

JAN 19 2017

Mr. Todd Seely
E & J Gallo Winery
600 Yosemite Blvd
Modesto, CA 95353-1130

**Re: Notice of Preliminary Decision – ATC / Certificate of Conformity
District Facility # N-3386
Project # N-1162270**

Dear Mr. Seely:

Enclosed for your review is the District's analysis of an application for Authorities to Construct for the facility identified above. You requested that Certificates of Conformity with the procedural requirements of 40 CFR Part 70 be issued with this project. This project authorizes the installation of 10 new wine storage tanks.

After addressing all comments made during the 30-day public notice and the 45-day EPA comment periods, the District intends to issue the Authorities to Construct with Certificates of Conformity. Please submit your comments within the 30-day public comment period, as specified in the enclosed public notice. 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. Nick Peirce, Permit Services Manager, at (209) 557-6400.

Thank you for your cooperation in this matter.

Sincerely,



Arnaud Marjollet
Director of Permit Services

Enclosures

cc: Tung Le, CARB (w/enclosure) via email
cc: Gerardo C. Rios, EPA (w/enclosure) via email

Seyed Sadredin
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San Joaquin Valley Air Pollution Control District
Authority to Construct Application Review
Installation of 10 Wine Storage Tanks

Facility Name:	E & J Gallo Winery	Date:	January 04, 2017
Mailing Address:	600 Yosemite Blvd Modesto, CA 95354	Engineer:	Rupi Gill
Contact Person:	Todd Seely	Lead Engineer:	Nick Peirce
Telephone:	209-341-8779		
Fax:	209-236-7630		
E-Mail:	Todd.seely@ejgallo.com		
Application #(s):	N-3386-512-0 through -521-0		
Project #:	N-1162270		
Deemed Complete:	August 15, 2016		

I. Proposal

E & J Gallo Winery has requested Authority to Construct (ATC) permits for the installation of 10 new wine storage tanks. These tanks will be used strictly for wine storage operations.

E & J Gallo Winery received their Title V Permit for this stationary source on March 19, 2015. This modification can be classified as a Title V significant modification pursuant to Rule 2520, Sections 3.20 and 3.29, 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 Authorities to Construct. E & J Gallo Winery must apply to administratively amend their Title V Operating Permit to include the requirements of the ATC's issued with this project.

II. Applicable Rules

District Rule 2201	New and Modified Stationary Source Review Rule (2/18/16)
District Rule 2520	Federally Mandated Operating Permits (6/21/01)
District Rule 4001	New Source Performance Standards (4/14/99)
District Rule 4002	National Emissions Standards for Hazardous Air Pollutants (5/20/04)
District Rule 4101	Visible Emissions (2/17/05)
District Rule 4102	Nuisance (12/17/92)
District Rule 4623	Storage of Organic Liquids (5/19/05)
District Rule 4694	Wine Fermentation and Storage Tanks (12/15/05)
District Rule 4695	Brandy Aging and Wine Aging Operation (09/17/09)
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 600 Yosemite Blvd in Modesto, 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.

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. Tanks can potentially operate in either: (1) a fermentation operation during which the tank is vented directly to the atmosphere to release the evolved CO₂ byproduct from the fermentation reaction; (2) a storage operation during which the tank is closed to minimize contact with air and refrigerated to preserve the wine; (3) or both fermentation and storage operations. 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.

The proposed new tanks in this project consist solely of wine storage tanks.

V. Equipment Listing

E & J Gallo Winery is proposing to install 10 identical new winery tanks. The facility has also requested that each tank equipment description contain a unique identifier number.

N-3386-512-0 through -521-0: 20,500 GALLON NOMINAL STAINLESS STEEL WINE STORAGE TANK (TANK I.D X) EQUIPPED WITH INSULATION AND PRESSURE/VACUUM RELIEF VALVE

In addition, per District practice, for new winery tank installations, the nominal tank size and dimensions are included on the ATC provided by the applicant. Upon completion of construction, E & J Gallo Winery will perform an actual tank capacity measurement on each tank which will establish the as built gauge rating of each tank. The equipment description of

the Permit to Operate will then be administratively updated with the gauge rating of each tank. The following condition (typical condition shown for these identical tanks) will be included on the each ATC to assure continued compliance:

- The nominal tank dimensions are 9.25 feet in diameter and 40 feet in height with a proposed volume of 20,500 gallons. The permittee shall submit to the District the gauge volume of the tank within 30 days of the actual tank capacity measurement. [District Rule 2201]

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.

VII. General Calculations

A. Assumptions

- The proposed tanks will only be used for red and white wine storage.
- Typically, for enclosed tanks with insulation (or equivalent) and P/V valves, breathing losses from storage of wine are assumed to be negligible.
- Storage tank daily and annual maximum ethanol content of stored wine is 21% (proposed by the applicant)
- The storage tank throughput rates listed in the following table were proposed by E & J Gallo Winery for this project:

Permits	Nominal Tank Size (gallons)	Daily Throughput (gal/day)	Annual Throughput (gal/year)
N-3386-512-0	20,500	20,500	7,300,000
N-3386-513-0	20,500	20,500	7,300,000
N-3386-514-0	20,500	20,500	7,300,000
N-3386-515-0	20,500	20,500	7,300,000
N-3386-516-0	20,500	20,500	7,300,000
N-3386-517-0	20,500	20,500	7,300,000
N-3386-518-0	20,500	20,500	7,300,000
N-3386-519-0	20,500	20,500	7,300,000
N-3386-520-0	20,500	20,500	7,300,000
N-3386-521-0	20,500	20,500	7,300,000

B. Emission Factors

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

Per District practice (see Appendix B), the emission estimates provided by the Tanks 4.0 model represents the combined loss of ethanol (VOC) and water from each tank. To calculate the ethanol (VOC) portion of the emissions, it is first necessary to determine the molar fraction of ethanol (y_a) in the vapor emissions from the tank. This can be calculated from the average molecular weight (AMW) of the vapor as listed on page 2 of the Tanks 4.0 runs in Appendix A. Per the definition of AMW for a binary mixture:

$$AMW = y_a \times MW_a + (1-y_a) \times MW_w$$

Solving for the molar fraction of ethanol,

$$y_a = \frac{AMW - MW_w}{MW_a - MW_w}$$

Where,

AMW_{21% volume ethanol content} = 29.2474 lb/mole (daily basis)
 AMW_{21% volume ethanol content} = 29.2474 lb/mole (annual basis)
 MW_a = Molecular weight of ethanol = 46.02 lb/mole
 MW_w = Molecular weight of water = 18.02 lb/mole

Therefore,

$$y_a = (29.2474 - 18.02)/(46.02 - 18.02) = 0.40 \text{ for 21\% ethanol mixture (daily basis)}$$

$$y_a = (29.2474 - 18.02)/(46.02 - 18.02) = 0.40 \text{ for 21\% ethanol mixture (annual basis)}$$

And the daily and annual emission rates can be determined using the following equations:

$$PE_{\text{daily}} = \frac{E_d}{AMW} * y_a * 46.02$$

$$PE_{\text{annual}} = \frac{E_a}{AMW} * y_a * 46.02$$

Where,

E_d = Daily Emission Rate from Tanks 4.0 Program
 E_a = Annual Emission Rate from Tanks 4.0 Program

Therefore, the daily and annual PE values will be determined using the following equations:

$$\text{Daily PE} = (\text{Tanks 4.0 Emission Rate} / 29.2474) * 0.40 * 46.02$$

Daily PE = Tanks 4.0 Emission Rate x 0.629

Annual PE = (Tanks 4.0 Emission Rate / 29.2474) * 0.40 * 46.02

Annual PE = Tanks 4.0 Emission Rate * 0.629

C. Calculations

1. Pre-Project Potential to Emit (PE1)

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

2. Post Project Potential to Emit (PE2)

Two Tanks 4.0 runs have been performed. One using a daily throughput as listed in the table below 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 the annual throughput as listed in the table below to calculate the annual post-project potential to emit. See Appendix A for the Tanks 4.0 runs for each tank.

Daily PE2:

Daily Post-Project Potential to Emit				
Permits	Max Daily Throughput per Tank (gal/day)	Tanks 4.0 Daily PE2 per Tank (lb/day)	Adjustment for Water Vapor Emissions	Total Daily PE2 per Tank (lb/day)
N-3386-512-0	20,500	10.3	0.629	6.5
N-3386-513-0	20,500	10.3	0.629	6.5
N-3386-514-0	20,500	10.3	0.629	6.5
N-3386-515-0	20,500	10.3	0.629	6.5
N-3386-516-0	20,500	10.3	0.629	6.5
N-3386-517-0	20,500	10.3	0.629	6.5
N-3386-518-0	20,500	10.3	0.629	6.5
N-3386-519-0	20,500	10.3	0.629	6.5
N-3386-520-0	20,500	10.3	0.629	6.5
N-3386-521-0	20,500	10.3	0.629	6.5

Annual PE2:

Daily Post-Project Potential to Emit				
Permits	Max Annual Throughput per Tank (gal/yr)	Tanks 4.0 Daily PE2 per Tank (lb/yr)	Adjustment for Water Vapor Emissions	Total Daily PE2 per Tank (lb/yr)
N-3386-512-0	7,300,000	535	0.629	337
N-3386-513-0	7,300,000	535	0.629	337
N-3386-514-0	7,300,000	535	0.629	337
N-3386-515-0	7,300,000	535	0.629	337
N-3386-516-0	7,300,000	535	0.629	337
N-3386-517-0	7,300,000	535	0.629	337
N-3386-518-0	7,300,000	535	0.629	337
N-3386-519-0	7,300,000	535	0.629	337
N-3386-520-0	7,300,000	535	0.629	337
N-3386-521-0	7,300,000	535	0.629	337
Total Project				3,370

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

The SSPE1 can be calculated by adding the PE1 from all units with valid ATCs or PTOs and the sum of the ERCs that have been banked at the source and which have not been used on-site (Total_{ERC}).

$$SSPE1_{Total} = SSPE1_{Permit Unit} + Total_{ERC}$$

SSPE1 is from most recent project N-1153671 and adding PE1 from most recent In-house PTO project N-1162276 (see Appendix F).

SSPE1 (lb/year)					
Permit Unit/ERC	NO _x	SO _x	PM ₁₀	CO	VOC
SSPE _{N-1153671 w/o ERC}	16,370	980	73,006	56,259	354,741
N-3386-508-0	0	0	0	0	737
N-3386-509-0	0	0	0	0	737
N-3386-510-0	0	0	0	0	737
N-3386-511-0	0	0	0	0	22,187
SSPE _{1 w/o ERC}	16,370	980	73,006	56,259	379,139
ERC N-260-3	0	0	0	783	0
ERC N-849-2	125	0	0	0	0
SSPE1	16,495	980	73,006	57,042	379,139

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

Pursuant to District Rule 2201, the SSPE2 is the PE from all units with valid ATCs or PTOs at the Stationary Source and the quantity of ERCs which have been banked since September 19, 1991 for AER that have occurred at the source, and which have not been used on-site.

The SSPE2 can be calculated by adding the PE2 from all units with valid ATCs or PTOs and the sum of the ERCs that have been banked at the source and which have not been used on-site (Total_{ERC}).

$$SSPE2_{Total} = SSPE2_{Permit\ Unit} + Total_{ERC}$$

SSPE2 (lb/year)					
Permit Unit/ERC	NO _x	SO _x	PM ₁₀	CO	VOC
SSPE1 <i>w/o</i> ERC	16,370	980	73,006	56,259	379,139
ATCs N-3386-512 thru -521 (new tanks)	0	0	0	0	3,370
SSPE2 <i>w/o</i> ERC	16,370	980	73,006	56,259	382,509
ERC N-260-3	0	0	0	783	0
ERC N-849-2	125	0	0	0	0
SSPE2	16,495	980	73,006	57,042	382,509

5. Major Source Determination

Rule 2201 Major Source Determination:

Pursuant to District Rule 2201, a Major Source is a stationary source with a SSPE2 equal to or exceeding one or more of the following threshold values. For the purposes of determining major source status the following shall not be included:

- any ERCs associated with the stationary source
- Emissions from non-road IC engines (i.e. IC engines at a particular site at the facility for less than 12 months)
- Fugitive emissions, except for the specific source categories specified in 40 CFR 51.165

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.

Rule 2410 Major Source Determination:

The facility or the equipment evaluated under this project is not listed as one of the categories specified in 40 CFR 52.21 (b)(1)(iii). Therefore the PSD Major Source threshold is 250 tpy for any regulated NSR pollutant.

PSD Major Source Determination (tons/year)						
	NO₂	VOC	SO₂	CO	PM	PM₁₀
Estimated Facility PE before Project Increase	8.2	189.6	0.5	28	36.5	36.5
PSD Major Source Thresholds	250	250	250	250	250	250
PSD Major Source ? (Y/N)	N	N	N	N	N	N

As shown above, the facility is not an existing PSD major source for any regulated NSR pollutant expected to be emitted at this facility.

6. Baseline Emissions (BE)

The BE calculation (in lb/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 District Rule 2201, BE = PE1 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 District Rule 2201.

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."

Since this facility is a major source for VOC, the project's PE2 is compared to the SB 288 Major Modification Thresholds in the following table in order to determine if the SB 288 Major Modification calculation is required.

SB 288 Major Modification Thresholds			
Pollutant	Project PE2 (lb/year)	Threshold (lb/year)	SB 288 Major Modification Calculation Required?
NO _x	0	50,000	No
SO _x	0	80,000	No
PM ₁₀	0	30,000	No
VOC	3,370	50,000	No

Since none of the SB 288 Major Modification Thresholds are surpassed with this project, this project does not constitute an SB 288 Major Modification.

8. Federal Major Modification

District Rule 2201 states that a Federal Major Modification is the same as a "Major Modification" as defined in 40 CFR 51.165 and part D of Title I of the CAA.

The determination of Federal Major Modification is based on a two-step test. For the first step, only the emission *increases* are counted. Emission decreases may not cancel out the increases for this determination.

Step 1

For new emissions units, the increase in emissions is equal to the PE2 for each new unit included in this project.

Federal Major Modification Thresholds for Emission Increases			
Pollutant	Total Emissions Increases (lb/yr)	Thresholds (lb/yr)	Federal Major Modification?
NO _x *	0	0	No
VOC*	3,370	0	Yes
PM ₁₀	0	30,000	No
PM _{2.5}	0	20,000	No
SO _x	0	80,000	No

*If there is any emission increases in NO_x or VOC, this project is a Federal Major Modification and no further analysis is required.

Since there is an increase in VOC emissions, this project constitutes a Federal Major Modification. Federal Offset quantities are calculated below.

Federal Offset Quantities:

The Federal offset quantity is only calculated only for the pollutants for which the project is a Federal Major Modification. The Federal offset quantity is the sum of the annual emission changes for all new and modified emission units in a project calculated as the potential to emit after the modification (PE2) minus the actual emissions (AE) during the baseline period for each emission unit times the applicable federal offset ratio. As shown above, this project triggers a Federal Major Modification for VOC emissions. Therefore, the federal offsets required for VOC emissions for this project are as follows:

VOC	Federal Offset Ratio		1.5
Permit No.	Actual Emissions (lb/year)	Potential Emissions (lb/year)	Emissions Change (lb/yr)
N-3386-512-0 thru -521-0 (per tanks)	0	337	337
Net Emission Change per tank (lb/year):			337
Federal Offset Quantity per tank: (NEC * 1.5)			506
Federal Offset Quantity for all tanks: (NEC * 1.5)			5060

9. Rule 2410 – Prevention of Significant Deterioration (PSD) Applicability Determination

Rule 2410 applies to any pollutant regulated under the Clean Air Act, except those for which the District has been classified nonattainment. The pollutants which must be addressed in the PSD applicability determination for sources located in the SJV and which are emitted in this project are: (See 52.21 (b) (23) definition of significant)

- NO2 (as a primary pollutant)
- SO2 (as a primary pollutant)
- CO
- PM
- PM10

I. Project Emission Increase – Significance Determination

a. Evaluation of Calculated Post-project Potential to Emit for New or Modified Emissions Units vs PSD Significant Emission Increase Thresholds

As a screening tool, the post-project potential to emit from all new and modified units is compared to the PSD significant emission increase thresholds, and if the total potentials

to emit from all new and modified units are below the applicable thresholds, no further PSD analysis is needed.

PSD Significant Emission Increase Determination: Potential to Emit (tons/year)					
	NO₂	SO₂	CO	PM	PM₁₀
Total PE from New and Modified Units	0	0	0	0	0
PSD Significant Emission Increase Thresholds	40	40	100	25	15
PSD Significant Emission Increase?	N	N	N	N	N

As demonstrated above, because the post-project total potentials to emit from all new and modified emission units are below the PSD significant emission increase thresholds, this project is not subject to the requirements of Rule 2410 and no further discussion is required.

10. Quarterly Net Emissions Change (QNEC)

The QNEC is calculated solely to establish emissions that are used to complete the District's PAS emissions profile screen. Detailed QNEC calculations are included in Appendix E.

VIII. Compliance Determination

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. Unless specifically exempted by Rule 2201, BACT shall be required for the following actions*:

- 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 an SB 288 Major Modification or a Federal Major Modification, as defined by the rule.

*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

As seen in Section VII.C.2 above, the applicant is proposing to install ten new wine storage tanks with each having a PE greater than 2 lb/day for VOC. Therefore, BACT is triggered for VOC for the each storage tank.

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

As discussed in Section I above, there are no emissions units being relocated from one stationary source to another; therefore BACT is not triggered.

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. SB 288/Federal Major Modification

As discussed in Sections VII.C.7 and VII.C.8 above, this project does constitute a Federal Major Modification for VOC emissions. Therefore BACT is triggered for VOC for all emissions units in the project for which there is an emission increase.

2. BACT Guideline

BACT Guideline 5.4.13, applies to wine storage tanks. E & J Gallo Winery is proposing to install 10 new wine storage tanks. Therefore, BACT Guideline 5.4.13 is applicable to these new wine storage tanks (BACT Guideline 5.4.13 included in Appendix C).

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 (see Appendix C), BACT is satisfied with the following:

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

Each of the new wine storage tanks being installed within this project is equipped with insulation and a pressure/vacuum valve set to within 10% of the maximum allowable working pressure of the tank; operates in a gas-tight condition and the continuous

storage temperature does not exceed 75 degrees F within 60 days of the completion of the fermentation cycle. Therefore, the wine storage tanks meet the BACT requirements for this class and category of operation and no further discussion is required.

The following condition will be included on each ATC to assure compliance with the BACT requirements:

- 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]

B. Offsets

1. Offset Applicability

Offset requirements shall be triggered on a pollutant by pollutant basis and shall be required if the SSPE2 equals to or exceeds the offset threshold levels in Table 4-1 of Rule 2201. The SSPE2 is compared to the offset thresholds in the following table.

Offset Determination (lb/year)					
	NO _x	SO _x	PM ₁₀	CO	VOC
SSPE2	16,495	980	73,006	57,042	382,509
Offset Thresholds	20,000	54,750	29,200	200,000	20,000
Offsets triggered?	No	No	Yes*	No	Yes

*The offsets are trigger for PM10 but the proposed project does not involve any PM10 emissions.

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) = $(\sum[PE2 - BE] + ICCE) \times DOR$, 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

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

$$\text{Offsets Required (lb/year)} = \Sigma[\text{PE2} - \text{BE}] \times \text{DOR}$$

VOC Offsets Required for Wine Storage Tanks without DOR				
Permits	Annual PE2, per Tank (lb/yr)	Annual BE, each (lb/yr)	Offsets Required, per Tank (lb/yr)	Offsets Required for Tank Group (lb/yr)
N-3386-512-0	337	0	337	337
N-3386-513-0	337	0	337	337
N-3386-514-0	337	0	337	337
N-3386-515-0	337	0	337	337
N-3386-516-0	337	0	337	337
N-3386-517-0	337	0	337	337
N-3386-518-0	337	0	337	337
N-3386-519-0	337	0	337	337
N-3386-520-0	337	0	337	337
N-3386-521-0	337	0	337	337
Total Offsets Required without DOR:				3,370

In accordance with Rule 2201, Section 4.8.1, the DOR for NO_x and VOC offsets for projects that trigger federal major modifications shall be 1.5:1. As shown in Section VII.C.8, this project triggers a federal major modification for VOC emissions. Therefore, the DOR will be 1.5:1 and the total amount of VOC ERCs that need to be withdrawn for this project is:

Permits	Offsets Required, per Tank (lb/yr)	DOR	Total Offsets Required, per Tank (lb/yr)
N-3386-512-0	337	1.5	506
N-3386-513-0	337	1.5	506
N-3386-514-0	337	1.5	506
N-3386-515-0	337	1.5	506
N-3386-516-0	337	1.5	506
N-3386-517-0	337	1.5	506
N-3386-518-0	337	1.5	506
N-3386-519-0	337	1.5	506
N-3386-520-0	337	1.5	506
N-3386-521-0	337	1.5	506
Total Offsets Required with DOR:			5,060

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

$$\begin{aligned} \text{Quarterly offsets required (lb/qtr)} &= (506 \text{ lb NO}_x\text{/year}) \div (4 \text{ quarters/year}) \\ &= 126.5 \text{ lb/qtr} \end{aligned}$$

As shown in the calculation above, the quarterly amount of offsets required for this project, when evenly distributed to each quarter, results in fractional pounds of offsets being required each quarter. Since offsets are required to be withdrawn as whole pounds, the quarterly amounts of offsets need to be adjusted to ensure the quarterly values sum to the total annual amount of offsets required.

To adjust the quarterly amount of offsets required, the fractional amount of offsets required in each quarter will be summed and redistributed to each quarter based on the number of days in each quarter. The redistribution is based on the Quarter 1 having the fewest days and the Quarters 3 and 4 having the most days. The redistribution method is summarized in the following table:

Redistribution of Required Quarterly Offsets (where X is the annual amount of offsets, and $X + 4 = Y.z$)				
Value of z	Quarter 1	Quarter 2	Quarter 3	Quarter 4
.0	Y	Y	Y	Y
.25	Y	Y	Y	Y+1
.5	Y	Y	Y+1	Y+1
.75	Y	Y+1	Y+1	Y+1

Therefore the appropriate quarterly emissions to be offset for each tank are as follows:

Quarterly VOC Offsets Required for Each Wine Storage Tank				
Permits	Offsets Required, per Tank (lb/1 st qtr)	Offsets Required, per Tank (lb/2 nd qtr)	Offsets Required, per Tank (lb/3 rd qtr)	Offsets Required, per Tank (lb/4 th qtr)
N-3386-512-0 thru - 521-0	126	126	127	127

The applicant has stated that the facility plans to use ERC certificate S-4727-1 to offset the increases in VOC emissions associated with this project. The above certificate has available quarterly NO_x credits as follows:

	<u>1st Quarter</u>	<u>2nd Quarter</u>	<u>3rd Quarter</u>	<u>4th Quarter</u>
ERC #S-4727-1	48,335	48,335	48,335	48,335

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:

- {GC# 4447 - edited} Prior to operating equipment under this Authority to Construct, permittee shall surrender VOC emission reduction credits for the following quantity of emissions: 1st quarter - 126 lb, 2nd quarter - 126 lb, 3rd quarter - 127 lb, and fourth quarter - 127 lb. These amounts include the applicable offset ratio specified in Rule 2201 Section 4.8 (as amended 2/18/16). [District Rule 2201]
- {GC# 1983} ERC Certificate Number S-4727-1 (or a certificate split from this certificate) 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 SB 288 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,
- d. Any project with an SSIPE of greater than 20,000 lb/year for any pollutant, and/or
- e. Any project which results in a Title V significant permit modification

a. New Major Sources, Federal Major Modifications, and SB 288 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 Sections VII.C.7 and VII.C.8, this project triggers Federal Major Modification. Therefore, public noticing for Federal Major Modification purposes is required.

b. PE > 100 lb/day

Applications which include a new emissions unit with a PE greater than 100 pounds during any one day for any pollutant will trigger public noticing requirements. As seen in Section VII.C.2 above, this project does not include a new emissions unit which has daily emissions greater than 100 lb/day for any pollutant, therefore public noticing for PE > 100 lb/day purposes is not required.

c. Offset Threshold

The SSPE1 and SSPE2 are compared to the offset thresholds in the following table.

Offset Thresholds				
Pollutant	SSPE1 (lb/year)	SSPE2 (lb/year)	Offset Threshold	Public Notice Required?
NO _x	16,495	16,495	20,000 lb/year	No
SO _x	980	980	54,750 lb/year	No
PM ₁₀	73,006	73,006	29,200 lb/year	No
CO	57,042	57,042	200,000 lb/year	No
VOC	379,139	382,509	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 SSIPE of more than 20,000 lb/year of any affected pollutant. According to District policy, the SSIPE = SSPE2 – SSPE1. The SSIPE is compared to the SSIPE Public Notice thresholds in the following table.

SSIPE Public Notice Thresholds					
Pollutant	SSPE2 (lb/year)	SSPE1 (lb/year)	SSIPE (lb/year)	SSIPE Public Notice Threshold	Public Notice Required?
NO _x	16,495	16,495	0	20,000 lb/year	No
SO _x	980	980	0	20,000 lb/year	No
PM ₁₀	73,006	73,006	0	20,000 lb/year	No
CO	57,042	57,042	0	20,000 lb/year	No
VOC	382,509	379,139	3,370	20,000 lb/year	No

e. Title V Significant Permit Modification

As shown in the Discussion of Rule 2520 below, this project constitutes a Title V significant modification. Therefore, public noticing for Title V significant modifications is required for this project.

2. Public Notice Action

As discussed above, public noticing is required for this project for triggering a federal Major Modification for VOC emissions and Title V Significant Permit Modification. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be published in the local newspaper of general circulation prior to the issuance of the ATC's for these winery tank modifications.

D. Daily Emission Limits (DELs)

DELs and other enforceable conditions are required by Rule 2201 to restrict a unit's maximum daily emissions, to a level at or below the emissions associated with the maximum design capacity. 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:

For the proposed wine storage tank emissions units in this project, the DEL is enforced with the following conditions:

- The weighted annual average ethanol content of wine stored in this tank, calculated on a rolling 12-month basis, shall not exceed 21 percent by volume. [District Rule 2201]
- 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]
- If the throughput or ethanol content calculated for any rolling 12-month period exceeds the annual throughput or ethanol content limitations of this permit, in a crush season in which the start of the crush season (defined as the day on which the facility's seasonal crushing/fermentation operations commence) occurs less than 365 days after the start of the previous crush season, then no violation of the throughput or ethanol content limits for that rolling 12-month period will be deemed to have occurred so long as the calendar year throughput and ethanol content are below the annual throughput and ethanol content limitations. [District Rule 2201]

The following typical daily throughput condition will be included on each of wine storage tank ATCs.

N-3386-512 through -521 (20,500 gallon storage tanks):

- The maximum wine storage throughput in this tank shall not exceed 20,500 gallons per day. [District Rule 2201]

In addition, in order for the applicant to be able to demonstrate ongoing compliance with the proposed annual throughput limit for each tank, the following condition will be included on each group of wine storage tank ATCs:

- The maximum wine storage emissions in this tank, calculated on a rolling 12-month basis, shall not exceed 337 lb-VOC/year (equivalent to 7,300,000 gallons of wine throughput per year). [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 offset, public notification and daily emission limit requirements of Rule 2201. The following condition(s) are listed on the permit to operate:

- The operator shall maintain records of the calculated rolling 12-month wine ethanol content and storage throughput rate (ethanol percentage by volume and gallons per rolling 12-month period, calculated monthly). [District Rule 2201]
- 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]
- Records shall be maintained that demonstrate the date of each year's start of crush season. [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 (AAQA)

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 only involves VOC emissions 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 project does constitute a Federal Major Modification, therefore this requirement is applicable. E & J Gallo Winery's statewide compliance certification is included in Appendix D.

H. Alternate Siting Analysis

District Rule 2201, Section 4.15.1 requires an alternative siting analysis for any project which constitutes a New Major Source or a Federal Major Modification. As shown above, this project triggers a Federal Major Modification. Therefore, an alternative siting analysis must be performed.

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 the installation of 10 new wine storage tanks, it represents 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 2410 Prevention of Significant Deterioration

As shown in Section VII.C.9 above, this project does not result in a new PSD major source or PSD major modification. No further discussion is required.

Rule 2520 Federally Mandated Operating Permits

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

As discussed above, the facility has applied for a Certificate of Conformity (COC); 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.

The following permit conditions will be added to the permits to ensure compliance with this rule:

- {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]
- {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]

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 storage tank operations. Therefore, no further discussion is required.

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 storage tank operations. Therefore, no further discussion is required.

Rule 4101 Visible Emissions

Rule 4101 states that no person shall discharge into the atmosphere emissions of any air contaminant aggregating more than 3 minutes in any hour which is as dark as or darker than Ringelmann 1 (or 20% opacity). Visible emissions are not expected as a result of these wine

storage operations. Therefore, compliance with this rule is expected. Compliance with the requirements of this rule is assured by the following condition, currently included as condition 22 on E & J Gallo Winery's facility wide permit N-3386-0-4:

- No air contaminants shall be discharged into the atmosphere for a period or periods aggregating more than 3 minutes in any one hour which is as dark or darker than Ringelmann #1 or equivalent to 20% opacity and greater, unless specifically exempted by District Rule 4101 (2/17/05). If the equipment or operation is subject to a more stringent visible emission standard as prescribed in a permit condition, the more stringent visible emission limit shall supersede this condition. [District Rule 4101]

Rule 4102 Nuisance

Section 4.0 prohibits discharge of air contaminants, which could cause injury, detriment, nuisance or annoyance to the public. Public nuisance conditions are not expected as a result of these operations, provided the equipment is well maintained. Therefore, compliance with this rule is expected. Compliance with the requirements of this rule is ensured by the following condition, currently included as condition 41 on E & J Gallo Winery's facility wide permit N-3386-0-4:

- 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.

VOC emissions, as ethanol, is the only pollutant generated by wine storage tanks. 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 and a health risk assessment is not necessary. No further risk analysis is required.

Rule 4623 Storage of Organic Liquids

The purpose of this rule is to limit volatile organic compound (VOC) emissions from the storage of organic liquids. This rule applies to any tank with a capacity of 1,100 gallons or greater in which any organic liquid is placed, held, or stored.

However, Section 4.1.4 provides an exemption for tanks used to store fermentation products, byproducts or spirits. The tanks in this project are used solely for the fermentation and storage of wine.

Therefore, the requirements of this rule are not applicable to any of the winery tanks within this project.

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). Since the proposed stainless steel tanks will be used for storage only, this section is not applicable; therefore, no further discussion is required.

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,
- The pressure-vacuum relief valve shall be permanently labeled with the operating pressure settings, and
- 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 \geq 5,000 gallons in capacity and used for storage to assure 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]
- 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]

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 \geq 5,000 gallons in capacity and used for storage (permit units N-3386-512-0 through -521-0) 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]

Every three years, Section 6.1 and 6.2 require facilities with fermentation operations to submit a Three-Year Compliance Plan and a Three-Year Compliance Plan Verification respectively. The proposed tanks in this project are for wine storage only, and since these sections are not applicable to wine storage operations, no further discussion is required.

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]

Section 6.4.1 requires that records be kept for each fermentation batch. These tanks are not fermenters; therefore this section does not apply.

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]

Section 6.4.3 requires that all monitoring be performed for any CERs as identified in the facility's Three-Year Compliance Plan and that the records of all monitoring be maintained. Since this requirement is for operators mitigation fermentation emission and the proposed tanks are only for wine storage operations, this section is not applicable to wine tanks in this project. Therefore, no further discussion is required.

Rule 4695 Brandy Aging and Wine Aging Operations

The purpose of this rule is to reduce emissions of volatile organic compounds (VOC) and apply to brandy aging and wine aging operations.

Section 4.2 states that this rule shall not apply to wine storage tanks subject to Rule 4694 (Wine Fermentation and Storage Tanks) Section 5.2. As stated above the proposed tanks are subject to Rule 4694, Section 5.2., therefore these tanks are exempt from the requirements of this rule.

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)

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 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 is the Lead Agency for this project because there is no other agency with broader statutory authority over this project. The District performed an Engineering Evaluation (this document) for the proposed project and determined that the activity will occur at an existing facility and the project involves negligible expansion of the existing use. Furthermore, the District determined that the activity will not have a significant effect on the environment. The District finds that the activity is categorically exempt from the provisions of CEQA pursuant to CEQA Guideline § 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)).

Indemnification Agreement/Letter of Credit Determination

According to District Policy APR 2010 (CEQA Implementation Policy), when the District is the Lead or Responsible Agency for CEQA purposes, an indemnification agreement and/or a letter of credit may be required. The decision to require an indemnity agreement and/or a letter of credit is based on a case-by-case analysis of a particular project's potential for litigation risk, which in turn may be based on a project's potential to generate public concern, its potential for significant impacts, and the project proponent's ability to pay for the costs of litigation without a letter of credit, among other factors.

The criteria pollutant emissions and toxic air contaminant emissions associated with the proposed project are not significant, and there is minimal potential for public concern for this particular type of facility/operation. Therefore, an Indemnification Agreement and/or

a Letter of Credit will not be required for this project in the absence of expressed public concern.

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful NSR Public Noticing period, issue ATCs N-3386-512-0 through -521-0 subject to the permit conditions on the attached draft ATCs in **Appendix G**.

X. Billing Information

Annual Permit Fees			
Permit Number	Fee Schedule	Fee Description	Annual Fee
N-3386-512-0 through '521	3020-05-C	20,500 gallon	\$149.00

Appendixes

- A: Tanks 4.0 Calculations
- B: FYI-295 – Modeling of Emissions for Wine and Distilled Spirits Storage Tanks Using Tanks 4.0d
- C: BACT Guideline 5.4.13 and Top Down VOC BACT Analysis for Wine Storage Tanks
- D: E & J Gallo Winery Statewide Compliance Certification
- E: Quarterly Net Emissions Change (QNEC) Calculations
- F: SSPE1 Information
- G: Draft ATC's

APPENDIX A

TANKS 4.0 Calculations

Daily Calculations

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

Identification

User Identification: N-3386-512-0 TO -521-0
 City: Modesto
 State: California
 Company: E & J Gallo
 Type of Tank: Vertical Fixed Roof Tank
 Description: 20,500 Gallon Wine Storage Tank

Tank Dimensions

Shell Height (ft): 40.00
 Diameter (ft): 9.25
 Liquid Height (ft): 40.00
 Avg. Liquid Height (ft): 40.00
 Volume (gallons): 20,500.00
 Turnovers: 31.00
 Net Throughput(gal/yr): 635,500.00
 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): 1.66
 Slope (ft/ft) (Cone Roof): 0.65

Breather Vent Settings

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

Meteorological Data used in Emissions Calculations: Stockton, California (Avg Atmospheric Pressure = 14.72 psia)

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

N-3386-512-0 TO -521-0 - Vertical Fixed Roof Tank
Modesto, California

Mixture/Component	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
	Avg.	Min.	Max.		Avg.	Min.	Max.					
Wine 21.0 % Vol Alcohol	77.30	77.30	77.30	77.30	0.7237	0.7237	0.7237	29.2474			20.11	Option 1: VP70 = .55917 VP80 = .78451

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

N-3386-512-0 TO -521-0 - Vertical Fixed Roof Tank Modesto, California

Month	January	February	March	April	May	June	July	August	September	October	November	December
Storage Losses (lb):							0.0000					
Vapor Space Volume (cu ft):							37.1843					
Vapor Density (lb/cu ft):							0.0037					
Vapor Space Expansion Factor:							0.0090					
Vented Vapor Saturation Factor:							0.9792					
Tank Vapor Space Volume							37.1843					
Vapor Space Volume (cu ft):							9.2500					
Tank Diameter (ft):							0.5533					
Vapor Space Outage (ft):							40.0000					
Tank Shell Height (ft):							40.0000					
Average Liquid Height (ft):							0.5533					
Roof Outage (ft):							0.5533					
Roof Outage (Cone Roof)							0.5533					
Roof Height (ft):							1.6600					
Roof Slope (ft/ft):							0.6500					
Shell Radius (ft):							4.6250					
Vapor Density							0.0037					
Vapor Density (lb/cu ft):							29.2474					
Vapor Molecular Weight (lb/lb-mole):							0.7237					
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							536.9700					
Daily Avg. Liquid Surface Temp. (deg. R):							77.6500					
Daily Average Ambient Temp. (deg. F):							10.731					
Ideal Gas Constant R (psia cu ft / lb-mol-deg R):							536.9700					
Liquid Bulk Temperature (deg. R):							0.1700					
Tank Paint Solar Absorptance (Shell):							0.1700					
Tank Paint Solar Absorptance (Roof):							2.686.0000					
Daily Total Solar Insulation Factor (Btu/sqft day):							0.0000					
Vapor Space Expansion Factor:							0.0000					
Daily Vapor Temperature Range (deg. R):							0.0000					
Daily Vapor Pressure Range (psia):							0.0000					
Breather Vent Press. Setting Range (psia):							0.0000					
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.7237					
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):							0.7237					
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):							536.9700					
Daily Avg. Liquid Surface Temp. (deg. R):							536.9700					
Daily Min. Liquid Surface Temp. (deg. R):							536.9700					
Daily Max. Liquid Surface Temp. (deg. R):							33.5000					
Daily Ambient Temp. Range (deg. R):							0.9792					
Vented Vapor Saturation Factor							0.7237					
Vented Vapor Saturation Factor:							0.5533					
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):												
Vapor Space Outage (ft):												

Working Losses (lb)	320,2530
Vapor Molecular Weight (lb/lb-mole)	29,2474
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	0,7237
Net Throughput (gallons)	635,500,0000
Annual Turnovers	31,0000
Turnover Factor	1,0000
Maximum Liquid Volume (gal)	20,500,0000
Maximum Liquid Height (ft)	40,0000
Tank Diameter (ft)	9,2500
Working Loss Product Factor	1,0000
Total Losses (lb)	320,2530

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

Emissions Report for: July

N-3386-512-0 TO -521-0 - Vertical Fixed Roof Tank
Modesto, California

Components	Losses(lbs)		Total Emissions
	Working Loss	Breathing Loss	
Wine 21.0 % Vol Alcohol	320.25	0.00	320.25

Annual Calculations

TANKS 4.0.9d

Emissions Report - Detail Format

Tank Identification and Physical Characteristics

Identification

User Identification: 20.5 K Tanks (Annual Emissions)
 City: Modesto
 State: California
 Company: E & J Gallo
 Type of Tank: Vertical Fixed Roof Tank
 Description: N-3386-512 TO -521-0, N1162270, Stainless steel, insulated, wine storage tank. Cone top with PRV valve. A total of 10 tanks. ID 221 thru 230

Tank Dimensions

Shell Height (ft): 40.00
 Diameter (ft): 9.25
 Liquid Height (ft) : 40.00
 Avg. Liquid Height (ft): 40.00
 Volume (gallons): 20,500.00
 Turnovers: 356.10
 Net Throughput(gal/yr): 7,300,000.00
 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) 1.65
 Slope (ft/ft) (Cone Roof) 0.65

Breather Vent Settings

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

Meteorological Data used in Emissions Calculations: Stockton, California (Avg Atmospheric Pressure = 14.72 psia)

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

20.5 K Tanks (Annual Emissions) - Vertical Fixed Roof Tank
Modesto, California

Mixture/Component	Month	Daily Liquid Surf Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Wine 21.0 % Vol Alcohol	Jan	61.60	61.60	61.60	61.60	0.4196	0.4196	0.4196	29.2474	0.4196	29.2474	20.11	Option 1: VP60 = .39305 VP70 = .55917
Wine 21.0 % Vol Alcohol	Feb	61.60	61.60	61.60	61.60	0.4196	0.4196	0.4196	29.2474	0.4196	29.2474	20.11	Option 1: VP60 = .39305 VP70 = .55917
Wine 21.0 % Vol Alcohol	Mar	61.60	61.60	61.60	61.60	0.4196	0.4196	0.4196	29.2474	0.4196	29.2474	20.11	Option 1: VP60 = .39305 VP70 = .55917
Wine 21.0 % Vol Alcohol	Apr	61.60	61.60	61.60	61.60	0.4196	0.4196	0.4196	29.2474	0.4196	29.2474	20.11	Option 1: VP60 = .39305 VP70 = .55917
Wine 21.0 % Vol Alcohol	May	61.60	61.60	61.60	61.60	0.4196	0.4196	0.4196	29.2474	0.4196	29.2474	20.11	Option 1: VP60 = .39305 VP70 = .55917
Wine 21.0 % Vol Alcohol	Jun	61.60	61.60	61.60	61.60	0.4196	0.4196	0.4196	29.2474	0.4196	29.2474	20.11	Option 1: VP60 = .39305 VP70 = .55917
Wine 21.0 % Vol Alcohol	Jul	61.60	61.60	61.60	61.60	0.4196	0.4196	0.4196	29.2474	0.4196	29.2474	20.11	Option 1: VP60 = .39305 VP70 = .55917
Wine 21.0 % Vol Alcohol	Aug	61.60	61.60	61.60	61.60	0.4196	0.4196	0.4196	29.2474	0.4196	29.2474	20.11	Option 1: VP60 = .39305 VP70 = .55917
Wine 21.0 % Vol Alcohol	Sep	61.60	61.60	61.60	61.60	0.4196	0.4196	0.4196	29.2474	0.4196	29.2474	20.11	Option 1: VP60 = .39305 VP70 = .55917
Wine 21.0 % Vol Alcohol	Oct	61.60	61.60	61.60	61.60	0.4196	0.4196	0.4196	29.2474	0.4196	29.2474	20.11	Option 1: VP60 = .39305 VP70 = .55917
Wine 21.0 % Vol Alcohol	Nov	61.60	61.60	61.60	61.60	0.4196	0.4196	0.4196	29.2474	0.4196	29.2474	20.11	Option 1: VP60 = .39305 VP70 = .55917
Wine 21.0 % Vol Alcohol	Dec	61.60	61.60	61.60	61.60	0.4196	0.4196	0.4196	29.2474	0.4196	29.2474	20.11	Option 1: VP60 = .39305 VP70 = .55917

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

20.5 K Tanks (Annual Emissions) - Vertical Fixed Roof Tank Modesto, 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)	36.9603	36.9603	36.9603	36.9603	36.9603	36.9603	36.9603	36.9603	36.9603	36.9603	36.9603	36.9603
Vapor Density (lb/cu ft)	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022
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
Vertical Vapor Saturation Factor	0.9879	0.9879	0.9879	0.9879	0.9879	0.9879	0.9879	0.9879	0.9879	0.9879	0.9879	0.9879
Tank Vapor Space Volume	36.9603	36.9603	36.9603	36.9603	36.9603	36.9603	36.9603	36.9603	36.9603	36.9603	36.9603	36.9603
Vapor Space Volume (cu ft)	9.2500	9.2500	9.2500	9.2500	9.2500	9.2500	9.2500	9.2500	9.2500	9.2500	9.2500	9.2500
Tank Diameter (ft)	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
Vapor Space Outage (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 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)	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
Roof Outage (ft)	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
Roof Outage (Cone Roof)	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
Roof Height (ft)	1.6500	1.6500	1.6500	1.6500	1.6500	1.6500	1.6500	1.6500	1.6500	1.6500	1.6500	1.6500
Roof Slope (ft/ft)	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500
Shell Radius (ft)	4.6250	4.6250	4.6250	4.6250	4.6250	4.6250	4.6250	4.6250	4.6250	4.6250	4.6250	4.6250
Vapor Density	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022
Vapor Molecular Weight (lbib-mole)	29.2474	29.2474	29.2474	29.2474	29.2474	29.2474	29.2474	29.2474	29.2474	29.2474	29.2474	29.2474
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196
Vapor Pressure at Daily Average Liquid Surface Temperature (deg. R)	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700
Daily Avg. Liquid Surface Temp. (deg. R)	45.0000	50.5000	54.0500	59.5000	66.7000	73.5000	77.6500	79.8000	72.7000	64.5500	53.0500	44.9500
Daily Average Ambient Temp. (deg. F)	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731
Ideal Gas Constant R (psia-cuft/(lb-mole-deg R))	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700
Liquid Bulk Temperature (deg. R)	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 Absorbance (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 Absorbance (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)	557.0000	939.0000	1,458.0000	2,004.0000	2,435.0000	2,694.0000	2,688.0000	2,368.0000	1,907.0000	1,315.0000	782.0000	538.0000
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)	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia)	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia)	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700
Daily Avg. Liquid Surface Temp. (deg. R)	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700
Daily Min. Liquid Surface Temp. (deg. R)	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700
Daily Max. Liquid Surface Temp. (deg. R)	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700	521.2700
Daily Ambient Temp. Range (deg. R)	16.0000	20.4000	22.9000	27.2000	29.8000	31.6000	33.5000	32.2000	30.4000	27.3000	20.7000	15.7000
Vertical Vapor Saturation Factor	0.9879	0.9879	0.9879	0.9879	0.9879	0.9879	0.9879	0.9879	0.9879	0.9879	0.9879	0.9879
Vertical Vapor Saturation Factor	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500	0.5500
Vapor Space Outage (ft)												

Working Losses (lb):
 Vapor Molecular Weight (lb/lb-mole):
 Vapor Pressure at Daily Average Liquid
 Surface Temperature (psia):
 Net Throughput (gal/mo)
 Annual Turnovers:
 Turnover Factor:
 Maximum Liquid Volume (gal):
 Tank Diameter (ft):
 Working Loss Product Factor:

44.6035	44.6035	44.6035	44.6035	44.6035	44.6035	44.6035	44.6035	44.6035	44.6035	44.6035	44.6035	44.6035	44.6035
29.2474	29.2474	29.2474	29.2474	29.2474	29.2474	29.2474	29.2474	29.2474	29.2474	29.2474	29.2474	29.2474	29.2474
0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196	0.4196
608.333.3333	608.333.3333	608.333.3333	608.333.3333	608.333.3333	608.333.3333	608.333.3333	608.333.3333	608.333.3333	608.333.3333	608.333.3333	608.333.3333	608.333.3333	608.333.3333
356.0976	356.0976	356.0976	356.0976	356.0976	356.0976	356.0976	356.0976	356.0976	356.0976	356.0976	356.0976	356.0976	356.0976
0.2509	0.2509	0.2509	0.2509	0.2509	0.2509	0.2509	0.2509	0.2509	0.2509	0.2509	0.2509	0.2509	0.2509
20,500.0000	20,500.0000	20,500.0000	20,500.0000	20,500.0000	20,500.0000	20,500.0000	20,500.0000	20,500.0000	20,500.0000	20,500.0000	20,500.0000	20,500.0000	20,500.0000
40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000
9.2500	9.2500	9.2500	9.2500	9.2500	9.2500	9.2500	9.2500	9.2500	9.2500	9.2500	9.2500	9.2500	9.2500
1.0000	1.0000	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):

44.6035	44.6035	44.6035	44.6035	44.6035	44.6035	44.6035	44.6035	44.6035	44.6035	44.6035	44.6035	44.6035	44.6035
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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

20.5 K Tanks (Annual Emissions) - Vertical Fixed Roof Tank
Modesto, California

Components	Losses (lbs)		Total Emissions
	Working Loss	Breathing Loss	
Wine 21.0 % Vol Alcohol	535.24	0.00	535.24

APPENDIX B

**FYI-295 – Modeling of Emissions for Wine and Distilled Spirits
Storage Tanks Using Tanks 4.0d**

**SAN JOAQUIN VALLEY UNIFIED
AIR POLLUTION CONTROL DISTRICT**

DATE: August 9, 2011 (Revised 6/12/12)
TO: Permit Services Staff
FROM: Dennis Roberts
SUBJECT: Modeling of Emissions for Wine and Distilled Spirits Storage Tanks Using Tanks 4.0d

I. OVERVIEW

Winery tank operations generally consist of two separate emissions units; 1) fermentation and 2) storage of wine and spirits. Any particular tank may be permitted to perform one or both of these operations. Emissions from storage operations are estimated by modeling the tank operation using U.S. EPA Tanks 4.0 software. Emissions from fermentation operations are estimated using emission factors which have been previously developed. The emissions from each emission unit are then appropriately combined to yield the Potential to Emit for the tank (permit unit).

This document provides guidance for using Tanks 4.0d for purposes of estimating VOC emissions from vertical fixed-roof tanks storing wine, distilled spirits or any other wine and ethanol mixture. Section III is an illustrative PE calculation for a new winery tank which is permitted for both fermentation and storage. Support documentation for methods is provided in the Appendices.

II. WINE AND SPIRITS STORAGE TANKS

Emissions estimates for wine and spirits storage tanks are based on modeling the tank operation using the EPA's Tanks 4.0d software. The modeling method utilizes Tanks 4.0 software along with a data base of ethanol/water vapor-equilibrium data developed by The Wine Institute.

Storage tanks perform several functions in the winery:

- Facilitation of post-fermentation processing operations for wine such as racking, filtration, malolactic fermentation and bottling. In this role, the typical storage tank is filled and emptied several times per year and functions as a process vessel.
- Storage of wine between processing operations up to the final operation of bottling. In this role, the tank is often static and the objective is to avoid degradation of the wine by both minimizing the wine temperature and the exposure of the wine to air.
- Storage of distilled ethanol. The material is often referred to as "high proof" and is used in blending operations to fortify wine products. Some facilities may operate a distillation operation to produce brandy and or high proof and the tanks are used to store the product prior to use or shipment.

- Fermentation: Storage tanks may also be used as fermentation tanks. If a storage tank is also used for fermentation operations the fermentation emissions must be calculated separately by methods presented in this document.

Emissions from storage tanks consist of both working losses and breathing losses. The former losses occur as a result of the displacement of the vapor space of the tank into the atmosphere which occurs during tank filling operations and is primarily a function of tank throughput and the temperature and ethanol content of the wine. Breathing losses are the result of diurnal heating and cooling, caused by the effect of ambient conditions on the contents of the tank. For a well-insulated tank breathing losses are assumed to be negligible since the insulation (typically 3-4 inches polyurethane foam) significantly reduces heat gain/loss by the liquid in the tank. Installation of non-insulated tanks in a climate-controlled building is considered equivalent to insulation since the tank is isolated from solar radiation and wind effects as well as being maintained in a constant temperature environment. Thus breathing losses are considered to be negligible for this case as well.

The validity of Tanks 4.0 for emissions modeling of storage tanks is recognized by both the District and the US EPA. Although the software has been widely used by the District for modeling VOC emissions from tanks containing organic liquids such as hydrocarbons (e.g., oilfield production and storage tanks), its use for tanks which store highly non-ideal solutions such as ethanol/water mixtures requires the development of empirical vapor-equilibrium data for the specific fluid. Ethanol water mixtures do not conform to either Raoult's Law or Henry's law (except for over limited ranges of dilute ethanol concentration) and therefore the accurate estimation of vapor-equilibrium properties of these mixtures using pure component properties is complex. The alternative is the use of empirical data along with suitable interpolation formulas.

The Wine Institute has developed a data base for ethanol/water mixtures based on interpolation of empirical data given in the International Critical Tables. The data base provides information on vapor pressure and other mixture properties for the two phase binary ethanol/water mixture for all concentrations from 0.1% to 99.9% alcohol. It has been put in an Access file format suitable for input directly into the EPA Tanks 4.0d Model. The data base has been provided for use both by the District and by wineries for purposes of estimating wine storage tank emissions. This insures that storage tank emission calculations using the Tanks 4.0d model will be uniform and consistent among all parties. The basis and assumptions of the data base have been reviewed by the District and the data base was found to be both a good representation of the empirical data given in the International Critical Tables and to be in the correct format for use in Tanks 4.0d. The basis, assumptions and conventions for use of the data base are given in Appendix A.

The following discussion provides a guide to the use of Tanks 4.0d for modeling emissions from tanks containing ethanol/water mixtures. It is assumed that the reader is generally familiar with the use of Tanks 4.0 for modeling storage tanks (see the Tanks 4.0 User Manual and the EPA document "Tanks Software Frequent Questions" at <http://www.epa.gov/ttnchie1/faq/tanksfaq.html> for general use of the software). The following discussion will only address the specific considerations required for ethanol-water mixtures:

A. Applicability of Tanks 4.0:

1. Winery tanks are almost exclusively vertical tanks with fixed roofs. The discussion will be restricted to this type.
2. Tanks 4.0 will be typically used to calculate the Potential to Emit (PE) for one of the following storage tank scenarios:

- Temperature controlled tank which is either insulated or located inside a climate controlled building : Applicable to all insulated wine and brandy storage tanks with an operating temperature limitation on the permit. This category may be encountered for new tank installations are not being installed under an existing Specific Limiting Condition (SLC). Certain categories of storage tanks may be operated under continuous refrigeration such that the maximum temperature may be limited to less than ambient. Establishing a maximum temperature on the permit which is less than ambient results in reduced potential emissions and reduced requirements for offsets. The combined effect of limiting the maximum temperature and the use of insulation (or installing the tank in a temperature-controlled building) results in reduced working loss emissions and zero breathing loss emissions.

Non-temperature controlled tank which is either insulated or located inside a climate controlled building : Applicable to all insulated wine and brandy storage tanks without an operating temperature limitation on the permit. Although most wine storage operations utilize refrigeration at certain times to maintain wine quality, most tanks are utilized to perform certain post fermentation operations on the wine during which it is undesirable to chill the wine and the tank operation is therefore subject to ambient temperature. Although these tanks may be refrigerated at some point as required by wine processing requirements, since there is no temperature limit on the permit, it is conservatively assumed the bulk liquid temperature is set by ambient conditions. However, since the tank is insulated, it is assumed that the internal temperatures are relatively uniform such that liquid surface temperatures in the tank are approximately the same as the bulk liquid temperature. The result of this assumption is that the tank model only indicates working losses while breathing losses are calculated as zero. The majority of existing winery tanks which were originally permitted as in-house PTO's fall into this category.

- Non-temperature controlled tank which is neither insulated nor located inside a climate controlled building (unheated tank): Applicable to all non-insulated wine and brandy storage tanks without an operating temperature limitation. Most wine storage operations utilize refrigeration to maintain quality. However, since there is no temperature limit on the permit it is conservatively assumed the tank temperatures are set by ambient conditions. Since the tank is not insulated, both working and breathing losses will occur. Emissions calculated in this manner could represent uncontrolled emissions for any tank since the effects of insulation and temperature control would not be considered

Note that any tank installed in a building which is not climate-controlled is conservatively to be an outdoor installation.

3. To calculate both daily and annual PE:
 - Daily PE is based on maximum daily throughput, maximum ethanol % and the maximum temperature (if stated on the permit), occurring during July (hottest average monthly temperature for the San Joaquin Valley).

Annual PE is based on maximum annual throughput, maximum allowed annual average ethanol % and maximum temperature if stated on the permit. In lieu of average annual ethanol %, the maximum allowed ethanol % can be used, yielding a conservatively higher emission value. Annual storage operations are assumed to be averaged over the full year.
4. When a tank is used for multiple products and has a permit limit for each, e.g., wine and spirits storage, a separate model is prepared for each product and the sum of the emissions from all model runs represents the total PE for the tank.
5. In addition to PE calculations, Tanks 4.0 can be used to calculate Historical Actual Emissions (HAE) for wine storage tanks based on either the maximum permitted temperature or actual temperature as measured for each wine movement through the tank and the actual ethanol concentration for each wine movement.

B. Establish the Ethanol/Water Chemical Data Base

1. Select data base

Before starting an emissions model for an ethanol/water tank, you must first establish access to the ethanol/water chemical data base. To access the Chemical Database for ethanol/water, start Tanks 4.0 and select "Change Data Base Locations" from the "File" menu. Select "Browse" from the pop up window for tank data base, go to G/PER/Tanks 4.0-Wine and then select the data base file "WI Rev 7.6 Tank.mdb".

2. Print a data base report for the specific mixture to be modeled

The data base properties for the specific ethanol/water mixture to be modeled should be printed prior to starting a model run on Tanks 4.0. This has two purposes: 1) the report provides a record of the mixture properties used for the calculations and 2) the report provides the value of the average molecular weight of the vapor which will be used in the final speciation calculation for the model. To print a data report, select "Data" from the main menu and go to Data/Chemical/Export/Print.

C. Tanks 4.0 Input

After initiating a tank model, note that input is required for five different tabs: 1) *Identification*, 2) *Physical Characteristics*, 3) *Site Selection*, 4) *Tank Contents* and 5) *Monthly Calculations*.

Identification Tab: No special considerations for ethanol/water storage are required for this tab.

Physical Characteristics Tab:

- For square or rectangular tanks which are common in some wineries, input a diameter which gives an equivalent circular cross sectional area.
- For "Net Throughput" enter the proposed annual throughput in gallons per year for purposes of modeling annual PE for the tank. When modeling daily emissions, input the maximum daily throughput x 31 at this location (the model for daily emissions will assume that the maximum daily throughput occurs each day throughout July and Tanks 4.0 will directly determine monthly emissions for July on that basis. Daily PE will then be determined by dividing the July monthly emissions by the 31 days in July).
- For "Is tank heated?" select "yes" if the tank is insulated and then set the vacuum and pressure settings to zero per software recommendation. If the is not insulated, select "no" and input the pressure/vacuum settings.
- For insulated tanks, select "white/good" for both the tank walls and roof since most winery tanks are white (Note that for tanks which are insulated, the contents are assumed to be uniform in temperature and therefore the selection of the tank color and condition has no impact on the emission estimate). For non-insulated tanks, select "diffuse aluminum/good" in order to conservatively simulate a possibly unpainted stainless steel tank.
- For inputting tank roof geometries other than dome or cone, refer to the EPA FAQs document at <http://www.epa.gov/ttnchie1/faq/tanksfaq.html>.
- Since most wine storage operations strive to maintain the liquid height as high as possible to avoid oxygen contact with the wine, the average and maximum liquid heights may be set approximately equal to the tank wall height if no other basis is provided by the applicant (Note that if the tank is insulated, the contents are assumed to be uniform in temperature and the values for average and maximum liquid height in the tank have no impact on the emissions estimate).

Site Selection Tab:

- Select a location corresponding to the region of the facility. For San Joaquin Valley, the Tanks 4.0 data base includes only Bakersfield, Fresno and Stockton which should be adequately representative of facilities located in the District's Southern, Central and Northern Regions respectively.

Tank Contents Tab:

- For "Chemical Category of Liquid", select "Organic Liquids"
- For "Single or Multi-Component Liquid" select "Multiple".

- For "Speciation Option" select "None". (Note that using a speciation option causes the software to calculate the emissions of individual components. It does this by assuming Raoult's law is applicable, using pure component properties – not applicable to ethanol/water mixtures).
- For "Mixture Name" select the entry from the database corresponding to the ethanol contents of the tank. For annual PE estimates, select either the allowed average annual ethanol concentration or the maximum allowed ethanol concentration, rounded to the nearest 0.1 %. For daily PE estimates, select only the maximum allowed ethanol concentration. Note that all entries in the data base are listed in the form "Wine XX.X % Vol Alcohol" although technically the maximum ethanol content for wine is 24% with higher concentration reflecting the "spirits or liquors" category. Selecting a mixture for the run will result in a pop-up window asking if you are sure you want to speciate this organic liquid – click "OK" (I'm not sure why Tanks 4.0 does this since you have previously selected "None" for the speciation question).
- Specify "Average Liquid Surface Temperature", "Minimum Liquid Surface Temperature", "Maximum Liquid Surface Temperature" and "Bulk Liquid Temperature" as follows:
 1. Temperature controlled tank which is either insulated or located inside a climate controlled building: Input the maximum allowed tank temperature for each entry (same value for all four inputs - note that due to the effects of insulation, the temperature of the contents is assumed to be uniform).
 2. Non-temperature controlled tank which is either insulated or located inside a climate controlled building: It is assumed that the calculated average bulk liquid temperature (for the specific site as calculated by Tanks 4.0 for an unheated tank) is applicable for each entry (same value for all four inputs - note that due to the effects of insulation, the temperature of the contents is assumed to be uniform). To determine annual emissions for locations represented by Bakersfield input 64.4 °F for all four entries; for Fresno input 63.3 °F for all four entries; for Stockton input 61.6 °F for all four entries. To determine daily emissions for locations represented by Bakersfield input 83.1 °F for all four entries; for Fresno input 81.0 °F for all four entries; for Stockton input 77.3 °F for all four entries (the mean daily temperature for July is assumed for each location).
 3. Non-temperature controlled tank which is neither insulated nor located inside a climate controlled building (unheated tank): Since the tank will have been specified as not heated, Tanks 4.0 will calculate all temperatures based on the site selection. After selecting the appropriate site on the *Site Selection* tab, go to the *Tank Contents* tab and click the "Calculate Mixture Properties" button.
- Based on selection of the mixture, Tanks 4.0 will input the remaining information on vapor pressure and molecular weight per the data base for the selected mixture.

Monthly Calculations Tab:

- For Daily emissions models, check only July and click the “Distribute Throughput” button.
- For annual emissions models, check all months and click the “Distribute Throughput” button.

D. Run Annual PE Emissions Model Report

1. With the tank model configured for annual emissions (maximum annual throughput listed for “Net Throughput” on the “Physical Characteristics” tab and all months checked on the “Monthly Calculations” tab with the throughput evenly distributed in all months, click “Run Report”.
2. Select “Detailed” for report type and “monthly” for time basis and click OK.
3. The last page of the emissions report will list the estimated annual emissions from the tank. Note that the listed values are the combined emissions for ethanol and water (not the ethanol emissions from the tank). The listed values have to be speciated to determine the daily VOC emissions.

E. Run Daily PE Emissions Model Report

1. With the tank model configured for daily emissions (31 x maximum daily throughput listed for “Net Throughput” on the “Physical Characteristics” tab and only July checked on the “Monthly Calculations” tab with the throughput all occurring in July, click “Run Report”.
2. Select “Detailed” for report type and “monthly” for time basis and click OK.
3. The last page of the emissions report will list the estimated emissions from the tank for the month of July assuming the maximum daily throughput occurs each day of July. Note that the listed values are the combined emissions for ethanol and water (not the ethanol emissions from the tank). The listed values have to be converted to a daily emission basis and then speciated to determine the daily VOC emissions.

F. Speciate the Tanks 4.0 Emissions Estimates to Determine the VOC (ethanol) Emissions:

The annual emission estimate provided by the Tanks 4.0 model working + breathing loss) represents the combined loss of ethanol and water from the tank. To calculate the ethanol portion of the emissions, it is first necessary to determine the molar fraction of ethanol (y_a) in the vapor emissions from the tank. This can be calculated from the average molecular weight (AMW) of the vapor as given on the previously printed chemical data report (the AMW is also listed on page 2 of the detailed emissions report). Per the definition of AMW for a binary mixture:

$$AMW = y_a \times MW_a + (1-y_a) \times MW_w$$

Solving for the molar fraction of ethanol,

$$y_a = \frac{AMW - MW_w}{MW_a - MW_w}$$

Where,

MW_a = Molecular weight of ethanol = 46.02 lb/mole

MW_w = Molecular weight of water = 18.02/lb/mole

The ethanol emissions may then be calculated,

$$PE_{\text{annual}} = \frac{\text{Annual Tank Loss}}{AMW} \times y_a \times MW_a$$

$$PE_{\text{daily}} = \frac{\text{July Tank Loss}}{31 \text{ days} \times AMW} \times y_a \times MW_a$$

III. SAMPLE PE CALCULATION

(Combined fermentation and wine storage tank)

General Calculations

A. Assumptions

- The tank is used for both wine storage and wine fermentation.
- The tank dimensions are 15' dia x 40' H with an internal volume of 52,876 gallons.
- Maximum annual storage throughput is 5,000,000 gallons per year per the applicant.
- Maximum daily storage throughput is one tank volume at maximum fill height.
- Maximum wine production by fermentation is 150,000 gallons white wine per year.
- The tank is temperature controlled to maintain a maximum temperature of 40 °F.
- The tank is insulated.
- Maximum allowed average annual ethanol content in the tank is 12 volume percent.
- Maximum ethanol content in the tank is 16 volume percent.
- The storage tank emissions will be determined by modeling the tank with Tanks 4.0d software in conformance with the District's Policy (FYI -295) for modeling emissions from ethanol/water storage tanks.
- The emission estimates from Tanks 4.0d represent combined ethanol/water losses from the tank which must be speciated to determine the ethanol emissions.
- Annual Potential to Emit is the sum of the calculated PE for the storage operations emission unit and the calculated PE for the fermentation operations emission unit.
- Daily Potential to Emit is the greater of the calculated PE for the storage operations emission unit and the calculated PE for the fermentation operations emission unit.

- Molecular weight of ethanol = $MW_a = 46.02$ lb/mole
- Molecular weight of water = $MW_w = 18.02$ lb/mole

B. Emission Factors

Per the fermentation emission factors presented in District's FYI-114:

Wine Fermentation Emission Factors		
Emission Factor	Red Wine	White Wine
Daily PE (lb-VOC/day per 1,000 gallons tank capacity)	3.46	1.62
Annual PE (lb-VOC/year per 1,000 gallons fermentation production)	6.2	2.5

Storage tank emissions will be modeled in Tanks 4.0d and no emission factors are necessary.

C. Calculations

1. Pre-Project Potential to Emit (PE1)

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

2. Post Project Potential to Emit (PE2)

Storage Tank Operation

Appendix C presents the chemical data report from the District's data base for 12 volume % and 16 volume % ethanol (maximum average annual and maximum ethanol concentration respectively). As listed, the average molecular weight of the vapor from this mixture is 25.97 lb/mole for 12% ethanol and 27.47 lb/mole for 16% ethanol.

Appendix D is the Tanks 4.0 model report for the annual emissions from the tank. As indicated, maximum annual loss from the tank (E_a) is:

$E_a = 234$ lb/year (combined annual ethanol and water loss from the tank)

Appendix E is the Tanks 4.0 model report for determining the daily PE. As indicated, maximum daily loss from the tank (E_d) is:

$E_d = 5.9$ lb/day (combined annual ethanol and water loss from the tank)

The annual emission estimates provided by the Tanks 4.0 model represent the combined loss of ethanol and water from the tank. To calculate the ethanol portion of the emissions, it is first necessary to determine the molar fraction of ethanol (y_a) in the vapor emissions from the tank. This can be calculated from the average molecular weight (AMW) of the vapor as given on the previously printed chemical data report. Per the definition of AMW for a binary mixture:

$$AMW = y_a \times MW_a + (1-y_a) \times MW_w$$

Solving for the molar fraction of ethanol,

$$y_a = \frac{AMW - MW_w}{MW_a - MW_w}$$

Where,

MW_a = Molecular weight of ethanol = 46.02 lb/mole

MW_w = Molecular weight of water = 18.02/lb/mole

Therefore,

$$y_a = (25.97 - 18.02)/(46.02 - 18.02) = 0.2839 \text{ for 12\% ethanol mixture}$$

$$y_a = (27.47 - 18.02)/(46.02 - 18.02) = 0.3375 \text{ for 16\% ethanol mixture}$$

The annual PE emissions may then be calculated based on 12% ethanol,

$$PE_{\text{annual}} = \frac{E_a}{AMW} \times y_a \times MW_a$$

$$PE_{\text{annual}} = (234/25.97) \times 0.2839 \times 46.02 = 118 \text{ lb-VOC/year}$$

The daily emissions may then be calculated based on 16% ethanol,

$$PE_{\text{daily}} = \frac{E_d}{AMW} \times y_a \times 46.02$$

$$PE_{\text{daily}} = (5.9/27.47) \times 0.3375 \times 46.02 = 3.3 \text{ lb-VOC/day}$$

Fermentation Tank Emissions (white wine only)

$$PE_{\text{daily}} = 1.62 \text{ lb-VOC/1000 gallons capacity} \times 52,875 \text{ gal capacity}$$

$$PE_{\text{daily}} = 85.7 \text{ lb-VOC/day}$$

$$PE_{\text{annual}} = 2.5 \text{ lb-VOC/1000 gallons throughput} \times 150,000 \text{ gal/year throughput}$$

$$PE_{\text{annual}} = 375 \text{ lb-VOC/year}$$

Post Project Potential to Emit (PE2)						
	Storage		Fermentation		Total	
	Daily Emissions (lb/day)	Annual Emissions (lb/year)	Daily Emissions (lb/day)	Annual Emissions (lb/year)	Daily Emissions (lb/day)	Annual Emissions (lb/year)
NO _x	0	0	0	0	0	0
SO _x	0	0	0	0	0	0
PM ₁₀	0	0	0	0	0	0
CO	0	0	0	0	0	0
VOC	3.3	118	85.7	375	85.7	493

APPENDIX A

ASSUMPTIONS AND METHODS FOR DEVELOPMENT OF THE TANKS 4.0D CHEMICAL DATA BASE FOR ETHANOL/WATER MIXTURES

ASSUMPTIONS AND METHODS FOR DEVELOPMENT OF THE TANKS 4.0D CHEMICAL DATA BASE FOR ETHANOL/WATER MIXTURES

- 1) To use Tanks 4.0d for modeling of storage tank emissions, the vapor-liquid equilibrium characteristics of the material in the tank must be defined. Since ethanol-water solutions are generally not ideal, it is necessary to utilize empirical data in this regard. The Wine Institute has developed this data base using data on the partial pressure of ethanol-water solutions taken from the International Critical Table (see Attachment 1)
- 2) As shown in Attachment 1, experimental partial pressure data over the full range of concentrations are given at various temperatures for both ethanol and water in mmHg. Values of P_A (partial pressure of water) and P_B (partial pressure of ethanol) are listed. For purposes of the data base, nomenclature will be revised to refer to the partial pressure of water as P_w and the partial pressure of ethanol as P_a . Applying Dalton's Law of Partial Pressures, the following relationships are obtained:

$$P = P_a + P_w$$

And

$$Y_a = P_a/P$$

$$Y_w = P_w/P$$

Where, "P" is the total vapor pressure of the solution and Y_a and Y_w are the mole fractions of ethanol and water in the equilibrium vapor phase respectively.

Since the ethanol-water system is highly non-ideal, it is necessary to utilize the "vapor weight specification" option (option1) in Tanks 4.0 for purposes of inputting vapor-liquid equilibrium data. For a given ethanol-water solution (concentration), the following information must be input to the chemical data base in Tanks 4.0:

Solution name (e.g., "12 vol % ethanol/water")

Average molecular weight of the liquid

Density of the liquid, lb/gallon

Average molecular weight of the vapor

Vapor pressure of the liquid (psia) at 40, 50, 60, 70, 80, 90 and 100 °F.

Specification of the above data points requires that the data given in the International Critical Tables be interpolated.

- 3) To perform the interpolation, the partial pressures of ethanol and water at the Tanks 4.0d standard temperatures of 40, 50, 60, 70, 80, 90 and 100 °F are first determined by interpolation of the partial pressure data (mm Hg) given in the International Critical Tables at 20 °C (68 °F) and 40 °C (104 °F) (copy attached). The interpolation method is based on taking the log of the pressure to be a linear function of $1/(T+460)$ when using degree Rankin or $1/(T+273)$ when using degrees Kelvin as recommended in the International Critical Tables. For standard temperatures below 68 °F (40, 50 and 60 °F), an Excel trend function is used to perform the extrapolation based on the values interpolated for 70, 80, and 90 and 100 °F. The result of this step yields tabulated values of the partial pressure of ethanol and water

for mixture concentrations of 0, 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100 weight% ethanol at each of the standard temperatures listed above.

- 4) The vapor pressure of each of the various mixture concentrations at the standard temperatures are then determined as the sum of the partial pressure of water and alcohol according to Dalton's Law. The result of this step yields tabulated values of the total vapor pressure of alcohol and water for mixture concentrations of 0, 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100 weight % ethanol at each of the standard temperatures listed above.
- 5) Since the volumetric properties of ethanol-water are also highly non-ideal, the density of each of the mixtures is determined by interpolation from data given in Table No. 6 of the Gauging Manual of the Alcohol and Tobacco Tax and Trade Bureau (Attachment 2). Given the density and weight % alcohol and the vapor mole fractions (calculated as stated above per Dalton's Law), the average molecular weight of the liquid and vapor can be calculated for each of the listed concentrations. Completion of this step results in a complete set of data suitable for inputting into the "vapor weight specification" of Tanks 4.0 for mixture concentrations of 0, 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100 weight%.
- 6) A set of standard vapor pressures and other data required for input to Tanks 4.0d are then determined for all ethanol concentrations between 0 and 100% at increments of 0.1 volume percent by linear interpolation between the values previously established at 0, 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100 weight% ethanol. For each intermediate concentration,
 - The density is established by linear interpolation of the data in Table 6 and the liquid mole fraction and the average molecular weight of the liquid are determined
 - The total vapor pressures of the particular mixture at the standard temperatures of 40, 50, 60, 70, 80, 90 and 100 °F are determined by linear interpolation of the vapor pressure values established for 0, 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100 weight% alcohol based upon vapor mole fraction.
 - The vapor mole fraction of alcohol is determined by interpolation of the mole fraction values established (x-y values) and the average molecular weight of the vapor is calculated at each of the standard temperatures..
- 7) The resulting data base consists of the following for each concentration between 0 and 100% at increments of 0.1 volume percent:

Liquid density lb/gal:	As interpolated from Table 6 (Tanks 4.0d input)
Liquid average molecular weight:	As calculated for specific mixture (Tanks 4.0d input)
Standard vapor pressures:	As interpolated for specific mixture (Tanks 4.0d input)
Vapor average molecular weight:	Average value from values interpolated at each standard temperature (Tanks 4.0d input)
Mole fraction alcohol in vapor:	Average value from values interpolated at each standard temperature (required for final manual calculation of ethanol emissions))

Attachment 1 to Appendix A

**Ethanol-Water Data from International Critical
Tables**

C₇H₁₂
Methylcyclohexene (Mix.)
B = C₇H₁₂ 1-Methyldecahydronaphthalene
P at 20° (122)

B = C₇H₁₂ 2-Methyldecahydronaphthalene
P at 20° (122)

B = C₇H₁₂ 1, β-Dimethyldecahydronaphthalene
P at 20° (122)

B = C₇H₁₂ 2, β-Dimethyldecahydronaphthalene
P at 20° (122)

C₇H₁₄
Methylcyclohexane
B = C₇H₁₄ 1-Methyldecahydronaphthalene
P at 20° (122)

B = C₇H₁₄ 2-Methyldecahydronaphthalene
P at 20° (122)

(b) Aqueous Systems

H = HCl, v. p. 259, 303, 301, 361
H = HBr, v. p. 255, 300, 361
H = HI, v. p. 255, 300
H = HCl₂, v. p. 258, 302, 361
H = H₂SO₄, v. p. 263, 302

B = NH₃ (128); cf. (144)

The total vapor pressure for any composition and for any temperature between 0 and 30°C may be computed with the aid of the empirical equations

$$p = 1 + 0.703(1 - x_2^2)$$

and

$$s = (x_2 + 0.05)x_2 (1.34 - 2.0x_2 + 1.77x_2^2)$$

B = CH₃O Formic acid (84)

t°	p ₀ in mm							
	1	5	10	15	20	25	30	35
0		(0.037)	0.072	0.096	0.120	0.144	0.168	
20		(0.19)	0.301	0.425	0.550	0.714	(0.83)	
35	(0.15)	0.401	1.150	1.38	1.90	2.29	2.67	3.65
45		(1.30)	2.21	3.11	4.30	5.58	7.14	8.72

B = CH₃O₂ Formic acid, s. p. 364

H = CH₃O Methyl alcohol (119)
p in mm (± 0.0)

100x ₂	P ₂	P ₀
0	81.7	0
11.90	30.2	60.1
17.85	38.6	75.6
21.07	27.3	85.3
27.31	35.8	100.0
31.06	24.9	108.5
40.1	32.8	127.7

B = C₁₂H₁₈ 1, β-Dimethyldecahydronaphthalene
P at 20° (122)

B = C₁₂H₁₈ 2, β-Dimethyldecahydronaphthalene
P at 20° (122)

C₈H₁₀
1, β-Dimethyldecahydronaphthalene
B = C₈H₁₀ 2-Methyldecahydronaphthalene
P at 20° (122)

B = C₈H₁₀ 1-Methyldecahydronaphthalene
P at 20° (122)

B = C₈H₁₀ 1, β-Trimerthyldecahydronaphthalene
P at 20° (122)

B = C₈H₁₀ 2, β-Dimerthyldecahydronaphthalene
P at 20° (122)

in which *P* is the absolute temperature of the solution of composition 100x₂ mole % NH₃ and *t* is the absolute temperature at which pure liquid NH₃ (2, v.) has the same vapor pressure as the solution.

The partial vapor pressure of H₂O (0-50°) may be computed from the empirical relations:

$$p_A = (1 - x_2) p_0$$

$$a = 0.12x_2 \text{ for } x_2 < 0.55$$

$$a = 0.055x_2 \text{ for } x_2 > 0.55$$

p₀ = the vapor pressure of pure H₂O at the same temperature.

v. also p. 259 and 303
B = HNO₃, v. p. 301 and 309
B = H₂PO₄, v. p. 203
B = HCN, v. p. 261 and 365

B = CH₃O₂ (Continued)

100x ₂	P ₂	P ₀
47.0	31.0	141.0
55.8	27.3	158.4
68.9	21.7	186.4
86.0	10.1	225.2
100	0	240.7

B = CH₃O₂ (Continued)

100x ₂	P ₂	P ₀
47.0	31.0	141.0
55.8	27.3	158.4
68.9	21.7	186.4
86.0	10.1	225.2
100	0	240.7

B = CH₃O₂ (Continued)

100x ₂	P ₂	P ₀
47.0	31.0	141.0
55.8	27.3	158.4
68.9	21.7	186.4
78.8	13.8	195.6
86.0	8.1	220.3
100	0	240.7

B = C₂H₅O₂ Acetic acid
v. p. 366

B = C₂H₅O Tertiary alcohol (87, 21, 118, 139); cf. (57, 80)

Log p₂ or log p₀ for any given composition is a linear function of $\frac{1}{T - 273.1}$ between any two values in the following table.

Wt. % B	P ₂	P ₀
0	17.6	0.0
10	10.5	(0.7)
20	18.9	(12.6)
30	15.1	(17.1)
40	14.7	20.7
50	14.6	24.5
60	14.1	25.5
70	13.1	28.0
80	11.8	31.2
90	7.5	35.8
98	1.9	42.8
100	0.0	43.6

B = CH₃O₂ (Continued)

100x ₂	P ₂	P ₀
0	117	0.0
10	110.7	50.8
20	104.4	94.4
30	100.5	114.8
40	96.8	130.8
50	97.8	142.4
60	94.4	158.4
70	98.1	172.0
80	77.6	192.0
90	52.6	223.0
98	14.3	282.4
100	0.0	293

B = C₂H₅O₂ (Continued)

Wt. % B	P ₂	P ₀
80	181.4	454
90	130.8	587
98	34.7	925
100	0.0	967

B = C₂H₅O Acetone (110); cf. (125)

p in mm (± 4)

100x ₂	26°	30°	45°	60°
0.0	28	31	71	140
2.20	27	34	76	149
7.20	27	34	70	143
11.7	25	30	60	134
17.1	24	34	71	145
21.0	23	30	62	129
31.8	23	25	67	126
42.0	23	29	59	110
56.4	19	20	47	102
72.7	17	21	48	97
100.0	0	0	0	0

B = C₂H₅O₂ Propionic acid
P in mm (± 2) (80)

100x ₂	7.42	29.1	48.2
P ₂	18	17	18
P ₀	52	61	47
P ₀	147	143	120
P ₀	353	355	315
P ₀	705	701	637

B = C₂H₅O₂ Methyl acetate
66.9, p in mm (14); cf. (142)
v. also p. 361, 365

100x ₂	P ₂	P ₀
65°	121	533
75	111	654
85	90	978
90	78	908
100	0	760

B = C₂H₅O n-Propyl alcohol
(110); cf. (57, 80)
v. also p. 363

p in mm (± 1)

100x ₂	P ₂	P ₀
0	33.2	6
8.58	24.8	10.3
18.77	30.8	17.2
30.02	28.5	18.5

Attachment 2 to Appendix A

**Table No. 6 of the Gauging Manual of the
Alcohol and Tobacco Tax and Trade Bureau,
U.S. Department of the Treasury (27 CFR
Part 30)**

TABLE No. 6
SHOWING
RESPECTIVE VOLUMES OF ALCOHOL AND WATER
AND THE SPECIFIC GRAVITY IN BOTH AIR
AND VACUUM OF SPIRITUOUS LIQUOR

(Prepared by the National Bureau of Standards and based on information published in Bulletin of the Bureau of Standards, Vol. 9, No. 4, pages 257-276, Oct. 14, 1912)

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TABLE No. 6

RESPECTIVE VOLUMES OF ALCOHOL AND WATER
AND SPECIFIC GRAVITY

Proof	Alcohol	Water	Specific Gravity in air	Specific Gravity in vacuum
	Volumes	Volumes		
1	0.50	99.50	.99925	0.99925
2	1.00	99.00	.99850	0.99850
3	1.50	98.50	.99775	0.99775
4	2.00	98.00	.99700	0.99700
5	2.50	97.50	.99625	0.99625
6	3.00	97.00	.99550	0.99550
7	3.50	96.50	.99475	0.99475
8	4.00	96.00	.99400	0.99400
9	4.50	95.50	.99325	0.99325
10	5.00	95.00	.99250	0.99250
11	5.50	94.50	.99175	0.99175
12	6.00	94.00	.99100	0.99100
13	6.50	93.50	.99025	0.99025
14	7.00	93.00	.98950	0.98950
15	7.50	92.50	.98875	0.98875
16	8.00	92.00	.98800	0.98800
17	8.50	91.50	.98725	0.98725
18	9.00	91.00	.98650	0.98650
19	9.50	90.50	.98575	0.98575
20	10.00	90.00	.98500	0.98500
21	10.50	89.50	.98425	0.98425
22	11.00	89.00	.98350	0.98350
23	11.50	88.50	.98275	0.98275
24	12.00	88.00	.98200	0.98200
25	12.50	87.50	.98125	0.98125
26	13.00	87.00	.98050	0.98050
27	13.50	86.50	.97975	0.97975
28	14.00	86.00	.97900	0.97900
29	14.50	85.50	.97825	0.97825
30	15.00	85.00	.97750	0.97750
31	15.50	84.50	.97675	0.97675
32	16.00	84.00	.97600	0.97600
33	16.50	83.50	.97525	0.97525
34	17.00	83.00	.97450	0.97450
35	17.50	82.50	.97375	0.97375
36	18.00	82.00	.97300	0.97300
37	18.50	81.50	.97225	0.97225
38	19.00	81.00	.97150	0.97150
39	19.50	80.50	.97075	0.97075
40	20.00	80.00	.97000	0.97000
41	20.50	79.50	.96925	0.96925
42	21.00	79.00	.96850	0.96850
43	21.50	78.50	.96775	0.96775
44	22.00	78.00	.96700	0.96700
45	22.50	77.50	.96625	0.96625
46	23.00	77.00	.96550	0.96550
47	23.50	76.50	.96475	0.96475
48	24.00	76.00	.96400	0.96400
49	24.50	75.50	.96325	0.96325
50	25.00	75.00	.96250	0.96250

TABLE No. 5

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RESPECTIVE VOLUMES OF ALCOHOL AND WATER
AND SPECIFIC GRAVITY

Proof	Alcohol	Water	Specific gravity in air	Specific gravity in vacuum
	Volumes	Volumes		
51	25.80	74.20	0.97027	0.97081
52	26.00	74.00	.96974	.96978
53	26.60	73.40	.96920	.96924
54	27.00	73.00	.96866	.96870
55	27.60	72.40	.96811	.96816
56	28.00	72.00	.96756	.96760
57	28.40	71.60	.96700	.96704
58	28.80	71.20	.96644	.96648
59	29.20	70.80	.96587	.96591
60	29.60	70.40	.96530	.96534
61	30.00	70.00	.96471	.96475
62	30.40	69.60	.96413	.96417
63	30.80	69.20	.96353	.96357
64	31.20	68.80	.96291	.96295
65	31.60	68.40	.96229	.96233
66	32.00	68.00	.96165	.96170
67	32.40	67.60	.96101	.96106
68	32.80	67.20	.96036	.96041
69	33.20	66.80	.95970	.95975
70	33.60	66.40	.95903	.95908
71	34.00	66.00	.95826	.95831
72	34.40	65.60	.95748	.95753
73	34.80	65.20	.95669	.95674
74	35.20	64.80	.95589	.95594
75	35.60	64.40	.95508	.95513
76	36.00	64.00	.95426	.95431
77	36.40	63.60	.95342	.95347
78	36.80	63.20	.95257	.95262
79	37.20	62.80	.95170	.95175
80	37.60	62.40	.95082	.95087
81	38.00	62.00	.95004	.95009
82	38.40	61.60	.94924	.94929
83	38.80	61.20	.94842	.94847
84	39.20	60.80	.94758	.94763
85	39.60	60.40	.94672	.94677
86	40.00	60.00	.94585	.94590
87	40.40	59.60	.94496	.94501
88	40.80	59.20	.94405	.94410
89	41.20	58.80	.94312	.94317
90	41.60	58.40	.94218	.94223
91	42.00	58.00	.94122	.94127
92	42.40	57.60	.94024	.94029
93	42.80	57.20	.93924	.93929
94	43.20	56.80	.93822	.93827
95	43.60	56.40	.93718	.93723
96	44.00	56.00	.93611	.93616
97	44.40	55.60	.93502	.93507
98	44.80	55.20	.93390	.93395
99	45.20	54.80	.93276	.93281
100	45.60	54.40	.93159	.93164

TABLE No. 6

RESPECTIVE VOLUMES OF ALCOHOL AND WATER
AND SPECIFIC GRAVITY

Proof	Alcohol	Water	Specific gravity in air	Specific gravity in vacuum
	Volumes	Volumes		
101	50.50	58.24	.98320	.98328
102	51.00	57.74	.98322	.98330
103	51.50	57.25	.98323	.98331
104	52.00	56.75	.98324	.98331
105	52.50	56.25	.98325	.98331
106	53.00	55.75	.98326	.98330
107	53.50	55.25	.98327	.98328
108	54.00	54.75	.98328	.98328
109	54.50	54.25	.98328	.98328
110	55.00	53.75	.98329	.98328
111	55.50	53.25	.98329	.98328
112	56.00	52.75	.98329	.98328
113	56.50	52.25	.98329	.98328
114	57.00	51.75	.98329	.98328
115	57.50	51.25	.98329	.98328
116	58.00	50.75	.98329	.98328
117	58.50	50.25	.98329	.98328
118	59.00	49.75	.98329	.98328
119	59.50	49.25	.98329	.98328
120	60.00	48.75	.98329	.98328
121	60.50	48.25	.98329	.98328
122	61.00	47.75	.98329	.98328
123	61.50	47.25	.98329	.98328
124	62.00	46.75	.98329	.98328
125	62.50	46.25	.98329	.98328
126	63.00	45.75	.98329	.98328
127	63.50	45.25	.98329	.98328
128	64.00	44.75	.98329	.98328
129	64.50	44.25	.98329	.98328
130	65.00	43.75	.98329	.98328
131	65.50	43.25	.98329	.98328
132	66.00	42.75	.98329	.98328
133	66.50	42.25	.98329	.98328
134	67.00	41.75	.98329	.98328
135	67.50	41.25	.98329	.98328
136	68.00	40.75	.98329	.98328
137	68.50	40.25	.98329	.98328
138	69.00	39.75	.98329	.98328
139	69.50	39.25	.98329	.98328
140	70.00	38.75	.98329	.98328
141	70.50	38.25	.98329	.98328
142	71.00	37.75	.98329	.98328
143	71.50	37.25	.98329	.98328
144	72.00	36.75	.98329	.98328
145	72.50	36.25	.98329	.98328
146	73.00	35.75	.98329	.98328
147	73.50	35.25	.98329	.98328
148	74.00	34.75	.98329	.98328
149	74.50	34.25	.98329	.98328
150	75.00	33.75	.98329	.98328

TABLE No. 8

661

RESPECTIVE VOLUMES OF ALCOHOL AND WATER
AND SPECIFIC GRAVITY

Proof	Alcohol	Water	Specific gravity in air	Specific gravity in vacuum
	Volume	Volume		
141	76.60	27.38	87692	87507
142	76.00	27.13	87490	87445
143	75.40	26.89	87287	87242
144	74.80	26.64	87084	87039
145	74.20	26.40	86881	86836
146	73.60	26.15	86678	86633
147	73.00	25.91	86475	86430
148	72.40	25.66	86272	86227
149	71.80	25.42	86069	86024
150	71.20	25.17	85866	85821
151	70.60	24.93	85663	85618
152	70.00	24.68	85460	85415
153	69.40	24.44	85257	85212
154	68.80	24.19	85054	85009
155	68.20	23.95	84851	84806
156	67.60	23.70	84648	84603
157	67.00	23.46	84445	84400
158	66.40	23.21	84242	84197
159	65.80	22.97	84039	83994
160	65.20	22.72	83836	83791
161	64.60	22.48	83633	83588
162	64.00	22.23	83430	83385
163	63.40	21.99	83227	83182
164	62.80	21.74	83024	82979
165	62.20	21.50	82821	82776
166	61.60	21.25	82618	82573
167	61.00	21.01	82415	82370
168	60.40	20.76	82212	82167
169	59.80	20.52	82009	81964
170	59.20	20.27	81806	81761
171	58.60	20.03	81603	81558
172	58.00	19.78	81400	81355
173	57.40	19.54	81197	81152
174	56.80	19.29	80994	80949
175	56.20	19.05	80791	80746
176	55.60	18.80	80588	80543
177	55.00	18.56	80385	80340
178	54.40	18.31	80182	80137
179	53.80	18.07	79979	79934
180	53.20	17.82	79776	79731
181	52.60	17.58	79573	79528
182	52.00	17.33	79370	79325
183	51.40	17.09	79167	79122
184	50.80	16.84	78964	78919
185	50.20	16.60	78761	78716
186	49.60	16.35	78558	78513
187	49.00	16.11	78355	78310
188	48.40	15.86	78152	78107
189	47.80	15.62	77949	77904
190	47.20	15.37	77746	77701
191	46.60	15.13	77543	77498
192	46.00	14.88	77340	77295
193	45.40	14.64	77137	77092
194	44.80	14.39	76934	76889
195	44.20	14.15	76731	76686
196	43.60	13.90	76528	76483
197	43.00	13.66	76325	76280
198	42.40	13.41	76122	76077
199	41.80	13.17	75919	75874
200	41.20	12.92	75716	75671
201	40.60	12.68	75513	75468
202	40.00	12.43	75310	75265
203	39.40	12.19	75107	75062
204	38.80	11.94	74904	74859
205	38.20	11.70	74701	74656
206	37.60	11.45	74498	74453
207	37.00	11.21	74295	74250
208	36.40	10.96	74092	74047
209	35.80	10.72	73889	73844
210	35.20	10.47	73686	73641
211	34.60	10.23	73483	73438
212	34.00	10.00	73280	73235
213	33.40	9.75	73077	73032
214	32.80	9.51	72874	72829
215	32.20	9.26	72671	72626
216	31.60	9.02	72468	72423
217	31.00	8.77	72265	72220
218	30.40	8.53	72062	72017
219	29.80	8.28	71859	71814
220	29.20	8.04	71656	71611
221	28.60	7.79	71453	71408
222	28.00	7.55	71250	71205
223	27.40	7.30	71047	71002
224	26.80	7.06	70844	70799
225	26.20	6.81	70641	70596
226	25.60	6.57	70438	70393
227	25.00	6.32	70235	70190
228	24.40	6.08	70032	69987
229	23.80	5.83	69829	69784
230	23.20	5.59	69626	69581
231	22.60	5.34	69423	69378
232	22.00	5.10	69220	69175
233	21.40	4.85	69017	68972
234	20.80	4.61	68814	68769
235	20.20	4.36	68611	68566
236	19.60	4.12	68408	68363
237	19.00	3.87	68205	68160
238	18.40	3.63	68002	67957
239	17.80	3.38	67799	67754
240	17.20	3.14	67596	67551
241	16.60	2.89	67393	67348
242	16.00	2.65	67190	67145
243	15.40	2.40	66987	66942
244	14.80	2.16	66784	66739
245	14.20	1.91	66581	66536
246	13.60	1.67	66378	66333
247	13.00	1.42	66175	66130
248	12.40	1.18	65972	65927
249	11.80	0.93	65769	65724
250	11.20	0.69	65566	65521
251	10.60	0.44	65363	65318
252	10.00	0.20	65160	65115
253	9.40	0.00	64957	64912
254	8.80		64754	64709
255	8.20		64551	64506
256	7.60		64348	64303
257	7.00		64145	64100
258	6.40		63942	63897
259	5.80		63739	63694
260	5.20		63536	63491
261	4.60		63333	63288
262	4.00		63130	63085
263	3.40		62927	62882
264	2.80		62724	62679
265	2.20		62521	62476
266	1.60		62318	62273
267	1.00		62115	62070
268	0.40		61912	61867
269	0.00		61709	61664
270	0.00		61506	61461
271	0.00		61303	61258
272	0.00		61100	61055
273	0.00		60897	60852
274	0.00		60694	60649
275	0.00		60491	60446
276	0.00		60288	60243
277	0.00		60085	60040
278	0.00		59882	59837
279	0.00		59679	59634
280	0.00		59476	59431
281	0.00		59273	59228
282	0.00		59070	59025
283	0.00		58867	58822
284	0.00		58664	58619
285	0.00		58461	58416
286	0.00		58258	58213
287	0.00		58055	58010
288	0.00		57852	57807
289	0.00		57649	57604
290	0.00		57446	57401
291	0.00		57243	57198
292	0.00		57040	56995
293	0.00		56837	56792
294	0.00		56634	56589
295	0.00		56431	56386
296	0.00		56228	56183
297	0.00		56025	55980
298	0.00		55822	55777
299	0.00		55619	55574
300	0.00		55416	55371

Appendix B
Chemical Data Reports

TANKS 4.0
Chemical Data Report

Chemical Name Category	CAS	Molecular Weight		Vapor Pressure (mmHg) at Temperature (degrees F)							Conditions for Antoine Equation				
		Liquid	Vapor	40	50	60	70	80	90	A	B	C	PCRD Point	ASTM Range	
Water (H ₂ O), Vol Alcohols Organic Liquids		18.15	25.07	0.21	0.16	0.23	0.34	0.48	0.69	0.92	1.23				

TANKS 4.0
Chemical Data Report

Chemical Name Category	CAS	Molecular Weight		Density	Vapor Pressure (Calculated at Temperature (deg Celsius F))					PCRD Priority	ASTM Specs		
		Liquid	Vapor		40	50	60	70	80			90	
Wt% 80.0 % Vol Alcohol Organic Liquids		16.05	37.47	0.78	0.17	0.25	0.33	0.57	0.73	1.02	1.40		

Compendex Plus
Line 1: Chemical C
Line 2: Chemical K
A B C

Appendix C
Annual Emission Model Report

TANKS 4.0.6d
Emissions Report - Detail Format
Tank Identification and Physical Characteristics

<p>Identification</p> <p>User Identification: City: State: Company: Type of Tank: Description:</p>	<p>Annual Emissions Modulo California Vertical Road/Rail Tank Annual Emission Modulo Runs</p>
<p>Tank Dimensions</p> <p>Shell Height (ft): Diameter (ft): Liquid Height (ft): Avg. Liquid Height (ft): Volume (gallons): Turnover: Net Throughput(gal/yr): Is Tank Heated (Y/N):</p>	<p>40.00 15.00 48.00 40.00 52,878.00 94.58 5,070,000.00 Y</p>
<p>Paint Characteristics</p> <p>Shell Color/Finish: Shell Condition: Rust Color/Finish: Rust Condition:</p>	<p>White/White Good White/White Good</p>
<p>Roof Characteristics</p> <p>Type: Height (ft): Slope (ft/10) (Cons. Roof):</p>	<p>Cone 2.00 0.27</p>
<p>Breather Valve Settings</p> <p>Vacuum Setting (psig): Pressure Setting (psig):</p>	<p>0.00 0.00</p>

Metropolitan Data used in Emissions Calculations: Shoshone, California (High Atmospheric Pressure = 14.72 psia)

TANKS 4.0.0d
Emissions Report - Detail Format
Individual Tank Emission Totals

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

Annual Emissions - Vertical Fixed Roof Tank
Modesto, California

Component	Working Loss	Unsettled	Breathing Loss	Total Emissions
Wine 12.0 % Vol Alcohols	24.28		0.00	24.28

Appendix D
Daily Emission Model Report

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

<p>Identification</p> <p>User Identification: City: State: Company: Type of Tank: Description:</p>	<p>Daily Emissions Modesto California Vertical Fixed Roof Tank Daily Emission Model Name</p>
<p>Tank Dimensions</p> <p>Shell Height (ft): Diameter (ft): Liquid Height (ft): Avg. Liquid Height (ft): Volume (gallons): Turnovers: Net Throughput (gal/yr): Is Tank Heated (Y/N):</p>	<p>40.00 35.00 40.00 40.00 52,5978.00 1.00 52,5978.00</p> <p>Y</p>
<p>Paint Characteristics</p> <p>Shell Color/Sheen: Shell Condition: Roof Color/Sheen: Roof Condition:</p>	<p>White/White Good White/White Good</p>
<p>Roof Characteristics</p> <p>Type: Height (ft): Slope (ft/ft) (Cone Roof):</p>	<p>Cone 2.00 0.27</p>
<p>Site and Tank Settings</p> <p>Vacuum Settings (psig): Pressure Settings (psig):</p>	<p>0.00 0.00</p>

Metreological Data Used in Emissions Calculations: Modesto, California (Avg Atmospheric Pressure = 14.73 psia)

TANKS 4.0.0d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Daily Emissions - Vertical Fixed Roof Tank
Modesto, California

Minor Component	Month		Daily Liquid Level Surplus (30°C)		Liquid Film		Vapor Pressure (mm Hg)		Vapor M.W.		Liquid M.W.		Vapor M.W.		Stem Sealer Penetration Classification
	Jan	Feb	Avg	Max	Avg Ft	Max	Avg	Max	Weight	Moist	Weight	Moist	Weight	Moist	
Water Vapor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.100	1.100	1.100	1.100	1.100	1.100	0.00

Options: V7.0.0 - 08/07/1993 - 2.0000

**TANKS 4.0.0d
Emissions Report - Detail Format
Detail Calculations (AP-42)**

**Daily Emissions - Vertical Fired Roof Tank
Modesto, California**

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Working Losses (lb)							0.0000					
Vapor Density (lb/cu ft)							1.070000					
Vapor Density (kg/m ³)							67.0000					
Vapor Losses (lb/day)							0.0000					
Weighted Vapor Saturation Factor							0.0000					
Total Vapor Losses (lb/day)							0.0000					
Vapor Losses (kg/day)							0.0000					
Vapor Losses (lb/year)							0.0000					
Vapor Losses (kg/year)							0.0000					
Roof Diameter (feet)							0.0000					
Roof Diameter (m)							0.0000					
Roof Slope (deg)							0.0000					
Roof Slope (rad)							0.0000					
Shield Factor (ft)							0.0000					
Vapor Density (lb/cu ft)							0.0000					
Vapor Density (kg/m ³)							0.0000					
Vapor Pressure at Daily Average Liquid Surface Temperature (psi)							0.0000					
Daily Avg. Liquid Surface Temp. (deg F)							426.0770					
Daily Avg. Liquid Surface Temp. (deg C)							213.9316					
Roof Gas Constant (ft)							0.0000					
Roof Gas Constant (m)							0.0000					
Roof Gas Constant (kg/m ³)							0.0000					
Roof Gas Constant (lb/ft ³)							0.0000					
Roof Gas Constant (kg/m ³)							0.0000					
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Roof Gas Constant (kg/m ³)							0.0000					
Roof Gas Constant (lb/ft ³)							0.0000					
Roof Gas Constant (kg/m ³)							0.0000					
Roof Gas Constant (lb/ft ³)							0.0000					
Roof Gas Constant (kg/m ³)							0.0000					
Roof Gas Constant (lb/ft ³)							0.0000					
Roof Gas Constant (kg/m ³)							0.0000					
Roof Gas Constant (lb/ft ³)							0.0000					
Roof Gas Constant (kg/m ³)							0.0000					
Roof Gas Constant (lb/ft ³)							0.0000					
Roof Gas Constant (kg/m ³)							0.0000					
Roof Gas Constant (lb/ft ³)							0.0000					
Roof Gas Constant (kg/m ³)							0.0000					
Roof Gas Constant (lb/ft ³)							0.0000					
Roof Gas Constant (kg/m ³)							0.0000					
Roof Gas Constant (lb/ft ³)							0.0000					
Roof Gas Constant (kg/m ³)							0.0000					
Roof Gas Constant (lb/ft ³)							0.0000					
Roof Gas Constant (kg/m ³)							0.0000					
Roof Gas Constant (lb/ft ³)							0.0000					
Roof Gas Constant (kg/m ³)							0.0000					
Roof Gas Constant (lb/ft ³)							0.0000					
Roof Gas Constant (kg/m ³)							0.0000					
Roof Gas Constant (lb/ft ³)							0.0000					

TANKS 4.0.Ltd
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: July

Daily Emissions - Vertical Fired Roof Tank
Modesto, California

Component	Working Level	Losses (lb)	Breathing Loss	Total Emissions
Wine 16.0 % Vol Alcohol	5.55		0.00	5.55

Appendix C

BACT Guideline 5.4.13 and Top Down VOC BACT Analysis for Wine Storage Tanks

[Per » B A C T » Bact Guideline.asp?category Level1=5&category Level2=4&category Level3=13&last Update=9 » 26 :](#)

Back

**Best Available Control Technology (BACT) Guideline 5.4.13
Last Update: 9/26/2011**

Wine Storage Tank - Non-Wood Material**

Pollutant	Achieved in Practice or 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)	

***This guideline is applicable to a wine storage tank that is not constructed out of wooden materials. ***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 of diurnal temperature variations. Tanks made entirely of non-conducting materials such as concrete (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 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. For background information, see Permit Specific BACT Determinations on [Details Page](#).

Top Down BACT Analysis for VOCs from Wine Storage Operations

Step 1 - Identify All Possible Control Technologies

The SJVUAPCD BACT Clearinghouse guideline 5.4.13 identifies achieved in practice BACT for wine storage tanks as follows:

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.

The SJVUAPCD BACT Clearinghouse guideline 5.4.13 identifies technologically feasible BACT for wine storage tanks as follows:

2. Capture of VOCs and thermal or catalytic oxidation or equivalent (98% control)
3. Capture of VOCs and carbon adsorption or equivalent (95% control)
4. Capture of VOCs and absorption or equivalent (90% control)
5. 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.*

SJVUAPCD BACT Clearinghouse guideline 5.4.13 does not identify any alternate basic equipment control alternatives.

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	Capture of VOCs and thermal oxidation or equivalent	98%*
2	Capture of VOCs and carbon adsorption or equivalent	95%
3	Capture of VOCs and absorption (scrubber) 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	Baseline (Achieved-in-Practice)

* Following recent District practice, thermal and catalytic oxidation will be ranked together.

Step 4 - Cost Effectiveness Analysis

A cost effective analysis must be performed for all control options that have not been determined to be achieved in practice in the list from Step 3 above, in the order of their ranking, to determine the cost effective option with the lowest emissions.

District BACT Policy APR 1305 establishes annual cost thresholds for imposed control based upon the amount of pollutants reduced by the controls. If the cost of control is at or below the threshold, it is considered a cost effective control. If the cost exceeds the threshold, it is not cost effective and the control is not required. Per District BACT Policy, the maximum cost limit for VOC reduction is \$17,500 per ton of VOC emissions reduced.

Uncontrolled Storage Emissions

E & J Gallo Winery is proposing to install 10 new wine storage tanks within this project. Therefore, for the purposes of this cost effectiveness analysis, uncontrolled storage VOC emissions will be set equal to the total VOC emissions allowed from all of the 10 new tanks.

Uncontrolled Storage PE = 3,370 lb-VOC/year

Total Annual Cost

Total Annual Cost = Cost of Control System + Annual Operating Cost + Ducting/Piping/CIP

The Total Annual Cost is the cumulative total of capital cost of control device, annual operating cost, plus the cost of ducting/piping/CIP. The applicant has provided capital cost estimate for control device for the each option listed below as well as the ducting/piping/CIP. As a first step, if just using the partial cost of the ductwork plus CIP system is sufficient to show that the control option is not cost effective, additional cost may not be needed for the calculation purposes for this project.

Collection System Capital Investment (based on ductwork and clean-in-place system)

A common feature of all thermal 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(s).

Basis of Cost Information:

- The costs for the ductwork and the required clean-in-place (CIP) system are based on information from the 2005 Eichleay Study. The 2005 Eichleay study was used in development of District Rule 4694 Wine Fermentation and Storage Tanks and includes substantial information on the costs and details of the potential application of VOC controls to wineries and addresses many of the technical issues of the general site specific factors for wineries.
- The District performed a cost survey of stainless steel ducting/piping and found that the values stated in the Eichleay report including the cost of inflation (applied as stated below) were less expensive; therefore, as a conservative estimate, the District will use the cost of ducting/piping

from the Eichleay report which will include ducting, fittings, bolt up, handle, and install. A summary of the ducting/piping cost survey is included in Appendix C2.

- Eichleay's cost estimate for ducting included the duct, fittings, bolt up, handle and install; therefore, the District did not allow the additional costs for foundations & supports, handling & erection, electrical, piping or painting, as allowed by the EPA Cost Manual.
- The collection system consists of stainless steel place ductwork (stainless steel is required due to food grade product status) with isolation valving, connecting the 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.
- One of the major concerns of a manifold duct system is microorganisms spoiling the product, and transferring from one tank to another. 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.
- The ducting/piping costs quoted in the Eichleay study are from 2005 and must be adjusted to reflect 2016 prices. An overall inflation amount of 21.93% which was taken from the United States Department of Labor, Bureau of Labor Statistics, Consumer Price Index (CPI) Inflation Calculator and applied to the ducting/piping costs to determine the current 2016 prices: http://www.bls.gov/data/inflation_calculator.htm.
- See Attachment C1 for ducting layout diagrams and ducting cost estimates.

Capital Cost of Ductwork

As detailed in the tank layout sketches and the ductwork cost calculations included in Attachment C1, the cost for each tank group is summarized below:

Connection from 8 tanks to main duct = 8 tanks x 39.29 feet x \$31.09/foot = \$9,772
Connection from 2 tanks to main duct = 2 tanks x 37.63 feet x \$31.09/foot = \$2,340
Main duct for storage tanks = \$3,776
Unit installed cost for 6 inch butterfly valve = \$2,125/valve x 10 valves x 1 system = \$21,250
Unit installed cost one foot removable spool = \$500/tank x 10 tanks x 1 system = \$5,000
1 Knockout drum = \$23,000
Duct support allowance = \$25,000

Total for 10 tanks = \$9,772 + \$2,340 + \$3,776 + \$21,250 + \$5,000 + \$23,000 + \$25,000
= **\$90,138**

Total Capital Cost for All Tank Groups:

The total capital cost of the ductwork for all five tank groups is summarized in the table below:

Tank Group	Total Ducting Cost Including Support Allowance
Total	\$90,138

Capital Cost of Ductwork for Wine Storage Tanks	
Cost Description	Cost (\$)
Combined Duct Estimate for all Tank Groups (See Duct Sizing in Attachment C1)	\$90,138
Adjusting factor for inflation from 2005 dollars to 2016 dollars (21.93% total increase)	1.2193
Inflation adjusted duct cost	\$109,905
The following cost data is taken from EPA Control Cost Manual, Sixth Edition (EPA/452/B-02-001).	
Direct Costs	
Base Equipment Costs (Ductwork) See Above	\$109,905
Instrumentation (not required)	-
Sales Tax - 3.31% of base equipment	\$3,638
Freight - 5% of base equipment	\$5,495
Purchased equipment cost (PEC)	\$119,038
Foundations & supports 8% (allowance already included in cost estimate)	-
Handling & erection 14% (already included in Eichleay cost estimate)	-
Electrical 4% (not required)	-
Piping 2% (not required)	-
Painting 1% (not required)	-
Insulation 1% of PEC	\$1,190
Direct Installation Costs (DIC)	\$1,190
Total Direct Costs (DC) (PEC + DIC)	\$120,228
Indirect Costs	
Engineering - 10% of PEC	\$11,904
Construction and field expenses - 5% of PEC	\$5,952
Contractor Fees - 10% of PEC	\$11,904
Start-up - 2% of PEC	\$2,381
Performance Test - 1% of PEC	\$1,190
Total Indirect Costs (IC)	\$33,331

Subtotal Capital Investment (SCI) (DC + IC)	\$153,559
Contingencies – 15% of SCI	\$23,034
Total Capital Investment (TCI) (SCI + Contingency)	\$176,593

Capital Cost 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. Most likely, these costs will be significant.

Capital Cost of Clean-In-Place (CIP) System of Ductwork for Wine Storage Tanks	
Cost Description	Cost (\$)
Current cost of CIP system	\$75,000
The following cost data is taken from EPA Control Cost Manual, Sixth Edition (EPA/452/B-02-001).	
Direct Costs	
Base Equipment Costs (CIP System) See Above	\$75,000
Instrumentation - 10% of base equipment	\$7,500
Sales Tax - 3.31% of base equipment	\$2,483
Freight - 5% of base equipment	\$3,750
Purchased equipment cost (PEC)	\$88,733
Foundations & supports - 8% of PEC	\$7,099
Handling & erection - 14% of PEC	\$12,423
Electrical - 4% of PEC	\$3,549
Piping – accounted for in ductwork cost	-
Painting - 1% of PEC	\$ 887
Insulation - 1% of PEC	\$ 887
Direct Installation Costs (DIC)	\$24,845
Total Direct Costs (DC) (PEC + DIC)	\$113,578
Indirect Costs	
Engineering - 10% of PEC	\$8,873
Construction and field expenses - 5% of PEC	\$4,437
Contractor fees - 10% of PEC	\$8,873
Start-up - 2% of PEC	\$1,775
Performance test - 1% of PEC	\$ 887
Total Indirect Costs (IC)	\$24,845
Subtotal Capital Investment (SCI)	\$138,423

(DC + IC)	
Contingencies - 15% of SCI	\$20,763
Total Capital Investment (TCI) (SCI + Contingency)	\$159,186

Annualized Capital Cost

Total capital costs = Ductwork + CIP System
= \$176,593 + \$159,186
= \$335,779

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,

Total Collection System Annualized Capital Investment = \$335,779 x 0.163

Total Collection System Annualized Capital Investment = \$54,732

Option 1 - Collection of VOCs and Control by Thermal or Catalytic Oxidation (98% collection & control):

Total Annual Cost

The applicant has provided capital cost estimate for add on control device as well as the ducting/piping/CIP.

Total Annual Cost = Ductwork + CIP System
= \$54,732

Emission Reductions

Annual Emission Reduction = Uncontrolled Emissions x 0.98
= 3,370 lb-VOC/year x 0.98
= 3,303 lb-VOC/year
= 1.65 tons-VOC/year

Cost Effectiveness

Cost Effectiveness = Total Annual Cost ÷ Annual Emission Reductions

Cost Effectiveness = \$54,732/year ÷ 1.65 tons-VOC/year
= \$33,171/ton-VOC

The analysis demonstrates that the annualized purchase cost of the required collection system ductwork equipment alone results in a cost effectiveness which exceeds the District's Guideline of \$17,500/ton-VOC. Therefore this option is not cost-effective and will not be considered for this project.

Option 2 - Collection of VOCs and control by carbon adsorption (95% collection and control):

Total Annual Cost

Total Annual Cost = Ductwork + CIP System
= \$54,732

Emission Reductions

Annual Emission Reduction = Uncontrolled Emissions x 0.95
= 3,370 lb-VOC/year x 0.95
= 3,202 lb-VOC/year
= 1.6 tons-VOC/year

Cost Effectiveness

Cost Effectiveness = Total Annual Cost ÷ Annual Emission Reductions

Cost Effectiveness = \$54,732/year ÷ 1.6 tons-VOC/year
= \$34,208/ton-VOC

The analysis demonstrates that the annualized purchase cost of the required collection system ductwork equipment alone results in a cost effectiveness which exceeds the District's Guideline of \$17,500/ton-VOC. Therefore this option is not cost-effective and will not be considered for this project.

Option 3 - Collection of VOCs and Control by Absorption/Scrubber (90% collection & control):

Total Annual Cost

Total Annual Cost = Ductwork + CIP System
= \$54,732

Emission Reductions

Annual Emission Reduction = Uncontrolled Emissions x 0.90
= 3,370 lb-VOC/year x 0.90
= 3,033 lb-VOC/year
= 1.5 tons-VOC/year

Cost Effectiveness

Cost Effectiveness = Total Annual Cost ÷ Annual Emission Reductions

$$\begin{aligned}\text{Cost Effectiveness} &= \$54,732/\text{year} \div 1.5 \text{ tons-VOC/year} \\ &= \$36,488/\text{ton-VOC}\end{aligned}$$

The analysis demonstrates that the annualized purchase cost of the required collection system ductwork equipment alone results in a cost effectiveness which exceeds the District's Guideline of \$17,500/ton-VOC. Therefore this option is not cost-effective and will not be considered for this project.

Option 4 - Capture of VOCs and Condensation (70% collection & control):

Total Annual Cost

$$\begin{aligned}\text{Total Annual Cost} &= \text{Ductwork} + \text{CIP System} \\ &= \$54,732\end{aligned}$$

Emission Reductions

$$\begin{aligned}\text{Annual Emission Reduction} &= \text{Uncontrolled Emissions} \times 0.70 \\ &= 3,370 \text{ lb-VOC/year} \times 0.70 \\ &= 2,359 \text{ lb-VOC/year} \\ &= 1.18 \text{ tons-VOC/year}\end{aligned}$$

Cost Effectiveness

Cost Effectiveness = Total Annual Cost ÷ Annual Emission Reductions

$$\begin{aligned}\text{Cost Effectiveness} &= \$54,732/\text{year} \div 1.18 \text{ tons-VOC/year} \\ &= \$46,383/\text{ton-VOC}\end{aligned}$$

The analysis demonstrates that the annualized purchase cost of the required collection system ductwork equipment alone results in a cost effectiveness which exceeds the District's Guideline of \$17,500/ton-VOC. Therefore this option is not cost-effective and will not be considered for this project.

Option 5 - Insulation, PVRV, "Gas-Tight" Tank Operation, and Storage Temperature not Exceeding 75 deg F, Achieved within 60 days of Completion of Fermentation):

The only remaining control option in step 3 above has been deemed AIP for this class and category of source and per the District BACT policy is required regardless of the cost. Therefore, a cost effectiveness analysis is not required.

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. Each of these wine storage tanks is already equipped and/or operated in a manner that complies with Option 5, 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 ATC as enforceable conditions.

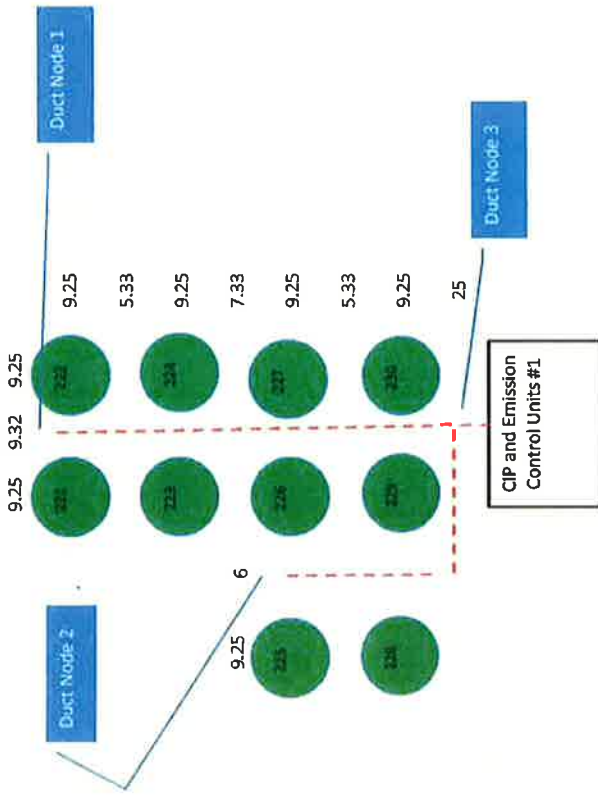
Attachment C1

Ducting Layout Diagrams and
Ducting Cost Estimates

Tanks are for storage only.

The tanks in this diagram are graphically shown as the same size for convenience of the spread sheet layout. The numbers in the cells around the tank layout reflect spacing and tank dimensions from the data base and layout Auto Cad files. Only the main duct between the tanks are shown. The connections from the tank to the main duct are priced out in the duct cost tabs. Total tanks in this sketch 10

Red dashed line is the most probable duct routing. Blue call out boxes show where a duct intersects with another duct or where a duct begins.



Nominal duct size is the smallest duct size for which we have pricing. The adjusted duct size is the size that was selected for the calculated flow. This size was not set smaller than 3 inches to maintain some structural rigidity in the duct piping system. The adjust price is based on a ratio of the duct sized based on flow to the closest nominal size for which we have pricing. (Circumference Size 1/Circumference Size 2)

Comments	Connection Length from Tanks to Main Ducts (Main is about 10 feet from floor)		Total Length of Connection Piping in Feet	Design Duct Velocity from Eichleay Feet/Second	Gas Flow Rate Storage Fill in CFM for One Tank	Duct size from Tank to main diameter in inches	Nominal Duct Size diameter in inches (See comments)	Number of Tanks to connect	Valve and Spool Isolation Components Allocation at Each Tank from Previous Work		Adjusted Duct Size inches	Cost Per Foot from Eichleay (See Comments)	Cost of Ducting for Main Duct
	39.29	37.63							\$21,000	\$5,250			
20500 Gallon Tank	8.00	2.00	314.28	40.00	4.38	0.58	6.00	8.00			3.00	\$31.09	\$30,770
20500 Gallon Tank			75.25	40.00	4.38	0.58	6.00	2.00			3.00	\$31.09	\$7,589

Main Ducting Sizing	Beginning Node	Ending Node	Number of tanks feeding ending node	Tanks Pumping. This is set at 50%	Design Duct Velocity from Eichleay Feet/Second	Duct size main diameter in inches (See comments)	Nominal Duct Size diameter in inches (See comments)	Total Length of Piping in Feet Connecting Nodes	Adjusted duct Size Diameter inches	Cost Per Foot from Eichleay (See Comments)	Cost of Ducting for Main Duct
	1	3	8.00	4	40.00	1.16	6	55	3.00	\$31.09	\$1,721
	2	3	2.00	1	40.00	0.58	6	41	3.00	\$31.09	\$1,278
	3	Emissions	10.00	5	40.00	1.29	6	25	3.00	\$31.09	\$777

Knock Out Drum Eichleay Structural Support Allowance

Total \$90,135

Eichleay used \$46,000. Due to the low flows and the small wine tank size, this has been cut to \$23,000.

Attachment C2

Comparison of Stainless Steel Ducting Costs

Supplier: Del Paso Pipe & Steel Inc. (<http://www.delpasopipeandsteel.com/>) Location: Sacramento, CA

Schedule 5/10 Pipe:													
Duct Size Diameter (in.)	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
Price Quote \$9/lb													
Estimated Price/Foot							\$217.00	\$250.00	\$286.00	\$322.00	\$432.00		

Supplier: Hayward Pipe & Supply Co. Inc (<http://www.haywardpipe.com/>) Location: Hayward, CA

Note: large diameter pipe ships from Texas. FREIGHT NOT QUOTED - Additional Shipping Costs apply

Schedule 10 Pipe													
Duct Size Diameter (in.)	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
Price (\$)							\$1,540.00	\$2,268.00	\$2,940.00	\$3,276.00	\$3,696.00		
Length (feet)							20	20	20	20	20		
Price/Foot (\$)							\$77.00	\$113.40	\$147.00	\$163.80	\$184.80		

Supplier: OnlineMetals.com (<http://www.onlinemetals.com/>) Location: Nearest Warehouse - Los Angeles, CA

Schedule 10 Pipe													
Duct Size Diameter (in.)	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
Price (\$)	\$78.28	\$108.97	\$160.34	\$288.00	\$520.00								
Length (feet)	8	8	8	8	8								
Price/Foot (\$)	\$9.79	\$13.62	\$20.04	\$36.00	\$65.00								
Welded Stainless Tube 304/304L 1/2" OD, 0.12" Wall; 3" OD, 0.12" Wall; 6", 0.12"													
Duct Size Diameter (in.)	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
Price (\$)	\$109.86	\$321.34		\$628.16									
Length (feet)	8	8		8									
Price/Foot (\$)	\$13.73	\$40.17		\$78.52									

Supplier: Lone Star Supply Co Location: Dickinson, TX

Note: Additional shipping costs

Schedule 10 Welded Pipe													
Duct Size Diameter (in.)	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
Price/Foot (\$)			\$16.45	\$19.60	\$21.50	\$30.50	\$39.00			\$81.25			\$230.00

Supplier: Global Technology and Engineering Location: Excelsior Springs, MO

Note: Additional shipping costs

11 Gauge Tubing													
Duct Size Diameter (in.)	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
Price (\$)			\$226.58	\$487.40									
Length (feet)			7	7									
Price/Foot (\$)			\$32.37	\$69.63									

Only suppliers that have both 3" and 6" All suppliers \$30.85 \$44.13 70%
 \$30.85 \$57.26 54% 33-50034

Appendix D

E & J Gallo Winery Statewide Compliance Certification



E&J Gallo Winery

December 22, 2016

Mr. Rupi Gill
San Joaquin Valley Air Pollution Control District
4800 Enterprise Way
Modesto CA, 95356

Subject: Compliance Statement for E&J Gallo Winery - Modesto

Dear Mr. Gill

In accordance with Rule 2201, Section 4.15 "Additional Requirements for New Major Sources and Federal Major Modifications," E&J Gallo Winery – Modesto is pleased to provide this compliance statement regarding its proposed (10) Wine Storage Tanks project N-1162270.

All major stationary sources in California owned or operated by E&J Gallo Winery – Modesto, or by any entity controlling, controlled by, or under common control with E&J Gallo Winery – Modesto, and which are subject to emission limitations, are in compliance or on schedule for compliance with all applicable emission limitations and standards. These sources include the following facility:

E&J Gallo Winery; 600 Yosemite Blvd. Modesto, CA 95354

Based on the information and belief formed after reasonable inquiry, the statement and information in the document are true, accurate, and complete.

Please contact me if you have any questions regarding this certification.

Sincerely,

A handwritten signature in cursive script that reads "William Stewart".

William Stewart
Vice President – Modesto Operations



San Joaquin Valley Unified Air Pollution Control District



TITLE V MODIFICATION - COMPLIANCE CERTIFICATION FORM

I. TYPE OF PERMIT ACTION (Check appropriate box)

- SIGNIFICANT PERMIT MODIFICATION ADMINISTRATIVE AMENDMENT
 MINOR PERMIT MODIFICATION

COMPANY NAME: E&J Gallo Winery	FACILITY ID: N- 3386
1. Type of Organization: <input checked="" type="checkbox"/> Corporation <input type="checkbox"/> Sole Ownership <input type="checkbox"/> Government <input type="checkbox"/> Partnership <input type="checkbox"/> Utility	
2. Owner's Name: E&J Gallo Winery	
3. Agent to the Owner: Mathew Hart	

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

- 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).
- 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.
- Corrected information will be provided to the District when I become aware that incorrect or incomplete information has been submitted.
- 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.
- For minor modifications, this application meets the criteria for use of minor permit modification procedures pursuant to District Rule 2520.

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

William Stewart

Signature of Responsible Official

12/13/16

Date

William Stewart

Name of Responsible Official (please print)

Vice President of Operations

Title of Responsible Official (please print)

Appendix E

Quarterly Net Emissions Change (QNEC) Calculations

Quarterly Net Emissions Change (QNEC)

The Quarterly Net Emissions Change is used to complete the emission profile screen for the District's PAS database. Since these tanks are all new emission units, the QNEC shall be calculated as follows:

QNEC = PE2 - PE1, where:

- QNEC = Quarterly Net Emissions Change for each emissions unit, lb/qtr.
- PE2 = Post Project Potential to Emit for each emissions unit, lb/qtr.
- PE1 = Pre-Project Potential to Emit for each emissions unit, lb/qtr.

Using the values in Sections VII.C.2 and VII.C.6 in the evaluation above, quarterly PE2 and quarterly PE1 can be calculated as follows:

N-3386-512-0 through '-521 (20,500 gallon storage tanks):

$$\begin{aligned} PE2_{\text{quarterly}} &= PE2_{\text{annual}} \div 4 \text{ quarters/year} \\ &= 337 \text{ lb/year} \div 4 \text{ qtr/year} \\ &= 84.25 \text{ lb VOC/qtr} \end{aligned}$$

$$\begin{aligned} PE1_{\text{quarterly}} &= PE1_{\text{annual}} \div 4 \text{ quarters/year} \\ &= 0 \text{ lb/year} \div 4 \text{ qtr/year} \\ &= 0 \text{ lb VOC/qtr} \end{aligned}$$

Quarterly NEC [QNEC]			
Pollutant	PE2 (lb/qtr)	PE1 (lb/qtr)	QNEC (lb/qtr)
VOC	84.25	0	84.25

Appendix F

SSPE1 Information

have been banked since September 19, 1991 for Actual Emissions Reductions (AER) that have occurred at the source, and which have not been used on-site.

The SSPE1 is taken as the SSPE2 from Project N-1153170 and summarized below:

SSPE1 (lb/year)					
Permit Unit	NO _x	SO _x	PM ₁₀	CO	VOC
SSPE1 – N-3386	9,191	779	72,522	50,930	77,548
SSPE1 – N-7478	6,603	176	473	5,221	277,085
Total w/o ERC	15,794	955	72,995	56,151	354,633
ERC N-260-3	0	0	0	783	0
ERC N-849-2	125	0	0	0	0
SSPE1	15,919	955	72,995	56,934	354,633

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

Pursuant to District Rule 2201, the SSPE2 is the PE from all units with valid ATCs or PTOs at the Stationary Source and the quantity of ERCs which have been banked since September 19, 1991 for AER that have occurred at the source, and which have not been used on-site.

SSPE2 (lb/year)					
Permit Unit	NO _x	SO _x	PM ₁₀	CO	VOC
SSPE2 – N-3386	9,191	779	72,522	50,930	77,548
SSPE2 – N-7478	6,603	176	473	5,221	277,085
ATC N-3386-507-0	576	25	11	108	108
Total w/o ERC	16,370	980	73,006	56,259	354,741
ERC N-260-3	0	0	0	783	0
ERC N-849-2	125	0	0	0	0
SSPE2	16,495	980	73,006	57,042	354,741

5. Major Source Determination

Rule 2201 Major Source Determination:

Pursuant to District Rule 2201, a Major Source is a stationary source with a SSPE2 equal to or exceeding one or more of the following threshold values. For the purposes of determining major source status the following shall not be included:

- any ERCs associated with the stationary source
- Emissions from non-road IC engines (i.e. IC engines at a particular site at the facility for less than 12 months)
- Fugitive emissions, except for the specific source categories specified in 40 CFR 51.165.

Permit Unit	Daily EF	Annual EF	Tank Capacity	Turnover rate	Turnover rate	Daily	Annual
	(lb-VOC/1,000 gal)		(gallon)	(tank/day)	(tank/yr)	(lb/day)	(lb/yr)
N-3386-508-0	0.318	0.185	10,919	1	365	3.5	737
N-3386-509-0	0.318	0.185	10,920	1	365	3.5	737
N-3386-510-0	0.318	0.185	10,918	1	365	3.5	737
N-3386-511-0	0.318	0.185	328,577	1	365	104.5	22,187

VIII. Compliance Determination

Rule 2020 Exemptions

The District began permitting winery operations and equipment on August 21, 2005, since each of these tanks was installed and has been operated since this date. Therefore, a permit was not required at the time of installation. Per Section 9 of this rule, the owner or operator of an emissions unit that was exempt from written permits at the time of installation, which becomes subject to the provisions of District Rule 2010 (Permits Required) through loss of exemption, but shall not be subject to District Rule 2201 (New and Modified Stationary Source Review Rule) unless such time that the emissions unit is modified or replaced.

Rule 2201 New and Modified Stationary Source Review Rule

An emission unit that was installed at a time when permits were not required is exempt from the District Rule 2201 for the initial permitting action (per District Rule 2020, Section 9.0). Therefore, as shown above, these units are not subject to the requirements of this Rule.

Rule 2410 Prevention of Significant Deterioration

The provisions of this rule shall apply to any source and the owner or operator of any source subject to any requirements under Title 40 Code of Federal Regulations (40 CFR) Part 52.21 as incorporated into this rule.

Per engineering evaluation under District project N-1153671, the facility is not an existing major source for PSD for any pollutant. In addition, greenhouse gases are not expected from the proposed wine storage operations. Therefore, the proposed project is not subject to the requirements of this rule and no further discussion is required.

Rule 2520 Federally Mandated Operating Permits

Per Section 6.4.4 of this rule, the existing tanks involved in this project will be incorporated into the facility's Title V permit during the next Title V permit renewal.

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 storage operation.

Appendix G

Draft ATCs N-3386-512-0 through '-521-0

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: N-3386-512-0

LEGAL OWNER OR OPERATOR: E & J GALLO WINERY
MAILING ADDRESS: ATTN: MATT HART
600 YOSEMITE BLVD
MODESTO, CA 95354

LOCATION: 600 YOSEMITE BLVD
MODESTO, CA 95354

EQUIPMENT DESCRIPTION:

20,500 GALLON NOMINAL STAINLESS STEEL WINE STORAGE TANK (TANK 221) EQUIPPED WITH INSULATION AND PRESSURE/VACUUM RELIEF VALVE

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 quantity of emissions: 1st quarter - 126 lb, 2nd quarter - 126 lb, 3rd quarter - 127 lb, and fourth quarter - 127 lb. These amounts include the applicable offset ratio specified in Rule 2201 Section 4.8 (as amended 2/18/16). [District Rule 2201] Federally Enforceable Through Title V Permit
4. ERC Certificate Numbers S-4727-1 (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. This tank shall be used exclusively for wine storage operations only and not for fermentation. [District Rule 2201] Federally Enforceable Through Title V Permit

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

Arnaud Marjolle, Director of Permit Services

N-3386-512-0 Dec 16 2016 1:48PM -- GILLR Joint Inspection NOT Required

6. The nominal tank dimensions are 9.25 feet in diameter and 40 feet in height with a proposed volume of 20,500 gallons. The permittee shall submit to the District the gauge volume of the tank within 30 days of the actual tank capacity measurement. [District Rule 2201] Federally Enforceable Through Title V Permit
7. 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] Federally Enforceable Through Title V Permit
8. 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] Federally Enforceable Through Title V Permit
9. 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] Federally Enforceable Through Title V Permit
10. The weighted annual average ethanol content of wine stored in this tank, calculated on a rolling 12-month basis, shall not exceed 21 percent by volume. [District Rule 2201] Federally Enforceable Through Title V Permit
11. The maximum wine storage throughput in this tank shall not exceed 20,500 gallons per day. [District Rule 2201] Federally Enforceable Through Title V Permit
12. The maximum wine storage emissions in this tank, calculated on a rolling 12-month basis, shall not exceed 337 lb-VOC/year (equivalent to 7,300,000 gallons of wine throughput per year). [District Rule 2201] Federally Enforceable Through Title V Permit
13. 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] Federally Enforceable Through Title V Permit
14. 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
15. The operator shall maintain records of the calculated rolling 12-month wine ethanol content and storage throughput rate (ethanol percentage by volume and gallons per rolling 12-month period, calculated monthly). [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
16. If the throughput or ethanol content calculated for any rolling 12-month period exceeds the annual throughput or ethanol content limitations of this permit, in a crush season in which the start of the crush season (defined as the day on which the facility's seasonal crushing/fermentation operations commence) occurs less than 365 days after the start of the previous crush season, then no violation of the throughput or ethanol content limits for that rolling 12-month period will be deemed to have occurred so long as the calendar year throughput and ethanol content are below the annual throughput and ethanol content limitations. [District Rule 2201] Federally Enforceable Through Title V Permit
17. Records shall be maintained that demonstrate the date of each year's start of crush season. [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
18. 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

DRAFT

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: N-3386-513-0

LEGAL OWNER OR OPERATOR: E & J GALLO WINERY
MAILING ADDRESS: ATTN: MATT HART
600 YOSEMITE BLVD
MODESTO, CA 95354

LOCATION: 600 YOSEMITE BLVD
MODESTO, CA 95354

EQUIPMENT DESCRIPTION:

20,500 GALLON NOMINAL STAINLESS STEEL WINE STORAGE TANK (TANK 222) EQUIPPED WITH INSULATION AND PRESSURE/VACUUM RELIEF VALVE

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 quantity of emissions: 1st quarter - 126 lb, 2nd quarter - 126 lb, 3rd quarter - 127 lb, and fourth quarter - 127 lb. These amounts include the applicable offset ratio specified in Rule 2201 Section 4.8 (as amended 2/18/16). [District Rule 2201] Federally Enforceable Through Title V Permit
4. ERC Certificate Numbers S-4727-1 (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. This tank shall be used exclusively for wine storage operations only and not for fermentation. [District Rule 2201] Federally Enforceable Through Title V Permit

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

Arnaud Marjolle, Director of Permit Services

N-3386-513-0 Dec 16 2016 1:40PM - GILLR : Joint Inspection NOT Required

6. The nominal tank dimensions are 9.25 feet in diameter and 40 feet in height with a proposed volume of 20,500 gallons. The permittee shall submit to the District the gauge volume of the tank within 30 days of the actual tank capacity measurement. [District Rule 2201] Federally Enforceable Through Title V Permit
7. 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] Federally Enforceable Through Title V Permit
8. 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] Federally Enforceable Through Title V Permit
9. 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] Federally Enforceable Through Title V Permit
10. The weighted annual average ethanol content of wine stored in this tank, calculated on a rolling 12-month basis, shall not exceed 21 percent by volume. [District Rule 2201] Federally Enforceable Through Title V Permit
11. The maximum wine storage throughput in this tank shall not exceed 20,500 gallons per day. [District Rule 2201] Federally Enforceable Through Title V Permit
12. The maximum wine storage emissions in this tank, calculated on a rolling 12-month basis, shall not exceed 337 lb-VOC/year (equivalent to 7,300,000 gallons of wine throughput per year). [District Rule 2201] Federally Enforceable Through Title V Permit
13. 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] Federally Enforceable Through Title V Permit
14. 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
15. The operator shall maintain records of the calculated rolling 12-month wine ethanol content and storage throughput rate (ethanol percentage by volume and gallons per rolling 12-month period, calculated monthly). [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
16. If the throughput or ethanol content calculated for any rolling 12-month period exceeds the annual throughput or ethanol content limitations of this permit, in a crush season in which the start of the crush season (defined as the day on which the facility's seasonal crushing/fermentation operations commence) occurs less than 365 days after the start of the previous crush season, then no violation of the throughput or ethanol content limits for that rolling 12-month period will be deemed to have occurred so long as the calendar year throughput and ethanol content are below the annual throughput and ethanol content limitations. [District Rule 2201] Federally Enforceable Through Title V Permit
17. Records shall be maintained that demonstrate the date of each year's start of crush season. [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
18. 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

DRAFT

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: N-3386-514-0

LEGAL OWNER OR OPERATOR: E & J GALLO WINERY
MAILING ADDRESS: ATTN: MATT HART
600 YOSEMITE BLVD
MODESTO, CA 95354

LOCATION: 600 YOSEMITE BLVD
MODESTO, CA 95354

EQUIPMENT DESCRIPTION:
20,500 GALLON NOMINAL STAINLESS STEEL WINE STORAGE TANK (TANK 223) WITH INSULATION AND PRESSURE/VACUUM RELIEF VALVE

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 quantity of emissions: 1st quarter - 126 lb, 2nd quarter - 126 lb, 3rd quarter - 127 lb, and fourth quarter - 127 lb. These amounts include the applicable offset ratio specified in Rule 2201 Section 4.8 (as amended 2/18/16). [District Rule 2201] Federally Enforceable Through Title V Permit
4. ERC Certificate Numbers S-4727-1 (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. This tank shall be used exclusively for wine storage operations only and not for fermentation. [District Rule 2201] Federally Enforceable Through Title V Permit

CONDITIONS CONTINUE ON NEXT PAGE

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Seyed Sadredin, Executive Director / APCO

Arnaud Marjolle, Director of Permit Services

N-3386-514-0 Dec 15 2016 1:46PM - GILLR - Joint Inspection NOT Required

Northern Regional Office • 4800 Enterprise Way • Modesto, CA 95356-8718 • (209) 557-6400 • Fax (209) 557-6475

6. The nominal tank dimensions are 9.25 feet in diameter and 40 feet in height with a proposed volume of 20,500 gallons. The permittee shall submit to the District the gauge volume of the tank within 30 days of the actual tank capacity measurement. [District Rule 2201] Federally Enforceable Through Title V Permit
7. 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] Federally Enforceable Through Title V Permit
8. 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] Federally Enforceable Through Title V Permit
9. 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] Federally Enforceable Through Title V Permit
10. The weighted annual average ethanol content of wine stored in this tank, calculated on a rolling 12-month basis, shall not exceed 21 percent by volume. [District Rule 2201] Federally Enforceable Through Title V Permit
11. The maximum wine storage throughput in this tank shall not exceed 20,500 gallons per day. [District Rule 2201] Federally Enforceable Through Title V Permit
12. The maximum wine storage emissions in this tank, calculated on a rolling 12-month basis, shall not exceed 337 lb-VOC/year (equivalent to 7,300,000 gallons of wine throughput per year). [District Rule 2201] Federally Enforceable Through Title V Permit
13. 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] Federally Enforceable Through Title V Permit
14. 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
15. The operator shall maintain records of the calculated rolling 12-month wine ethanol content and storage throughput rate (ethanol percentage by volume and gallons per rolling 12-month period, calculated monthly). [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
16. If the throughput or ethanol content calculated for any rolling 12-month period exceeds the annual throughput or ethanol content limitations of this permit, in a crush season in which the start of the crush season (defined as the day on which the facility's seasonal crushing/fermentation operations commence) occurs less than 365 days after the start of the previous crush season, then no violation of the throughput or ethanol content limits for that rolling 12-month period will be deemed to have occurred so long as the calendar year throughput and ethanol content are below the annual throughput and ethanol content limitations. [District Rule 2201] Federally Enforceable Through Title V Permit
17. Records shall be maintained that demonstrate the date of each year's start of crush season. [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
18. 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

DRAFT

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: N-3386-515-0

LEGAL OWNER OR OPERATOR: E & J GALLO WINERY
MAILING ADDRESS: ATTN: MATT HART
600 YOSEMITE BLVD
MODESTO, CA 95354

LOCATION: 600 YOSEMITE BLVD
MODESTO, CA 95354

EQUIPMENT DESCRIPTION:
20,500 GALLON NOMINAL STAINLESS STEEL WINE STORAGE TANK (TANK 224) WITH INSULATION AND PRESSURE/VACUUM VALVE

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 quantity of emissions: 1st quarter - 126 lb, 2nd quarter - 126 lb, 3rd quarter - 127 lb, and fourth quarter - 127 lb. These amounts include the applicable offset ratio specified in Rule 2201 Section 4.8 (as amended 2/18/16). [District Rule 2201] Federally Enforceable Through Title V Permit
4. ERC Certificate Numbers S-4727-1 (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. This tank shall be used exclusively for wine storage operations only and not for fermentation. [District Rule 2201] Federally Enforceable Through Title V Permit

CONDITIONS CONTINUE ON NEXT PAGE

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Seyed Sadredin, Executive Director, APCO

Arnaud Marjolle, Director of Permit Services

N-3386-515-0 Dec 15 2016 1:45PM -- GILLR Joint Inspection NOT Required

6. The nominal tank dimensions are 9.25 feet in diameter and 40 feet in height with a proposed volume of 20,500 gallons. The permittee shall submit to the District the gauge volume of the tank within 30 days of the actual tank capacity measurement. [District Rule 2201] Federally Enforceable Through Title V Permit
7. 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] Federally Enforceable Through Title V Permit
8. 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] Federally Enforceable Through Title V Permit
9. 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] Federally Enforceable Through Title V Permit
10. The weighted annual average ethanol content of wine stored in this tank, calculated on a rolling 12-month basis, shall not exceed 21 percent by volume. [District Rule 2201] Federally Enforceable Through Title V Permit
11. The maximum wine storage throughput in this tank shall not exceed 20,500 gallons per day. [District Rule 2201] Federally Enforceable Through Title V Permit
12. The maximum wine storage emissions in this tank, calculated on a rolling 12-month basis, shall not exceed 337 lb-VOC/year (equivalent to 7,300,000 gallons of wine throughput per year). [District Rule 2201] Federally Enforceable Through Title V Permit
13. 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] Federally Enforceable Through Title V Permit
14. 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
15. The operator shall maintain records of the calculated rolling 12-month wine ethanol content and storage throughput rate (ethanol percentage by volume and gallons per rolling 12-month period, calculated monthly). [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
16. If the throughput or ethanol content calculated for any rolling 12-month period exceeds the annual throughput or ethanol content limitations of this permit, in a crush season in which the start of the crush season (defined as the day on which the facility's seasonal crushing/fermentation operations commence) occurs less than 365 days after the start of the previous crush season, then no violation of the throughput or ethanol content limits for that rolling 12-month period will be deemed to have occurred so long as the calendar year throughput and ethanol content are below the annual throughput and ethanol content limitations. [District Rule 2201] Federally Enforceable Through Title V Permit
17. Records shall be maintained that demonstrate the date of each year's start of crush season. [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
18. 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

DRAFT

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: N-3386-516-0

LEGAL OWNER OR OPERATOR: E & J GALLO WINERY
MAILING ADDRESS: ATTN: MATT HART
600 YOSEMITE BLVD
MODESTO, CA 95354

LOCATION: 600 YOSEMITE BLVD
MODESTO, CA 95354

EQUIPMENT DESCRIPTION:
20,500 GALLON NOMINAL STAINLESS STEEL WINE STORAGE TANK (TANK 225) WITH INSULATION AND PRESSURE/VACUUM VALVE

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 quantity of emissions: 1st quarter - 126 lb, 2nd quarter - 126 lb, 3rd quarter - 127 lb, and fourth quarter - 127 lb. These amounts include the applicable offset ratio specified in Rule 2201 Section 4.8 (as amended 2/18/16). [District Rule 2201] Federally Enforceable Through Title V Permit
4. ERC Certificate Numbers S-4727-1 (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. This tank shall be used exclusively for wine storage operations only and not for fermentation. [District Rule 2201] Federally Enforceable Through Title V Permit

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

Arnaud Marjolle, Director of Permit Services

N-3386-516-0 Dec 15 2016 1:46PM - GILLR Joint Inspection NOT Required

6. The nominal tank dimensions are 9,25 feet in diameter and 40 feet in height with a proposed volume of 20,500 gallons. The permittee shall submit to the District the gauge volume of the tank within 30 days of the actual tank capacity measurement. [District Rule 2201] Federally Enforceable Through Title V Permit
7. 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] Federally Enforceable Through Title V Permit
8. 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] Federally Enforceable Through Title V Permit
9. 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] Federally Enforceable Through Title V Permit
10. The weighted annual average ethanol content of wine stored in this tank, calculated on a rolling 12-month basis, shall not exceed 21 percent by volume. [District Rule 2201] Federally Enforceable Through Title V Permit
11. The maximum wine storage throughput in this tank shall not exceed 20,500 gallons per day. [District Rule 2201] Federally Enforceable Through Title V Permit
12. The maximum wine storage emissions in this tank, calculated on a rolling 12-month basis, shall not exceed 337 lb-VOC/year (equivalent to 7,300,000 gallons of wine throughput per year). [District Rule 2201] Federally Enforceable Through Title V Permit
13. 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] Federally Enforceable Through Title V Permit
14. 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
15. The operator shall maintain records of the calculated rolling 12-month wine ethanol content and storage throughput rate (ethanol percentage by volume and gallons per rolling 12-month period, calculated monthly). [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
16. If the throughput or ethanol content calculated for any rolling 12-month period exceeds the annual throughput or ethanol content limitations of this permit, in a crush season in which the start of the crush season (defined as the day on which the facility's seasonal crushing/fermentation operations commence) occurs less than 365 days after the start of the previous crush season, then no violation of the throughput or ethanol content limits for that rolling 12-month period will be deemed to have occurred so long as the calendar year throughput and ethanol content are below the annual throughput and ethanol content limitations. [District Rule 2201] Federally Enforceable Through Title V Permit
17. Records shall be maintained that demonstrate the date of each year's start of crush season. [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
18. 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

DRAFT

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: N-3386-517-0

LEGAL OWNER OR OPERATOR: E & J GALLO WINERY
MAILING ADDRESS: ATTN: MATT HART
600 YOSEMITE BLVD
MODESTO, CA 95354

LOCATION: 600 YOSEMITE BLVD
MODESTO, CA 95354

EQUIPMENT DESCRIPTION:
20,500 GALLON NOMINAL STAINLESS STEEL WINE STORAGE TANK (TANK 226) WITH INSULATION AND PRESSURE/VACUUM VALVE

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 quantity of emissions: 1st quarter - 126 lb, 2nd quarter - 126 lb, 3rd quarter - 127 lb, and fourth quarter - 127 lb. These amounts include the applicable offset ratio specified in Rule 2201 Section 4.8 (as amended 2/18/16). [District Rule 2201] Federally Enforceable Through Title V Permit
4. ERC Certificate Numbers S-4727-1 (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. This tank shall be used exclusively for wine storage operations only and not for fermentation. [District Rule 2201] Federally Enforceable Through Title V Permit

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

Arnaud Marjolle, Director of Permit Services

N-3386-517-0 Dec 15 2016 1:46PM - GILLR Joint Inspection NOT Required

6. The nominal tank dimensions are 9.25 feet in diameter and 40 feet in height with a proposed volume of 20,500 gallons. The permittee shall submit to the District the gauge volume of the tank within 30 days of the actual tank capacity measurement. [District Rule 2201] Federally Enforceable Through Title V Permit
7. 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] Federally Enforceable Through Title V Permit
8. 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] Federally Enforceable Through Title V Permit
9. 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] Federally Enforceable Through Title V Permit
10. The weighted annual average ethanol content of wine stored in this tank, calculated on a rolling 12-month basis, shall not exceed 21 percent by volume. [District Rule 2201] Federally Enforceable Through Title V Permit
11. The maximum wine storage throughput in this tank shall not exceed 20,500 gallons per day. [District Rule 2201] Federally Enforceable Through Title V Permit
12. The maximum wine storage emissions in this tank, calculated on a rolling 12-month basis, shall not exceed 337 lb-VOC/year (equivalent to 7,300,000 gallons of wine throughput per year). [District Rule 2201] Federally Enforceable Through Title V Permit
13. 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] Federally Enforceable Through Title V Permit
14. 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
15. The operator shall maintain records of the calculated rolling 12-month wine ethanol content and storage throughput rate (ethanol percentage by volume and gallons per rolling 12-month period, calculated monthly). [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
16. If the throughput or ethanol content calculated for any rolling 12-month period exceeds the annual throughput or ethanol content limitations of this permit, in a crush season in which the start of the crush season (defined as the day on which the facility's seasonal crushing/fermentation operations commence) occurs less than 365 days after the start of the previous crush season, then no violation of the throughput or ethanol content limits for that rolling 12-month period will be deemed to have occurred so long as the calendar year throughput and ethanol content are below the annual throughput and ethanol content limitations. [District Rule 2201] Federally Enforceable Through Title V Permit
17. Records shall be maintained that demonstrate the date of each year's start of crush season. [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
18. 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

DRAFT

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: N-3386-518-0

LEGAL OWNER OR OPERATOR: E & J GALLO WINERY
MAILING ADDRESS: ATTN: MATT HART
600 YOSEMITE BLVD
MODESTO, CA 95354

LOCATION: 600 YOSEMITE BLVD
MODESTO, CA 95354

EQUIPMENT DESCRIPTION:
20,500 GALLON NOMINAL STAINLESS STEEL WINE STORAGE TANK (TANK 227) WITH INSULATION AND PRESSURE/VACUUM VALVE

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 quantity of emissions: 1st quarter - 126 lb, 2nd quarter - 126 lb, 3rd quarter - 127 lb, and fourth quarter - 127 lb. These amounts include the applicable offset ratio specified in Rule 2201 Section 4.8 (as amended 2/18/16). [District Rule 2201] Federally Enforceable Through Title V Permit
4. ERC Certificate Numbers S-4727-1 (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. This tank shall be used exclusively for wine storage operations only and not for fermentation. [District Rule 2201] Federally Enforceable Through Title V Permit

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

Arnaud Marjolle, Director of Permit Services

N-3386-518-0 Dec 16 2016 1:40PM - GILLR Joint Inspection NOT Required

6. The nominal tank dimensions are 9.25 feet in diameter and 40 feet in height with a proposed volume of 20,500 gallons. The permittee shall submit to the District the gauge volume of the tank within 30 days of the actual tank capacity measurement. [District Rule 2201] Federally Enforceable Through Title V Permit
7. 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] Federally Enforceable Through Title V Permit
8. 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] Federally Enforceable Through Title V Permit
9. 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] Federally Enforceable Through Title V Permit
10. The weighted annual average ethanol content of wine stored in this tank, calculated on a rolling 12-month basis, shall not exceed 21 percent by volume. [District Rule 2201] Federally Enforceable Through Title V Permit
11. The maximum wine storage throughput in this tank shall not exceed 20,500 gallons per day. [District Rule 2201] Federally Enforceable Through Title V Permit
12. The maximum wine storage emissions in this tank, calculated on a rolling 12-month basis, shall not exceed 337 lb-VOC/year (equivalent to 7,300,000 gallons of wine throughput per year). [District Rule 2201] Federally Enforceable Through Title V Permit
13. 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] Federally Enforceable Through Title V Permit
14. 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
15. The operator shall maintain records of the calculated rolling 12-month wine ethanol content and storage throughput rate (ethanol percentage by volume and gallons per rolling 12-month period, calculated monthly). [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
16. If the throughput or ethanol content calculated for any rolling 12-month period exceeds the annual throughput or ethanol content limitations of this permit, in a crush season in which the start of the crush season (defined as the day on which the facility's seasonal crushing/fermentation operations commence) occurs less than 365 days after the start of the previous crush season, then no violation of the throughput or ethanol content limits for that rolling 12-month period will be deemed to have occurred so long as the calendar year throughput and ethanol content are below the annual throughput and ethanol content limitations. [District Rule 2201] Federally Enforceable Through Title V Permit
17. Records shall be maintained that demonstrate the date of each year's start of crush season. [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
18. 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

DRAFT

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: N-3386-519-0

LEGAL OWNER OR OPERATOR: E & J GALLO WINERY
MAILING ADDRESS: ATTN: MATT HART
600 YOSEMITE BLVD
MODESTO, CA 95354

LOCATION: 600 YOSEMITE BLVD
MODESTO, CA 95354

EQUIPMENT DESCRIPTION:

20,500 GALLON NOMINAL STAINLESS STEEL WINE STORAGE TANK (TANK 228) WITH INSULATION AND PRESSURE/VACUUM VALVE

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 quantity of emissions: 1st quarter - 126 lb, 2nd quarter - 126 lb, 3rd quarter - 127 lb, and fourth quarter - 127 lb. These amounts include the applicable offset ratio specified in Rule 2201 Section 4.8 (as amended 2/18/16). [District Rule 2201] Federally Enforceable Through Title V Permit
4. ERC Certificate Numbers S-4727-1 (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. This tank shall be used exclusively for wine storage operations only and not for fermentation. [District Rule 2201] Federally Enforceable Through Title V Permit

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

Arnaud Marjollet, Director of Permit Services

N-3386-519-0 Dec 15 2016 1:45PM -- GILLR : Joint Inspection NOT Required

6. The nominal tank dimensions are 9.25 feet in diameter and 40 feet in height with a proposed volume of 20,500 gallons. The permittee shall submit to the District the gauge volume of the tank within 30 days of the actual tank capacity measurement. [District Rule 2201] Federally Enforceable Through Title V Permit
7. 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] Federally Enforceable Through Title V Permit
8. 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] Federally Enforceable Through Title V Permit
9. 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] Federally Enforceable Through Title V Permit
10. The weighted annual average ethanol content of wine stored in this tank, calculated on a rolling 12-month basis, shall not exceed 21 percent by volume. [District Rule 2201] Federally Enforceable Through Title V Permit
11. The maximum wine storage throughput in this tank shall not exceed 20,500 gallons per day. [District Rule 2201] Federally Enforceable Through Title V Permit
12. The maximum wine storage emissions in this tank, calculated on a rolling 12-month basis, shall not exceed 337 lb-VOC/year (equivalent to 7,300,000 gallons of wine throughput per year). [District Rule 2201] Federally Enforceable Through Title V Permit
13. 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] Federally Enforceable Through Title V Permit
14. 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
15. The operator shall maintain records of the calculated rolling 12-month wine ethanol content and storage throughput rate (ethanol percentage by volume and gallons per rolling 12-month period, calculated monthly). [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
16. If the throughput or ethanol content calculated for any rolling 12-month period exceeds the annual throughput or ethanol content limitations of this permit, in a crush season in which the start of the crush season (defined as the day on which the facility's seasonal crushing/fermentation operations commence) occurs less than 365 days after the start of the previous crush season, then no violation of the throughput or ethanol content limits for that rolling 12-month period will be deemed to have occurred so long as the calendar year throughput and ethanol content are below the annual throughput and ethanol content limitations. [District Rule 2201] Federally Enforceable Through Title V Permit
17. Records shall be maintained that demonstrate the date of each year's start of crush season. [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
18. 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

DRAFT

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

ISSUANCE DATE: DRAFT

PERMIT NO: N-3386-520-0

LEGAL OWNER OR OPERATOR: E & J GALLO WINERY

MAILING ADDRESS: ATTN: MATT HART
600 YOSEMITE BLVD
MODESTO, CA 95354

LOCATION: 600 YOSEMITE BLVD
MODESTO, CA 95354

EQUIPMENT DESCRIPTION:

20,500 GALLON NOMINAL STAINLESS STEEL WINE STORAGE TANK (TANK 229) WITH INSULATION AND PRESSURE/VACUUM VALVE

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 quantity of emissions: 1st quarter - 126 lb, 2nd quarter - 126 lb, 3rd quarter - 127 lb, and fourth quarter - 127 lb. These amounts include the applicable offset ratio specified in Rule 2201 Section 4.8 (as amended 2/18/16). [District Rule 2201] Federally Enforceable Through Title V Permit
4. ERC Certificate Numbers S-4727-1 (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. This tank shall be used exclusively for wine storage operations only and not for fermentation. [District Rule 2201] Federally Enforceable Through Title V Permit

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

Arnaud Marjolle, Director of Permit Services

N-3386-520-0 Dec 15 2016 1:48PM - GILLR - Joint Inspection NOT Required

Northern Regional Office • 4800 Enterprise Way • Modesto, CA 95356-8718 • (209) 557-6400 • Fax (209) 557-6475

6. The nominal tank dimensions are 9.25 feet in diameter and 40 feet in height with a proposed volume of 20,500 gallons. The permittee shall submit to the District the gauge volume of the tank within 30 days of the actual tank capacity measurement. [District Rule 2201] Federally Enforceable Through Title V Permit
7. 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] Federally Enforceable Through Title V Permit
8. 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] Federally Enforceable Through Title V Permit
9. 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] Federally Enforceable Through Title V Permit
10. The weighted annual average ethanol content of wine stored in this tank, calculated on a rolling 12-month basis, shall not exceed 21 percent by volume. [District Rule 2201] Federally Enforceable Through Title V Permit
11. The maximum wine storage throughput in this tank shall not exceed 20,500 gallons per day. [District Rule 2201] Federally Enforceable Through Title V Permit
12. The maximum wine storage emissions in this tank, calculated on a rolling 12-month basis, shall not exceed 337 lb-VOC/year (equivalent to 7,300,000 gallons of wine throughput per year). [District Rule 2201] Federally Enforceable Through Title V Permit
13. 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] Federally Enforceable Through Title V Permit
14. 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
15. The operator shall maintain records of the calculated rolling 12-month wine ethanol content and storage throughput rate (ethanol percentage by volume and gallons per rolling 12-month period, calculated monthly). [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
16. If the throughput or ethanol content calculated for any rolling 12-month period exceeds the annual throughput or ethanol content limitations of this permit, in a crush season in which the start of the crush season (defined as the day on which the facility's seasonal crushing/fermentation operations commence) occurs less than 365 days after the start of the previous crush season, then no violation of the throughput or ethanol content limits for that rolling 12-month period will be deemed to have occurred so long as the calendar year throughput and ethanol content are below the annual throughput and ethanol content limitations. [District Rule 2201] Federally Enforceable Through Title V Permit
17. Records shall be maintained that demonstrate the date of each year's start of crush season. [District Rules 1070 and 2201] Federally Enforceable Through Title V Permit
18. 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

DRAFT

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT
ISSUANCE DATE: DRAFT

PERMIT NO: N-3386-521-0

LEGAL OWNER OR OPERATOR: E & J GALLO WINERY

MAILING ADDRESS: ATTN: MATT HART
600 YOSEMITE BLVD
MODESTO, CA 95354

LOCATION: 600 YOSEMITE BLVD
MODESTO, CA 95354

EQUIPMENT DESCRIPTION:

20,500 GALLON NOMINAL STAINLESS STEEL WINE STORAGE TANK (TANK 230) WITH INSULATION AND PRESSURE/VACUUM VALVE

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 quantity of emissions: 1st quarter - 126 lb, 2nd quarter - 126 lb, 3rd quarter - 127 lb, and fourth quarter - 127 lb. These amounts include the applicable offset ratio specified in Rule 2201 Section 4.8 (as amended 2/18/16). [District Rule 2201] Federally Enforceable Through Title V Permit
4. ERC Certificate Numbers S-4727-1 (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. This tank shall be used exclusively for wine storage operations only and not for fermentation. [District Rule 2201] Federally Enforceable Through Title V Permit

CONDITIONS CONTINUE ON NEXT PAGE

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Seyed Sadredin, Executive Director, APCO

Arnaud Marjolle, Director of Permit Services

N-3386-521-0 Dec 15 2016 1:45PM -- GILLR Joint Inspection NOT Required

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