San Joaquin Valley
Unified Air Pollution Control District

Best Performance Standard (BPS) x.x.xx

Date: 2/23/2011

Class	Front-line Organic Liquid Storage Tanks
Category	Subcategories: 1) Fixed Roof Tanks < 5,000 bbl 2) Fixed Roof Tanks ≥ 5,000 bbl
Best Performance Standard	1) Front-line Fixed Roof Tanks < 5,000 bbl Minimize GHG emissions by equipping fixed roof tanks <5,000 bbl with PV-vent set to within 10% of maximum allowable pressure 2) Front-line Fixed Roof Tanks ≥ 5,000 bbl Minimize GHG emissions of fixed roof tanks ≥ 5,000 bbl by controlling the emissions by 99% by weight
Percentage Achieved GHG Emission Reduction Relative to Baseline Emissions	1) Front-line Fixed Roof Tanks < 5,000 bbl: 0% 2) Front-line Fixed Roof Tanks ≥ 5,000 bbl: 0%

District Project Number	C-1100392
Evaluating Engineer	Dolores Gough, P.E.
Lead Engineer	Leonard Scandura, P.E.
Public Participation: Public Notice: start date	January 20, 2010
Public Participation: Public Notice: ending date	February 22, 2011
Determination Effective Date	February 23, 2011

TABLE OF CONTENTS

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

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 Phases

The District has established *Petroleum & Petrochemical Production – Front-line Organic Liquid Storage Tanks* 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 phased 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 Petroleum & Petrochemical Production – Organic Liquid Storage Tanks

Phase	Description	Date	Comments
1	Public Notice of Intent	9/28/10	The District's Notice of Development is attached as Appendix 1.
2	BPS Development	9/28/10	See Section evaluation document.
3	Public Participation: Public Notice Start Date	1/20/11	A draft evaluation was provided for public comment.
4	Public Participation: Public Notice End Date	2/22/11	No public comments were received by the District
5	Finalization	2/23/11	The BPS established in this evaluation document is effective on the date of finalization.

III. Class and Category

This class and category applies to the storage of organic liquids in fixed roof (vertical or horizontal) tanks. A typical vertical fixed roof tank consists of a cylindrical steel shell with a cone or domed shaped roof permanently attached to the tank. A horizontal tank has a smaller capacity and is constructed such that the length is not greater than six times the diameter for structural integrity (EPA – AP42). Sources of volatile organic compound (VOC) emissions as well as greenhouse gas (GHG) emissions are from flashing and breathing losses (working and standing).

Crude oil production tanks are the tanks which are predominantly permitted within the District. In these tanks, flashing losses occur as the crude oil vapor pressure decreases from the separator conditions to atmospheric pressure in the storage tank (2009 API Compendium). Working loss emissions occur during the filling and emptying of the tanks and standing losses are due to temperature variations.

GHG emissions, mainly methane (CH_4) and carbon dioxide (CO_2), are emitted through the flashing process. Once the oil has reached atmospheric pressure, the CH_4 has flashed off and can be assumed to no longer have GHG. As a result, it

can be assumed that the GHG working and standing losses are very small to non-existent in the downstream tanks. As such, this BPS determination only applies to front-line tanks.

Some controlled tanks require a blanketing medium on top of the stored crude oil to prevent air from being drawn in and potentially forming an explosive mixture. Blanket medium used include gases such as CO_2, methane, nitrogen or produced gas. During storage, the blanket gas and VOC mixture are vented to a vapor collection system. These types of tanks are included in this class and category and will be assumed similar to the first line tank, as they can be the source of fugitive GHG emissions.

Current District Rule 4623 "Storage of Organic Liquids" and current Best Available Technologies (BACT) allow varied levels of VOC control depending on liquid true vapor pressure (TVP) of the liquid and tank capacity. In line with the existing BACT guidelines, this class and category is subdivided to include the following sub-categories evaluated in this document.

1) Front-line Fixed Roof Tanks < 5,000 bbl
2) Front-line Fixed Roof Tanks ≥ 5,000 bbl

IV. Public Notice of Intent

Prior to developing the development of BPS for this class and category, the District published a Notice of Development. Public notification of the District's intent to develop BPS for this class and category was sent on September 28, 2010 to individuals registered with the CCAP list server.

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.

The following equipment are evaluated under this class and category:

1) Front-line Fixed Roof Tanks < 5,000 bbl
2) Front-line Fixed Roof Tanks ≥ 5,000 bbl

A. Representative Baseline Operation

For the above equipment**,** the representative baseline operation has been based on District permitted fixed roof tanks during 2002-2004. From the District's database, the capacity of the majority of the tanks permitted ranges from 200 to 2,000 barrels.

B. Basis and Assumptions

- *GHG emissions are stated as "CO_2 equivalents" (CO_2e) which includes the global warming potential of methane and carbon dioxide emissions associated with gaseous venting emissions.*
- *Only direct GHG emissions (CH4 and CO2) are calculated from the equipment/operation*
- *Assume that VOC control measures also control GHG emissions*
- *Indirect emissions from electric power consumption are not included as such an estimate would be speculation*
- *GHG emissions will be vented along with VOC emissions*
- *Only the front-line tank will have GHG emissions from flashing loss; downstream tanks will have zero CH4 or CO2*
- *Emission factor for front-line tank is 0.019 Mton-CO_2e/bbl of produced liquids (from Table 5-8 of 2009 API Compendium based on 78.8% vol CH4 and 3.78 % vol CO2)*
- *For Subcategory 1: Assume PV-vent within 10% of maximum allowable pressure is 10% VOC control*
- *For Subcategory 2: Assume 99% VOC control efficiency for tanks with vapor control systems based on BACT Guideline 7.3.2*

C. Unit of Activity

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

GHG emissions, expressed in metric tons CO_2e per bbl of organic liquid throughput.

D. Calculations

Sub-category 1: Front-line Fixed Roof Tanks < 5,000 bbl – Baseline Emissions

For fixed roof tanks (including front-line fixed roof tanks) with a capacity less than 5,000 bbl the District determined (in October 2002) that achieved in practice controls for VOC (which also control GHGs) consist of the use of a pressure-vacuum vent (PV vent).

Therefore, it can be assumed that a PV-vent is representative of the level of control during the 2000-2004 period, and will be used as the basis for the baseline emissions calculations.

Front-line Fixed Roof Tank: (with PV-vent, 10% control efficiency)

CO_2e (Mton/bbl) = EF (Mton-CO_2e/bbl) x (1 - 0.10)
= 0.017 Mton-CO_2e/bbl throughput

Sub-category 2: Front-line Fixed Roof Tanks ≥ 5,000 bbl – Baseline Emissions

For fixed roof tanks (including front-line fixed roof tanks) with a capacity equal to or greater than 5,000 bbl the District determined (in October 2002) that achieved in practice controls for VOC (which also control GHGs) consist of a capture and control system to reduce VOC emissions by at least 99% by weight by waste gas incineration and inspection & maintenance program or equal or equivalent.

Therefore, it can be assumed that a capture and control system with a 99% control efficiency representative of the level of control during the 2000-2004 period, and will be used as the basis for the baseline emissions calculations.

Front-line Tank: (use 99% minimum control efficiency)

CO_2e (Mton/bbl) = EF (Mton-CO_2e/bbl) x (1 - 0.99)
= (0.019 Mton-CO_2e/bbl) x 0.01
= 0.00019 Mton-CO_2e/bbl throughput

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:

- Current District Rule 4623 requires operators of tanks with throughput of over 50 barrels or with storage of liquids with a TVP of over 0.5 psia to comply with VOC control system requirements. Acceptable control systems based on certain volumes and TVP include pressure-vacuum relief valve, internal or external floating roof or vapor recovery system depending on tank capacity, TVP of the liquid or oil producer category (small or large producer).
- Best Available Control Technologies (BACT) that are achieved in practice and technologically feasible have also been developed for the two sub-categories to control VOCs.

With the assumption that GHG emissions are controlled along with VOC emissions, then the control requirements specified in the rule and BACT can also be applied with the GHG emissions.

Based on a review of available technology and as discussed above, the following is determined to be the technologically feasible GHG emission reduction measures for this class and category:

Table 2
Technologically Feasible GHG Control Measures for Petroleum & Petrochemical – Front-line Organic Liquid Storage Tanks

Control Measure	Qualifications
Front-line Fixed Roof Tanks < 5,000 bbl Minimize GHG emissions by equipping fixed roof tanks < 5,000 bbl with PV-vent to within 10% of maximum allowable pressure	*Current BACT Achieved in Practice requires PV-vent to within 10% of maximum allowable pressure to control VOCs. These control measure should also reduce GHG emissions.*
Front-line Fixed Roof Tanks < 5,000 bbl 99% Control (Waste gas incinerated and inspection & maintenance; or transfer of non-condensable vapors to gas pipeline; or re-injected to formation or equal)	*Currect BACT Technologically Feasible is 99% VOC Control by recovering waste gas and incinerating or transferring gas to pipelines or re-injecting back to formation will reduce VOCs and GHG emissions*
Front-line Fixed Roof Tanks ≥ 5,000 bbl Minimize GHG emissions of fixed roof tanks ≥ 5,000 bbl by controlling the VOCs by 99%	*Current BACT Achieved in Practice requires 99% VOC control. These VOC control measures should also reduce GHG emissions.*
Front-line Fixed Roof Tanks ≥ 5,000 bbl 99% Control (Waste gas re-injected to formation or transfer to pipelines; thermal or catalytic oxidizer; carbon adsorption or equal)	*Current BACT Technologically Feasible is 99% VOC Control by recovering waste gas and transferring gas to pipelines or re-injecting back to formation or treating by carbon adsorption or catalytic oxidizer will reduce VOCs and GHG emissions*

The above control measures will decrease VOC emissions as well as GHG emissions for all tanks in this category. These control measures would not result in an increase in emissions of criteria pollutants.

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

For all technologically feasible GHG emission reduction measures, all GHG reduction measures determined to be Achieved-in-Practice (AIP) 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:

- District Rule 4623 was last amended on May 19, 2005. The VOC control requirements are the same in both amendments. All organic liquid storage tanks subject to this rule must comply with the VOC control requirements applicable to the specific tank based on capacity, TVP and daily throughput.

- BACT Guideline 7.3.1 for < 5,000 bbl tank capacity and Guideline 7.3.2 for tanks with ≥ 5,000 bbl capacity were updated on October 10, 2002. The BACT identified achieved in practice and technologically feasible control measures for VOCs. All tanks that require a District permit and emit over 2 lb-VOC/day are subject to VOC BACT requirements.

With the assumption that GHG emissions are controlled along with VOC emissions, then the control requirements specified in the rule and BACT can also be applied with the GHG emissions.

Based on a review of available technology, the following were determined to be the Achieved-in-Practice GHG emission reduction measures for this class and category:

Table 3
Achieved-in-Practice GHG Control Measures for Petroleum & Petrochemical – Front-line Organic Liquid Storage Tanks

Control Measure	Achieved-Qualifications
Front-line Fixed Roof Tanks < 5,000 bbl Minimize GHG emissions by equipping fixed roof tanks < 5,000 bbl with PV-vent to within 10% of maximum allowable pressure	*Current BACT Achieved in Practice requires PV-vent to within 10% of maximum allowable pressure to control VOCs. These control measure should also reduce GHG emissions.*
Front-line Fixed Roof Tanks ≥ 5,000 bbl Minimize GHG emissions of fixed roof tanks ≥ 5,000 bbl by controlling the VOCs by 99%	*Current BACT Achieved in Practice requires 99% VOC control. These VOC control measure should also reduce GHG emissions.*

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

A. Basis and Assumptions:

- *VOC control requirements in District Rule 4623, as amended on May 19, 2005, have not changed. BACT requirements established in 2002 also have not changed. Therefore, current control efficiency is the same as the baseline.*

B. Calculation of Potential GHG Emissions per Unit of Activity:

Sub-category 1: Front-line Fixed Roof Tanks < 5,000 bbl

Front-line Fixed Roof Tanks: (10% control efficiency)
CO_2e (Mton/bbl) = EF (Mton-CO_2e/bbl) x (1 - 0.10)
= 0.017 Mton-CO_2e/bbl throughput

Sub-category 2: Front-line Fixed Roof Tanks ≥ 5,000 bbl

Front-line Tanks: (use 99% minimum control efficiency)
CO_2e (Mton/bbl) = EF (Mton-CO_2e/bbl) (1 - 0.99)
= (0.019 Mton-CO_2e/bbl) x 0.01
= 0.00019 Mton-CO_2e/bbl throughput

C. Calculation of Potential GHG Emission Reduction as a Percentage of the Baseline Emission Factor (G_p):

Sub-category 1: Front-line Fixed Roof Tanks < 5,000 bbl

GHG Emission Reduction = GHG emissions from baseline
- GHG emissions from AIP Technology
GHG Emission Reduction = (0.017 – 0.017) Mton CO_2e/bbl
GHG Emission Reduction = 0

Sub-category 2: Front-line Fixed Roof Tanks ≥ 5,000 bbl

GHG Emission Reduction = GHG emissions from baseline
- GHG emissions from AIP Technology
GHG Emission Reduction = (0.00019 – 0.00019) Mton CO_2e/bbl
GHG Emission Reduction = 0

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

Based on the calculations presented in Section II.4 above, the Achieved-in Practice GHG emission reduction measures are ranked in Table 3 below:

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

Rank	Control Measure	Potential GHG Emission per Unit of Activity ($MTCO_2e$/bbl)	Potential GHG Emission Reduction as a Percentage of the Baseline Emission Factor
1	*Front-line Fixed Roof Tanks < 5,000 bbl* *Minimize GHG emissions by equipping fixed roof tanks <5,000 bbl with PV-vent to within 10% of maximum allowable pressure*	0.017	0%
	Front-line Fixed Roof Tanks ≥ 5,000 bbl *Minimize GHG emissions of fixed roof tanks ≥ 5,000 bbl by controlling the VOCs by 99%*	0.00019	0%

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:

Fixed Roof Tanks < 5,000 bbl
Minimize GHG emissions by equipping fixed roof tanks <5,000 bbl with PV-vent set to within 10% of maximum allowable pressure

Fixed Roof Tanks ≥ 5,000 bbl
Minimize GHG emissions of fixed roof tanks ≥ 5,000 bbl by controlling the emissions by 99% by weight

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

The following Achieved-in-Practice GHG control measures, identified in the tables 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 this evaluation:

No other Achieved-in-Practice options were identified.

VI. Public Participation

VII. Appendices

Appendix 1 Public Notice of Intent: 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 development of Best Performance Standards for the following Stationary Source class and category of greenhouse gas emissions:

Oil & Gas Extraction, Storage and Production – Tanks Vapor Control

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

- Recommendations regarding the scope of the proposed Class and Category, (Stationary GHG sources group based on fundamental type of equipment or industrial classification of the source operation)
- Recommendations regarding processes 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, and
- Recommendations regarding technologies to be evaluated by the District, when establishing Best Performance Standards for the subject Class and Category.

Information regarding development of the proposed Best Performance Standard can be obtained from the District's website at http://www.valleyair.org/Programs/CCAP/CCAP_idx.htm.

Written comments regarding the proposed Best Performance Standard should be addressed to Dolores Gough by email, dolores.gough@valleyair.org, or by mail at SJVUAPCD, 34946 Flyover Court, Bakersfield, CA 93308 and must be received by October 15, 2010. For additional information, please contact Dolores Gough at dolores.gough@valleyair.org or by phone at (661) 392-5609.

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.