San Joaquin Valley
Unified Air Pollution Control District

Best Performance Standard (BPS) x.x.xx

Class	Gasoline Dispensing Facilities (GDFs)
Category	GDFs with Underground Storage Tanks (USTs) and Phase II EVR Vapor Recovery System
Best Performance Standard	ARB-certified non-combustion based Phase II vapor recovery systems
Percentage Reduction in GHG Emissions Relative to Baseline Emissions	Greater than 75%

District Project Number	C-1100389
Prepared by	Sajjad Ahmad (Air Quality Engineer)
Reviewed by	Jim Swaney, P.E. (Permit Services Manager), Arnaud Marjollet (Permit Services Manager), Sheraz Gill (Supervising Air Quality Engineer), Daniel Barber, Ph.D. (Supervising Air Quality Specialist)
Approved by	Dave Warner (Director of Permit Services)

Initial Public Notice Date	March 4, 2010
Final Public Notice Date	April 8, 2010
Determination Effective Date	

SAN JOAQUIN VALLEY
AIR POLLUTION CONTROL DISTRICT

Best Performance Standard (BPS) Evaluation

GDFs with USTs and Phase II EVR

TABLE OF CONTENTS

Page

I. 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 (GHG) emissions 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 emissions 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 Gasoline Dispensing Facilities (GDFs) with Underground Storage Tanks (USTs) subject to California Air Resources Board's (ARB's) Phase II Enhanced Vapor Recovery (EVR) system requirements 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 GDFs with USTs and Phase II EVR

Phase	Description	Date	Comments
1	Initial Public Process	3/04/10	The District's intent notice is attached as Appendix D
2	BPS Development	4/02/10	See Section III of this evaluation document.
3	Public Review	4/08/10	The current draft proposed BPS will be posted on the District's website for public review. Any comments received during the public review process will be addressed before finalizing the BPS determination.
4	Public Comments	5/06/10	Public comments received during the public review process will be addressed before finalizing the BPS determination.

III. Class and Category

Gasoline dispensing facilities (GDFs) are recognized as a distinct class based on the following:

- GDFs represent a distinct operation (gasoline unloading, storage, and refueling) when compared to all other permit units currently regulated by the District.
- The District already considers this a distinct class with respect to Best Available Control Technology (BACT) for criteria pollutant emissions.
- This is a distinct class with respect to the District's prohibitory rules for criteria pollutant emissions (Rules 4621 and 4622).
- District's current prohibitory rules currently only allow ARB certified vapor recovery systems to control gasoline vapor emissions from GDFs. GDFs differ substantially from all other District classes in their basic function, operational components, and design requirements, and thus are considered to be a separate class.

GDFs with Underground Storage Tanks (USTs) and with Phase II EVR are recognized as a distinct category of GDFs based on the following:

- District has divided GDFs, in line with ARB classification, into two main categories: GDFs with underground storage tanks (USTs) and GDFs with aboveground storage tanks (AGTs). ARB has different vapor recovery certification procedures and enhanced vapor recovery (EVR) requirements for each category (see Appendix E for UST EVR timeline). Therefore, it is more appropriate to address GDFs with USTs under a separate BPS.
- There are certain GDFs with USTs that are not subject to EVR timeline as shown in Appendix E. These include GDFs with USTs with liquid condensate traps and GDFs at bulk plants where USTs also serve the bulk plant loading rack. Therefore, this BPS applies only to those GDFs that are subject to current EVR requirements.
- A Phase I vapor recovery system is always a balance system with no electrical requirements. Therefore, no Phase I vapor recovery system involves with direct or indirect GHG emissions and thus not evaluated in this BPS.
- Several of the Phase II EVR vapor recovery systems involve with a burner to control gasoline vapor emissions. Since the combustion of gasoline vapors results in direct GHG emissions, this document evaluates all current ARB certified Phase II EVR vapor recovery systems for GDFs with USTs.

IV. BPS Development

STEP 1. Establish Baseline Emission Factor (BEF)

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. BEF 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

Step 1: Number of GDFs with Various System Types:

For GDFs with USTs subject to ARB's EVR requirements, the representative baseline operation has been determined to be 59% of GDFs equipped with balance Phase II vapor recovery systems (predominately G-70-52-AM), 33% equipped with a vacuum assist system without a burner (with no combustion emissions) and 8% equipped with a vacuum assist system with a burner (with combustion emissions).

This determination is based on a review of the District's permit data base, which indicates that this was the most common configuration permitted by the District during the baseline period of 2002-2004. The following table summarizes the various system types during the baseline period:

Table 2
Baseline Period (2002-04) GDF Representative Operations

#	Phase II Vapor Recovery System Type		Number of GDFs	% of Number of GDFs
1	Balance Systems		739	59 %
2	Vacuum Assist Systems (no Combustion Emissions)		407	33 %
3	Vacuum Assist Systems (with Combustion Emissions)	Hirt VCS-200 (G-70-33)	24	8 %
4		Hirt VCS-400 (G-70-177)	38	
5		Hasstech VCP-2/2A or 3A (G-70-7 or G-70-164)	36	
		Total =	1,244	100 %

Step 2: Establishing Percentage of Gasoline Dispensed by Each System Type During Baseline Period:

District's Emissions Inventory (EI) database was reviewed to find the actual gasoline dispensed for each system type during the baseline emissions period. Since District's EI database was under development, the data for two years 2002 and 2003 was not complete. However, complete data was available for years 1999 and 2004 through 2008. The following table summarizes the EI data for each system type for years 1999 and 2002 through 2008:

Table 3
Total Gasoline Throughput (All numbers are in 1,000 gallons)

#	GDF Sub-Category	Emission Inventory Year							
		1999	2002	2003	2004	2005	2006	2007	2008
1	Balance Systems	479,547	3,740	9,443	451,061	407,388	499,474	580,173	538,256
2	Vaccum Assist without burner	294,045	4,184	11,996	308,073	204,013	388,275	427,185	422,606
3	Hirt VCS 200 (G-70-33)	26,847			10,319	7,048	19,123	25,759	24,080
4	Hirt VCS 400 (G-70-177)	68,016			71,856	65,002	73,247	72,730	68,770
5	Hasstech VCP-2/2A or 3A (G-70-7 or G-70-164)	48,539			53,923	54,272	60,153	63,150	60,485
	Grand Total =	916,994	7,924	21,439	895,232	737,723	1,040,272	1,168,997	1,114,197

As shown above, data for years 2002 and 2003 is not complete. Therefore, the data for all other years, in the above table, was used to calculate the percentage of total gasoline dispensed for each system type. This percentage is then assumed to be the representative of baseline period gasoline dispensed for each system type. The following table summarizes the calculations:

Table 4 Percentage of Gasoline Dispensed (All numbers are in 1,000 gallons)									
#	GDF Sub-Category	Emission Inventory Year						Total	%
		1999	2004	2005	2006	2007	2008		
1	Balance Systems	479,547	451,061	407,388	499,474	580,173	538,256	2,955,899	**50 %**
2	Vaccum Assist without burner	294,045	308,073	204,013	388,275	427,185	422,606	2,044,196	**35 %**
3	Hirt VCS 200 (G-70-33)	26,847	10,319	7,048	19,123	25,759	24,080	113,177	**15 %**
4	Hirt VCS 400 (G-70-177)	68,016	71,856	65,002	73,247	72,730	68,770	419,622	
5	Hasstech VCP-2/2A or 3A (G-70-7 or G-70-164)	48,539	53,923	54,272	60,153	63,150	60,485	340,522	
Grand Total =		916,995	895,234	737,722	1,040,271	1,168,997	1,114,197	5,873,416	100 %

Therefore, the baseline emission factor will be calculated using representative baseline operation as 50% of gasoline dispensed at GDFs equipped with balance Phase II vapor recovery systems, 35% gasoline dispensed at GDFs equipped with a vacuum assist system without a burner (with no combustion emissions) and 15% of gasoline dispensed at GDFs equipped with a vacuum assist system with a burner (with combustion emissions).

B. Basis and Assumptions

GHG emissions are stated as "CO_2 equivalents" ($CO_{2(e)}$) which includes the global warming potential of methane and nitrous oxide emissions associated with gaseous fuel combustion.

All other applicable basis and assumptions are stated in BEF calculations in Appendix A.

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.

Based on initial public review process and consistent with District and ARB practice of stating emission factors, the unit of activity for this class and category has been established as 1,000 gallon of gasoline dispensed.

D. Calculations

Baseline Emission Factor (BEF) for this class and category is calculated as the sum of the direct (GHG_D) and indirect (GHG_I) emissions (on a per unit of activity basis), stated as lb-CO2 equivalent per 1,000 gallon of gasoline dispensed (see Appendix A for detailed calculations):

BEF = 3.421 lb-CO2(e)/1,000 gallon

STEP 2. List Technologically Feasible GHG Emission Reduction Measures

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

- The GDF must be equipped with ARB-certified Phase I and Phase II vapor recovery systems to comply with ARB's Enhanced Vapor Recovery (EVR) requirements for GDFs with underground gasoline storage tanks.

Vapor recovery systems are designed to control gasoline vapor emissions only during gasoline refueling. Gasoline vapors are not classified as GHG, instead they are considered Volatile Organic Compound (VOC) emissions. Therefore, the only GHG emissions resulting from GDFs are due to combustion of gasoline vapors in a burner associated with a Phase II system (direct GHG emissions) or a system electricity usage (indirect GHG emissions). Since none of the Phase II vapor recovery systems are designed to control or reduce GHG emissions, they cannot be directly classified as GHG reduction measures. However, all systems will be ranked on the basis of the amount of total GHG emissions (both direct and indirect GHG) and the systems resulting in least GHG emissions will be considered as GHG emissions reduction measures as compared to systems resulting in higher GHG emissions.

Thus Phase II EVR vapor recovery systems can be divided into two groups as follows:

1. Phase II Vapor Recovery Systems with Combustion Emissions: These types of vapor recovery systems use a burner to combust excess gasoline vapors to control system pressure. Therefore, in addition to gasoline vapor emissions during refueling, these systems involve with combustion emissions from burner. Currently there are three such ARB certified systems: VR-205, VR-207 and VR-208. They involve both direct GHG emissions due to combustion and indirect GHG emissions due to electric usage of various system components (see Appendix A for calculations of GHG emissions).

2. Phase II Vapor Recovery Systems without Burner: In addition to gasoline vapor emissions during refueling, these systems do not involve with combustion emissions. Currently there are five such ARB certified systems: VR-201, VR-202, VR-203, VR-204, and VR-209. They involve only indirect GHG emissions due to electric usage of various system components (see Appendix B for calculations of GHG emissions).

The following table summarizes the current ARB certified Phase II vapor recovery systems that are applicable to this class and category:

<table>
<tr><th colspan="5">Table 5
ARB Certified Phase II EVR Vapor Recovery Systems</th></tr>
<tr><th>#</th><th>ARB Executive Order</th><th>System</th><th>Most Prominent System Component</th><th>System Type</th></tr>
<tr><td>1</td><td>VR-201 and VR-202</td><td>Healy</td><td>Healy Clean Air Separator</td><td>Vacuum Assist</td></tr>
<tr><td>2</td><td>VR-203 and VR-204</td><td>VST</td><td>VST Membrane Processor
Or
Veeder-Root Vapor Polisher</td><td rowspan="4">Balance</td></tr>
<tr><td>3</td><td>VR-205</td><td>VST</td><td>Hirt VCS 100 Thermal Oxidizer</td></tr>
<tr><td>4</td><td>VR-207 and VR-208</td><td>Emco Wheaton</td><td>Hirt VCS 100 Thermal Oxidizer</td></tr>
<tr><td>5</td><td>VR-209</td><td>VST</td><td>Healy Clean Air Separator</td></tr>
</table>

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 technologically feasible GHG emission reduction measures for this class and category:

Table 6
Technologically Feasible GHG Reduction Measures

Reduction Measure	Qualifications
ARB-certified non-combustion based Phase II vapor recovery systems	Use of non-combustion based systems eliminates the direct GHG emissions involved with combustion based systems.
ARB-certified combustion based Phase II vapor recovery systems	These systems have no control over direct GHG emissions, however, they will be ranked along with other systems based on the amount of total GHG emissions reductions as a percentage of baseline emissions.

All of the reduction measures identified above are equipped with control equipment for VOC emissions which meets current regulatory requirements and criteria for Best Available Control Technology. None of the identified control measures would result in an increase in emissions of criteria pollutants.

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:

- GDFs with ARB-certified non-combustion Phase II EVR vapor recovery systems have been demonstrated commercially available and are thus Achieved-in-Practice

- GDFs with ARB-certified combustion based Phase II EVR vapor recovery systems have been demonstrated commercially available and thus are Achieved-in-Practice

All of the reduction measures identified above are equipped with control equipment for VOC emissions which meets current regulatory requirements and criteria for Best Available Control Technology. None of the identified control measures would result in an increase in emissions of criteria pollutants.

STEP 4. Quantify Potential GHG Emission and Percent Reduction

For each Achieved-in-Practice GHG emission reduction measure identified in Step 3 above:

a. Quantify the potential GHG emission reduction, as compared to the Baseline Emission Factor (BEF) per unit of activity (G_a).

b. Express the potential GHG emission reduction as a percent (G_b) of BEF per unit of activity as follows:

$$\%\ \text{Reduction}\ in\ GHG\ emissions\ (G_b) = \frac{BEF - (proposed\ \ project\ emissions\ \ factor)}{BEF} \times 100$$

Please see Appendices B and C for detailed calculations of both direct and indirect GHG emissions from each of the currently ARB certified Phase II EVR vapor recovery systems.

STEP 5. Rank All Achieved-in-Practice GHG Emission Reduction Measures

Based on calculations presented in Appendices B and C, the Achieved-in Practice GHG emission reduction measures are ranked by order of percentage GHG emissions reduction in the table below:

Table 7
Ranking of Achieved-in-Practice GHG Emission Control Measures

Rank	Control Measure	Potential GHG Emission Reduction per Unit of Activity (G_a) lb-CO2(e)/1,000 gallon	Potential GHG Emission Reduction as a Percentage of the Baseline Emission Factor (G_p)
1	VST with Healy Clean Air Separator (VR-209)	3.421	100.00 %
2	VST with Veeder-Root Vapor Polisher (VR-203 or VR-204)	3.409	99.65 %
3	Healy with Healy Clean Air Separator (VR-201 or VR-202)	3.240	95 %
3	VST with VST Membrane Processor (VR-203 or VR-204)	2.553	75 %
5	VST/Emco Wheaton with Hirt VCS 100 Burner (VR-205, VR-207 or VR-208)	-4.137	-121 %

STEP 6. Establish 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 the Table 7 above from Section II.5, Best Performance Standard (BPS) for this class and category is determined as:

Best Performance Standard for GDFs with Underground Storage Tanks and Phase II EVR Vapor Recovery System

- *ARB-certified non-combustion based Phase II vapor recovery systems.*

STEP 7. Eliminate All Other Achieved-in-Practice Options

The following Achieved-in-Practice GHG emissions control measures, identified in Section II.4 and ranked in Table 7 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:

Eliminated Achieved-in-Practice Control Measures for GDFs with Underground Storage Tanks and Phase II EVR Vapor Recovery System

- *ARB-certified combustion based Phase II vapor recovery systems.*

V. Appendices

Appendix A Calculations for Baseline Emission Factor (BEF)
Appendix B Calculations for GHG Emissions from Hirt Burner
Appendix C Calculations for GHG Emissions from Technologically Feasible Options
Appendix D Initial Public Process
Appendix E ARB's EVR Timeline

APPENDIX A

Calculations for Baseline Emission Factor (BEF)

Calculations for Baseline Emissions Factor (BEF)

As discussed in Section III.1.A of this document, there were three GDF classes during the baseline period of 2002-2004. Baseline emission factor for GHG emissions is calculated below for each GDF class and then combined to give an overall BEF. The following table summarizes the percentage of gasoline dispensed used to calculate baseline emission factor:

Percentage of Gasoline Dispensed (All numbers are in 1,000 gallons)			
#	GDF Sub-Category	Total	%
1	Balance Systems	2,955,899	**50 %**
2	Vaccum Assist without burner	2,044,196	**35 %**
3	Hirt VCS 200 (G-70-33)	113,177	**2 %**
4	Hirt VCS 400 (G-70-177)	419,622	**7 %**
5	Hasstech VCP-2/2A or 3A (G-70-7 or G-70-164)	340,522	**6 %**
	Grand Total =	**5,873,416**	**100 %**

BEF for each of these five sub-categories is calculated below:

a) GDFs equipped with a balance Phase II vapor recovery system:

Assumptions

- Direct GHG emissions are zero since methane emissions from gasoline tanks are negligible and there are no combustion processes involved.
- Indirect GHG emissions are zero since balance systems do not use any electric motor-driven vacuum pump to draw vapors.

Calculations

The Baseline Emission Factor for this class is $\mathbf{BEF_a = 0}$

b) GDFs equipped with a vacuum assist Phase II vapor recovery system WITHOUT a burner:

Assumptions

- Direct GHG emissions are zero since methane emissions from gasoline tanks are negligible and there are no combustion processes involved.

- Indirect GHG emissions are due to operation of a ½ bhp electric motor-driven vacuum pump associated with the Phase II vapor recovery system.
- The vacuum pump at each fueling point (FP) is estimated to operate 8 hours/FP-day.
- Nozzles pump at 10 gal/min (from ARB Executive Orders).
- Stations are designated to handle peak gasoline dispensing periods, so an estimated use factor of 50% is considered conservative.
- If the time that a vehicle spends at a fueling point (FP) is 8 minutes, only about 2 minutes of that time is actually spent dispensing fuel (20 gallon @ 10 gal/min). Therefore, a utilization factor of 0.25 will be used for calculations.
- Based on above assumptions, maximum time that a vacuum pump operates is calculated as: 24 hour/day × 0.25 × 0.5 = 3 hour/FP-day.
- Based on above assumptions, maximum gasoline dispensed by each nozzle is calculated as: 10 gal/min × 1,440 min/day × 0.25 × 0.5 = 1,800 gallon/day per nozzle.
- Since only one vehicle can be refueled at one fueling point (FP) at a time, the maximum gasoline dispensed at a fueling point = 1,800 gallon/FP-day.
- Indirect emissions from electric power consumptions are calculated based on the current PG&E electric power generation factor of 0.524 lb- $CO_{2(e)}$ per kWh.
- Electric motor efficiency is 90%

Calculations

Specific electricity consumption for the vacuum pump, calculated in units of kWh/1,000 gallon, is:

$$\frac{0.5\,bhp}{0.90} \times \frac{0.7457\,kW}{1\,bhp} \times \frac{3\,hours}{FP-day} \times \frac{1\,FP-day}{1{,}800\,gallon} \times \frac{1{,}000\,gallon}{1{,}000\,gallon} = 0.690\,\frac{kW-hr}{1{,}000\,gallon}$$

GHG Emissions are:

$$\frac{0.690\,kW-hr}{1{,}000\,gallon} \times \frac{0.524\,lb-CO2(e)}{1\,kW-hr} = 0.362\,\frac{lb-CO2(e)}{1{,}000\,gallon}$$

The Baseline Emission Factor is therefore,

BEF$_b$ $= 0.362 \dfrac{lb - CO2(e)}{1{,}000\ gallon}$

c) GDFs equipped with a vacuum assist Phase II vapor recovery system WITH a burner:

Under this category, it was further found that about 2% of the total gasoline dispensed during baseline period was from GDFs equipped with Hirt VCS-200 burner, whereas 7% gasoline was dispensed from GDFs equipped with Hirt VCS-400 burner and 6% gasoline was dispensed from GDFs equipped with Hasstech VCP-2/2A burner. Thus BEF each of these sub categories is evaluated below:

c-1) GDFs equipped with a vacuum assist Phase II vapor recovery system WITH a Hirt VCS-200 burner:

Assumptions

- Direct GHG emissions consist of $CO_{2(e)}$ emissions from combustion of gasoline vapors in the burner.
- Maximum CO_2 emissions from combustion of gasoline vapors in the Hirt burner are 29.8 lb- $CO_{2(e)}$/hr (based on ARB determination for Hirt VCS-100 burner emissions of 14.9 lb-$CO_{2(e)}$/hr and the fact that VCS-200 burner design flowrate is double that of VCS-100).
- The Hirt burner and the vacuum pump associated with burner are estimated to operate 30 minutes-each per 1,000 gallon of gasoline dispensed (worst case).
- Indirect emissions are produced due to operation of a ½ bhp electric motor-driven vacuum pump associated with the Phase II vapor recovery system.
- Indirect emissions from electric power consumptions are calculated based on the current PG&E electric power generation factor of 0.524 lb-$CO_{2(e)}$ per kWh.
- Electric motor efficiency is 90%

Calculations

Direct GHG emissions:

CO_2 emissions = 29.8 lb- $CO_{2(e)}$/hr x 30 min/1,000 gallon x 1 hr/60 min
= 14.9 lb-$CO_{2(e)}$/1,000 gallon

Indirect GHG Emissions:

Specific electricity consumption for the vacuum pump is:

0.5 bhp x (1/90%) x 0.7457 kW/bhp x 30 min/1,000 gallon x 1 hr/60 min
= 0.207 kWh/1,000 gallon

Based on PG&E electric power generation factor, indirect GHG emissions are:

0.207 kWh/1,000 gallon x 0.524 lb-$CO_{2(e)}$/kWh
= 0.108 lb-$CO_{2(e)}$/1,000 gallon

Total GHG Emissions:

Therefore, total GHG emissions from Phase II vapor recovery system with Hirt burner are:

Total GHG from Hirt burner = 14.9 + 0.108 = 15.008 lb-$CO_{2(e)}$/1,000 gallon

The Baseline Emission Factor is therefore,

BEF_{c-1} = 15.008 lb-$CO_{2(e)}$/1,000 gallon

c-2) GDF equipped with a vacuum assist Phase II vapor recovery system WITH a Hirt VCS-400 burner:

Assumptions

- Direct GHG emissions consist of CO_2 emissions from combustion of gasoline vapors in the burner.
- Maximum CO_2 emissions from combustion of gasoline vapors in the Hirt burner are 59.6 lb- $CO_{2(e)}$/hr (based on ARB determination for Hirt VCS-100 burner emissions of 14.9 lb-$CO_{2(e)}$/hr and the fact that VCS-400 burner design flowrate is four times that of VCS-100).
- The Hirt burner and the vacuum pump associated with burner are estimated to operate 30 minutes-each per 1,000 gallon of gasoline dispensed (worst case).
- Indirect emissions are produced due to operation of a ½ bhp electric motor-driven vacuum pump associated with the Phase II vapor recovery system.
- Indirect emissions from electric power consumptions are calculated based on the current PG&E electric power generation factor of 0.524 lb-$CO_{2(e)}$ per kWh.

- Electric motor efficiency is 90%

Calculations

Direct GHG Emissions:

CO_2 emissions = 59.6 lb- $CO_{2(e)}$/hr x 30 min/1,000 gallon x 1 hr/60 min
= 29.8 lb- $CO_{2(e)}$/1,000 gallon

Indirect GHG Emissions:

Specific electricity consumption for the vacuum pump is:

0.5 bhp x (1/90%) x 0.7457 kW/bhp x 30 min/1,000 gallon x 1 hr/60 min
= 0.207 kWh/1,000 gallon

Based on PG&E electric power generation factor, indirect GHG emissions are:

0.207 kWh/1,000 gallon x 0.524 lb-$CO_{2(e)}$/kWh
= 0.108 lb-$CO_{2(e)}$/1,000 gallon

Total GHG Emissions:

Therefore, the total GHG emissions from Phase II vapor recovery system with Hirt burner are:

Total GHG from Hirt burner = 29.8 + 0.108 = 29.908 lb-$CO_{2(e)}$/1,000 gallon

The Baseline Emission Factor is therefore,

$BEF_{c\text{-}2}$ = 29.908 lb-$CO_{2(e)}$/1,000 gallon

c-3) GDFs equipped with a vacuum assist Phase II vapor recovery system WITH a Hasstech VCP-2/2A or VCP-3A burners:

Assumptions

- Currently no data is available for Hasstech VCP-2/2A or VCP-3A burners. Therefore, it will be assumed that each of the Hasstech VCP-2/2A or VCP-3A burners have CO_2 emissions similar to a Hirt VCS-200 burner. Thus maximum CO_2 emissions from combustion of gasoline vapors in the Hasstech burners are 29.8 lb-$CO_{2(e)}$/hr.

- Since Hasstech VCP-2/2A and 3A have identical burners, GHG emissions from Hasstech will be calculated once.

- Direct GHG emissions consist of CO_2 emissions from combustion of gasoline vapors in the burner.
- The Hasstech burner and the vacuum pump associated with burner are estimated to operate 30 minutes-each per 1,000 gallon of gasoline dispensed (worst case).
- Indirect emissions are produced due to operation of a ½ bhp electric motor-driven vacuum pump associated with the Phase II vapor recovery system.
- Indirect emissions from electric power consumptions are calculated based on the current PG&E electric power generation factor of 0.524 lb-$CO_{2(e)}$ per kWh.
- Electric motor efficiency is 90%

Calculations

Direct GHG Emissions:

CO_2 emissions = 29.8 lb-$CO_{2(e)}$/hr x 30 min/1,000 gallon x 1 hr/60 min
= 14.9 lb-$CO_{2(e)}$/1,000 gallon

Indirect GHG Emissions:

Specific electricity consumption for the vacuum pump is:

0.5 bhp x (1/90%) x 0.7457 kW/bhp x 30 min/1,000 gallon x 1 hr/60 min
= 0.207 kWh/1,000 gallon

Based on PG&E electric power generation factor, indirect GHG emissions are:

0.207 kWh/1,000 gallon x 0.524 lb-$CO_{2(e)}$/kWh
= 0.108 lb-$CO_{2(e)}$/1,000 gallon

Total GHG Emissions:

Therefore, total GHG emissions from Phase II vapor recovery system with Hirt burner are:

Total GHG from Hirt burner = 14.9 + 0.108 = 15.008 lb-$CO_{2(e)}$/1,000 gallon

The Baseline Emission Factor is therefore,

$BEF_{c\text{-}3}$ = 15.008 lb-$CO_{2(e)}$/1,000 gallon

<u>D) Calculations of Overall Baseline Emissions Factor</u>:

The overall Baseline Emission Factor (BEF) is calculated as follows:

$$BEF = (0.50 \times 0) + (0.35 \times BEF_b) + (0.02 \times BEF_{c-1}) + (0.07 \times BEF_{c-2}) + (0.06 \times BEF_{c-3})$$

$$= (0.50 \times 0) + \left(0.35 \times \frac{0.362\ lb - CO_2}{1{,}000\,gallon}\right) + \left(0.02 \times \frac{15.008\ lb - CO_2}{1{,}000\,gallon}\right) + \left(0.07 \times \frac{29.908\ lb - CO_2}{1{,}000\,gallon}\right) + \left(0.06 \times \frac{15.008\ lb - CO_2}{1{,}000\,gallon}\right)$$

$$= 0 + \left(\frac{0.127\ lb - CO_2}{1{,}000\,gallon}\right) + \left(\frac{0.300\ lb - CO_2}{1{,}000\,gallon}\right) + \left(\frac{2.094\ lb - CO_2}{1{,}000\,gallon}\right) + \left(\frac{0.900\ lb - CO_2}{1{,}000\,gallon}\right)$$

$$BEF = \frac{3.421\ lb - CO_2}{1{,}000\,gallon}$$

APPENDIX B

Calculations for GHG Emissions from Hirt Burner (with Combustion Emissions)

Determination of GHG Emissions from Hirt Burner

ARB has currently certified several Phase II EVR vapor recovery systems for GDFs subject to ARB EVR timeline. Currently three balance systems (under ARB executive orders VR-205, VR-207, and VR-208) involve with Hirt VCS 100 burner. Under normal conditions, these balance systems do not involve in any vacuum pump to draw gasoline vapors and Hirt burner typically does not operate during that time. However, when pressure in the ullage space rises above the allowable limit, Hirt burner activates and starts drawing excess vapor with a turbine and incinerates until pressure in the ullage is within the allowable range. The ullage pressurization occurs mostly during periods of less activity, e.g. station being shut down overnight, winter fuels present, etc. ARB has determined that a typical Hirt burner operates only a maximum of 20 minutes a day.

A. Basis and Assumptions:

- Direct GHG emissions consist of CO_2 emissions from combustion of gasoline vapors in the Hirt burner.
- Maximum CO_2 emissions from combustion of gasoline vapors in the Hirt burner are 14.9 lb-$CO_{2(e)}$/hr (ARB determination).
- The Hirt burner and the vacuum pump associated with burner are estimated to operate 30 minutes-each per 1,000 gallon of gasoline dispensed (worst case).
- Indirect emissions are produced due to operation of a ½ bhp electric motor-driven vacuum pump associated with the Phase II vapor recovery system.
- Indirect emissions from electric power consumptions are calculated based on the current PG&E electric power generation factor of 0.524 lb-$CO_{2(e)}$ per kWh.
- Electric motor efficiency is 90%

B. Calculation of Potential GHG Emissions per Unit of Activity (G_a):

<u>Direct GHG Emissions:</u>

CO_2 emissions = 14.9 lb-$CO_{2(e)}$/hr x 30 min/1,000 gallon x 1 hr/60 min
= 7.45 lb-$CO_{2(e)}$/1,000 gallon

<u>Indirect GHG Emissions:</u>

Specific electricity consumption for the vacuum pump is:

0.5 bhp x (1/90%) x 0.7457 kW/bhp x 30 min/1,000 gallon x 1 hr/60 min

= 0.207 kWh/1,000 gallon

Based on PG&E electric power generation factor, indirect GHG emissions are:

0.207 kWh/1,000 gallon x 0.524 lb-$CO_{2(e)}$/kWh
= 0.108 lb-$CO_{2(e)}$/1,000 gallon

<u>Total GHG Emissions:</u>

Therefore, the total GHG emissions from Phase II vapor recovery system with Hirt burner are:

Total GHG from Hirt burner = 7.45 + 0.108 = 7.558 lb-$CO_{2(e)}$/1,000 gallon

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

$$G_p = G_a / BEF = (3.421 - 7.558) / 3.421 \times 100 = -120.94\ \%$$

Negative sign means that the emissions are actually increasing by 121%.

APPENDIX C

Calculations for GHG Emissions from Technologically Feasible Options

1. Healy with Clean Air Separator (VR-201 or VR-202):

A. Basis and Assumptions:

- Direct GHG emissions are zero since methane emissions from gasoline tanks are negligible and there are no combustion processes involved.

- Indirect GHG emissions are due to operation of a ¼ bhp electric motor-driven Healy Vacuum Pump VP1000 installed in each dispenser.
- The vacuum pump operates at two speeds: low speed when one fueling point being activated, and high speed when both fueling points are activated simultaneously. For worst case scenario, it is assumed that pump operates 100 % load at high speed only.
- Nozzles pump at 10 gal/min (from ARB Executive Orders).
- Stations are designated to handle peak gasoline dispensing periods, so an estimated use factor of 50% is considered conservative.
- If the time that a vehicle spends at a fueling point (FP) is 8 minutes, only about 2 minutes of that time is actually spent dispensing fuel (20 gallon @ 10 gal/min). Therefore, a utilization factor of 0.25 will be used for calculations.
- Based on above assumptions, maximum time that a vacuum pump operates is calculated as: 24 hour/day × 0.25 × 0.5 = 3 hour/FP-day.
- Based on above assumptions, maximum gasoline dispensed by each nozzle is calculated as: 10 gal/min × 1,440 min/day × 0.25 × 0.5 = 1,800 gallon/day per nozzle.
- Since only one vehicle can be refueled at one fueling point (FP) at a time, the maximum gasoline dispensed at a fueling point = 1,800 gallon/FP-day.
- Indirect emissions from electric power consumptions are calculated based on the current PG&E electric power generation factor of 0.524 lb- $CO_{2(e)}$ per kWh.
- Electric motor efficiency is 90%

B. Calculation of Potential GHG Emissions per Unit of Activity (G_a):

<u>Direct GHG Emissions:</u>

Since no combustion process is involved, the direct GHG emissions are zero for this category.

Indirect GHG Emissions:

Total electricity consumption for each vacuum pump per 1,000 gallon of gasoline dispensed is:

1/4 bhp x (1/90%) x 0.7457 kW/bhp x 3 hours/FP-day x 1 FP-day/1,800 gallon x 1,000 gallon/1,000 gallon = 0.345 kWh/1,000 gallon

Based on PG&E electric power generation factor, indirect GHG emissions are:

0.345 kWh/1,000 gallon x 0.524 lb-$CO_{2(e)}$/kWh
= 0.181 lb-$CO_{2(e)}$/1,000 gallon

Total GHG Emissions:

Therefore, total GHG emissions from Phase II vapor recovery system with Healy system (VR-201 or VR-202) are:

Total GHG from Healy (VR-201, VR-202) = 0 + 0.181
= 0.181 lb-$CO_{2(e)}$/1,000 gallon

G_a = 0.181 lb-$CO_{2(e)}$/1,000 gallon

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

$G_p = G_a$ / BEF = (3.421 - 0.181) / 3.421 x 100 = 94.71 %

2. VST with VST Membrane Processor (VR-203 or VR-204):

A. Basis and Assumptions:

- Direct GHG emissions are zero since methane emissions from gasoline tanks are negligible and there are no combustion processes involved.
- VST Membrane Processor is equipped with two vacuum pumps each with a 1/2 bhp electrical motor.
- Each vacuum pump associated with the membrane processor operates 2 hours per 1,000 gallon of gasoline dispensed (worst case).
- Indirect emissions from electric power consumptions are calculated based on the current PG&E electric power generation factor of 0.524 lb- $CO_{2(e)}$ per kWh.
- Electric motor efficiency is 90%

B. Calculation of Potential GHG Emissions per Unit of Activity (G_a):

Direct GHG Emissions:

Since no combustion process is involved, the direct GHG emissions are zero for this category.

Indirect GHG Emissions:

Total electricity consumption for two vacuum pumps per 1,000 gallon of gasoline dispensed is:

2 pumps x 1/2 bhp x (1/90%) x 0.7457 kW/bhp x 2 hr/1,000 gallon
= 1.657 kWh/1,000 gallon

Based on PG&E electric power generation factor, indirect GHG emissions are:

1.657 kWh/1,000 gallon x 0.524 lb-$CO_{2(e)}$/kWh
= 0.868 lb-$CO_{2(e)}$/1,000 gallon

Total GHG Emissions:

Therefore, total GHG emissions from Phase II vapor recovery system with VST Membrane Processor (VR-203 or VR-204) are:

Total GHG from VST (VR-203, VR-204)
= 0 + 0.868 = 0.868 lb- $CO_{2(e)}$/1,000 gallon

G_a = 0.868 lb-$CO_{2(e)}$/1,000 gallon

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

$G_p = G_a / BEF = (3.421 - 0.868) / 3.421 \times 100 = 74.63\ \%$

3. VST with Veeder-Root Vapor Polisher (VR-203 or VR-204):

Assumptions

- Direct GHG emissions are zero since methane emissions from gasoline tanks are negligible and there are no combustion processes involved.
- The electrical component with VST Veeder-Root Vapor Polisher is the pressure sensor switch and solenoid that activates with pressure increase to allow gasoline vapors to flow to the carbon canister.
- All electrical components operate on direct-current only at an electric voltage of 110 volts.
- Total electricity consumed by all electrical components is 100 milli-Amperes (m-Amp) at 110 volts.
- Total operating time for all electrical components is 2 hours per 1,000 gallon gasoline dispensed.

Calculations

Direct GHG Emissions:

Since no combustion process is involved, the direct GHG emissions are zero for this category.

Indirect GHG Emissions:

Total electricity consumption for all system components is calculating using the following formula:

$P = I \times V$

Where,
P = electrical power (watts)
I = electrical current (amperes)
V = electrical voltage (volts)

Thus,

P = (100 milli-Amp x 1 Amp/1,000 milli-Amp) x 110 volts

= 0.1 Amp x 110 volts

=11 watts x 1 kilo-watt (kW)/1,000 watts

= 0.011 kW

Based on assumption that these electrical components operate for 2 hours per 1,000 gallon gasoline dispensed, the total system electrical power consumption is calculated as:

P = 0.011 kW x 2 hours/1,000 gallon

= 0.022 kWh/1,000 gallon

Based on PG&E electric power generation factor, indirect GHG emissions are:

0.022 kWh/1,000 gallon x 0.524 lb-$CO_{2(e)}$/kWh = 0.012 lb-$CO_{2(e)}$/1,000 gallon

Total GHG Emissions:

Therefore, total GHG emissions from Phase II vapor recovery system with VST Vapor Polisher (VR-203 or VR-204) are:

Total GHG from VST (VR-203, VR-204) = 0 + 0.012
= 0.012 lb-$CO_{2(e)}$/1,000 gallon

G_a = 0.012 lb-$CO_{2(e)}$/1,000 gallon

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

$G_p = G_a$ / BEF = (3.421 - 0.012) / 3.421 x 100 = 99.65 %

4. VST with Healy Clean Air Separator (VR-209):

Assumptions

- Direct GHG emissions are zero since methane emissions from gasoline tanks are negligible and there are no combustion processes involved.
- This is a balance system with no electrical requirements. Therefore, indirect GHG emissions are zero.

Calculations

Total Direct and indirect GHG emissions are zero. Thus,

G_a = 0.0 lb-$CO_{2(e)}$/1,000 gallon

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

$$G_p = G_a / BEF = (3.421 - 0.0) / 3.421 \times 100 = 100\ \%$$

APPENDIX D

Initial Public Process

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:

GASOLINE DISPENSING FACILITIES
Subject to District Permitting Requirements

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 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.

To facilitate public comment, the District has prepared a draft Best Performance Standards document for the subject stationary source class and category of greenhouse gas emissions. This document can be downloaded 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 Sajjad Ahmad by email, Sajjad.Ahmad@valleyair.org, or by mail at SJVUAPCD, 1990 East Gettysburg Avenue, Fresno, CA 93726 and must be received by **February 23, 2010**. For additional information, please contact Sajjad Ahmad by e-mail or by phone at (559) 230-5903.

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 by clicking on http://www.valleyair.org/Programs/CCAP/CCAP_idx.htm.

From: Sajjad Ahmad   Sent: Fri 2/19/2010 4:52 PM

To: HirtVCS@aol.com; demmington@veeder.com; kreid@veeder.com; walker@vsthose.com; brown@vsthose.com; nelson@franklinfueling.com; trondson@franklinfueling.com; walsh@franklinfueling.com; rbenscoter@husky.com; wburnett@husky.com; jlaschke@husky.com; JERodriguezSD@aol.com; jgrubb@barghausen.com; ainigues@barghausen.com; richardw@franzen-hill.com; john_moore@banks-co.com; lctesting@yahoo.com; cyork@rrmsc.com; charleiyork@gmail.com; anthony@tritonsc.com; zmann100@hotmail.com; mike.eliason@vpps.net

Cc: Jim Swaney; Arnaud Marjollet; Resa Garcia; Patia Siong; Sajjad Ahmad; Sheraz Gill

Subject: Notice of Development of Best Performance Standards (BPS)

The San Joaquin Valley Air Pollution Control District is soliciting public input on the development of Best Performance Standards. The Notice of Development for Gasoline Dispensing Facilities is available here.

Written comments regarding the subject Best Performance Standard should be addressed to Sajjad Ahmad by email, Sajjad Ahmad@valleyair.org, or by mail at SJVUAPCD, 1990 East Gettysburg Avenue, Fresno, CA 93726 and must be received by **February 23, 2010**. For additional information, please contact Sajjad Ahmad by e-mail or by phone at (559) 230-5903.

The San Joaquin Valley Air Pollution Control District created several list serves for stakeholders and other interested parties to register in order to receive e-mail notifications regarding the establishment of Best Performance Standards (BPS) for stationary sources and characterization of emission reduction measures for land-use development projects.

To participate in the development of BPS for gasoline dispensing operation, please sign up by clicking on the following link below :

Gasoline Dispensing Facilities BPS : Please click here to register.

From: gasoline_dispensing_facilities_bps@lists.valleyair.org   Sent: Thu 2/25/2010 11:49 AM
To: Sajjad Ahmad
Cc:
Subject: [Gasoline_Dispensing_Facilities_BPS] (no subject)

Attachments: ATT2090529.txt (786 B)

Dear Interested Parties:

The San Joaquin Valley Air Pollution Control District is soliciting public input on the development of Best Performance Standards. The Notice of Development for Gasoline Dispensing Facilities is available here.

The information requested below will be used when establishing Best Performance Standards for the subject Class and Category:

- Total electricity usage of various ARB certified Phase II EVR vapor recovery systems for underground gasoline storage tanks. This information is required to determine indirect greenhouse gas emissions for a specific system.
- For ARB certified Phase II EVR systems involved with combustion emissions, the data is required to calculate both direct and indirect greenhouse gas (GHG) emissions. Direct GHG emissions would be calculated based on combustion process and indirect GHG emissions would be calculated based on total electricity usage.
- Any other suggestions to better evaluate BPS.

Extension of Initial Commenting Period:

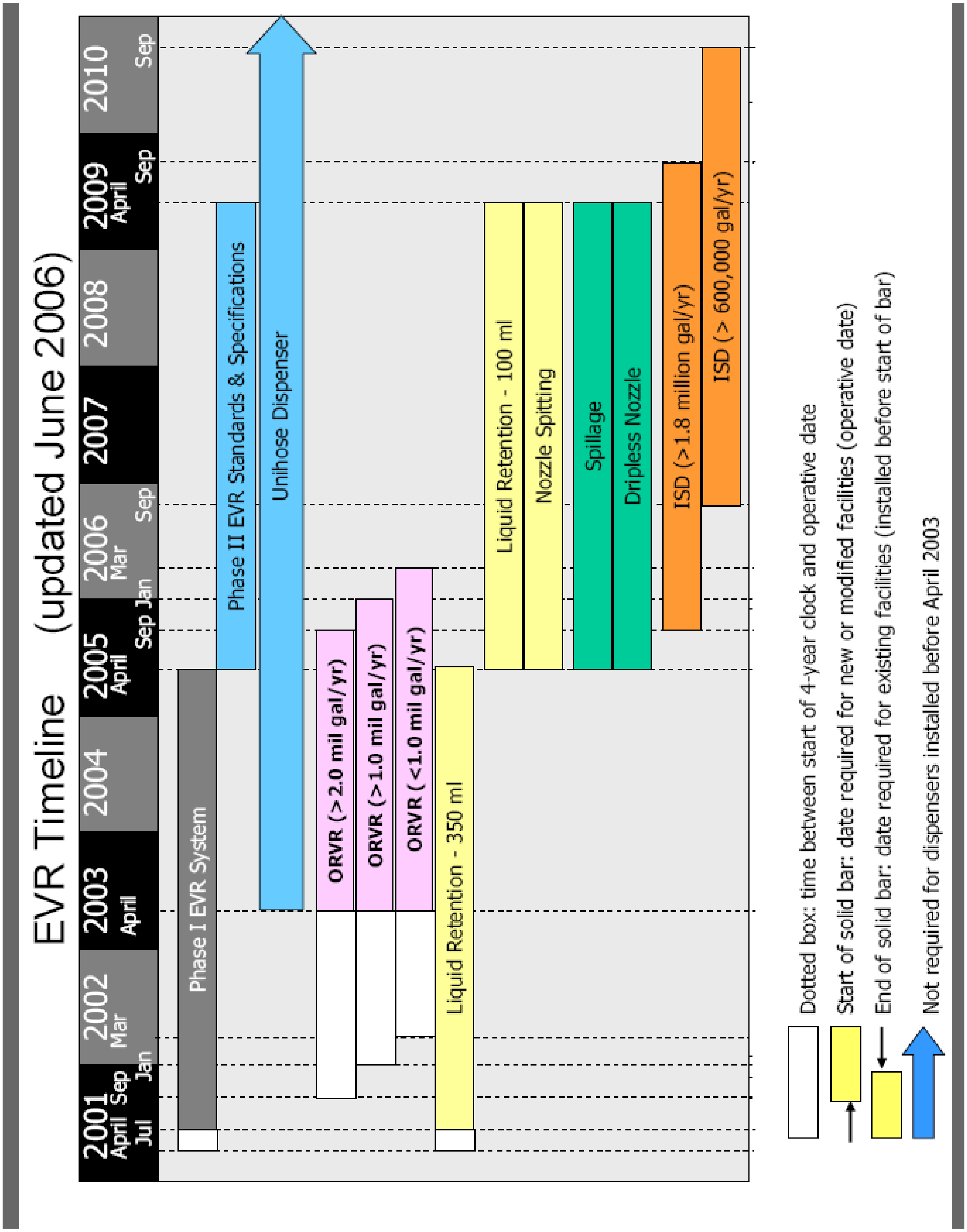
The District is **extending** the initial commenting period regarding development of Best Performance Standards (BPS) for Gasoline Dispensing Facilities.

Written comments regarding the subject Best Performance Standard should be addressed to Sajjad Ahmad by email, Sajjad.Ahmad@valleyair.org, or by mail at SJVUAPCD, 1990 East Gettysburg Avenue, Fresno, CA 93726 and must be received by **March 4, 2010**. For additional information, please contact Sajjad Ahmad by e-mail or by phone at (559) 230-5903.

Thank you for your cooperation in this matter.

APPENDIX E

ARB's EVR Timeline


EVR Timeline (updated June 2006)
2001 April Jul Sep
2002 Jan Mar
2003 April
2004
2005 April Sep
2006 Jan Mar Sep
2007
2008
2009 April Sep
2010 Sep
Phase I EVR System
Phase II EVR Standards & Specifications
Unihose Dispenser
ORVR (>2.0 mil gal/yr)
ORVR (>1.0 mil gal/yr)
ORVR (<1.0 mil gal/yr)
Liquid Retention - 350 ml
Liquid Retention - 100 ml
Nozzle Spitting
Spillage
Dripless Nozzle
ISD (>1.8 million gal/yr)
ISD (> 600,000 gal/yr)
Dotted box: time between start of 4-year clock and operative date
Start of solid bar: date required for new or modified facilities (operative date)
End of solid bar: date required for existing facilities (installed before start of bar)
Not required for dispensers installed before April 2003