San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

MAR 07 2012

Mr. Dan Martin
E & J Gallo Winery
18000 W River Rd
Livingston, CA 95334

Re: Proposed ATC / Certificate of Conformity (Significant Mod)
District Facility # N-1237
Project # N-1113864

Dear Mr. Martin:

Enclosed for your review is the District's analysis of an application for Authority to Construct for the facility identified above. The applicant is requesting that a Certificate of Conformity with the procedural requirements of 40 CFR Part 70 be issued with this project. The applicant is proposing to install an ethanol evaporator system consisting of a quadruple effect evaporator which handles alcohol containing material.

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

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

Thank you for your cooperation in this matter.

Sincerely,

David Warner
Director of Permit Services

Enclosures
c: Stanley Tom, Permit Services

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

Central Region (Main Office)
1990 E. Gettysburg Avenue
Fresno, CA 93726-0244
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Southern Region
34946 Flyover Court
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www.valleyair.org www.healthyairliving.com

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

MAR 07 2012

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

Re: Proposed ATC / Certificate of Conformity (Significant Mod)
District Facility # N-1237
Project # N-1113864

Dear Mr. Rios:

Enclosed for your review is the District's engineering evaluation of an application for Authority to Construct for E & J Gallo Winery at 18000 W River Rd, Livingston, which has been issued a Title V permit. E & J Gallo Winery is requesting that a Certificate of Conformity, with the procedural requirements of 40 CFR Part 70, be issued with this project. The applicant is proposing to install an ethanol evaporator system consisting of a quadruple effect evaporator which handles alcohol containing material.

Enclosed is the engineering evaluation of this application with a copy of the current Title V permit and proposed Authority to Construct # N-1237-600-0 with Certificate of Conformity. After demonstrating compliance with the Authority to Construct, the conditions will be incorporated into the facility's Title V permit through an administrative amendment.

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

Thank you for your cooperation in this matter.

Sincerely,

David Warner
Director of Permit Services

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c: Stanley Tom, Permit Services

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AIR POLLUTION CONTROL DISTRICT

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MAR 07 2012

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

Re: Proposed ATC / Certificate of Conformity (Significant Mod)
District Facility # N-1237
Project # N-1113864

Dear Mr. Tollstrup:

Enclosed for your review is the District's analysis of an application for Authority to Construct for the facility identified above. The applicant is requesting that a Certificate of Conformity with the procedural requirements of 40 CFR Part 70 be issued with this project. The applicant is proposing to install an ethanol evaporator system consisting of a quadruple effect evaporator which handles alcohol containing material.

Enclosed is the engineering evaluation of this application with a copy of the current Title V permit and proposed Authority to Construct # N-1237-600-0 with Certificate of Conformity. After demonstrating compliance with the Authority to Construct, the conditions will be incorporated into the facility's Title V permit through an administrative amendment.

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

Thank you for your cooperation in this matter.

Sincerely,

David Warner
Director of Permit Services

Enclosures
c: Stanley Tom, Permit Services

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Merced Sun Star

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

NOTICE IS HEREBY GIVEN that the San Joaquin Valley Air Pollution Control District solicits public comment on the proposed significant modification of E & J Gallo Winery for its winery at 18000 W River Rd, Livingston, California. The applicant is proposing to install an ethanol evaporator system consisting of a quadruple effect evaporator which handles alcohol containing material.

The District's analysis of the legal and factual basis for this proposed action, project #N-1113864, is available for public inspection at http://www.valleyair.org/notices/public_notices_idx.htm and the District office at the address below. There are no emission increases associated with this proposed action. This will be the public's only opportunity to comment on the specific conditions of the modification. If requested by the public, the District will hold a public hearing regarding issuance of this modification. For additional information, please contact Mr. Jim Swaney, Permit Services Manager, at (559) 230-5900. Written comments on the proposed initial permit must be submitted within 30 days of the publication date of this notice to DAVID WARNER, DIRECTOR OF PERMIT SERVICES, SAN JOAQUIN VALLEY AIR POLLUTION CONTROL DISTRICT, 1990 E. GETTYSBURG AVE, FRESNO, CA 93726-0244.

San Joaquin Valley Air Pollution Control District
Authority to Construct Application Review
Ethanol Evaporator System

Facility Name:	E & J Gallo Winery	Date:	February 18, 2012
Mailing Address:	18000 W River Rd Livingston, CA 95334	Engineer:	Stanley Tom
		Lead Engineer:	Joven Refuerzo
Contact Person:	Dan Martin		
Telephone:	(209) 394-6211		
Application #:	N-1237-600-0		
Project #:	N-1113864		
Complete:	January 24, 2012		

I. Proposal

E & J Gallo Winery is requesting an Authority to Construct permit to install an ethanol evaporator system consisting of a quadruple effect evaporator which handles alcohol containing material.

E & J Gallo Winery has received their Title V Permit. This modification can be classified as a Title V significant modification pursuant to Rule 2520, Section 3.29, 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 Authority to Construct. E & J Gallo Winery must apply to administratively amend their Title V Operating Permit to include the requirements of the ATC issued with this project.

II. Applicable Rules

Rule 2201 New and Modified Stationary Source Review Rule (April 21, 2011)
Rule 2520 Federally Mandated Operating Permits (June 21, 2001)
Rule 4001 New Source Performance Standards (4/14/99)
Rule 4002 National Emissions Standards for Hazardous Air Pollutants (5/20/04)
Rule 4101 Visible Emissions (February 17, 2005)
Rule 4102 Nuisance (December 17, 1992)
Rule 4694 Wine Fermentation and Storage Tanks (December 15, 2005)
CH&SC 41700 California Health & Safety Code, Sec 41700, Health Risk Assessment
CH&SC 42301 California Health & Safety Code, Sec 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 site is located at 18000 W River Rd, in Livingston, CA. The equipment is not located within 1,000 feet of the outer boundary of a K-12 school. Therefore, the public notification requirement of California Health and Safety Code 42301.6 is not applicable to this project.

IV. Process Description

This project will modify an existing evaporator process that runs grape juice making concentrate to a new process that will run grape juice with alcohol. The evaporator has two operational modes: 1) Non-Alcoholic juice processing and 2) Alcohol containing product processing where the alcohol content of the feedstock batch will be documented. The permit in this project is only for the mode 2 process as the mode 1 process is permit exempt.

The alcohol content of the material to be fed to the evaporator will range from 14 to 18% by volume.

V. Equipment Listing

N-1237-600-0 ETHANOL EVAPORATOR SYSTEM CONSISTING OF QUADRUPLE EFFECT EVAPORATOR, HEAT EXCHANGERS, STEAM HEATED PREHEATERS, CONDENSERS, CONDENSATE COLLECTORS, AND COOLING TOWERS

VI. Emission Control Technology Evaluation

There are no proposed emission control techniques for the ethanol evaporator system. However, there are multiple emission control technologies that are feasible for this system and will be discussed and analyzed in the BACT section below.

VII. General Calculations

A. Assumptions

- VOC is the only pollutant of concern in this project.
- Maximum annual hours of operation of the evaporator to handle ethanol material is 2,573 hours per year (per applicant).

B. Emission Factors

For the last steam jet of the ethanol evaporator system, the applicant calculated an ethanol emission rate of 1.4 lb/hr (see Attachment A). The facility has added at 1.6 lb/hr contingency to the calculated emission rate and has proposed an emission rate of 3.0 lb-ethanol per hour from the system.

Emission Factor		
Permit Unit	lb-VOC/hour	Source
Ethanol Evaporator System (uncontrolled)	3.0	Applicant Proposed

The report to establish the actual VOC emission factor from this system will be required within 30 days of the first annual source test following the initial source test outlining the actual VOC emission factor. The final VOC emission factor based on the results of the initial source test and first annual source test following the initial source test and portable analyzer results shall be incorporated into the permit.

C. Calculations

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

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

2. Post Project Potential to Emit (PE2):

The applicant has proposed an uncontrolled emission rate of 3.0 lb-ethanol/hour.

Daily PE2 = 3.0 lb-VOC/hour x 24 hours/day = 72.0 lb-VOC/day
Annual PE2 = 3.0 lb-VOC/hour x 2,573 hours/year = 7,719 lb-VOC/year

Post Project Potential to Emit (PE2) Summary			
Emission Unit	Pollutant	Daily Emissions (lb/day)	Annual Emissions (lb/year)
Ethanol Evaporator System	VOC	72.0	7,719

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

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

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

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

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

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

5. Major Source Determination

Pursuant to Section 3.24 of District Rule 2201, a Major Source is a stationary source with post-project emissions or a Post Project Stationary Source Potential to Emit (SSPE2), equal to or exceeding one or more of the following threshold values. However, Section 3.24.2 states, "for the purposes of determining major source status, the SSPE2 shall not include the quantity of emission reduction credits (ERC) which have been banked since September 19, 1991 for Actual Emissions Reductions that have occurred at the source, and which have not been used on-site."

Major Source Determination (lb/year)	
	VOC
Pre-Project SSPE (SSPE1)	> 20,000
Post Project SSPE (SSPE2)	> 20,000
Major Source Threshold	20,000
Major Source?	Yes

The source is an existing Major Source for VOC and will remain a Major Source for VOC.

6. Baseline Emissions (BE)

BE = Pre-project Potential to Emit for:

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

otherwise,

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

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

7. SB 288 Major Modification

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

As discussed in Section VII.C.5 above, the facility is an existing Major Source for VOC; however, the project by itself would need to be a significant increase in order to trigger a SB 288 Major Modification. The emissions units within this project do not have a total potential to emit which is greater than Major Modification thresholds (see table below). Therefore, the project cannot be a significant increase and the project does not constitute a SB 288 Major Modification.

SB 288 Major Modification Thresholds (Existing Major Source)			
Pollutant	Project PE (lb/year)	Threshold (lb/year)	Major Modification?
VOC	7,719	50,000	No

8. Federal Major Modification

District Rule 2201, Section 3.17 states that major modifications are also federal major modifications, unless they qualify for either a "Less-Than-Significant Emissions Increase" exclusion or a "Plantwide Applicability Limit" (PAL) exclusion.

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

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

Significant Threshold (lb/year)	
Pollutant	Threshold (lb/year)
VOC	0
NO_x	0
PM_{10}	30,000
SO_x	80,000

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

Net Emission Increase for New Units (NEI_N)

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

$NEI_N = PE2_N - BAE$

Since this is a new unit, BAE for this unit is zero and,

$NEI_N = PE2_N$

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

$NEI_N = PE2_N = 7{,}719$ lb-VOC/year

The NEI for this project is thus calculated as follows:

$NEI = NEI_N$
NEI = 7,719 lb-VOC/year

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

9. Quarterly Net Emissions Change (QNEC)

The Quarterly Net Emissions Change is used to complete the emission profile screen for the District's PAS database. 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:

$PE2_{quarterly}$ = $PE2_{annual} \div 4$ quarters/year
= 7,719 lb VOC/year ÷ 4 qtr/year
= 1,930 lb VOC/qtr

$PE1_{quarterly}$ = $PE1_{annual} \div 4$ quarters/year
= 0 lb VOC/year ÷ 4 qtr/year
= 0 lb VOC/qtr

Quarterly NEC [QNEC]			
	PE2 (lb/qtr)	PE1 (lb/qtr)	QNEC (lb/qtr)
NO_X	0	0	0
SO_X	0	0	0
PM_{10}	0	0	0
CO	0	0	0
VOC	1,930	0	1,930

VIII. Compliance

Rule 2201 New and Modified Stationary Source Review Rule

A. Best Available Control Technology (BACT)

1. BACT Applicability

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

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

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

a. New Emissions units with PE > 2 lb/day

As seen in Section VII.C.2 of this evaluation, the applicant is proposing to install a new ethanol evaporator system with a PE greater than 2 lb/day for VOC. BACT is triggered for VOC for this emission unit.

b. Relocation of emissions with 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 with AIPE > 2 lb/day

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

d. Major Modification

As discussed in Section VII.C.7 above, this project does constitute a Major Modification; therefore BACT is triggered for VOC for the ethanol evaporator system.

2. BACT Guideline

There is no existing BACT Guideline for an ethanol evaporator system. Therefore, a new BACT determination will be performed (see Attachment B).

BACT Guideline 5.4.XX, applies to the ethanol evaporator system. [Ethanol Evaporator System] (Attachment B)

3. Top-Down BACT Analysis

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

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

VOC: No emission control equipment

As explained in the source test section below, the facility shall submit a report to revise the VOC emission factor following the source test. This may result in an increase in annual hours of operation but the annual potential to emit shall not be changed. An increase in the annual hours of operation would increase the operating cost of the control options identified in the Top Down BACT Analysis. The cost ineffectiveness of each option would hence increase with an increase in operating cost yet maintaining the same annual reductions in emissions. Therefore, the VOC emission factor revision will not affect the validity of the BACT Analysis performed in this project.

B. Offsets

1. Offset Applicability

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

The following table compares the post-project facility-wide annual emissions in order to determine if offsets will be required for this project.

Offset Applicability (lb/year)	
	VOC
Post Project SSPE (SSPE2)	> 20,000
Offset Threshold	20,000
Offsets Triggered?	Yes

2. Quantity of Offsets Required

Per Sections 4.7.1 and 4.7.3 of Rule 2201, the quantity of offsets in pounds per year for each pollutant 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) = ([PE2 - BE] + ICCE) X DOR, for all new or modified emissions units in the project

where:
PE2 = Post-project Potential to Emit (lb/year)
BE = Baseline Emissions (lb/year)
ICCE = Increase in Cargo Carrier Emissions (lb/year)
DOR = Distance Offset Ratio, determined pursuant to Rule 2201, Section 4.8

BE = Pre-project Potential to Emit for:
- Any unit located at a non-major source,
- Any Highly-Utilized Emissions Unit, located at a Major Source,
- Any Fully-Offset Emissions Unit, located at a Major Source, or
- Any Clean Emissions Unit, located at a Major Source

otherwise,

BE = Historic Actual Emissions (HAE)

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

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

Permit	Annual PE2 (lb-VOC/yr)	Annual BE (lb-VOC/yr)
N-1237-600-0	7,719	0

Offsets Required (lb/year) = [7,719 – 0] x DOR
= 7,719 lb-VOC/year x DOR

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

1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1,929	1,930	1,930	1,930

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

Offsets Required (lb/year) = [7,719 – 0] x 1.5]
= 11,579 lb VOC/year

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

1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
2,894	2,895	2,895	2,895

The applicant has stated that the facility plans to use ERC certificate C-1107-1 and S-3714-1 to offset the increases in VOC emissions associated with this project. The above certificate has available quarterly VOC credits as follows:

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
ERC #C-1107-1	14,338	14,338	14,338	14,338
ERC #S-3714-1	79,800	79,800	79,800	79,796
Total	94,138	94,138	94,138	94,134

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

Proposed Rule 2201 (offset) Conditions:

- Prior to operating equipment under this Authority to Construct, permittee shall surrender VOC emission reduction credits for the following quantity of emissions: 1st quarter – 1,929 lb, 2nd quarter - 1,930 lb, 3rd quarter - 1,930 lb, and fourth quarter - 1,930 lb. Offsets shall be provided at the applicable offset ratio specified in Table 4-2 of Rule 2201 (as amended 04/21/11). [District Rule 2201]
- ERC Certificate Numbers C-1107-1 and S-3714-1 (or a certificate split from these certificates) shall be used to supply the required offsets, unless a revised offsetting proposal is received and approved by the District, upon which this Authority to Construct shall be reissued, administratively specifying the new offsetting proposal. Original public noticing requirements, if any, shall be duplicated prior to reissuance of this Authority to Construct. [District Rule 2201]

C. Public Notification

1. Applicability

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

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

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

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

b. PE > 100 lb/day

Applications which include a new emissions unit with a Potential to Emit 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 following table compares the SSPE1 with the SSPE2 in order to determine if any offset thresholds have been surpassed with this project.

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

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

d. SSIPE > 20,000 lb/year

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

Stationary Source Increase in Permitted Emissions [SSIPE] – Public Notice				
Pollutant	Project PE2 (lb/year)	Project PE1 (lb/year)	SSIPE	Public Notice Required?
VOC	7,719	0	7,719	No

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

2. Public Notice Action

As discussed above, public noticing is required for this project for Federal Major Modification for VOC. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB), US Environmental Protection Agency (EPA), and a public notice will be published in a local newspaper of general circulation prior to the issuance of the ATC for this equipment.

D. Daily Emission Limits (DELs)

Daily Emissions Limitations (DELs) and other enforceable conditions are required by Section 3.16 to restrict a unit's maximum daily emissions, to a level at or below the emissions associated with the maximum design capacity. Per Sections 3.16.1 and 3.16.2, the DEL must be contained in the latest ATC and contained in or enforced by the latest PTO and enforceable, in a practicable manner, on a daily basis. DELs are also required to enforce the applicability of BACT.

Proposed Rule 2201 (DEL) Conditions:

- VOC emission rate from the ethanol evaporator system atmospheric vent shall be no greater than 3.0 lb-VOC/hour and shall be limited to 7,719 lb-VOC/year. The final VOC emission rate shall be determined according to the conditions of this permit, to the satisfaction of the Air Pollution Control Officer, within 30 days of the date of the first annual source test following the initial source test. [District Rule 2201]

E. Compliance Assurance

The following measures shall be taken to ensure continued compliance with District Rules:

1. Source Testing

To demonstrate compliance with the proposed VOC emission rate, initial and periodic source testing will be required.

District Policy APR 1705 establishes guidelines for source testing requirements. APR 1705 requires that:

- Units equipped with afterburner, thermal incinerator, or catalytic incinerator for controlling VOCs must be tested upon initial start-up and annually thereafter.
- Units equipped with carbon adsorption for control of VOCs must be tested upon initial start-up and annually thereafter.
- Units served by a scrubber for PM_{10} control with expected emissions in excess of 30 pounds per day must be tested upon initial start-up and annually thereafter.
- Annual source testing must be considered if significant performance deterioration can be expected over time or if the margin of compliance is low.

Using the policy guideline, initial source testing and source testing once every twelve (12) months thereafter will be required. After demonstrating compliance on two consecutive annual source tests the unit shall be tested once every thirty-six (36) months. If the thirty-six (36) month source test does not show compliance, the unit shall revert to once every twelve (12) month source testing.

Initial VOC source testing shall be required within 60 days after start-up using EPA Method 18 and 25 or 25A and EPA's Midwest Scaling Protocol for the Measurement of "VOC Mass Emissions" at Ethanol Production Facilities and/or any other testing methodology that has been previously approved by the District, CARB, and EPA. This initial source testing will be conducted at the evaporator system vent to the atmosphere.

Permit conditions will be listed on the permit as follows:

- Initial source testing to determine the rate of VOC at the evaporator vent to atmosphere, expressed as lb-VOC/hour, shall be conducted within 60 days after initial start-up, with the unit operating at conditions representative of normal operations. [District Rules 1081 and 2201]
- Source testing to determine the rate of VOC at the evaporator vent to atmosphere, expressed as lb-VOC/hour, shall be conducted at least once every twelve (12) months with the unit operating at conditions representative of normal operations. After demonstrating compliance on two (2) consecutive annual source tests, the unit shall be tested not less than once every thirty-six (36) months. If the result of the 36-month source test demonstrates that the unit does not meet the applicable emission limits, the source testing frequency shall revert to at least once every twelve (12) months. [District Rules 1081 and 2201]
- Source testing to determine the rate of VOC, measured in lb-VOC per hour, shall be conducted using EPA Method 18 and 25 or 25A. Source testing shall also be conducted in accordance with EPA's Midwest Scaling Protocol for the Measurement of "VOC Mass Emissions" at Ethanol Production Facilities and/or any other testing methodology that has been previously approved by the District, CARB, and EPA. [District Rules 1081 and 2201]
- {109} Source testing shall be conducted using the methods and procedures approved by the District. The District must be notified at least 30 days prior to any compliance source test, and a source test plan must be submitted for approval at least 15 days prior to testing. [District Rule 1081]
- {110} The results of each source test shall be submitted to the District within 60 days thereafter. [District Rule 1081]

A report proposing the actual emission level from the ethanol evaporator system will be submitted by the facility within 30 days of the first annual source test following the initial source test. The actual emission level will be incorporated into the permit by the District within 30 days of receipt of the report discussed above. This system is typically only operated in the offseason (outside June through December). Therefore, the aforementioned time frame will provide the facility with an adequate period to test and optimize the system. The following permit conditions will be placed on the ATC to require the facility to prepare an engineering report based on the results of the initial source test and first annual source test following the initial source test. The District will use this report to establish the emission level from the ethanol evaporator system.

- VOC emission rate from the ethanol evaporator system atmospheric vent shall be no greater than 3.0 lb-VOC/hour and shall be limited to 7,719 lb-VOC/year. The final VOC emission rate shall be determined according to the conditions of this permit, to the satisfaction of the Air Pollution Control Officer, within 30 days of the date of the first annual source test following the initial source test. [District Rule 2201]
- Within 30 days of the date of the first annual source test following the initial source test, the permittee shall prepare and submit to the District a report proposing the final VOC emission rate for inclusion in this permit. The report shall provide all relevant information and data and a technical demonstration of the proposed emission limit. [District Rule 2201]
- The District shall establish the final VOC emission limitation and incorporate the limitation into the permit within 30 days of receipt of the report. [District Rule 2201]

2. Monitoring

To ensure there is sufficient data to establish the final VOC emission rate, the facility shall perform portable analyzer testing at the ethanol evaporator system atmospheric vent at least once every 30 days the unit is in operation starting subsequent to the initial source test until the first annual source test following the initial source test. The following condition will be listed on the permit:

- The permittee shall monitor and record the atmospheric vent emission rate of VOC at least once every month subsequent to the initial source test using a portable emission monitor and stack volumetric flow rate monitor that meets District specifications. Monitoring shall be performed not less than once every month until the first annual source test following the initial source test. Monitoring shall not be required if the system is not in operation, i.e. the system need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the system unless monitoring has been performed within the last month. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rule 2201]
- All alternate monitoring parameter emission readings shall be taken with the unit operating at conditions representative of normal operations. The portable analyzer and stack volumetric flow rate monitor shall be calibrated, maintained, and operated in accordance with the manufacturer's specifications and recommendations or a protocol approved by the APCO. Emission readings taken shall be averaged over a 15 consecutive-minute period by either taking a cumulative 15 consecutive-minute sample reading or by taking at least five (5) readings, evenly spaced out over the 15 consecutive-minute period. [District Rule 2201]
- The permittee shall maintain records of: (1) the date and time of VOC measurements, (2) the measured VOC emission rate, (3) the measured stack velocity flow rate, (4) make and model of exhaust gas analyzer and stack volumetric flow rate monitor, and (5) exhaust gas analyzer and stack volumetric flow rate monitor calibration records. [District 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 conditions will appear on the permit to operate:

- 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 and 2201]

4. Reporting

The following conditions will be placed on the ATC to satisfy reporting requirements.

- Within 30 days of the date of the first annual source test following the initial source test, the permittee shall prepare and submit to the District a report proposing the final VOC emission rate for inclusion in this permit. The report shall provide all relevant information and data and a technical demonstration of the proposed emission limit. [District Rule 2201]
- The District shall establish the final VOC emission limitation and incorporate the limitation into the permit within 30 days of receipt of the report. [District Rule 2201]

F. Ambient Air Quality Analysis

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

G. Compliance Certification

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

H. Alternative Siting Analysis

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

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

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

Rule 2520 Federally Mandated Operating Permit

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

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

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

Rule 4001 New Source Performance Standards (NSPS)

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

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

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

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, the following condition will be listed on each permit to ensure compliance:

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

California Health & Safety Code 41700 (Health Risk Assessment)

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

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

District Rule 4694 Wine Fermentation and Storage Tanks

The purpose of this rule is to reduce emissions of volatile organic compounds (VOC) from the fermentation and bulk storage of wine, or achieve equivalent reductions from alternative emission sources. This rule is applicable to any winery fermenting wine and/or storing wine in bulk containers.

Section 5.1 applies to fermentation tanks. The evaporator in this project does not perform fermentation. Therefore, the requirements of this section do not apply to this project.

Section 5.2 applies to storage tanks having an internal volume equal to or greater than 5,000 gallons. The evaporator in this project does not store wine. Therefore, the requirements of this section do not apply to this project.

Every three years, Section 6.1 and 6.2 require the facility to submit a Three-Year Compliance Plan and a Three-Year Compliance Plan Verification respectively. Section 6.3 requires that an Annual Compliance Plan Demonstration be submitted to the District no later than February 1 of each year to show compliance with the applicable requirements of the Rule.

The following conditions on the facility-wide permit ensure compliance:

- A Three-Year Compliance Plan that demonstrates compliance with the requirements of Section 5.1 of District Rule 4694 (12/15/05) for each year of the applicable compliance period shall be submitted to the District by no later than December 1, 2006, and every three years thereafter on or before December 1. [District Rule 4694, 6.1]
- A Three-Year Compliance Plan Verification that demonstrates that the Three-Year Compliance Plan elements are in effect shall be submitted to the District by no later than July 1, 2007, and every three years thereafter on or before July 1. [District Rule 4694, 6.2]
- An Annual Compliance Plan Demonstration that shows compliance with the applicable requirements of this rule shall be submitted to the District by no later than February 1, 2008, and every year thereafter on or before February 1. [District Rule 4694, 6.3]

California Health & Safety Code 42301.6 (School Notice)

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

California Environmental Quality Act (CEQA)

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

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

The District 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 § 15031 (Existing Facilities), and finds that the project is exempt per the general rule that CEQA applies only to projects which have the potential for causing a significant effect on the environment (CEQA Guidelines §15061(b)(3)).

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Issue Authority to Construct N-1237-600-0 subject to the permit conditions on the attached draft Authority to Construct in Attachment E.

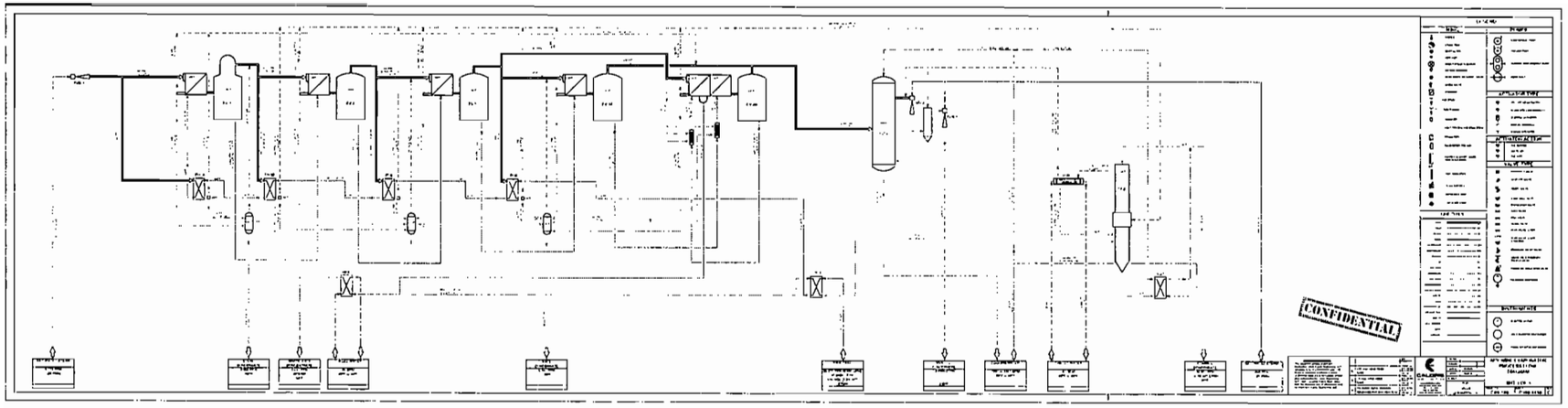
X. Billing Information

Annual Permit Fees			
Permit Number	Fee Schedule	Fee Description	Annual Fee
N-1237-600-0	3020-06	Miscellaneous	$105.00

Attachments

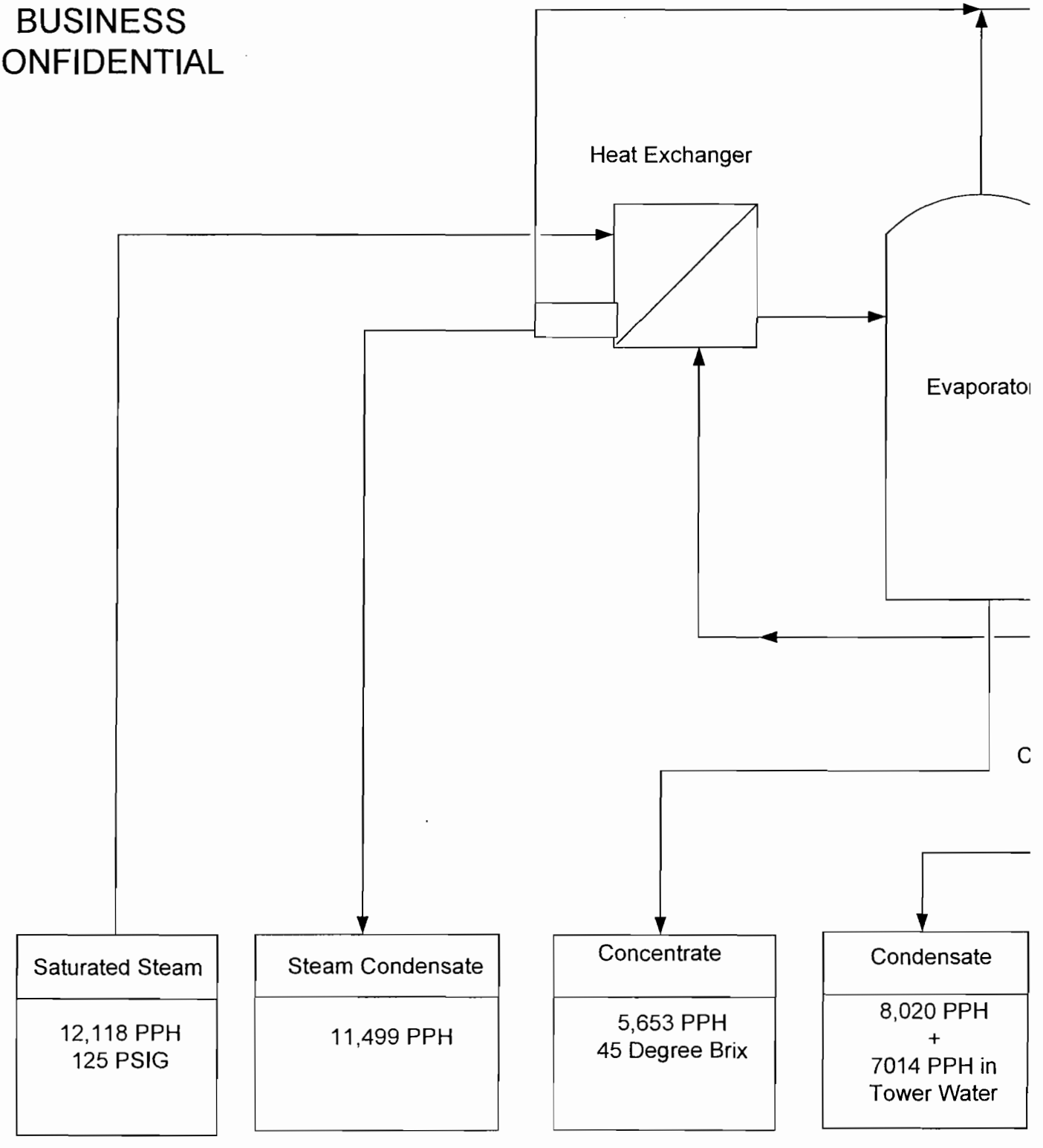
A. Ethanol Evaporator System Mass Balance
B. BACT Guideline 5.4.XX and Top Down BACT Analysis
C. Compliance Certification
D. Certificate of Conformity
E. Draft Authority to Construct Permit

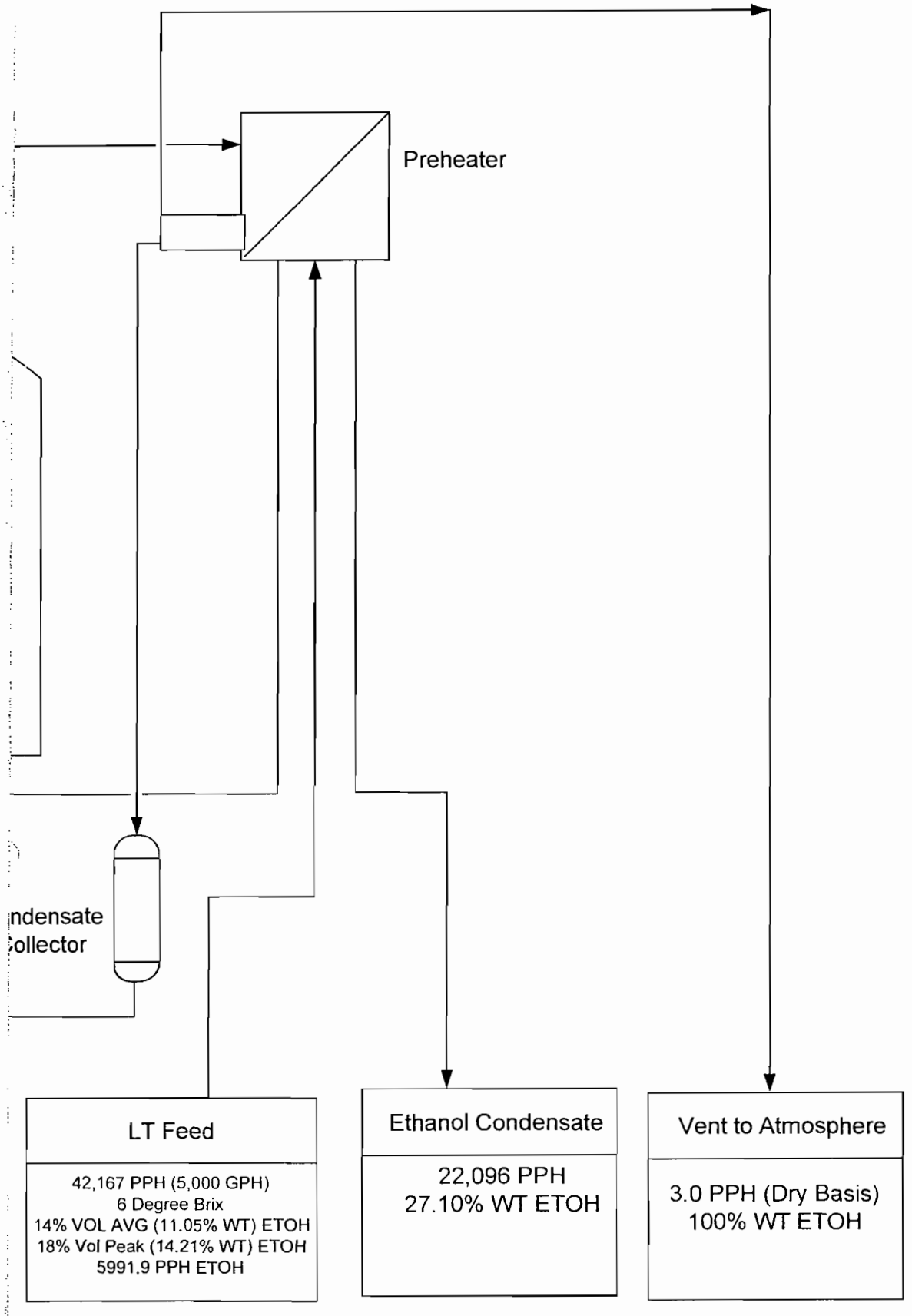
Attachment A
Ethanol Evaporator System Mass Balance



EJ Gallo Livingston Winery
APV Evaporator Mass Balance
11-14-11

BUSINESS
CONFIDENTIAL




Preheater
ndensate
ollector
LT Feed
42,167 PPH (5,000 GPH)
6 Degree Brix
14% VOL AVG (11.05% WT) ETOH
18% Vol Peak (14.21% WT) ETOH
5991.9 PPH ETOH
Ethanol Condensate
22,096 PPH
27.10% WT ETOH
Vent to Atmosphere
3.0 PPH (Dry Basis)
100% WT ETOH

Attachment B
BACT Guideline 5.4.XX and Top Down BACT Analysis

New BACT Determination 5.4.XX: Ethanol Evaporator System

Facility Name:	E & J Gallo Winery	Date:	February 4, 2012
Mailing Address:	18000 W River Rd Livingston, CA 95334	Engineer:	Stanley Tom
		Lead Engineer:	Joven Refuerzo
Contact Person:	Dan Martin		
Telephone:	(209) 394-6211		
Application #:	N-1237-600-0		
Project #:	N-1113864		
Location:	18000 W River Rd, Livingston, CA		
Complete:	January 24, 2012		

I. PROPOSAL

E & J Gallo Winery is requesting an Authority to Construct permit to install an ethanol evaporator system consisting of a quadruple effect evaporator which handles alcohol containing material.

II. PROJECT LOCATION

This facility is located at 18000 W River Rd, Livingston, CA.

III. EQUIPMENT LISTING

N-1237-600-0 ETHANOL EVAPORATOR SYSTEM CONSISTING OF QUADRUPLE EFFECT EVAPORATOR, HEAT EXCHANGERS, STEAM HEATED PREHEATERS, CONDENSERS, CONDENSATE COLLECTORS, AND COOLING TOWERS

IV. PROCESS DESCRIPTION

This project will modify an existing evaporator process that runs grape juice making concentrate to a new process that will run grape juice with alcohol. The evaporator has two operational modes: 1) Non-Alcoholic juice processing and 2) Alcohol containing product processing where the alcohol content of the feedstock batch will be documented. The permit in this project is only for the mode 2 process.

The alcohol content of the material to be fed to the evaporator will range from 14 to 18% by volume. Per the applicant, the emission rate of the vent stream is 3.0 lb-ethanol/hour and 100 lb-water/hour at a temperature of 212 degrees Fahrenheit.

IV. CONTROL EQUIPMENT EVALUATION

There are no proposed emission control techniques for the ethanol evaporator system. However, there are multiple emission control technologies that are feasible for this system and will be discussed and analyzed in the BACT section below.

A. Best Available Control Technology (BACT) for Permit Unit N-1237-600-0

Applicability

District Rule 2201 Section 4.1 states that BACT requirements are triggered on a pollutant-by-pollutant basis and on an emissions unit-by-emissions unit basis for the following:

a) Any new emissions unit with a potential to emit exceeding two pounds per day,
b) The relocation from one Stationary Source to another of an existing emissions unit with a potential to emit exceeding two pounds per day, and/or
c) Modifications to an existing emissions unit with a valid Permit to Operate resulting in an AIPE exceeding two pounds per day.
d) When a Major Modification is triggered for a modification project at a facility that is a Major Source.

As shown below, BACT is triggered for VOC emissions for the ethanol evaporator system.

Daily PE2 = 3.0 lb-VOC/hour x 24 hours/day = 72.0 lb-VOC/day

B. BACT Policy

Per District Policy APR 1305, Section IX, "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 for source categories or classes covered in the BACT Clearinghouse, relevant information under each of the following steps may be simply cited from the Clearinghouse without further analysis".

The District's 1st quarter 2012 BACT Clearinghouse was surveyed to determine if an existing BACT guideline was applicable for this class and category of operation. No BACT guidelines were found that cover ethanol evaporator systems. Therefore, pursuant to the District's BACT policy, a Top-Down BACT analysis will be performed for inclusion of a new determination in the District's BACT Clearinghouse.

C. Top-Down BACT Analysis for Permit Unit N-1237-600-0

The Environmental Protection Agency (EPA), California Air Resources Board (CARB), San Diego County Air Pollution Control District (SDCAPCD), South Coast Air Quality Management District (SCAQMD), Bay Area Air Quality Management District (BAAQMD) and the San Joaquin Valley Air Pollution Control District (SJVAPCD) BACT clearinghouses were reviewed to determine potential control technologies for this class and category of operation, but no BACT guidelines for ethanol evaporator systems were found.

VOC Emissions:

Step 1 - Identify all control technologies

Option 1 – Collection of VOCs and control by biofiltration (>90% collection & control)

Biofiltration has been previously employed to achieve 90% control of ethanol emissions in a process vent stream. Biofiltration uses microorganisms attached to a porous medium to biologically destroy the VOCs present in an air stream. The microorganisms grow in a biofilm on the surface of a medium (inert material) or are suspended in the water phase surrounding the medium particles. Ethanol in the air stream is sorbed onto the medium where it is biologically degraded.

Option 2 – Collection of VOCs and control by refrigerated absorption (>95% collection & control)

Ethanol is highly soluble in water and thus absorption in water (or other absorbents) using a scrubber is technologically feasible. The draft Technical Assessment Document for Strategies and Costs for Winery Ethanol Emission Control (TAD), developed by in a joint effort by several San Joaquin Valley wineries, states that >95% control can be achieved by absorption but notes that the absorption process will produce ethanol-laden wastewater, requiring either recovery of the ethanol or disposal of the wastewater.

Option 3 – Collection of VOCs and control by carbon adsorption (95% collection and control)

Collection and capture of VOCs on activated carbon is a well-established process for controlling VOCs in the vent streams from enclosed evaporative sources, including ethanol emissions. A VOC removal efficiency of 95% is generally recognized as achievable. As such, it is adaptable from a purely technical standpoint to ethanol evaporation systems.

Option 4 – Collection of VOCs and control by thermal or catalytic oxidation (>95% collection & control)

Collection and destruction of VOCs with catalytic or thermal oxidation is a well-established process for controlling VOCs in the vent streams from enclosed evaporative sources. A VOC removal efficiency of 95% is generally recognized as achievable. As such, it is adaptable from a purely technical standpoint to ethanol evaporation systems.

Option 5 – Refrigerated condensation of VOCs (>99% collection & control)

Assuming the ethanol evaporation system has a 100% collection efficiency condensation of the ethanol stream theoretically could achieve a 100% collection and control efficiency. Ethanol has a boiling point of 173 degrees Fahrenheit so a 40 degree Fahrenheit chilled water stream should result in condensation achieving a 100% control efficiency but a 99% control efficiency will be assumed as a worst case scenario.

Step 2 - Eliminate Technologically Infeasible Options

All of the options listed above are considered to be feasible with the exception of option 3, 4, and 5.

Option 1 is determined to be infeasible for the following reasons:

1. Emissions from the ethanol evaporation system is highly intermittent as the process does not operate continuously. The intermittent nature of the emissions would not be suitable for maintaining a healthy bed of microorganisms in the filter.

2. The evaporated ethanol is a food-grade product and requires stringent sanitation practices from the standpoint of eliminating contamination and preserving product quality. The introduction of a system containing microorganisms would not be possible within the sanitation practices normally employed and could potentially be detrimental to product quality.

3. The high temperature vent stream at 212 degrees Fahrenheit would not be suitable for microorganism life.

Option 3 is determined to be infeasible since the vent stream will be at a high temperature (212 F) and high humidity. The discharge of the steam jet would approach the temperature one would use to thermal swing the carbon. At this temperature, no adsorption would take place due to the energy content of the molecules and the weak bond of the alcohol to the carbon/adsorbent.

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

Rank	Control Technology	Overall Capture and Control Efficiency
1	Refrigerated condensation	99%
2	Capture of VOCs and thermal or catalytic oxidation	>95%
3	Capture of VOCs and refrigerated absorption	95%

There are no remaining control technologies for VOC.

Step 4 - Cost Effectiveness Analysis

A cost effectiveness analysis is performed for each control technology which is more effective than achieved-in-practice BACT. The cost-effectiveness analysis will be performed based on the most cost effective approach by installing a control device on the system.

Maximum Vapor Flow Rate

Per applicant, the ethanol emission rate of the vent stream is 3.0 lb/hr. Also, per the applicant, the water emission rate from the small steam jet is 100 lb/hr.

Moles of ethanol = 3.0 lb/hr x lb-mol/46.02 lb = 0.065 lb-mol/hr
Moles of water = 100 lb/hr x lb-mol/18.02 lb = 5.549 lb-mol/hr
Total moles = 0.065 + 5.549 lb-mol/hr = 5.615 lb-mol/hr

Ethanol Vapor Flow Rate = nRT/P = 0.065 lb-mol/hr x 0.7302 lb-mol °R/atm ft^3 x (460 + 212) °R ÷ 1 atm
= 31.895 ft^3/hr
= 0.53 ft^3/min

Water Vapor Flow Rate = nRT/P = 5.549 lb-mol/hr x 0.7302 lb-mol °R/atm ft^3 x (460 + 212) °R ÷ 1 atm
= 2722.86 ft^3/hr
= 45.38 ft^3/min

Total Vapor Flow Rate = nRT/P = 5.615 lb-mol/hr x 0.7302 lb-mol °R/atm ft^3 x (460 + 212) °R ÷ 1 atm
= 2755.04 ft^3/hr
= 45.9 ft^3/min

Uncontrolled Emission Calculation

Assumptions:

- VOC is the only pollutant of concern in this project.
- Maximum annual hours of operation of the evaporator to handle ethanol material is 2,573 hours per year (per applicant).

Emission Factors:

For the last steam jet of the ethanol evaporator system, the applicant calculated an ethanol emission rate of 1.4 lb/hr (see Attachment A). The facility has added a 1.6 lb/hr contingency to the calculated emission rate and has proposed an emission rate of 3.0 lb-ethanol per hour from the system.

Emission Factor		
Permit Unit	lb-VOC/hour	Source
Ethanol Evaporator System (uncontrolled)	3.0	Applicant Proposed

Calculation:

The applicant has proposed an uncontrolled emission rate of 3.0 lb-ethanol/hour.

Daily PE2 = 3.0 lb-VOC/hour x 24 hours/day = 72.0 lb-VOC/day
Annual PE2 = 3.0 lb-VOC/hour x 2,573 hours/year = 7,719 lb-VOC/year

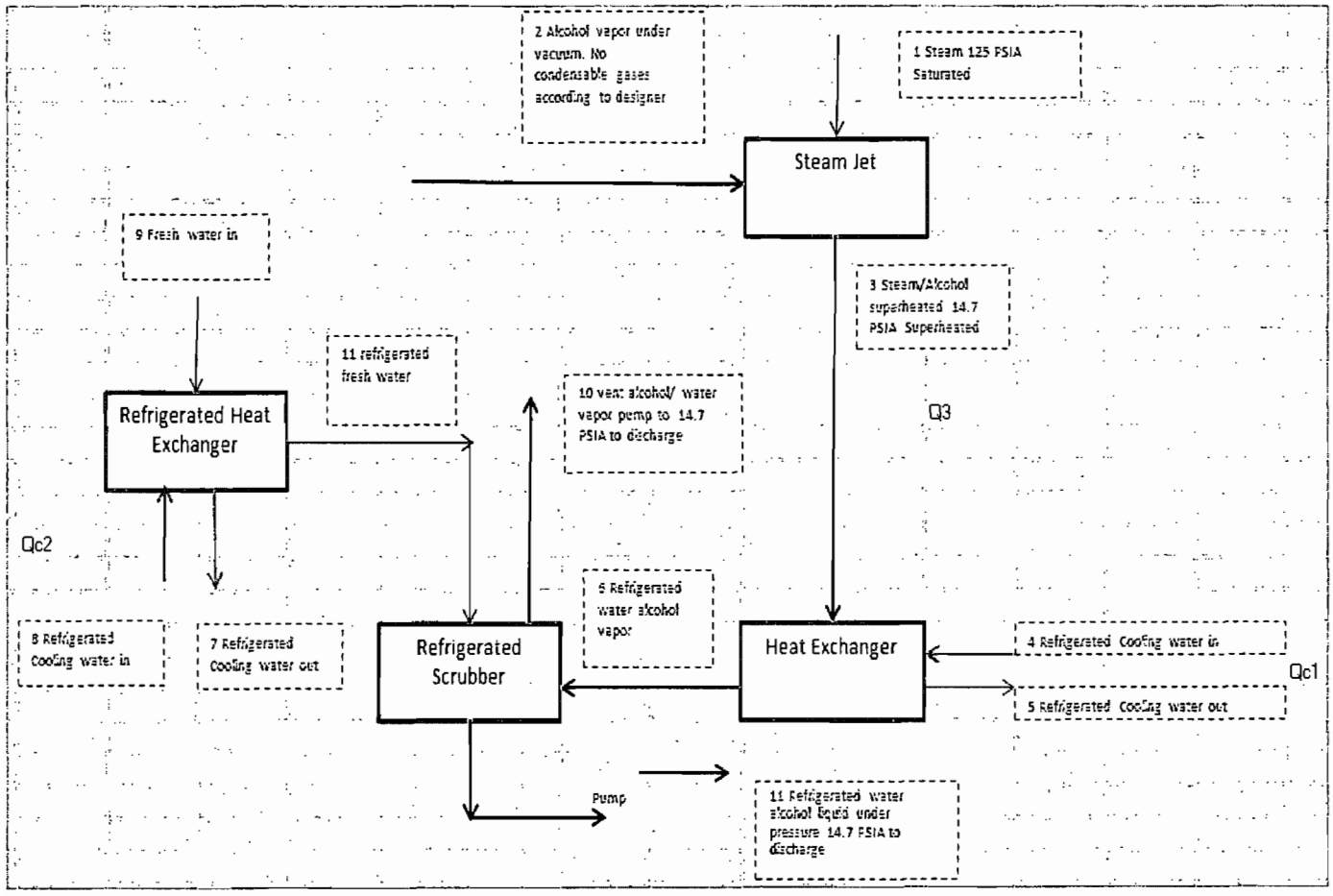
Post Project Potential to Emit (PE2) Summary			
Emission Unit	Pollutant	Daily Emissions (lb/day)	Annual Emissions (lb/year)
Ethanol Evaporator System	VOC	72.0	7,719

Uncontrolled Emissions = 7,719 lb-VOC/year

Option 2 – Collection of VOCs and control by refrigerated absorption

The following cost analysis will examine the capital cost of the scrubber control system in conjunction with utility system equipment costs of the clean-in-place system (see Appendix 1) and refrigeration system (see Appendix 2) and associated utilities.

The 40 degree Fahrenheit condensing temperature is lower than the temperature in the process. It will be necessary to pump the liquid out as well as any remaining vapor. According to the applicant there are no other compounds present other than the alcohol and water. Non-condensables are not present either.



Scrubber Capital Cost

One scrubber will be required sized at the maximum vapor flow rate of 45.9 scfm.

Packed Tower gas scrubber (46 cfm) capital cost = $115,435 (per Schutte & Koerting quotation November 4, 2011)

A scrubber water 10,000 gallon collection tank is provided which has enough capacity to allow a full truck load of material to be transported and some free board. It is estimated this tank will cost about $20,000. Site inspection indicates a lot of ducting components are present but $10,000 will be added for ducting modifications.

Total scrubber capital costs = $115,435 + $20,000 + $10,000 = $145,435

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

Packed Tower Gas Scrubber – Cost Estimate	
Cost Description	Cost ($)
Direct Costs (DC)	
Base Equipment Costs	145,435
Instrumentation	0.10 x 145,435 = 14,544
Sales Tax	0.03 x 145,435 = 4,363
Freight	0.05 x 145,435 = 7,272
Purchased equipment cost	**171,614**
Foundations & supports	0.08 x 171,614 = 13,729
Handling & erection	0.14 x 171,614 = 24,026
Electrical	0.04 x 171,614 = 6,865
Piping	0.02 x 171,614 = 3,432
Painting	0.01 x 171,614 = 1,716
Insulation	0.01 x 171,614 = 1,716
Direct installation costs	**51,484**
Total Direct Costs	**223,098**
Indirect Costs (IC)	
Engineering	0.10 x 171,614 = 17,161
Construction and field expenses	0.05 x 171,614 = 8,581
Contractor fees	0.10 x 171,614 = 17,161
Start-up	0.02 x 171,614 = 3,432
Performance test	0.01 x 171,614 = 1,716
Contingencies	0.03 x 171,614 = 5,148
Total Indirect Costs	**53,199**
Total Capital Cost (DC + IC)	**276,297**

Annualized Capital Investment = Total Capital Cost x Amortization Factor

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

Therefore,

Annualized Capital Investment = $276,297 x 0.163 = $44,966

Power Costs

As shown in Appendix 2, the amount of refrigeration required is 6.76 tons.

Power = 6.76 tons refrigeration x 12,000 Btu/1 ton-hr x kWh/3,413 Btu x 2,685 hr/year
= 63,896 kWh/year

Average cost of electricity to commercial users in California [1]:
2011 = $0.1179
2010 = $0.1147
AVG = $0.1163

Power Cost = 63,896 kWh/year x $0.1163/kWh = $7,431/year

Wastewater Disposal Costs

Per Schutte & Koerting, the makeup water required for a packed tower scrubber for this system would be 4 gallons per minute. Per estimate in Sonoma Technologies study, an allowance of $0.25 per gallon is applied for disposal costs.

Annual disposal costs = 4 gallons/min x 60 min/hour x 2,685 hr/year x $0.25/gallon = $161,100/year

Chemical Costs

Annual chemical costs = $3,500

Most evaporators require cleaning every 4 to 6 days. It is estimated the evaporator in this project will be cleaned 23 to 35 times per year. Generally the cleaning agents are caustics, organic acids, a disinfectant, and hot water. All the cleaning compounds would be FDA approved for food contact surfaces. This means that between $94 to $152 would be spent per clean for the additional emission control equipment added to control emissions. The main evaporator would require additional chemicals and cleaning which is not included in the $3,500 annual chemical cost assumption.

[1] Energy Information Administration/Electric Power Monthly February 2012; Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State, 2010 - 2011

The amount of time an evaporator stays on line between cleanings is highly dependent on the design, and the characteristics of the feed stock being processed. Some designs have a redundant stage in areas where fouling potential is high. Through automation a portion of the evaporator is cleaned while the rest of it is running. The redundant stages are switched back and forth between cleaning and production every few hours. The evaporator in this project does not have this feature, but it is running a proprietary feed stock. The fouling characteristics of this feed stock in the evaporator or the entrained liquid that might enter the emission control equipment is unknown at the present time. These will not be fully understood until the evaporator modification is complete and some running experience is obtained. Based on past applications it is assumed the $3,500 is a reasonable allowance for cleaning.

Total Costs

Total Annual Cost = Scrubber Capital Cost + CIP Cost + Refrigeration Cost + Power Costs + Wastewater Disposal Costs + Chemical Costs

Total Annual Cost = $44,966 + $26,881 + $7,892 + $7,431 + $161,100 + $3,500 = $251,770

Annual Emission Reduction = Uncontrolled Emissions x 0.95
= 7,719 lb-VOC/year x 0.95
= 7,333 lb-VOC/year
= 3.667 tons-VOC/year

Cost Effectiveness = $251,770/year ÷ 3.667 tons-VOC/year
= $68,658/ton-VOC

The analysis demonstrates that the annualized purchase cost of the required water scrubber control system and associated utility system equipment and utilities alone results in a cost effectiveness which exceeds the District's Guideline of $17,500/ton-VOC.

Option 4 – Collection of VOCs and control by thermal or catalytic oxidation

The following cost analysis will examine the capital cost of the thermal or catalytic oxidation control system in conjunction with utility system equipment costs of the clean-in-place system (see Appendix 1) and associated utilities.

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

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

Thermal/Catalytic Oxidizer Capital Cost

One thermal oxidizer will be required sized at the maximum vapor flow rate of 45.9 scfm.

Per the Eichleay study "Fermenter VOC Emissions Control Cost Estimate" performed on June 30, 2005, the ethanol threshold below which supplemental fuel (e.g. natural gas) is needed to sustain combustion temperature is 3% of LEL. Adding the amount of supplemental fuel and corresponding combustion air (plus excess air for complete combustion) to the below analysis would result in this control option being more cost ineffective. Therefore, the below analysis is conservative.

Per the Eichleay study "Fermenter VOC Emissions Control Cost Estimate" performed on June 30, 2005, the minimum oxygen concentration must be at least 4 volume percent in order to support efficient combustion of low concentrations of ethanol. This is equivalent to 2357 scfm of combustion air per 10,000 scfm of vapor.

Combustion air

$0.21x / (0.53 + x) = 0.04$
$x = 0.125$

Total vapor flow rate = Total Vapor flow + Combustion air = 45.9 scfm + 0.125 scfm = 46.0 scfm

However, in practice the smallest thermal oxidizer available is 50 scfm. Baker Furnace provided a quote for a 50 scfm thermal oxidizer at a capital cost of $37,700 (2009 dollars).

Adjusting from 2009 dollars to 2011 dollars (multiply by 1.055, 2.75% inflation/year).

Regenerative thermal oxidizer (50 cfm) capital cost = $37,700 x 1.055 = $39,774

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

Thermal and Catalytic Incinerator – Cost Estimate	
Cost Description	Cost ($)
Direct Costs (DC)	
Base Equipment Costs (Incinerator)	39,774
Instrumentation	0.10 x 39,774 = 3,977
Sales Tax	0.03 x 39,774 = 1,193
Freight	0.05 x 39,774 = 1,989
Purchased equipment cost	**46,933**
Foundations & supports	0.08 x 46,933 = 3,755
Handling & erection	0.14 x 46,933 = 6,571
Electrical	0.04 x 46,933 = 1,877
Piping	0.02 x 46,933 = 939
Painting	0.01 x 46,933 = 469
Insulation	0.01 x 46,933 = 469
Direct installation costs	**14,080**
Total Direct Costs	**61,013**
Indirect Costs (IC)	
Engineering	0.10 x 46,933 = 4,693
Construction and field expenses	0.05 x 46,933 = 2,347
Contractor fees	0.10 x 46,933 = 4,693
Start-up	0.02 x 46,933 = 939
Performance test	0.01 x 46,933 = 469
Contingencies	0.03 x 46,933 = 1,408
Total Indirect Costs	**14,549**
Total Capital Cost (DC + IC)	**75,562**

Annualized Capital Investment = Total Capital Cost x Amortization Factor

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

Therefore,

Annualized Capital Investment = $75,562 x 0.163 = $12,297

Operation and Maintenance Costs

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

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

heat of combustion -dHc = 20276 Btu/lb
Daily VOC emissions rate = 7,719 lb/year ÷ 365 = 21.1 lb/day
Blower flow rate = 50 scfm
= 72,000 ft^3/day

-dh(c) = 21.1 lb/day x 20276 Btu/lb / 72,000 ft^3/day
= 5.96 Btu/ft^3

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

-dh(c) = 5.96 Btu/ft^3 / 0.0739 lb/ft^3
= 80.59 Btu/lb

Fuel Flow Requirement

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

Where
Pw = 0.0739 lb/ft^3
Cp = 0.255 Btu/lb-°F
Qw = 50 scfm
-dh(m) = 21,502 Btu/lb for methane
Tr = 77°F assume ambient conditions
P(ef) = 0.0408 lb/ft^3 m, methane at 77°F, 1 atm
Tf = 1600°F
Tw = 1150°F
-dh(c) = 80.58858 Btu/lb

$$Q = \frac{0.0739*50*\{0.255*[1.1*1600-1150-0.1*77]-80.59\}}{0.0408*[21502 - 1.1*0.255*(1600 - 77)]}$$

= 269.73/859.9 = 0.31 ft^3/min

Fuel Costs

The cost for natural gas shall be based upon the average price of natural gas sold to "Commercial Consumers" in California for the years 2010 and 2011.[2]

2011 = $8.23/thousand ft^3 total monthly average
2010 = $8.30/thousand ft^3 total monthly average
Average for two years = $8.265/thousand ft^3 total monthly average

Fuel Cost = 0.31 cfm x 1440 min/day x 365 day/year x $8.265/1000 ft^3
= $1,363/year

Electricity Requirement

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

Where

ΔP = Pressure drop Across system = 4 in. H_2O
$\in$ = Efficiency for fan and motor = 0.6
Qw = 50 scfm

$$\text{Power}_{fan} = \frac{1.17*10^{-4}\ *50\ cfm*\ 4\ in.\ H_2O}{0.60}$$

= 0.039 kW

Electricity Costs

Average cost of electricity to commercial users in California [3]:
2011 = $0.1179
2010 = $0.1147
AVG = $0.1163

Electricity Cost = 0.039 kW x 24 hours/day x 365 days/year x $0.1163/kWh = $40/year

Total Utility Costs

Total Annual Cost (Data from: Annual Costs for Thermal and Catalytic Incinerators, Table 3.10 – OAQPS Control Cost Manual, Fourth Edition)

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2 Energy Information Administration/Natural Gas Monthly February 2012; Average Price of Natural Gas Sold to Commercial Consumers by State, 2010 - 2011

3 Energy Information Administration/Electric Power Monthly February 2012; Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State, 2010 - 2011

Total Annual Cost			
Operator	0.5 h/shift	$25.92/h	$4,730
Supervisor	15% of operator		$710
Maintenance			
Labor	0.5 h/shift	$28.52	$5,205
Material	100% of labor		$5,205
Utility			
Natural Gas			$1,363
Electricity			$40
Indirect Annual Cost (IC)			
Overhead	60% of Labor Cost		$6,387
Administrative Charge	2% TCI		$1,511
Property Taxes	1% TCI		$756
Insurance	1% TCI		$756
Total Annual Cost			**$26,663**

Total Costs

Total Annual Costs = Thermal Oxidizer Capital Cost + CIP Cost + Total Utility Costs

Total Annual Costs = $12,297 + $26,881 + $26,663 = $65,841/year

Annual Emission Reduction = Uncontrolled Emissions x 0.95
= 7,719 lb-VOC/year x 0.95
= 7,333 lb-VOC/year
= 3.67 tons-VOC/year

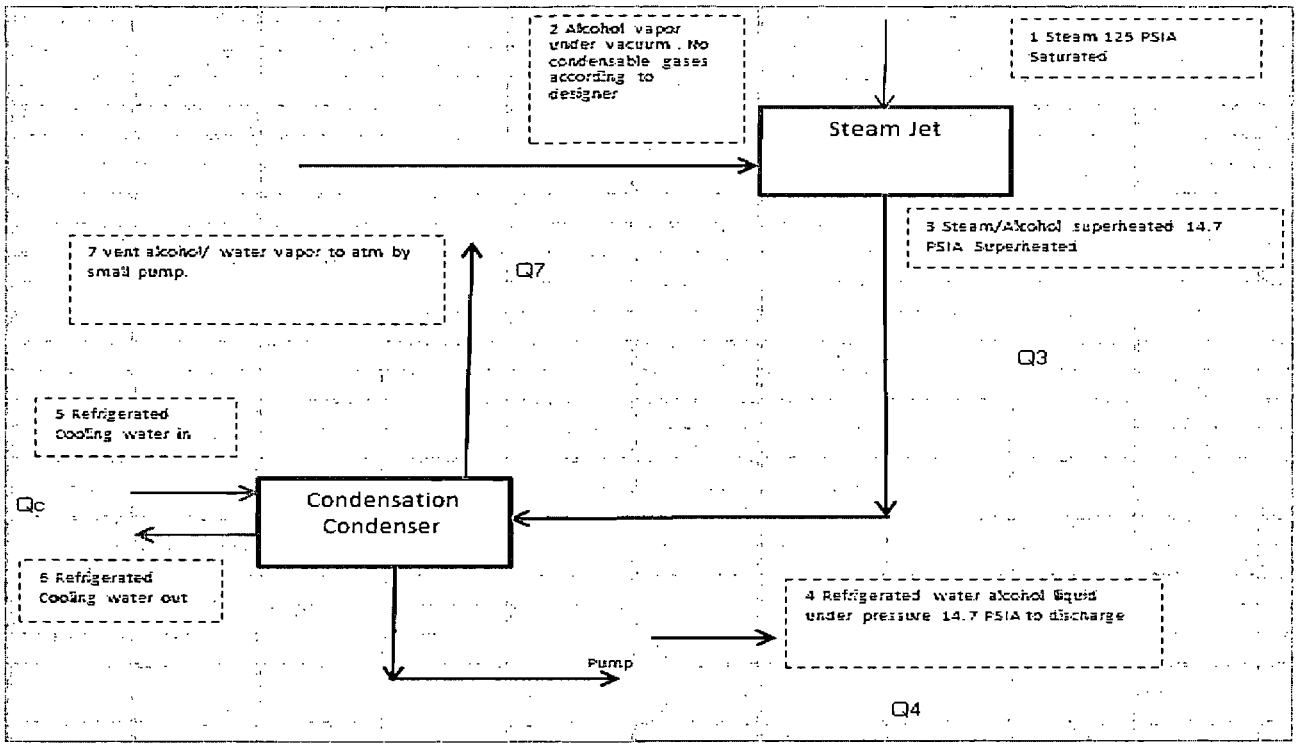
Cost Effectiveness = $65,841/year ÷ 3.67 tons-VOC/year
= $17,940/ton-VOC

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

Option 5 – Refrigerated condensation of VOCs

The following cost analysis will examine the capital cost of the condenser control system in conjunction with utility system equipment costs of the clean-in-place system (see Appendix 1) and refrigeration system (see Appendix 3) and associated utilities.

The 40 degrees Fahrenheit condensing temperature is lower than the temperature in the process, and the condenser is under vacuum. It will be necessary to pump the liquid out as well as any remaining vapor. According to the applicant there are no other compounds present other than the alcohol and water. Non-condensables are not present either.



Condenser Capital Cost

One condenser will be required sized at the maximum vapor flow rate of 45.9 scfm.

A condenser liquid 10,000 gallon collection tank is provided which has enough capacity to allow a full truck load of material to be transported and some free board. It is estimated this tank will cost about $20,000. Site inspection indicates a lot of ducting components are present but $10,000 will be added for ducting modifications. An all stainless steel condenser is estimated to cost $5,000 and the pumps an additional $5,000.

Total Condensation System Capital Cost = $20,000 + $10,000 + $5,000 + $5,000 = $40,000

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

Condensation System – Cost Estimate	
Cost Description	Cost ($)
Direct Costs (DC)	
Base Equipment Costs	40,000
Instrumentation	0.10 x 40,000 = 4,000
Sales Tax	0.03 x 40,000 = 1,200
Freight	0.05 x 40,000 = 2,000
Purchased equipment cost	**47,200**
Foundations & supports	0.08 x 47,200 = 3,776
Handling & erection	0.14 x 47,200 = 6,608
Electrical	0.04 x 47,200 = 1,888
Piping	0.02 x 47,200 = 944
Painting	0.01 x 47,200 = 472
Insulation	0.01 x 47,200 = 472
Direct installation costs	**14,160**
Total Direct Costs	**61,360**
Indirect Costs (IC)	
Engineering	0.10 x 47,200 = 4,720
Construction and field expenses	0.05 x 47,200 = 2,360
Contractor fees	0.10 x 47,200 = 4,720
Start-up	0.02 x 47,200 = 944
Performance test	0.01 x 47,200 = 472
Contingencies	0.03 x 47,200 = 1,416
Total Indirect Costs	**14,632**
Total Capital Cost (DC + IC)	**75,992**

Annualized Capital Investment = Total Capital Cost x Amortization Factor

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

Therefore,

Annualized Capital Investment = $75,992 x 0.163 = $12,367

Power Costs

As shown in Appendix 3, the amount of refrigeration required is 9.93 tons.

Power = 9.93 tons refrigeration x 12,000 Btu/1 ton-hr x kWh/3,413 Btu x 2,685 hr/year
= 93,858 kWh/year

Average cost of electricity to commercial users in California:
2011 = $0.1179
2010 = $0.1147
AVG = $0.1163

Power Cost = 93,788 kWh/year x $0.1163/kWh = $10,908/year

Wastewater Disposal Costs

Approximately 33,160 gallons of waste water [(3 lb/hr + 100 lb/hr) x gal/8.34 lb x 2,685 hr/yr] will be generated annually. Per estimate in Sonoma Technologies study, an allowance of $0.25 per gallon is applied for disposal costs.

Annual disposal costs = 33,160 gallons x $0.25/gallon = $8,290

Chemical Costs

Annual chemical costs = $3,500 (per above)

CIP Cost = $26,881 (see Appendix 1)
Refrigeration System Cost = $12,367 (see Appendix 3)

Total Costs

Total Annual Cost = Condenser Capital Cost + CIP Cost + Refrigeration Cost + Power Costs + Wastewater Disposal Costs + Chemical Costs

Total Annual Cost = $12,367 + $26,881 + $6,144 + $10,908 + $8,290 + $3,500 = $68,090

Annual Emission Reduction = Uncontrolled Emissions x 0.99
= 7,719 lb-VOC/year x 0.99
= 7,642 lb-VOC/year
= 3.82 tons-VOC/year

Cost Effectiveness = $68,090/year ÷ 3.82 tons-VOC/year
= $17,825/ton-VOC

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

Step 5 - Select BACT

All identified technologically feasible options have been shown to not be cost effective. There is no achieved in practice option and therefore; BACT is satisfied with no emission control equipment.

Appendix 1
Clean-In-Place System Capital Cost

Clean-In-Place System Capital Investment

Clean-In-Place (CIP) systems are typically used in wine bottling applications. A CIP system can be adapted and designed to be more suitable for cleaning air emission control systems. The following justifies the need for a CIP system for an emission control device on an ethanol evaporator system.

Some products may require additional precautions in the cleaning process prior to bottling, and some facilities make kosher products which may require additional cleaning steps along the entire production process. These include bottling, wine making, and emission control systems.

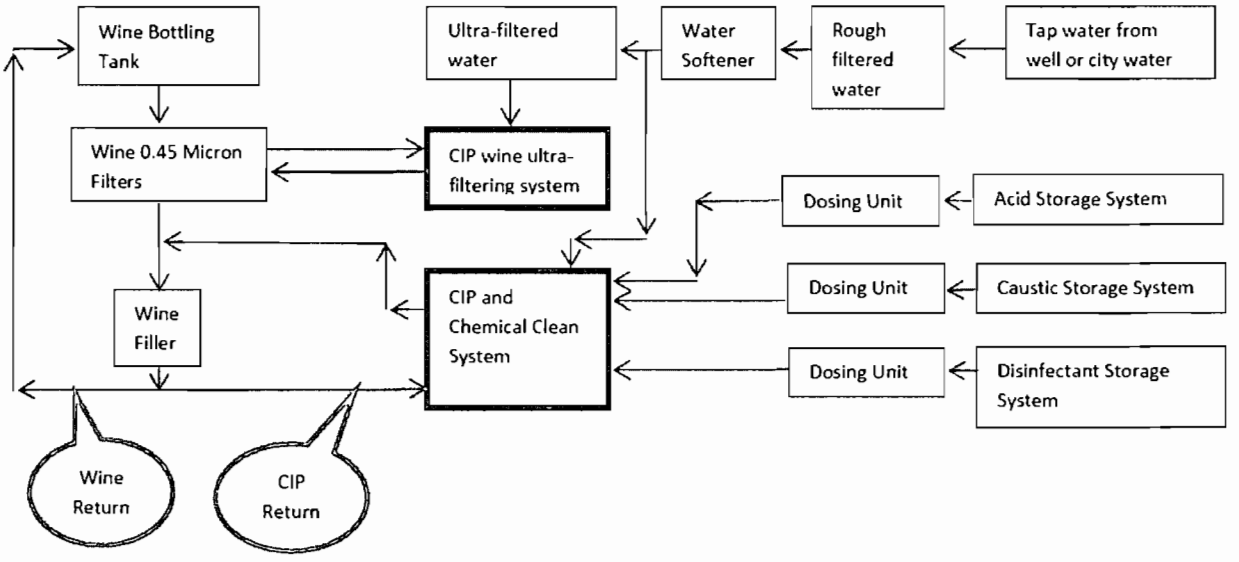
Chemical cleaning agents may also be called acids, caustics, or disinfectants. These compounds are cleaning compounds that are commercially available, FDA approved for cleaning food contact surfaces, and often contain emulsifiers, wetting agents and other compounds to help in the cleaning process. Most of these are available in two forms (powdered or liquid). The chemical delivery system to get the chemicals into water would need to be adjusted according to the form used. Generally these are received in bulk and an appropriate storage facility is required. It will be assumed the liquid form is used for this system which is common.

The chemical compound user instructions sometimes require soft water or heating to a temperature greater than ambient for use in a given application. They also have recommended dosages and other guidelines for the user. In all CIP systems hardware is provided to properly store and use cleaning agents.

In addition to using chemical cleaning agents on bottling lines, bottling lines are typically sterilized with heat. Hot water is circulated for about 20 minutes, and the metal skin temperature on the outside of the filler bowl is checked to make sure it has reached "microbe kill" temperature. The return hot water temperature is monitored as well. Some systems have electronic data gathering capabilities on selected data points for recordkeeping and report generation. This is used to help identify a problem in case of product recall, or a micro issue on a particular bottling lot. Some wineries gather this information by hand and record it in paper form instead of electronically. In general, the emission control device on the evaporator would not require this kind of rigor in sanitation recordkeeping, nor does it require heat sterilization (possible exception Koshered products).

Almost all bottling lines today fill the bottle using a cold bottling process. Basically in this process the wine is sterile filtered in progressive steps down to 0.45 microns which removes yeast and other micro biological agents as the cold wine is pumped to the bottling filter. To clean these filtering units soft filtered water is needed. In the past some wineries pasteurized the wine going to bottling, but due to potential heat issues on wine quality; pasteurization is not in wide spread use today. This project will address CIP systems related only to the cold bottling process.

The following shows how a typical bottling CIP system works and the components that are often present.



The boxes in red include a heat exchanger for heating, a heat exchanger to cool the hot material down while maintaining clean integrity, a tank of about 2,000 gallons, a circulation pump, and controls. These are not shown in the diagram, but included in the red block. The controls sequence through the steps of cleaning as defined by the wineries quality assurance personnel. A caustic clean is usually done warm (140 to 160 degrees Fahrenheit), sterilization is usually done at 180 to 200 degrees Fahrenheit and the rest is done at ambient temperature. The acid is used to neutralize the remains of the caustic material, and there is a rinse with water in between steps. Heat Sterilization is usually the final step. Some wineries use a disinfectant in the pipelines leading to the filler, and they may also leave the disinfectants in the system if the bottling line is down over a weekend. The disinfectant is removed when the line is cleaned before the next production run.

CIP systems operate in a closed loop mode, but may have provisions to add chemicals or water during the circulation if it is necessary. Older bottling filler models sometimes have the need to push cleaning solution through the filler valves and on to the floor to sterilize the filler valve. Newer fillers in general can avoid this inconvenience. Steam is the source of heat in CIP operations.

With a macro understanding of how a bottling system CIP may be built and run, it can be evaluated how the system can be adapted to an emission control device installed on an evaporator.

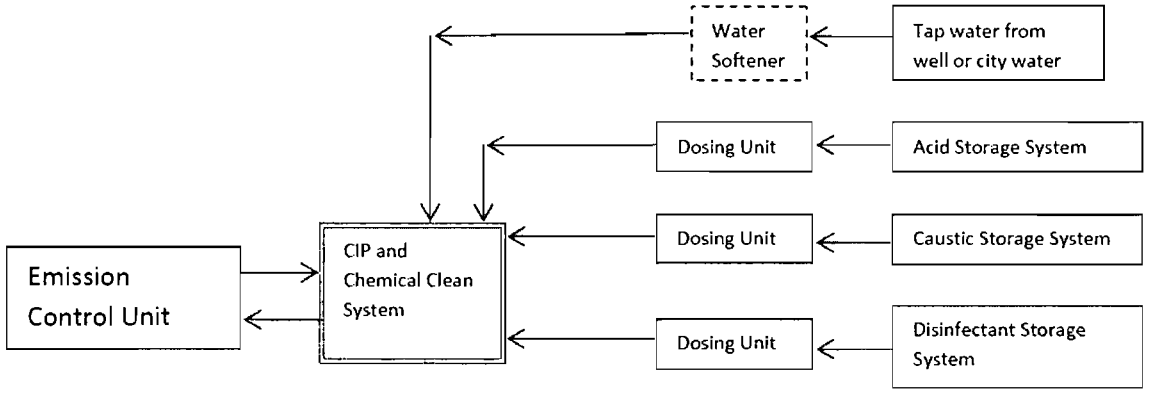
E&J Gallo has developed a propriety process. The feedstock E&J Gallo is processing is a grape juice alcohol mixture. The modified evaporator will produce a concentrate and recovers alcohol for another use. The plan is to convert an existing evaporator to run this material, and the concern is the sugar. When grape juice flashes it can produce

entrained droplets of water and sugar. Experience has shown that traces of sugar can be deposited everywhere in a conventional grape juice evaporator.

The scrubber considered for this project has a heat exchanger to cool the discharge from the scrubber. A side stream of cooling water is taken from the existing cooling tower at 85 degrees Fahrenheit to provide this cooling. The ambient temperature makeup water (about 75 degrees Fahrenheit at 4 GPM) will provide some cooling as well. Since wineries are full of microorganisms, the facility is concerned that sugar will accumulate in the scrubber and would be an ideal food for biological activities. This problem has been seen in cooling tower servicing conventional evaporators sometimes requiring shut down, and pressure washing the fill.

A CIP system will be needed from a maintenance perspective, and its need is not directly related to food contact. As a result, the CIP system only needs to remove the sugar and keep the micro count down so that the scrubber does not plug up with micro growth.

The following is a CIP system envisioned to work on an emission control unit.



The CIP and chemical clean system would be smaller than a typical bottling line system, and would not have a cool down heat exchanger. It would consist of a smaller tank (about 1000 gallons), a circulating pump, and a heat exchanger for heating only. Steam would be the source of heat.

The scrubber considered for this project included CIP spray nozzles in the design from the manufacturer. The finely filtered water is not needed, and the softener would only be needed if the supplier's instructions on the chemicals required soft water. After the evaporator has finished a production run and is being cleaned, the scrubber would be cleaned at this time as well. One possible sequence of steps is as follows:

Rinse with water

a. Rinse with caustic
b. Rinse with water
c. Rinse with acid
d. Rinse with water
e. Then add a disinfectant, and leave it there until the next production run.

Field experience on the modified evaporator will determine how often to clean the scrubber, and what steps to follow. Other sequences may be possible and equally effective. The purpose here is to control, but not entirely eliminate biological activity. The main goal is to keep the recovery efficiency up to design specifications in the scrubber, and not to allow the efficiency to fall because of biological growth on the scrubber internal parts. However, when CIP systems are applied to bottling plants the purpose is truly to eliminate all undesirable microbes.

It should be noted that a design of the scrubber cleaning system has not been done, so the pricing is estimated from stand-alone CIP systems servicing a single bottling line. The bottling CIP systems can be dependent on the design of the bottling line. Items that can affect design are the liquid volume space in the piping and filler bowl, product type being bottled, actual fuller valve design, filler equipment manufacturer's recommended cleaning procedures, and surrounding environment in which the bottling line is placed. Some wineries use clean rooms, and positive pressurized buildings to augment the overall sanitation of the bottling facility.

The price of a typical CIP system for a single bottling line is $380,000 installed. The cost of the scrubber CIP system is in the order of $169,000 installed or about 44.5% of the cost for the bottling system. It should be pointed out that if the chemical costs or operating costs were not included in the BACT analysis for the scrubber CIP system. The $169,000 purchases chemical storage and dosing units and a tank with circulation pump and heat exchanger, a minimum control system, and installation with startup. In addition, it was assumed all power, steam, and other utilities are in the immediate area and adequate for the addition of both the CIP system and the scrubber without major modifications or additions to the utility systems.

An allowance of $200,000 for a CIP system at a vapor flow rate of 184 scfm was determined in project C-1110475.

To compare the cost and size of a 184 scfm CIP system to the subject 45.9 scfm CIP system, the six-tenths rule of thumb is used.

$$Cost\ 45.9\,scfm\ CIP\ system = Cost\,184\,scfm\ CIP\ system \times \left(\frac{45.9\,scfm}{184\,scfm}\right)^{0.6}$$

Base Cost 45.9 scfm CIP system = $200,000 x $(45.9 \div 184)^{0.6}$
= $86,941/year

Clean-In-Place System – Cost Estimate	
Cost Description	Cost ($)
Direct Costs (DC)	
Base Equipment Costs	86,941
Instrumentation	0.10 x 86,941 = 8,694
Sales Tax	0.03 x 86,941 = 2,608
Freight	0.05 x 86,941 = 4,347
Purchased equipment cost	**102,590**
Foundations & supports	0.08 x 102,590 = 8,207
Handling & erection	0.14 x 102,590 = 14,363
Electrical	0.04 x 102,590 = 4,104
Piping	0.02 x 102,590 = 2,052
Painting	0.01 x 102,590 = 1,026
Insulation	0.01 x 102,590 = 1,026
Direct installation costs	**30,778**
Total Direct Costs	**133,368**
Indirect Costs (IC)	
Engineering	0.10 x 102,590 = 10,259
Construction and field expenses	0.05 x 102,590 = 5,130
Contractor fees	0.10 x 102,590 = 10,259
Start-up	0.02 x 102,590 = 2,052
Performance test	0.01 x 102,590 = 1,026
Contingencies	0.03 x 102,590 = 3,078
Total Indirect Costs	**31,804**
Total Capital Cost (DC + IC)	**165,172**

Annualized Capital Investment = Initial Capital Investment x Amortization Factor

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

Therefore,

Annualized Capital Investment = $165,172 x 0.163 = $26,881

Appendix 2
Scrubber Refrigeration Capital Cost

Scrubber Refrigeration System Capital Cost

As shown in the spreadsheets on the following pages, based on 1 ton-hr refrigeration/12,000 Btu, the amount of refrigeration required is 6.76 tons.

Refrigeration Capacity = Qc x 1 ton-hr refrigeration/12,000 Btu
= 81,157 Btu/hr x 1 ton-hr refrigeration/12,000 Btu
= 6.76 tons

As shown in the following pages, the RsMeans data shows an average cost of $3,751 per ton of refrigeration. Bill Davidson from APCCO refrigeration quoted a client a 60 ton packaged refrigeration unit at about $2,000 per ton of refrigeration in 2011. Therefore, a refrigeration cost of $2,000 per ton of refrigeration will be used in this analysis.

Refrigeration System Cost = $2,000/ton x 6.76 tons = $13,526

The refrigeration will require a small and large heat exchanger. The small heat exchanger is estimated at $2,000 and the large heat exchanger is estimated at $5,000. Also, add pumping allowance of $5,000.

Total Refrigeration System Cost = $13,526 + $2,000 + $5,000 + $5,000 = $25,526

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

Refrigeration – Cost Estimate	
Cost Description	Cost ($)
Direct Costs (DC)	
Base Equipment Costs	25,526
Instrumentation	0.10 x 25,526 = 2,553
Sales Tax	0.03 x 25,526 = 766
Freight	0.05 x 25,526 = 1,276
Purchased equipment cost	**30,121**
Foundations & supports	0.08 x 30,121 = 2410
Handling & erection	0.14 x 30,121 = 4217
Electrical	0.04 x 30,121 = 1205
Piping	0.02 x 30,121 = 602
Painting	0.01 x 30,121 = 301
Insulation	0.01 x 30,121 = 301
Direct installation costs	**9,036**
Total Direct Costs	**39,157**
Indirect Costs (IC)	
Engineering	0.10 x 30,121 = 3,012
Construction and field expenses	0.05 x 30,121 = 1,506
Contractor fees	0.10 x 30,121 = 3,012
Start-up	0.02 x 30,121 = 602
Performance test	0.01 x 30,121 = 301
Contingencies	0.03 x 30,121 = 904
Total Indirect Costs	**9,337**
Total Capital Cost (DC + IC)	**48,494**

Annualized Capital Investment = Total Capital Cost x Amortization Factor

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

Therefore,

Annualized Capital Investment = $48,494 x 0.163 = $7,892

Condition 6 Alcohol/water under vacuum and in the vapor state at 40 Deg F

Flow Rate #-mole/Hour (= EtOH + H2O)	Q3 from condensation in Btu/Hour (= Q1 + Q2)	Q6 in Btu/Hour from Cooling Vapor to 40 Deg F (= EtOH moles x H vapor + H2O moles x H vapor)	Qc1 BTU/Hour (= Q3 - Q6)	Alcohol Moles per hour	Water Moles per hour	Mole Fraction Alcohol Vapor Ya6	Mole Fraction Water Vapor Yw6
5.6146	120,303	109,118	11,185	0.0652	5.5494	0.0116	0.9884

Refrigerated Water Make Up

GPM from S and K	#/Hour (= GPM x ρ x 60 min/hr)	Fresh Water Temperature Deg F	Condensing Temperature Deg F	Qc2 in Btu per hour (= mCpΔT)
4.00	1999.20	75.00	40.00	69,972

Total energy to Remove in Btu's per hour	81,157	= Qc1 + Qc2
Tons rounded Up	7.00	= 81157 / 12000 Btu/ton

A material balance was not done. A percent capture efficiency was used to estimate the amount of alcohol removed.

Chilled Water Systems (Means 1998)

Square Feet	Tons	Cost per Square Feet	Cost per Ton	2.75% Inflation Factor from 1998 (13 Years)	Adjusted Cost Per Ton
4,000	7.33	$10.22	$5,577	1.42	$7,935
6,000	11.00	$8.30	$4,527	1.42	$6,442
10,000	18.33	$6.63	$3,617	1 42	$5,147
20,000	26.66	$5.10	$3,826	1.42	$5,444
40,000	73.33	$5.57	$3,038	1.42	$4,323
60,000	110.00	$5.58	$3,044	1 42	$4,331
4,000	16.66	$13.45	$3,229	1.42	$4,595
6,000	25.00	$11.18	$2,683	1.42	$3,818
10,000	41.66	$8.72	$2,093	1.42	$2,978
20,000	83.33	$9.35	$2,244	1.42	$3,193
40,000	166.66	$9.88	$2,371	1.42	$3,374
60,000	250.00	$10.13	$7,431	1.42	$3,459
4,000	44.33	$19.40	$1,751	1.42	$2,491
6,000	66.50	$19.90	$1,795	1.42	$2,555
10,000	110.83	$18.75	$1,692	1.42	$2,407
20,000	271.66	$18.45	$1,665	1.42	$2,369
40,000	440.00	$18.45	$1,677	1.42	$2,387
60,000	660.00	$15.30	$1,391	1.42	$1,979
4,000	22.66	$15.30	$2,701	1.42	$3,843
6,000	34.00	$13.10	$2,312	1 42	$3,289
10,000	56.66	$10.33	$1,823	1.42	$2,594
20,000	113.33	$10.70	$1,888	1.42	$2,687
40,000	226.66	$11.17	$1,971	1 42	$2,805
60,000	340.00	$11.15	$1,968	1.42	$2,800
4,000	11.66	$11.15	$3,825	1.42	$5,443
6,000	17.50	$10.29	$3,528	1.42	$5,020
10,000	29.17	$7.52	$2,578	1.42	$3,668
20,000	58.33	$5.74	$1,968	1.42	$2,800
40,000	116.66	$6.61	$2,266	1.42	$3,225
60,000	175.00	$8.64	$2,962	1.42	$4,215
4,000	26.66	$15.85	$2,378	1.42	$3,384
6,000	40.00	$13.45	$2,018	1.42	$2,871
10,000	66.66	$12.84	$1,926	1.42	$2,741
20,000	133.33	$12.00	$1,800	1.42	$2,561
40,000	266.67	$12.85	$1,927	1.42	$2,743
60,000	400.00	$11.94	$1,791	1.42	$2,548
4,000	13.33	$11.94	$3,583	1.42	$5,098
6,000	20.00	$10.27	$3,081	1.42	$4,384
10,000	33.33	$8.08	$2,424	1.42	$3,449
20,000	66.66	$7.45	$2,235	1.42	$3,180
40,000	133.33	$7.19	$2,157	1.42	$3,069
60,000	200.00	$9.19	$2,757	1.42	$3,923
4,000	11.33	$11.00	$3,883	1 42	$5,526
6,000	17.00	$9.41	$3,321	1.42	$4,726
10,000	28.33	$7.40	$2,612	1.42	$3,717
20,000	56.66	$5.84	$2,061	1.42	$2,933
40,000	113.33	$6.54	$2,308	1.42	$3,284
60,000	170.00	$8 56	$3,021	1.42	$4,299
4,000	9.33	$9.74	$4,176	1.42	$5,947
6,000	14.00	$9 20	$3,943	1.42	$5,610
10,000	23.33	$6.94	$2,975	1.42	$4,233
20,000	46.66	$5.37	$2,302	1.42	$3,275
40,000	93.33	$6.10	$2,614	1.42	$3,720
60,000	140.00	$8.12	$3,480	1.42	$4,952
4,000	12.66	$11.64	$3,678	1.42	$5,233
6,000	19.00	$10.27	$3,227	1.42	$4,592
10,000	31.66	$8.04	$2,539	1.42	$3,613
20,000	63.33	$7.37	$2,327	1.42	$3,312
40,000	126.66	$8.73	$2,757	1.42	$3,923
60,000	190.00	$8.97	$2,833	1.42	$4,030
4,000	20.00	$13.90	$2,780	1.42	$3,956
6,000	30.00	$12.01	$2,402	1.42	$3,418
10,000	50.00	$9.60	$1,920	1.42	$2,732
20,000	100.00	$10.37	$2,074	1.42	$2,951
40,000	200.00	$10.24	$2,048	1.42	$2,914
60,000	300.00	$11.12	$2,224	1.42	$3,164
4,000	15.33	$12.85	$3,353	1.42	$4,771
6,000	23.00	$10.74	$2,802	1.42	$3,986
10,000	38.33	$8.91	$2,325	1.42	$3,308
20,000	76.66	$8.98	$2,343	1.42	$3,334
40,000	153.33	$9.42	$2,457	1.42	$3,497
60,000	230.00	$9.55	$2,491	1.42	$3,545

Minimum from Means	$1,391	$1,979
Maximum from Means	$5,577	$7,935
Average from Means	$2,636	$3,751
From the BACT analysis		$2,000

$'s per Ton of Refrigeration

The systems shown in Means are installed system costs. The condensing process for the 104 tanks resembles an air conditioning system in that the evaporative coil is placed in the duct system to cool the gas, and condense water from moist air, or in this case a water/alcohol mixture from air or CO2. The systems in Means are for a variety of buildings but illustrate a range of costs per ton for chilled water systems. The illustrated systems are for roof mounted units.

This application was discussed by phone with Bill Davidson from APCCO refrigeration. He had quoted a client a 60 ton packaged refrigeration unit at about $2,000/ton several months ago. The use of the chilled water was some what different from the use in this application, and the packaged unit was designed to sit on the ground. However it was felt that the $2,000/ton was a good number for this application. It is consistent with the average Means number when the $2,000 per ton value is used in the EPA estimating format.

RSMeans

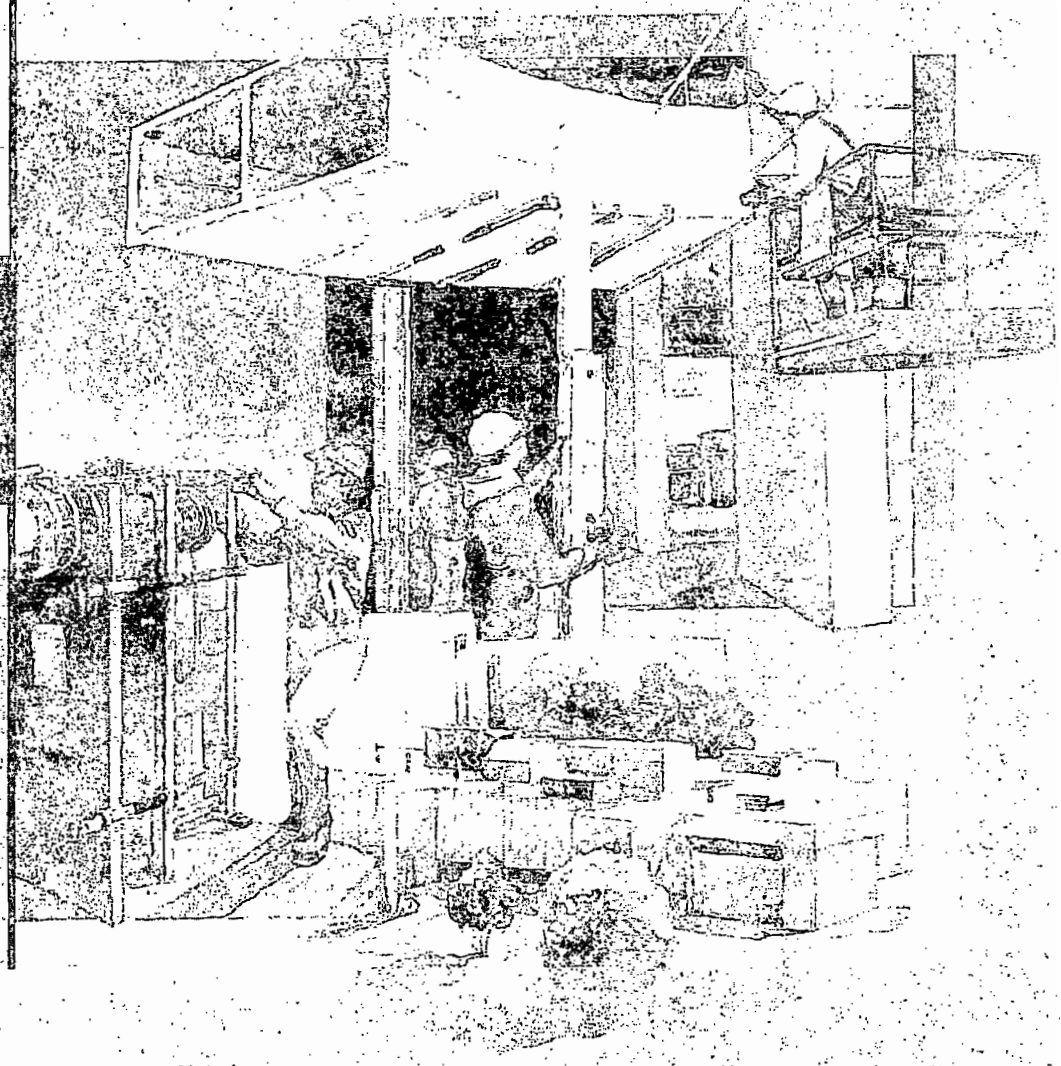
Mechanical Cost Data

21st Annual Edition

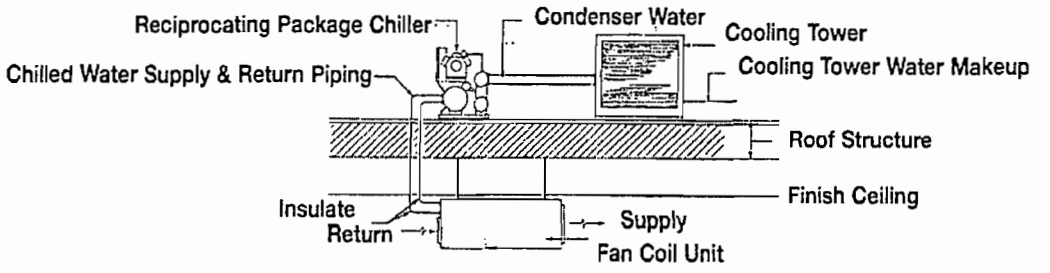
- HVAC
- Controls

Now Available on CD-ROM!

1998



A8.4-120 | Chilled Water, Water Cooled



General: Water cooled chillers are available in the same sizes as air cooled units. They are also available in larger capacities.

Design Assumptions: The chilled water systems with water cooled condenser include reciprocating hermetic compressors, water cooling tower, pumps, piping and expansion tanks and are based on a two pipe system. Chilled water piping is insulated. No ducts are included and fan-coil units are cooling only. Area distribution is through use of multiple fan coil units. Fewer but larger fan coil units with duct distribution would be approximately the same S.F. cost. Water treatment and balancing are not included.

System Components	QUANTITY	UNIT	COST EACH MAT.	COST EACH INST.	COST EACH TOTAL
SYSTEM 8.4-120-1320					
PACKAGED CHILLER, WATER COOLED, WITH FAN COIL UNIT					
APARTMENT CORRIDORS, 4,000 S.F., 7.33 TON					
Fan coil air conditioner unit, cabinet mounted & filters, chilled water	2.000	Ea.	4,397.40	425.08	4,822.48
Water chiller, reciprocating, water cooled, 1 compressor semihermetic	1.000	Ea.	9,618	2,358.70	11,976.70
Cooling tower, draw thru single flow, belt drive	1.000	Ea.	579.07	88.33	667.40
Cooling tower pumps & piping	1.000	System	289.54	208.91	498.45
Chilled water unit coil connections	2.000	Ea.	1,010	1,740	2,750
Chilled water distribution piping	520.000	L.F.	6,162	14,040	20,202
TOTAL			22,056.01	18,861.02	40,917.03
COST PER S.F.			5.51	4.72	10.23

*Cooling requirements would lead to choosing a water colled unit

8.4-120	Chilled Water, Cooling Tower Systems	COST PER S.F. MAT.	COST PER S.F. INST.	COST PER S.F. TOTAL
1300	Packaged chiller, water cooled, with fan coil unit			
1320	Apartment corridors, 4,000 S.F., 7.33 ton	5.50	4.72	10.22
1360	6,000 S.F., 11.00 ton	4.30	4	8.30
1400	10,000 S.F., 18.33 ton	3.62	3.01	6.63
1440	20,000 S.F., 26.66 ton	2.85	2.25	5.10
1480	40,000 S.F., 73.33 ton	3.20	2.37	5.57
1520	60,000 S.F., 110.00 ton	3.14	2.44	5.58
1600	Banks and libraries, 4,000 S.F., 16.66 ton	8.20	5.25	13.45
1640	6,000 S.F., 25.00 ton	6.60	4.58	11.18
1680	10,000 S.F., 41.66 ton	5.25	3.47	8.72
1720	20,000 S.F., 83.33 ton	5.90	3.45	9.35
1760	40,000 S.F., 166.66 ton	5.70	4.18	9.88
1800	60,000 S.F., 250.00 ton	5.60	4.53	10.13
1880	Bars and taverns, 4,000 S.F., 44.33 ton	12.65	6.75	19.40
1920	6,000 S.F., 66.50 ton	12.90	7	19.90
1960	10,000 S.F., 110.83 ton	12.75	6	18.75
2000	20,000 S.F., 221.66 ton	11.90	6.55	18.45
2040	40,000 S.F., 440 ton*			
2080	60,000 S.F., 660 ton*			
2160	Bowling alleys, 4,000 S.F., 22.66 ton	9.55	5.75	15.30
2200	6,000 S.F., 34.00 ton	8	5.10	13.10
2240	10,000 S.F., 56.66 ton	6.50	3.83	10.33
2280	20,000 S.F., 113.33 ton	6.95	3.75	10.70
2320	40,000 S.F., 226.66 ton	6.70	4.47	11.17

R157 -020

8.4-120	Chilled Water, Cooling Tower Systems	COST PER S.F.		
		MAT.	INST.	TOTAL
2360	60,000 S.F., 340 ton			
2440	Department stores, 4,000 S.F., 11.66 ton	6.10	5.05	11.15
2480	6,000 S.F., 17.50 ton	6	4.29	10.29
2520	10,000 S.F., 29.17 ton	4.34	3.18	7.52
2560	20,000 S.F., 58.33 ton	3.34	2.40	5.74
2600	40,000 S.F., 116.66 ton	4.02	2.59	6.61
2640	60,000 S.F., 175.00 ton	4.59	4.05	8.64
2720	Drug stores, 4,000 S.F., 26.66 ton	9.95	5.90	15.85
2760	6,000 S.F., 40.00 ton	8.30	5.15	13.45
2800	10,000 S.F., 66.66 ton	8.15	4.69	12.84
2840	20,000 S.F., 133.33 ton	7.95	4.05	12
2880	40,000 S.F., 266.67 ton	7.75	5.10	12.85
2920	60,000 S.F., 400 ton			
3000	Factories, 4,000 S.F., 13.33 ton	6.95	4.99	11.94
3040	6,000 S.F., 20.00 ton	6	4.27	10.27
3080	10,000 S.F., 33.33 ton	4.79	3.29	8.08
3120	20,000 S.F., 66.66 ton	4.48	2.97	7.45
3160	40,000 S.F., 133.33 ton	4.47	2.72	7.19
3200	60,000 S.F., 200.00 ton	4.94	4.25	9.19
3280	Food supermarkets, 4,000 S.F., 11.33 ton	6	5	11
3320	6,000 S.F., 17.00 ton	5.25	4.16	9.41
3360	10,000 S.F., 28.33 ton	4.24	3.16	7.40
3400	20,000 S.F., 56.66 ton	3.43	2.41	5.84
3440	40,000 S.F., 113.33 ton	3.97	2.57	6.54
3480	60,000 S.F., 170.00 ton	4.52	4.04	8.56
3560	Medical centers, 4,000 S.F., 9.33 ton	5.15	4.59	9.74
3600	6,000 S.F., 14.00 ton	5.10	4.10	9.20
3640	10,000 S.F., 23.33 ton	3.91	3.03	6.94
3680	20,000 S.F., 46.66 ton	3.03	2.34	5.37
3720	40,000 S.F., 93.33 ton	3.63	2.47	6.10
3760	60,000 S.F., 140.00 ton	4.16	3.96	8.12
3840	Offices, 4,000 S.F., 12.66 ton	6.70	4.94	11.64
3880	6,000 S.F., 19.00 ton	5.85	4.37	10.22
3920	10,000 S.F., 31.66 ton	4.72	3.32	8.04
3960	20,000 S.F., 63.33 ton	4.40	2.97	7.37
4000	40,000 S.F., 126.66 ton	4.79	3.94	8.73
4040	60,000 S.F., 190.00 ton	4.78	4.19	8.97
4120	Restaurants, 4,000 S.F., 20.00 ton	8.55	5.35	13.90
4160	6,000 S.F., 30.00 ton	7.25	4.76	12.01
4200	10,000 S.F., 50.00 ton	5.95	3.65	9.60
4240	20,000 S.F., 100.00 ton	6.70	3.67	10.37
4280	40,000 S.F., 200.00 ton	6	4.24	10.24
4320	60,000 S.F., 300.00 ton	6.35	4.77	11.12
4400	Schools and colleges, 4,000 S.F., 15.33 ton	7.70	5.15	12.85
4440	6,000 S.F., 23.00 ton	6.25	4.49	10.74
4480	10,000 S.F., 38.33 ton	4.92	3.39	8.31
4520	20,000 S.F., 76.66 ton	5.60	3.38	8.98
4560	40,000 S.F., 153.33 ton	5.35	4.07	9.42
4600	60,000 S.F., 230.00 ton	5.20	4.35	9.55

Appendix 3
Condenser Refrigeration Capital Cost

Condenser Refrigeration System Capital Cost

As shown in the spreadsheets on the following pages, based on 1 ton-hr refrigeration/12,000 Btu, the amount of refrigeration required is 10.0 tons.

Refrigeration Capacity = Qc x 1 ton-hr refrigeration/12,000 Btu
= 119,217 Btu/hr x 1 ton-hr refrigeration/12,000 Btu
= 9.93 tons

As explained above, a refrigeration cost of $2,000 per ton of refrigeration will be used in this analysis.

Refrigeration System Cost = $2,000/ton x 9.93 tons = $19,870

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

Refrigeration – Cost Estimate	
Cost Description	Cost ($)
Direct Costs (DC)	
Base Equipment Costs	19,870
Instrumentation	0.10 x 19,870 = 1,987
Sales Tax	0.03 x 19,870 = 596
Freight	0.05 x 19,870 = 994
Purchased equipment cost	**23,447**
Foundations & supports	0.08 x 23,447 = 1,876
Handling & erection	0.14 x 23,447 = 3,283
Electrical	0.04 x 23,447 = 938
Piping	0.02 x 23,447 = 469
Painting	0.01 x 23,447 = 234
Insulation	0.01 x 23,447 = 234
Direct installation costs	**7,034**
Total Direct Costs	**30,481**
Indirect Costs (IC)	
Engineering	0.10 x 23,447 = 2345
Construction and field expenses	0.05 x 23,447 = 1172
Contractor fees	0.10 x 23,447 = 2345
Start-up	0.02 x 23,447 = 470
Performance test	0.01 x 23,447 = 234
Contingencies	0.03 x 23,447 = 703
Total Indirect Costs	**7,269**
Total Capital Cost (DC + IC)	**37,750**

Annualized Capital Investment = Total Capital Cost x Amortization Factor

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

Therefore,

Annualized Capital Investment = $37,750 x 0.163 = $6,144

Jet

Condition 1 Saturated Steam @ 125 PSIA

H Enthalpy BTU/#-mole	Flow Rate #-moles/Hour	Q1 BTU/Hour
21,449.89	5.5494	119,034

Condition 2 Alcohol under vacuum assume 90 Deg F

H Enthalpy BTU/#-mole	Flow Rate #-moles/Hour	Q2 BTU/Hour
19,471.60	0.065189048	1,269

Condition 3 Alcohol/water at 14.7 PSIA

Condition 1 + Condition 2 = Q1 + Q2 = condition 2 = condition 1

Flow Rate #-mole/Hour	Q3 BTU/Hour (K1)	Alcohol Moles per hour K8	Water Moles per hour K9	Mole Fraction Alcohol Liquid Xa3	Mole Fraction Water Liquid
5.614578615	120,303	0.0652	5.5494	0.0116	0.9884

X L3

Condition 7 vent to 14.7 PSIA

vapor

40°F " "

Flow Rate #/Hour M7	Q7 BTU/Hour Q7	Alcohol Moles per hour M7a	Water Moles per hour M7w	Mole Fraction of alcohol in Condenser Vapor Ya7 See Below	Mole Fraction of water in Condenser Vapor See Below	H Vapor Alcohol BTU/#-Mole (K2) 18,659.60	H vapor Water BTU/#-Mole (K3) 19,443.89

Condition 4 Discharge to ATM

liquid

= 40°F "

Flow Rate #/Hour M4	Q4 BTU/Hour Q4	Alcohol Moles per hour M4a	Water Moles per hour M4w	Maximum Mole Fraction of alcohol in Condenser Liquid 0.0116	Maximum Mole Fraction of Water in Condenser Liquid 0.9884	H Liquid Alcohol BTU/#-Mole (k4) 207.31	H Liquid Water BTU/#-Mole (k5) 145.02

" condition 3 " condition 3

See Notes Tab for the Solution for M4 and M7 and Conditions M7>=0 M7<=M3(K9) Xa4<=Xa3

Family of solutions in moles per hour

M7	Ya7 (Note Hlookup finds the closest value of Ya7 for a given Xa4. We did not interpolate so results will not exactly close. Error is very small).	Xa4	M4	M4a	M4w	M7a	M7w	Q3(K1)	Q7	Q4	Qc Cooling	Check sum of M4+M7= M3	M3(K9)	Check sum of M4a+M7 a=M3a	M3a(K8)
-0.0251	0.0679	0.0120	5.6397	0.0677	5.5720	-0.0017	-0.0234	120,303	487	822	119,968	5.6146	5.6146	0.0660	0.0652
0.0139	0.0660	0.0116	5.6007	0.0650	5.5356	0.0009	0.0130	120,303	270	816	119,217	5.6146	5.6146	0.0659	0.0652
0.2078	0.0567	0.0100	5.4068	0.0541	5.3527	0.0118	0.1961	120,303	4,032	787	115,484	5.6146	5.6146	0.0658	0.0652
0.5543	0.0455	0.0080	5.0602	0.0405	5.0198	0.0252	0.5291	120,303	10,759	736	108,808	5.6146	5.6146	0.0657	0.0652
1.1207	0.0345	0.0060	4.4938	0.0270	4.4669	0.0386	1.0821	120,303	21,761	653	97,889	5.6146	5.6146	0.0656	0.0652
2.4336	0.0217	0.0040	3.1810	0.0127	3.1682	0.0527	2.3809	120,303	47,278	462	72,563	5.6146	5.6146	0.0654	0.0652
6.1525	0.0108	0.0020													
		0.0000													
		0.0020													

Cooling tons 10.000

Use Maximum Qc

Rounded Up

" ton

" Btu/hr

Red areas outside liming conditions or boundary conditions

see following page for formula derivations

Symbol		Comments	Units	*Equation # or Condition Letter*	Equation	Note
Q3	=	Energy entering the condenser from the steam jet	BTU's/Hour			
Q7	=	Energy leaving the condenser by venting vapor to the atmosphere	BTU's/Hour			
Q4	=	Energy Leaving the condenser by the liquid pump	BTU's/Hour			
Qc	=	Cooling Load needed	BTU's/Hour			
H	=	Enthalpy	BTU's/#-mole			
		Example H7va means enthalpy at thermodynamic condition #7, it is in the vapor state (v), and is the pure component alcohol (a). L(l) means liquid and w refers to water.	BTU's/#-mole			
K		Ki.....K9 reminds the reader that the value in the equations are constant and known for the conditions under consideration.				
X		Mole fraction of the component in the liquid	None			
Y		Mole fraction of the component in the vapor	None			
		Energy Balance Around Condenser	BTU's/Hour	1	Q3(K1)-Q7-Q4-Qc=0	
		Value of Q7		2	Q7=M7a*H7va(K2)+M7w*H7vw(K3)	
		Value of Q4		3	Q4=M4a*H7la(K4)+M4w*H4lw(K5)	
		Value of M7a		4	M7a=Ya7*M7	
		Value of M7w		5	M7w=Yw7*M7	
		Value of M4a		6	M4a=Xa4*M4	
		Value of M4w		7	M4w=Xw4*M4	
						From Tab "Equilibrium Data
		Xa4 is in equilibrium with Ya7 where Keq=equilibrium Constant		A	Ya7=Keq*Xa4	From WI Work"
		Xa4<=Xa3		B	Limiting Condition	
		M7>=0		D	Limiting Condition	
		M4<=M3 and M7<=M3		E	Limiting Condition	
		Alcohol Balance		9	-M7a-M4a+M3a=0	
		Substitute 4&5 into 9		9-A	Ya7*M7+Xa4*M4=M3a(K8)	
		Overall Material Balance		8	M4+M7=M3(K9)	
		M7=			(K8-Xa4*K9)/(Ya7-Xa4)	
		M4=			K9-M7	
				F	1=Xa3+Xw3	
				G	1=Xa4+Xw4	
				H	1=Ya7+Yw7	

Proposed Pages For the BACT Clearinghouse

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.4.XX

Emission Unit: Ethanol Evaporator System **Industry Type:** Wine and Distilled Spirits Production

Equipment Rating: None **Last Update:** February 4, 2012

	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
VOC		1. Capture of VOCs and refrigerated condensation or equivalent (99% control) 2. Capture of VOCs and thermal or catalytic oxidation or equivalent (>95% control) 3. Capture of VOCs and refrigerated absorption or equivalent (95% control)	

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in 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 - Permit Specific BACT Determinations on Next Page(s)**

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 5.4.xxA

Emission Unit: Ethanol Evaporator System

Equipment Rating: None

Facility: E & J Gallo Winery

References: ATC #: N-1237-600-0
Project #: 1113864

Location: 18000 W River Road, Livingston, CA

Date of Determination: February 4, 2012

Pollutant	BACT Requirements
VOC	None

BACT Status:

__ Achieved in practice __ Small Emitter __ T-BACT
__ Technologically feasible BACT
__ At the time of this determination achieved in practice BACT was equivalent to technologically feasible BACT
__ Contained in EPA approved SIP
X The following technologically feasible options were not cost effective:
1) Capture of VOCs and refrigerated condensation or equivalent
2) Capture of VOCs and thermal or catalytic oxidation or equivalent
2) Capture of VOCs and refrigerated absorption or equivalent
__ Alternate Basic Equipment
__ The following alternate basic equipment was not cost effective:

BACT CLEARINGHOUSE

--Submission Form--

Category

Source Category		
Winery		
SIC Code	2084	**View SIC Code List**
NAICS Code		View NAICS Code List

Emission Unit Information

Manufacturer	N/A
Type	N/A
Model	N/A
Equipment Description	Ethanol Evaporator System
Capacity/Dimensions	None
Fuel Type	N/A
Multiple Fuel Types	N/A
Operating Schedule	Continuous 24 hrs/day, 2,573 hrs/yr
Function of Equipment	The purpose of the ethanol evaporator system is to evaporate ethanol.

Facility/District Information

Facility Name	E & J Gallo Winery
Facility County	Merced County
Facility Zip Code	95334
District Contact	David Warner, San Joaquin Valley Air Pollution District
District Contact Phone	(559) 230-6000
District Contact E-mail	carlos.garcia@valleyair.org

Project/Permit Information

Application or Permit Number	N-1237-600-0
New Construction/Modification	New Construction
ATC Date (mm-dd-yyyy)	TBD
PTO Date (mm-dd-yyyy)	TBD
Startup Date (mm-dd-yyyy)	TBD
Technology Status	None
Source Test Available	No

Source Test Results TBD

BACT Information

Pollutant Limit(s) and Control Method(s) – Please include proper units

NOx	Limit:	Units:	Averaging Time:
	Control Method Type:		
	Control Method Description:		
CO	Limit:	Units:	Averaging Time:
	Control Method Type:		
	Control Method Description:		
VOC	Limit: 72.0	Units: lb/day	Averaging Time:
	Control Method Type:		
	Control Method Description: None		
PM	Limit:	Units:	Averaging Time:
	Control Method Type:		
	Control Method Description:		
PM 2.5	Limit:	Units:	Averaging Time:
	Control Method Type:		
	Control Method Description:		
PM 10	Limit:	Units:	Averaging Time:
	Control Method Type:		
	Control Method Description:		
SOx	Limit:	Units:	Averaging Time:
	Control Method Type:		
	Control Method Description:		

Attachment C
Compliance Certification

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

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

Steven M. Kidd

11/16/11

Mr. Steve Kidd
Vice President of Operations

Date

Attachment D
Certificate of Conformity

San Joaquin Valley
Unified Air Pollution Control District

TITLE V MODIFICATION - COMPLIANCE CERTIFICATION FORM

I. TYPE OF PERMIT ACTION (Check appropriate box)

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

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

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

(M) 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).

(M) 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.

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

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

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

Signature of Responsible Official — Date: 11/16/11

Mr. Dan Martin
Name of Responsible Official (please print)

Plant Manager-Livingston Winery
Title of Responsible Official (please print)

Mailing Address: Central Regional Office * 1990 E. Gettysburg Avenue * Fresno, California 93726-0244 * (559) 230-5900 * FAX (559) 230-6061

Attachment E
Draft Authority to Construct Permit

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: N-1237-600-0 **ISSUANCE DATE:** DRAFT

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

LOCATION: 18000 W RIVER RD
LIVINGSTON, CA 95334

EQUIPMENT DESCRIPTION:
ETHANOL EVAPORATOR SYSTEM CONSISTING OF QUADRUPLE EFFECT EVAPORATOR, HEAT EXCHANGERS, STEAM HEATED PREHEATERS, CONDENSERS, CONDENSATE COLLECTORS, AND COOLING TOWERS

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 - 1,929 lb, 2nd quarter - 1,930 lb, 3rd quarter - 1,930 lb, and fourth quarter - 1,930 lb. Offsets shall be provided at the applicable offset ratio specified in Table 4-2 of Rule 2201 (as amended 04/21/11). [District Rule 2201] Federally Enforceable Through Title V Permit
4. ERC Certificate Numbers C-1107-1 and S-3714-1 (or a certificate split from these certificates) shall be used to supply the required offsets, unless a revised offsetting proposal is received and approved by the District, upon which this Authority to Construct shall be reissued, administratively specifying the new offsetting proposal. Original public noticing requirements, if any, shall be duplicated prior to reissuance of this Authority to Construct. [District Rule 2201] Federally Enforceable Through Title V Permit
5. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]

CONDITIONS CONTINUE ON NEXT PAGE

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

Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services

N-1237-600-0 : Mar 6 2012 9:21AM – TOMS · Joint Inspection NOT Required

6. All equipment shall be maintained in good operating condition and shall be operated in a manner to minimize emissions of air contaminants into the atmosphere. [District Rule 2201] Federally Enforceable Through Title V Permit

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

8. VOC emission rate from the ethanol evaporator system atmospheric vent shall be no greater than 3.0 lb-VOC/hour and shall be limited to 7,719 lb-VOC/year. The final VOC emission rate shall be determined according to the conditions of this permit, to the satisfaction of the Air Pollution Control Officer, within 30 days of the date of the first annual source test following the initial source test. [District Rule 2201] Federally Enforceable Through Title V Permit

9. Initial source testing to determine the rate of VOC at the evaporator vent to atmosphere, expressed as lb-VOC/hour, shall be conducted within 60 days after initial start-up, with the unit operating at conditions representative of normal operations. [District Rules 1081 and 2201] Federally Enforceable Through Title V Permit

10. Source testing to determine the rate of VOC at the evaporator vent to atmosphere, expressed as lb-VOC/hour, shall be conducted at least once every twelve (12) months, with the unit operating at conditions representative of normal operations. After demonstrating compliance on two (2) consecutive annual source tests, the unit shall be tested not less than once every thirty-six (36) months. If the result of the 36-month source test demonstrates that the unit does not meet the applicable emission limits, the source testing frequency shall revert to at least once every twelve (12) months. [District Rules 1081 and 2201] Federally Enforceable Through Title V Permit

11. Source testing to determine the rate of VOC, measured in lb-VOC per hour, shall be conducted using EPA Method 18 and 25 or 25A. Source testing shall also be conducted in accordance with EPA's Midwest Scaling Protocol for the Measurement of "VOC Mass Emissions" at Ethanol Production Facilities and/or any other testing methodology that has been previously approved by the District, CARB, and EPA. [District Rules 1081 and 2201] Federally Enforceable Through Title V Permit

12. Source testing shall be conducted using the methods and procedures approved by the District. The District must be notified at least 30 days prior to any compliance source test, and a source test plan must be submitted for approval at least 15 days prior to testing. [District Rule 1081] Federally Enforceable Through Title V Permit

13. The results of each source test shall be submitted to the District within 60 days thereafter. [District Rule 1081] Federally Enforceable Through Title V Permit

14. The permittee shall monitor and record the atmospheric vent emission rate of VOC at least once every month subsequent to the initial source test using a portable emission monitor and stack volumetric flow rate monitor that meets District specifications. Monitoring shall be performed not less than once every month until the first annual source test following the initial source test. Monitoring shall not be required if the system is not in operation, i.e. the system need not be started solely to perform monitoring. Monitoring shall be performed within 5 days of restarting the system unless monitoring has been performed within the last month. Records must be maintained of the dates of non-operation to validate extended monitoring frequencies. [District Rule 2201] Federally Enforceable Through Title V Permit

15. All alternate monitoring parameter emission readings shall be taken with the unit operating either at conditions representative of normal operations or conditions specified in the permit. The portable analyzer and stack volumetric flow rate monitor shall be calibrated, maintained, and operated in accordance with the manufacturer's specifications and recommendations or a protocol approved by the APCO. Emission readings taken shall be averaged over a 15 consecutive-minute period by either taking a cumulative 15 consecutive-minute sample reading or by taking at least five (5) readings, evenly spaced out over the 15 consecutive-minute period. [District Rule 2201] Federally Enforceable Through Title V Permit

16. The permittee shall maintain records of: (1) the date and time of VOC measurements, (2) the measured VOC emission rate, (3) the measured stack velocity flow rate, (4) make and model of exhaust gas analyzer and stack volumetric flow rate monitor, and (5) exhaust gas analyzer and stack volumetric flow rate monitor calibration records. [District Rule 2201] Federally Enforceable Through Title V Permit

CONDITIONS CONTINUE ON NEXT PAGE

17. Within 30 days of the date of the first annual source test following the initial source test, the permittee shall prepare and submit to the District a report proposing the final VOC emission rate for inclusion in this permit. The report shall provide all relevant information and data and a technical demonstration of the proposed emission limit. [District Rule 2201] Federally Enforceable Through Title V Permit
18. The District shall establish the final VOC emission limitation and incorporate the limitation into the permit within 30 days of receipt of the report. [District Rule 2201] Federally Enforceable Through Title V Permit
19. All records shall be retained on site for a minimum of five (5) years, and shall be made available for District inspection upon request. [District Rule 1070] Federally Enforceable Through Title V Permit