San Joaquin Valley
Unified Air Pollution Control District

Best Performance Standard (BPS) x.x.xx

Date: September 29, 2010

Class	**Non-Catalytic Thermal Oxidizers for VOC Control**
Category	**All**
Best Performance Standard	**SCENARIO A: CLEAN AIR STREAMS** A clean air stream is an air stream that is either clean or cleanable to the level that a regenerative type thermal oxidizer may be employed without damage or loss of performance due to contamination. **Contaminated air stream ≤ 0.23% Lower Explosive Limit (LEL):** Regenerative Thermal Oxidizer with a Concentrator (hot gas by-pass system is allowed, but not required). A concentrator is not required for influent contaminated air streams with flow rates of less than 15,000 scfm, humidity levels of 80% or greater, temperatures of over 100 degrees F, air streams with VOC's that will not adsorb at a rate of at least 95% by weight or for air streams with VOC's that would damage or significantly diminish the performance of the adsorption material. **Contaminated air stream > 0.23% LEL to 2.1% LEL:** Regenerative Thermal Oxidizer with a Concentrator and a Hot Gas By-Pass System. Neither a concentrator or a hot gas by-pass system is required for influent contaminated air streams with flow rates of less than 15,000 scfm, humidity levels of 80% or greater, temperatures of over 100 degrees F, air streams with VOC's that will not adsorb at a rate of at least 95% by weight or for air streams with VOC's that would damage or significantly diminish the performance of the adsorption material. **Contaminated air stream >2.1% LEL to ≤ 3.2% LEL:** Regenerative Thermal oxidizer (concentrators and hot gas by-pass systems are allowed. If a concentrator is employed, a hot gas by-pass system is required) **Contaminated air stream >2.3% LEL to ≤ 32% LEL:** In addition to the Regenerative Thermal Oxidizer option, a Recuperative Thermal Oxidizer with a concentrator is allowed. A concentrator is not required for influent contaminated air streams with flow rates of less than 15,000 scfm, humidity levels of 80% or greater, temperatures of over 100 degrees F, air streams with VOC's that will not adsorb at a rate of at least 95% by weight or for air streams with VOC's that would damage or significantly diminish the performance of the adsorption material. If a concentrator will not be utilized, a Regenerative Thermal Oxidizer is required. **Contaminated air stream >32% LEL:** Recuperative Thermal Oxidizer

SCENARIO B: DIRTY AIR STREAMS

A dirty air stream is an air stream that cannot be cleaned such that a regenerative thermal oxidizer could be employed without damage or loss of performance due to contamination

<u>Contaminated air stream ≤ 32% LEL:</u>

Recuperative Thermal Oxidizer with a Concentrator. A concentrator is not required for influent contaminated air streams with flow rates of less than 15,000 scfm, humidity levels of 80% or greater, temperatures of over 100 degrees F, air streams with VOC’s that will not adsorb at a rate of at least 95% by weight or for air streams with VOC’s that would damage or significantly diminish the performance of the adsorption material.

<u>Contaminated air stream > 32% LEL:</u>

Recuperative Thermal Oxidizer

SCENARIO C: DIRTIEST AIR STREAMS

The dirtiest air streams are air streams that are not cleanable such that regenerative or recuperative thermal oxidizers could be employed without damage or loss of performance due to contamination.

<u>Contaminated air stream ≤ 32 % LEL:</u>

Direct Fired Thermal Oxidizer with a Concentrator. A concentrator is not required for influent contaminated air streams with flow rates of less than 15,000 scfm, humidity levels of 80% or greater, temperatures of over 100 degrees F, air streams with VOC’s that will not adsorb at a rate of at least 95% by weight or for air streams with VOC’s that would damage or significantly diminish the performance of the adsorption material.

<u>Contaminated air stream > 32 % LEL:</u>

Direct Fired Thermal Oxidizer

GHG Control Measures	Percentage Achieved GHG Emission Reductions Relative to Baseline Emissions
Clean Air Streams With VOC Contamination levels of ≤ 0.23% LEL	
Regenerative Thermal Oxidizer with a Concentrator (hot gas by-pass system is allowed)	32 %
Clean Air Streams With VOC Contamination Levels of > 0.23% LEL to 2.1% LEL	
Regenerative Thermal Oxidizer with a Concentrator and a Hot Gas By-Pass System	37 %
Clean Air Streams With VOC Contamination Levels of >2.1% LEL to ≤ 3.2% LEL	
Regenerative Thermal oxidizer (concentrators and hot gas by-pass systems are allowed but not required)	23 %
Clean Air Streams With VOC Contamination Levels of >2.3% LEL to ≤ 32% LEL	
Regenerative Thermal Oxidizer option (A Recuperative Thermal Oxidizer with a concentrator is allowed)	50 %
Clean Air Streams With VOC Contamination Levels of >32% LEL	
Recuperative Thermal Oxidizer without a concentrator	50 %
Dirty Air Streams With VOC Contamination Levels of ≤ 32% LEL	
Recuperative Thermal Oxidizer with a Concentrator	32 %
Dirty Air Streams With VOC Contamination Levels of > 32% LEL	
Recuperative Thermal Oxidizer without a concentrator	50 %
Dirtiest Air Streams With VOC Contamination Levels of ≤ 32% LEL	
Direct Fired Thermal Oxidizer With a Concentrator	23 %
Dirtiest Air Streams With VOC Contamination Levels of > 32% LEL	
Direct Fired Thermal Oxidizer Without a Concentrator	50 %

District Project Number	N-1102809
Evaluating Engineer	Mark Schonhoff
Lead Engineer	Arnaud Marjollet
Public Notice: Start Date	9/29/2010
Public Notice: End Date	10/20/2010
Determination Effective Date	TBD

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I. Best Performance Standard (BPS) Determination Introduction

A. Purpose

To assist permit applicants, project proponents, and interested parties in assessing and reducing the impacts of project specific greenhouse gas emissions (GHG) on global climate change from stationary source projects, the San Joaquin Valley Air Pollution Control District (District) has adopted the polic*y: District Policy – Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency.* This policy applies to projects for which the District has discretionary approval authority over the project and the District serves as the lead agency for CEQA purposes. Nonetheless, land use agencies can refer to it as guidance for projects that include stationary sources of emissions. The policy relies on the use of performance based standards, otherwise known as Best Performance Standards (BPS) to assess significance of project specific greenhouse gas emissions on global climate change during the environmental review process, as required by CEQA. Use of BPS is a method of streamlining the CEQA process of determining significance and is not a required emission reduction measure. Projects implementing BPS would be determined to have a less than cumulatively significant impact. Otherwise, demonstration of a 29 percent reduction in GHG emissions, from business-as-usual, is required to determine that a project would have a less than cumulatively significant impact.

B. Definitions

An emission level or an emission control technology or technique that is has been identified by the District, CARB, EPA, or any other air pollution control District as having been achieved in practice for the same class and category of source provided:

Best Performance Standard for Stationary Source Projects for a specific Class and Category is the most effective, District approved, Achieved-in-Practice means of reducing or limiting GHG emissions from a GHG emissions source, that is also economically feasible per the definition of Achieved-in-Practice. BPS includes equipment type, equipment design, and operational and maintenance practices for the identified service, operation, or emissions unit class and category.

Business-as-Usual is - the emissions for a type of equipment or operation within an identified class and category projected for the year 2020, assuming no change in GHG emissions per unit of activity as established for the baseline period, 2002-2004. To relate BAU to an emissions generating activity, the District proposes to establish emission factors per unit of activity, for each class and category, using the 2002-2004 baseline period as the reference.

Category is - a District approved subdivision within a “class” as identified by unique operational or technical aspects.

Class is - the broadest District approved division of stationary GHG sources based on fundamental type of equipment or industrial classification of the source operation.

C. Determining Project Significance Using BPS

Use of BPS is a method of determining significance of project specific GHG emission impacts using established specifications. BPS is not a required mitigation of project related impacts. Use of BPS would streamline the significance determination process by pre-quantifying the emission reductions that would be achieved by a specific GHG emission reduction measure and pre-approving the use of such a measure to reduce project-related GHG emissions.

GHG emissions can be directly emitted from stationary sources of air pollution requiring operating permits from the District, or they may be emitted indirectly, as a result of increased electrical power usage, for instance. For traditional stationary source projects, BPS includes equipment type, equipment design, and operational and maintenance practices for the identified service, operation, or emissions unit class and category.

II. Summary of BPS Determination Process

The District has established thermal oxidizers as a separate class and category which requires implementation of a Best Performance Standard (BPS) pursuant to the District's Climate Change Action Plan (CCAP). The District's determination of the BPS for this class and category has been made using the BPS development process established in the District's Final Staff Report, *Addressing Greenhouse Gas Emissions under the California Environmental Quality Act.* A summary of the specific implementation of the phased BPS development process for this specific determination is as follows:

Table 1
BPS Development Process Phases for Thermal Oxidizers for VOC Control

Phase	Description	Date	Description
1	Public Notice of Intent	7/8/2010	The District's intent notice is attached as Appendix 1
2	BPS Development	9/23/2010	See evaluation document.
3	Public Notice: Start Date	9/29/2010	A Draft BPS evaluation was provided for public comment (This document).
4	Public Notice: End Date	10/20/2010	

III. Class and Category

This BPS will apply to non-catalytic thermal oxidizers, including direct-fired thermal oxidizers (such as afterburners), recuperative thermal oxidizers and regenerative thermal oxidizers. Such control devices are used mainly to control the emissions of volatile organic compounds (VOC). Since District rules established to regulate affected pollutants take precedence over GHG minimization requirements, this BPS will not attempt to specify alternative VOC control devices, such as carbon adsorption, that may also minimize GHG emissions. The definition of VOC is as presented in District Rule 1020.

IV. Public Notice of Intent

Prior to developing the development of BPS for this class and category, the District published a Notice of Intent. Public notification of the District's intent to develop BPS for this class and category was sent on July 8, 2010 to individuals registered with the CCAP list server. The District's notification is attached as Appendix 1.

No comments were received during the initial public outreach.

V. BPS Development

STEP 1. Establish Baseline Emissions Factor for Class and Category

The Baseline Emission Factor (BEF) is defined as the three-year average (2002-2004) of GHG emissions for a particular class and category of equipment in the San Joaquin Valley (SJV), expressed as annual GHG emissions per unit of activity. The Baseline Emission Factor is calculated by first defining an operation which is representative of the average population of units of this type in the SJV during the Baseline Period and then determining the specific emissions per unit throughput for the representative unit.

A. Representative Baseline Operation

A search of the District Permit Administration System (PAS) showed that no concentrator technology is currently in use in the District. Therefore, baseline period operation will be assumed to be operation of thermal oxidizers without concentrator technology.

B. Basis and Assumptions

- *All direct GHG emissions the District has control over are produced by the combustion of supplemental fuel used to heat the influent air stream.*

C. Unit of Activity

To relate Business-as-Usual to an emissions control activity, it is necessary to establish an emission factor per unit of activity, for the established class and category, using the 2002-2004 baseline period as the reference.

The resulting emissions factor is the combination of
GHG emission reductions achieved through technology, and
GHG emission reductions achieved through changes in activity efficiencies.

D. Calculations

Information regarding baseline period heat recovery efficiencies was received directly from thermal oxidizer manufacturers as part of an industry survey. Calculations are not necessary.

STEP 2. List Technologically Feasible GHG Emission Control Measures

For the specific equipment or operation being proposed, all technologically feasible GHG emissions reduction measures are listed, including equipment selection, design elements and best management practices, that do not result in an increase in criteria pollutant emissions compared to the proposed equipment or operation. The following findings or considerations are applicable to this class and category:

- ***Use of a thermal oxidizer of appropriate design for the VOC and particulate matter contamination levels***

  and

- ***Use of concentrator technology, as appropriate, to minimize the use of supplemental fuel***

The operation of concentrators and the three types of thermal oxidizers (regenerative thermal oxidizers, recuperative thermal oxidizers and direct fired thermal oxidizers) under consideration will be discussed at this time.

Concentrators:

Concentrators are used to transform high airflow, low-VOC concentration air streams to lower flow, higher concentration air streams prior to treatment by a VOC control device. When properly utilized, concentrator technology has the benefit of reducing the supplemental fuel required to elevate the contaminated air stream temperature to the oxidation temperature of the VOC's. This is achieved by increasing the VOC concentration of the contaminated air stream to the level that it will combust without supplemental fuel or with reduced amounts of supplemental fuel.

In their simplest form, concentrators are two chambered enclosures fitted with a rotating adsorption paddle assembly. The paddles are manufactured from materials such as vanadium or activated carbon and adsorb the VOC's contained in the contaminated air stream with an efficiency of 96% to 98%.

The high flow, low-VOC concentration contaminated air stream from the process unit enters the adsorption chamber and flows over one or more of the adsorption paddles, which adsorb 96 to 98 percent of the VOC's. The air stream, which still contains 2% to 4% of the VOC's, is then discharged to the atmosphere.

Once saturated with VOC's, the paddles rotate into the desorption chamber, which is isolated from the adsorption chamber, where they are desorbed utilizing a heated, low-flow air stream. The temperature increase is normally achieved using waste heat recovered from the oxidizer exhaust system. The air stream is then transported in a low-flow and concentrated form to the thermal oxidizer for treatment and the desorbed paddle rotates back into the adsorption chamber.

The dis-benefit to concentrators is that somewhere between 2 and 4 percent of the VOC's are discharged to the atmosphere without being treated by the oxidizer.

The benefit to concentrators that they feed a lower flow and higher concentration stream to the oxidizer, which can result in self sustaining operation. By self sustaining, it is meant that combustion of the VOC's in the air stream is sustained without the need for supplementary fuel (which would be required if the contaminated air stream were fed into the oxidizer in its original high-flow, low-concentration form). The reduced amount of supplementary fuel results reduced GHG and NOx formation. Typically, the VOC emission control increases as the influent concentration rises.

One of the manufacturers stated that they do not specify concentrators for influent air streams with air flows of less than 5,000 scfm and another stated they are not specified for air streams with flows of less than 15,000 scfm. Therefore, it will be assumed that concentrator technology is not Achieved–in–Practice for applications with air flows of less than 15,000 scfm.

Research also showed that concentrators are not feasible for the following:

Influent air streams with temperatures of over 100 degrees F

Influent air streams with humidity's of 80% or greater

Influent air streams that include VOC's that do not adsorb well. For example, methanol does not adsorb well because it is a polar molecule.

Influent air streams that include VOC's that are sticky, such as streams containing phenolic resins or fats from rendering processes. This is because they tend to significantly diminish the performance of the adsorption material – or even damage it.

Concentrator technology will therefore not be required for such air streams. In the case of regenerative thermal oxidizers, the increased contaminated air stream VOC concentration provided by concentrators can result in an effluent heat recovery bed overheating condition that would necessitate the use of a hot gas by-pass system. Therefore, if a concentrator is not required, over heating would not be expected and a hot gas by-pass system will not be required either.

Direct Fired Thermal Oxidizers (after burners):

The VOC contaminated air stream is introduced into the unit where it is directly heated by a flame for the amount of time necessary to provide the desired VOC control. Such units include no heat recovery medium and therefore provide no heat recovery. Since they provide no heat recovery, they are most suited to high VOC content airstreams that are capable of acting as the fuel source. They are also well suited to airstreams with high concentrations of silicates or other contaminants that would mask or damage the heat exchanger medium of recuperative or regenerative type units.

Recuperative Thermal Oxidizers:

The influent VOC contaminated air stream is preheated by passing it through a heat exchanger whose temperature is elevated with the use of waste heat recuperated from the exhaust stream. This use of waste heat reduces the amount of supplementary fuel required to achieve and maintain the temperature necessary to achieve the desired VOC control. In fact, if the contaminated air stream includes sufficient heat content, the system can be self sustaining. A system is said to be self sustaining if combustion of the VOC's is sustained without the use of supplemental fuel.

These units are designed to provide 50% - 70% heat recovery with the amount of heat transfer designed into the system being dependant on the VOC content and flow rate of the contaminated airstream. Systems that will treat highly contaminated airstreams will normally be designed with relatively low heat recovery efficiencies because such air streams will result in the generation of large amounts of heat, which would likely cause overheating of the heat exchanger. An overheated heat exchanger will cause the oxidizer to shut down, which would make it necessary to shut the processing line down.

Regenerative Thermal Oxidizers (RTO):

RTO's utilize ceramic beds as heat recovery devices (heat sinks). Depending on their design, they may employ multiple beds, but in their simplest form, they include only two. For simplicity, this discussion will focus on dual bed RTO's.

The main components of an RTO are ceramic beds, a burner that will provide combustion heat and a valve and duct system that will allow the reversal of direction of the contaminated air stream through the unit.

Upon cold start, the VOC contaminated air stream passes over a cold ceramic bed and then to the combustion chamber where the VOC's are oxidized by a supplemental fuel fired flame. The hot, decontaminated air stream then travels over the second ceramic bed, heating it prior to being discharged to the atmosphere. Once the second ceramic bed is sufficiently heated, the valve system redirects the contaminated airstream flow over the now hot ceramic bed for preheating prior to introduction into the combustion chamber where oxidation of the VOC's will occur. The hot, decontaminated airstream then passes over the first ceramic bed causing it to heat up. After the first bed becomes hot, and the second bed begins to cool, the valve system once again changes the direction of flow such that the first ceramic bed now provides the preheat and the second bed reheats. This cycle continues until the unit is shut down.

RTO's are capable of 95% to 97% heat recovery. The use of this recovered waste heat results in the ability to cause combustion of the VOC's with minimal amounts of supplemental fuel. In fact, this high heat recovery capability may allow the system to be self sustaining even with low VOC concentration streams.

This high heat recovery capability, compared to that of recuperative thermal oxidizers, makes these units most suitable for high-flow, low heat content (low VOC content) airstreams because low flow, high VOC content air steams are most likely to cause the overheating of high heat recovery systems. Once such a unit becomes overheated, it must be shut down to avoid damage. Shut down the oxidizer would result in the necessity of shutting the processing line down also. To prevent overheating, some units are available with a hot-side-bypass, which is a valve and ducting system that causes bypassing of the effluent bed when it reaches its maximum temperature. Once the bed cools, the system will restore effluent flow to the heat recovery bed to maintain it at a high temperature.

STEP 3. Identify all Achieved-in-Practice GHG Emission Control Measures

For all technologically feasible GHG emission reduction measures, all GHG reduction measures determined to be Achieved-in-Practice are identified. Achieved-in-Practice is defined as any equipment, technology, practice or operation available in the United States that has been installed and operated or used at a commercial or stationary source site for a reasonable period of time sufficient to demonstrate that the equipment, the technology, the practice or the operation is reliable when operated in a manner that is typical for the process. In determining whether equipment, technology, practice or operation is Achieved-in-Practice, the District will consider the extent to which grants, incentives or other financial subsidies influence the economic feasibility of its use.

The following findings or considerations are applicable to this class and category:

- Information received from thermal oxidizer manufacturers surveyed indicated that the use of the type of oxidation technology (including concentrator technology) is in common use and has been for a period of at least 30 years.

Based on a review of available technology and with consideration of input from industry, manufacturers and other members of the public, the following is determined to be the Achieved-in-Practice GHG emission reduction measures for this class and category:

SCENARIO A: CLEAN AIR STREAMS

A clean air stream is an air stream that is either clean or cleanable to the level that a regenerative type thermal oxidizer may be employed without damage or loss of performance due to contamination.

Contaminated air stream ≤ 0.23% LEL:

Regenerative Thermal Oxidizer with a Concentrator (hot gas by-pass system is allowed). A concentrator is not required for contaminated air streams with flow rates of less than 15,000 scfm, humidity levels of 80% or greater, temperatures of over 100 degrees F, air streams with VOC's that will not adsorb at a rate of at least 95% by weight or for air streams with VOC's that would damage or significantly diminish the performance of the adsorption material.

Contaminated air stream > 0.23% LEL to 2.1% LEL:

Regenerative Thermal Oxidizer with a Concentrator and a Hot Gas By-Pass System. Neither a concentrator or a hot gas by-pass system is required for influent contaminated air streams with flow rates of less than 15,000 scfm, humidity levels of 80% or greater, temperatures of over 100 degrees F, air streams with VOC’s that will not adsorb at a rate of at least 95% by weight or for air streams with VOC’s that would damage or significantly diminish the performance of the adsorption material.

Contaminated air stream >2.1% LEL to ≤ 3.2% LEL:

Regenerative Thermal oxidizer (concentrators and hot gas by-pass systems are allowed. If a concentrator is employed, a hot gas by-pass system is required)

Contaminated air stream >2.3% LEL to ≤ 32% LEL:

In addition to the Regenerative Thermal Oxidizer option, a Recuperative Thermal Oxidizer with a concentrator is allowed. A concentrator is not required for influent contaminated air streams with flow rates of less than 15,000 scfm, humidity levels of 80% or greater, temperatures of over 100 degrees F, air streams with VOC’s that will not adsorb at a rate of at least 95% by weight or for air streams with VOC’s that would damage or significantly diminish the performance of the adsorption material. If a concentrator will not be utilized, a Regenerative Thermal Oxidizer is required.

Contaminated air stream >32% LEL:

Recuperative Thermal Oxidizer

SCENARIO B: DIRTY AIR STREAMS

A dirty air stream is an air stream that cannot be cleaned such that a regenerative thermal oxidizer could be employed without damage or loss of performance due to contamination.

Contaminated air stream ≤ 32% LEL:

Recuperative Thermal Oxidizer with a Concentrator. A concentrator is not required for influent contaminated air streams with flow rates of less than 15,000 scfm, humidity levels of 80% or greater, temperatures of over 100 degrees F, air streams with VOC’s that will not adsorb at a rate of at least 95% by weight or for air streams with VOC’s that would damage or significantly diminish the performance of the adsorption material.

Contaminated air stream > 32% LEL:

Recuperative Thermal Oxidizer

SCENARIO C: DIRTIEST AIR STREAMS

The dirtiest air streams are air streams that are not cleanable such that regenerative or recuperative thermal oxidizers could be employed without damage or loss of performance due to contamination.

Contaminated air stream ≤ 32 % LEL:

Direct Fired Thermal Oxidizer with a Concentrator. A concentrator is not required for influent contaminated air streams with flow rates of less than 15,000 scfm, humidity levels of 80% or greater, temperatures of over 100 degrees F, air streams with VOC's that will not adsorb at a rate of at least 95% by weight or for air streams with VOC's that would damage or significantly diminish the performance of the adsorption material.

Contaminated air stream > 32 % LEL:

Direct Fired Thermal Oxidizer

Safety:

Recognizing that various fire and safety codes apply, the following will be added:

In no case shall this Best Performance Standard cause the violation of an applicable fire or safety standard

STEP 4. Quantify the Potential GHG Emission and Percent Reduction for Each Identified Achieved-in-Practice GHG Emission Control Measure

For each Achieved-in-Practice GHG emission reduction measure identified:

a. Quantify the potential GHG emissions per unit of activity (G_a)
b. Express the potential GHG emission reduction as a percent (G_p) of Baseline GHG emissions factor per unit of activity (BEF)

Although several different types of thermal oxidizers are listed as being Achieved-in-Practice, the appropriate choice of oxidizer is dependant on the contaminated air stream VOC content as well as the amount and type of particulate matter present in the stream. The particulate matter concentration and type is important, because it can cause loss of performance.

A. Basis and Assumptions:

- *By its nature, the combustion of VOC's causes the formation of GHG's; this is unavoidable. Therefore, the only practical way to reduce GHG formation is to reduce the amount of supplemental fuel associated with VOC combustion.*

- *Since baseline period thermal oxidizer population data is not available and since the District did not specify which type of thermal oxidizer technology was to be used during the baseline period, it will be assumed that during the baseline period 50 percent of the oxidation heat was provided by the VOC's in the contaminated air steam with the other 50 percent coming from supplemental fuel.*

- *Concentrators will be assumed to be unsuitable in 50% of possible applications because of factors such as contaminated air stream flow rate, temperature, humidity or because VOC's that do not adsorb well are to be controlled.*

- *The decrease in fuel usage shown is directly proportional to the decrease in GHG formation.*

B. Calculation of Potential GHG Emissions per Unit of Activity (G_a), and
C. Calculation of Potential GHG Emission Reduction as a Percentage of the Baseline Emission Factor (G_p):

As previously stated, the category under consideration is control equipment, not processing equipment with a unit of activity that can be defined. Therefore, limiting the GHG emissions in the terms of GHG per unit of activity is not appropriate and the calculations referred to in B and C above are not required. The reductions will instead be expressed as percent reduction in supplemental fuel usage from baseline. Those calculations will be conducted for each category under consideration.

SCENARIO A: CLEAN AIR STREAMS

Contaminated air stream ≤ 0.23% LEL:

Control Type: Regenerative Thermal Oxidizer with a Concentrator (hot gas by-pass system is allowed)

Baseline Period Sustainability: 50% - assumption

Sustainability
(if concentrator is used): 85% (15% of oxidation heat will be provided by supplemental fuel) - assumption

Sustainability
(If concentrator is unsuitable): 65% (35% of oxidation heat will be provided by supplemental fuel) - assumption

Applications suited to concentrators: 50%

Decrease in GHG = (0.5)[(85% – 50%)/85%]
+ (0.5)[(65% - 50%) /65%] = **32%**

Contaminated air stream > 0.23% LEL to 2.1% LEL:

Control Type: Regenerative Thermal Oxidizer with a Concentrator and a Hot Gas By-Pass System.

Baseline Period Sustainability: 50% - assumption

Sustainability
(if concentrator is used): 100% (survey of oxidizer manufacturers)

Sustainability
(If concentrator is unsuitable): 65% (35% of oxidation heat will be provided by supplemental fuel) - assumption

Applications suited to concentrators: 50%

Decrease in GHG = (0.5)[(100% – 50%)/100%]
+ (0.5)[(65% - 50%) /65%] = **37%**

Contaminated air stream >2.1% LEL to ≤ 3.2% LEL:

Control Type: Regenerative Thermal oxidizer (concentrators and hot gas by-pass systems are allowed but not required).

Baseline Period Sustainability:50% - assumption

Sustainability: 65% (35% of oxidation heat will be provided by supplemental fuel) – assumes that although concentrators are allowed, they will not be used because they are not required.

Decrease in GHG = [(65% - 50%) /65%] = **23%**

Contaminated air stream >2.3% LEL to ≤ 32% LEL:

Control Type: Regenerative Thermal Oxidizer option (A Recuperative Thermal Oxidizer with a concentrator is allowed)

Baseline Period Sustainability:50% - assumption

Sustainability
(if concentrator is used): 100% for either scenario (survey of oxidizer manufacturers)

Decrease in GHG = [(100% – 50%)/100%] = **50%**

Contaminated air stream >32% LEL:

Control Type: Recuperative Thermal Oxidizer without a concentrator

Sustainability: 100% (survey of oxidizer manufacturers)

Decrease in GHG = [(100% – 50%)/100%] = **50%**

SCENARIO B: DIRTY AIR STREAMS

Contaminated air stream ≤ 32% LEL:

Control Type: Recuperative Thermal Oxidizer with a Concentrator

Baseline Period Sustainability: 50% - assumption

Sustainability
(if concentrator is used): 85% (15% of oxidation heat will be provided by supplemental fuel) - assumption

Sustainability
(If concentrator is unsuitable): 65% (35% of oxidation heat will be provided by supplemental fuel) - assumption

Applications suited to concentrators: 50%

Decrease in GHG = (0.5)[(85% – 50%)/85%]
+ (0.5)[(65% - 50%) /65%] = **32%**

Contaminated air stream > 32% LEL:

Control Type: Recuperative Thermal Oxidizer

Baseline Period Sustainability: 50% - assumption

Sustainability: 100% (survey of oxidizer manufacturers)

Decrease in GHG = [(100% – 50%)/100%] = **50%**

SCENARIO C: DIRTIEST AIR STREAMS

Contaminated air stream ≤ 32 % LEL:

Control Type: Direct Fired Thermal Oxidizer with a Concentrator.

Baseline Period Sustainability: 50% - assumption

Sustainability
(if concentrator is used): 65% (35% of oxidation heat will be provided by supplemental fuel) - assumption

Sustainability
(If concentrator is unsuitable): 50% (50% of oxidation heat will be provided by supplemental fuel) - assumption

Applications suited to concentrators: 50%

Decrease in GHG = (0.5)[(65% – 50%)/65%]
+ (0.5)[(50% - 50%) /50%] = **23%**

Contaminated air stream > 32 % LEL:

Control Type: Direct Fired Thermal Oxidizer

Baseline Period Sustainability: 50% - assumption

Sustainability: 100% (survey of oxidizer manufacturers)

Decrease in GHG = [(100% – 50%)/100%] = **50%**

STEP 5. Rank all Achieved-in-Practice GHG emission reduction measures by order of % GHG emissions reduction

Based on the calculations presented above, the Achieved-in Practice GHG emission reduction measures are ranked in the table below:

Table 4
Ranking of Achieved-in-Practice GHG Emission Control Measures

Rank	GHG Control Measures	Potential GHG Emission per Unit of Activity (G_a) (lb-CO_2e/ton)	Potential GHG Emission Reduction as a Percentage of the Baseline Emission Factor (G_p)
Clean Air Streams With VOC Contamination levels of ≤ 0.23% LEL			
1	Regenerative Thermal Oxidizer with a Concentrator (hot gas by-pass system is allowed)	N/A	32 %
Clean Air Streams With VOC Contamination Levels of > 0.23% LEL to 2.1% LEL			
1	Regenerative Thermal Oxidizer with a Concentrator and a Hot Gas By-Pass System	N/A	37 %
Clean Air Streams With VOC Contamination Levels of >2.1% LEL to ≤ 3.2% LEL			
1	Regenerative Thermal oxidizer (concentrators and hot gas by-pass systems are allowed but not required)	N/A	23 %
Clean Air Streams With VOC Contamination Levels of >2.3% LEL to ≤ 32% LEL			
1	Regenerative Thermal Oxidizer option (A Recuperative Thermal Oxidizer with a concentrator is allowed)	N/A	50 %
Clean Air Streams With VOC Contamination Levels of >32% LEL			
1	Recuperative Thermal Oxidizer without a concentrator	N/A	50 %
Dirty Air Streams With VOC Contamination Levels of ≤ 32% LEL			
1	Recuperative Thermal Oxidizer with a Concentrator	N/A	32 %
Dirty Air Streams With VOC Contamination Levels of > 32% LEL			
1	Recuperative Thermal Oxidizer without a concentrator	N/A	50 %
Dirtiest Air Streams With VOC Contamination Levels of ≤ 32% LEL			
1	Direct Fired Thermal Oxidizer With a Concentrator	N/A	23
Dirtiest Air Streams With VOC Contamination Levels of > 32% LEL			
1	Direct Fired Thermal Oxidizer Without a Concentrator	N/A	50

STEP 6. Establish the Best Performance Standard (BPS) for this Class and Category

For Stationary Source Projects for which the District must issue permits, Best Performance Standard is – "For a specific Class and Category, the most effective, District approved, Achieved-In-Practice means of reducing or limiting GHG emissions from a GHG emissions source, that is also economically feasible per the definition of achieved-in-practice. BPS includes equipment type, equipment design, and operational and maintenance practices for the identified service, operation, or emissions unit class and category".

Based on the definition above and the ranking of evaluated technologies, Best Performance Standard (BPS) for this class and category is determined as:

Best Performance Standard for Thermal Oxidizers

SCENARIO A: CLEAN AIR STREAMS

A clean air stream is an air stream that is either clean or cleanable to the level that a regenerative type thermal oxidizer may be employed without damage or loss of performance due to contamination.

Contaminated air stream ≤ 0.23% LEL:

Regenerative Thermal Oxidizer with a Concentrator (hot gas by-pass system is allowed). A concentrator is not required for influent contaminated air streams with flow rates of less than 15,000 scfm, humidity levels of 80% or greater, temperatures of over 100 degrees F, air streams with VOC's that will not adsorb at a rate of at least 95% by weight or for air streams with VOC's that would damage or significantly diminish the performance of the adsorption material.

Contaminated air stream > 0.23% LEL to 2.1% LEL:

Regenerative Thermal Oxidizer with a Concentrator and a Hot Gas By-Pass System. Neither a concentrator or a hot gas by-pass system is required for influent contaminated air streams with flow rates of less than 15,000 scfm, humidity levels of 80% or greater, temperatures of over 100 degrees F, air streams with VOC's that will not adsorb at a rate of at least 95% by weight or for air streams with VOC's that would damage or significantly diminish the performance of the adsorption material.

Contaminated air stream >2.1% LEL to ≤ 3.2% LEL:

Regenerative Thermal oxidizer (concentrators and hot gas by-pass systems are allowed. If a concentrator is employed, a hot gas by-pass system is required)

Contaminated air stream >2.3% LEL to ≤ 32% LEL:

In addition to the Regenerative Thermal Oxidizer option, a Recuperative Thermal Oxidizer with a concentrator is allowed. A concentrator is not required for influent contaminated air streams with flow rates of less than 15,000 scfm, humidity levels of 80% or greater, temperatures of over 100 degrees F, air streams with VOC's that will not adsorb at a rate of at least 95% by weight or for air streams with VOC's that would damage or significantly diminish the performance of the adsorption material. If a concentrator will not be utilized, a Regenerative Thermal Oxidizer is required.

Contaminated air stream >32% LEL:

Recuperative Thermal Oxidizer

SCENARIO B: DIRTY AIR STREAMS

A dirty air stream is an air stream that cannot be cleaned such that a regenerative thermal oxidizer could be employed without damage or loss of performance due to contamination.

Contaminated air stream ≤ 32% LEL:

Recuperative Thermal Oxidizer with a Concentrator. A concentrator is not required for influent contaminated air streams with flow rates of less than 15,000 scfm, humidity levels of 80% or greater, temperatures of over 100 degrees F, air streams with VOC's that will not adsorb at a rate of at least 95% by weight or for air streams with VOC's that would damage or significantly diminish the performance of the adsorption material.

Contaminated air stream > 32% LEL:

Recuperative Thermal Oxidizer

SCENARIO C: DIRTIEST AIR STREAMS

The dirtiest air streams are air streams that are not cleanable such that regenerative or recuperative thermal oxidizers could be employed without damage or loss of performance due to contamination

Contaminated air stream ≤ 32 % LEL:

Direct Fired Thermal Oxidizer with a Concentrator. A concentrator is not required for influent contaminated air streams with flow rates of less than 15,000 scfm, humidity levels of 80% or greater, temperatures of over 100 degrees F, air streams with VOC’s that will not adsorb at a rate of at least 95% by weight or for air streams with VOC’s that would damage or significantly diminish the performance of the adsorption material.

Contaminated air stream > 32 % LEL:

Direct Fired Thermal Oxidizer

Safety:

Recognizing that various fire and safety codes apply, the following will be added:

In no case shall this Best Performance Standard cause the violation of an applicable fire or safety standard

STEP 7. Eliminate All Other Achieved-in-Practice Options from Consideration as Best Performance Standard

The following Achieved-in-Practice GHG control measures identified and ranked in the table above are eliminated from consideration as Best Performance Standard since they have GHG control efficiencies which are less than that of the selected Best Performance Standard as stated in Step 6 of this evaluation:

No other Achieved-in-Practice options were identified.

VI. Public Participation

N/A. Public notice period has not started yet.

VII. Appendices

Appendix 1: Notice of Development

Appendix 1
Notice of Development

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY
AIR
LIVING™

Notice of Development Of
Best Performance Standards

NOTICE IS HEREBY GIVEN that the San Joaquin Valley Air Pollution Control District solicits public comment on the development of Best Performance Standards for the following Stationary Source class and category of greenhouse gas emissions:

Thermal (Non-Catalytic) Oxidizers

The District is soliciting public input on the following topics for the subject Class and Category of greenhouse gas emission source:

- Recommendations regarding process or operational activities the District should consider when establishing Baseline Emissions for the subject Class and Category.
- Recommendations regarding processes or operational activities the District should consider when converting Baseline Emissions into emissions per unit of activity.
- Recommendations regarding technologies to be evaluated by the District when establishing control measures applicable to direct sources of greenhouse gas emissions.
- Recommendations regarding technologies to be evaluated by the District when establishing control measures applicable to indirect sources of greenhouse gas emissions.

Information regarding development of Best Performance Standard for the subject Class and Category of greenhouse gas emission source can be obtained from the District's website at http://www.valleyair.org/Programs/CCAP/CCAP_idx.htm.

Written comments regarding the subject Best Performance Standard should be addressed to Mark Schonhoff by email, mark.schonhoff@valleyair.org, or by mail at SJVAPCD, 4800 Enterprise Way, Modesto, CA 95356. All comments must be received by **July 22, 2010**. For additional information, please contact Mark Schonhoff by e-mail or by phone at (209) 557-6448.

Information regarding the District's Climate Action Plan and how to address GHG emissions impacts under CEQA, can be obtained from the District's website at http://www.valleyair.org/Programs/CCAP/CCAP_idx.htm