San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

DEC 0 1 2011

Mr. Kent Mann
E & J Gallo Winery
18000 W River Rd
Livingston, CA 95334

Re: Proposed ATC / Certificate of Conformity (Significant Mod)
District Facility # N-1237
Project # N-1113395

Dear Mr. Mann:

Enclosed for your review is the District's analysis of an application for Authorities to Construct for the facility identified above. The applicant is requesting that Certificates of Conformity with the procedural requirements of 40 CFR Part 70 be issued with this project. E & J Gallo Winery has requested Authority to Construct (ATC) permits for the installation of three new 105,000 gallon red and white wine fermentation and storage tanks.

After addressing any EPA comments made during the 45-day comment period, the Authorities to Construct will be issued to the facility with Certificates of Conformity. Prior to operating with modifications authorized by the Authorities to Construct, the facility must submit an application to modify the Title V permit as an administrative amendment, in accordance with District Rule 2520, Section 11.5.

If you have any questions, please contact Mr. Jim Swaney, Permit Services Manager, at (559) 230-5900.

Thank you for your cooperation in this matter.

Sincerely,

David Warner
Director of Permit Services

Enclosures
c: Stanley Tom, Permit Services

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

www.valleyair.org www.healthyairliving.com

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

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DEC 0 1 2011

Gerardo C. Rios, Chief
Permits Office
Air Division
U.S. EPA - Region IX
75 Hawthorne St.
San Francisco, CA 94105

Re: Proposed ATC / Certificate of Conformity (Significant Mod)
District Facility # N-1237
Project # N-1113395

Dear Mr. Rios:

Enclosed for your review is the District's engineering evaluation of an application for Authorities to Construct for E & J Gallo Winery at 18000 W River Rd in Livingston, CA, which has been issued a Title V permit. E & J Gallo Winery is requesting that Certificates of Conformity, with the procedural requirements of 40 CFR Part 70, be issued with this project. E & J Gallo Winery has requested Authority to Construct (ATC) permits for the installation of three new 105,000 gallon red and white wine fermentation and storage tanks.

Enclosed is the engineering evaluation of this application with a copy of the current Title V permit and proposed Authorities to Construct # ATC # N-1237-593-0, '594-0, '595-0 with Certificates of Conformity. After demonstrating compliance with the Authority to Construct, the conditions will be incorporated into the facility's Title V permit through an administrative amendment.

Please submit your written comments on this project within the 45-day comment period that begins on the date you receive this letter. If you have any questions, please contact Mr. Jim Swaney, Permit Services Manager, at (559) 230-5900.

Thank you for your cooperation in this matter.

Sincerely,

David Warner
Director of Permit Services

Enclosures
c: Stanley Tom, Permit Services

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DEC 0 1 2011

Mike Tollstrup, Chief
Project Assessment Branch
Air Resources Board
P O Box 2815
Sacramento, CA 95812-2815

Re: Proposed ATC / Certificate of Conformity (Significant Mod)
District Facility # N-1237
Project # N-1113395

Dear Mr. Tollstrup:

Enclosed for your review is the District's analysis of an application for Authorities to Construct for the facility identified above. The applicant is requesting that Certificates of Conformity with the procedural requirements of 40 CFR Part 70 be issued with this project. E & J Gallo Winery has requested Authority to Construct (ATC) permits for the installation of three new 105,000 gallon red and white wine fermentation and storage tanks.

Enclosed is the engineering evaluation of this application with a copy of the current Title V permit and proposed Authorities to Construct # ATC # N-1237-593-0, '594-0, '595-0 with Certificates of Conformity. After demonstrating compliance with the Authorities to Construct, the conditions will be incorporated into the facility's Title V permit through an administrative amendment.

Please submit your written comments on this project within the 30-day comment period that begins on the date you receive this letter. If you have any questions, please contact Mr. Jim Swaney, Permit Services Manager, at (559) 230-5900.

Thank you for your cooperation in this matter.

Sincerely,

David Warner
Director of Permit Services

Enclosures
c: Stanley Tom, Permit Services

Seyed Sadredin
Executive Director/Air Pollution Control Officer

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Merced Sun Star

**NOTICE OF PRELIMINARY DECISION
FOR THE ISSUANCE OF AUTHORITY TO CONSTRUCT AND
THE PROPOSED SIGNIFICANT MODIFICATION OF FEDERALLY
MANDATED OPERATING PERMIT**

NOTICE IS HEREBY GIVEN that the San Joaquin Valley Air Pollution Control District solicits public comment on the proposed significant modification of E & J Gallo Winery for its winery at 18000 W River Rd in Livingston, CA, California. E & J Gallo Winery has requested Authority to Construct (ATC) permits for the installation of three new 105,000 gallon red and white wine fermentation and storage tanks.

The District's analysis of the legal and factual basis for this proposed action, project #N-1113395, is available for public inspection at http://www.valleyair.org/notices/public_notices_idx.htm and the District office at the address below. This will be the public's only opportunity to comment on the specific conditions of the modification. If requested by the public, the District will hold a public hearing regarding issuance of this modification. For additional information, please contact Mr. Jim Swaney, Permit Services Manager, at (559) 230-5900. Written comments on the proposed initial permit must be submitted within 30 days of the publication date of this notice to DAVID WARNER, DIRECTOR OF PERMIT SERVICES, SAN JOAQUIN VALLEY AIR POLLUTION CONTROL DISTRICT, 1990 E. GETTYSBURG AVE, FRESNO, CA 93726-0244.

San Joaquin Valley Air Pollution Control District
Authority to Construct Application Review
Fermentation and Wine Storage Tanks

Facility Name:	E & J Gallo Winery	Date:	November 29, 2011
Mailing Address:	18000 W River Rd	Engineer:	Stanley Tom
	Livingston, CA 95334	Lead Engineer:	Joven Refuerzo
Contact Person:	Kent Mann		
Telephone:	(209) 394-5822		
Fax:	(209) 394-5936		
Application #(s):	N-1237-593-0, '594-0, '595-0		
Project #:	N-1113395		
Deemed Complete:	September 26, 2011		

I. Proposal

E & J Gallo Winery has requested Authority to Construct (ATC) permits for the installation of three new 105,000 gallon wine tanks. These tanks will be used for red and white wine fermentation and storage.

E & J Gallo Winery has received their Title V Permit. This modification can be classified as a Title V significant modification pursuant to Rule 2520, Section 3.20, and can be processed with a Certificate of Conformity (COC). Since the facility has specifically requested that this project be processed in that manner, the 45-day EPA comment period will be satisfied prior to the issuance of the Authority to Construct. E & J Gallo Winery must apply to administratively amend their Title V Operating Permit to include the requirements of the ATCs issued with this project.

II. Applicable Rules

Rule 2201	New and Modified Stationary Source Review Rule (4/21/11)
Rule 2520	Federally Mandated Operating Permits (6/21/01)
Rule 4001	New Source Performance Standards (4/14/99)
Rule 4002	National Emissions Standards for Hazardous Air Pollutants (5/20/04)
Rule 4102	Nuisance (12/17/92)
Rule 4694	Wine Fermentation and Storage Tanks (12/15/05)
CH&SC 41700	Health Risk Assessment
CH&SC 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 18000 W River Rd in Livingston, CA. The equipment is not located within 1,000 feet of the outer boundary of a K-12 school. Therefore, the public notification requirement of California Health and Safety Code 42301.6 is not applicable to this project.

IV. Process Description

E & J Gallo Winery produces both red and white table wines, as well as other specialty wine products, from the fermentation of grapes. During the "crush season," typically from late August to late November, both red and white grapes are received by truck and delivered to a crusher-stemmer which serves to crush the grapes and remove the stems. In the case of red wines, the resultant juice (termed "must" and containing the grape skins, pulp and seeds) is pumped to red wine fermentation tanks for fermentation, a batch process. The red wine fermentation tanks are specifically designed to ferment the must in contact with the skins and to allow the separation of the skins and seeds from the wine after fermentation. In the case of white wines, the must is sent to screens and presses for separation of grape skins and seeds prior to fermentation. After separation of the skins and seeds, the white must is transferred to a fermentation tank. White wine fermentation can be carried out in a tank without design provisions for solids separation since the skins and seeds have already been separated.

After transfer of the must (for red or white wine) to the fermentation tank, the must is inoculated with yeast which initiates the fermentation reactions. During fermentation, the yeast metabolizes the sugar in the grape juice, converting it to ethanol and carbon dioxide (CO_2) while releasing heat. Temperature is typically controlled by refrigeration, and is maintained at 45–65 °F for white wine fermentation and 70–95 °F for red wine fermentation. The sugar content of the fermentation mass is measured in °Brix (weight %) and is typically 22–26° for unfermented grape juice, dropping to 4° or less at the end of fermentation. Finished ethanol concentration is approximately 10 to 14 percent by volume. Batch fermentation requires 3-5 days per batch for red wine and 1-2 weeks per batch for white wine. VOCs are emitted during the fermentation process along with the CO_2. The VOCs consist primarily of ethanol along with small quantities of other fermentation byproducts.

Following the completion of fermentation, white wine is transferred directly to storage tanks. Red wine is first directed to the presses for separation of solids and then routed to the storage tanks. All tanks in the winery typically operate as two separate emissions units: (1) a fermentation operation during which the tank is vented directly to the atmosphere to release the evolved CO_2 byproduct from the fermentation reaction; and (2) a storage operation during which the tank is closed to minimize contact with air and refrigerated to preserve the wine. Post-fermentation operations such as cold stabilization, racking, and filtration are conducted in the tanks, resulting in a number of inter-tank transfers during the period between the end of fermentation and bottling or bulk shipment. Storage operations are conducted year-round. VOC emissions occur primarily as a result of the inter-tank transfers which are necessitated by the post fermentation operations.

V. Equipment Listing

N-1237-593-0: 105,000 GALLON STEEL RED AND WHITE WINE FERMENTATION AND WINE STORAGE TANK (TANK LVW-WS-1) WITH PRESSURE/VACUUM VALVE AND INSULATION

N-1237-594-0: 105,000 GALLON STEEL RED AND WHITE WINE FERMENTATION AND WINE STORAGE TANK (TANK LVW-WS-2) WITH PRESSURE/VACUUM VALVE AND INSULATION

N-1237-595-0: 105,000 GALLON STEEL RED AND WHITE WINE FERMENTATION AND WINE STORAGE TANK (TANK LVW-WS-3) WITH PRESSURE/VACUUM VALVE AND INSULATION

VI. Emission Control Technology Evaluation

VOCs (ethanol) are emitted from wine storage tanks as a result of both working losses (which occur when the liquid level in the tank changes) and breathing losses (expansion and contraction effects due to temperature variations). The proposed pressure/vacuum valve limits these emissions by requiring the maximum amount of variation in tank pressure before allowing the tank to vent to the atmosphere or allowing air admission to the tank. When wine storage tanks are insulated or located in a climate controlled building, breathing losses are considered to be negligible. The proposed tanks are insulated.

The temperature of the fermentation is controlled to maintain an average fermentation temperature not exceeding 95 °F which avoids higher temperatures that might be damaging to the yeast cells and reduces the potential for an out-of-control fermentation reaction in the tank. Temperature control serves to minimize VOC emissions relative to a tank without temperature control since the potential emissions increase with fermentation temperature.

VII. General Calculations

A. Assumptions

- Winery tanks generally consist of two emissions units; 1) a fermentation tank emissions unit and 2) a wine storage tank emissions unit.
- All tanks will be classified as red and white wine fermentation and red and white wine storage tanks.

Fermentation

- Annual fermentation throughput for each tank is 800,000 gallons (per applicant)
- Daily VOC fermentation emissions will be determined using a worst case of one tank turnover per day (proposed by the applicant).
- This fermentation tank is subject to the fermentation tank emission reduction measures of District Rule 4694. The actual production in this tank is subject to a minimum facility-wide fermentation emission reduction of 35% pursuant to District Rule 4694. The District has determined that the fermentation emission reduction provisions of Rule 4694 constitute a Specific Limiting Condition (SLC) applicable to all wine fermentation tanks at the facility.

Storage

- Typically, for enclosed tanks with refrigeration and/or insulation (or equivalent) and P/V valves, breathing losses from storage of wine are assumed to be negligible.
- Storage tank Daily Storage Throughput = 105,000 gallons/day (per applicant)
- Storage tank Annual Storage Throughput = 1,050,000 gallons/year (per applicant)
- Storage tank maximum liquid storage temperature = 75 °F
- Storage tank daily maximum ethanol content of stored wine is 14.5%
- Storage tank annual average ethanol content of stored wine is 12%

B. Emission Factors

Fermentation

Uncontrolled emissions factors are taken from District FYI-114, *VOC Emission Factors for Wine Fermentation and Storage Tanks*.

Wine Type	EF (lb-VOC/1,000 gallon of wine)		Source
	Daily	Annual	
White	1.62	2.5	FYI-114
Red	3.46	6.2	FYI-114

Fermentation tanks which are subject to the fermentation emission reduction requirements of Rule 4694 are considered to be controlled sources subject to a 35% reduction in emissions. For tanks controlled per Rule 4694, the emission factors are determined to be:

Wine Type	EF (lb-VOC/1,000 gallon of wine)	
	Daily	Annual
White	1.62	2.5 x (1-35%) = 1.6
Red	3.46	6.2 x (1-35%) = 4.0

Since these tanks can ferment either white or red wine, therefore, worst case emissions factors of red wine will be used to calculate the maximum potential emissions.

Storage

Tanks 4.0 will be used to calculate the storage emissions from the new tanks.

C. Calculations

1. Pre-Project Potential to Emit (PE1)

Since these are new emissions units (storage), PE1 = 0 (all pollutants) for the fermentation and storage operation in these tanks.

2. Post Project Potential to Emit (PE2)

Fermentation

Either red or white wine, the fermentation process takes longer than a day (3 to 5 days for red wine and 10 to 14 days for white wine). Therefore, maximum one turnover per day will be used to determine the potential daily emissions.

The potential daily and annual VOC emissions are determined using the red wine emissions factor, tank capacity, turnover rate, and the annul throughput as follows:

Daily PE2 = EF_{red} (lb-VOC/1,000 gal) x tank capacity (gal/tank) x turnover rate (tank/day)
Annual PE2 = EF_{red} (lb-VOC/1,000 gal) x annual throughput (gal/yr)

Permit Unit	Daily EF	Annual EF	Tank Capacity	Turnover Rate	Annual Throughput	Daily	Annual
	(lb-VOC/1,000 gal)		(gallon)	(tank/day)	(gal/yr)	(lb/day)	(lb/yr)
N-1237-593-0	3.46	4.0	105,000	1	800,000	363.3	3,200
N-1237-594-0			105,000			363.3	3,200
N-1237-595-0			105,000			363.3	3,200

Storage

The new wine tanks will be used for fermentation and storage. Tanks 4.0 runs have been performed one using a throughput of 105,000 gallons/day to calculate the daily post-project potential to emit by dividing the month of July emissions by the number of days in the month and one using 1,050,000 gallons/year to calculate the annual post-project potential to emit. See Appendix A for the Tanks 4.0 runs for each tank.

Tank	Daily PE2 (lb-VOC/day)	Annual PE2 (lb-VOC/yr)
N-1237-593-0	5.5	191
N-1237-594-0	5.5	191
N-1237-595-0	5.5	191

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

Pursuant to Section 4.9 of District Rule 2201, the Pre-Project Stationary Source Potential to Emit (SSPE1) 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.

This project only concerns VOC emissions. This facility acknowledges that its VOC emissions are already above the Offset and Major Source Thresholds for VOC emissions; therefore, SSPE1 calculations are not necessary.

4. 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.

This project only concerns VOC emissions. This facility acknowledges that its VOC emissions are already above the Offset and Major Source Thresholds for VOC emissions; therefore, SSPE2 calculations are not necessary.

5. Major Source Determination

This source is an existing Major Source for VOC emissions and will remain a Major Source for VOC. No change in other pollutants are proposed or expected as a result of this project.

6. Baseline Emissions (BE)

The BE calculation (in lbs/year) is performed pollutant-by-pollutant for each unit within the project, to calculate the QNEC and if applicable, to determine the amount of offsets required.

Pursuant to Section 3.7 of District Rule 2201, BE = Pre-project Potential to Emit for:

- Any unit located at a non-Major Source,
- Any Highly-Utilized Emissions Unit, located at a Major Source,
- Any Fully-Offset Emissions Unit, located at a Major Source, or
- Any Clean Emissions Unit, located at a Major Source.

otherwise,

BE = Historic Actual Emissions (HAE), calculated pursuant to Section 3.22 of District Rule 2201.

The permit units in this project only emit VOC and therefore the BE determination is only required for this pollutant, as discussed in the following sections:

BE VOC

New Wine Tanks

Since this is a new emissions unit, BE = PE1 = 0 for all pollutants.

7. SB 288 Major Modification

SB 288 Major Modification is defined in 40 CFR Part 51.165 as "*any physical change in or change in the method of operation of a major stationary source that would result in a significant net emissions increase of any pollutant subject to regulation under the Act.*"

As discussed in Section VII.C.5 above, the facility is an existing Major Source for VOC; however, the project by itself would need to be a significant increase in order to trigger a Major Modification. The emissions units within this project do not have a total potential to emit which is greater than Major Modification thresholds (see table below). Therefore, the project cannot be a significant increase and the project does not constitute a Major Modification.

SB 288 Major Modification Thresholds (Existing Major Source)			
Pollutant	Project PE (lb/year)	Threshold (lb/year)	Major Modification?
VOC	(3,200 + 191) x 3 = 10,173	50,000	No

8. Federal Major Modification

District Rule 2201, Section 3.17 states that Federal Major Modifications are the same as "Major Modification" as defined in 40 CFR 51.165 and part D of Title I of the CAA. SB 288 Major Modifications are not federal major modifications if they meet the criteria of the "Less-Than-Significant Emissions Increase" exclusion.

A Less-Than-Significant Emissions Increase exclusion is for an emissions increase for the project, or a Net Emissions Increase for the project (as defined in 40 CFR 51.165 (a)(2)(ii)(B) through (D), and (F)), that is not significant for a given regulated NSR pollutant, and therefore is not a federal major modification for that pollutant.

- To determine the post-project projected actual emissions from existing units, the provisions of 40 CFR 51.165 (a)(1)(xxviii) shall be used.
- To determine the pre-project baseline actual emissions, the provisions of 40 CFR 51.165 (a)(1)(xxxv)(A) through (D) shall be used.
- If the project is determined not to be a federal major modification pursuant to the provisions of 40 CFR 51.165 (a)(2)(ii)(B), but there is a reasonable possibility that the project may result in a significant emissions increase, the owner or operator shall comply with all of the provisions of 40 CFR 51.165 (a)(6) and (a)(7).
- Emissions increases calculated pursuant to this section are significant if they exceed the significance thresholds specified in the table below.

Significant Threshold (lb/year)	
Pollutant	Threshold (lb/year)
VOC	0

The Net Emissions Increases (NEI) for purposes of determination of a "Less-Than-Significant Emissions Increase" exclusion will be calculated below to determine if this project qualifies for such an exclusion.

Net Emission Increase for New Units (NEI_N)

Per 40 CFR 51.165 (a)(2)(ii)(D) for new emissions units in this project,

$NEI_N = PE2_N - BAE$

Since these are new units, BAE for these units is zero and,

$NEI_N = PE2_N$

where $PE2_N$ is the Post Project Potential to Emit for the new emissions units.

$NEI_N = PE2_N$ = (3,200 + 191) lb-VOC/year x 3 tanks = 10,173 lb-VOC/year

The NEI for this project is thus calculated as follows:

NEI = NEI_N
NEI = 10,173 lb-VOC/year

The NEI for this project will be greater than the federal Major Modification threshold of 0 lb-VOC/year. Therefore, this project does not qualify for a "Less-Than-Significant Emissions Increase" exclusion and is thus determined to be a Federal Major Modification for VOC.

VIII. Compliance

Rule 2201 New and Modified Stationary Source Review Rule

A. Best Available Control Technology (BACT)

1. BACT Applicability

BACT requirements are triggered on a pollutant-by-pollutant basis and on an emissions unit-by-emissions unit basis for the following*:

a. Any new emissions unit with a potential to emit exceeding two pounds per day,
b. The relocation from one Stationary Source to another of an existing emissions unit with a potential to emit exceeding two pounds per day,
c. Modifications to an existing emissions unit with a valid Permit to Operate resulting in an AIPE exceeding two pounds per day, and/or
d. Any new or modified emissions unit, in a stationary source project, which results in a Major Modification.

*Except for CO emissions from a new or modified emissions unit at a Stationary Source with an SSPE2 of less than 200,000 pounds per year of CO.

a. New emissions units – PE > 2 lb/day

The applicant is proposing to install three new wine fermentation and storage tanks with a PE greater than 2 lb/day for VOC. Thus BACT is triggered for VOC for these emissions units.

b. Relocation of emissions units – PE > 2 lb/day

There are no emissions units being relocated from one stationary source to another, hence BACT is not triggered under this category.

c. Modification of emissions units – AIPE > 2 lb/day

As discussed in Section I above, there are no modified emissions units associated with this project; therefore BACT is not triggered.

d. Major Modification

As discussed in Section VII.C.7 above, this project does constitute a Major Modification for VOC emissions; therefore BACT is triggered for VOC for the new wine tanks.

2. BACT Guideline

BACT Guideline 5.4.14, applies to the wine fermentation tanks. [Wine Fermentation Tanks] (Appendix B)

BACT Guideline 5.4.13, applies to the wine storage tanks. [Wine Storage Tanks] (Appendix B)

3. Top-Down BACT Analysis

Per Permit Services Policies and Procedures for BACT, a Top-Down BACT analysis shall be performed as a part of the application review for each application subject to the BACT requirements pursuant to the District's NSR Rule.

Pursuant to the attached Top-Down BACT Analysis (Appendix B), BACT has been satisfied with the following:

Fermentation

VOC: Temperature-Controlled Open Top Tank with Maximum Average Fermentation Temperature of 95 deg F.

Storage

VOC: Insulated tank, pressure/vacuum valve set within 10% of the maximum allowable working pressure of the tank, "gas tight" tank operation and achieve and maintain a continuous storage temperature not exceeding 75 °F within 60 days of completion of fermentation.

B. Offsets

1. Offset Applicability

Pursuant to Section 4.5.3, offset requirements shall be triggered on a pollutant by pollutant basis and shall be required if the Post Project Stationary Source Potential to Emit (SSPE2) equals to or exceeds the offset threshold levels in Table 4-1 of Rule 2201.

Facility emissions are already above the Offset and Major Source Thresholds for VOC emissions; therefore, offsets are triggered.

2. Quantity of Offsets Required

As discussed above, the facility is an existing Major Source for VOC and the SSPE2 is greater than the offset thresholds; therefore offset calculations will be required for this project.

Per Sections 4.7.1 and 4.7.3, the quantity of offsets in pounds per year for VOC is calculated as follows for sources with an SSPE1 greater than the offset threshold levels before implementing the project being evaluated.

Offsets Required (lb/year) = (Σ[PE2 – BE] + ICCE) x DOR, for all new or modified emissions units in the project,

Where,
PE2 = Post Project Potential to Emit, (lb/year)
BE = Baseline Emissions, (lb/year)
ICCE = Increase in Cargo Carrier Emissions, (lb/year)
DOR = Distance Offset Ratio, determined pursuant to Section 4.8

BE = Pre-project Potential to Emit for:

- Any unit located at a non-Major Source,
- Any Highly-Utilized Emissions Unit, located at a Major Source,
- Any Fully-Offset Emissions Unit, located at a Major Source, or
- Any Clean Emissions Unit, Located at a Major Source.

otherwise,

BE = Historic Actual Emissions (HAE)

There are no increases in cargo carrier emissions due to this project. Therefore,

Offsets Required (lb/year) = Σ[PE2 – BE] x DOR

Tank	Annual PE2 (lb-VOC/yr)	Annual BE (lb-VOC/yr)
N-1237-593-0	3,200 + 191 = 3,391	0
N-1237-594-0	3,200 + 191 = 3,391	0
N-1237-595-0	3,200 + 191 = 3,391	0

Offsets Required (lb/year) = ([3,391 – 0]) x DOR
= 3,391 lb-VOC/year x DOR

Calculating the appropriate quarterly emissions to be offset is as follows:

1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
847	848	848	848

Offsets Required (lb/year) = ([3,391 – 0] x 3) x DOR
= 10,173 lb-VOC/year x DOR

Calculating the appropriate quarterly emissions to be offset is as follows:

1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
2,543	2,543	2,543	2,544

Assuming an offset ratio of 1.5:1, the amount of VOC ERCs that need to be withdrawn is:

Offsets Required (lb/year) = ([3,391 – 0] x 3) x 1.5]
= 15,260 lb VOC/year

Calculating the appropriate quarterly emissions to be offset is as follows:

1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
3,815	3,815	3,815	3,815

The applicant has stated that the facility plans to use ERC certificate C-1066-1 and S-3666-1 to offset the increases in VOC emissions associated with this project. The above certificate has available quarterly VOC credits as follows:

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
ERC #C-1066-1	17,500	17,500	17,500	17,500
ERC #S-3666-1	80,000	80,000	80,000	80,000
Total	97,500	97,500	97,500	97,500

As seen above, the facility has sufficient credits to fully offset the quarterly VOC emissions increases associated with this project.

Proposed Rule 2201 (offset) Conditions:

- Prior to operating equipment under this Authority to Construct, permittee shall surrender VOC emission reduction credits for the following quantity of emissions: 1st quarter - 847 lb, 2nd quarter - 848 lb, 3rd quarter - 848 lb, and fourth quarter - 848 lb. Offsets shall be provided at the applicable offset ratio specified in Table 4-2 of Rule 2201 (as amended 04/21/11). [District Rule 2201]
- ERC Certificate Numbers C-1066-1 and S-3666-1 (or a certificate split from these certificates) shall be used to supply the required offsets, unless a revised offsetting proposal is received and approved by the District, upon which this Authority to Construct shall be reissued, administratively specifying the new offsetting proposal. Original public noticing requirements, if any, shall be duplicated prior to reissuance of this Authority to Construct. [District Rule 2201]

C. Public Notification

1. Applicability

Public noticing is required for:

a. New Major Sources, Federal Major Modifications, and SB288 Major Modifications,
b. Any new emissions unit with a Potential to Emit greater than 100 pounds during any one day for any one pollutant,
c. Any project which results in the offset thresholds being surpassed, and/or
d. Any project with an SSIPE of greater than 20,000 lb/year for any pollutant.

a. New Major Sources, Federal Major Modifications, and SB288 Major Modifications

New Major Sources are new facilities, which are also Major Sources. Since this is not a new facility, public noticing is not required for this project for New Major Source purposes.

As demonstrated in VII.C.7, this project is a Federal Major Modification for VOC; therefore, public noticing for Federal Major Modification purposes is required.

b. PE > 100 lb/day

The PE2 for this new unit is compared to the daily PE Public Notice thresholds in the following table:

PE > 100 lb/day Public Notice Thresholds			
Pollutant	PE2 (lb/day)	Public Notice Threshold	Public Notice Triggered?
VOC	363.3	100 lb/day	Yes

Therefore, public noticing for PE > 100 lb/day purposes is not required.

c. Offset Threshold

The following table compares the SSPE1 with the SSPE2 in order to determine if any offset thresholds have been surpassed with this project.

Offset Threshold				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
VOC	> 20,000	> 20,000	20,000 lb/year	No

As detailed above, there were no thresholds surpassed with this project; therefore public noticing is not required for offset purposes.

d. SSIPE > 20,000 lb/year

Public notification is required for any permitting action that results in a Stationary Source Increase in Permitted Emissions (SSIPE) of more than 20,000 lb/year of any affected pollutant. According to District policy, the SSIPE is calculated as the Post Project Stationary Source Potential to Emit (SSPE2) minus the Pre-Project Stationary Source Potential to Emit (SSPE1), i.e. SSIPE = SSPE2 – SSPE1. The values for SSPE2 and SSPE1 are calculated according to Rule 2201, Sections 4.9 and 4.10, respectively. The SSIPE is compared to the SSIPE Public Notice thresholds in the following table:

Stationary Source Increase in Permitted Emissions [SSIPE] – Public Notice					
Pollutant	∑PE2 (lb/year)	∑PE1 (lb/year)	SSIPE (lb/year)	SSIPE Public Notice Threshold	Public Notice Required?
VOC	10,173	0	10,173	20,000 lb/year	No

As demonstrated above, the SSIPEs for all pollutants were less than 20,000 lb/year; therefore public noticing for SSIPE purposes is not required.

2. Public Notice Action

As discussed above, public noticing is required for this project for VOC emissions in excess of 100 lb/day and Federal Major Modification for VOC. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be published in a local newspaper of general circulation prior to the issuance of the ATCs for this equipment.

D. Daily Emission Limits (DELs)

Daily Emissions Limitations (DELs) and other enforceable conditions are required by Section 3.15 to restrict a unit's maximum daily emissions, to a level at or below the emissions associated with the maximum design capacity. Per Sections 3.15.1 and 3.15.2, the DEL must be contained in the latest ATC and contained in or enforced by the latest PTO and enforceable, in a practicable manner, on a daily basis. DELs are also required to enforce the applicability of BACT.

For all wine storage tank emissions units affected by this project, the DEL is stated in the form of a daily limit on tank throughput and a maximum ethanol content for wine stored in the tank.

Proposed Rule 2201 (DEL) Conditions:

- The daily maximum ethanol content of wine stored in this tank shall not exceed 14.5 percent by volume. [District Rule 2201]
- The annual average ethanol content of wine stored in this tank shall not exceed 12 percent by volume. [District Rule 2201]
- The maximum liquid temperature of wine stored in this tank shall not exceed 75 degrees Fahrenheit. [District Rule 2201]
- The maximum wine fermentation throughput in this tank shall not exceed 105,000 gallons per day. [District Rule 2201]
- The maximum wine fermentation throughput in this tank shall not exceed 800,000 gallons per year. [District Rule 2201]
- The maximum wine storage throughput in this tank shall not exceed 105,000 gallons per day. [District Rule 2201]
- The daily VOC emissions for fermentation operations in this tank shall not exceed 3.46 lb per 1000 gallons of tank capacity. [District Rule 2201]
- The annual VOC emissions for fermentation operations in this tank shall not exceed 4.0 lb per 1000 gallons of tank capacity. [District Rule 2201]
- Daily VOC emissions from wine stored in this tank shall not exceed 5.5 lb/day. [District Rule 2201]

E. Compliance Assurance

1. Source Testing

Pursuant to District Policy APR 1705, source testing is not required to demonstrate compliance with Rule 2201.

2. Monitoring

No monitoring is required to demonstrate compliance with Rule 2201.

3. Recordkeeping

Recordkeeping is required to demonstrate compliance with the offsets, public notification and daily emission limit requirements of Rule 2201. Recordkeeping is also required for winery tanks pursuant to District Rule 4694, *Wine Fermentation and Storage Tanks*. The following conditions will be placed on the permits:

- The operator shall record the temperature of the stored wine weekly and each time the tank is filled. [District Rule 1070]
- The operator shall record the ethanol content and liquid height of wine stored in this tank each time the tank is filled. [District Rule 1070]
- The operator shall record, on a weekly basis, the total gallons of wine contained in the tank. [District Rule 4694, 6.4.2]
- For each batch of must fermented in this tank, the operator shall record the fermentation completion date, the total gallons of must fermented, the average fermentation temperature and the uncontrolled fermentation emissions and fermentation emission reductions (calculated per the emission factors given in District Rule 4694). The information shall be recorded by the tank Permit to Operate number and by wine type, stated as either red wine or white wine. [District Rules 2201 and 4694]
- Separate annual records each of total red wine and total white wine produced by fermentation at this facility, based on values reported to the Alcohol and Tobacco Tax and Trade Bureau (TTB), U.S. Department of the Treasury, shall be kept. [District Rules 2201 and 4694]
- Daily throughput records, including records of filling and emptying operations, the dates of such operations, a unique identifier for each batch, the volume percent ethanol in the batch, and the volume of wine transferred, shall be maintained. [District Rules 1070 and 2201]
- All records shall be retained on-site for a period of at least five years and made available for District inspection upon request. [District Rules 1070, 2201 and 4694]

4. Reporting

No reporting is required to demonstrate compliance with Rule 2201.

F. Ambient Air Quality Analysis

Section 4.14.1 of this Rule requires that an ambient air quality analysis (AAQA) be conducted for the purpose of determining whether a new or modified Stationary Source will cause or make worse a violation of an air quality standard. However, since this project involves only VOC and no ambient air quality standard exists for VOC, an AAQA is not required for this project.

G. Compliance Certification

Section 4.15.2 of this Rule requires the owner of a new Major Source or a source undergoing a Federal Major Modification to demonstrate to the satisfaction of the District that all other Major Sources owned by such person and operating in California are in compliance or are on a schedule for compliance with all applicable emission limitations and standards. As discussed in Sections VIII-Rule 2201-C.1.a and VIII-Rule 2201-C.1.b, this source is undergoing a Federal Major Modification, therefore this requirement is applicable. Included in Appendix C is E & J Gallo's compliance certification.

H. Alternative Siting Analysis

Alternative siting analysis is required for any project, which constitutes a New Major Source or a Federal Major Modification.

In addition to winery tanks, the operation of a winery requires a large number support equipment, services and structures such as raw material receiving stations, crushers, piping, filtering and refrigeration units, warehouses, laboratories, bottling and shipping facilities, and administration buildings.

Since the current project involves only a minimal increase in the winery's total tank volume and no change to any other facets of the operation, the existing site will result in the least possible impact from the project. Alternative sites would involve the relocation and/or construction of various support structures and facilities on a much greater scale, and would therefore result in a much greater impact.

Rule 2520 Federally Mandated Operating Permits

This facility is subject to this Rule, and has received their Title V Operating Permit. Section 3.29 defines a significant permit modification as a "permit amendment that does not qualify as a minor permit modification or administrative amendment."

Section 3.20.5 states that a minor permit modification is a permit modification that does not meet the definition of modification as given in Section 111 or Section 112 of the Federal Clean Air Act. Since this project is a Title I modification (i.e. Federal Major Modification), the proposed project is considered to be a modification under the Federal Clean Air Act. As a result, the proposed project constitutes a Significant Modification to the Title V Permit pursuant to Section 3.29.

As discussed above, the facility has applied for a Certificate of Conformity (COC) (see Appendix D); therefore, the facility must apply to modify their Title V permit with an administrative amendment, prior to operating with the proposed modifications. Continued compliance with this rule is expected. The facility shall not implement the changes requested until the final permit is issued.

Rule 4001 New Source Performance Standards (NSPS)

This rule incorporates NSPS from Part 60, Chapter 1, Title 40, Code of Federal Regulations (CFR); and applies to all new sources of air pollution and modifications of existing sources of air pollution listed in 40 CFR Part 60. However, no subparts of 40 CFR Part 60 apply to wine fermentation and storage tank operations.

Rule 4002 National Emission Standards for Hazardous Air Pollutants (NESHAPs)

This rule incorporates NESHAPs from Part 61, Chapter I, Subchapter C, Title 40, CFR and the NESHAPs from Part 63, Chapter I, Subchapter C, Title 40, CFR; and applies to all sources of hazardous air pollution listed in 40 CFR Part 61 or 40 CFR Part 63. However, no subparts of 40 CFR Part 61 or 40 CFR Part 63 apply to wine fermentation and storage tank operations.

Rule 4102 Nuisance

Rule 4102 states that no air contaminant shall be released into the atmosphere which causes a public nuisance. Public nuisance conditions are not expected as a result of the proposed operations provided the equipment is well maintained. Therefore, the following condition will be listed on each permit to ensure compliance:

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

California Health & Safety Code 41700 (Health Risk Assessment)

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.

Ethanol is not a HAP as defined by Section 44321 of the California Health and Safety Code. Therefore, there are no increases in HAP emissions associated with any emission units in this project, therefore a health risk assessment is not necessary and no further risk analysis is required.

District Rule 4694 Wine Fermentation and Storage Tanks

The purpose of this rule is to reduce emissions of volatile organic compounds (VOC) from the fermentation and bulk storage of wine, or achieve equivalent reductions from alternative emission sources. This rule is applicable to all facilities with fermentation emissions in excess of 10 tons-

VOC/year. The storage tank provisions of this rule apply to all tanks with capacity in excess of 5,000 gallons.

Section 5.1 requires the winery operator achieve Required Annual Emissions Reductions (RAER) equal to at least 35% of the winery's Baseline Fermentation Emissions (BFE). Per the definition of RAER in Section 3.25 of the Rule, the RAER may be achieved by any combination of Fermentation Emission Reductions (FER), Certified Emission Reductions (CER) or District Obtained Emission Reductions (DOER) as established in the facility's District-approved Rule 4694 Compliance Plan, due every three years on December 1st beginning in 2006. The facility has submitted the required plan to the District and is currently satisfying the required emission reductions in the form of Certified Emission Reductions.

The following condition on the facility-wide permit (unit 0-2) ensures compliance:

- A Three-Year Compliance Plan that demonstrates compliance with the requirements of Section 5.1 of District Rule 4694 (12/15/05) for each year of the applicable compliance period shall be submitted to the District by no later than December 1, 2006, and every three years thereafter on or before December 1. [District Rule 4694, 6.1]

Section 5.2 places specific restrictions on wine storage tanks with 5,000 gallons or more in capacity when such tanks are not constructed of wood or concrete. Section 5.2.1 requires these tanks to be equipped and operated with a pressure-vacuum relief valve meeting all of the following requirements:

- The pressure-vacuum relief valve shall operate within 10% of the maximum allowable working pressure of the tank,
- The pressure-vacuum relief valve shall operate in accordance with the manufacturer's instructions, and
- The pressure-vacuum relief valve shall be permanently labeled with the operating pressure settings.
- The pressure-vacuum relief valve and storage tank shall remain in a gas-tight condition except when the operating pressure of the tank exceeds the valve set pressure. A gas-tight condition shall be determined by measuring the gas leak in accordance with the procedures in EPA Method 21.

The following conditions will be placed on the permits for stainless steel tanks ≥ 5,000 gallons in capacity to ensure compliance with the requirements of Section 5.2.1:

- This tank shall be equipped with and operated with a pressure-vacuum relief valve, which shall operate within 10% of the maximum allowable working pressure of the tank, operate in accordance with the manufacturer's instructions, and be permanently labeled with the operating pressure settings. [District Rules 2201 and 4694, 5.2.1]
- The pressure-vacuum relief valve and storage tank shall remain in a gas-tight condition, except when the operating pressure of the tank exceeds the valve set pressure. A gas-tight condition shall be determined by measuring the gas leak in accordance with the procedures in EPA Method 21. [District Rules 2201 and 4694, 5.2.1]

Section 5.2.2 requires that the temperature of the stored wine be maintained at or below 75° F.

The following condition will be placed on the permits for stainless steel tanks ≥ 5,000 gallons in capacity to ensure compliance with the requirements of Section 5.2.2:

- The temperature of the wine stored in this tank shall be maintained at or below 75 degrees Fahrenheit. The temperature of the stored wine shall be determined and recorded at least once per week. For each batch of wine, the operator shall achieve the storage temperature of 75 degrees Fahrenheit or less within 60 days after completing fermentation, and shall maintain records to show when the required storage temperature of 75 degrees Fahrenheit or less was achieved. [District Rule 4694, 5.2.2]

Every three years, Section 6.1 and 6.2 require the facility to submit a Three-Year Compliance Plan and a Three-Year Compliance Plan Verification respectively. Section 6.3 requires that an Annual Compliance Plan Demonstration be submitted to the District no later than February 1 of each year to show compliance with the applicable requirements of the Rule. Section 6.4.3 requires that all monitoring be performed for any Certified Emission Reductions as identified in the facility's Three-Year Compliance Plan and that the records of all monitoring be maintained.

The following conditions on the facility-wide permit (unit 0-2) ensure compliance:

- A Three-Year Compliance Plan that demonstrates compliance with the requirements of Section 5.1 of District Rule 4694 (12/15/05) for each year of the applicable compliance period shall be submitted to the District by no later than December 1, 2006, and every three years thereafter on or before December 1. [District Rule 4694, 6.1]
- A Three-Year Compliance Plan Verification that demonstrates that the Three-Year Compliance Plan elements are in effect shall be submitted to the District by no later than July 1, 2007, and every three years thereafter on or before July 1. [District Rule 4694, 6.2]
- An Annual Compliance Plan Demonstration that shows compliance with the applicable requirements of this rule shall be submitted to the District by no later than February 1, 2008, and every year thereafter on or before February 1. [District Rule 4694, 6.3]
- Operators using CER to mitigate fermentation emissions shall perform all monitoring and recordkeeping, as established in their approved Three-Year Compliance Plan, and shall maintain all records necessary to demonstrate compliance. [District Rule 4694]

Section 6.4.1 requires that records be kept for each fermentation batch. The following condition will be placed on the ATC for each fermentation tank to ensure compliance:

- For each batch of must fermented in this tank, the operator shall record the fermentation completion date, the total gallons of must fermented, the average fermentation temperature and the uncontrolled fermentation emissions and fermentation emission reductions (calculated per the emission factors given in District Rule 4694). The information shall be recorded by the tank Permit to Operate number and by wine type, stated as either red wine or white wine. [District Rules 2201 and 4694]

Section 6.4.2 requires that weekly records be kept of wine volume and temperature in each storage tank. The following conditions will be placed on the permit for each storage tank to ensure compliance with the requirements of Section 6.4.2:

- The operator shall record, on a weekly basis, the total gallons of wine contained in the tank and the maximum temperature of the stored wine. [District Rule 4694, 6.4.2]

Section 6.4.3 requires that all monitoring be performed for any Certified Emission Reductions as identified in the facility's Three-Year Compliance Plan and that the records of all monitoring be maintained. The following condition on the facility-wide permit (N-1237-0-2) ensures compliance:

- Operators using CER to mitigate fermentation emissions shall perform all monitoring and recordkeeping, as established in their approved Three-Year Compliance Plan, and shall maintain all records necessary to demonstrate compliance. [District Rule 4694]

Section 6.4 requires that records required by this rule be maintained, retained on-site for a minimum of five years, and made available to the APCO upon request. The following conditions will be placed on all permits to ensure compliance:

- All records shall be retained on-site for a period of at least five years and made available for District inspection upon request. [District Rules 1070, 2201 and 4694]

California Health & Safety Code 42301.6 (School Notice)

The District has verified that this site is not located within 1,000 feet of a school. Therefore, pursuant to California Health and Safety Code 42301.6, a school notice is not required.

California Environmental Quality Act (CEQA)

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; and
- 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 project will occur at an existing facility and the project involves negligible or no expansion of the existing use. Furthermore, the District determined that the project will not have a significant effect on the environment. The District finds that the project is categorically exempt from the provisions of CEQA pursuant to CEQA Guideline §15301 (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

Compliance with all applicable rules and regulations is expected. Pending a successful NSR Public Noticing period, issue Authorities to Construct N-1237-593-0, '594-0, '595-0 subject to the permit conditions on the attached draft Authorities to Construct in Appendix E.

X. Billing Information

Annual Permit Fees			
Permit Number	Fee Schedule	Fee Description	Annual Fee
N-1237-593-0	3020-05-E	105,000 gallons	$246.00
N-1237-594-0	3020-05-E	105,000 gallons	$246.00
N-1237-595-0	3020-05-E	105,000 gallons	$246.00

XI. Appendices

A: Tanks 4.0 Calculations
B: BACT Guidelines 5.4.13 and 5.4.14 and Top Down BACT Analyses
C: Compliance Certification
D: Certificate of Conformity
E: Draft ATCs

XI. Appendices

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Appendix A

Tanks 4.0 Calculations

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	X001 Daily1
City:	Livingston
State:	California
Company:	E and J Gallo Winery
Type of Tank:	Vertical Fixed Roof Tank
Description:	105,000 gallon stainless steel tank insulated with white insulation. Tank number is not currently available. It will be assigned later. Flat sloping roof. The roof volume is calculated baed on an equivalent cone volume and height.

Tank Dimensions

Shell Height (ft):		40.00
Diameter (ft):		21.00
Liquid Height (ft) :		40.00
Avg. Liquid Height (ft):		40.00
Volume (gallons):		105,000.00
Turnovers:		365.00
Net Throughput(gal/yr):		38,325,000.00
Is Tank Heated (y/n):	Y	

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone	
Height (ft)		7.50
Slope (ft/ft) (Cone Roof)		0.71

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meterological Data used in Emissions Calculations: Fresno, California (Avg Atmospheric Pressure = 14.56 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

X001 Daily1 - Vertical Fixed Roof Tank
Livingston, California

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Wine 14.5 % Vol Alcohol	Jan	75.00	75.00	75.00	75.00	0.6086	0.6086	0.6086	26.9559			19.40	Option 1: VP70 = .50461 VP80 = .71254
Wine 14.5 % Vol Alcohol	Feb	75.00	75.00	75.00	75.00	0.6086	0.6086	0.6086	26.9559			19.40	Option 1: VP70 = .50461 VP80 = .71254
Wine 14.5 % Vol Alcohol	Mar	75.00	75.00	75.00	75.00	0.6086	0.6086	0.6086	26.9559			19.40	Option 1: VP70 = .50461 VP80 = .71254
Wine 14.5 % Vol Alcohol	Apr	75.00	75.00	75.00	75.00	0.6086	0.6086	0.6086	26.9559			19.40	Option 1: VP70 = .50461 VP80 = .71254
Wine 14.5 % Vol Alcohol	May	75.00	75.00	75.00	75.00	0.6086	0.6086	0.6086	26.9559			19.40	Option 1: VP70 = .50461 VP80 = .71254
Wine 14.5 % Vol Alcohol	Jun	75.00	75.00	75.00	75.00	0.6086	0.6086	0.6086	26.9559			19.40	Option 1: VP70 = .50461 VP80 = .71254
Wine 14.5 % Vol Alcohol	Jul	75.00	75.00	75.00	75.00	0.6086	0.6086	0.6086	26.9559			19.40	Option 1: VP70 = .50461 VP80 = .71254
Wine 14.5 % Vol Alcohol	Aug	75.00	75.00	75.00	75.00	0.6086	0.6086	0.6086	26.9559			19.40	Option 1: VP70 = .50461 VP80 = .71254
Wine 14.5 % Vol Alcohol	Sep	75.00	75.00	75.00	75.00	0.6086	0.6086	0.6086	26.9559			19.40	Option 1: VP70 = .50461 VP80 = .71254
Wine 14.5 % Vol Alcohol	Oct	75.00	75.00	75.00	75.00	0.6086	0.6086	0.6086	26.9559			19.40	Option 1: VP70 = .50461 VP80 = .71254
Wine 14.5 % Vol Alcohol	Nov	75.00	75.00	75.00	75.00	0.6086	0.6086	0.6086	26.9559			19.40	Option 1: VP70 = .50461 VP80 = .71254
Wine 14.5 % Vol Alcohol	Dec	75.00	75.00	75.00	75.00	0.6086	0.6086	0.6086	26.9559			19.40	Option 1: VP70 = .50461 VP80 = .71254

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

X001 Daily1 - Vertical Fixed Roof Tank
Livingston, California

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vapor Space Volume (cu ft):	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015
Vapor Density (lb/cu ft):	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029
Vapor Space Expansion Factor:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vented Vapor Saturation Factor:	0.9254	0.9254	0.9254	0.9254	0.9254	0.9254	0.9254	0.9254	0.9254	0.9254	0.9254	0.9254
Tank Vapor Space Volume:												
Vapor Space Volume (cu ft):	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015
Tank Diameter (ft):	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000
Vapor Space Outage (ft):	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000
Tank Shell Height (ft):	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000
Average Liquid Height (ft):	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000
Roof Outage (ft):	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000
Roof Outage (Cone Roof)												
Roof Outage (ft):	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000
Roof Height (ft):	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000
Roof Slope (ft/ft):	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100
Shell Radius (ft):	10.5000	10.5000	10.5000	10.5000	10.5000	10.5000	10.5000	10.5000	10.5000	10.5000	10.5000	10.5000
Vapor Density												
Vapor Density (lb/cu ft):	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029	0.0029
Vapor Molecular Weight (lb/lb-mole):	26.9559	26.9559	26.9559	26.9559	26.9559	26.9559	26.9559	26.9559	26.9559	26.9559	26.9559	26.9559
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086
Daily Avg. Liquid Surface Temp. (deg. R):	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700
Daily Average Ambient Temp. (deg. F):	45.7500	51.1000	55.0000	61.2000	68.9500	76.5500	81.8500	80.2500	74.4500	65.2000	53.6000	45.4000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731
Liquid Bulk Temperature (deg. R):	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700
Tank Paint Solar Absorptance (Shell):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	668.1706	1,022.2439	1,488.6308	1,992.7729	2,390.9467	2,566.7143	2,551.4853	2,279.5850	1,860.7886	1,369.9719	851.5527	592.3431
Vapor Space Expansion Factor												
Vapor Space Expansion Factor:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Daily Vapor Temperature Range (deg. R):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Daily Vapor Pressure Range (psia):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Breather Vent Press. Setting Range(psia):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086
Daily Avg. Liquid Surface Temp. (deg R):	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700
Daily Min. Liquid Surface Temp. (deg R):	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700
Daily Max. Liquid Surface Temp. (deg R):	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700
Daily Ambient Temp. Range (deg. R):	16.7000	21.2000	23.2000	27.8000	30.5000	32.3000	33.5000	32.9000	31.3000	29.0000	22.2000	16.6000
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor:	0.9254	0.9254	0.9254	0.9254	0.9254	0.9254	0.9254	0.9254	0.9254	0.9254	0.9254	0.9254
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086

Vapor Space Outage (ft):	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000
Working Losses (lb):	310.4359	310.4359	310.4359	310.4359	310.4359	310.4359	310.4359	310.4359	310.4359	310.4359	310.4359	310.4359
Vapor Molecular Weight (lb/lb-mole):	26.9559	26.9559	26.9559	26.9559	26.9559	26.9559	26.9559	26.9559	26.9559	26.9559	26.9559	26.9559
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086	0.6086
Net Throughput (gal/mo.):	3,193,750.0000	3,193,750.0000	3,193,750.0000	3,193,750.0000	3,193,750.0000	3,193,750.0000	3,193,750.0000	3,193,750.0000	3,193,750.0000	3,193,750.0000	3,193,750.0000	3,193,750.0000
Annual Turnovers:	365.0000	365.0000	365.0000	365.0000	365.0000	365.0000	365.0000	365.0000	365.0000	365.0000	365.0000	365.0000
Turnover Factor:	0.2489	0.2489	0.2489	0.2489	0.2489	0.2489	0.2489	0.2489	0.2489	0.2489	0.2489	0.2489
Maximum Liquid Volume (gal):	105,000.0000	105,000.0000	105,000.0000	105,000.0000	105,000.0000	105,000.0000	105,000.0000	105,000.0000	105,000.0000	105,000.0000	105,000.0000	105,000.0000
Maximum Liquid Height (ft):	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000
Tank Diameter (ft):	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000
Working Loss Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	310.4359	310.4359	310.4359	310.4359	310.4359	310.4359	310.4359	310.4359	310.4359	310.4359	310.4359	310.4359

$$\frac{310.4359}{31} = 10.0$$

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

X001 Daily1 - Vertical Fixed Roof Tank
Livingston, California

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Wine 14.5 % Vol Alcohol	3,725.23	0.00	3,725.23

	Daily Values			Output from Tank 4.0 total emissions no speciation		
Tank ID	% by Volume Alcohol	Average Ya	AMW Average	Total Pound of Emissions	Alcohol Emissions in pounds (Max Daily, per tank)	
Tank X001-X003	14.5%	0.3191	26.96	~~410.12~~ 10.0	~~7.21~~ 5.5	

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	X001
City:	Livingston
State:	California
Company:	E and J Gallo Winery
Type of Tank:	Vertical Fixed Roof Tank
Description:	105,000 gallon stainless steel tank insulated with white insulation. Tank number is not currently available. It will be assigned later. Flat sloping roof. The roof volume is calculated based on an equivalent cone volume and height.

Tank Dimensions

Shell Height (ft):		40.00
Diameter (ft):		21.00
Liquid Height (ft) :		40.00
Avg. Liquid Height (ft):		40.00
Volume (gallons):		103,638.63
Turnovers:		10.00
Net Throughput(gal/yr):		1,050,000.00
Is Tank Heated (y/n):	Y	

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone	
Height (ft)		7.50
Slope (ft/ft) (Cone Roof)		0.71

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meterological Data used in Emissions Calculations: Fresno, California (Avg Atmospheric Pressure = 14.56 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

X001 - Vertical Fixed Roof Tank
Livingston, California

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Wine 12.0 % Vol Alcohol	Jan	75.00	75.00	75.00	75.00	0.5838	0.5838	0.5838	25.9706			19.15	Option 1: VP70 = .48357 VP80 = .68401
Wine 12.0 % Vol Alcohol	Feb	75.00	75.00	75.00	75.00	0.5838	0.5838	0.5838	25.9706			19.15	Option 1: VP70 = .48357 VP80 = .68401
Wine 12.0 % Vol Alcohol	Mar	75.00	75.00	75.00	75.00	0.5838	0.5838	0.5838	25.9706			19.15	Option 1: VP70 = .48357 VP80 = .68401
Wine 12.0 % Vol Alcohol	Apr	75.00	75.00	75.00	75.00	0.5838	0.5838	0.5838	25.9706			19.15	Option 1: VP70 = .48357 VP80 = .68401
Wine 12.0 % Vol Alcohol	May	75.00	75.00	75.00	75.00	0.5838	0.5838	0.5838	25.9706			19.15	Option 1: VP70 = .48357 VP80 = .68401
Wine 12.0 % Vol Alcohol	Jun	75.00	75.00	75.00	75.00	0.5838	0.5838	0.5838	25.9706			19.15	Option 1: VP70 = .48357 VP80 = .68401
Wine 12.0 % Vol Alcohol	Jul	75.00	75.00	75.00	75.00	0.5838	0.5838	0.5838	25.9706			19.15	Option 1: VP70 = .48357 VP80 = .68401
Wine 12.0 % Vol Alcohol	Aug	75.00	75.00	75.00	75.00	0.5838	0.5838	0.5838	25.9706			19.15	Option 1: VP70 = .48357 VP80 = .68401
Wine 12.0 % Vol Alcohol	Sep	75.00	75.00	75.00	75.00	0.5838	0.5838	0.5838	25.9706			19.15	Option 1: VP70 = .48357 VP80 = .68401
Wine 12.0 % Vol Alcohol	Oct	75.00	75.00	75.00	75.00	0.5838	0.5838	0.5838	25.9706			19.15	Option 1: VP70 = .48357 VP80 = .68401
Wine 12.0 % Vol Alcohol	Nov	75.00	75.00	75.00	75.00	0.5838	0.5838	0.5838	25.9706			19.15	Option 1: VP70 = .48357 VP80 = .68401
Wine 12.0 % Vol Alcohol	Dec	75.00	75.00	75.00	75.00	0.5838	0.5838	0.5838	25.9706			19.15	Option 1: VP70 = .48357 VP80 = .68401

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

X001 - Vertical Fixed Roof Tank
Livingston, California

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vapor Space Volume (cu ft):	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015
Vapor Density (lb/cu ft):	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026
Vapor Space Expansion Factor:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vented Vapor Saturation Factor:	0.9282	0.9282	0.9282	0.9282	0.9282	0.9282	0.9282	0.9282	0.9282	0.9282	0.9282	0.9282
Tank Vapor Space Volume:												
Vapor Space Volume (cu ft):	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015	865.9015
Tank Diameter (ft):	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000
Vapor Space Outage (ft):	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000
Tank Shell Height (ft):	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000
Average Liquid Height (ft):	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000
Roof Outage (ft):	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000
Roof Outage (Cone Roof)												
Roof Outage (ft):	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000
Roof Height (ft):	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000
Roof Slope (ft/ft):	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100
Shell Radius (ft):	10.5000	10.5000	10.5000	10.5000	10.5000	10.5000	10.5000	10.5000	10.5000	10.5000	10.5000	10.5000
Vapor Density												
Vapor Density (lb/cu ft):	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026	0.0026
Vapor Molecular Weight (lb/lb-mole):	25.9706	25.9706	25.9706	25.9706	25.9706	25.9706	25.9706	25.9706	25.9706	25.9706	25.9706	25.9706
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838
Daily Avg. Liquid Surface Temp. (deg. R):	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700
Daily Average Ambient Temp. (deg. F):	45.7500	51.1000	55.0000	61.2000	68.9500	76.5500	81.8500	80.2500	74.4500	65.2000	53.6000	45.4000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731
Liquid Bulk Temperature (deg. R):	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700
Tank Paint Solar Absorptance (Shell):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	668.1706	1,022.2439	1,488.6308	1,992.7729	2,390.9467	2,566.7143	2,551.4853	2,279.5850	1,860.7886	1,369.9719	851.5527	592.3431
Vapor Space Expansion Factor												
Vapor Space Expansion Factor:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Daily Vapor Temperature Range (deg. R):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Daily Vapor Pressure Range (psia):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Breather Vent Press. Setting Range(psia):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838
Daily Avg. Liquid Surface Temp. (deg R):	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700
Daily Min. Liquid Surface Temp. (deg R):	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700
Daily Max. Liquid Surface Temp. (deg R):	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700	534.6700
Daily Ambient Temp. Range (deg. R):	16.7000	21.2000	23.2000	27.8000	30.5000	32.3000	33.5000	32.9000	31.3000	29.0000	22.2000	16.6000
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor:	0.9282	0.9282	0.9282	0.9282	0.9282	0.9282	0.9282	0.9282	0.9282	0.9282	0.9282	0.9282
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838
Vapor Space Outage (ft):	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000	2.5000
Working Losses (lb):	31.5862	31.5862	31.5862	31.5862	31.5862	31.5862	31.5862	31.5862	31.5862	31.5862	31.5862	31.5862
Vapor Molecular Weight (lb/lb-mole):	25.9706	25.9706	25.9706	25.9706	25.9706	25.9706	25.9706	25.9706	25.9706	25.9706	25.9706	25.9706
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838	0.5838
Net Throughput (gal/mo.):	87,500.0000	87,500.0000	87,500.0000	87,500.0000	87,500.0000	87,500.0000	87,500.0000	87,500.0000	87,500.0000	87,500.0000	87,500.0000	87,500.0000
Annual Turnovers:	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000
Turnover Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Maximum Liquid Volume (gal):	103,638.6288	103,638.6288	103,638.6288	103,638.6288	103,638.6288	103,638.6288	103,638.6288	103,638.6288	103,638.6288	103,638.6288	103,638.6288	103,638.6288

Maximum Liquid Height (ft):	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000
Tank Diameter (ft):	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000
Working Loss Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	31.5862	31.5862	31.5862	31.5862	31.5862	31.5862	31.5862	31.5862	31.5862	31.5862	31.5862	31.5862

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

X001 - Vertical Fixed Roof Tank
Livingston, California

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Wine 12.0 % Vol Alcohol	379.03	0.00	379.03

LVW Westside Tank Permitting- Storage Tank Emissions
Summary of Daily and Annual Alcohol Emissions Calculations
07/25/2011

		Annual Values			Output from Tank 4.0 total emissions no speciation
Tank ID	% by Volume Alcohol	Average Ya	AMW Average	Total Pound of Emissions	Alcohol Emissions in pounds (per Tank)
Tank X001-X003	12.0%	0.2839	25.97	379.03	190.71

286.065

ethanol + water

$$\frac{379.03}{25.97} \times 0.2839 \times 46.03$$

Appendix B

BACT Guidelines 5.4.13 and 5.4.14 and Top Down BACT Analyses

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.4.14*

Last Update 10/6/2009

Wine Fermentation Tank

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Temperature-Controlled Open Top Tank with Maximum Average Fermentation Temperature of 95 deg F	1. Capture of VOCs and Thermal Oxidation or Equivalent (88% control) 2. Capture of VOCs and Carbon Adsorption or Equivalent (86% control) 3. Capture of VOCs and Absorption or Equivalent (81% control) 4. Capture of VOCs and Condensation or Equivalent (81% control)	

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

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

Top Down BACT Analysis for VOC Emissions:

Wine Fermentation

Step 1 - Identify All Possible Control Technologies

The SJVUAPCD BACT Clearinghouse guideline 5.4.14, 4th quarter 2011, identifies achieved in practice BACT for wine fermentation tanks as follows:

1) Temperature-Controlled Open Top Tank with Maximum Average Fermentation Temperature of 95 deg F

The SJVUAPCD BACT Clearinghouse guideline 5.4.14, 4th quarter 2011, identifies technologically feasible BACT for wine fermentation tanks as follows:

1) Capture of VOCs and thermal oxidation or equivalent (88% control)
2) Capture of VOCs and carbon adsorption or equivalent (86% control)
3) Capture of VOCs and absorption or equivalent (81% control)
4) Capture of VOCs and condensation or equivalent (70% control)

Step 2 - Eliminate Technologically Infeasible Options

None of the above listed technologies are technologically infeasible.

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

Rank by Control Effectiveness		
Rank	Control	Overall Capture and Control Efficiency[1]
1	Capture of VOCs and thermal or catalytic oxidation or equivalent	88%
2	Capture of VOCs and carbon adsorption or equivalent	86%
3	Capture of VOCs and absorption or equivalent	81%
4	Capture of VOCs and condensation or equivalent	70%
5	Temperature-Controlled Open Top Tank with Maximum Average Fermentation Temperature of 95 deg F	0%

Step 4 - Cost Effectiveness Analysis

A cost-effective analysis is performed for each control technology which is more effective than meeting the requirements of District Rule 4694 plus temperature-controlled open top tank with maximum average fermentation temperature of 95 deg F (achieved-in-practice BACT), as proposed by E & J Gallo.

[1] Relative to "industry standard".

Maximum Vapor Flow Rate

Per the Eichleay Engineers "Fermenter VOC Emissions Control Cost Estimate" report prepared for The Wine Institute dated June 30, 2005, the following is the fermenter vapor rate assuming a simple stoichiometric kinetic model for sugar fermentation and ethanol-water vapor-liquid equilibrium. Note this assumes a beginning sugar concentration of 20 grams/100 mL and ending concentration of 2 grams/100 mL.

Fermenter Vent Calculation Results		
Fermentation Temperature (°F)	Fermentation Cycle (hours)	Peak Vapor Rate (scfm/1000 gal wine)
75	57	5.06
80	37	7.18
85	25	9.75

The fermentation tanks in this project can reach up to 95 °F per BACT Guideline 5.4.14 Achieved in Practice option. Therefore, the peak vapor rate at a fermentation temperature of 85 °F will be utilized as a conservative assumption.

Daily Fermentation throughput = 105,000 gallons/day x 3 tanks = 315,000 gallons/day

Daily Peak Vapor Rate = 315,000 gal/day x 9.75 scfm/1000 gal = 3071.25 scfm per day

Collection System Capital Investment (based on ductwork)

A common feature of all thermal or catalytic oxidation/carbon adsorption/absorption or condensation options is that they require installation of a collection system for delivering the VOCs from the tanks to the common control device. The analysis below indicates that these options are not cost effective by showing that just the annualized direct cost for the ductwork of the collection system and supporting structural steel and foundations and the control devices themselves is too large, when considered at the District's cost effectiveness threshold for VOC BACT, to justify the capital investment required by these options.

Collection system to consist of:

- The collection system consists of stainless steel place ductwork (stainless steel is required due to food grade product status) with isolation valving, connecting three 105,000 gallon tanks to a common manifold system which ducts the combined vent to the common control device. The cost of dampers and isolation valving, installed in the ductwork, will be included in the cost estimate.
- A minimum duct size is established at six inches diameter at each tank to provide adequate strength for spanning between supports. The main header is twelve inches diameter to handle the potential for simultaneous venting.
- minimum estimated length 234 feet (based on a three tank layout, 10 feet spacing between tanks, 10 feet spacing between tank and header, and control device located within 100 feet of tank array)

Capital Cost Ductwork

An estimate of straight line duct lengths required was prepared based on a winery layout of three 105,000 gallon tanks.

6" Stainless Steel Duct: 92.5 linear feet
12" Stainless Steel Duct: 141.5 linear feet

A direct cost estimate for 12 inch diameter stainless steel ductwork, installed in a San Joaquin Valley winery, was taken from Fermenter VOC Emission Control Cost Estimate, prepared by Eichleay Engineering for the Wine Institute in conjunction with development of District Rule 4694. The estimate is based on 2nd quarter 2005 dollars, and includes fittings, miscellaneous duct supports and other materials plus field labor costs required to install the ductwork, but does not include other associated indirect costs such as construction management, engineering, owner's cost, contingency, etc.

Unit installed cost for 6 inch Stainless Steel ducting: $61.30/linear foot
Unit installed cost for 12 inch Stainless Steel ducting: $143.80/linear foot

Installed costs = ($61.30 linear foot x 92.5 feet) + ($143.80 linear foot x 141.5 feet) = $26,018

Adjusting from 2005 dollars to 2011 dollars (multiply by 1.165, 2.75% inflation/yr).

Installed costs = $26,018 x 1.165 = $30,311

Duct Valve Allowance

One of the major concerns of a manifold duct system is micro organisms spoiling the wine, and transferring from one tank to another. It is possible to completely ruin a tank of white wine if a few hundred gallons of red wine were back fed through the duct. It is necessary to design into the system a positive disconnect of the ducting system when the tanks are not being filled. There are a number of ways this can be done. In this case, an automatic butterfly valve with a physical spool to disconnect the tank from the duct will be utilized.

Unit installed cost for 6 inch butterfly valve = $2,125/valve
Unit installed cost one foot removable spool = $500/tank

Installed costs = ($2,125/valve x 3 tanks) + ($500/tank x 3 tanks) = $7,875

Clean-In-Place (CIP) System

A ducting system on a tank farm must have this system to maintain sanitation and quality of the product. The cost of operation of the CIP system has not been estimated. Operation of a CIP system, using typical cleaning agents, will raise disposal and wastewater treatment costs.

An allowance of $200,000 for a CIP system is included in the evaluation. Per applicant, this value is consistent with typical bottling systems.

Installed costs = $200,000

Total costs = Ductwork + Duct Valve + CIP System
= $30,311 + $7,875 + $200,000
= $238,186

Annualized Capital Investment = Initial Capital Investment x Amortization Factor

Amortization Factor = $\left[\frac{0.1(1.1)^{10}}{(1.1)^{10}-1}\right]$ = 0.163 per District policy, amortizing over 10 years at 10%

Therefore,

Annualized Capital Investment = $238,186 x 0.163 = $38,764

Capture of VOCs and condensation

Design Basis

- A common refrigeration system will be installed for all three tanks.
- The refrigeration system will be a packaged single-stage vapor-compression system.
- Minimum refrigeration capacity will allow cooling one of the three tanks from 75 °F to 40 °F in 24 hours. This would be a conservatively small system with respect to cost effectiveness since it would effectively limit the filling of the three tanks to one tank per day.

Based on a specific heat capacity of 1.0 Btu/lb-°F and cooling one tank from 95 °F top 40 °F in 24 hours, the capacity required for the refrigeration system would be:

Refrigeration Capacity = 105,000 gal/day x 8.34 lb/gal x 1.0 Btu/lb-°F x (95 °F – 40 °F)
x (day/24 hours) x (1 ton-hr refrigeration/12,000 Btu)

Refrigeration Capacity = 167 tons

Capital Cost

The EPA Air Pollution Control Manual, Section 3, Chapter 2, Table 2.5, provides costs for single stage vapor compression systems up to 100 tons capacity at a condensation temperature of 40 °F. Conservatively, using the purchase price for a 100 ton unit yields:

Refrigeration System Cost = $140,000

Annualized Capital Investment = Initial Capital Investment x Amortization Factor

Amortization Factor = $\left[\frac{0.1(1.1)^{10}}{(1.1)^{10}-1}\right]$ = 0.163 per District policy, amortizing over 10 years at 10%

Therefore,

Annualized Capital Investment = $140,000 x 0.163 = $22,820

To compare the cost and size of a 100 ton condenser to the subject 167 ton condenser, the six-tenths rule of thumb is used.

$$Annualized\ Costs\ 167\,ton = Annualized\ Costs\ 100\,ton \times \left(\frac{167\,ton}{100\,ton}\right)^{0.6}$$

Annualized Costs 167 ton = $22,820 x (167 ÷ 100)$^{0.6}$
= $31,042/year

Total Annual Cost = $38,764 + $31,042 = $69,806

Annual Emission Reduction = Uncontrolled Emissions x 0.81
= 9,600 lb-VOC/year x 0.81
= 7,776 lb-VOC/year
= 3.888 tons-VOC/year

Cost Effectiveness = $69,806/year ÷ 3.888 tons-VOC/year
= $17,954/ton-VOC

The analysis demonstrates that the annualized purchase cost of the required condenser and collection system ductwork equipment alone results in a cost effectiveness which exceeds the District's Guideline of $17,500/ton-VOC.

Collection of VOCs and control by absorption

One scrubber will be required sized at the maximum vapor flow rate of 3071.25 scfm.

Water scrubber (750 cfm) capital cost = $108,500 (per 2003 budgetary pricing obtained by Sonoma Technologies)

Adjusting from 2003 dollars to 2011 dollars (multiply by 1.22, 2.75% inflation/yr).

Water scrubber (750 cfm) capital cost = $108,500 x 1.22 = $132,370

$$Capital\ Cost\ 3071.25\,cfm = Capital\ Cost\ 750\,cfm \times \left(\frac{3071.25\,cfm}{750\,cfm}\right)^{0.6}$$

Capital Cost 3071.25 cfm = \$132,370 x $(3071.25 \div 750)^{0.6}$
= \$308,420

The following cost data is taken from EPA Control Cost Manual, Sixth Edition (EPA/452/B-02-001).

Water Scrubber – Cost Estimate	
Cost Description	Cost (\$)
Direct Costs (DC)	
Base Equipment Costs (Water Scrubber)	308,420
Instrumentation	0.10 x 308,420 = 30,842
Sales Tax	0.03 x 308,420 = 9,253
Freight	0.05 x 308,420 = 15,421
Purchased equipment cost	**363,936**
Foundations & supports	0.08 x 363,936 = 29,115
Handling & erection	0.14 x 363,936 = 50,951
Electrical	0.04 x 363,936 = 14,557
Piping	0.02 x 363,936 = 7,279
Painting	0.01 x 363,936 = 3,639
Insulation	0.01 x 363,936 = 3,639
Direct installation costs	**109,180**
Total Direct Costs	**473,116**
Indirect Costs (IC)	
Engineering	0.10 x 363,936 = 36,394
Construction and field expenses	0.05 x 363,936 = 18,197
Contractor fees	0.10 x 363,936 = 36,394
Start-up	0.02 x 363,936 = 7,279
Performance test	0.01 x 363,936 = 3,639
Contingencies	0.03 x 363,936 = 10,918
Total Indirect Costs	**112,821**
Total Capital Cost (DC + IC)	**585,937**

Annualized Capital Investment = Total Capital Cost x Amortization Factor

Amortization Factor = $\left[\frac{0.1(1.1)^{10}}{(1.1)^{10}-1}\right]$ = 0.163 per District policy, amortizing over 10 years at 10%

Therefore,

Annualized Capital Investment = $585,937 x 0.163 = $95,359

Additionally, the water scrubber will generate ethanol-laden wastewater containing 3.888 tons-ethanol annually. Assuming a 2% solution, approximately 58,731 gallons of waste water (3.888 ton-ethanol/year x 2000 lb/ton x gal/6.62 lb ÷ 0.02) will be generated annually. Per estimate in Sonoma Technologies study, an allowance of $0.25 per gallon is applied for disposal costs.

Annual disposal costs = 58,731 gallons x $0.25/gallon = $14,683

Total Annual Cost = $38,764 + $95,359 + $14,683 = $148,806

Annual Emission Reduction = Uncontrolled Emissions x 0.81
= 9,600 lb-VOC/year x 0.81
= 7,776 lb-VOC/year
= 3.888 tons-VOC/year

Cost Effectiveness = $148,806/year ÷ 3.888 tons-VOC/year
= $38,273/ton-VOC

The analysis demonstrates that the annualized purchase cost of the required water scrubber, wastewater disposal costs, and collection system ductwork equipment alone results in a cost effectiveness which exceeds the District's Guideline of $17,500/ton-VOC.

Collection of VOCs and control by carbon adsorption

Annual Emission Reduction = Uncontrolled Emissions x 0.86
= 9,600 lb-VOC/year x 0.86
= 8,256 lb-VOC/year
= 4.128 tons-VOC/year

Assume a working bed capacity of 20% for carbon (weight of vapor per weight of carbon)

Carbon required = 4.128 tons-VOC/year x 2000 lb/ton x 1/0.20
= 41,280 lb carbon

Carbon capital cost = $1.00/lb = $1.00/lb x 41,280 lb carbon = $41,280

The following cost data is taken from EPA Control Cost Manual, Sixth Edition (EPA/452/B-02-001).

Carbon Adsorption – Cost Estimate	
Cost Description	Cost ($)
Direct Costs (DC)	
Base Equipment Costs (Carbon Material)	41,280
Instrumentation	0.10 x 41,280 = 4,128
Sales Tax	0.03 x 41,280 = 1,238
Freight	0.05 x 41,280 = 2,064
Purchased equipment cost	**48,710**
Foundations & supports	0.08 x 48,710 = 3,897
Handling & erection	0.14 x 48,710 = 6,819
Electrical	0.04 x 48,710 = 1,948
Piping	0.02 x 48,710 = 974
Painting	0.01 x 48,710 = 487
Insulation	0.01 x 48,710 = 487
Direct installation costs	**14,612**
Total Direct Costs	**63,322**
Indirect Costs (IC)	
Engineering	0.10 x 48,710 = 4,871
Construction and field expenses	0.05 x 48,710 = 2,436
Contractor fees	0.10 x 48,710 = 4,871
Start-up	0.02 x 48,710 = 974
Performance test	0.01 x 48,710 = 487
Contingencies	0.03 x 48,710 = 1,461
Total Indirect Costs	**15,100**
Total Capital Cost (DC + IC)	**78,422**

Annualized Capital Investment = Initial Capital Investment x Amortization Factor

Amortization Factor = $\left[\frac{0.1(1.1)^{10}}{(1.1)^{10}-1}\right]$ = 0.163 per District policy, amortizing over 10 years at 10%

Therefore,

Annualized Capital Investment = $78,422 x 0.163 = $12,763

Operation and Maintenance Cost

The operation and maintenance cost for this carbon adsorption system will only include the cost of the service to remove and replace the saturated carbon canisters.

A representative from United States Filter Corporation stated that carbon adsorption systems are able to control about 20% of their weight in VOC's. As shown above, the annual carbon requirement would be 41,280 pounds. A typical recommended system consists of 2-8,000 pound canisters connected in series. In order to ensure no breakthrough, a service would be required every time the primary system becomes saturated. Therefore, a service would be required six times per year (41,280 lb/yr/8,000 lb/canister).

Pursuant to the cost estimate received from United States Filter Corporation, the cost of the service to remove and replace a saturated carbon canister is $8,720 per unit. This cost would include removal and replacement of the spent unit, packaging of the unit, shipping of the unit to the reactivation facility and reactivation of the unit.

Therefore, the annual service cost can be calculated as follows:

Service Cost = Occurrence (service/year) x Cost ($/service)
Service Cost = 6 services/year x $8,720 /service = $52,320/year

Total Annual Cost = $38,764 + $12,763 + $52,320 = $103,827/year

Cost Effectiveness = $103,827/year ÷ 4.128 tons-VOC/year
= $25,152/ton-VOC

The analysis demonstrates that the annualized purchase cost of the required carbon and collection system ductwork equipment alone results in a cost effectiveness which exceeds the District's Guideline of $17,500/ton-VOC.

Collection of VOCs and control by thermal or catalytic oxidation

The balanced chemical equation for combustion of ethanol is shown below.

$C_2H_5OH + 3O_2 \rightarrow 3H_2O + 2CO_2$

One thermal oxidizer will be required sized at the maximum vapor flow rate of 3071.25 scfm.

Regenerative thermal oxidizer (5,700 cfm) capital cost = $279,000 (2005 dollars)

Adjusting from 2005 dollars to 2011 dollars (multiply by 1.165, 2.75% inflation/yr).

Regenerative thermal oxidizer (5,700 cfm) capital cost = $279,000 x 1.165 = $325,035

$$Capital\,Cost\ 3071.25\,cfm = Capital\ Cost\ 5700\,cfm \times \left(\frac{3071.25\ cfm}{5700\,cfm} \right)^{0.6}$$

Capital Cost 3071.25 cfm = $325,035 x (3071.25 ÷ 5700)$^{0.6}$
= $224,282

Operation and Maintenance Costs

The Direct annual costs include labor (operating, supervisory, and maintenance), maintenance materials, electricity, and fuel.

Heat of Combustion for waste gas stream -dh(c):

heat of combustion -dHc = 20276 Btu/lb
Daily VOC emissions rate = 168.0 x 3 = 504.0 lb/day
Blower flow rate = 3071.25 scfm
= 4,422,600 ft^3/day

-dh(c) = 504.0 lb/day x 20276 Btu/lb / 4,422,600 ft^3/day
= 2.31 Btu/ft^3

Assuming the waste gas is principally air, with a molecular weight of 28.97 and a corresponding density of 0.0739 lb/scf, the heat of combustion per pound of incoming waste gas is:

-dh(c) = 2.31 Btu/ft^3 / 0.0739 lb/ft^3
= 31.27 Btu/lb

Fuel Flow Requirement

$$Q(fuel) = \frac{Pw*Qw*\{Cp*[1.1Tf-Tw-0.1Tr]-[-dh(c)]\}}{P(ef) * [-dh(m) - 1.1\ Cp * (Tf - Tr)]}$$

Where
Pw = 0.0739 lb/ft^3
Cp = 0.255 Btu/lb-°F
Qw = 3071.25 scfm
-dh(m) = 21,502 Btu/lb for methane
Tr = 77°F assume ambient conditions
P(ef) = 0.0408 lb/ft^3 m, methane at 77°F, 1 atm
Tf = 1600°F
Tw = 1150°F
-dh(c) = 31.27 Btu/lb

$$Q = \frac{0.0739*3071.25*\{0.255*[1.1*1600-1150-0.1*77]-31.27\}}{0.0408*[21502 - 1.1*0.255*(1600 - 77)]}$$

$$= 27761.61/859.9 = 32.28 \text{ ft}^3/\text{min}$$

Fuel Cost = 32.28 cfm x (1-0.95 heat recovery) x 1440 min/day x 365 day/yr x $0.00453/ft^3
= $3,843/yr

Electricity Requirement

$$\text{Power}_{fan} = \frac{1.17*10^{-4}\ Qw*\ \Delta P}{\in}$$

Where
ΔP = Pressure drop Across system = 4 in. H_2O
$\in$ = Efficiency for fan and motor = 0.6
Qw = 3071.25 scfm

$$\text{Power}_{fan} = \frac{1.17*10^{-4}\ *3071.25\ \text{cfm}*\ 4\ \text{in. } H_2O}{0.60}$$

= 2.4 kW

Electricity Cost = 2.4 kW x 24 hr/day x 365 days/yr x $0.168/kWh = $3,526/yr

The following cost data is taken from EPA Control Cost Manual, Sixth Edition (EPA/452/B-02-001).

Thermal and Catalytic Incinerator – Cost Estimate	
Cost Description	Cost ($)
Direct Costs (DC)	
Base Equipment Costs (Incinerator)	224,282
Instrumentation	0.10 x 224,282 = 22,428
Sales Tax	0.03 x 224,282 = 6,728
Freight	0.05 x 224,282 = 11,214
Purchased equipment cost	**264,652**
Foundations & supports	0.08 x 264,652 = 21,172
Handling & erection	0.14 x 264,652 = 37,051
Electrical	0.04 x 264,652 = 10,586
Piping	0.02 x 264,652 = 5,293
Painting	0.01 x 264,652 = 2,647
Insulation	0.01 x 264,652 = 2,647
Direct installation costs	**79,396**
Total Direct Costs	**344,048**
Indirect Costs (IC)	
Engineering	0.10 x 264,652 = 26,465
Construction and field expenses	0.05 x 264,652 = 13,233
Contractor fees	0.10 x 264,652 = 26,465
Start-up	0.02 x 264,652 = 5,293
Performance test	0.01 x 264,652 = 2,647
Contingencies	0.03 x 264,652 = 7,940
Total Indirect Costs	**82,043**
Total Capital Cost (DC + IC)	**426,091**

Annualized Capital Investment = Total Capital Cost x Amortization Factor

Amortization Factor = $\left[\frac{0.1(1.1)^{10}}{(1.1)^{10}-1}\right]$ = 0.163 per District policy, amortizing over 10 years at 10%

Therefore,

Annualized Capital Investment = $426,091 x 0.163 = $69,344

Operating Labor			
Operator	0.5 h/shift	$20.00/h	$5,550
Supervisor	15% of operator		$833
Maintenance			
Labor	0.5 h/shift	$20.00	$5,550
Material	100% of labor		$5,550
Utility			
Natural Gas		$4.53/kft^3	$3,843
Electricity		$0.168/kWh	$3,526
Indirect Annual Cost (IC)			
Overhead	60% of Labor Cost		$3,330
Administrative Charge	2% TCI		$8,522
Property Taxes	1% TCI		$4,261
Insurance	1% TCI		$4,261
Total Annual Cost			**$45,226**

Total Annual Costs = $38,764 + $69,344 + $45,226 = $153,334/year

Annual Emission Reduction = Uncontrolled Emissions x 0.88
= 9,600 lb-VOC/year x 0.88
= 8,448 lb-VOC/year
= 4.224 tons-VOC/year

Cost Effectiveness = $153,334/year ÷ 4.224 tons-VOC/year
= $36,301/ton-VOC

The analysis demonstrates that the annualized purchase cost of the required thermal oxidizer, utilities, and collection system ductwork equipment alone results in a cost effectiveness which exceeds the District's Guideline of $17,500/ton-VOC.

Step 5 - Select BACT

All identified feasible options with control efficiencies higher than the option proposed by the facility have been shown to not be cost effective. The facility has proposed Option 1, temperature-controlled open top tank with maximum average fermentation temperature of 95 deg F. These BACT requirements will be placed on the ATCs as enforceable conditions.

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.4.13*

Last Update 10/6/2009

Wine Storage Tank

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	1. Insulation or Equivalent**, Pressure Vacuum Relief Valve (PVRV) set within 10% of the maximum allowable working pressure of the tank; "gas-tight" tank operation; and continuous storage temperature not exceeding 75 degrees F, achieved within 60 days of completion of fermentation.	1. Capture of VOCs and thermal or catalytic oxidation or equivalent (98% control) 2. Capture of VOCs and carbon adsorption or equivalent (95% control) 3. Capture of VOCs and absorption or equivalent (90% control) 4. Capture of VOCs and condensation or equivalent (70% control)	

**Tanks made of heat-conducting materials such as stainless steel may be insulated or stored indoors (in a completely enclosed building, except for vents, doors and other essential openings) to limit exposure ot diurnal temperature variations. Tanks made entirely of non-conducting materials such as concrete and wood (except for fittings) are considered self-insulating.

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

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

Wine Storage

Step 1 - Identify All Possible Control Technologies

The SJVUAPCD BACT Clearinghouse guideline 5.4.13, 4th quarter 2011, identifies achieved in practice BACT for wine storage tanks as follows:

2) Insulation or Equivalent**, Pressure Vacuum Relief Valve (PVRV) set within 10% of the maximum allowable working pressure of the tank; "gas-tight" tank operation; and continuous storage temperature not exceeding 75 degrees F, achieved within 60 days of completion of fermentation.

The SJVUAPCD BACT Clearinghouse guideline 5.4.13, 4th quarter 2011, identifies technologically feasible BACT for wine storage tanks as follows:

5) Capture of VOCs and thermal or catalytic oxidation or equivalent (98% control)
6) Capture of VOCs and carbon adsorption or equivalent (95% control)
7) Capture of VOCs and absorption or equivalent (90% control)
8) Capture of VOCs and condensation or equivalent (70% control)

***Tanks made of heat-conducting materials such as stainless steel may be insulated or stored indoors (in a completely enclosed building, except for vents, doors and other essential openings) to limit exposure to diurnal temperature variations. Tanks made entirely of non-conducting materials such as concrete and wood (except for fittings) are considered self-insulating.*

Step 2 - Eliminate Technologically Infeasible Options

None of the above listed technologies are technologically infeasible.

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

Rank by Control Effectiveness		
Rank	Control	Overall Capture and Control Efficiency[2]
1	Capture of VOCs and thermal or catalytic oxidation or equivalent	98%
2	Capture of VOCs and carbon adsorption or equivalent	95%
3	Capture of VOCs and absorption or equivalent	90%
4	Capture of VOCs and condensation or equivalent	70%
5	Insulation or Equivalent**, Pressure Vacuum Relief Valve (PVRV) set within 10% of the maximum allowable working pressure of the tank; "gas-tight" tank operation; and continuous storage temperature not exceeding 75 degrees F, achieved within 60 days of completion of fermentation	0%

[2] Relative to "industry standard".

Step 4 - Cost Effectiveness Analysis

A cost-effective analysis is performed for each control technology which is more effective than meeting the requirements of District Rule 4694 plus tank insulation (achieved-in-practice BACT), as proposed by E & J Gallo.

Maximum Vapor Flow Rate

The following calculation only examines working losses from the tanks and is therefore conservative. The Tanks 4.0 daily emission run is based on one turnover per day for each tank during the month of July. The means each tank is filled for 12 hours and emptied for 12 hours. This fill rate is conservative as shown in the calculation below. Typical pumps utilized are rated at 20 hp.

Flow rate from a 20 hp pump:

Motor efficiency 90%
Pump Efficiency 60%
Differential pressure at pump = 10 psi (assume psi dynamic losses in piping plus 5 psi for static head difference on average)
Brake horsepower for a centrifugal pump may be calculated by the following equation.

$$BHP = \frac{\text{Differential Pressure (psi)} \times \text{gallons per minute}}{1{,}713 \times \text{Efficiency}}$$

BHP for a 20 hp motor = 20 hp x 90% = 18 bhp

Solving for the flow in gallons per minute (GPM),

GPM = (18 x 1,713 x 60%)/(10) = 1,850 gpm

105,000 gallons x min/1,850 gallons x 1 hr/60 min = 0.95 hours

Therefore, assuming a 12 hour fill rate for a 105,000 gallon tank is conservative.

Moles of air displaced = 105,000 gallons x ft^3/7.48 gallons x 0.07544 lb-air/ft^3 x lb/mol/28.58 lb
= 37.1 lb-mol air

Tanks 4.0 Wine emissions = 10.0 lb

Moles Wine = 10.0 lb x lb-mol/26.9559 lb = 0.37 lb-mol

Total moles = (37.1 + 0.37) lb-mol x 3 tanks = 112.41 lb-mol

V = nRT/P = 112.41 lb-mol x 0.7302 lb-mol °R/atm ft^3 x 520 °R / 1 atm
= 42,682.5 ft^3

Vapor Flow Rate = 42,682.5 ft^3 ÷ 12 hours x 1 hour/60 min = 59.3 scfm

Collection System Capital Investment (based on ductwork)

A common feature of all thermal or catalytic oxidation/carbon adsorption/absorption or condensation options is that they require installation of a collection system for delivering the VOCs from the tanks to the common control device. The analysis below indicates that these options are not cost effective by showing that just the annualized direct cost for the ductwork of the collection system and supporting structural steel and foundations and the control devices themselves is too large, when considered at the District's cost effectiveness threshold for VOC BACT, to justify the capital investment required by these options.

Collection system to consist of:

- The collection system consists of stainless steel place ductwork (stainless steel is required due to food grade product status) with isolation valving, connecting three 105,000 gallon tanks to a common manifold system which ducts the combined vent to the common control device. The cost of dampers and isolation valving, installed in the ductwork, will be included in the cost estimate.
- A minimum duct size is established at six inches diameter at each tank to provide adequate strength for spanning between supports. The main header is twelve inches diameter to handle the potential for simultaneous venting.
- minimum estimated length 234 feet (based on a three tank layout, 10 feet spacing between tanks, 10 feet spacing between tank and header, and control device located within 100 feet of tank array)

Capital Cost Ductwork

An estimate of straight line duct lengths required was prepared based on a winery layout of three 105,000 gallon tanks.

6" Stainless Steel Duct:	92.5 linear feet
12" Stainless Steel Duct:	141.5 linear feet

A direct cost estimate for 12 inch diameter stainless steel ductwork, installed in a San Joaquin Valley winery, was taken from Fermenter VOC Emission Control Cost Estimate, prepared by Eichleay Engineering for the Wine Institute in conjunction with development of District Rule 4694. The estimate is based on 2nd quarter 2005 dollars, and includes fittings, miscellaneous duct supports and other materials plus field labor costs required to install the ductwork, but does not include other associated indirect costs such as construction management, engineering, owner's cost, contingency, etc.

Unit installed cost for 6 inch Stainless Steel ducting: $61.30/linear foot
Unit installed cost for 12 inch Stainless Steel ducting: $143.80/linear foot

Installed costs = ($61.30 linear foot x 92.5 feet) + ($143.80 linear foot x 141.5 feet) = $26,018

Adjusting from 2005 dollars to 2011 dollars (multiply by 1.165, 2.75% inflation/yr).

Installed costs = $26,018 x 1.165 = $30,311

Duct Valve Allowance

One of the major concerns of a manifold duct system is microorganisms spoiling the wine, and transferring from one tank to another. It is possible to completely ruin a tank of white wine if a few hundred gallons of red wine were back fed through the duct. It is necessary to design into the system a positive disconnect of the ducting system when the tanks are not being filled. There are a number of ways this can be done. In this case, an automatic butterfly valve with a physical spool to disconnect the tank from the duct will be utilized.

Unit installed cost for 6 inch butterfly valve = $2,125/valve
Unit installed cost one foot removable spool = $500/tank

Installed costs = ($2,125/valve x 3 tanks) + ($500/tank x 3 tanks) = $7,875

Clean-In-Place (CIP) System

A ducting system on a tank farm must have this system to maintain sanitation and quality of the product. The cost of operation of the CIP system has not been estimated. Operation of a CIP system, using typical cleaning agents, will raise disposal and wastewater treatment costs.

An allowance of $200,000 for a CIP system is included in the evaluation. Per applicant, this value is consistent with typical bottling systems.

Installed costs = $200,000

Total costs = Ductwork + Duct Valve + CIP System
= $30,311 + $7,875 + $200,000
= $238,186

Annualized Capital Investment = Initial Capital Investment x Amortization Factor

Amortization Factor = $\left[\frac{0.1(1.1)^{10}}{(1.1)^{10}-1}\right]$ = 0.163 per District policy, amortizing over 10 years at 10%

Therefore,

Annualized Capital Investment = $238,186 x 0.163 = $38,764

Capture of VOCs and condensation

Design Basis

- A common refrigeration system will be installed for all three tanks.
- The refrigeration system will be a packaged single-stage vapor-compression system.
- Minimum refrigeration capacity will allow cooling one of the three tanks from 75 °F to 40 °F in 24 hours. This would be a conservatively small system with respect to cost effectiveness since it would effectively limit the filling of the three tanks to one tank per day.

Based on a specific heat capacity of 1.0 Btu/lb-°F and cooling one tank from 75 °F top 40 °F in 24 hours, the capacity required for the refrigeration system would be:

Refrigeration Capacity = 105,000 gal/day x 8.34 lb/gal x 1.0 Btu/lb-°F x (75 °F – 40 °F) x (day/24 hours) x (1 ton-hr refrigeration/12,000 Btu)

Refrigeration Capacity = 106 tons

Capital Cost

The EPA Air Pollution Control Manual, Section 3, Chapter 2, Table 2.5, provides costs for single stage vapor compression systems up to 100 tons capacity at a condensation temperature of 40 °F. Conservatively, using the purchase price for a 100 ton unit yields:

Refrigeration System Cost = $140,000

Annualized Capital Investment = Initial Capital Investment x Amortization Factor

Amortization Factor = $\left[\frac{0.1(1.1)^{10}}{(1.1)^{10}-1}\right]$ = 0.163 per District policy, amortizing over 10 years at 10%

Therefore,

Annualized Capital Investment = $140,000 x 0.163 = $22,820

To compare the cost and size of a 100 ton condenser to the subject 106 ton condenser, the six-tenths rule of thumb is used.

$$Annualized\ Costs\ 106ton = Annualized\ Costs\ 100ton \times \left(\frac{106ton}{100ton}\right)^{0.6}$$

Annualized Costs 106 ton = \$22,820 x (106 ÷ 100)$^{0.6}$
= \$23,632/year

Total Annual Cost = \$38,764 + \$23,632 = \$62,396

Annual Emission Reduction = Uncontrolled Emissions x 0.70
= 573 lb-VOC/year x 0.70
= 401 lb-VOC/year
= 0.20 tons-VOC/year

Cost Effectiveness = \$62,396/year ÷ 0.20 tons-VOC/year
= \$311,980/ton-VOC

The analysis demonstrates that the annualized purchase cost of the required condenser and collection system ductwork equipment alone results in a cost effectiveness which exceeds the District's Guideline of \$17,500/ton-VOC.

Collection of VOCs and control by absorption

One scrubber will be required sized at the maximum vapor flow rate of 59.3 scfm.

Water scrubber (750 cfm) capital cost = \$108,500 (per 2003 budgetary pricing obtained by Sonoma Technologies)

Adjusting from 2003 dollars to 2011 dollars (multiply by 1.22, 2.75% inflation/yr).

Water scrubber (750 cfm) capital cost = \$108,500 x 1.22 = \$132,370

$$Capital\ Cost\ 59.3cfm = Capital\ Cost\ 750cfm \times \left(\frac{59.3cfm}{750cfm}\right)^{0.6}$$

Capital Cost 59.3 cfm = \$132,370 x (59.3 ÷ 750)$^{0.6}$
= \$28,879

The following cost data is taken from EPA Control Cost Manual, Sixth Edition (EPA/452/B-02-001).

Water Scrubber – Cost Estimate	
Cost Description	Cost ($)
Direct Costs (DC)	
Base Equipment Costs (Water Scrubber)	28,879
Instrumentation	0.10 x 28,879 = 2,889
Sales Tax	0.03 x 28,879 = 866
Freight	0.05 x 28,879 = 1,444
Purchased equipment cost	**34,078**
Foundations & supports	0.08 x 34,078 = 2,726
Handling & erection	0.14 x 34,078 = 4,771
Electrical	0.04 x 34,078 = 1,363
Piping	0.02 x 34,078 = 682
Painting	0.01 x 34,078 = 341
Insulation	0.01 x 34,078 = 341
Direct installation costs	**10,224**
Total Direct Costs	**44,302**
Indirect Costs (IC)	
Engineering	0.10 x 34,078 = 3,408
Construction and field expenses	0.05 x 34,078 = 1,704
Contractor fees	0.10 x 34,078 = 3,408
Start-up	0.02 x 34,078 = 682
Performance test	0.01 x 34,078 = 341
Contingencies	0.03 x 34,078 = 1,022
Total Indirect Costs	**10,565**
Total Capital Cost (DC + IC)	**54,867**

Annualized Capital Investment = Total Capital Cost x Amortization Factor

Amortization Factor = $\left[\frac{0.1(1.1)^{10}}{(1.1)^{10}-1}\right]$ = 0.163 per District policy, amortizing over 10 years at 10%

Therefore,

Annualized Capital Investment = $54,867 x 0.163 = $8,929

Additionally, the water scrubber will generate ethanol-laden wastewater containing 0.258 tons-ethanol annually. Assuming a 2% solution, approximately 3,897 gallons of waste water (0.258 ton-ethanol/year x 2000 lb/ton x gal/6.62 lb ÷ 0.02) will be generated annually. Per estimate in Sonoma Technologies study, an allowance of $0.25 per gallon is applied for disposal costs.

Annual disposal costs = 3,897 gallons x $0.25/gallon = $974

Total Annual Cost = $38,764 + $8,929 + $974 = $48,667

Annual Emission Reduction = Uncontrolled Emissions x 0.90
= 573 lb-VOC/year x 0.90
= 516 lb-VOC/year
= 0.258 tons-VOC/year

Cost Effectiveness = $48,667/year ÷ 0.258 tons-VOC/year
= $188,632/ton-VOC

The analysis demonstrates that the annualized purchase cost of the required water scrubber, wastewater disposal costs, and collection system ductwork equipment alone results in a cost effectiveness which exceeds the District's Guideline of $17,500/ton-VOC.

Collection of VOCs and control by carbon adsorption

Annual Emission Reduction = Uncontrolled Emissions x 0.95
= 573 lb-VOC/year x 0.95
= 544 lb-VOC/year
= 0.27 tons-VOC/year

Assume a working bed capacity of 20% for carbon (weight of vapor per weight of carbon)

Carbon required = 0.27 tons-VOC/year x 2000 lb/ton x 1/0.20
= 2,722 lb carbon

Carbon capital cost = $1.00/lb = $1.00/lb x 2,722 lb carbon = $2,722

The following cost data is taken from EPA Control Cost Manual, Sixth Edition (EPA/452/B-02-001).

Carbon Adsorption – Cost Estimate	
Cost Description	Cost ($)
Direct Costs (DC)	
Base Equipment Costs (Carbon Material)	2,722
Instrumentation	0.10 x 2,722 = 272
Sales Tax	0.03 x 2,722 = 82
Freight	0.05 x 2,722 = 136
Purchased equipment cost	**3,212**
Foundations & supports	0.08 x 3,212 = 257
Handling & erection	0.14 x 3,212 = 450
Electrical	0.04 x 3,212 = 128
Piping	0.02 x 3,212 = 64
Painting	0.01 x 3,212 = 32
Insulation	0.01 x 3,212 = 32
Direct installation costs	**963**
Total Direct Costs	**4,175**
Indirect Costs (IC)	
Engineering	0.10 x 3,212 = 321
Construction and field expenses	0.05 x 3,212 = 161
Contractor fees	0.10 x 3,212 = 321
Start-up	0.02 x 3,212 = 64
Performance test	0.01 x 3,212 = 32
Contingencies	0.03 x 3,212 = 96
Total Indirect Costs	**995**
Total Capital Cost (DC + IC)	**5,170**

Annualized Capital Investment = Initial Capital Investment x Amortization Factor

Amortization Factor = $\left[\frac{0.1(1.1)^{10}}{(1.1)^{10}-1}\right]$ = 0.163 per District policy, amortizing over 10 years at 10%

Therefore,

Annualized Capital Investment = $5,170 x 0.163 = $841

Operation and Maintenance Cost

The operation and maintenance cost for this carbon adsorption system will only include the cost of the service to remove and replace the saturated carbon canisters.

A representative from United States Filter Corporation stated that carbon adsorption systems are able to control about 20% of their weight in VOC's. As shown above, the annual carbon requirement would be 2,722 pounds. A typical recommended system consists of 2-8,000 pound canisters connected in series. In order to ensure no breakthrough, a service would be required every time the primary system becomes saturated. Therefore, a service would be required one time per year (2,722 lb/yr/8,000 lb/canister).

Pursuant to the cost estimate received from United States Filter Corporation, the cost of the service to remove and replace a saturated carbon canister is $8,720 per unit. This cost would include removal and replacement of the spent unit, packaging of the unit, shipping of the unit to the reactivation facility and reactivation of the unit.

Therefore, the annual service cost can be calculated as follows:

Service Cost = Occurrence (service/year) x Cost ($/service)
Service Cost = 1 services/year x $8,720 /service = $8,720/year

Total Annual Cost = $38,764 + $841 + $8,720 = $48,325/year

Cost Effectiveness = $48,325/year ÷ 0.27 tons-VOC/year
= $178,981/ton-VOC

The analysis demonstrates that the annualized purchase cost of the required carbon and collection system ductwork equipment alone results in a cost effectiveness which exceeds the District's Guideline of $17,500/ton-VOC.

Collection of VOCs and control by thermal or catalytic oxidation

The balanced chemical equation for combustion of ethanol is shown below.

$C_2H_5OH + 3O_2 \rightarrow 3H_2O + 2CO_2$

One thermal oxidizer will be required sized at the maximum vapor flow rate of 59.3 scfm.

Regenerative thermal oxidizer (5,700 cfm) capital cost = $279,000 (2005 dollars)

Adjusting from 2005 dollars to 2011 dollars (multiply by 1.165, 2.75% inflation/yr).

Regenerative thermal oxidizer (5,700 cfm) capital cost = $279,000 x 1.165 = $325,035

$$Capital\,Cost\ 59.3\,cfm = Capital\ Cost\ 5700\,cfm \times \left(\frac{59.3\,cfm}{5700\,cfm}\right)^{0.6}$$

Capital Cost 59.3 cfm = $325,035 x (59.3 ÷ 5700)$^{0.6}$
= $21,001

Operation and Maintenance Costs

The Direct annual costs include labor (operating, supervisory, and maintenance), maintenance materials, electricity, and fuel.

Heat of Combustion for waste gas stream -dh(c):

heat of combustion -dHc = 20276 Btu/lb
Daily VOC emissions rate = 5.5 x 3 = 16.5 lb/day
Blower flow rate = 59.3 scfm
= 85,392 ft^3/day

-dh(c) = 16.5 lb/day x 20276 Btu/lb / 85,392 ft^3/day
= 3.92 Btu/ft^3

Assuming the waste gas is principally air, with a molecular weight of 28.97 and a corresponding density of 0.0739 lb/scf, the heat of combustion per pound of incoming waste gas is:

-dh(c) = 3.92 Btu/ft^3 / 0.0739 lb/ft^3
= 53.02 Btu/lb

Fuel Flow Requirement

$$Q(fuel) = \frac{Pw*Qw*\{Cp*[1.1Tf-Tw-0.1Tr]-[-dh(c)]\}}{P(ef) * [-dh(m) - 1.1\ Cp * (Tf - Tr)]}$$

Where
- Pw = 0.0739 lb/ft^3
- Cp = 0.255 Btu/lb-°F
- Qw = 59.3 scfm
- -dh(m) = 21,502 Btu/lb for methane
- Tr = 77°F assume ambient conditions
- P(ef) = 0.0408 lb/ft^3 m, methane at 77°F, 1 atm
- Tf = 1600°F
- Tw = 1150°F
- -dh(c) = 53.02 Btu/lb

$$Q = \frac{0.0739*59.3*\{0.255*[1.1*1600-1150-0.1*77]-53.02\}}{0.0408*[21502 - 1.1*0.255*(1600 - 77)]}$$

$$= 440.71/859.9 = 0.51\ ft^3/min$$

Fuel Cost = 0.51 cfm x (1-0.95 heat recovery) x 1440 min/day x 365 day/yr x $0.00453/ft^3
= $60/yr

Electricity Requirement

$$Power_{fan} = \frac{1.17*10^{-4}\ Qw*\ \Delta P}{\in}$$

Where
- ΔP = Pressure drop Across system = 4 in. H_2O
- $\in$ = Efficiency for fan and motor = 0.6
- Qw = 59.3 scfm

$$Power_{fan} = \frac{1.17*10^{-4}\ *59.3\ cfm*\ 4\ in.\ H_2O}{0.60}$$

$$= 0.0463\ kW$$

Electricity Cost = 0.0463 kW x 24 hr/day x 365 days/yr x $0.168/kWh = $68/yr

The following cost data is taken from EPA Control Cost Manual, Sixth Edition (EPA/452/B-02-001).

Thermal and Catalytic Incinerator – Cost Estimate	
Cost Description	Cost ($)
Direct Costs (DC)	
Base Equipment Costs (Incinerator)	21,001
Instrumentation	0.10 x 21,001 = 2,100
Sales Tax	0.03 x 21,001 = 630
Freight	0.05 x 21,001 = 1,050
Purchased equipment cost	**24,781**
Foundations & supports	0.08 x 24,781 = 1,982
Handling & erection	0.14 x 24,781 = 3,469
Electrical	0.04 x 24,781 = 991
Piping	0.02 x 24,781 = 496
Painting	0.01 x 24,781 = 248
Insulation	0.01 x 24,781 = 248
Direct installation costs	**7,434**
Total Direct Costs	**32,215**
Indirect Costs (IC)	
Engineering	0.10 x 24,781 = 2,478
Construction and field expenses	0.05 x 24,781 = 1,239
Contractor fees	0.10 x 24,781 = 2,478
Start-up	0.02 x 24,781 = 496
Performance test	0.01 x 24,781 = 248
Contingencies	0.03 x 24,781 = 743
Total Indirect Costs	**7,682**
Total Capital Cost (DC + IC)	**39,897**

Annualized Capital Investment = Total Capital Cost x Amortization Factor

Amortization Factor = $\left[\frac{0.1(1.1)^{10}}{(1.1)^{10}-1}\right]$ = 0.163 per District policy, amortizing over 10 years at 10%

Therefore,

Annualized Capital Investment = $39,897 x 0.163 = $6,493

Operating Labor			
Operator	0.5 h/shift	$20.00/h	$5,550
Supervisor	15% of operator		$833
Maintenance			
Labor	0.5 h/shift	$20.00	$5,550
Material	100% of labor		$5,550
Utility			
Natural Gas		$4.53/kft^3	$60
Electricity		$0.168/kWh	$68
Indirect Annual Cost (IC)			
Overhead	60% of Labor Cost		$3,330
Administrative Charge	2% TCI		$798
Property Taxes	1% TCI		$399
Insurance	1% TCI		$399
Total Annual Cost			**$22,537**

Total Annual Costs = $38,764 + $6,493 + $22,537 = $67,794/year

Annual Emission Reduction = Uncontrolled Emissions x 0.98
= 573 lb-VOC/year x 0.98
= 562 lb-VOC/year
= 0.28 tons-VOC/year

Cost Effectiveness = $67,794/year ÷ 0.28 tons-VOC/year
= $242,121/ton-VOC

The analysis demonstrates that the annualized purchase cost of the required thermal oxidizer, utilities, and collection system ductwork equipment alone results in a cost effectiveness which exceeds the District's Guideline of $17,500/ton-VOC.

Step 5 - Select BACT

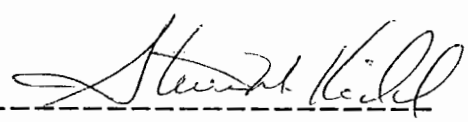
All identified feasible options with control efficiencies higher than the option proposed by the facility have been shown to not be cost effective. The facility has proposed Option 1, insulated tank, pressure/vacuum valve set within 10% of the maximum allowable working pressure of the tank, "gas tight" tank operation and achieve and maintain a continuous storage temperature not exceeding 75 °F within 60 days of completion of fermentation. These BACT requirements will be placed on the ATCs as enforceable conditions.

Appendix C

Compliance Certification

N-1237
E&J Gallo Winery-Livingston
Compliance Certification Statement
For Federal Major Permit Modifications
Compliance with District Rule 2201, Section 4.15.2

"I certify under penalty of law that all major stationary sources (Title V facilities) operated under my control in California are compliant with all applicable air emissions limitations and standards. The facilities included in this certification statement include the E&J Gallo Winery-Fresno, the E&J Gallo Winery-Livingston, and the E&J Gallo Winery-Modesto."



08/31/11

Mr. Steve Kidd
Vice President of Operations

Date

Appendix D

Certificate of Conformity

San Joaquin Valley
Unified Air Pollution Control District

TITLE V MODIFICATION - COMPLIANCE CERTIFICATION FORM

I. TYPE OF PERMIT ACTION (Check appropriate box)

[X] Federal Major Permit MODIFICATION
[] MINOR PERMIT MODIFICATION
[ ] ADMINISTRATIVE AMENDMENT

COMPANY NAME: E&J Gallo Winery - Livingston	FACILITY ID N -1237
1. Type of Organization:[x] Corporation [ ] Sole Ownership [ ] Government [ ] Partnership [ ] Utility	
2. Owner's Name: E&J Gallo Winery-Livingston	
3. Agent to the Owner: Mr. Kent Mann	

II. COMPLIANCE CERTIFICATION (Read each statement carefully and initial **all** circles for confirmation):

(KM) Based on information and belief formed after reasonable inquiry, the equipment identified in this application will continue to comply with the applicable federal requirement(s).

(KM) Based on information and belief formed after reasonable inquiry, the equipment identified in this application will comply with applicable federal requirement(s) that will become effective during the permit term, on a timely basis.

(KM) Corrected information will be provided to the District when I become aware that incorrect or incomplete information has been submitted.

(KM) Based on information and belief formed after reasonable inquiry, information and statements in the submitted application package, including all accompanying reports, and required certifications are true accurate and complete.

I declare, under penalty of perjury under the laws of the state of California, that the forgoing is correct and true:

Kent Mann — 09/06/11

Signature of Responsible Official — Date

Mr. Kent Mann

Name of Responsible Official (please print)

Senior Director-Production and Operations

Title of Responsible Official (please print)

Appendix E

Draft ATCs

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

PERMIT NO: N-1237-593-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: E & J GALLO WINERY
MAILING ADDRESS: 18000 W RIVER RD
LIVINGSTON, CA 95334

LOCATION: 18000 W RIVER RD
LIVINGSTON, CA 95334

EQUIPMENT DESCRIPTION:
105,000 GALLON STEEL RED AND WHITE WINE FERMENTATION AND WINE STORAGE TANK (TANK LVW-WS-1) WITH PRESSURE/VACUUM VALVE AND INSULATION

CONDITIONS

1. {1830} This Authority to Construct serves as a written certificate of conformity with the procedural requirements of 40 CFR 70.7 and 70.8 and with the compliance requirements of 40 CFR 70.6(c). [District Rule 2201] Federally Enforceable Through Title V Permit
2. {1831} Prior to operating with modifications authorized by this Authority to Construct, the facility shall submit an application to modify the Title V permit with an administrative amendment in accordance with District Rule 2520 Section 5.3.4. [District Rule 2520, 5.3.4] Federally Enforceable Through Title V Permit
3. Prior to operating equipment under this Authority to Construct, permittee shall surrender VOC emission reduction credits for the following quantities of emissions: 1st quarter - 847 lb, 2nd quarter - 848 lb, 3rd quarter - 848 lb, and fourth quarter - 848 lb. Offsets shall be provided at the applicable offset ratio specified in Table 4-2 of Rule 2201 (as amended 4/21/11). [District Rule 2201] Federally Enforceable Through Title V Permit
4. ERC Certificate Numbers C-1066-1 and S-3666-1 (or a certificate split from these certificates) shall be used to supply the required offsets, unless a revised offsetting proposal is received and approved by the District, upon which this Authority to Construct shall be reissued, administratively specifying the new offsetting proposal. Original public noticing requirements, if any, shall be duplicated prior to reissuance of this Authority to Construct. [District Rule 2201] Federally Enforceable Through Title V Permit
5. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]

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-1237-593-0 : Nov 29 2011 4:38PM -- TOMS : Joint Inspection NOT Required

6. When used for wine storage, this tank shall be equipped with and operated with a pressure-vacuum relief valve, which shall operate within 10% of the maximum allowable working pressure of the tank, operate in accordance with the manufacturer's instructions, and be permanently labeled with the operating pressure settings. [District Rules 2201 and 4694, 5.2.1] Federally Enforceable Through Title V Permit

7. When this tank is used for wine storage, the pressure-vacuum relief valve and storage tank shall remain in a gas-tight condition, except when the operating pressure of the tank exceeds the valve set pressure. A gas-tight condition shall be determined by measuring the gas leak in accordance with the procedures in EPA Method 21. [District Rules 2201 and 4694, 5.2.1] Federally Enforceable Through Title V Permit

8. The temperature of the wine stored in this tank shall be maintained at or below 75 degrees Fahrenheit. The temperature of the stored wine shall be determined and recorded at least once per week. For each batch of wine, the operator shall achieve the storage temperature of 75 degrees Fahrenheit or less within 60 days after completing fermentation, and shall maintain records to show when the required storage temperature of 75 degrees Fahrenheit or less was achieved. [District Rules 2201 and 4694, 5.2.2] Federally Enforceable Through Title V Permit

9. The average fermentation temperature of each batch of must fermented in this tank shall not exceed 95 degrees Fahrenheit, calculated as the average of all temperature measurements for the batch taken at least every 12 hours over the course of the fermentation. [District Rule 2201] Federally Enforceable Through Title V Permit

10. The daily maximum ethanol content of wine stored in this tank shall not exceed 14.5 percent by volume. [District Rule 2201] Federally Enforceable Through Title V Permit

11. The annual average ethanol content of wine stored in this tank shall not exceed 12 percent by volume. [District Rule 2201] Federally Enforceable Through Title V Permit

12. The maximum liquid temperature of wine stored in this tank shall not exceed 75 degrees Fahrenheit. [District Rule 2201] Federally Enforceable Through Title V Permit

13. The maximum wine fermentation throughput in this tank shall not exceed 105,000 gallons per day. [District Rule 2201] Federally Enforceable Through Title V Permit

14. The maximum wine fermentation throughput in this tank shall not exceed 800,000 gallons per year. [District Rule 2201] Federally Enforceable Through Title V Permit

15. The maximum wine storage throughput in this tank shall not exceed 105,000 gallons per day. [District Rule 2201] Federally Enforceable Through Title V Permit

16. The maximum wine storage throughput in this tank shall not exceed 1,050,000 gallons per year. [District Rule 2201] Federally Enforceable Through Title V Permit

17. The daily VOC emissions for fermentation operations in this tank shall not exceed 3.46 lb per 1000 gallons of tank capacity. [District Rule 2201] Federally Enforceable Through Title V Permit

18. The annual VOC emissions for fermentation operations in this tank shall not exceed 4.0 lb per 1000 gallons of tank capacity. [District Rule 2201] Federally Enforceable Through Title V Permit

19. Daily VOC emissions from wine stored in this tank shall not exceed 5.5 lb/day. [District Rule 2201] Federally Enforceable Through Title V Permit

20. All wine fermented in this tank shall be subject to the fermentation tank emission reduction measures of District Rule 4694 with actual production in this tank included in the minimum facility-wide fermentation emission reduction of 35% pursuant to District Rule 4694. [District Rule 2201] Federally Enforceable Through Title V Permit

21. Annual fermentation emissions from this tank shall be determined by the following equation: E = 4.0 x annual red wine production + 1.6 x annual white wine production. [District Rule 2201] Federally Enforceable Through Title V Permit

22. The operator shall record the temperature of the stored wine weekly and each time the tank is filled. [District Rule 1070] Federally Enforceable Through Title V Permit

23. The operator shall record the ethanol content and liquid height of wine stored in this tank each time the tank is filled. [District Rule 1070] Federally Enforceable Through Title V Permit

CONDITIONS CONTINUE ON NEXT PAGE

24. The operator shall record, on a weekly basis, the total gallons of wine contained in the tank. [District Rule 4694, 6.4.2] Federally Enforceable Through Title V Permit

25. For each batch of must fermented in this tank, the operator shall record the fermentation completion date, the total gallons of must fermented, the average fermentation temperature and the uncontrolled fermentation emissions and fermentation emission reductions (calculated per the emission factors given in District Rule 4694). The information shall be recorded by the tank Permit to Operate number and by wine type, stated as either red wine or white wine. [District Rules 2201 and 4694] Federally Enforceable Through Title V Permit

26. Separate annual records each of total red wine and total white wine produced by fermentation at this facility, based on values reported to the Alcohol and Tobacco Tax and Trade Bureau (TTB), U.S. Department of the Treasury, shall be kept. [District Rule 4694]

27. Daily throughput records, including records of filling and emptying operations, the dates of such operations, a unique identifier for each batch, the volume percent ethanol in the batch, and the volume of wine transferred, shall be maintained. [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit

28. All records shall be retained on-site for a period of at least five years and made available for District inspection upon request. [District Rules 1070, 2201 and 4694] Federally Enforceable Through Title V Permit

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-1237-594-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: E & J GALLO WINERY
MAILING ADDRESS: 18000 W RIVER RD
LIVINGSTON, CA 95334

LOCATION: 18000 W RIVER RD
LIVINGSTON, CA 95334

EQUIPMENT DESCRIPTION:
105,000 GALLON STEEL RED AND WHITE WINE FERMENTATION AND WINE STORAGE TANK (TANK LVW-WS-2) WITH PRESSURE/VACUUM VALVE AND INSULATION

CONDITIONS

1. {1830} This Authority to Construct serves as a written certificate of conformity with the procedural requirements of 40 CFR 70.7 and 70.8 and with the compliance requirements of 40 CFR 70.6(c). [District Rule 2201] Federally Enforceable Through Title V Permit
2. {1831} Prior to operating with modifications authorized by this Authority to Construct, the facility shall submit an application to modify the Title V permit with an administrative amendment in accordance with District Rule 2520 Section 5.3.4. [District Rule 2520, 5.3.4] Federally Enforceable Through Title V Permit
3. Prior to operating equipment under this Authority to Construct, permittee shall surrender VOC emission reduction credits for the following quantities of emissions: 1st quarter - 847 lb, 2nd quarter - 848 lb, 3rd quarter - 848 lb, and fourth quarter - 848 lb. Offsets shall be provided at the applicable offset ratio specified in Table 4-2 of Rule 2201 (as amended 4/21/11). [District Rule 2201] Federally Enforceable Through Title V Permit
4. ERC Certificate Numbers C-1066-1 and S-3666-1 (or a certificate split from these certificates) shall be used to supply the required offsets, unless a revised offsetting proposal is received and approved by the District, upon which this Authority to Construct shall be reissued, administratively specifying the new offsetting proposal. Original public noticing requirements, if any, shall be duplicated prior to reissuance of this Authority to Construct. [District Rule 2201] Federally Enforceable Through Title V Permit
5. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]

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

DRAFT

DAVID WARNER, Director of Permit Services
N-1237-594-0 : Nov 29 2011 4:38PM -- TOMS : Joint Inspection NOT Required

6. When used for wine storage, this tank shall be equipped with and operated with a pressure-vacuum relief valve, which shall operate within 10% of the maximum allowable working pressure of the tank, operate in accordance with the manufacturer's instructions, and be permanently labeled with the operating pressure settings. [District Rules 2201 and 4694, 5.2.1] Federally Enforceable Through Title V Permit

7. When this tank is used for wine storage, the pressure-vacuum relief valve and storage tank shall remain in a gas-tight condition, except when the operating pressure of the tank exceeds the valve set pressure. A gas-tight condition shall be determined by measuring the gas leak in accordance with the procedures in EPA Method 21. [District Rules 2201 and 4694, 5.2.1] Federally Enforceable Through Title V Permit

8. The temperature of the wine stored in this tank shall be maintained at or below 75 degrees Fahrenheit. The temperature of the stored wine shall be determined and recorded at least once per week. For each batch of wine, the operator shall achieve the storage temperature of 75 degrees Fahrenheit or less within 60 days after completing fermentation, and shall maintain records to show when the required storage temperature of 75 degrees Fahrenheit or less was achieved. [District Rules 2201 and 4694, 5.2.2] Federally Enforceable Through Title V Permit

9. The average fermentation temperature of each batch of must fermented in this tank shall not exceed 95 degrees Fahrenheit, calculated as the average of all temperature measurements for the batch taken at least every 12 hours over the course of the fermentation. [District Rule 2201] Federally Enforceable Through Title V Permit

10. The daily maximum ethanol content of wine stored in this tank shall not exceed 14.5 percent by volume. [District Rule 2201] Federally Enforceable Through Title V Permit

11. The annual average ethanol content of wine stored in this tank shall not exceed 12 percent by volume. [District Rule 2201] Federally Enforceable Through Title V Permit

12. The maximum liquid temperature of wine stored in this tank shall not exceed 75 degrees Fahrenheit. [District Rule 2201] Federally Enforceable Through Title V Permit

13. The maximum wine fermentation throughput in this tank shall not exceed 105,000 gallons per day. [District Rule 2201] Federally Enforceable Through Title V Permit

14. The maximum wine fermentation throughput in this tank shall not exceed 800,000 gallons per year. [District Rule 2201] Federally Enforceable Through Title V Permit

15. The maximum wine storage throughput in this tank shall not exceed 105,000 gallons per day. [District Rule 2201] Federally Enforceable Through Title V Permit

16. The maximum wine storage throughput in this tank shall not exceed 1,050,000 gallons per year. [District Rule 2201] Federally Enforceable Through Title V Permit

17. The VOC emissions for fermentation operations in this tank shall not exceed 3.46 lb/day per 1000 gallons of tank capacity. [District Rule 2201] Federally Enforceable Through Title V Permit

18. Daily VOC emissions from wine stored in this tank shall not exceed 65.5 lb/day. [District Rule 2201] Federally Enforceable Through Title V Permit

19. Annual emissions from wine fermentation in this tank shall not exceed 3,200 lb-VOC per year. [District Rule 2201] Federally Enforceable Through Title V Permit

20. All wine fermented in this tank shall be subject to the fermentation tank emission reduction measures of District Rule 4694 with actual production in this tank included in the minimum facility-wide fermentation emission reduction of 35% pursuant to District Rule 4694. [District Rule 2201] Federally Enforceable Through Title V Permit

21. Annual fermentation emissions from this tank shall be determined by the following equation: E = 4.0 x annual red wine production + 1.6 x annual white wine production. [District Rule 2201] Federally Enforceable Through Title V Permit

22. The operator shall record the temperature of the stored wine weekly and each time the tank is filled. [District Rule 1070] Federally Enforceable Through Title V Permit

23. The operator shall record the ethanol content and liquid height of wine stored in this tank each time the tank is filled. [District Rule 1070] Federally Enforceable Through Title V Permit

CONDITIONS CONTINUE ON NEXT PAGE

24. The operator shall record, on a weekly basis, the total gallons of wine contained in the tank. [District Rule 4694, 6.4.2] Federally Enforceable Through Title V Permit

25. For each batch of must fermented in this tank, the operator shall record the fermentation completion date, the total gallons of must fermented, the average fermentation temperature and the uncontrolled fermentation emissions and fermentation emission reductions (calculated per the emission factors given in District Rule 4694). The information shall be recorded by the tank Permit to Operate number and by wine type, stated as either red wine or white wine. [District Rule 4694]

26. Separate annual records each of total red wine and total white wine produced by fermentation at this facility, based on values reported to the Alcohol and Tobacco Tax and Trade Bureau (TTB), U.S. Department of the Treasury, shall be kept. [District Rule 4694]

27. Daily throughput records, including records of filling and emptying operations, the dates of such operations, a unique identifier for each batch, the volume percent ethanol in the batch, and the volume of wine transferred, shall be maintained. [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit

28. All records shall be retained on-site for a period of at least five years and made available for District inspection upon request. [District Rules 1070, 2201 and 4694] Federally Enforceable Through Title V Permit

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-1237-595-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: E & J GALLO WINERY
MAILING ADDRESS: 18000 W RIVER RD
LIVINGSTON, CA 95334

LOCATION: 18000 W RIVER RD
LIVINGSTON, CA 95334

EQUIPMENT DESCRIPTION:
105,000 GALLON STEEL RED AND WHITE WINE FERMENTATION AND WINE STORAGE TANK (TANK LVW-WS-3) WITH PRESSURE/VACUUM VALVE AND INSULATION

CONDITIONS

1. {1830} This Authority to Construct serves as a written certificate of conformity with the procedural requirements of 40 CFR 70.7 and 70.8 and with the compliance requirements of 40 CFR 70.6(c). [District Rule 2201] Federally Enforceable Through Title V Permit
2. {1831} Prior to operating with modifications authorized by this Authority to Construct, the facility shall submit an application to modify the Title V permit with an administrative amendment in accordance with District Rule 2520 Section 5.3.4. [District Rule 2520, 5.3.4] Federally Enforceable Through Title V Permit
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CONDITIONS CONTINUE ON NEXT PAGE

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Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services
N-1237-595-0 : Nov 29 2011 4:38PM -- TOMS : Joint Inspection NOT Required

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7. When this tank is used for wine storage, the pressure-vacuum relief valve and storage tank shall remain in a gas-tight condition, except when the operating pressure of the tank exceeds the valve set pressure. A gas-tight condition shall be determined by measuring the gas leak in accordance with the procedures in EPA Method 21. [District Rules 2201 and 4694, 5.2.1] Federally Enforceable Through Title V Permit

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CONDITIONS CONTINUE ON NEXT PAGE

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26. Separate annual records each of total red wine and total white wine produced by fermentation at this facility, based on values reported to the Alcohol and Tobacco Tax and Trade Bureau (TTB), U.S. Department of the Treasury, shall be kept. [District Rule 4694]

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