (3)- Discussion of how you will establish the upper and/or lower values for these parameters which will establish the limits on these parameters in the operating limitations;
- (4)- Discussion identifying the methods you will use to measure the instruments you will use you monitor these parameters, and the relative accuracy and precision of these methods and instruments; and
- (5)- Discussion identifying the frequency and methods for recalibrating the instruments you will use for monitoring these parameters.

63.6620(h)- If you petition the Administrator for approval of no operating limitations, your petition must include:

- (1)- Identification of the parameters associated with operation of the stationary RICE and any emission control device which could change intentionally (operator adjustment, automatic controller adjustment, etc.) or unintentionally (wear and tear, error, etc.) on a routine basis or over time;
- (2)- Discussion of the relationship, if any, between changes in the parameters and changes in HAP emissions;
- (3)- For the parameters which could change in such a way as to increase HAP emissions, a discussion of whether establishing limitations on the parameters would serve to limit HAP emissions;
- (4)- For the parameters which could change in such a way as to increase HAP emissions, a discussion of how you could establish upper and/or lower values for

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 20
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

the parameters which would establish limits on the parameters in operating limitations;

(5)- For the parameters, a discussion identifying the methods you could use to measure them and the instruments you could use to monitor them, as well as the relative accuracy and precision of the methods and instruments;

(6)- For the parameters, a discussion identifying the frequency and methods for recalibrating the instruments you could use to monitor them; and

(7)- A discussion of why, from your point of view, it is infeasible or unreasonable to adopt the parameters as operating limitations.

63.6620(i)- The engine percent load during a performance test must be determined by documenting the calculations, assumptions, and measurement devices used to measure or estimate the percent load in a specific application. A written report of the average percent load determination must be included in the notification of compliance status. The written report must include: the engine model number, the engine manufacturer, the year of purchase, the manufacturer's site-rated brake horsepower, the ambient temperature, pressure, and humidity during the performance test, and all assumptions that were made to estimate or calculate percent load during the performance test must be clearly explained. If measurement devices such as flow meters, kilowatt meters, beta analyzers, stain gauges, etc. are used, the model number of the measurement device, and an estimate of its accurate in percentage of true value must be provided.

63.6625(e) - If you own or operate A/N 504395: (7) an existing non-emergency, non-black start 4SLB stationary RICE with a site rating \leq 500 HP located at an area source of HAP, & A/Ns 504396 & 504502: (8) an existing non-emergency, non-black start 4SRB stationary RICE with a site rating less \leq 500 HP located at an area source of HAP, must operate and maintain the stationary RICE and after-treatment control device according to the manufacturer's emission-related written instructions or develop your own maintenance plan which must provide to the extent practicable for the maintenance and operation of the engine in a manner consistent with good air pollution control practice for minimizing emissions.

63.6625(h)- Minimize the engine's time spent at idle during startup and minimize the engine's startup time to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes, after which time the emission standards applicable to all times other than startup in Tables 1a, 2a, 2c, and 2d. (see Table 2d requirements above)

63.6625(j)- You have the option of utilizing an oil analysis program in order to extend the specified oil change requirement in Tables 2c and 2d to this subpart. (see 63.6625(j) requirements) The owner or operator must keep records of the parameters that are analyzed as part of the program, the results of the analysis, and the oil changes for the engine. The analysis program must be part of the maintenance plan for the engine.

63.6630(c)- You must submit the Notification of Compliance Status containing the results of the initial compliance demonstration according to the requirements in 63.6645.

63.6640(a)- You must demonstrate continuous compliance with each emission limitation and operating limitation in Tables 1a, 1b, 2a, 2b, 2c, and 2d to this subpart that apply to you according to methods specified in Table 6 to this subpart.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 21
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

Table 6: Continuous Compliance with Emission Limitations, Operating Limitations, Work Practices, and Management Practices

A/Ns 504395, 504396 & 504502: (9) Existing non-emergency 4SLB and 4SRB stationary RICE \leq 500 HP located at an area source of HAP

(a)- Work or management practices

(i)- Operating and maintaining stationary RICE according to the manufacturer's emission-related operation and maintenance instructions; or

(ii)- Develop and follow your own maintenance plan which must provide to the extent practicable for the maintenance and operation of the engine in a manner consistent with good air pollution control practice for minimizing emissions.

63.6640(b)- Report each instance in which you did not meet each emission limitation or operating limitation in Tables 1a, 1b, 2a, 2b, 2c, and 2d to this subpart that apply to you. These deviations must be reported according to the requirements in 63.6650.

63.6640(e)- Report each instance in which you did not meet the requirements in Table 8 to this subpart that apply to you. (see Table 8)

63.6645(a)- If you own or operate an existing stationary RICE located at an area source of HAP, you must submit all of the notifications in 63.7(b) & (c), (f)(4) & (6), 63.9(b)-(e), (g), & (h) that apply to you by the dates specified.

63.7(b)(1)- Written notification of source test shall be submitted at least 60 days before the test to approve the test plan and have an observer present.

63.7(b)(2)- If the performance test will not take occur as indicated in the notification, the owner or operator shall notify the Administrator as soon as possible and indicate the rescheduled date.

63.7(c)(1)- Results of the QA program will be used to determine validity of the performance test.

63.7(c)(2)(i)- Owner or operator shall submit a test plan for approval, including a test program summary, test schedule, data quality objectives, and both internal and external QA program.

63.7(c)(2)(ii)- Internal QA program shall include, activities planned by routine operators and analysts to provide an assessment of test data precision.

63.7(c)(2)(iii)- Test shall include a test method performance audit (PA) during the test. PAs consist of blind audit samples supplied by an accredited audit sample provider and analyzed during the test for a measure of test data bias.

63.7(c)(3)- The Administrator will notify owner or operator of approval or intention to deny the test plan within 30 days after receipt of the plan and within 30 days after any supplemental information is submitted.

63.7(f)(4)- If the Administrator finds reasonable grounds to dispute the results obtained by an alternative test method for the purposes of demonstrating compliance with a relevant standard, the Administrator may require the use of a test method specified in a relevant standard.

63.7(f)(6)- Neither the validation and approval process nor the failure to validate an alternative test method shall abrogate the owner or operator's responsibility to comply with the requirements of this part.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 22
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

63.6645(g)- If you are required to conduct a performance test, you must submit a Notification of Intent to conduct a performance test at least 60 days before the performance test is scheduled to begin as required in 63.7(b)(1).

63.6645(h)- If you are required to conduct a performance test or other initial compliance demonstration as specified in Tables 4 and 5 to this subpart, you must submit a Notification of Compliance Status according to 63.9(h)(2)(ii).

63.9(h)(2)(ii)- The notification must be sent before the close of business on the 60th day following the completion of the relevant compliance demonstration activity specified in the relevant standard (unless a different reporting period is specified in the standard, in which case the letter must be sent before the close of business on the day the report of the relevant testing or monitoring results is required to be delivered or postmarked). For example, the notification shall be sent before close of business on the 60th (or other required) day following completion of the initial performance test and again before the close of business on the 60th (or other required) day following the completion of any subsequent required performance test. Notifications may be combined as long as the due date requirement for each notification is met.

63.6650(a)- Submit each report in Table 7 of this subpart that applies to you.

Table 7: There are no Requirements for Reports for these engines.

63.6650(d)- For each deviation for a RICE not using a CMS, the Compliance report must contain the information in (c)(1)-(4) and (d)(1)-(2)

63.6650(f)- Each affected source that has obtained a Title V operating permit must report all deviations in the semiannual monitoring report.

63.6655(a)(1)- A copy of each notification and report submitted to comply with this subpart, including all documentation supporting any Initial Notification or Notification of Compliance Status submitted, according to the requirement in 63.10(b)(2)(xiv).

63.6655(a)(2)- Records of the occurrence and duration of each malfunction of operation (process equipment) or the air pollution control and monitoring equipment.

63.6655(a)(3)- Records of performance tests and performance evaluations as required in 63.10(b)(2)(viii).

63.6655(a)(4)- Records of all required maintenance performed on the air pollution control and monitoring equipment.

63.6655(a)(5)- Records of actions taken during periods of malfunction to minimize emissions in accordance with 63.6605(b), including corrective actions to restore malfunctioning process and air pollution control and monitoring equipment to its normal manner of operation.

63.6655(d)- Keep records required in Table 6 of this subpart to show continuous compliance with each emission or operating limitation that applies.

63.6655(e)(3)- Keep records of the maintenance conducted on the existing stationary RICE located at an area source of HAP subject to management practices in Table 2d to this subpart to demonstrate that you operated and maintained the stationary RICE and after-treatment control device according to your own maintenance plan.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 23
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

63.6660(a)- Records must be in a form suitable and readily available for expeditious review according to 63.10(b)(1).

63.6660(b)- Keep each record for 5 years following the date of each occurrence, measurement, maintenance, corrective action, report or record.

63.6660(c)- Keep each record readily accessible in hard copy or electronic form for at least 5 years after the date of the occurrence, measurement, maintenance, corrective action, report, or record.

Compliance with this Regulation is expected.

Rule 1110.2: Emissions From Gaseous and Liquid-Fueled Engines

A/N 504395 (Caterpillar 260 HP)

Rule 1110.2(d)(1)(C)- Digester gas fired engines shall not exceed 36 x ECF ppmvd of NO_x, 250 x ECF ppmvd of VOC and 2000 ppmvd of CO, provided that the facility monthly average biogas usage by the biogas engines is 90% or more, based on higher heating values of fuels used (see Table III).

Concentration limits effective July 1, 2012: NO_x 11 ppmvd 15% O₂, VOC 30 ppmvd 15% O₂, CO 250 ppmvd 15% O₂.

A/Ns 504396 & 504502 (Caterpillar 330 HP)

Rule 1110.2(d)(1)(B)- Stationary engines shall not exceed concentration limits effective July 1, 2012: NO_x 11 ppmvd 15% O₂, VOC 30 ppmvd 15% O₂, CO 250 ppmvd 15% O₂.

Rule 1110.2(d)(1)(E)-Engine without Rule 218 approved CEMS shall equip and maintain engine w/ air-to-fuel ratio controller with an oxygen sensor and feedback control, or equivalent technology approved by the Executive Officer, CARB and EPA. AFRC is equipped on the engines.

Rule 1110.2(e)(3)- Stationary Engine CEMS

Rule 1110.2(e)(3)(B)- CEMS is not required, see Rule 1110.2(f)(1)(A)(ii)(III).

Rule 1110.2(e)(4)- Stationary Engine Inspection and Monitoring (I&M) Plans: I&M plan application has been submitted. Determination has not yet been made for this application.

Rule 1110.2(f)(1)(A)(i)(III)- CEMS is not required for these engines.

Rule 1110.2(f)(1)(B)- Maintain operational non-resettable totalizing time meter to determine engine elapsed operating time.

Rule 1110.2(f)(1)(C)(i)-Effective August 1, 2008 shall conduct source test for NO_x, VOC as carbon, and CO (ppmvd, 15% O₂) every two years. Or every three years if engine operated less than 2000 hours since last test. If engine has not operated within 3 months of required source test date, source test shall be conducted when operation resumes for 7 consecutive days or 15 cumulative days.

Rule 1110.2(f)(1)(D)-I&M Plan application has been submitted. Determination has not yet been made for this application.

Rule 1110.2(f)(1)(E)- Maintain a monthly engine operating log that includes: (i) Total hours of operation, (ii) Types of liquid and/or type of gaseous fuel, (iii) fuel consumption

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 24
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

(cubic feet of gas and gallons of liquid), and (iv) Cumulative hours of operation since the last source test required in (f)(1)(C).

Rule 1110.2(f)(3)- 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.
Compliance with Rule 1110.2 is expected.

Rule 1147 NOx Reductions From Miscellaneous Sources
 Rule 1147(a)- Applicability: not applicable to internal combustion engines subject to District Rule 1110.2.
 Rule 1147(a)- Applicability: Applicable to NOxTech system since it is not required to comply with a NOx limit by other District XI rules.
 Rule 1147(c)(1)- Equipment with process temperature $\geq 1200^{\circ}\text{F}$: 60 ppm NOx or 0.073 lb/mmBtu. Equipment is in compliance with both NOx emission limits. Although compliance with the emission limits is not required until July 1 of the year the unit is 15 years old (July 1, 2025), since the Manufacturer date is June 2010.
 Rule 1147(c)(7)-Owner or operator shall maintain on site a copy of the manufacturer's and/or distributor's written instructions and retain a record of maintenance activity for a period of not less than three years. The owner or operator shall maintain on site a copy of the District certification or District approved source test reports, conducted by an independent third party, demonstrating the specific unit complies with the emission limit. The source test report(s) must identify that the source test was conducted pursuant to a District approved protocol. The model and serial numbers of the specified unit shall be indicated on the source test report(s). The owner or operator shall maintain on the unit in an accessible location a permanent rating plate.
 Rule 1147(c)(12)(A) New Manufactured Units: The manufacturer shall display the model number and the rated heat input capacity of the unit complying with subdivision (c) on the shipping container and permanent rating plate.
 Rule 1147(c)(13)- The owner or operator shall maintain on site a copy of all documents identifying the unit's rated heat input capacity for as long as the unit is retained on-site. The rated heat input capacity shall be identified by a manufacturer's or distributor's manual or invoice and a permanent rating plate attached to the unit.
 Compliance with Rule 1147 is expected.

Reg. XIII: Rule 1303(a)(1)- Equipment must be constructed with BACT for the three engines. NOxTech system is considered BACT. BACT is not required for the urea storage tank, since emissions are less than 1 lb/day.
 Rule 1303(a)(2)- Engines are equipped with emission control equipment that meets LAER/BACT requirements shown below.
 A/N 504395 (Caterpillar 260 HP) BACT requirements: VOC: 0.8 g/bhp-hr, NOx: 0.60 g/bhp-hr, SOx: Compliance with Rule 431.1, CO: 2.5 g/bhp-hr.
 A/Ns 504396 & 504502 (Caterpillar 330 HP) BACT requirements: VOC: 0.15 g/bhp-hr, NOx: 0.15 g/bhp-hr, SOx: See Clean Fuels Policy, CO: 0.60 g/bhp-hr, PM10: See Clean Fuels Policy.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION	PAGES 25	PAGE 25
	APPL NO 504395, 504396, 504398, 504502, 511886	DATE 11/12/2010
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY

Rule 1303(b)(1)- Modeling for VOC and SOx is not required (1303 Appendix A). NOx, CO and PM10 are less than the allowable emissions in Table A-1, no further analysis is required (1301 Appendix A).

Rule 1303(b)(2)- There is no increase of emissions for: CO and SOx. Since the facility is an essential public service, any required offsets (NOx, PM10, and ROG) shall be provided through priority reserve.

Compliance with Regulation XIII is expected.

- Rule 1401: Toxic Air Contaminants
 Rule 1401(d)(1)(A)- MICR less than 1.0×10^{-6} limit.
 Rule 1401(d)(1)(C)- Cancer burden is less than 0.5.
 Rule 1401(d)(2) and Rule 1401(d)(3)- HIC and HIA values are estimated to be less than 1 respectively.
- Rule 1401.1: Rule 1401.1(b)- Equipment is exempt since it is located at an existing facility.
- Reg. XXX: The modification of the three stationary engines and installation of the air pollution control system and storage tank is considered a Title V De Minimis Significant permit revision under Rule 3000(b)(6), since the cumulative emission increases of non-RECLAIM pollutants or HAPs do not exceed the emissions in Table 5-4 of the Draft Title V TDG March 2005 and does not result in new or additional NSPS or NESHAP requirements and will be subject to an EPA review (Rule 3003(j)). A public notice is not required. Compliance is expected.

Conclusions and Recommendations

The equipment is in compliance with the Rules and Regulations of the AQMD. A Permit to Construct is recommended for applications 504395, 504396, 504398, and 504502. A Permit to Construct/Operate is recommended for application 511886. For Permit Conditions please see Sample Permit. A revised Title V permit is recommended after EPA review.