



MAR 09 2010

Carl Morris
Gallo Cattle Company
P.O. Box 775
Atwater, CA 95301-0775

**Re: Notice of Preliminary Decision - Authority to Construct
Project Number: N-1073882**

Dear Mr. Morris:

Enclosed for your review and comment is the District's analysis of Gallo Cattle Company's application for an Authority to Construct for increasing CO concentrations for the 575 bhp biogas-fired rich burn internal combustion engine, at 10561 West Highway 140, Atwater, California.

The notice of preliminary decision for this project will be published approximately three days from the date of this letter. Please submit your written comments on this project within the 30-day public comment period which begins on the date of publication of the public notice.

Thank you for your cooperation in this matter. If you have any questions regarding this matter, please contact Mr. Jagmeet Kahlon of Permit Services at (209) 557-6452.

Sincerely,

David Warner
Director of Permit Services

DW:JK/cm

Enclosures

Seyed Sadredin
Executive Director/Air Pollution Control Officer

Northern Region
4800 Enterprise Way
Modesto, CA 95356-8718
Tel: (209) 557-6400 FAX: (209) 557-6475

Central Region (Main Office)
1990 E. Gettysburg Avenue
Fresno, CA 93726-0244
Tel: (559) 230-6000 FAX: (559) 230-6061

Southern Region
34946 Flyover Court
Bakersfield, CA 93308-9725
Tel: 661-392-5500 FAX: 661-392-5585



MAR 09 2010

Mike Tollstrup, Chief
Project Assessment Branch
Stationary Source Division
California Air Resources Board
PO Box 2815
Sacramento, CA 95812-2815

Re: Notice of Preliminary Decision - Authority to Construct
Project Number: N-1073882

Dear Mr. Tollstrup:

Enclosed for your review and comment is the District's analysis of Gallo Cattle Company's application for an Authority to Construct for increasing CO concentrations for the 575 bhp biogas-fired rich burn internal combustion engine, at 10561 West Highway 140, Atwater, California.

The notice of preliminary decision for this project will be published approximately three days from the date of this letter. Please submit your written comments on this project within the 30-day public comment period which begins on the date of publication of the public notice.

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Merced Sun-Star
Merced Sun-Star

**NOTICE OF PRELIMINARY DECISION
FOR THE PROPOSED ISSUANCE OF
AN AUTHORITY TO CONSTRUCT**

NOTICE IS HEREBY GIVEN that the San Joaquin Valley Unified Air Pollution Control District solicits public comment on the proposed issuance of Authority to Construct to Gallo Cattle Company for increasing CO concentrations for the 575 bhp biogas-fired rich burn internal combustion engine, at 10561 West Highway 140, Atwater, California.

The analysis of the regulatory basis for this proposed action, Project #N-1073882, is available for public inspection at http://www.valleyair.org/notices/public_notices_idx.htm and the District office at the address below. Written comments on this project must be submitted within 30 days of the publication date of this notice to **DAVID WARNER, DIRECTOR OF PERMIT SERVICES, SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT, 4800 ENTERPRISE WAY, MODESTO, CA 95356-8718.**

**San Joaquin Valley Air Pollution Control District
Authority to Construct
Application Review**

Facility Name:	Gallo Cattle Company	Date:	March 8, 2010
Mailing Address:	P.O. Box 775 Atwater, CA 95301-0775	Engineer:	Jagmeet Kahlon
Contact Person:	Carl Morris, General Manager	Lead Engineer:	Nick Peirce
Telephone:	(209) 394-7984		
Fax:	(209) 394-4988		
Application #(s):	N-1660-9-2		
Project #:	N-1073882		
Deemed Complete:	December 16, 2009		

I. PROPOSAL:

On November 16, 2005, Gallo Cattle Company was issued Authority to Construct (ATC) permit N-1660-9-0 for a 575 hp rich-burn, dairy digester gas-fired internal combustion (IC) engine powering a 400 kW electrical generator. The engine successfully completed its initial source testing, and the ATC was converted into a Permit to Operate (PTO) on October 2, 2006.

Sometime after this date, the facility began having issues maintaining compliance with the engine's permitted NO_x and CO emission limits, where the engine's NO_x and CO emissions would periodically drift in and out of compliance, especially during the hottest days of summer. Also during this time, the facility experienced several catalyst failures, where the catalyst element would suffer severe thermal degradation. Consequently, on October 1, 2007, Gallo Cattle Company requested an Authority to Construct permit to raise the permitted levels of NO_x, CO, and H₂S for this IC engine.

Since the facility had no idea why the IC engine was experiencing compliance problems and catalyst failures, they were granted emergency, interim, and regular Variances (Docket Nos. N-08-03-E, N-08-03i, N-08-03R, respectively), to investigate the cause of: (1) NO_x and CO excursions and (2) premature catalyst failure. The variance period started on March 19, 2008 and lasted until June 4, 2009. This project was placed on hold until the facility identified and addressed the emission excursion and premature catalyst failure issues.

The periodic NO_x emission excursion issue was caused by the engine operating at a "fuel lean" air-fuel ratio, thus causing the preferential chemical reactions within the catalyst to shift from reduction of NO_x emissions to oxidation of CO emissions. The primary cause for this "fuel lean" condition was that the fuel delivery system simply could not deliver enough fuel to the engine to maintain a stable, slightly "fuel rich" air-

fuel ratio, which is necessary for the 3-way catalyst to adequately reduce NO_x emissions, especially during the hot summer months. Two reasons were identified for the fuel delivery system's inability to deliver sufficient fuel to the engine.

First, the existing fuel dehydrator (a 7-ton refrigerated vapor condenser of mainly copper construction) was found to be undersized to adequately remove sufficient moisture from the biogas fuel during the hot summer months. Also, copper is easily corroded by sulfur compounds, and there is a relatively high concentration of hydrogen sulfide around the area where the fuel dehydrator is located. Consequently, the fuel dehydrator's copper tubing would frequently develop small leaks, which allowed refrigerant to escape thus reducing the unit's ability to remove moisture from the fuel. The applicant replaced the existing fuel dehydrator with a larger 12-ton unit of stainless steel construction that uses a glycol solution to chill the biogas in order to condense out the moisture. The applicant also installed a cyclonic water separator and a coalescing filter canister to the biogas transmission line to further remove moisture from the fuel.

Second, the fuel pressure booster blower at the IC engine was determined to be undersized to maintain sufficient fuel pressure and fuel flow rate. The undersized blower, combined with high moisture because of the inadequate fuel dehydrator, prevented the fuel delivery system from delivering sufficient fuel to the IC engine. The applicant replaced the blower with a larger unit served by a variable frequency motor drive, which allows the blower to deliver sufficient fuel pressure and fuel flow rate while minimizing fuel temperature increase. It is believed these improvements to the fuel delivery system have resolved the periodic emission NO_x excursion issues.

The premature catalyst failure issue was traced to an issue with the engine's ignition, air-fuel ratio, and generator controller systems. Essentially, the generator controller controls the carburetor throttle position, and the air-fuel ratio controls the position of the fuel supply valve. Originally, neither of these systems had any knowledge of the status of the IC engine's ignition system. Moreover, as a safety precaution, whenever the ignition system experiences a fault, it is programmed to immediately kill the ignition spark to prevent an explosion and severe damage to the engine. Consequently, when an ignition system fault occurs, the ignition controller immediately kills spark to the engine, but since neither the generator controller nor the air-fuel ratio controller know that the engine has lost spark, the engine's throttle and fuel valve remain open, thus allowing raw fuel to be pumped through the engine into the hot catalyst, thus causing catastrophic thermal degradation and premature failure. The applicant addressed this scenario by installing a logic circuit that immediately closes the fuel valve upon any ignition system fault, thus minimizing the chance of raw fuel being pumped into the hot catalyst.

Since these system upgrades have been made, the engine appears to be operating in compliance with the permitted 9.0 ppmvd @ 15% O₂ NO_x emission limit, but not with the permitted 46 ppmvd at 15% O₂ CO emission limit. Therefore, the facility has proposed to raise the permitted CO to 1,100 ppmvd at 15% O₂, while retaining the currently permitted NO_x limit of 9.0 ppmvd at 15% O₂.

The facility states that there is no need to establish the startup and shutdown provisions for this engine, as they can meet the required NO_x and CO emissions levels within a minute or two after starting the engine. Furthermore, they have stated to retain 59 ppmv H₂S in the permit.

Due to the proposed in CO concentrations, this facility's CO emissions exceed 20,000 pounds per year. Thus, a 30-day public notice is being conducted for this project. This project will be published in the local newspaper for public review and comment.

II. APPLICABLE RULES:

Rule 2201 New and Modified Stationary Source Review Rule (9/21/06)
Rule 4101 Visible Emissions (2/17/05)
Rule 4102 Nuisance (12/17/92)
Rule 4201 Particulate Matter Concentration (12/17/92)
Rule 4202 Particulate Matter Emission Rate (12/17/92)
Rule 4301 Fuel Burning Equipment (12/17/92)
Rule 4701 Internal Combustion Engines - Phase 1 (8/21/03)
Rule 4702 Internal Combustion Engines - Phase 2 (1/18/07)
Rule 4801 Sulfur Compounds (12/17/92)
California Health & Safety Code 41700 (Health Risk Assessment)
California Health & Safety Code 42301.6 (School Notice)
Public Resources Code 21000-21177: California Environmental Quality Act (CEQA)
California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387:
CEQA Guidelines

III. PROJECT LOCATION:

The facility is located at 10561 West Highway 140 in Atwater, CA. This facility is not located within 1,000 feet of any K-12 school. Therefore, school notice, under California Health & Safety Code 42301.6 is not required.

IV. PROCESS DESCRIPTION:

This facility produces cheese and other dairy products, and also operates a dairy as part of this stationary source.

Manure from the dairy is flushed with water towards a covered lagoon. Anaerobic decomposition takes place in the lagoon, generating waste gas (also known as biogas or digester gas). The biogas is removed from the digester and sent to the proposed IC engine, which is located in the cheese plant.

The engine can operate up to 24 hr/day and 365 day/year.

V. EQUIPMENT LISTING:

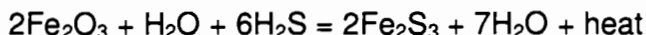
575 BHP CATERPILLAR MODEL G399NA RICH BURN DIGESTER GAS-FIRED INTERNAL COMBUSTION ENGINE SERVED BY A 3-WAY NON-SELECTIVE CATALYST. THE ENGINE POWERS A 400KW ELECTRICAL GENERATOR.

VI. EMISSION CONTROL TECHNOLOGY EVALUATION:

The exhaust from the proposed rich-burn (< 4% exhaust O₂) engine is routed through a 3-way catalytic converter before being emitted to the atmosphere through a single vertical exhaust stack, which is fitted with a flapper-type rain cap. The applicant claims the IC engine together with the proposed 3-way catalytic converter will achieve the following emission factors:

NO_x: 9.0 ppmvd @ 15% O₂
CO: 1,100 ppmvd @ 15% O₂
VOC: 20.0 ppmvd @ 15% O₂

A scrubber, which uses an iron sponge bed, controls the influent biogas H₂S content. The sponge consists of wood shavings impregnated with a hydrated form of iron oxide (Fe₂O₃). The wood shavings serve only as a carrier for the iron oxide powder. As the biogas moves through the scrubber, the H₂S is removed by reacting with the iron oxide to form ferric sulfide (Fe₂S₃). The chemical reaction is as follows:



According to the application review for project N1052089, the scrubber reduces the biogas H₂S content by 90%.

The sponge's life is limited as elemental sulfur deposits accumulate on the scrubber bed. The sponge life depends on the inlet concentration of H₂S, flow rate, and volume of the sponge. Therefore, the sponge life will vary since the H₂S content of the fuel will vary season to season at the dairy. When the iron sponge is completely spent, it requires regeneration (lifespan extension) or replacement.

VII. CALCULATIONS:

A. Assumptions:

1. All calculations and physical constants used are corrected to Standard Conditions as defined in District Rule 1020, Section 3.47 (60 °F and 1 atm).
2. The daily and annual PE2 will be based on 24 and 8,760 hours of operation, respectively.

3. The IC engine's fuel consumption rate at 100% load is 9,090 scf/hr (per applicant).
4. The oxygen based F-factor for the biogas is 8,979 dscf/MMBtu @ 60°F. This F-factor is an average of the source test results conducted on 12/17/04, 6/20/06 and 1/11/07.
5. The higher heating value (HHV) of the biogas is 584 Btu/ft³ @ 60°F. This HHV is an average of the source test results conducted on 12/17/04, 6/20/06 and 1/11/07.

B. Emission Factors (EFs):

1. Pre-Project Emission Factors:

NO_x: 9.0 ppmvd @ 15% O₂ (current permit)
CO: 0.5 g/bhp-hr or 46.0 ppmvd @ 15% O₂ (current permit)
VOC: 20.0 ppmvd @ 15% O₂ (current permit)
PM₁₀: 0.1 g/bhp-hr (current permit)
SO_x: 59 ppmv fuel H₂S content (current permit)

2. Post-Project Emission Factors:

NO_x: 9.0 ppmvd @ 15% O₂
CO: 1,100 ppmvd @ 15% O₂ (applicant's proposal)
VOC: 20.0 ppmvd @ 15% O₂
PM₁₀: 0.1 g/bhp-hr
SO_x: 59 ppmv fuel H₂S content

C. Calculations:

1. Pre-Project Potential to Emit (PE1):

Per the applicant, the proposed engine's fuel consumption at 100% load is 9,090 ft³/hr. HHV of the biogas is 584 Btu/ft³. Therefore, the engine's Brake Specific Fuel Consumption at 100% load is:

$$\frac{(9,090 \text{ ft}^3 - \text{fuel}) \left(584 \frac{\text{Btu}}{\text{ft}^3 - \text{fuel}} \right)}{(575 \text{ bhp})} = 9,232 \frac{\text{Btu}}{\text{bhp} - \text{hr}}$$

NO_x, VOC, and CO:

$$PE = \frac{(\text{ppmvd}) \left(F\text{-factor} \frac{\text{dscf}}{\text{MMBtu}} \right) \left(\text{BSFC} \frac{\text{Btu}}{\text{hp-hr}} \right) \left(\text{MW} \frac{\text{lb}}{\text{lb-mol}} \right) (\text{hp}) \left(\frac{\text{hr}}{\text{day}}; \frac{\text{hr}}{\text{yr}} \right)}{\left(\text{MSV} \frac{\text{dscf}}{\text{lb-mol}} \right) (10^{12}) \left(\frac{20.95 - 15}{20.95} \right)}$$

Where:

- ppmvd = emission concentration @ 15% O₂:
- F-factor = 8,979 ft³-exhaust/MMBtu @ 60 °F
- BSFC = 9,232 Btu/bhp-hr
- MW = 46 for NO_x
- = 16 for VOC
- = 28 for CO
- hp = 575
- MSV = 379.5 ft³/mol (Molar Specific Volume of Ideal Gas @ 60 °F)

NO_x:

$$PE = \frac{(9.0) \left(8,979 \frac{\text{dscf}}{\text{MMBtu}} \right) \left(9,232 \frac{\text{Btu}}{\text{hp-hr}} \right) \left(46 \frac{\text{lb}}{\text{lb-mol}} \right) (575 \text{ hp}) \left(24 \frac{\text{hr}}{\text{day}}; 8,760 \frac{\text{hr}}{\text{yr}} \right)}{\left(379.5 \frac{\text{dscf}}{\text{lb-mol}} \right) (10^{12}) \left(\frac{20.95 - 15}{20.95} \right)}$$

$$= 4.4 \frac{\text{lb-NO}_x}{\text{day}}; 1,604 \frac{\text{lb-NO}_x}{\text{yr}}$$

CO:

$$PE = \frac{(46) \left(8,979 \frac{\text{dscf}}{\text{MMBtu}} \right) \left(9,232 \frac{\text{Btu}}{\text{hp-hr}} \right) \left(28 \frac{\text{lb}}{\text{lb-mol}} \right) (575 \text{ hp}) \left(24 \frac{\text{hr}}{\text{day}}; 8,760 \frac{\text{hr}}{\text{yr}} \right)}{\left(379.5 \frac{\text{dscf}}{\text{lb-mol}} \right) (10^{12}) \left(\frac{20.95 - 15}{20.95} \right)}$$

$$= 13.7 \frac{\text{lb-CO}}{\text{day}}; 4,990 \frac{\text{lb-CO}}{\text{yr}}$$

VOC:

$$PE = \frac{(20.0) \left(8,979 \frac{\text{dscf}}{\text{MMBtu}} \right) \left(9,232 \frac{\text{Btu}}{\text{hp-hr}} \right) \left(16 \frac{\text{lb}}{\text{lb-mol}} \right) (575 \text{ hp}) \left(24 \frac{\text{hr}}{\text{day}}; 8,760 \frac{\text{hr}}{\text{yr}} \right)}{\left(379.5 \frac{\text{dscf}}{\text{lb-mol}} \right) (10^{12}) \left(\frac{20.95 - 15}{20.95} \right)}$$

$$= 3.4 \frac{\text{lb-VOC}}{\text{day}}; 1,240 \frac{\text{lb-VOC}}{\text{yr}}$$

PM₁₀:

$$\begin{aligned} PE &= (575 \text{ hp}) \left(0.1 \frac{\text{g} - \text{PM}_{10}}{\text{bhp} - \text{hr}} \right) \left(\frac{\text{lb} - \text{PM}_{10}}{453.6 \text{ g} - \text{PM}_{10}} \right) \left(24 \frac{\text{hr}}{\text{day}} ; 8,760 \frac{\text{hr}}{\text{yr}} \right) \\ &= 3.0 \frac{\text{lb} - \text{PM}_{10}}{\text{day}} ; 1,110 \frac{\text{lb} - \text{PM}_{10}}{\text{yr}} \end{aligned}$$

SO_x:

$$\begin{aligned} PE &= \left(59 \frac{\text{ft}^3 - \text{H}_2\text{S}}{10^6 \text{ ft}^3 - \text{fuel}} \right) \left(9,090 \frac{\text{ft}^3 - \text{fuel}}{\text{hr}} \right) \left(\frac{34 \text{ lb} - \text{H}_2\text{S}}{379.5 \text{ ft}^3 - \text{H}_2\text{S}} \right) \left(\frac{32 \text{ lb} - \text{S}}{34 \text{ lb} - \text{H}_2\text{S}} \right) \left(\frac{2 \text{ lb} - \text{SO}_2}{\text{lb} - \text{S}} \right) \\ &= 0.09 \frac{\text{lb} - \text{SO}_2}{\text{hr}} ; 2.2 \frac{\text{lb} - \text{SO}_2}{\text{day}} ; 788 \frac{\text{lb} - \text{SO}_2}{\text{yr}} \end{aligned}$$

Pollutant	PE1 (lb/day)	PE1 (lb/year)
NO _x	4.4	1,604
CO	13.7	4,990
VOC	3.4	1,240
PM ₁₀	3.0	1,110
SO _x	2.2	788

2. Post Project Potential to Emit (PE2):

The IC engine's NO_x, VOC, PM₁₀ and SO_x emissions will remain unchanged.

CO:

$$\begin{aligned} PE &= \frac{(1,100) \left(8,979 \frac{\text{dscf}}{\text{MMBtu}} \right) \left(9,232 \frac{\text{Btu}}{\text{hp} - \text{hr}} \right) \left(28 \frac{\text{lb}}{\text{lb} - \text{mol}} \right) (575 \text{ hp}) \left(24 \frac{\text{hr}}{\text{day}} ; 8,760 \frac{\text{hr}}{\text{yr}} \right)}{\left(379.5 \frac{\text{dscf}}{\text{lb} - \text{mol}} \right) (10^{12}) \left(\frac{20.95 - 15}{20.95} \right)} \\ &= 326.9 \frac{\text{lb} - \text{CO}}{\text{day}} ; 119,317 \frac{\text{lb} - \text{CO}}{\text{yr}} \end{aligned}$$

Pollutant	PE2 (lb/day)	PE2 (lb/yr)
NO _x	4.4	1,604
CO	326.9	119,317
VOC	3.4	1,240
PM ₁₀	3.0	1,110
SO _x	2.2	788

3. Quarterly Emissions Changes (QEC)

QEC are determined to complete the emissions profile in District's Permit Administration System (PAS) database. The annual emissions are evenly distributed throughout the quarters using the following equation: $(PE2 - PE1) \text{ lb/year} \div 4 \text{ quarters/year}$

Pollutant	Quarterly Emission Changes (QEC)			
	1 st Quarter (lb/quarter)	2 nd Quarter (lb/quarter)	3 rd Quarter (lb/quarter)	4 th Quarter (lb/quarter)
NO _x	0	0	0	0
CO	28,581	28,582	28,582	28,582
VOC	0	0	0	0
PM ₁₀	0	0	0	0
SO _x	0	0	0	0

4. Adjusted increase in Permitted Emissions (AIPE) Calculations:

Pursuant to District Rule 2201, sections 4.1 and 4.1.2, AIPE calculations are performed for each pollutant on a daily basis to determine if BACT is triggered for a modified emissions unit. District Rule 2201, sections 4.3 and 4.4, define $AIPE = PE2 - HAPE = PE2 - PE1 \times (EF2 \div EF1)$. The proposed modification results in an increase in CO emissions only.

$$AIPE_{CO} = 326.9 \frac{\text{lb-CO}}{\text{day}} - \left(13.7 \frac{\text{lb-CO}}{\text{day}} \right) (1) = 313.2 \frac{\text{lb-CO}}{\text{day}}$$

Note: Since $EF2 > EF1$ for CO, the quantity $(EF2/EF1)$ is set to 1 pursuant to District Rule 2201, section 4.4.

D. Facility Emissions:

1. Pre-Project Stationary Source Potential to Emit (SSPE1)

Pursuant to Section 4.9 of District Rule 2201, SSPE1 is the Potential to Emit from all units with valid Authorities to Construct (ATC) or Permits to Operate (PTO) at the Stationary Source and the quantity of emission reduction credits (ERCs) which have been banked since September 19, 1991 for Actual Emissions Reductions (AERs) that have occurred at the source, and which have not been used on-site. SSPE1 values are calculated in Appendix III of this document.

Permit Unit	SSPE1 (lb/yr)				
	NO _x	CO	VOC	PM ₁₀	SO _x
N-1660-1-5	1,690	10,289	511	613	817
N-1660-3-1	1,092	3,324	99	198	264
N-1660-4-1	317	53	11	18	0

SSPE1 (lb/yr) Continue...					
Permit Unit	NO_x	CO	VOC	PM₁₀	SO_x
N-1660-6-1	1,133	1,396	164	24	2
N-1660-7-1	5,040	22,262	2,100	840	762
<i>N-1660-9-0</i>	<i>1,604</i>	<i>4,990</i>	<i>1,240</i>	<i>1,110</i>	<i>788</i>
ERCs	0	0	0	0	0
Total	10,876	42,314	4,125	2,803	2,633

2. Post Project Stationary Source Potential to Emit (SSPE2)

Pursuant to Section 4.10 of District Rule 2201, the Post-Project Stationary Source Potential to Emit (SSPE2) is the Potential to Emit (PE) from all units with valid Authorities to Construct (ATC) or Permits to Operate (PTO) at the Stationary Source and the quantity of emission reduction credits (ERC) which have been banked since September 19, 1991 for Actual Emissions Reductions that have occurred at the source, and which have not been used on-site.

SSPE2 (lb/yr)					
Permit Unit	NO_x	CO	VOC	PM₁₀	SO_x
N-1660-1-5	1,690	10,289	511	613	817
N-1660-3-1	1,092	3,324	99	198	264
N-1660-4-1	317	53	11	18	0
N-1660-6-1	1,133	1,396	164	24	2
N-1660-7-1	5,040	22,262	2,100	840	762
<i>ATC N-1660-9-2</i>	<i>1,604</i>	<i>119,317</i>	<i>1,240</i>	<i>1,110</i>	<i>788</i>
ERCs	0	0	0	0	0
Total	10,876	156,641	4,125	2,803	2,633
Offset Thresholds	20,000	200,000	20,000	29,200	54,750
Offsets Triggered?	No	No	No	No	No
Major Source Threshold	50,000	200,000	50,000	140,000	140,000
Major Source?	No	No	No	No	No

3. Stationary Source Increase in Permitted Emissions (SSIPE)

It is a District Practice to define the SSIPE as the difference of SSPE2 and SSPE1. SSIPE is summarized in the following table:

Pollutant	SSPE2 (lb/yr)	SSPE1 (lb/yr)	SSIPE (lb/yr)
NO _x	10,876	10,876	0
CO	156,641	42,314	114,327
VOC	4,125	4,125	0
PM ₁₀	2,803	2,803	0
SO _x	2,633	2,633	0

4. District Rule 2201 Major Modification

The purpose of Major Modification calculations is to determine the following:

- A. If Best Available Control Technology (BACT) is triggered for a new or modified emission unit that results in a Major Modification (District Rule 2201, §4.1.3); and
- B. If a public notification is triggered (District Rule 2201, §5.4.1).

Per section VII.D.2 of this document, the facility is not a Major Source for any pollutant; therefore, the proposed project cannot trigger a Major Modification.

5. Federal Major Modification

The purpose of Federal Major Modification calculations is to determine the following:

- A. If a Rule-compliance project qualifies for District Rule 2201's Best Available Control Technology (BACT) and offset exemptions (District Rule 2201, §4.2.3.5); and
- B. If an Alternate Siting analysis must be performed (District Rule 2201, §4.15.1);
- C. If the applicant must provide certification that all California stationary sources owned, operated, or controlled by the applicant that are subject to emission limits are in compliance with those limits or are on a schedule for compliance with all applicable emission limits and standards; and
- D. If a public notification is triggered. (District Rule 2201, §5.4.1) Although the language in §5.4.1 states "Major Modifications", the District is taking a conservative approach by assuming this applies to both District Rule 2201 Major Modifications and Federal Major Modifications.

Since the proposed project is not a District Major Modification, it cannot trigger a Federal Major Modification, so no further calculations are necessary.

VIII. COMPLIANCE:

Rule 2201 New and Modified Stationary Source Review Rule

1. Best Available Control Technology (BACT)

Section 4.1.2 states that BACT requirements are triggered for modified emission units if the Adjusted Increase in Permitted Emissions (AIPE) exceeds 2.0 lb/day for any affected pollutant. Section 4.2.1 provides an exemption from BACT requirements for CO emissions if the facility is located in a CO attainment area and the SSPE_{2CO} is less than 200,000 lb/yr.

Per section VII.C.4 of this document, AIPE is greater than 2.0 lb/day for CO emissions. However, SSPE2 is less than 200,000 lb/yr for CO emissions. Therefore, BACT is not triggered for CO.

2. Offsets

Offsets are examined on a pollutant-by-pollutant basis, and are triggered for any pollutant with an SSPE2 equal to or greater than the threshold values in Table 4-1 of this Rule.

Per Section VII.D.2 of this document, SSPE2 is less than the offset threshold level for each pollutant. Thus, offsets are not triggered for any pollutant.

3. Public Notice

District Rule 2201, section 5.4, requires a public notification for the affected pollutants from the following types of projects:

- New Major Sources
- Major Modifications
- New emission units with a PE>100 lb/day of any one pollutant
- Modifications with SSPE1 below an Offset threshold and SSPE2 above an Offset threshold on a pollutant-by-pollutant basis
- New stationary sources with SSPE2 exceeding Offset thresholds
- Any permitting action with a SSIPE exceeding 20,000 lb/yr for any one pollutant

New Major Sources: Gallo Cattle Company is an existing Stationary Source. Therefore, this section is not applicable.

Major modifications: Per section VII.D.4 and VII.D.5 of this document, the proposed project does not result in a Major Modification. Thus, public notice is not required for this project.

New emission units with a PE>100 lb/day of any one pollutant: The facility is not proposing to install a new emission unit in this project. Therefore, this section is not applicable.

Modifications with SSPE1 below an Offset threshold and SSPE2 above an Offset threshold on a pollutant-by-pollutant basis: Per sections VII.D.1 and VII.D.2 of this document, SSPE1 and SSPE2 are less than the offset threshold level for each pollutant. Thus, public notice is not required for this project.

New stationary sources with SSPE2 exceeding Offset thresholds: This facility is not a new stationary source. Therefore, this section is not applicable to this project.

Any permitting action with an SSIPE exceeding 20,000 lb/yr for any one pollutant: Per section VII.D.3 of this document, SSIPE is greater than 20,000 lb/yr for CO. Thus, public notice is required for this project.

4. Daily Emission Limits (DELs)

Daily Emissions Limitations (DELs) and other enforceable conditions are required by Section 3.17 to restrict a unit's maximum daily emissions. The following conditions will be placed on the permit:

- NO_x emissions shall not exceed 9.0 ppmvd @ 15% O₂ (or 0.15 g/bhp-hr) referenced as NO₂. [District Rules 2201, 4701 and 4702]
- CO emissions shall not exceed 1,100 ppmvd @ 15% O₂. [District Rules 2201, 4701 and 4702]
- VOC emissions shall not exceed 20 ppmvd @ 15% O₂ referenced as methane. [District Rules 2201, 4701 and 4702]
- PM₁₀ emissions shall not exceed 0.1 g/bhp-hr. [District Rule 2201]
- Hydrogen Sulfide (H₂S) content of the digester gas used as a fuel in the engine shall not exceed 59 ppmv. [District Rules 2201 and 4801]

5. Compliance Assurance

Source Testing

The permittee is required to source test this unit within 60-days of startup under this permit and at least once every 24-months thereafter. The source test frequency is consistent with Rule 4702.

Monitoring, Recordkeeping and Reporting:

Monitoring, recordkeeping and reporting requirements are replicated from the existing Permit to Operate N-1660-9-0, which is included in Appendix II of this document.

6. Ambient Air Quality Analysis (AAQA)

Section 4.14.1 requires an AAQA to be performed for projects that trigger public notice. The following table shows the summary of AAQA:

Criteria Pollutant Modeling Results*

Pollutant	1 Hour	3 Hours	8 Hours	24 Hours	Annual
CO	Pass	X	Pass	X	X

*Results were taken from the PSD spreadsheet.

The criteria modeling runs indicate that the CO emissions from the proposed project will not cause or significantly contribute to a violation of the State or National Ambient Air Quality Standards.

Compliance is expected with this Rule.

Rule 4101 Visible Emissions

Section 5.0, indicates that no air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour, which is dark or darker than Ringelmann 1 or equivalent to 20% opacity. The following condition will be placed on the permit:

- No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]

Compliance is expected with this Rule.

Rule 4102 Nuisance

Section 4.0 prohibits discharge of air contaminants, which could cause injury, detriment, nuisance or annoyance to the public. Public nuisance conditions are not expected as a result of these operations, provided the equipment is well maintained. Therefore, compliance with this rule is expected. The following condition will be placed on the permit:

- No air contaminant shall be released into the atmosphere, which causes a public nuisance. [District Rule 4102]

California Health & Safety Code 41700

District Policy APR 1905 - Risk Management Policy for Permitting New and Modified Sources specifies that for an increase in emissions associated with a proposed new source or modification, the District perform an analysis to determine the possible impact to the nearest resident or worksite.

There is no increase in fuel use, and therefore, increase in hazardous air pollutants is not expected and health risk assessment is not necessary for the proposed project.

Rule 4201 Particulate Matter Concentration

Section 3.0 of this Rule states: A person shall not release or discharge into the atmosphere from any single source operation, dust, fumes, or total suspended particulate matter emissions in excess of 0.1 grain per cubic foot of gas at dry standard

conditions. The particulate matter concentration in the engine's exhaust stream can be estimated as follows:

$$PM \left(\frac{gr}{dscf} \right) = \frac{Emissions \left(\frac{gr - PM}{min} \right)}{Exhaust Flow (scfm) \times Moisture Correction}$$

The applicant states the exhaust flow rate at maximum load is 2,000 acfm @ 1,070 °F. The rich-burn engine's exhaust moisture content is assumed to be 19% ⁽¹⁾. Therefore, the exhaust particulate matter emission concentration at 60 °F is:

$$PM \left(\frac{gr}{dscf} \right) = \frac{\left(0.13 \frac{lb - PM}{hr} \right) \left(7,000 \frac{gr - PM}{lb - PM} \right) \left(\frac{hr}{60 min} \right)}{\left(2,000 \frac{ft^3}{min} \right) \left(\frac{460 + 60}{460 + 1,070} \right) (1 - 0.19)} = 0.028 \frac{gr - PM}{dscf}$$

Since 0.028 gr/dscf is less than 0.1 gr/dscf, compliance with this Rule is expected.

Rule 4701 Internal Combustion Engines – Phase 1

The requirements of Rule 4702 are equivalent or more stringent than the requirements of this Rule. Since the proposed IC engine is subject to both Rules 4701 and 4702, compliance with Rule 4702 is sufficient to demonstrate compliance with this Rule.

Rule 4702 Internal Combustion Engines – Phase 2

Section 2.0 states that this rule applies to any IC engine with a rated brake horsepower greater than 50 horsepower (hp). The proposed engine is 545 hp. Therefore, this rule is applicable to this engine.

Section 5.1 states an owner shall not operate an engine that results in emissions exceeding the limits specified in Table 1, Category 1.a. The emission limits for this category are as follows:

NO_x: 50 ppmvd @ 15 % O₂ or 90% reduction;
CO: 2000 ppmvd @ 15 % O₂; and
VOC: 250 ppmvd @ 15 % O₂

The applicant is proposing the following emission limits for the engine:

NO_x: 9.0 ppmvd @ 15 % O₂ or 96% reduction;
CO: 1,100 ppmvd @ 15 % O₂; and
VOC: 20 ppmvd @ 15 % O₂

¹ Gregg Arney, *How to Apply Non-Selective Catalytic Reduction Systems to Rich Burn Engines Successfully* (Southern California Gas Company/Sempra Energy, 2002), page 8.

The proposed emission rates are below than the Rule emission limits. Therefore, compliance is expected with this section.

Section 5.6.1 requires engines equipped with an external emission control device to either install and maintain continuous emissions monitoring equipment for NO_x, CO, and oxygen, as identified in Rule 1080 (Stack Monitoring), or install and maintain provisions for APCO-approved alternate monitoring.

Currently, NO_x, CO and O₂ emission concentrations from this engine are measured using a District-approved portable analyzer on monthly basis. This testing frequency is consistent with the testing frequency for the engine permitted under N-1660-7-1. The following conditions will be placed on the ATC to assure compliance with the monitoring requirements:

- The permittee shall monitor and record the stack concentration of NO_x, CO, and O₂ at least once every month (in which a source test is not performed) and within two hours of replacing the catalyst elements, using a portable emission monitor that meets District specifications. The monthly monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Furthermore, the monthly monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last month. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 4701 and 4702]
- The permittee shall maintain records of: (1) the date and time of NO_x, CO, and O₂ measurements, (2) the O₂ concentration in percent and the measured NO_x and CO concentrations corrected to 15% O₂, (3) make and model of exhaust gas analyzer, (4) exhaust gas analyzer calibration records, (5) date and time of catalyst elements change-out, and (6) a description of any corrective action taken to maintain the emissions within the acceptable range. [District Rules 2201, 4701 and 4702]

Section 5.6.6 requires the installation, maintenance, and use of a non-resettable elapsed operating time meter. In lieu of a non-resettable operating time meter, the owner/operator may use an alternative device, method, or technique for determining operating time provided the alternative is approved by the District and is allowed on the permit. The engine is equipped with non-resettable elapsed time meter. The following condition will be placed on the permit:

- The permittee shall utilize and maintain a non-resettable elapsed operating time meter. [District Rule 4702]

To satisfy the recordkeeping requirements of section 6.2.1, the following conditions will be placed the permit:

- The permittee shall maintain records, on a monthly basis, that contain the following information: (1) total hours of operation; (2) type of fuel used; (3) maintenance or modifications performed; (4) monitoring data; and (5) compliance source test results. [District Rules 4701 and 4702]
- All records shall be retained for a period of at least 5 years and shall be made available for District inspection upon request. [District Rules 1070 and 4702]

Section 6.3.2 requires an engine to demonstrate compliance with the NO_x, CO and VOC emission limits upon initial start-up and at least once every 24 months thereafter, in accordance with the test methods in Section 6.4. The applicant is not required to conduct initial source test, as they are not modifying the engine:

- Source testing to measure compliance with the permitted NO_x, CO, and VOC emission limits shall be conducted at least once every 24 months. [District Rules 2201, 4701 and 4702]

Section 6.3.3 states that, for the purpose of demonstrating compliance with the permitted NO_x, CO, and VOC emission limits, the arithmetic average of three 30-consecutive-minute test runs shall apply. If two of three test runs are above an applicable limit, the test cannot be used to demonstrate compliance with an applicable limit. To ensure compliance with this section the following condition will be placed on the permit:

- For emissions source testing, the arithmetic average of three 30-consecutive-minute test runs shall apply. If two of three runs are above an applicable limit the test cannot be used to demonstrate compliance with an applicable limit. [District Rules 4701 and 4702]

Section 6.4 states that the compliance with the requirements of Section 5.0 shall be determined in accordance with the following test procedures or any other method approved by the EPA and the APCO:

- The following test methods shall be used for testing: NO_x (ppmv) - EPA Method 7E or ARB Method 100, CO (ppmv) - EPA Method 10 or ARB Method 100, VOC (ppmv) - EPA Method 18, 25A or 25B, or ARB Method 100, stack gas oxygen - EPA Method 3 or 3A or ARB Method 100. EPA approved alternative test methods as approved by the District may also be used to address the source testing requirements of this permit. [District Rules 1081, 4701 and 4702]

Section 6.5 requires that the owner of an engine subject to the emission limits in Section 5.1 or the requirements of Section 8.2, submit to the APCO for approval, an Inspection and Monitoring (I&M) plan that specifies all actions to be taken to satisfy the following requirements. Sources may meet the requirements of 6.5.1 and 6.5.2 by monthly monitoring of some component, after having established a parametric correlation through source testing, etc. The applicant has proposed compliance with section 6.5 by

monthly NO_x, CO and O₂ concentrations utilizing a portable analyzer. Permit conditions will be included specifying procedures for corrective action and notification, as required by sections 6.5.3 and 6.5.4. The applicant will perform preventative maintenance as required by section 6.5.5. The applicant has proposed and ATC conditions will specify schedule for monitoring and data collection as required by sections 6.5.6 and 6.5.7. The applicant will review the I&M plan yearly as required by section 6.5.8. The I&M plan requirement is therefore satisfied.

Section 7.6.2 requires IC engines subject to the requirements of this Rule to demonstrate compliance by June 1, 2007. The IC engines at this facility have already met this compliance date.

Compliance is expected with this Rule.

Rule 4801 Sulfur Compounds

Section 3.1 of this Rule states: A person shall not discharge into the atmosphere sulfur compounds, which would exist as a liquid or gas at standard conditions, exceeding in concentration at the point of discharge: two-tenths (0.2) percent by volume calculated as sulfur dioxide (SO₂), on a dry basis averaged over 15 consecutive minutes.

The sulfur dioxide concentration in the engine's exhaust stream can be estimated as follows:

$$\frac{\text{Volume}_{\text{SO}_2} \left(\frac{\text{ft}^3 - \text{SO}_2}{\text{min}} \right)}{\text{Exhaust Flow (scfm)} \times \text{Moisture Correction}}$$

The applicant states the exhaust flow rate at maximum load is 2,000 acfm @ 1,070 °F. The rich-burn engine's exhaust moisture content is assumed to be 19%. Therefore, the exhaust sulfur dioxide emission concentration at 60 °F is:

$$\frac{\left(0.09 \frac{\text{lb} - \text{SO}_2}{\text{hr}} \right) \left(\frac{\text{lb} - \text{mol}}{64 \text{ lb} - \text{SO}_2} \right) \left(\frac{\text{hr}}{60 \text{ min}} \right) \left(379.5 \frac{\text{ft}^3 - \text{SO}_2}{\text{lb} - \text{mol}} \right)}{\left(2,000 \frac{\text{ft}^3}{\text{min}} \right) \left(\frac{460 + 60}{460 + 1,070} \right) (1 - 0.19)} = 1.61 \times 10^{-5} \frac{\text{ft}^3 - \text{SO}_2}{\text{ft}^3 - \text{exhaust}}$$

This Rule's limit is equivalent to 2 × 10⁻³ ft³-SO₂/ft³-exhaust. Therefore, compliance with this Rule is expected.

California Environmental Quality Act (CEQA)

Greenhouse Gas Significance Determination

The District started addressing greenhouse gases for the projects that are deemed complete after December 16, 2009.

This project was deemed complete on December 16, 2009. Therefore, greenhouse gas significance determination is not required.

District CEQA Findings

The California Environmental Quality Act (CEQA) requires each public agency to adopt objectives, criteria, and specific procedures consistent with CEQA Statutes and the CEQA Guidelines for administering its responsibilities under CEQA, including the orderly evaluation of projects and preparation of environmental documents. The San Joaquin Valley Unified Air Pollution Control District (District) adopted its *Environmental Review Guidelines* (ERG) in 2001. The basic purposes of CEQA are to:

- Inform governmental decision-makers and the public about the potential, significant environmental effects of proposed activities.
- Identify the ways that environmental damage can be avoided or significantly reduced.
- Prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible.
- Disclose to the public the reasons why a governmental agency approved the project in the manner the agency chose if significant environmental effects are involved.

The District performed an Engineering Evaluation (this document) for the proposed project and determined that the activity will occur at an existing facility and the project involves negligible expansion of the existing use. Furthermore, the District determined that the activity will not have a significant effect on the environment. The District finds that the activity is categorically exempt from the provisions of CEQA pursuant to CEQA Guideline § 15031 (Existing Facilities), and finds that the project is exempt per the general rule that CEQA applies only to projects which have the potential for causing a significant effect on the environment (CEQA Guidelines §15061(b)(3)).

IX. RECOMMENDATION

The existing Permit to Operate (PTO), N-1660-9-0 (included in Appendix II of this document), requires the applicant to use a scrubber in the fuel line to reduce H₂S to a level at or below 59 ppmv, and achieve at least 90% H₂S control efficiency (CE).

These multiple H₂S limits cause problems with facility's ability to reduce fuel H₂S by other viable means such as maintaining an environment in the digester to reduce H₂S formation. They have to maintain relatively high influent H₂S concentration to show compliance with the scrubber CE requirement, which does not appear to have a regulatory basis. The CE requirement was not established due to BACT because BACT was not triggered for the sulfur compound emissions (see application review under project N1052089). Moreover, absolute H₂S concentration is the most relevant limit, as it is used to quantify engine's sulfur compounds emissions. Therefore, the scrubber CE requirement and associated conditions will be removed from the permit.

X. BILLING INFORMATION

ATC	Fee Schedule	Fee Description	Previous Fee Schedule
N-1660-9-2	3020-10D	545 hp	3020-10D

APPENDICES

- Appendix I: Draft Authority to Construct Permit
- Appendix II: Permit to Operate N-1660-9-0
- Appendix III: SSPE1 Calculations

Appendix I
Draft Authority to Construct Permit

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT
DRAFT

PERMIT NO: N-1660-9-2

LEGAL OWNER OR OPERATOR: GALLO CATTLE COMPANY
MAILING ADDRESS: PO BOX 775
ATWATER, CA 95301-0775

LOCATION: 10561 W HIGHWAY 140
ATWATER, CA

EQUIPMENT DESCRIPTION:
MODIFICATION OF: 575 BHP CATERPILLAR MODEL G399NA RICH BURN DIGESTER GAS-FIRED IC ENGINE
EQUIPPED WITH MIRATECH NON-SELECTIVE CATALYST POWERING AN ELECTRICAL GENERATOR: INCREASE
CO CONCENTRATIONS

CONDITIONS

1. {14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
2. {15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
3. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
4. {1897} This engine shall be equipped with either a positive crankcase ventilation (PCV) system that recirculates crankcase emissions into the air intake system for combustion, or a crankcase emissions control device of at least 90% control efficiency. [District Rule 2201]
5. This engine shall only be fired on digester gas. [District Rule 2201]
6. The permittee shall utilize a nonresettable elapsed operating time meter. [District Rule 4702]
7. Sampling ports adequate for Hydrogen Sulfide (H2S) testing shall be provided in the fuel line both influent to and effluent from the H2S scrubber. [District Rule 2201]
8. {33} Sampling facilities for source testing shall be provided in accordance with the provisions of Rule 1081 (Source Sampling). [District Rule 1081]
9. NOx emissions shall not exceed 9.0 ppmvd @ 15% O2 (or 0.15 g/bhp-hr) referenced as NO2. [District Rules 2201, 4701 and 4702]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (209) 557-6400 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director, APCO

DAVID WARNER, Director of Permit Services

N-1660-9-2 : Mar 8 2010 1:06PM - KAH-LONJ : Joint Inspection NOT Required

10. CO emissions shall not exceed 1,100 ppmvd @ 15% O₂. [District Rules 2201, 4701 and 4702]
11. VOC emissions shall not exceed 20 ppmvd @ 15% O₂ referenced as methane. [District Rules 2201, 4701 and 4702]
12. PM₁₀ emissions shall not exceed 0.1 g/bhp-hr. [District Rule 2201]
13. The fuel line to the engine shall be equipped with a scrubber to reduce H₂S in the digester gas to a level at or below 59 ppmv. [District Rules 2201 and 4801]
14. Testing to demonstrate compliance with the fuel H₂S content limit of this permit shall be conducted weekly. Once eight consecutive weekly tests show compliance, the fuel H₂S content testing frequency may be reduced to once every calendar quarter. If a quarterly test shows a violation of the H₂S content limit of this permit, then weekly testing shall resume and continue until eight consecutive tests show compliance. Once compliance is shown on eight consecutive weekly tests, then testing may return to quarterly. The permittee shall keep records of the date and time of H₂S measurements, measured H₂S concentrations (ppmv) to demonstrate compliance with the permit limit. [District Rule 2201]
15. Source testing to demonstrate compliance with the permitted NO_x, CO, and VOC emission limits shall be conducted at least once every 24 months. [District Rules 4701 and 4702]
16. {3208} Emissions source testing shall be conducted with the engine operating either at conditions representative of normal operations or conditions specified in the Permit to Operate. [District Rules 4701 and 4702]
17. For emissions source testing, the arithmetic average of three 30-consecutive-minute test runs shall apply. If two of three runs are above an applicable limit the test cannot be used to demonstrate compliance with an applicable limit. [District Rules 4701 and 4702]
18. Testing to measure the H₂S content of the fuel shall be conducted using either EPA Method 15 or ASTM Method D1072, D3031, D4084, D3246, D5504 or with the use of the Testo 350 XL portable analyzer. [District Rule 2201]
19. The following test methods shall be used for testing: NO_x (ppmv) - EPA Method 7E or ARB Method 100, CO (ppmv) - EPA Method 10 or ARB Method 100, VOC (ppmv) - EPA Method 18, 25A or 25B, or ARB Method 100, stack gas oxygen - EPA Method 3 or 3A or ARB Method 100. EPA approved alternative test methods as approved by the District may also be used to address the source testing requirements of this permit. [District Rules 1081, 4701 and 4702]
20. The District must be notified at least 30 days prior to any compliance source test, and a source test plan must be submitted for approval at least 15 days prior to testing. [District Rule 1081]
21. {110} The results of each source test shall be submitted to the District within 60 days thereafter. [District Rule 1081]
22. The permittee shall monitor and record the stack concentration of NO_x, CO and O₂ at least once every month (in which a source test is not performed) using a portable emission monitor that meets District specifications. The monthly monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Furthermore, the monthly monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last month. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 2201, 4701 and 4702]
23. The permittee shall maintain records of: (1) the date and time of NO_x, CO, and O₂ measurements, (2) the O₂ concentration in percent and the measured NO_x and CO concentrations corrected to 15% O₂, (3) make and model of exhaust gas analyzer, (4) exhaust gas analyzer calibration records, and (6) a description of any corrective action taken to maintain the emissions within the acceptable range. [District Rules 2201, 4701 and 4702]
24. The permittee shall maintain records, on a monthly basis, that contain the following information: (1) total hours of operation; (2) type of fuel used; (3) maintenance or modifications performed; (4) monitoring data; and (5) compliance source test results. [District Rules 4701 and 4702]
25. {3202} This engine shall be operated and maintained in proper operating condition per the manufacturer's requirements as specified on the Inspection and Monitoring (I&M) plan submitted to the District. [District Rule 4702]
26. {3203} This engine shall be operated within the ranges that the source testing has shown result in pollution concentrations within the emissions limits as specified on this permit. [District Rule 4702]

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CONDITIONS CONTINUE ON NEXT PAGE

27. {3212} The permittee shall update the I&M plan for this engine prior to any planned change in operation. The permittee must notify the District no later than seven days after changing the I&M plan and must submit an updated I&M plan to the APCO for approval no later than 14 days after the change. The date and time of the change to the I&M plan shall be recorded in the engine's operating log. For modifications, the revised I&M plan shall be submitted to and approved by the APCO prior to issuance of the Permit to Operate. The permittee may request a change to the I&M plan at any time. [District Rule 4702]
28. {3213} All records shall be maintained and retained on-site for a minimum of five (5) years, and shall be made available for District inspection upon request. [District Rules 4701 and 4702]

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Appendix II
Permit to Operate N-1660-9-0

San Joaquin Valley Air Pollution Control District

PERMIT UNIT: N-1660-9-0

EXPIRATION DATE: 09/30/2012

EQUIPMENT DESCRIPTION:

575 BHP CATERPILLAR MODEL G399NA RICH BURN DIGESTER GAS-FIRED IC ENGINE EQUIPPED WITH A FUEL SULFUR SCRUBBER AND A MIRATECH NON-SELECTIVE CATALYST POWERING AN ELECTRICAL GENERATOR

PERMIT UNIT REQUIREMENTS

1. Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]
2. No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
3. No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
4. All equipment shall be maintained in good operating condition and shall be operated in a manner to minimize emissions of air contaminants into the atmosphere. [District Rule 2201]
5. This engine shall be equipped with either a positive crankcase ventilation (PCV) system that recirculates crankcase emissions into the air intake system for combustion, or a crankcase emissions control device of at least 90% control efficiency. [District Rule 2201]
6. This engine shall only be fired on digester gas. [District Rule 2201]
7. The permittee shall install and operate a nonresettable fuel meter and a nonresettable elapsed operating time meter. In lieu of installing a nonresettable fuel meter, the owner or operator may use a non-resettable elapsed operating time meter in conjunction with the engine manufacturer's maximum rated fuel consumption to determine annual fuel usage. [District Rule 4702]
8. Sampling ports adequate for H2S testing shall be provided in the fuel line both influent to and effluent from the H2S scrubber. [District Rule 2201]
9. Sampling facilities for source testing shall be provided in accordance with the provisions of Rule 1081 (Source Sampling). [District Rule 1081]
10. Emissions from this IC engine shall not exceed any of the following limits: 9 ppmvd-NOx @ 15% O2 or 0.15 g-NOx/bhp-hr, 0.1 g-PM10/bhp-hr, 46 ppmvd-CO @ 15% O2 or 0.5 g-CO/bhp-hr, or 20 ppmvd @ 15% O2 or 0.12 g-VOC/bhp-hr. [District Rules 2201, 4701, and 4702]
11. The H2S content of the digester gas used as a fuel in the engine shall not exceed 59 ppmv. [District Rules 2201 and 4801]
12. The fuel line to the engine shall be equipped with a scrubber that achieves a minimum H2S control efficiency of 90%. [District Rule 2201]
13. Testing to demonstrate compliance with the fuel H2S content limit of this permit shall be conducted weekly. Once eight (8) consecutive weekly tests show compliance, the fuel H2S content testing frequency may be reduced to once every calendar quarter. If a quarterly test shows a violation of the H2S content limit of this permit, then weekly testing shall resume and continue until eight (8) consecutive tests show compliance. Once compliance is shown on eight (8) consecutive weekly tests, then testing may return to quarterly. [District Rule 2201]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

These terms and conditions are part of the Facility-wide Permit to Operate.

Facility Name: GALLO CATTLE COMPANY

Location: 10561 W HIGHWAY 140, ATWATER, CA

N-1660-9-0 : Mar 8 2010 1:07PM -- KAH/LONJ

14. Testing to demonstrate compliance with the H₂S control efficiency requirement of the scrubber shall be conducted at least once every 12 months. [District Rule 2201]
15. Source testing to measure combustion NO_x, CO, and VOC emissions from this unit shall be conducted not less than once every 24 months. [District Rules 4701 and 4702]
16. Emissions source testing shall be conducted with the engine operating either at conditions representative of normal operations or conditions specified in the Permit to Operate. [District Rules 4701 and 4702]
17. For emissions source testing, the arithmetic average of three 30-consecutive-minute test runs shall apply. If two of three runs are above an applicable limit, the test cannot be used to demonstrate compliance with an applicable limit. VOC emissions shall be reported as methane. VOC, NO_x, and CO concentrations shall be reported in ppmv, corrected to 15% oxygen. [District Rules 4701 and 4702]
18. Testing to measure the H₂S content of the fuel shall be conducted using either EPA Method 15, ASTM Method D1072, D3031, D4084, D3246, D5504 or with the use of the Testo 350 XL portable analyzer. [District Rule 2201]
19. The following test methods shall be used: NO_x (ppmv) - EPA Method 7E or ARB Method 100, CO (ppmv) - EPA Method 10 or ARB Method 100, stack gas oxygen - EPA Method 3 or 3A or ARB Method 100, and VOC (ppmv) - EPA Method 18, 25A or 25B, or ARB Method 100. [District Rules 1081, 4701, and 4702]
20. Source testing shall be conducted using the methods and procedures approved by the District. The District must be notified at least 30 days prior to any compliance source test, and a source test plan must be submitted for approval at least 15 days prior to testing. [District Rule 1081]
21. The results of each source test shall be submitted to the District within 60 days thereafter. [District Rule 1081]
22. The permittee shall monitor and record the stack concentration of NO_x, CO, and O₂ at least once every month (in which a source test is not performed) using a portable emission monitor that meets District specifications. Monitoring shall not be required if the engine is not in operation, i.e. the engine need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the engine unless monitoring has been performed within the last month. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rules 4701 and 4702]
23. This engine shall be operated and maintained in proper operating condition per the manufacturer's requirements as specified on the Inspection and Monitoring (I&M) plan submitted to the District. [District Rule 4702]
24. This engine shall be operated within the ranges that the source testing has shown result in pollution concentrations within the emissions limits as specified on this permit. [District Rule 4702]
25. The permittee shall maintain an engine operating log to demonstrate compliance. The engine operating log shall include, on a monthly basis, the following information: total hours of operation, type and quantity (cubic feet of gas or gallons of liquid) of fuel used, maintenance or modifications performed, monitoring data, compliance source test results, and any other information necessary to demonstrate compliance. [District Rules 4701 and 4702]
26. The permittee shall update the I&M plan for this engine prior to any planned change in operation. The permittee must notify the District no later than seven days after changing the I&M plan and must submit an updated I&M plan to the APCO for approval no later than 14 days after the change. The date and time of the change to the I&M plan shall be recorded in the engine's operating log. For modifications, the revised I&M plan shall be submitted to and approved by the APCO prior to issuance of the Permit to Operate. The permittee may request a change to the I&M plan at any time. [District Rule 4702]
27. All records shall be maintained and retained on-site for a minimum of five (5) years, and shall be made available for District inspection upon request. [District Rules 4701 and 4702]

These terms and conditions are part of the Facility-wide Permit to Operate.

Appendix III
SSPE1 Calculations

SSPE1 Calculations

N-1660-1-5: 10.6 MMBTU/HR IRON FIREMAN BOILER MODEL 302-H-250 (S/N 13256) WITH AN AMERICAN COMBUSTION TECHNOLOGIES LOW NOX BURNER MODEL ACT SLE 06

Heat input: 10.6 MMBtu/hr × 8,760 hr/yr = 92,856 MMBtu/yr
 F-factor_{LPG}: 8,578 dscf/MMBtu
 Molecular Weight for NO_x: 46 lb/lb-mole
 Molecular Weight for CO: 28 lb/lb-mole

Permitted Emission Factors: NO_x: 15.0 ppmvd @ 3% O₂
 CO: 150 ppmvd @ 3% O₂
 VOC: 0.0055 lb/MMBtu
 PM₁₀: 0.0066 lb/MMBtu
 SO_x: 0.0088 lb/MMBtu

$$PE2_{NO_x, CO} = \frac{(\text{ppmvd}) \left(F - \text{factor} \frac{\text{dscf}}{\text{MMBtu}} \right) \left(MW \frac{\text{lb}}{\text{lb-mol}} \right) \left(\frac{\text{MMBtu}}{\text{yr}} \right)}{\left(379.5 \frac{\text{dscf}}{\text{lb-mol}} \right) (10^6) \left(\frac{20.95 - 3}{20.95} \right)}$$

$$PE2_{VOC, PM_{10}, SO_x} = \text{MMBtu/yr} \times \text{EF lb/MMBtu}$$

Pollutant	Annual PE2 (lb/yr)
NO _x	1,690
CO	10,289
VOC	511
PM ₁₀	613
SO _x	817

N-1660-3-1: 10.5 MMBTU/HR DIXON BOILER MODEL WW-3250BHP WITH AN INDUSTRIAL COMBUSTION LOW-NOX BURNER MODEL LNDG-1455-250-LPG

Heat input: 30,000 MMBtu/yr (permit limit)
 F-factor_{LPG}: 8,578 dscf/MMBtu
 Molecular Weight for NO_x: 46 lb/lb-mole
 Molecular Weight for CO: 28 lb/lb-mole

Permitted Emission Factors: NO_x: 30.0 ppmvd @ 3% O₂
 CO: 150 ppmvd @ 3% O₂
 VOC: 0.0033 lb/MMBtu
 PM₁₀: 0.0066 lb/MMBtu
 SO_x: 0.0088 lb/MMBtu

$$PE2_{NO_x, CO} = \frac{(\text{ppmvd}) \left(F - \text{factor} \frac{\text{dscf}}{\text{MMBtu}} \right) \left(MW \frac{\text{lb}}{\text{lb-mol}} \right) \left(\frac{\text{MMBtu}}{\text{yr}} \right)}{\left(379.5 \frac{\text{dscf}}{\text{lb-mol}} \right) (10^6) \left(\frac{20.95 - 3}{20.95} \right)}$$

$$PE2_{VOC, PM10, SO_x} = \text{MMBtu/yr} \times \text{EF lb/MMBtu}$$

Pollutant	Annual PE2 (lb/yr)
NO _x	1,092
CO	3,324
VOC	99
PM ₁₀	198
SO _x	264

N-1660-4-1: 800 BHP CUMMINS MODEL VT 12-800-GSGC DIESEL-FIRED EMERGENCY STANDBY IC ENGINE POWERING AN ELECTRICAL GENERATOR

The emission factors (EF) for NO_x, CO, VOC, and PM₁₀ emissions for this unit are taken from the permit conditions. The EF for SO_x for this engine when burning CARB diesel fuel is based on mass balance with 15 ppmw sulfur using the engine's fuel consumption at 100% load.

$$\begin{aligned}
 EF_{NO_x} &= 9.0 \text{ g/bhp-hr} \\
 EF_{CO} &= 1.5 \text{ g/bhp-hr} \\
 EF_{VOC} &= 0.32 \text{ g/bhp-hr} \\
 EF_{PM10} &= 0.5 \text{ g/bhp-hr} \\
 \\
 EF_{SO_x} &= 0.000015 \text{ lb-S/lb-fuel} \times 7.1 \text{ lb fuel/gal} \times 37.4 \text{ gal/hr} \\
 &\quad \times (2 \text{ lb-SO}_2 \text{ in exhaust/1 lb-S in fuel}) \\
 &= 0.008 \text{ lb/hr}
 \end{aligned}$$

$$PE2_{NO_x, CO, VOC, \text{ and } PM_{10}} = hp \times EF \text{ (g/hp-hr)} \times 20 \text{ hr/yr} \div 453.6 \text{ g/lb}$$

$$PE2_{SO_x} = EF \text{ (lb/hp)} \times 20 \text{ hr/yr}$$

Pollutant	Annual PE2 (lb/yr)
NO _x	317
CO	53
VOC	11
PM ₁₀	18
SO _x	0

N-1660-6-1: 1,490 BHP CUMMINS MODEL QST30-G5 DIESEL-FIRED EMERGENCY STANDBY IC ENGINE POWERING AN ELECTRICAL GENERATOR

The emission factors (EF) for NO_x, CO, VOC, and PM₁₀ emissions for this unit are taken from the permit conditions. The EF for SO_x for this engine when burning CARB diesel fuel is based on mass balance with 15 ppmw sulfur using the engine's fuel consumption at 100% load.

$$\begin{aligned} EF_{NO_x} &= 6.9 \text{ g/bhp-hr} \\ EF_{CO} &= 8.5 \text{ g/bhp-hr} \\ EF_{VOC} &= 1.0 \text{ g/bhp-hr} \\ EF_{PM_{10}} &= 0.149 \text{ g/bhp-hr} \end{aligned}$$

$$\begin{aligned} EF_{SO_x} &= 0.000015 \text{ lb-S/lb-fuel} \times 7.1 \text{ lb fuel/gal} \times 150 \text{ gal/hr} \\ &\quad \times (2 \text{ lb-SO}_2 \text{ in exhaust/1 lb-S in fuel)} \\ &= 0.032 \text{ lb/hr} \end{aligned}$$

$$PE2_{NO_x, CO, VOC, \text{ and } PM_{10}} = hp \times EF \text{ (g/hp-hr)} \times 50 \text{ hr/yr} \div 453.6 \text{ g/lb}$$

$$PE2_{SO_x} = EF \text{ (lb/hp)} \times 50 \text{ hr/yr}$$

Pollutant	Annual PE2 (lb/yr)
NO _x	1,133
CO	1,396
VOC	164
PM ₁₀	24
SO _x	2

N-1660-7-1: 435 BHP CATERPILLAR MODEL G3412TA DIGESTER GAS-FIRED IC ENGINE SERVED BY A THREE-WAY CATALYTIC CONVERTER POWERING AN ELECTRICAL GENERATOR

The emission factors (EF) for NO_x, CO, VOC, and PM₁₀ emissions for this unit are taken from the permit conditions. The EF for SO_x for this engine when burning digester gas fuel is based on mass balance with an H₂S concentration of 75 ppmw using the engine's fuel consumption at 100% load.

In the application review for this project, this engine's fuel usage at 100% load was specified as 3,901 scf/hr. However, this fuel usage seems incorrect as it implies the engine's brake specific fuel consumption is 5,237 Btu/hp-hr (3,901 scf/hr × 584 Btu/scf ÷ 435 hp), which in turn implies that the engine's thermal efficiency is approximately 49% (2,545 Btu/hp-hr ÷ 5,237 Btu/hp-hr), which is highly unlikely for a spark-ignited IC engine as they typically have thermal efficiencies between 25%-30%. Therefore, in order to calculate the engine's fuel usage, a brake specific fuel consumption of 9,232 Btu/hp-hr (similar to that of the IC engine permitted under N-1660-9) will be used.

$$\frac{\left(9,232 \frac{\text{Btu}}{\text{bhp-hr}}\right)(435 \text{ bhp})}{\left(584 \frac{\text{Btu}}{\text{ft}^3 - \text{fuel}}\right)} = 6,877 \frac{\text{ft}^3 - \text{fuel}}{\text{hr}}$$

EF _{NOx}	=	0.6 g/bhp-hr
EF _{CO}	=	2.65 g/bhp/hr
EF _{VOC}	=	0.25 g/bhp-hr
EF _{PM10}	=	0.1 g/bhp-hr

$$PE2_{NO_x, CO, VOC, \text{ and } PM_{10}} = \text{hp} \times EF \text{ (g/hp-hr)} \times 8,760 \text{ hr/yr} \div 453.6 \text{ g/lb}$$

$$PE2_{SO_x} = \frac{\left(75 \frac{\text{ft}^3 - H_2S}{10^6 \text{ ft}^3 - \text{fuel}}\right) \left(6,877 \frac{\text{ft}^3 - \text{fuel}}{\text{hr}}\right) \left(\frac{2 \text{ lb} - SO_2}{\text{lb} - S}\right) \left(8,760 \frac{\text{hr}}{\text{yr}}\right)}{\left(\frac{379.5 \text{ ft}^3 - H_2S}{34 \text{ lb} - H_2S}\right) \left(\frac{34 \text{ lb} - H_2S}{32 \text{ lb} - S}\right)}$$

$$= 762 \frac{\text{lb} - SO_2}{\text{yr}}$$

Pollutant	Annual PE2 (lb/yr)
NO _x	5,040
CO	22,262
VOC	2,100
PM ₁₀	840
SO _x	762