ECOPAS

626-539-5850 - 5319 University Drive, #430, Irvine, CA 92612

May 5, 2014
David Warner, Deputy APCO
San Joaquin Valley Air Pollution Control District
1990 East Gettysburg Avenue
Fresno, CA 93726

RE: **Comments on Top-Down BACT Analysis**
Notice of Preliminary Decision-Authority to Construct
District Facility #N-1237; Project #N-1133659

Dear Mr. Warner:

Our company is submitting comments on the above project during the public comment period, with time extension authorized by you. Our detailed comments are attached in the enclosed *Comments on Top-Down BACT Analysis: Project Number N-1133659*.

As a decade plus member of the District Advisory Council (DAC) to the SCAQMD I must note that I have never reviewed a more inaccurate, poorly presented and biased work-product from a public agency. As a former professor of environmental health sciences at UCLA, had a graduate student submitted the BACT analysis contained in the Preliminary Decision–ATC as a class project, she or he would have received at best a grade of Incomplete and would have been sent back for a do-over.

These comments and criticisms are not taken lightly. The SJVUAPCD has a duty and public responsibility to conduct a fair, open and honest evaluation of opportunities to assist in cleaning the serious air quality issues within the Central Valley. You owe the public no less.

We request that the attached comments be included in their entirety and we expect a detailed and complete response to the numerous errors that have been identified, and to the cost-effectiveness re-analysis we offer in the submitted comments. In our opinion a complete and unbiased analysis will demonstrate the clear cost-effectiveness of our technology; a novel system designed specifically to control VOC emissions from wine fermentation. This source-class is one of the most significant, if not the most significant, stationary source of VOC emissions in your jurisdiction during the late summer/early fall photo-chemical smog season.

We hope to work with you and the applicant to remove this source of VOC, improving the quality of air in the Valley. If you have any questions, please contact me at (626) 539-5850.

Sincerely,

Steven Colome, Sc.D.

cc: Mike Tollstrup, CARB
cc: Gerardo C. Rios, EPA

ECOPAS, LLC

Comments on Top-Down BACT Analysis

Project Number N-1133659

Submitted to SJVUAPCD

5/5/2014

EcoPAS, LLC comments on Notice of Preliminary Decision – Authority to Construct for Facility Number N-1237, Project Number N-1133659: Permits for the installation of eight (8) 35,000 gallon wine storage tanks and twenty four (24) 56,000 gallon red and white wine fermentation tanks.

CONTENTS

A. Errors in Top-Down BACT Analysis of Passive Alcohol System (PAS)

Facility Number N-1237, Project Number N-1133659

Following are errors of fact, errors of omission, or propagation of errors previously identified in earlier versions of the BACT analysis.

1. **District BACT for Wine Fermentation**, page 1[1]

District BACT analysis identifies the SJVUAPCD BACT Clearinghouse Guideline 5.4.14 for wine fermentation BACT as a ***Maximum Average Fermentation Temperature*** of 95ºF. While this term is consistent with the one-page Clearinghouse Guideline for this emission source, it is undefined mathematically and as such is meaningless.[2] The term is inconsistent with the draft Authority to Construct Condition in the Notice of Preliminary Decision, which states: "The average fermentation temperature of each batch of must fermented in this tank shall not exceed 95 degrees Fahrenheit, calculated as the average of all temperature measurements for the batch taken at least every 12 hours over the course of the fermentation".[3]

More telling is the fact that the Compliance Department memo, for inspection of tanks involved in the fermentation of wine (COM 2293, dated April 3, 2012 and signed by Morgan Lambert), does not directly mention the role of the field inspector in monitoring and reviewing compliance of wineries for this wine fermentation BACT requirement.

The lack of definition, conflicting terminology, and lax monitoring or recording of values by inspectors underscore the fact that this is a meaningless control measure that is not treated seriously by the District.

2. **Vapor Flow Rate**, page 2

District presents a scenario leading to a maximum combined flow rate of 6,926 scfm for the project during peak fermentation. This issue has been discussed previously in relation to Project N-1131615, with the District admitting that the maximum flow is unrealistic. In fact this scenario is so improbable as to be absurd.[4]

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[1] Page numbers refer to the numbers at the bottom of the pages of the top-down analysis.

[2] There are other issues with this policy addressed later in Section E.

[3] While a simple arithmetic average of all temperature measurements is defined and computable, this measure has an unknown relation to *maximum average fermentation temperature*. Other problems with the temperature BACT as practiced by District are addressed later.

[4] A scenario leading to this improbable flow rate is described in greater detail in Section D.

In short, the scenario requires that all 24 fermentation tanks start empty, are instantaneously filled to 80% tank capacity with approximately 5,250 tons of crushed and destemmed grapes and inoculated simultaneously with yeast; then all tanks reach maximum CO_2 flow in unison 23-27 hours later.

The scenario would be no more than an amusing thought experiment if it were not for the fact that the applicant calculated and used the maximum flow rate of 6,926 scfm to define the physical and capital requirements for a hypothetical control system. This is a bit like designing a dam to hold a once-in-100,000 year flood or requiring that buildings be built to withstand an earthquake of greater than 10 on the Richter Scale. It is simply bad engineering and poor public policy.

The District knows better but continues to propagate an unrealistic flow estimate that leads in part to the applicant's impossibly high estimate for cost per ton of VOC removed. While the applicant has an incentive to overestimate control costs, the District has a professional and public responsibility to identify impossible scenarios and cost projections that are based on unreasonable and overpriced design considerations.

Later we describe how the Passive Alcohol System is designed to handle all potential fermentation flow conditions, with capacity requirements far less than projected by the applicant, and at a cost-effective investment.

2. **EcoPAS Analysis**, page 3-4

The District re-applied an analysis of the EcoPAS control system (Project N-1131615 at the same Gallo facility) "as if it were submitted for this project." EcoPAS was not informed of this impending application nor invited to assist the District in development of a more accurate and professionally defensible cost-effectiveness analysis, despite knowledge by District staff and management of our interest.

Numerous and significant errors identified by EcoPAS in the initial BACT analysis have been propagated here. Both the applicant and Executive Staff at SJVUAPCD were acutely aware of the interest our company has in the analysis of cost-effectiveness of our VOC control system, designed specifically for wine fermentation. While a face-to-face meeting with Dave Warner was held on January 15, 2014 and a conference call with Mr. Warner and staff engineer Dennis Roberts was held on January 29, 2014, no mention was made to us of the current Gallo project. We suspect that this omission was not accidental. We did not have the opportunity to address serious errors in analysis, described herein, prior to release of the Notice of Preliminary Decision.

It is likely that a deliberate decision was made to keep the current project from our attention, preventing correction of obvious errors and the opportunity to update and improve the accuracy of the cost-effectiveness BACT analysis.

Had EcoPAS been notified of the current project we would have pointed out the errors in analysis and presentation; further, and based on the initial analysis, we would have identified opportunities for configuring the control system to ensure cost-effectiveness. Additional specific comments for this section of the BACT analysis follow:

a. The analysis from EcoPAS suggests that the preferred configuration for cooling the ethanol vapor is through tie-in to the winery's central chiller; this is clearly the most cost-effective and rational approach to providing chilling capacity to our PAS system. For Project N-1131615 the applicant claimed that "the current systems at the facility are fully utilized." For the present application the same claim was repeated. This claim is no longer credible since each application was for new fermentation and storage tanks, and the chilling capacity at the facility would need to be resized to supply the new tanks. The applicant can get away with that excuse once, but the second claim strains credulity.

A rational applicant would minimize capital and operating expense by sizing the added chilling capacity to accept the small incremental demand of the PAS control equipment. Nonetheless, we allow for a stand-alone chiller in the current application in the cost analysis, while recognizing that the applicant would ultimately choose to integrate the systems for a cleaner and more cost-effective solution.

b. On page 3 of the Top-Down BACT analysis, District presents an unreadable version of a clean spreadsheet supplied by EcoPAS. In this analysis we show how in a short season of fewer than 80 fermentation days, the total requested fermentation capacity could be handled by four PAS units. This analysis presents a reasonable worst-case scenario for design of our ethanol (VOC) control system. While the applicant claims the intended purpose for the fermentation tanks is to produce higher quality wine, fermented over 5-8 days, we project the capacity to collect emissions using PAS during a rolling fermentation for worst-case, high-CO_2 flow, fermentation cycles of 2-3 days.

3. **District presentation of Gallo Analysis**, page 4-6

a. Gallo indicates that while the proposed project is designed for production of premium wines with 5-8 day fermentation cycles, the fermentation cycle could be "aggressive" and completed in 2-3 days. EcoPAS approach is sized for a realistic worst-case 2-3 day fermentation cycle. The District could condition the permit to assure a reasonable maximum flow rate of CO_2 without major interference with winemaking or grape delivery. Currently, the District restricts single tank VOC emissions to 3.46 pounds per 1,000 gallons tank capacity. A multi-tank limit could easily be designed and extended to ensure optimal flow conditions.

b. Gallo represents that "grapes may not arrive in the quantities planned and tanks may be filled in groups at one time causing them to reach peak fermentation at the same time with variations in the fill quantity". This issue is discussed in greater detail in Section D. Winemakers have a number of tools available in order to stage fermentations, including timing of yeast inoculation and cold-soaking grapes to delay start of fermentation. District has the opportunity to place simple conditions on the ATC to ensure such staging. Alternatively, incentives could be placed on applicant to minimize emissions by imposing an emission fee for flow conditions that exceed the maximum design flows of the control system.

c. Gallo presented to the District operating data on tank utilization from June-September, 2013 for 24 red wine tanks. We asked for a copy of the letter to the District from Gallo dated September 26, 2013 but were told the information is considered confidential by the applicant. Despite the lack of detailed information on the specific case identified by Gallo, our system is designed to handle the general conditions specified in the paragraph.

d. The BACT analysis states: "Gallo Winery has provided a cost effectiveness analysis based on four condensers as quoted by the control technology company."

This statement is incorrect.

The Gallo cost analysis is presented in Attachment C of the District's BACT analysis. In that section Gallo bases their cost estimate deploying a total of 24, not 4 control units. This is part of the reason for the extremely inaccurate and unrealistically high cost/ton control estimate generated by the applicant and included in the District's discussion of the EcoPAS cost-effectiveness.

e. District states that Gallo says fire code requires a 25 foot radius from a control device. While that distance is correct for an indoor application, the requirement for an outdoor installation is a 10 foot radius to meet Class I, Division II Fire Code Standards. This error was previously pointed out to the District. EcoPAS is aware of the code requirements for our equipment and the system is designed to meet all applicable standards.

f. Gallo claims that our control devices would need a Clean-in-Place (CIP) system in the event of a foam-over.

This is incorrect as a foam-over preventer is incorporated in and budgeted with the PAS design.

g. Furthermore, modern winemaking practices have greatly reduced the likelihood of foam-overs which have been held up for over three decades by certain members of the winemaking community as the 'bogeyman' for emission controls. Good winemaking practice, modern yeasts, and working controls have greatly reduced the costly losses that result from fermentation foam-overs.

h. An analysis of modeled costs provided to Gallo by Eichleay Engineers was made without detailed knowledge of the specific invention, application and operating requirements of the PAS controls. As such the analysis is highly unrealistic, if not frankly biased, in presenting adjustments to equipment and installation costs. As previously mentioned, the Gallo estimate increases the appropriate number of 4 control units to an unrealistic 24 units. This adjustment is a capital penalty that makes a cost-effective solution appear to be cost-ineffective.

The District should have noticed the increase in control units and dismissed the applicant's cost estimate. Instead the District erroneously claims the cost estimate from Gallo was based on four control units.

In December 2013 we were contacted by Eichleay Engineers to discuss the PAS and its winery application. Due to multiple previous misinterpretations of the requirements and use of our system, we invited questions in writing and submitted through the SJVUAPCD in order to keep all communications clear, open and on the record.

4. **District Analysis**, page 6-10

a. The District control efficiency estimate of 81% applied to our system has been a long-standing estimate used by the District to estimate the efficiency for generic condensing and scrubbing systems. While we exceed that value in non-optimized pilot runs in a commercial winery, we will calculate cost-effectiveness based on this relatively low capture and control efficiency value. In a working installation our equipment will exceed this value and prove to be even more cost-effective.

b. The District stated that “EcoPAS has provided site-specific costs for the proposed scope of supply (see Attachment C)”.

This is not true.

Attachment C represents an unrealistic cost estimate provided by the applicant Gallo and is attributed to Dan Slagel, dated 10/27/2013. This estimate was generated without specific knowledge of the capacity, installation and operating requirements, or associated costs for the EcoPAS VOC control system.

EcoPAS has provided to the District site-specific costs, including a provisional turn-key cost estimate, producing a cost-effectiveness estimate of $13,265.[5] The District, for some reason avoided inclusion of our analysis.

c. District has calculated engineering costs at “5% of total direct cost exclusive of city/county plan check costs”. This leads to a District estimated $105,000 in engineering expenses for the project. This estimate is too high and is drawn from thin air without respect to the unique design and straightforward installation requirements of the PAS control equipment.

PAS assembly is substantially less expensive to install than assumed by the applicant, or even envisioned in 2002 in the EPA Control Cost Manual for a generic VOC condenser.

Designed specifically to control emissions from wine fermentation, and unlike conventional air pollution systems, PAS is comprised of standard food/beverage components that are simply assembled on-site.

The PAS system arrives fully fabricated. Engineering is required for structural and earthquake based on a mounting system of the client’s choice. We proudly state that after mounts are attached “no tools are required to install the PAS” because components are assembled by hand with triclamp fittings familiar in the wine industry. This allows for easy assembly and seasonal cleaning.

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[5] As provided in email to Dave Warner dated October 14, 2013. The EcoPAS documentation is not referenced in the current BACT analysis

Envisioned by Gallo and Eichleay Engineers in their cost estimates is a far more complex system and installation.

EcoPAS consulting engineers with extensive experience in the food and beverage industries, and with knowledge of installation and operating requirements of our system, have estimated more realistic engineering costs for this installation of $24,653. Direct engineering estimates are superior to proportionate assumed costs and should therefore be used.

On multiple occasions we have offered to work with the District, in concert with the applicant, to assist in understanding a more realistic estimate of engineering requirements for the PAS.

d. The District states: "Due to unsteady state operation of fermentation tanks……….An additional cost of $15,000 per unit will be assumed for initial source testing". This budget assessment is unrealistic for several reasons:

1. SJVUAPCD does not currently require source testing of winery emissions in the District, relying instead on separate emission factors for red and white wine. (Emission-factor EtOH)
2. Ethanol removed from fermentation exhausts by PAS is quantified and is reportable to the Treasury Department (Captured EtOH). An accurate assessment of capture efficiency is calculated from:

   (Captured EtOH)/(Emission-factor EtOH)

3. Another CA air district (SBCAPCD) uses captured EtOH, and not intermittent source testing, to calculate VOC removed from wine fermentation for a recent VOC ATC issued within their jurisdiction. This approach acknowledges that a direct measure of VOC removal is superior to the one-time source test suggested by SJVUAPCD.
4. Our company has had joint discussions with CARB, EPA Region 9, and EPA North Carolina to explore the challenges associated with the lack of established source-testing protocol for winery VOC fermentation emissions. Experts in source testing recognize the inherent errors in measuring capture efficiency for this source using available source-testing methods.
5. Each PAS unit is manufactured to the same specifications and does not require combustion or other processes that might vary from device to device. Requiring separate testing of each unit is not only unnecessary but totally irrelevant. There is no theory or mechanisms by which to propose unit-to-unit variation. While reasonable for

thermal oxidizers and certain other types of control devices, this requirement has no engineering or scientific basis in the case of PAS.

6. Given that an EXACT measurement of VOC (as EtOH) removed from the atmosphere is recorded daily and seasonally for the PAS, and given that this estimate represents a type of continuous monitoring system, and given the calculation errors inherent in monitoring intermittent inlet-to-outlet differences for this source type, the assumed $60,000 cost for source testing is useless and inferior to the approach approved by the SBCAPCD.

e. The District added an Owner's cost of $100,000. Like the prior and erroneous "capital adjustment factor" applied to the PAS, this expense does not have a category in the EPA Control Cost Manual[6] and is redundant to other costs already incorporated in the EPA methodology for Engineering and Direct Annual Labor attributed to the winery. This uncategorized and double-counted expense should be eliminated from the cost-effectiveness analysis.

It is possible that this category may have been developed specifically for this applicant and is not part of previous cost-effectiveness analyses conducted by the District.

f. The District gives a subjective rationale for an excessive and inappropriate contingency estimate of $475,009. This unnecessary amount is based on an ad hoc contingency assignment of 20% of the total estimated capital investment and produces a biased estimate of cost-effectiveness. The District analysis is contrary to the 3% of Purchased Equipment Costs used by EPA in the Control Cost Manual. The EPA Control Cost method would result in a $57,038 contingency allowance for a conceptual generic VOC condensing system. The District estimate is contrary to good engineering practice and EPA cost methodology upon which the District analysis is reported to be based.

g. The District allowed an optional $40,000 expense requested by the applicant for a PLC and data logging system for four PAS units. Since the PAS is a passive system with no mechanical or electronic controls, a PLC system would have nothing to program or control related to the control equipment. Instrumentation necessary for the safe and efficient operation of the PAS is included in the EcoPAS equipment cost estimate. While the customer may request optional equipment, which we are willing to price and install, it is inappropriate to add this or other optional expenses to the cost-effectiveness analysis.

[6] EPA Control Cost Manual, Sixth Edition (EPA?452/B-02-001) Chapter 2: Refrigerated Condensers

h. The District estimated a capital and annual operating cost for a stand-alone chiller system to service the PAS. The more cost-effective solution is to integrate the marginal chilling requirements of PAS into the main facility chillers servicing this bank of tanks. A cost-savings would follow from this straightforward integration and we find applicant's claim of insufficient chilling capacity unconvincing, particularly when it is repeated for a second facility expansion within months of a prior ATC.

i. A District assessment of $15,000 has been included for annual source testing. This is an unnecessary expense that is inferior to direct, integrated, and certain capture of ethanol reported to the US Treasury Department of the VOC removed from entering the atmosphere. These data are superior in quality and accuracy to that derived by one-time source test (see 4d, 1-6 above).

j. The District is highly non-transparent when it accepts the redaction for recovered product value provided by the applicant and fails to show any analysis for alternative estimates for recovered VOC value. By redacting this value, and hiding any analysis, no District cost estimate is given for the PAS system, in spite of the fact that the installation is near cost-effective even with the erroneous and inappropriate charges added to the system by the District.

No sensitivity analysis was conducted by the District, as would be expected with good practice for engineering/economic evaluations. Instead of redacting the Gallo valuation, and thereby blanking out *any* cost-effectiveness evaluation of the PAS, the District could easily have bounded evaluation between the fuel value of the recovered VOC and the EcoPAS estimate of $25/gallon.

The redacted Gallo estimate is close to the fuel value and is predicated on the inappropriate utilization of the condensate as a feedstock for brandy stills.

EcoPAS has tested the condensate, which has valuable flavor and aroma characteristics that would be lost in high-temperature distillation. We also have proprietary information that places a value up to $250/gallon for applications in the food flavoring and aroma industries. As a matter of comparison, the $25/gallon which we have previously claimed, is about $5/750ml bottle. For a premium 80 proof alcohol spirit this is a very conservative price.

k. We have previously corrected the District's assertion that the PAS units handle "the rated maximum flow stated by E&J Gallo" (see Section 2 above on vapor flow and Section D below). We have stated that the maximum flow scenario presented by Gallo is about as likely as rolling snake eyes 24 times in a row, once for each fermentation tank, and then being struck by lightning.

It is not good engineering practice to design a capital project to meet a highly improbable event. The District acknowledges the unreasonable flow estimate provided by the applicant but continues to propagate and use this value. Good engineering practice would be to work with a reasonable maximum flow under expected operating conditions and not some theoretical but highly improbable condition to size a system. Doing so leads to an oversized and inappropriate control system.

Nonetheless, the PAS could handle the Gallo-estimated maximum theoretical vapor flow of 6,926 scfm. Excess flow would be allowed to by-pass the pressure relief valve, much like the spillway on a dam.

l. The District was informed by us on February 28, 2014 in an email to Dennis Roberts that a new CA sales tax rate for certain manufacturing activities is 3.3% beginning the first of July this year:
http://www.boe.ca.gov/sutax/manufacturing_exemptions.htm
The revised and reduced sales tax of 3.3% should be reflected in the BACT analysis. Among qualifying expenses are: "tangible personal property used in pollution control that meets standards established by this state or any local or regional governmental agency within this state".

m. The District misuses the concept of Capital Recovery Factor (CRF) by ignoring its economic and engineering theory. While discount rate and equipment life expectancy are variables, for this analysis the District is treating them as fixed factors of a 10% discount rate and 10 year product life. A 10% discount rate in current markets is well above both private and social discount rates and is not supported by any current literature on CRFs, or by the various public agencies that annually adjust those variables.

The District's use of an amortization factor in this BACT analysis is contrary to good engineering, current market conditions, economic theory of discounting, and the expected life of the PAS units. More significantly, this use is contrary to the District's own policy on BACT analyses[7].

The error in the District's analysis is explored further in Section C below. Use of the fixed 10/10 not only makes no sense, but more importantly it serves

[7] Best Available Control Technology (BACT) Policy, November 9,1999 with May 14, 2008 update

to discourage introduction of novel and capital intensive control technologies.

That is not what one expects from an agency charged with and responsible for cleaning the air.

We have found no other public agency in the US currently utilizing a 10% discount rate for pollution controls and fixing control equipment life at ten years, irrespective of the equipment design, use and anticipated life of the equipment.

The EPA Control Cost Manual, upon which the District analysis is supposed to be based, uses a 15 year life for a nonpackaged (custom) refrigerated condenser system. The same manual, last published in 2002, used a 7% discount rate, referenced to the Office of Management and Budget estimates which are updated annually. The current 2014 OMB real discount rate for ten years is 1% and for twenty years is 1.6%.

The apparent interpretation of the District is contrary to the goal of implementing new cost-effective controls to reduce stationary pollutant emissions.

n. While the District claims that the cost data and model for their BACT calculation comes from the EPA Control Cost Manual Sixth Edition, the District has taken liberty with the EPA model and data to overestimate control costs. By consistently overestimating the costs of our equipment the District tilts the analysis in the direction of making a cost-effective control solution appear to be less cost-effective.

Examples include:

1. Addition of a PLC/Programming optional for $40,000 requested by applicant. This is an optional expense and not required for safe and effective operation of PAS controls.
2. Addition of separate and redundant owner expense of $105,000.
3. Overestimated project contingency (EPA estimate of $57,038 vs unrealistic and unsupported District estimate of $475,009)
4. EPA uses a default for equipment life for a generic condensing VOC control of 15 years rather than the District adhering to a 10 year device life in the face of demonstration that under expected use and operating conditions equipment should last more than 20 years with simple annual maintenance (budgeted).
5. In 2002 EPA used a discount rate of 7%, while the agency uses annual updates to discount rates calculated by OMB. For 2014 the OMB

discount rate for a 10-20 year life ranges from 1.0% to 1.6% for a real discount rate used for cost-effectiveness analysis.

Had the District in fact used cost data and methodology outlined in the EPA Control Cost Manual the conclusion that our technology is currently cost-effective would be unavoidable.

o. In this analysis of cost-effectiveness the District has again layered inappropriate expenses onto the PAS solution. Due to its keeping in place Gallo's redaction of a VOC recovery value, no District estimate is given for the cost-effectiveness of the PAS control. Instead, the District presents the applicant's extremely high and inaccurate cost estimate based on limited understanding of the unique installation and operating requirements of the PAS, and based on an unnecessary installation of 24 control units rather than the proposed and adequate 4 units.

While presenting the applicant's unrealistic estimate based on faulty assumptions and oversized capital considerations, the District fails to include the EcoPAS estimate of $13,265/ton of VOC reduced; a figure that was provided in correspondence dated October 14, 2013 to Dave Warner.

In the following section, we correct the errors identified in this section and present a sensitivity analysis with a more appropriate and accurate assessment of the current cost-effectiveness of PAS controls for this project.

Using the District's own analysis methodology, correcting errors and unveiling the information lost through redaction, **the EcoPAS control system is clearly cost-effective in the present application**.

B. Re-Analysis of District Top-Down BACT for Passive Alcohol System, with District Errors Removed

In this section errors identified in Section A above are corrected and the cost-effectiveness of the EcoPAS VOC controls for Project Number N-1133659 is recomputed for multiple realistic scenarios.

To make all runs comparable and transparent, we use the District's calculational model. The veil of redaction is lifted so that estimates of cost-effectiveness are revealed.

In order to show the range of cost-effectiveness values and the central tendency of those values, the following table contains cost-effectiveness calculations (expressed as dollars/ton of VOC removed) for multiple cases, including the initial and error-filled case presented by the District.

Table B-1: Re-Analysis of Passive Alcohol System (PAS)

Case	Scenario	Cost Effectiveness, $/ton VOC removed
#1	SJVUAPCD assumptions with VOC recovery credit of $3/gallon EtOH	**$17,599**
#2	As above with reduced tax rate to 3.3%, uncategorized "owner expense" removed and extreme contingency adjusted to EPA Control Cost Manual calculation	**$13,709**
#3	As above with 15 year device life as recommended for "generic" refrigerated condensing VOC control with 3% discount rate	**$8,570**
#4	As above with optional PCL and emission-testing expenses removed, engineering costs reduced to EcoPAS estimate of $24,635 based on "turn-key" installation	**$7,417**
#5	As above with 20 year useful life and 1% CARB discount rate	**$5,713**
#6	As above increasing value of recovered by-product alcohol to $10.75/gallon (slightly over $2/750ml bottle for 80 proof spirit)	**$0** (at this alcohol value the control device pays for itself)

C. Capital Recovery Factor in District's BACT Policy

The following quote is from District document APR 1305, the SJVUAPCD Best Available Control Technology (BACT) Policy, Section X.A.1 on Procedures for Conducting Cost-Effectiveness Analysis of Technologically Feasible Alternatives.

> "Calculate an equivalent annual cost from a capital cost using a capital recovery factor as shown below:
>
> $$A = P \frac{i(1+i)^n}{(1+i)^n - 1} \text{ where;}$$
>
> A = Equivalent Annual Control Equipment Capital Cost
> P = Present value of the control equipment, including installation cost
> i = interest rate (use 10%, **or demonstrate why alternate is more representative of the specific operation**).
> n = equipment life (assume 10 years **or demonstrate why alternate is more representative of the specific operation**)" *Emphasis added*

The District's written policy recognizes the variable quality of the interest rate and equipment life as inputs to the Capital Recovery Factor. Further, the District has had ample demonstration for why better alternatives to the 10/10 default assumption are more appropriate for this analysis.

1. Interest rate, *i*

We know of no other public agency currently using a value of 10% discount rate to evaluate cost-effectiveness.

The value of 10% is outdated and is not reflective of either private or public money costs. Per statute CARB updates the cost-effectiveness limit and capital recovery factors (CRF) annually. For 2014 CARB continues to use a discount rate of 1% with a revised cost-effectiveness limit of $17,720.

EPA uses the values reported by the Office of Management and Budget (OMB), the federal agency that annually updates interest rates for use in project evaluation[8].
OMB reports both nominal and real discount rates for projects of different duration. Nominal rates are the same as market rates and typically used for lease-purchase analysis. Real discount rates remove the inflation premium and are “often required in cost-effectiveness analysis”. Below is a Table of Nominal and Real interest rates for 10 and 20 year projects.

Table C-1: Real and Nominal Discount Rates (%), 2014
(OMB Circular No. A-94)

	10-Year Project	**20-Year Project**
Real Discount Rate	1.0%	1.6%
Nominal Discount Rate	3.0%	3.6%

Clearly, the District’s continued use of a 10% discount rate represents an extreme outlier among public agencies. The 10% value does not represent current rates and biases results, making cost-effective solutions appear to be cost-ineffective.

Most significantly, continued use by the District of an outdated 10% CRF serves to discourage new and innovative pollution controls that will serve to assist in cleaning up the serious and persistent air quality problems in the Central Valley.

2. Equipment Life, *n*

The District has also received ample evidence for why ten years is an incorrectly short life expectancy for PAS VOC controls. Use of a ten year life is also inconsistent with the EPA Air Pollution Control Cost Manual. The EPA Manual gives default equipment life for a generic condensing control system of 15 years.[9]

Fifteen years is a minimum feasible life for the PAS system. There are no moving parts (including motors, fans, or pumps) integral to the control unit. The body of the unit is fabricated from food-grade stainless steel and while in-use, pressures and temperatures within the system are moderate. Compared with other types of pollution control equipment, which operate

[8] OMB Circular No. A-94, 2014
[9] EPA Control Cost Manual, Sixth Edition (EPA/452/B-02-001) Chapter 2: Refrigerated Condensers

under more extreme conditions of temperature and pressure, it is reasonable to assume a product life of at least 25 years for the PAS.

D. Unreality of Applicant's Estimate for Maximum CO_2 Production Rate

The applicant has produced a highly improbable maximum flow condition. We will show in this section the unrealistic nature of this estimate. If it were only a mental exercise in rare events (like computing the probability of the earth being hit by a giant asteroid) it might be an amusing calculation.

The problem is that the applicant has used an unrealistic calculation of maximum fermentation activity (and therefore CO_2 flows) as the design basis for an oversized manifold and theoretical control system. By unreasonably sizing the system, the applicant has guaranteed that their estimate of cost-effectiveness would lead to a conclusion that controls are not cost-effective.

Indeed, that is the result developed by applicant in Attachment C of the District BACT analysis. In that section Gallo greatly oversizes the control system and arrives at an incorrect cost-effectiveness calculation of $113,643/ton VOC.

So let's explore what would be required to achieve the maximum combined vapor flow of 6,926 scfm as calculated by the applicant.

We must start with 24 empty fermentation tanks.

To achieve the theoretical flow calculated by the applicant, each of the twenty four (24) 56,000 gallon tanks would need to be filled to capacity (stated as 80% maximum fill).

For calculation we will assume:

1. 24.5 tons/truckload of grapes
2. 205 gallons must (grape juice)/ton of grapes

Therefore,

24 tanks x 56,000gal/tank x 80%fill = 1,075,200 gallons must
1,075,200 gallons/(205gal/ton) = 5,245 tons of grapes
5,245 tons/(24.5 tons/truckload) = 214 truckloads of grapes

Gallo states that certain conditions might require simultaneous and rapid (46 hour) fermentation in all 24 tanks. While multiple tanks will be fermenting at various times during the crush season, it is improbable that they are all peaking at the same time.

For that scenario to happen, all 24 tanks would need to start empty – something likely only at the start of the season. Then 5,245 tons of grapes would need to be picked by the harvest crew, loaded into 214 double-bed trucks, travel in caravan to the Livingston winery and line up at the crusher/destemmer.

To complete the Gallo scenario, the 214 truckloads would need to be instantly processed and all 24 tanks filled at one time (in spite of the capacity of the Livingston facility, this would be quite a magic trick).

Nutrients and yeast would be added simultaneously to the 24 tanks which would need to be at the same starting temperature to peak at the same time. Normal biological variation would need to be minimal for all fermentations to peak at the same time.

Not only is this scenario physically improbable, but it violates the intended use of these tanks to produce premium wine fermented over 5-8 days. Furthermore, this scenario would cause multiple tanks in this group to violate the District's proposed daily emission condition #7, that each tank "shall not exceed 3.46 lb per 1000 gallons of tank capacity."

As previously mentioned, even if the applicant were to cause this unlikely chain of events to occur, it would not damage the PAS system or cause reconsideration of the proposed sizing.

E. District's Current BACT for Wine Fermentation

The District's BACT for wine fermentation is to require average fermentation temperatures be maintained below 95 degrees F. This is in recognition that temperature IS the most significant variable affecting the atmospheric release of ethanol vapors for most commercial wine fermentation. In fact, this relationship is quite nonlinear.

While BACT is reported to be "the most stringent control technique for the emissions unit and class of source", it must be recognized that this BACT policy represents no control at all; for good winemaking practice calls for temperatures of both red and white wines be maintained below this temperature.

We have asked the District for written protocols on how temperatures are recorded and reported to the District, and none have been produced to date[10]. The definition of *maximum average temperature*, as used in the BACT analysis, is not mathematically defined. Starting times for temperature recording are also not specified (e.g., following tank-fill with must, or following yeast inoculation, or once sugar consumption is first detected).

There are multiple options for placement of thermal wells and for the timing and frequency of temperature recording which all affect the calculation of average fermentation temperature.

The District uses separate emission factors for red and white wine under the assumption that white wines are typically fermented at lower temperatures. However, the District has not set a separate and lower temperature for fermentation of white wines in spite of the fact that the District must assume lower fermentation temperatures to rely on the lower 2.5 lbs/1,000 gallon emission factor used for emission models.[11]

We have asked the District multiple times whether temperatures are reviewed by the District for white wine fermentations and have not received a direct answer. If white wines are not destined for the premium consumer markets it is quite possible that they are fermented at higher temperature in order to shorten time in the fermentation tanks. In that case, emission rates might begin to approximate those for normal red wine fermentations.

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[10] SJVUAPCD COM-2293, dated 4/3/2012, does not indicate temperature inspection protocols.

[11] Red wine emission factor of 6.2lb/1000gal is based on a fermentation temperature of 78 °F and 21.8 °Brix reduction; the corresponding white wine emission factor of 2.5lb/1000gal is based on 58 °F and 20.4 °Brix (SJVUAPCD FYI-114, revised 6/13/2012).

F. The Problem with Certified Emission Reduction (CER) Credits

The first 35% of offset credits for the proposed facility are derived from Certified Emission Reduction (CER) credits as described in Rule 4694. Unlike Emission Reduction Credits (ERCs), Certified Emission Reductions are treated as semi-secretive transactions not included in the public ERC record.

We have asked for any written District documentation[12], rules or policies that guide this class of emission reduction; and we have been met with lack of knowledge or silence. We understand that one senior member of the engineering/permit staff, who has since retired, was the sole District repository of, and accountant for, the CERs program. Current status and responsibility for the program are presently unclear.

The CERs used in the present Gallo application are derived from emission reductions on brandy-aging facilities owned and operated by the winery. It is unclear to us why this source of VOC emission was not identified by the District as an independent source of VOC emissions that should have had its own rule.

Nonetheless, we understand that thermal oxidizers were installed on the brandy-aging buildings[13] and that annual CER credits were derived. The emissions from brandy-aging are continuous; unlike wine fermentation which is a definite seasonal source.

It is an error for the District to allow a non-seasonal, annualized source of emission credits to be used to offset a clearly seasonal fermentation emission source, one for which over 75% of all emissions occur within the two month ozone season of September and October.

Further, by allowing thermal oxidizer controls to offset winery fermentation VOC emissions, the District has elected to trade off NO_x emissions from the oxidizers for control of the VOC fermentation emissions.

In contrast, the PAS control option directly captures fermentation VOC emissions without generating unnecessary NO_x emissions.

[12] Apart from pages 8-13 of Rule 4694

[13] Using Permanent Total Enclosure (PTE) for buildings housing the aging barrels.