San Joaquin Valley
Unified Air Pollution Control District

DRAFT Best Performance Standard (BPS) x.x.xx

Date: 4/20/2010

Class and Category	Components at Light Crude Oil and Natural Gas Production and Natural Gas Processing Facilities and at Petroleum Refineries, Gas Liquids Processing Facilities and Chemical Plants
Best Performance Standard	Minimize fugitive GHG emissions by applying leak standards and I&M requirements for components of the identified class and category
Percentage Achieved GHG Emission Reduction Relative to Baseline Emissions	**Components Subject to Rules 4409 and 4455 Requirements:** - Light Crude Oil & Natural Gas Production: 60% - Natural Gas Processing: 82% - Refineries: 86% - Gas Liquid Processing: 89% **Components Not Subject to Rules 4409 and 4455 Requirements:** - Components: 58%

District Project Number	C-1100392
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Initial Public Notice Date	April 20, 2010
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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

Best Performance Standard for Stationary Source Projects is – 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.

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 *Components at Light Crude Oil and Natural Gas Production and Natural Gas Processing Facilities and at Petroleum Refineries, Gas Liquids Processing Facilities and Chemical Plants* 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:

BPS Development Process Phases for Components at Light Crude Oil and Natural Gas Production and Natural Gas Processing Facilities and at Petroleum Refineries, Gas Liquids Processing Facilities and Chemical Plants			
Phase	**Description**	**Date**	**Comments**
1	Initial Public Process	04/15/10	The District's intent notice and a list of individuals receiving notification are attached as Appendix 1.
2	BPS Development	04/15/10	See Section III of this evaluation document.
3	Public Review	04/20/10	The District's BPS determination notice and a list of individuals receiving notification are attached as Appendix 2.
4	Public Comments	05/14/10	The public comment period ended on the date given. All public comments received and the District's responses are attached as Appendix 3.

III. Class and Category

This class and category applies to components containing or contacting gaseous streams at light crude oil production facilities, natural gas production facilities, natural gas processing facilities, petroleum refineries, gas liquids processing facilities, and chemical plants. These components include, but not limited to, any valve, fitting, threaded connection, pump, compressor, pressure relief device, flange, process drain, sealing mechanism, hatch, sight glass, meter or seal fluid system in VOC service. VOC emissions from this source are currently limited by the application of leak standards and an inspection and maintenance (I&M) program required by District rules. The application of the rule requirements are expected to also limit GHG emissions, primarily methane.

Current rules exempt certain components such as pressure relief devices, pumps, and compressors equipped with a closed vent systems, components buried below ground, those exclusively handling gas/vapor or liquid streams with a VOC content of 10% by weight or less, and components exclusively handling commercial natural gas.

The application of the I&M requirements specified in District rules for components subject to the rules and those components not subject to those rules will result in a reduction of fugitive GHG emissions. Therefore, the BPS considered for this class and category will apply for all components associated with light crude oil and natural gas production/processing, refineries, liquids processing and chemical plants, even those that are not subject to a particular rule requirement.

IV. BPS Development

STEP 1. Establish Baseline Emissions Factor for Fugitive Greenhouse Gas at Light Crude Oil & Natural Gas Production and Natural Gas Processing Facilities, Petroleum Refineries, Gas Liquids Processing and Chemical Plants

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 greenhouse gas (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 was evaluated under this class and category:

Components at Light Crude Oil and Natural Gas Production and Natural Gas Processing Facilities and at Petroleum Refineries, Gas Liquids Processing Facilities and Chemical Plants

A. Representative Baseline Operation

For the above equipment (components serving light crude oil or gases at light crude oil and gas production and natural gas processing facilities), the representative baseline operation are components that were subject to Rule 4403 during 2002-2004. Rule 4403 expired on April 20, 2006 and Rule 4409 was adopted on April 20, 2005. The rules apply to components containing or contacting volatile organic compound (VOC) streams at light crude oil production facilities, natural gas production facilities and natural gas processing facilities. The components affected include, but not limited, to valves, threaded connections, pumps, compressors, pressure relief devices (PRDs), polished rod stuffing box, etc. Rule 4403 has a leak definition of 10,000 ppmv for gas processing facilities and allows a repair period of 15 calendar days after a leak is discovered. PRSBs were not subject to Rule 4403.

For refineries and gas liquids processing facilities, the baseline operations are based on previous Rule 4455 leak definition of 10,000 ppmv and leak repair period of 15 days that was in effect in 2002-2004.

B. Basis and Assumptions

- *GHG emissions are stated as "CO_2 equivalent" (CO_2e) which includes the global warming potential of methane and carbon dioxide emissions associated with gaseous fugitive emissions*
- *Only direct GHG emissions are produced from the equipment/operation*
- *Fugitive CH_4 and CO_2 emissions will be reduced similar to fugitive VOCs*
- *Fugitive gas consists of 85% VOC and 15% CH4 (AP-42 Section 5.2); therefore, CO_2 is assumed negligible for calculation purposes*
- *Number of components provided to the District (Rule 4409 Analysis report)*
- *For components not subject to District rule requirements, fugitive GHG emissions from various oil & gas production and processing equipment or operation are taken from American Petroleum Institute (API) 2009 Compendium*

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, for the established class and category, using the 2002-2004 baseline period as the reference.

For Components subject to District Rules 4409 and 4455: *GHG emissions, expressed in metric tons CO_2e per component.*

For Components not subject to District Rules 4409 and 4455: *available information on GHG emissions are expressed in varying units (metric tons CO_2e per bbl crude oil or per scf gas, or per mile pipeline or per facility).*

D. Calculations

The GHG baseline emissions, as shown below, were estimated from the VOC baseline emissions inventories provided and used by the District during analysis of the applicable rules.

1) Light Crude Oil & Natural Gas Production & Processing

	VOC (Mton/day)	CH_4 (Mton/day)[A]	CO_2e (Mton/day)[B]	CO_2e (Mton/day/comp)[C]
Light Crude Oil & Natural Gas Production				
Calculated Baseline Emissions	20.2675	3.58	75.11	7.64E-05
Gas Processing				
Calculated Baseline Emissions	6.007	1.06	22.26	5.23E-05
Total Emissions				
Calculated Baseline Emissions	**26.2745**	**4.64**	**97.37**	**1.29E-04**

2) Petroleum Refineries & Gas Liquid Processing

	VOC (Mton/day)	CH_4 (Mton/day)[A]	CO_2e (Mton/day)[B]	CO_2e (Mton/day/comp)[C]
Refineries				
Calculated Baseline Emissions	0.789	0.14	2.92	1.01E-04
Liquid Processing				
Calculated Baseline Emissions	2.674	0.47	9.91	6.67E-05
Total Emissions				
Calculated Baseline Emissions	**3.463**	**0.61**	**12.83**	**1.68E-04**

[A] CH4 (Mton/day) = [VOC (Mton/day)/0.85] * 0.15
[B] CO2e (Mton/day) = CH4 (Mton/day) *21 (conversion factor to CO2e)
[C] CO2e (Mton/day/comp) = CO2e (Mton/day)/total number of components

3) Fugitive GHG emissions not controlled by District rule requirements

As stated in the assumption, baseline emissions to be used are available GHG emissions compiled by API for the various oil & gas production and processing equipment)

Equipment/Operation	CO_2e (Mton/bbl)	CO_2e (Mton/10^6scf)	CO_2e (Mton/stn/yr)	CO_2e (Mton/mile/yr)	Gas Content Basis
Onshore Oil Production	4.93E-03				78.8 % vol CH_4
Onshore Gas Production		5.46E-01			78.8 % vol CH_4
Gas Processing Plants		6.14E-01			86.8 % vol CH_4
Gas Storage Stations			1.42E+04		93.4 % vol CH_4
Gas Transmission Pipelines				7.57E+01	93.4% vol CH_4/ 2%CO_2
Gas Distribution Pipelines				3.45E+01	93.4% vol CH_4/ 2%CO_2
Refining-Fuel Gas System (110 K to 199K bbl/day)	2.96E-05				not available
Refining-Natural Gas System (110 K to 199K bbl/day)	2.12E-05				not available
Total	**4.98E-03**	**1.16E+00**	**1.42E+04**	**1.10E+02**	

STEP 2. List Technologically Feasible GHG Emission Control Measures

Currently, facilities are required by District Rules 4409 and 4455 to perform annual inspection and maintenance (I&M) to control VOC emissions. The annual I&M will also control fugitive methane emissions. Therefore, annual I&M is achieved in practice for the control of GHGs as well.

Fugitive emissions from components not subject to District rule requirements can also be controlled by implementation of an I&M program using the same frequencies specified in Rule 4409 and 4455.

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:

a) *Technologically Feasible - Increased Inspection & Maintenance Frequency for Components Subject to Rules 4409 and 4455 Requirements*

Current Rules 4409 and 4455 requirements is annual inspection and maintenance. Increasing I&M frequency should decrease direct GHG emissions but has not been achieved in practice. This control measure would not result in an increase in emissions of criteria pollutants.

b) *Technologically Feasible - Increased Frequency of Inspection & Maintenance for Components not Subject to Rules 4409 and 4455 Requirements*

Applying leak standards and I&M requirements to components not subject to Rules 4409 and 4455 requirements is expected to decrease GHG emissions. This control measure would not result in an increase in emissions of criteria pollutants.

Table 1
Technologically Feasible GHG Control Measures for Light Crude Oil and Natural Gas Production and Natural Gas Processing Facilities and at Petroleum Refineries, Gas Liquids Processing Facilities and Chemical Plants

Control Measure	Qualifications
Increasing I&M frequency for components subject to Rules 4409 and 4455 requirements	*Increasing I&M frequency for components subject to Rules 4409 and 4455 requirements will reduce fugitive VOCs and GHG emissions*
Applying leak standards and I&M requirements for components not subject to Rules 4409 and 4455 requirements	*Applying leak standards and I&M requirements for components not subject to Rules 4409 and 4455 requirements will reduce fugitive VOCs and GHG emissions from those components*

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:

- *Current Rule 4409 defines leak for components, except PRDs, in liquid service as 1,000 to 10,000 ppmv and 2,000 to 10,000 ppmv for the same components in gas/vapor service. The PRD leak is defined as 200 to 10,000 ppmv for the liquid service and 400 to 10,000 ppmv for the gas/vapor service. Component leak repair period has been changed from zero to 7 days depending on the severity of the leak.*

- *Current Rule 4455 defines leak for components, except for PRD, pumps & compressors, in liquid service as 200 to 10,000 ppmv and 400 to 10,000 ppmv for the same components in gas/vapor service.*

- *Compliance with Rules 4409 and 4455 will limit fugitive VOCs as well as fugitive GHG emissions.*

- *Leak thresholds have also been reduced depending on component type.*

- *Application of the I&M to all components subject to Rules 4409 and 4455, and to those components that are not subject to I&M requirements will limit VOCs as well as GHG emissions.*

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

Table 2 Achieved-in-Practice GHG Control Measures for Light Crude Oil and Natural Gas Production and Natural Gas Processing Facilities and at Petroleum Refineries, Gas Liquids Processing Facilities and Chemical Plants	
Control Measure	**Achieved-Quantifications**
Minimize fugitive GHG emissions by applying leak standards and I&M requirements to components subject to Rules 4409 and 4455 requirements	*Current rules specify a leak definition of a minimum of 200 ppmv to 1,000 ppmv for the various components. Repair periods are also specified depending on the severity of the leak and leak thresholds have been reduced. These I&M measures also reduce GHG emissions.*
Minimize fugitive GHG emissions by applying leak standards and I&M requirements to components not subject to Rules 4409 and 4455 requirements	*Current rules exempt certain components associated with this class and category but an I&M program is applicable to these components to control fugitive 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

- *All direct GHG emissions are reduced along with VOC emissions due to I & M requirements*
- *Fugitive methane emissions reduction rate will be similar to that of fugitive VOCs*
- *VOC reduction was taken from the Rule 4409 and 4405 Analysis 2006 report based on current rule leak definition and change in repair periods*
- *Fugitive gas consists of 85% VOC and 15% CH_4 (AP-42, Section 5.2); therefore, CO_2 is assumed negligible for calculation purposes.*
- *Number of components provided to the District (same number used as in the baseline calculations)*
- *For fugitive GHG emissions from components not subject to District rules, a control efficiency of 58% is assumed with the implementation of an I&M program. This efficiency is the average efficiency of oil & gas production and processing components in gas and light liquid service (from EPA's Protocol for Equipment Leak Emission Estimates, Tables 5-2 & 5-3).*

B. Calculation of Potential GHG Emissions Reduction

Fugitive GHG emissions reduction were estimated from the VOC emissions reductions which were based on the change in leak definition, repair periods and leak thresholds in the current Rules 4409 and 4455. These VOC reductions were taken from the District rule analysis report.

1) Light Crude Oil & Natural Gas Production

	VOC (Mton/day)	VOC Reduction (Mton/day)	CO_2e (Mton/day) [A]	CO_2e Reduction (Mton/day) [B]	% CO_2e Reduction [C]
Light Crude Oil & Natural Gas Production					
Baseline Emissions	20.2675		75.11		
Change in Leak definition & threshold		11.83		43.85	
Change repair period		0.36		1.34	
Sub-total		***12.19***		***45.19***	
CO_2e baseline emissions per component (Mton/day/comp)			7.64E-05		
CO_2e reduction per component (Mton/day/comp)				4.59E-05	**60 %**

2) Gas Processing

	VOC (Mton/day)	VOC Reduction (Mton/day)	CO2e (Mton/day) [A]	CO_2e Reduction (Mton/day) [B]	% CO_2e Reduction [C]
Gas Processing					
Baseline Emissions	6.007		22.26		
Change in Leak definition & threshold		4.79		17.76	
Change repair period		0.14		0.53	
Sub-total		***4.93***		***18.29***	
CO_2e baseline emissions per component (Mton/day/comp) [D]			5.23E-05		**82 %**
CO_2e reduction per component (Mton/day/comp) [D]				4.30E-05	

3) Petroleum Refineries & Gas Liquid Processing

	VOC (Mton/day)	VOC Reduction (Mton/day)	CO_2e (Mton/day)[A]	CO_2e Reduction (Mton/day)[B]	% CO_2e Reduction[C]
Refineries					
Baseline emissions	0.789		2.92		
Change in Leak definition & threshold		0.68		2.50	
Change in repair period		0.00		0.00	
Control PRD Releases		0.00		0.00	
Sub-total		***0.68***		***2.51***	
CO_2e baseline emissions per component (Mton/day/comp) [D]			1.01E-04		**86 %**
CO_2e reduction per component (Mton/day/comp) [D]				8.74E-05	
Gas Liquid Processing					
Baseline emissions	2.674		9.91		
Change in Leak definition & threshold		2.33		8.65	
Change in repair period		0.04		0.15	
Control PRD Releases		0.00		0.02	
Sub-total		***2.37***		***8.82***	
CO_2e baseline emissions per component (Mton/day/comp) [D]			6.67E-05		
CO_2e reduction per component (Mton/day/comp) [D]				5.94E-05	**89 %**

[A] CH4 (ton/day) = [VOC (ton/day)/0.85] * 0.15
[B] CO2e (ton/day) = CH4 (ton/day) *21 (conversion factor to CO2e)
[C] % CO2e reduction = CO2e (ton/day/comp)/baseline CO2e * 100%
[D] CO2e per component = CO2e (M ton/day)/number of components

4) Fugitive GHG emissions Not Subject to Rules 4409 and 4455 Requirements

As stated in the assumptions section of this document, an average control efficiency of 58% is used to show reduction in GHG emissions with the implementation of an I&M program). The current or reduced GHG emissions (CO_2e) are calculated using the following equation and summarized in the table below:

CO_2e (current) = CO_2e (baseline from Step 1 above) x (1- 0.58)

Equipment/Operation	CO_2e (Mton/bbl)	CO_2e (Mton/10^6scf)	CO_2e (Mton/stn/yr)	CO_2e (Mton/mile/yr)	Gas Content Basis
Onshore Oil Production	2.04E-03				78.8 % vol CH_4
Onshore Gas Production		2.26E-01			78.8 % vol CH_4
Gas Processing Plants		2.54E-01			86.8 % vol CH_4
Gas Storage Stations			5.87E+03		93.4 % vol CH_4
Gas Transmission Pipelines				3.13E+01	93.4% vol CH_4/ 2%CO_2
Gas Distribution Pipelines				1.43E+01	93.4% vol CH_4/ 2%CO_2
Refining-Fuel Gas System (110 K to 199K bbl/day)	1.22E-05				not available
Refining-Natural Gas System (110 K to 199K bbl/day)	8.77E-06				not available
CO_2e Total Baseline Emissions (from Step 1)	**4.98E-03**	**1.16E+00**	**1.42E+04**	**1.10+02**	
CO_2e Total Current Emissions (calculated)	**2.06E-03**	**4.79E-01**	**5.87E+03**	**4.56E+01**	
% Reduction (control efficiency)	**58%**	**58%**	**58%**	**58%**	

A review of available references did not reveal a control efficiency due to instituting an annual (as specified in Rule 4409 and 4455) I&M program.

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 3
Ranking of Achieved-in-Practice GHG Emission Control Measures

Rank	Control Measure	Potential GHG Emission per Unit of Activity (Mton CO_2e/total components)	Potential GHG Emission Reduction as a Percentage of the Baseline Emission Factor (G_p)
1	*Minimize fugitive GHG emissions by applying leak standards and I&M requirements for components subject to Rules 4409 and 4455 requirements*		- Light Crude Oil & Natural Gas Production: 60% - Natural Gas Processing: 82% - Refineries: 86% - Gas Liquid Processing : 89%
	Minimize fugitive GHG emissions by applying leak standards and I&M requirements for components not subject to Rules 4409 and 4455 requirements		- Components: 58%

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 given in Table 3 from Section II.5, Best Performance Standard (BPS) for this class and category is determined as:

Best Performance Standard for Light Crude Oil and Natural Gas Production/ Processing Facilities and at Petroleum Refineries, Gas Liquids Processing Facilities and Chemical Plants:

Minimize fugitive GHG emissions by applying leak standards and I&M requirements to all components at light crude oil and natural gas production and natural gas processing facilities and at petroleum refineries, gas liquids processing facilities and chemical plants.

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 Section II.4 and ranked in Table 3 of Section II.5 are specifically 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 Section II.6:

No other Achieved-in-Practice options were identified.