Bay Area Air Quality Management District

939 Ellis Street
San Francisco, CA 94109

BAY AREA OZONE STRATEGY
CONTROL MEASURE SS-7

BAAQMD Regulation 8, Rule 33: Gasoline Bulk Terminals and Gasoline Delivery Vehicles; and Regulation 8, Rule 39: Gasoline Bulk Plants and Gasoline Delivery Vehicles

STAFF REPORT

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BAAQMD
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I. EXECUTIVE SUMMARY

This staff report describes the amendments proposed for Regulation 8, Rule 33: Gasoline Bulk Terminals and Gasoline Delivery Vehicles (Regulation 8-33) and Regulation 8, Rule 39: Gasoline Bulk Plants and Gasoline Delivery Vehicles (Regulation 8-39), and their expected impact on Volatile Organic Compound (VOC) emissions from gasoline bulk terminals and gasoline bulk plants. The Bay Area Air Quality Management District's (District) Bay Area 2005 Ozone Strategy identified Control Measure SS-7: "Gasoline Bulk Terminals and Plants" (SS-7) as a potential opportunity to reduce emissions of organic compounds. The proposed amendments reduce the allowable emission limit, strengthen requirements for gasoline cargo tank loading operations, and require enhanced monitoring to improve facility operations. VOC emissions will be reduced by at least ~~0.06~~ 0.07 tons per day, and additional reductions will be achieved as a result of fewer episodic VOC emissions. These emissions reductions, on an average per day basis, are relatively small because many of the bulk terminals and bulk plants in the Bay Area already achieve the proposed emissions standards. However, the proposed monitoring requirements will also limit emissions by reducing the number of incidents of over pressuring vapor recovery systems during loading, which can result in significant VOC releases.

Gasoline bulk terminals and gasoline bulk plants are intermediate facilities that distribute gasoline, gasoline additives and other fuels, such as ethanol, by gasoline cargo tanks to service stations and local businesses. Gasoline bulk terminals also distribute refined fuels to gasoline bulk plants. A majority of the emissions from gasoline bulk terminals and plants are associated with vapor generated during loading of gasoline cargo tanks and vapors returned from delivery operations. Cargo tank loading operations can also release emissions through liquid leaks and from spilled product. Staff estimates that gasoline bulk terminals in the District emit a total of 0.52 tons per day (tpd) of non-methane organic compounds while gasoline bulk plants emit 0.0081 tpd. The fugitive emissions from liquid and vapor leaks from piping systems, and any episodic emissions from vapor recovery system overpressure events or failures are not included in these estimates.

Based on a review of the existing rules and District staff's experience monitoring and inspecting Bay Area gasoline bulk terminals and bulk plants, a set of amendments is proposed to Regulation 8-33 and Regulation 8-39 to reduce organic emissions, enhance the safety of gasoline bulk terminal and bulk plant operations, and improve the enforceability of the rules. The proposed amendments include:

- A reduction in the allowable emission limit; and a requirement to monitor vapor recovery system performance to ensure the vapor recovery system operates properly;
- A reduction~~clarification~~ of vapor leak standards and ~~reduction of~~ liquid leak standards in the rules;

- A requirement that loading arm connectors and cargo tank vapor recovery connectors are compatible prior to gasoline loading, and meet the vapor and ~~reduced~~ liquid leak standards;
- A requirement to install pressure sensors to monitor vapor collection piping backpressure, and an alarm or automatic shutdown if backpressure exceeds 18 inches water column;
- A requirement to install block or vapor check valves in each loading rack vapor collection header to minimize emissions when maintenance is required;
- A requirement that vapor hose connectors are stored out of the way of the truck driveway to prevent damage to the connectors, which can be a significant source of VOC leakage;
- A requirement to monitor vapor storage tank airspace emissions to ensure all leaks are discovered and repaired quickly;
- A requirement to install sample lines on the pressure and vacuum sides of inaccessible pressure/vacuum valves to provide ready access to check for leaks;
- A requirement to further control the release of organic compounds during operational, maintenance and repair operations.
- A requirement for an APCO-approved vapor recovery system monitoring, inspection, notification and reporting protocol.
- A requirement that plants and terminals apply for new or revised certifications of their equipment with the California Air Resources Board (CARB) if substantive changes are made to their existing equipment.
- Revision to definitions and updates to source test requirements to be consistent with federal and state requirements.

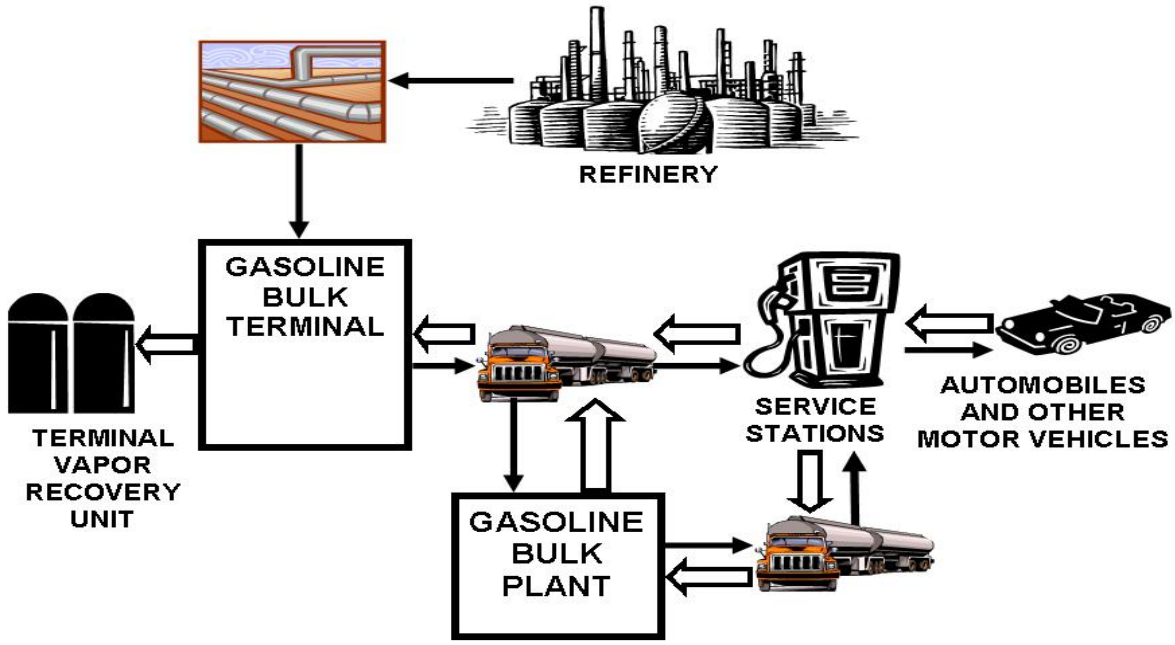
This Staff Report presents an overview of the proposed amendments to Regulation 8-33 and Regulation 8-39, and resulting reduction of an estimated ~~0.06~~ 0.07 tpd VOC emissions. Improvements in inspection and handling of connectors and inspection of vapor system pressure relief valves are expected to reduce emissions by an additional 1 ton per year. Estimates of the reduction in episodic events and associated VOC emissions are difficult to quantify, but, based on District staff's monitoring and inspection experience, assuming a reasonable estimate of one less event each quarter in each of the bulk terminals, with an associated reduction of 0.02 tons per event results in an additional estimated reduction of 1 ton per year. Altogether, the amendments are estimated to result in a reduction of approximately ~~24~~28 tons of VOC per year.

II. Background

A. Introduction

Gasoline bulk terminals and gasoline bulk plants are intermediate distribution centers where refined fuels are loaded into gasoline cargo tanks for delivery to gasoline dispensing facilities ("GDFs" or more commonly known as gas stations or service stations) and local businesses. Gasoline bulk terminals also deliver gasoline via cargo tank to gasoline bulk plants. Currently, there are fourteen gasoline bulk terminals in the Bay Area, one of which is not being used. There are ten active gasoline bulk plants within the District that distribute to service stations, along with two that only distribute other petroleum products (diesel, lubes, etc.), one that is available for emergency use only, and one that is out of service. Figure 1 illustrates the typical gasoline bulk terminal and bulk plant distribution system.

Figure 1
Typical Gasoline Bulk Terminal and Bulk Plant Distribution System



Notes: solid arrow indicate flow of petroleum product
Open arrow indicate flow of gasoline vapors.

Regulation 8, Rule 33 and Regulation 8, Rule 39 are focused on controlling the vapors that are displaced from cargo tanks when loaded with gasoline, as depicted by the open arrows shown in Figure 1. These vapors contain volatile organic compounds that are the precursors for ozone formation, and can also contain benzene, a toxic chemical.

B. Regulatory History

The District has a long history of regulating emissions from gasoline bulk terminals and plants. The District required installation of emission control equipment at gasoline bulk terminals in the late 1960s. In 1983, the District promulgated Regulation 8-33. The regulation currently requires terminals to install and maintain a CARB-certified vapor recovery system that emits no more than 9.6 grams of non-methane organic compounds per cubic meter of petroleum product loaded (or 0.08 pounds/1,000 gallons loaded). This standard represents a 99% reduction of organic vapors generated by loading at a gasoline terminal. Vapor recovery systems must have sufficient capacity to prevent the build up of pressure in cargo tanks during product loading. The regulation also requires the loading and delivery operations to be "leak free" and "vapor tight" as defined in the rule. The standards set in Rule 8-33, while now standard throughout California, were initially adopted in the Bay Area. The District amended Regulation 8-33 most recently in 1994.

The District promulgated Regulation 8-39 in 1987 to regulate organic emissions from gasoline bulk plants. Regulation 8-39 also requires the installation and maintenance of a CARB-certified Phase I vapor recovery system that emits less than 60 grams of non-methane organic compounds per cubic meter petroleum product loaded (or 0.5 pounds/1,000 gallons loaded). This standard represents a 94% reduction of organic vapors from a gasoline bulk plant. All equipment associated with delivery and loading operations must also be leak free and vapor tight. The District amended Regulation 8-39 most recently in 1994.

CARB tests and, if appropriate, certifies each individual vapor recovery system to the emission standards adopted by the air district in which the system is located. In addition, gasoline cargo tanks must be certified by CARB to operate in California. California Health and Safety Code Section 41962 requires that CARB set emission standards for gasoline cargo tanks and preempts the District's authority to set these standards, certify vehicles, or permit cargo tanks. While CARB conducts the annual performance test for initial certification, the District and other air districts administer and enforce pressure decay tests to check for "vapor tight" conditions on cargo tanks based upon CARB standards. Although CARB has sole authority to set cargo tank standards, CARB's pressure test methodology was developed by the District.

C. Source Description

Gasoline Bulk Terminals: Gasoline bulk terminals receive raw gasoline and other fuels and additives from refineries by pipeline and from marine tankers and barges, and store these petroleum distillates in tanks on site. Oxygenates such as ethanol, and some additives such as detergents and corrosion inhibitors are also delivered to terminals using gasoline cargo tanks. At the terminal's truck loading rack, cargo tank operators load gasoline and additives from the terminal's storage tanks into the delivery vehicle's cargo tanks for delivery as refined fuel. This refined gasoline goes to gasoline bulk plants, gas stations, and local businesses. A meter at the loading rack records the

amount of fuel loaded into each cargo tank. On average, each gasoline bulk terminal in the District dispenses over 800,000 gallons of refined gasoline each day.

Figure 2 is a photo of a gasoline cargo tank preparing for loading operations at the loading rack.

Figure 2
Tank Truck Connects to Vapor Hose

The gasoline bulk terminal loading rack includes:

- a liquid loading arm and cargo hose;
- a vapor recovery arm and vapor hose;
- an electrical ground line; and
- various pumps, valves, piping and, as noted above, a meter to measure the amount of fuel loaded into each cargo tank.
- Some terminals also have a slop tank, used to accommodate gasoline that does not meet specifications and occasional spills.

Gasoline cargo tank operators perform the actual hookup of the cargo tank to the electrical ground line, the vapor recovery system hose, and the bulk terminal loading hose. Operators then open the cargo tank's internal valve and load the gasoline and gasoline additive into the bottom of the cargo tank below the liquid level, once a level of gasoline is in the cargo tank. This loading is called "bottom fill" or "submerged loading," the purpose of which is to minimize the formation of gasoline vapors during the loading operation. Gasoline loaded into the cargo tanks displaces the gasoline vapors that were present in the cargo tanks prior to loading. These vapors flow from the cargo

tanks through the vapor recovery arm and cargo hose to the gasoline bulk terminal's vapor recovery system.

Gasoline Bulk Plants: Gasoline bulk plants receive and store refined fuels that are delivered from gasoline bulk terminals by delivery vehicles. Similar to the larger gasoline bulk terminals, cargo tank operators load gasoline from the bulk plant into cargo tanks at loading racks and deliver gasoline to GDFs and local businesses. In the District, gasoline bulk plants dispense approximately 2,800 gallons of gasoline in a day.

Gasoline loading operations at bulk plants are identical to loading operations performed at gasoline bulk terminals (described above) except that the gasoline vapors generated at GDFs and bulk plants are returned to the vapor space in the cargo tank by a process called "vapor balancing." Vapors from automobile tanks are collected through vapor recovery nozzles at GDFs when automobiles are filled with gasoline. Additional vapors also can also result from evaporation of liquids in storage tanks. These vapors are collected and returned to the cargo tanks when gasoline is delivered from the cargo tanks to GDF storage tanks.

D. Current Technology for Reducing VOC Emissions

Vapor Recovery Systems: Gasoline vapors from gasoline dispensing facilities (GDF) and bulk plants are contained in the vapor space of cargo tanks using the process of vapor balancing. These vapors are returned to gasoline bulk terminals. Cargo tanks are filled with vapor when they return to the gasoline bulk terminal for their next load of gasoline. The terminal loads liquid gasoline into the cargo tank, and displaces the vapor in the cargo tank through the vapor collection system to the vapor processing units for disposal. Vapor processing units dispose of the organic compounds by either recycling them, or burning them in an incinerator.

A vapor recovery system consists of:

- one or more vapor collection arms and vapor hoses at each loading rack;
- vapor recovery system piping to route the vapors to vapor processing unit(s); and
- one or more vapor processing units to dispose of the organic vapors.

In the Bay Area, gasoline bulk terminals utilize several types of vapor recovery systems including carbon adsorption/liquid absorption, thermal incineration, and at one terminal, a compressor system that recycles vapors back into the adjacent refinery fuel gas system.

Carbon adsorption/liquid absorption vapor recovery systems: Ten gasoline bulk terminals in the District have vapor recovery systems that consist of vapor recovery piping from each of the loading racks, and a pair of carbon adsorption or liquid absorption units to recover organic compounds from gasoline vapors. These systems are typically used at bulk terminals affiliated with Bay Area refineries. Figure 3 is a photo of a carbon adsorption/liquid adsorption vapor processing unit (VPU). Most VPUs

utilize two carbon adsorption beds. The first bed adsorbs organic compounds from the gasoline vapors onto carbon, and then the "cleansed" air vents to the atmosphere. While one carbon adsorption bed operates, the second carbon adsorption bed undergoes regeneration.

Figure 3
Example of Terminal Vapor Processing Unit

The carbon is regenerated to remove the organic compounds from the carbon for re-use. A vacuum pump on the carbon bed creates a negative pressure and desorbs the organic compounds. The desorbed organic compounds condense into liquid and are returned to the refinery for processing. Any remaining vapors are processed in the recovery column where the vapors are absorbed through contact with a gasoline stream. The regenerated carbon can then be used again to adsorb vapors.

The regeneration process of switching from one carbon bed to another occurs either after a fixed time period (typically every 15 minutes), after a fixed amount of product has been loaded, or after a fixed amount of hydrocarbon vapors have been adsorbed onto the carbon bed as determined using a hydrocarbon analyzer measuring the inlet concentrations to the carbon bed. One system uses hydrocarbon analyzer readings at the outlet of the carbon bed to trigger the switch to the other carbon bed, and start the regeneration cycle. These adsorptions systems are very effective, with control efficiencies ranging from 90 to 99+%. The Chevron Pascagoula Marketing Terminal in south Mississippi reports that it recovers more than one gallon of gasoline for every 1,000 gallons of gasoline loaded into cargo tanks using this type of vapor recovery system.

Thermal incineration vapor recovery systems: Some gasoline bulk terminals burn their hydrocarbon vapors rather than capture and recycle them. This approach is called thermal incineration. Two gasoline terminals in the Bay Area operate thermal incinerators. Both thermal incinerators consist of a combustion chamber to combust hydrocarbon vapors, aided by auxiliary fuel if necessary. Gasoline vapors are heated to ignition temperature and burned to carbon dioxide and water. The destruction efficiency of thermal oxidizers ranges from 90% to 99+%. The destruction efficiency depends upon the units' combustion temperatures and the residence time of gasoline vapors in the combustion chamber. The disadvantage of this approach is that incinerators contribute to greenhouse gas generation because supplemental fuel along with these hydrocarbon vapors is burned with little or no energy recovery mechanism used to generate useful work from these fuel sources.

One terminal in the Bay Area compresses its gasoline vapors, and recycles the vapors to the terminal's adjacent refinery fuel gas system. This approach uses the refinery furnaces as a type of thermal incinerator, with the inherent advantage of obtaining useful heat when the vapors are burned.

III. Proposed Rule Amendments

There are twelve amendments proposed to Rules 8-33 and 8-39. The purpose of these amendments is to reduce organic compound emissions, clarify applicability of the rules, improve enforceability of the rules, and enhance the safety of the bulk terminal and bulk plant operations. The proposed amendments include:

- A reduction in the allowable emission limit; and a requirement to monitor vapor recovery system performance to ensure the vapor recovery system operates properly;
- A reduction~~clarification~~ of vapor leak standards and ~~reduction of~~ liquid leak standards in the rules;
- A requirement that loading arm connectors and cargo tank vapor recovery connectors are compatible prior to gasoline loading, and meet the vapor and ~~reduced~~ liquid leak standards;
- A requirement to install pressure sensors to monitor vapor collection piping backpressure, and an alarm or automatic shutdown if backpressure exceeds 18 inches water column;
- A requirement to install block or vapor check valves in each loading rack vapor collection header to minimize emissions when maintenance is required;
- A requirement that vapor hose connectors are stored out of the way of the truck driveway to prevent damage to the connectors, which can be a significant source of VOC leakage;
- A requirement to monitor vapor storage tank airspace emissions to ensure all leaks are discovered and repaired quickly;
- A requirement to install sample lines on the pressure and vacuum sides of inaccessible pressure/vacuum valves to provide ready access to check for leaks;

- A requirement to further control the release of organic compounds during operational, maintenance and repair operations.
- A requirement for an APCO-approved vapor recovery system monitoring, inspection, notification and reporting protocol.
- A requirement that plants and terminals apply for new or revised certifications of their equipment with CARB if substantive changes are made to their existing equipment.
- Revision to definitions and updates to source test requirements to be consistent with federal and state requirements.

Enhanced monitoring and compliance is central to most of the proposed amendments. The proposals for lower emission limits will require rigorous monitoring to prevent performance deterioration of the vapor processing system, and resulting increased emissions over an extended period of time. Other proposed amendments also improve the ability of terminal and plant operators and District staff to monitor compliance. These other amendments will indirectly reduce emissions, but such reductions are very difficult to quantify. Some of these expected episodic emissions reductions are not included the quantitative analysis of the overall total emissions reductions.

A. Reduction in Emission Limits

The proposed amendments modify the emission limit of CARB-certified gasoline bulk terminal vapor recovery systems from a limit of 0.08 pounds of non-methane organic compounds per 1,000 gallons of product loaded to a limit of 0.04 pounds of non-methane organic compounds per 1,000 gallons of product loaded. While this appears to reduce emissions by half, all terminals already meet these more stringent standards in normal operation.

Currently, eight of the fourteen gasoline bulk terminals in the San Francisco Bay Area have District permit conditions that impose vapor recovery system emission limits of 0.02 to 0.04 pounds of non-methane organic compounds per 1,000 gallons of product loaded based on Best Available Control Technology (BACT) considerations. The remaining five bulk terminals (one bulk terminal is currently out of service) have permit conditions that limit organic compound emissions to the current Regulation 8, Rule 33 limit of 0.08 pounds of organic compounds per 1,000 gallons of gasoline loaded. The proposed amendments lower the organic compound emission limit to assure that all terminals maintain their vapor recovery equipment so that it continues to work efficiently and keeps emissions to a minimum.

Source tests conducted at twelve of the terminals demonstrate that the facilities already meet or exceed the proposed emission limit. The thirteenth terminal is not currently loading gasoline, but historical source tests indicate it can also meet the 0.04 lbs. /1000 gallons loaded. The fourteenth terminal is not currently in use.

Seven terminals have emission limits set by permit conditions that are at or below 0.04 lbs./1000 gal. The lower emission limit is estimated to reduce VOC emissions by approximately 0.06 tpd of organic compounds. This estimate is based on the recognition that while the five remaining terminals are currently capable of achieving 0.04 lbs./1000 gal. when operating effectively, they can occasionally have equipment or instrumentation problems that degrade their performance. Enhanced monitoring, combined with the more restrictive limit of 0.04 lbs./1000 gal. will require these five terminals to maintain their vapor recovery systems at the higher level of performance effectiveness. The District anticipates that terminals do not need to expend any capital or install additional equipment in order to achieve these emissions standards. However they may have to review maintenance procedures to ensure on-going compliance.

The proposed amendments require that an annual source test be conducted on each vapor processing unit at bulk terminals in accordance with the District's Source Test Method 34 (ST-34) or U.S. Environmental Protection Agency's (EPA) Reference Method 25. Similarly, the District is proposing a biennial source test at bulk plants.

In addition, the proposed amendments require gasoline bulk terminals to monitor their vapor processing units' performance. This monitoring can be performed by installing a hydrocarbon analyzer on the exhaust stream to monitor organic compound concentrations, or by alternative parametric monitoring of the vapor processing units. This monitoring is proposed to ensure performance is sustained at the high efficiency required to meet the VOC standards. The advantage of monitoring the hydrocarbon levels at the outlet of the abatement device is that it is a direct measurement of emissions, and can provide early warning if any aspect of the abatement system begins to malfunction. Hydrocarbon concentration measurement, however, does not replace a source test as the official determination of compliance. It is a tool to help a facility hold itself accountable for the abatement efficiency of its vapor processing system, avoid the risk of exceeding the District's emissions standard, and keep hydrocarbon emissions sustained at the desired low levels. While facilities will be required to comply with the Rule's parametric variable monitoring and notification provisions, facilities will not be in violation of District rules if they exceed their parametric variable limit. When the District is notified by a facility that it is has exceeded its parametric variable limit, the District may conduct a source test at the facility to ensure that the facility is in compliance with the District's emissions standard. The total annualized cost for installing a parametric monitor, span gas, automatic calibration equipment, and utilities is estimated at approximately $18,000 per terminal.

The proposed amendments also provide an option to develop an alternate parametric monitoring approach that would meet the requirements of 40 CFR, Part 63, Subpart R or 40 CFR, Part 63, Subpart BBBBBB. Alternate parametric monitoring protocols will most likely cost less, but may require more intensive operational effort depending on the process control and management information systems available at the bulk terminal.

B. Reduction~~Clarification~~ of Vapor and Liquid Leak Standards

The ~~vapor~~ leakage standards for cargo tanks are set by CARB, in its CP-204, *Certification Procedure for Vapor Recovery Systems of Cargo Tanks.* Cargo tanks are required to be "vapor tight" and meet liquid leak requirements. These standards have been incorporated into Regs. 8-33 and 8-39 by reference. In summary, these standards measure the pressure decay of a cargo tank pressurized to 18 inches of water pressure, and also require that cargo tank equipment meet both vapor and liquid leak standards. If the cargo tank is "vapor tight," the pressure will not decay significantly, and the cargo tank will have no measurable leaks. CARB certifies cargo tanks to be vapor tight. Regs. 8-33 and 8-39 require use of CARB certified cargo tanks.

Liquid and vapor leak requirements at bulk terminals and bulk plants are set by two District regulations. Regulation 8, Rule 18, *Equipment Leaks* applies to the typical pumps, piping and process vessels found at bulk terminals and bulk plants and establishes a vapor leak standard of 100 – 500 ppm, depending on the type of equipment and a liquid leak standard of 3 drops per minute. Regs. 8-33 and 8-39 set specific leak standards for the unique equipment found at bulk terminals and bulk plants. This unique equipment includes the pressure/vacuum (P/V) valves that serve as safety pressure devices for vapor recovery systems; the connectors (couplings) used on the hoses from the bulk terminal or bulk plant loading line to the cargo tanks; and the vapor recovery hoses from the cargo tanks back to the vapor recovery system at the terminal, or back to the tank using the vapor balance process at the bulk plant.

Currently, the vapor leak standard in Regs. 8-33 and 8-39 for P/V valves is consistent with the standard described in CARB CP-202, *Certification Procedure for Vapor Recovery Systems of Bulk Plants* and CARB CP-203, *Certification Procedure for Vapor Recovery Systems of Bulk Terminals.* Pursuant to the procedures outlined in CARB TP-202.1, *Determination of Emission Factor of Vapor Recovery Systems of Terminals* and CARB TP-203.1, *Determination of Emission Factor of Vapor Recovery Systems of Terminals*, any leaks from the pressure side of the P/V valve are captured by enclosing the P/V valve discharge with a plastic bag, and measuring the leak rate. However, the vacuum side of the P/V valve cannot be enclosed with a plastic bag without compromising the safety of the vacuum break device. Therefore, any leakage from the vacuum side of the P/V valve is measured with a hydrocarbon analyzer ~~using EPA Test Method 21~~. CARB currently defines "vapor tight" as leakage less than 100% of Lower Explosive Limit (LEL) hydrocarbon concentration. 100% of LEL equates to 21,000 ppm (as propane in air) when measured at the inlet to the vacuum side of the P/V valve.

Currently, the District's vapor leak standard in Regs. 8-33 and 8-39 for connectors is also consistent with the standard described in CARB CP-202, *Certification Procedure for Vapor Recovery Systems of Bulk Plants* and CARB CP-203, *Certification Procedure for Vapor Recovery Systems of Bulk Terminals.* Pursuant to CARB TP-204.3, *Determination of Leaks*, leakage is measured with a hydrocarbon analyzer ~~using EPA Test Method 21~~. The standard is 100% of LEL, when measured 1 inch from the cargo

tank half of the connector, and when measured 1 centimeter from the bulk terminal or bulk plant half of the connector. Currently, Regs. 8-33 and 8-39 are consistent with these leak standards.

EPA has also independently set standards for vapor leaks. EPA had established the vapor leak standard at 10,000 ppm (as methane) for new gasoline bulk terminals (40 CFR 60 Subpart XX), and at 500 ppm (as methane) for gasoline bulk terminals subject to EPA's Maximum Achievable Control Technology (MACT) standards (40 CFR 60 Subpart R). Other air districts have updated their vapor leak limits to 10,000 ppm to reflect EPA's standards of performance. EPA's most recent (January 2008) requirements set in 40 CFR 63 Subpart BBBBBB establish the vapor leak standard at 500 ppm. Many, if not all of the bulk terminals and plants in the District are subject to EPA's vapor leak standard during source tests, which the District may incorporate and enforce through facility permit conditions. ~~However, the proposed amendments do not include these more restrictive standards in Regs. 8-33 and 8-39, because California Health and Safety Code, Article 5, §41954 may be interpreted to require that more stringent standards adopted by the District not be implemented until at least two systems meeting the stricter performance standards have been certified by CARB. CARB certifies vapor and liquid leaks to meet its standard, but does not quantify vapor or liquid leaks in its certification process. No bulk terminal or bulk plant systems have been certified by CARB to meet stricter leak performance standards than CARB's 100% LEL standard. Staff has raised these issues with CARB, and, upon receipt of guidance from CARB, may revisit the vapor leak standard in Regs. 8-33 and 8-39 in the near future.~~ Staff received guidance from CARB that the District has the authority to set more stringent vapor leak standards in the Bay Area. The proposed amendments reduce the vapor leak limit for loading hose connectors, vapor recovery hose connectors, and pressure/vacuum valve leaks to 3000 ppm (as methane), which is equal to 6% of lower explosive limit. This limit is consistent with the most stringent limits currently in place in the state. Source test experience and inspection experience find that terminals and bulk plants are currently capable of meeting this more restrictive vapor leak limit provided proper maintenance procedures are in place. The amendments propose an effective date of July 1, 2009 for this lower vapor leak limit. The vapor leak standards for the cargo tank connectors to both the liquid loading arm and vapor recovery line will continue to be 100% of LEL.

In addition to imposing vapor leak standards, CARB, and Regs. 8-33 and 8-39 require that all equipment associated with gasoline cargo tank delivery and loading operations be free of liquid leaks. Currently, liquid "leak free" equipment is defined in Regs. 8-33 and 8-39 as equipment that leaks less than four drops of liquid gasoline per minute, not including leaks that occur during transfer fitting and loading arm disconnects. The proposed amendments will make these rules consistent with CARB's liquid leak standard. The CARB liquid leak standard is no more than three drops per minute. With the advent of improved self-sealing valves at the end of cargo and vapor recovery hoses based upon field observations of loading practices, the proposed standard is

being achieved today, provided good maintenance practices are employed. The proposed amendments also require that terminal owners inspect loading arm connectors and vapor recovery hose connectors for leaks daily using sight, sound and smell; and inspect them for leaks with a hydrocarbon analyzer weekly. All inspection records must be kept on file for review by District inspectors.

CARB, and Regs. 8-33 and 8-39 also have a liquid leak standard for liquid leaks that may occur when the liquid fill hose connectors or the vapor recovery hose connectors are disconnected from each other. All three rules stipulate that no more than 10 milliliters of product may be released per disconnect, averaged over three consecutive disconnects. Staff proposes to retain the existing standard for disconnect leaks. ~~The proposed revisions to Regs 8-33 and 8-39 incorporate the CARB leak standards by reference.~~

The amendments described above are being proposed to make District standards consistent with ~~CARB's~~ current capabilities of equipment at gasoline bulk terminals, and consistent with the most stringent standards already in place in the state. Existing P/V valves and connectors at terminals and plants have been observed to meet the proposed leak standards. The District does not anticipate that gasoline bulk terminals and plants will require any new equipment or retrofits, so will not incur additional capital costs to comply with the proposed lower liquid leak standard. Additional maintenance may be required.

Costs to accommodate the lower vapor and liquid leak limits are very minor. Connectors typically do not leak until they are damaged in some way. Pressure/vacuum valves typically do not leak until they open from overpressure, or are damaged. Lower leak limits may cause maintenance to be necessary one week earlier than currently necessary. Estimated costs are $40 per connector or valve annually, totaling an estimated $1000 for a terminal, or $100 for a bulk plant.

C. Compatibility of All Product Loading and Vapor Recovery Connections

The proposed amendments explicitly prohibit loading gasoline into a gasoline cargo tank unless the cargo tank's piping connectors are compatible with the gasoline bulk terminals' and plants' loading arms and vapor recovery connectors, and meet the vapor and liquid leak requirements. Incompatible piping connectors allow excessive liquid and vapor leaks. Because most cargo tank carriers load gasoline at more than one petroleum terminal or bulk plant, the proposed standard requires each bulk terminal and bulk plant to inform the cargo tank owner/operators of the compatible loading arm connectors and vapor recovery hose connectors required. In addition, the terminal and bulk plant operators must require the continued use of compatible connectors for cargo tanks to be allowed access to the terminal or bulk plant. Similarly, CARB already requires that the connectors of the cargo tank be compatible with the fittings on the fill pipes at the service stations and gasoline terminals or bulk plants that the cargo tank service.

Based on District staff experience at terminals and plants, terminal or plant operators adjust the counter-weight system in their facilities' loading arms as needed so that the height of their loading arms meet connectors situated on high profile cargo tanks. Terminals or plants may also have available adapters that fit a variety of loading connectors as a precaution.

Improved connections between loading arms, vapor recovery hoses and cargo tanks can reduce organic emissions. However, such emission reductions are difficult to quantify accurately since the District does not have sufficient data to determine the frequency of cargo tank loadings using incompatible equipment. The total annualized cost to adjust a facility's counterweight system and to carry a variety of adapters over a ten-year period is estimated to be $200 per loading rack. This estimate takes into account an additional adjustment of the counterweight system once a year. Reduced emissions are estimated at 100 lbs of VOC for each terminal, totaling 0.5 tons per year.

D. Installation of Pressure Monitors on Vapor Lines

The proposed amendments will assure that gasoline bulk terminals and bulk plants maintain proper pressures in the vapor recovery system piping at the loading racks. The proposed amendments require that gasoline bulk terminals and bulk plants install pressure monitoring systems on all loading racks. As described above, a cargo tank operator loads the cargo tank from the bottom. As the product fills the cargo tank, residual or collected vapors in the cargo tank enter the vapor recovery hose and piping and ultimately these vapors are processed through the vapor processing unit (VPU). EPA, CARB, and the current rules 8-33 and 8-39 all require the pressure in vapor recovery systems to not exceed a set pressure of 18 inches of water column, as measured at the vapor connection on the cargo tank truck. When 18 inches of water pressure is exceeded at the vapor connection, the pressure/vacuum (P/V) valve located on the dome hatch on top of the cargo tank is typically experiencing pressures above 20 inches of water column. At these pressures, the P/V valves may open and release all or part of the vapors contained in the headspace of the cargo tank to the atmosphere.

Pressure monitors and/or alarms will provide early warning if the backpressure on the vapor recovery system increases. Occasionally, the vapor collection system piping will have a restriction or blockage, which causes a build-up of pressure in the cargo tank headspace. When a restriction or blockage does occur, subsequent cargo tanks loading at the same rack can experience the same backpressure problem until the problem is corrected. That pressure build-up can release vapors to the atmosphere, as well as cause a potentially flammable situation. Backpressure monitoring and/or alarms allow the operator sufficient time to prevent releases, as well as prevent a potentially hazardous situation.

Backpressure monitors can be installed in terminal piping as part of the vapor recovery system so they are visible to the cargo tank drivers and operators during loading events.

The monitors will detect and signal when excessive pressure has developed in cargo tanks. A correlation must be established between the pressure at the monitoring point and the pressure at the vapor hose / cargo tank interface by testing near maximum load rate conditions. The District will work with industry to ensure the test near maximum load conditions does not exceed the 18" water pressure limit. The District estimates that up to 40 – 50 lbs of gasoline vapors per cargo tank may be released if a cargo tank's P/V valve set pressure is exceeded during loading at a terminal.

The proposal requires that bulk terminals install either an alarm system or an automatic shutoff system on their loading racks to notify operators if the vapor recovery piping back pressure is being exceeded during loading operations. An automatic shutoff system would stop a gasoline loading operation as soon as the back pressure in the vapor return hose exceeds 18 inches.

As an alternate, an alarm system would notify the operator as soon as the backpressure in the vapor hose exceeds 16 inches of water. If the backpressure in the vapor hose continues to increase to 18 inches of water, the alarm would again sound, and the operator would be required to complete the load, and then shut down that loading arm and the affected portion of vapor return system until the operator determines the cause of the pressure exceedance and completes repairs. In addition, operators will be required to notify the APCO within 24 hours, and document the time, date, ~~pressure~~alarm status, responses, results of the investigations, and corrective actions taken each time the pressure exceeds 18 inches water column.

The total annualized cost to install and maintain a single backpressure monitor on a loading rack over a ten-year period is approximately $2,700 per loading rack. The total annualized cost to install and maintain an automatic shutoff system on each loading rack over a ten-year period is estimated to be $8,100 per loading rack. If a bulk terminal installs an alarm system, the total annualized cost on each loading rack is estimated to be $3,400 over a ten-year period. Currently, all bulk terminals have manual shut-offs installed on each of their loading racks.

Bulk plants do not need to install an automatic shut-off or alarm system for their vapor recovery systems. Instead, the amendments propose to require the installation of a pressure gauge. The pressure gauge would be mounted on the end of the fixed piping of the vapor riser closest to the vapor hose connector. The gauge would indicate pressure levels in the hose. The cargo tank operator must maintain the vapor recovery system pressure below the CARB-certified set pressure of the P/V valve(s) and the pressure gauge will allow him to readily discern this. If the set pressure is exceeded, the cargo tank operator must immediately cease the loading operation. The District estimates that up to 40 - 50 lbs of gasoline vapors per cargo tank may be released from a single open P/V valve on a cargo tank loaded to capacity at a bulk plant. The total annualized cost to install and maintain a pressure gauge over a ten-year period is estimated to be approximately $700.

E. Block Valves or Vapor Check Valves in Vapor Recovery Piping Systems

The District proposes a new requirement to install a block valve or a vapor check valve at the end of the vapor recovery piping at each loading rack location. These valves should be located as close as is practical to the vapor recovery hose.

When vapor recovery hose or vapor recovery connectors require maintenance, the current practice is to take that loading rack out of service, and isolate the vapor recovery hose and connector for maintenance. However, in many instances, there may be only one block valve or vapor check valve in the vapor recovery system piping, located at the far end of the loading rack. When the vapor recovery hose or connector is opened for repair, the gasoline vapors in the hose and any associated piping up to the vapor check valve are released to the air. Installation of an additional block valve or vapor check valve at the end of each vapor recovery system piping near the vapor recovery hose will minimize the gasoline vapor that is emitted during this maintenance activity. Block valves can be installed for an annualized cost of about $200.

F. Hang the Vapor Recovery Hose When Not In Use

A new requirement is proposed to provide a hanger for each vapor recovery hose. When the vapor recovery hose is not in use, it should be hung up and out of the truck driveway, so that the connector does not get driven over and damaged. Connectors that have been damaged by trucks have been a source of excess emissions, and extra maintenance is required to replace the damaged connectors. Reduction in emissions from this simple approach is difficult to quantify, but is estimated at 0.05 tons per year at each terminal, totaling 0.5 tons per year. A hanger for each vapor hose can be installed for an annualized cost of about $100.

G. Monitor Hydrocarbon In The Airspace Of Vapor Storage Tanks

Four of the gasoline bulk terminals in the Bay Area have vapor recovery systems that include vapor storage tanks for temporary storage of vapors produced during gasoline loading operations. The storage tanks are cylindrical steel shells that contain a flexible diaphragm or bladder, which expands upwards as vapors enter. To handle large surges in recovered vapors from busy loading periods, vapors are temporarily stored in these tanks until they can be processed when loading decreases. Storage tanks also have the added benefit of allowing the VPU to maintain a steady state operation.

The flexible diaphragm inside the vapor storage tank can develop leaks and degrade to an extent that gasoline vapors may be leaked into airspace above the diaphragm, and ultimately into the atmosphere. A diaphragm typically lasts from seven to 11 years. Currently, organic compound emissions in/from the airspace above the diaphragm are limited to a concentration of 3,000 parts per million (ppm) expressed as methane or 6.8 kilograms (15 pounds) per day. The amendments propose to retain the allowable concentration standard of 3,000 ppm (expressed as methane).

The proposed amendments require ~~daily~~weekly monitoring of the vapor storage tank airspace when the vapor storage tank is in service and gasoline loading is in progress. A portable hydrocarbon analyzer can be used to monitor the hydrocarbon concentration and verify that total organic compound concentrations in the airspace remain below 3,000 ppm. 3,000 ppm equates to 6% of LEL for facility hydrocarbon detectors that measure in LEL. ~~Daily~~Weekly monitoring will allow the operator to detect any degradation or cracks developing in the diaphragms, so the vapor storage tank may be taken out of service for repair immediately, preventing excessive hydrocarbon leakage over an extended period of time. This proposed amendment only affects gasoline bulk terminals that operate vapor storage tanks as part of their vapor recovery systems. Most facilities already own hydrocarbon analyzers. Cost of a new portable hydrocarbon analyzer is $100 – 200 annually, depending on the analyzer chosen.

H. Install Sample Lines on Pressure / Vacuum Valves

District staff tests P/V valves located on top of the vapor recovery systems and vapor storage tanks to confirm that the valves comply with the vapor tight standard. Currently, staff must climb as much as 20 feet above grade to reach the top of the vapor recovery systems and vapor storage tanks to conduct these tests. The proposed amendment requires owners and operators of gasoline bulk terminals to install permanent sampling lines to their P/V valves with an outlet near ground level to provide a more accessible sampling location and enable District and bulk terminal staff to conduct the sampling safely and more frequently.

Sampling lines to inaccessible P/V valves would need to be at least 0.25 inch inside diameter and situated one (1.0) inch from the pressure outlet and vacuum inlet of the P/V valve. It is most effective to install these sample lines on the downwind side of the pressure and vacuum ports of the P/V valve. The sampling line will then be brought down to less than five (5) feet above grade and equipped with a valve. A portable hydrocarbon analyzer can then be used at the end of the valve to determine compliance with the leak concentration standards in the rules.

A majority of terminals have already installed sampling lines at most locations where their P/V valves are inaccessible. This amendment will ensure conformity in the installation of the sampling lines. The District estimates that the total annualized cost of installing sample lines over a ten-year period is about $200. Emission reductions from this requirement are based on catching P/V valve leaks earlier, so they can be repaired more quickly. VOC emission reductions from better P/V valve monitoring are estimated to total 0.5 tons per year for the terminals and bulk plants in the Bay Area.

I. Minimize Release of Vapors During Maintenance and Repairs

The amendments propose to enhance the practices used to remove gasoline liquid and vapors from piping systems and cargo hoses in preparation for maintenance and repair work in order to reduce potential fugitive gasoline vapor emissions. Some terminal

operators pour excess gasoline from their loading arms and cargo hoses into their oily water drainage system when they have to clean up the hoses and connectors for routine maintenance. Staff estimates that 17 – 22 gallons of gasoline are spilled from a loading arm onto the ground and into drain basins prior to washing the gasoline into the terminal's underground slop tanks. One third may evaporate prior to washing the remainder into the oil – water separator. The resultant emissions would be more than 30 lbs. This amendment would prohibit this practice and require that bulk terminal and bulk plant operators dispose of gasoline into an enclosed system that is connected to the vapor recovery system prior to maintenance or operational procedures that require draining the liquid or vapor hoses. This may be a portable maintenance container that is equipped with a liquid and vapor recovery hose connectors, or a slop tank.

The proposed amendments specifically prohibit the draining or storage of gasoline into an open container or the handling of gasoline in any manner (e.g., spillage, purging) that would allow liquid gasoline or gasoline vapors to enter the atmosphere or to flow to a sewer or to contaminate the ground. Any residual liquid found in hoses due to condensation of the vapors must be disposed of either in a portable maintenance container or in a slop tank to the greatest extent practicable (not all liquid and vapor can be recovered using these methods, but each facility is expected to recover as much liquid and vapor as possible, and only drain liquid into an open container for disposal when no other reasonable method is available). Finally, the proposal requires that portable maintenance containers or slop tanks have vapor tight covers, seals, and/or lids that meet the leak requirements of Regulation 8, Rule 18. The hose connectors and any adapters must meet the CARB vapor and liquid leak standards.

The annual emissions reductions from this proposal are difficult to quantify because the number of spills at bulk terminals is not documented. If, as described above, five gallons of gasoline evaporated during quarterly maintenance at each loading rack, organic compound emissions would total 500 lbs per year or more at each terminal, depending on its size. The total annualized cost over a 10-year period for developing and operating a handcart with a portable liquid transfer tank is approximately $900. This estimate includes the cost of a portable tank, two hose connectors, one drain line, and labor.

J. Emissions Monitoring, Inspection, Notification, and Reporting Protocol

EPA's most recent (January 2008) requirements for bulk terminals and bulk plants are set forth in 40 CFR Part 63, Subpart BBBBBB. These requirements apply to all gasoline bulk terminals and bulk plants that are not subject to EPA's Maximum Achievable Control Technology (MACT) requirements set forth in 40 CFR Part 63, Subpart R. Among many other requirements, Subpart BBBBBB requires a monthly leak inspection of all equipment in gasoline service using sight, sound and smell detection methods. The proposed amendments include a requirement for an APCO approved monitoring, inspection, notification and reporting plan that will be helpful for both industry and District staff by requiring approval and implementation of practices that will

satisfy the requirements of Subpart BBBBBB's monthly leak inspection and other requirements in Subparts BBBBBB, XX and R and 8-33, as applicable, while providing flexibility for industry to develop terminal-specific plans.

K. Require Updated CARB Certification

Pursuant to California Health and Safety Code Section 41954, owners and operators of California gasoline bulk terminals and plants must have their vapor recovery systems certified by CARB. The District currently requires that all bulk terminals' and bulk plants' vapor recovery systems comply with CARB standards and certification procedures at all times. These amendments propose to clarify when the District expects facilities to apply for recertification with CARB. The purpose of this requirement is to ensure that gasoline bulk terminal and plant owners and operators have their existing facilities recertified by CARB following any substantive modifications that cause an increase in throughput or capacity, or following installation of new equipment.

Owners and operators are required to notify CARB of any substantive modifications or additions to their terminal or plant under Title 17 of the California Code of Regulations. The recertification procedure ensures that any changes performed on the terminal or plants adhere to the existing regulations. A maximum throughput for terminals and plants is also established as part of the certification process based on the ability of existing control equipment to control vapor emissions generated. Re-certification of the plant or terminal is not required during routine maintenance that does not alter the throughput, modify the performance of the loading arm, or alter the original design of the terminal or plant. This is existing State law, although the amendment will clarify when the District expects facilities to apply for recertification and make it easier for District staff to enforce the provisions requiring valid certifications for individual terminals and plants. Consequently, this amendment has no anticipated emission reductions and does not require any additional capital expenditures by bulk terminals or plants.

L. Minor Editorial Changes

The definitions in Regulation 8-33 and Regulation 8-39 are proposed to be expanded or edited for clarification. Definitions for gasoline cargo tank, portable maintenance container, Reid vapor pressure, slop tank, vapor processing unit and vapor recovery system have also been added.

The District is proposing to amend the definition of gasoline to include aviation gasoline and additives that are delivered to a bulk terminal or plant via cargo tanks. Aviation fuels are currently not required to be distributed using a CARB certified vapor recovery system or cargo tank, however are required to comply with all the other standards (leak standards, etc.). The proposed amendments clarify the standards for aviation gasoline and additives.

IV. Emissions and Emission Reductions

District staff has estimated organic compound emissions attributable to cargo tank loading and vapor recovery operations at gasoline bulk terminals and bulk plants. District staff obtained annual throughput data for each fuel product dispensed from each of the Bay Area bulk terminals and bulk plants and obtained the temperatures and vapor pressures for each type of fuel that is received at the terminal or plant when the information was available. District staff used this data and District source tests to estimate the organic compounds emissions from cargo tank loading and vapor recovery operations.

Vapor Recovery Systems: Although a VPU is highly efficient, some small percentage of vapors remains unprocessed and is emitted from the outlet. Fugitive emissions from vapor recovery system flanges, fittings, and valves also release organic compounds. However, because these emissions are unpredictable and sporadic, emissions from these fugitive sources were not quantified. Regulation 8-33 currently specifies that no more than 0.08 lbs of organic compounds per 1,000 gallons of any petroleum product loaded may be released from a CARB-certified vapor recovery system at a bulk terminal, and Regulation 8-39 currently specifies that no more than 0.5 lbs of organic compounds per 1,000 gallons loaded may be released from a CARB-certified Phase I recovery system at a bulk plant. The District has set permit conditions for new or modified vapor recovery systems at bulk plants and terminals that are more stringent than the rule standards based on Best Available Control Technology. In estimating emissions from vapor recovery systems, terminal or plant specific permit limits were multiplied by the facility throughput. The total organic compound emissions from the VPU outlets are currently estimated at 0.21 tpd for bulk terminals and 0.006 tpd for bulk plants.

Gasoline Cargo Tank Operations: Cargo tank loading operations may release organic compounds through minor losses during loading operations and from potential spilled product while disconnecting the transfer fittings after loading or unloading. These vapors are the result of the “allowable” leak rates in CARB’s CP-204, *Certification Procedure for Vapor Recovery Systems of Cargo Tanks*. To estimate emissions from cargo tank loading, the District’s Source Test Section has developed an equation to approximate the total mass of evaporative emissions being released from a cargo tank during loading. Using typical loading conditions, District staff estimates organic compound emissions from cargo tanks to be 0.30 tpd from terminals and 0.001 tpd from bulk plants.

A third source of emissions occurs when vapors enter the atmosphere from spills that occur when bulk terminal or plant loading arm fittings are disconnected from cargo tanks during pre-fill and post-fill situations. Fitting losses are associated with operator error or incompatible connection closures. Both Rules 8-33 and 8-39 currently restrict the amount of disconnect losses to no more than 10 milliliters per disconnect, averaged over three disconnects. District inspection and source test data from the past five years

were used to estimate spillage losses. Assuming that 100 percent of the spillage evaporates, emissions were estimated based on assuming that the maximum allowable spill (10 milliliters) occurs in 10% of the loading events while the remaining loading events do not spill any gasoline. Average organic compound emissions from spillage losses are estimated at 0.004 tpd for terminals and 0.00002 tpd for plants.

Additional emissions occur when equipment malfunctions or human error causes the cargo tank, connectors, vapor recovery system or loading controls to fail to operate as designed. These events occur randomly, and each can lead to significant VOC emissions. Estimates of historical emissions from these events are not included in the inventory because they are truly random in when and how often they occur, and the extent of resulting emissions can vary widely. However, since these episodic events can be significant, much of the proposed monitoring requirements target reducing or eliminating the frequency, duration, or size of these events.

Table 1 presents a summary of the emission estimates for all bulk terminals and bulk plants in operation in the Bay Area. These emissions do not include fugitive emissions as mentioned above, or emissions from storage tanks at the terminals and plants. As mentioned above, the estimates also do not include estimated emissions from bulk terminal and bulk plant episodic events.

Table 1
Emissions from Terminals and Plants

Facility	Emissions from VPU (tpd)	Evaporative Emissions from Cargo Tanks (tpd)	Loading Losses from Cargo Tank Spillage (tpd)	Total Organic Emissions (tpd)
Gasoline Bulk Terminals	0.214	0.300	0.004	0.518
Gasoline Bulk Plants	0.0064	0.0011	0.00002	0.0075

Emission Reductions:
Table 2 summarizes the emission reductions from the proposed amendments, including both daily and conservative estimates of the impact of fewer episodic events.

Table 2
Emissions Reductions from Proposed Amendments

Proposed Amendment	**Estimated Emission Reductions:** Daily	**Estimated Emission Reductions:** Episodic
Emission limits	0.06 tons per day	
Vapor and Liquid leak standards	0.01 tons per day ~~uncertain~~	
Compatibility of connectors		uncertain
Pressure monitors on vapor lines		0.021 tons per event (terminal) 0.018 tons per event (plant)
Block valves or Vapor check valves		0.01 tons per event
Hang Vapor hoses		0.5 tons per year
Monitor hydrocarbons in vapor storage tanks		0.004 tons per day (for 4 terminals)
Sample lines on P/V valves		0.5 tons per year
Spilled gasoline during repairs		0.015 tons per event
TOTAL	**0.06~~5~~7 tons per day***	**1.0 tons per year ~0.02 tons per event***

* Episodic emissions (events) and daily emissions are not combined.

V. ECONOMIC IMPACTS

A. Compliance Costs

Costs to comply with the various specific proposed amendments are included in the discussion of the proposed amendments (above). Cumulatively, the cost for an individual terminal can total as high as $200,000 capital, amortized to an impact on operating costs of approximately $65,000 annually. However, most terminals already have some of the monitoring equipment installed as part of their permit requirements, so the typical terminal will require approximately $100,000 capital, amortized to an impact on annual operating costs of approximately $35,000.

B. Incremental Cost Effectiveness

Reduction in the emission limit for bulk terminals will not require any new or replacement equipment, because the bulk terminals currently achieve the lower standard. It will require enhanced monitoring, and possibly more maintenance. The parametric hydrocarbon monitoring proposed can cost $100K capital, and is estimated

to cost $18,000 annually. Emission reductions from this enhanced monitoring are estimated to total 0.010 tons per day. Cost effectiveness for this monitoring is approximately $5,000 per ton. Alternate parametric monitoring will typically cost less, but may require more operational effort depending on the existing management and operational information systems in place.

More restrictive vapor leak limits will cause leaks to be identified and repaired more quickly. Staff assumed that half the connectors and pressure/vacuum valves would require repair one week earlier than otherwise needed. Repair costs are estimated at $2000, and are incurred one week earlier than otherwise needed. Annualized costs increase approximately $40, so cost effectiveness of this proposed amendment is estimated to be $800 per ton of VOC reduced.

Loading arm and vapor recovery connection improvement costs are estimated to total approximately $600 annually. These include adjustments in the counter-weight system that eases manipulation of the liquid loading arm, and a hanger to keep the vapor hose up and out of the driveway so it does not get damaged by a truck. These improvements are estimated to have an impact of 200 lbs of VOC reductions per year at each terminal rack. Cost effectiveness for these improvements is approximately $6000 per ton of reduced emissions.

Pressure monitors are estimated to cost $15,000 per loading rack, or as much as $150,000 for a large terminal. The amortized capital, and increased maintenance and operational costs are estimated to be approximately $2,700 per year. The addition of an alarm system is estimated to increase the cost to $20,000 per loading rack. Amortized capital and maintenance expenses are expected to be approximately $3,400 per year. An automatic shutdown system could cost as much as $200,000 capital, but terminal operators have the option to choose the less costly alarm system option. Enhanced back pressure monitoring is expected to prevent at least one over-pressure events each quarter at each loading rack. These 4 events are estimated to release a minimum of 50 lbs. of VOC each, totaling a reduction of at least 200 lbs. VOC annually at each rack. In addition, early warning of high pressure events will reduce the number of these events, and reduce the existing allowable leakage from cargo tanks when there is high backpressure. Cost effectiveness for a backpressure alarm system is approximately $25,000 per ton.

Block valves or vapor check valves on each vapor recovery piping system cost approximately $1000 to install on each loading rack, amortized to about $200 annual cost. The VOC release prevented by these valves is approximately 20 lbs. of hydrocarbon each quarter at each loading rack. Cost effectiveness for these valves is about $4000 per ton of reduced VOC.

Monitoring the vapor storage tank for leakage will not require any capital construction, but may require an additional portable hydrocarbon monitor. Annual costs are

estimated at $100 – 200, based on the hydrocarbon monitor selected. When the vapor storage tank diaphragm leaks, it can become a significant release. However, they only leak approximately every 7 – 11 years. ~~Daily~~Weekly monitoring will reduce the emissions from a leak by identifying it within 24 hours, rather than allowing it to leak for days or weeks. VOC reduction was estimated at 200 lbs. of hydrocarbon per year at each of the four terminals with vapor storage tanks. Cost effectiveness of monitoring the vapor storage tank emissions is estimated at $20,000 per ton.

Installation of sample lines to the ports of pressure/vacuum valves is estimated to cost $300 per valve, or $1500 for a typical terminal with five P/V valves. Annual cost is estimated to be approximately $200. Emissions from P/V valves are estimated to be reduced in half, approximately 100 lbs. per year at each facility. Cost effectiveness of these sample lines is $4000 per ton of VOC's.

The capital cost of fitting an existing slop tank or using a portable maintenance container to control the VOC emissions when taking a loading hose or vapor recovery hose out of service is estimated at $6000. Amortized annual costs are $900. Emission reductions are estimated at 30 lbs of hydrocarbon, eight times each year at each terminal. Cost effectiveness of using a container to control VOC's is approximately $7500 per ton of VOC's.

The seven bulk terminals that must already meet 0.04 lbs./1000 gal. will require very little new equipment. The other five bulk terminals will probably require installation of hydrocarbon monitoring and backpressure monitors. The average terminal in the Bay Area will have to improve their preventive maintenance to assure all facilities are leak free and vapor tight. Cumulative cost effectiveness for all the improvements required is estimated to be $13,200 per ton of VOC reduction.

C. Socioeconomic Impacts

Section 40728.5 of the California Health and Safety Code requires an air district to assess the socioeconomic impacts of the adoption, amendment or repeal of a rule if the rule is one that "will significantly affect air quality or emissions limitations." Applied Development Economics of Walnut Creek, California has prepared a socioeconomic analysis of the proposed amendments to Regulation 8, Rules 33 and 39. The analysis concludes that the affected facilities are not significantly impacted by costs stemming from the proposed amendments. Costs are analyzed to be 0.22% to 0.31% of net profits for terminals, and 2.03% for bulk plants, well under the 10% threshold used for determining when costs are significant. No impact is expected on small business, or on jobs.

VI. Environmental Impacts

A. CEQA

Pursuant to the California Environmental Quality Act, the District has had an initial study for the proposed amendments prepared by Environmental Audit, Inc. of Placentia, California. The initial study concludes that there are no potential significant adverse environmental impacts associated with the proposed amendments. A negative declaration is proposed for approval by the District Board of Directors. The negative declaration and initial study was made available to the public for comment, and no comments were received.

B. Greenhouse Gas Emissions

In June, 2005, the District's Board of Directors adopted a resolution recognizing the link between global climate change and localized air pollution impacts. Climate change, or global warming, is the process whereby emissions of anthropogenic pollutants, together with other naturally-occurring gases, absorb infrared radiation in the atmosphere, leading to increases in the overall average global temperature.

While carbon dioxide (CO2) is the largest contributor to global warming, methane, halogenated carbon compounds, nitrous oxide, and other species also contribute to climate change. Gases in the atmosphere can contribute to the greenhouse effect both directly and indirectly. Direct effects occur when the gas itself is a greenhouse gas (GHG). While there is relative agreement on how to account for these direct effects of GHG emissions, accounting for indirect effects is more problematic. Indirect effects occur when chemical transformations of the original compound produce other GHGs, when a gas influences the atmospheric lifetimes of methane, and/or when a gas affects atmospheric processes that alter the radiative balance of the earth (e.g., affect cloud formation).

VOCs have some direct global warming effects; however they may also be considered greenhouse gases due to their indirect effects. VOCs react chemically in the atmosphere to increase concentrations of ozone and may prolong the life of methane. The magnitude of the indirect effect of VOCs is poorly quantified and depends on local air quality. Global warming not only exacerbates ozone formation, but ozone formation exacerbates global warming. Consequently, reducing VOCs to make progress towards meeting California air quality standards for ozone will help reduce global warming.

Proposed amendments to Regulation 8, Rule 33 and 39 will have very little impact on the terminal's vapor recovery systems or overall efficiency, so no significant net change in greenhouse gas emissions is anticipated. Carbon adsorption units found in 10 of the bulk terminals have the advantage of recycling gasoline vapors back to a refinery. Thermal oxidizers are found in two of the gasoline bulk terminals where it is not practical to recycle vapors back to a refinery. These thermal oxidizers do have a slight advantage in that they burn methane, a minor component in gasoline vapors. Carbon

adsorption does not capture methane very effectively. Although methane has a greater global warming potential than carbon dioxide (21X), overall, carbon adsorption units generate less green house gas emissions than thermal oxidizers.

Proposed amendments to Regulation 8, Rule 33 and Rule 39 have very little impact on efficiency or energy conservation. Bulk terminals and plants that are equipped to recycle gasoline vapors are currently doing so. Those who are currently burning these vapors will also continue to do so. As explained in more detail in the initial study and negative declaration, the proposed amendments will have little impact on greenhouse gas emissions because they will not require increased use of existing thermal oxidizers or new thermal oxidizers, which generate greenhouse gas emissions from combustion of VOC.

VII. Regulatory Impacts

Section 40727.2 of the Health and Safety Code requires an air district, in adopting, amending, or repealing an air district regulation, to identify existing federal and district air pollution control requirements for the equipment or source type affected by the proposed change in air district rules. The air district must then note any difference between these existing requirements and the requirements imposed by the proposed change.

Gasoline cargo tanks are regulated by CARB and CARB certifies bulk terminals and plants to District emissions standards using CARB test methods. Table 3 compares federal requirements for new sources, hazardous pollutants, and generally achievable control technology (GACT). CARB requirements are referenced in the proposed amendments to ensure consistency between CARB and District requirements. New federal requirements for inspection, monitoring, notification and reporting have been incorporated into the proposed amendments to ensure consistency between federal and District requirements.

Table 3
Comparison of Federal and District Requirements
Gasoline Bulk Terminals and Bulk Plants

Requirement	Applicability	Vapor Leak Standard	Emission Standard	Loading	Monitoring
40CFR60 XX NSPS	New bulk terminals with throughput greater than 75,700 liters per day (20,000 gal/day)	10,000 ppm	New vapor collection system: 35 mg/l TOC Existing vapor processing system: 80 mg/l TOC	Submerged fill. Collect TOC vapors Prevent TOCs collected at one rack passing to another rack. Facilities – vapor tight. Cargo Tanks – vapor tight. Track cargo tanks to ensure vapor tightness. Compatible connections required. Pressure less than 450 mm water.	Monthly leak inspection incorporating sight, sound and smell. Document leaks with log book. Initial repair leaks within 5 days. Repair within 15 days.
40CFR60 R (MACT)	Terminals greater than 75,700 liters per day, and not a major (Title V) source.	500 ppm	10 mg/l gasoline loaded Equivalent to 0.0833 lbs/Kgal	Submerged fill. Collect TOC vapors Facilities – vapor tight. Cargo Tanks – vapor tight. Track cargo tanks to ensure vapor tightness. Pressure less than 450 mm water.	Monthly leak inspection incorporating sight, sound and smell. Document leaks with log book. Initial repair leaks within 5 days. Repair within 15 days. Continuous monitoring of organic emissions, or parametric monitoring of VPU.
40CFR63 BBBBBB (GACT)	Terminals and plants with throughput > 250,000 gal/day AND not subject to Subpart R	500 ppm	TOC limit: 80 mg/l gasoline loaded	Prevent TOCs collected at one rack passing to another rack. Vapor Tight	Monthly leak inspection incorporating sight, sound and smell. Document leaks with log book. Initial repair leaks within 5 days. Repair within 15 days.

					Continuous monitoring of organic emissions, or parametric monitoring of VPU, with defined action plan for deviations.
	Terminals and plants with throughput < 250,000 gal/day	Must not allow vapor releases for extended periods.	none	Load using submerged fill •	Monthly leak inspection incorporating sight, sound and smell. Document leaks with log book. Initial repair leaks within 5 days. Repair within 15 days.
Reg. 8, Rule 33	Defined as Bulk Terminals	100 ppm or 500 ppm for equipment subject to Reg. 8-18 Current: 100% LEL for vapor tight. Proposed: 3000 ppm for gasoline bulk terminal specialty equipment.	Current: 0.08 lb/K gal. Proposed: 0.04 lb/K gal	Meet CARB certification requirements.	Meet applicable federal requirements.
Reg. 8, Rule 39	Defined as Bulk Plants	100 ppm or 500 ppm for equipment subject to Reg. 8-18 Current: 100% LEL for vapor tight. Proposed: 3000 ppm for gasoline bulk terminal specialty equipment.	Current: 0.5 lb/K gal.	Meet CARB certification requirements.	Meet applicable federal requirements.

VIII. District Staff Impacts

Implementation of the proposed amendments is expected to clarify and support effective enforcement of these rules. However, no net savings in inspector time is anticipated. Parametric monitoring requirements will require District review and approval. Facility inspection, monitoring, notification and reporting plans will require District review and approval. These plans will help the District enforcement staff when inspecting a facility. District human resource requirement for the review and approvals needed are estimated to be 23 staff – weeks.

IX. Rule Development Process

The 2005 Ozone Strategy Control Measure SS7 caused the District to consider amendments to Regulations 8-33 and 8-39 to reduce organic compound emissions at gasoline bulk terminals and gasoline bulk plants and to tighten loading standards of gasoline cargo tanks. At meetings on December 6, 2004 and October 27, 2005, during development of the Ozone Strategy, District staff consulted informally with representatives from the Western States Petroleum Association and gasoline bulk terminal operators about possible amendments to Regulation 8-33. In 2006, District staff notified the owners or operators of all of gasoline bulk plants and terminals located in the District's jurisdiction of the District's intention to amend the regulations and to verify the facilities' 2005 gasoline loading throughputs in order to update the District's emission inventory. Staff met with WSPA again on July 14, 2008 to review progress and discuss issues.

Staff conducted two public workshops on Monday, October 6, 2008 to review proposed amendments to each rule. Comments were received at the workshops, and additional written comments were received from KinderMorgan, BP, Tesoro, and Western States Petroleum Association (WSPA). Staff then met with WSPA representatives on Friday, October 31, 2008 and conducted a conference call with them on Friday, November 21, 2008. Staff incorporated their comments into the current proposed amendments, as appropriate.

Staff visited bulk terminals at Valero, ConocoPhillips, and KinderMorgan, and a bulk plant at Moffett Field to develop an understanding of each facility's operational and emissions control issues and receive input on how to further reduce emissions. Staff visited a cargo tank maintenance facility at KAG West (a bulk petroleum common carrier) to improve understanding of how cargo tanks operate, and how cargo tanks are designed and operated to limit emissions. Staff visited Travis Air Force Base to witness an innovative fuel loading control system that prevents cargo tank overfills.

Staff received several oral comments from terminal operators, environmental staff, and WSPA during the public comment period before the public hearing. Tesoro suggested a clarification to the limited exemption for source testing requirements of its unique vapor treatment system. This minor clarification has been incorporated into the rule. A

representative of WSPA suggested a clarification regarding use of a portable maintenance container that was incorporated into the rule language. WSPA suggested a future effective date for one specific provision of the proposed amendments so that it would comport with the future effective date of related requirements, and staff has incorporated this future effective date into the rule. WSPA also suggested delaying rule implementation at least 90 days to provide adequate time for personnel training, and to establish adequate record keeping systems. Staff ~~proposes rule implementation 90 days after rule adoption, and intends to incorporate this proposal into the Board of Directors resolution for its approval of these rule' amendments~~ incorporated an effective date of July 1, 2009 into the rules where appropriate. Staff will issue a compliance advisory to notify affected parties of the effective date.

Based on legal review of the sections of the California Health and Safety Code that set jurisdictional authority for standards for gasoline bulk terminals, bulk plants, and cargo tanks, and after consultation with CARB staff, District staff proposed amendments to these rules for public review that did not include a lower vapor leak standard for terminal and bulk plant connectors and pressure/vacuum valves. On October 3, 2008, a letter was sent to CARB requesting formal guidance on this matter. Staff received CARB's response, indicating that the District does have legal authority to set vapor leak standards on January 29, 2009. Consequently, staff requested the Board to continue the February 4 Public Hearing to March 4 to provide an opportunity for public input on this new proposal.

X. Conclusions

Pursuant to the California Health and Safety Code Section 40727, before adopting, amending, or repealing a rule the Board of Directors must make findings of necessity, authority, clarity, consistency, non-duplication and reference. The proposal is:

- Necessary to supplement the District's ability to attain the State one-hour and eight-hour ozone standards, and meet the requirements of the Bay Area 2005 Ozone Strategy;
- Authorized by California Health and Safety Code Sections 40000, 40001 and 40702;
- Clear, in that the new regulation specifically delineates the affected industries, compliance options and administrative and monitoring requirements for industry subject to this rule;
- Consistent with other District rules, and not in conflict with state or federal law;
- Non-duplicative of other statutes, rules or regulations; and
- Implementing, interpreting or making specific the provisions of the California Health and Safety Code Sections 40000 and 40702.

A socioeconomic analysis prepared by Applied Development Economics has found that the proposed amendments would not have a significant economic impact or cause regional job loss. District staff have reviewed and accepted this analysis. A California Environmental Quality Act analysis prepared by Environmental Audit, Inc., concludes that the proposed amendments would not result in adverse environmental impacts.

District staff have reviewed and accepted this analysis as well. The CEQA documents were made available for public comments, and no comments were received. A CEQA Negative Declaration is proposed for adoption by the Board of Directors.

Staff recommends the adoption of the proposed amendments to Regulation 8, Rule 33: *Gasoline Bulk Terminals and Gasoline Delivery Vehicles, and* Regulation 8, Rule 39: *Gasoline Bulk Plants and Gasoline Delivery Vehicles;* and approval of the CEQA Negative Declaration.

XI. References

1. American Petroleum Institute. 2003. Bottom Loading and Vapor Recovery for MC-306 and DOT-406 Tank Motor Vehicles. API Recommended Practice 1004, Eighth Edition, January 2003.
2. Bay Area Air Quality Management District. 2006. Bay Area 2005 Ozone Strategy, January 2006.
3. California Air Resources Board. 1999. Gasoline Cargo Tank Technical Manual – Compliance Assistance Program.
4. Unites States Environmental Protection Agency. 1995. Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fifth Edition. Office of Air Quality Planning and Standards. AP-42. Research Triangle Park, NC. January 1995.
5. Environmental Protection Agency, 40 CFR 60, Standards of Performance for New Stationary Sources, Subpart XX – Standards of Performance for Bulk Gasoline Terminals
6. Environmental Protection Agency, 40 CFR 63, National Emissions Standards for Hazardous Air Pollutants for Source Categories, Subpart R – National Emission Standards for Gasoline Distribution Facilities (Bulk Gasoline Terminals and Pipeline Breakout stations)
7. Environmental Protection Agency, 40 CFR 63, National Emission Standards for Hazardous Air Pollutants for Source Categories, Subpart BBBBBB - Gasoline Distribution Bulk Terminals, Bulk Plants, and Pipeline Facilities; Final Rule,
8. California Air Resources Board, Vapor Recovery Definitions, D-200, May 25, 2006
9. California Air Resources Board, Certification Procedure for Vapor Recovery Systems of Bulk Plants, CP-202, March 17, 1999
10. California Air Resources Board, Certification Procedure for Vapor Recovery Systems of Terminals, CP-203, March 17, 1999
11. California Air Resources Board, Certification Procedure for Vapor Recovery Systems of Cargo Tanks, CP-204, March 17, 1999
12. California Air Resources Board, Determination of Emission Factor of Vapor Recovery Systems of Bulk Plants, TP-202.1, March 17, 1999
13. California Air Resources Board, Determination of Emission Factor of Vapor Recovery Systems of Terminals, TP-203.1, March 17, 1999
14. California Air Resources Board, Determination of Leak(s), TP-204.3, March 17, 1999
15. California Air Resources Board, Letter regarding BAAQMD authority to set vapor leak limits. January, 28, 2009.