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 Cargo Tanks; and Regulation 8, Rule 39: Gasoline Bulk Plants and Gasoline Cargo Tanks

WORKSHOP REPORT

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I. INTRODUCTION

This Workshop Report introduces proposed amendments to Regulation 8, Rule 33: Gasoline Bulk Terminals (Regulation 8-33) and Regulation 8, Rule 39: Gasoline Bulk Plants (Regulation 8-39).

The Bay Area Air Quality Management District's (District) Bay Area 2005 Ozone Strategy proposed amendments to both regulations to reduce emissions of organic compounds at gasoline bulk terminals and gasoline bulk plants through improved facility operations and more stringent standards for gasoline cargo tank loading operations in its Control Measure SS-7: "Gasoline Bulk Terminals and Plants" (SS-7).

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 from loading gasoline cargo tanks and vapors returned from delivery operations. Cargo tank loading operations may also release emissions through liquid leaks during the loading operations 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 are not included in these estimates.

Based on District staff's estimate of the emission inventory and review of the existing regulations, the District is proposing a set of amendments 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 outlet vapor for organic concentrations to ensure the vapor recovery system is operating properly;
- A clarification of vapor and liquid leak standards;
- A requirement that loading arms and cargo tank connectors be compatible prior to gasoline loading, and meet the vapor and liquid leak standards;
- A requirement to install pressure sensors to monitor vapor collection piping backpressure, and activate an alarm or automatic shutdown if backpressure exceeds 18 inches water column;
- A requirement of vapor check valves in each loading rack vapor collection header;

- A requirement that vapor hose connectors are stored with a vapor connector cap in place to provide a double seal against fugitive emissions;
- A requirement to monitor vapor storage tank airspace emissions to ensure all leaks

leaks are discovered and repaired quickly;
- A requirement to install sample lines on the pressure and vent sides of inaccessible pressure/vacuum valves to allow immediate access to check for leaks;

- A requirement to minimize the release of organic compounds during maintenance and repair operations.
- A reduction in the allowable backpressure in new vapor recovery system piping.
- A requirement for an APCO approved emissions monitoring, inspection, notification and reporting protocol.
- A requirement that plants and terminals re-certify 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.

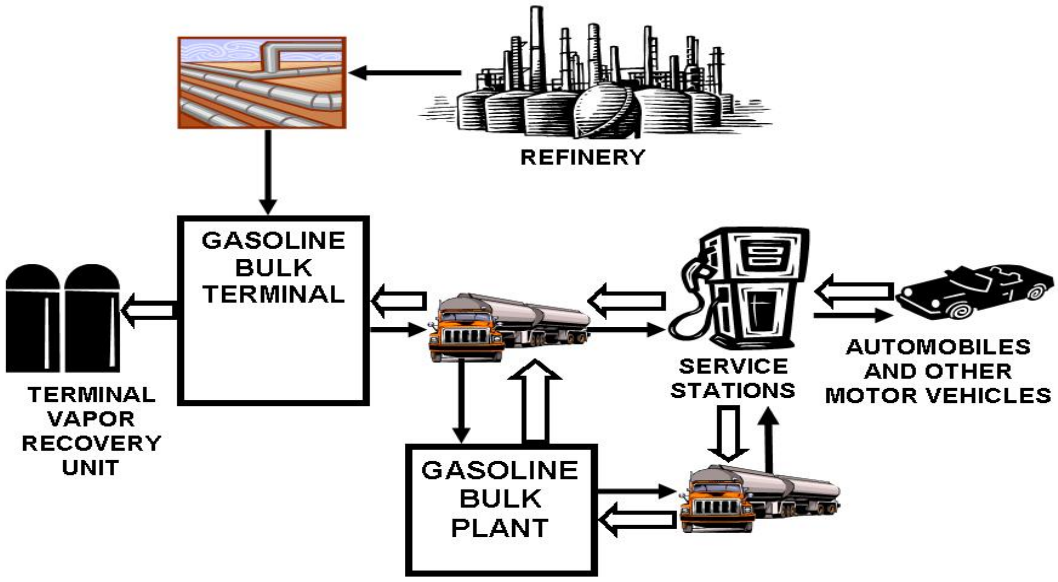
This Workshop Report presents an overview of the proposed amendments to Regulation 8-33 and Regulation 8-39 as a means to solicit input and comments from the public on this proposal.

II. BACKGROUND

A. Process Description

Gasoline bulk terminals and gasoline bulk plants are intermediate distribution centers where refined fuels are loaded into gasoline cargo tanks for delivery by vehicle to gasoline dispensing facilities ("GDFs" or service stations) and local businesses. Gasoline bulk terminals also deliver gasoline via cargo tank to gasoline bulk plants. Currently, there are thirteen gasoline bulk terminals and ten gasoline bulk plants within the District that distribute to service stations. Figure 1 illustrates the gasoline bulk terminal and bulk plant distribution system.

Figure 1
Flow Diagram of Gasoline Distribution System



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

Gasoline Bulk Terminals

Gasoline bulk terminals receive raw gasoline and other fuels and additives that are delivered from refineries by pipeline and from marine tankers and barges, and store these petroleum distillates in tanks on site. Some additives such as ethanol are 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 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 in a single day.

Figure 2 is a photo of a gasoline cargo tank preparing for loading operations at the loading rack. The gasoline bulk terminal loading rack includes a loading arm and hose, vapor hose, electrical ground line, slop tank, pumps, valves, piping and, as noted above, a meter to measure the amount of fuel loaded into each cargo tank. Gasoline cargo tank operators perform the actual hookup of the cargo tank to the bulk terminal loading and vapor recovery equipment, and monitor the tank loading operations. Gasoline cargo tank operators connect the electric ground line from the terminal to the cargo tank and then connect the terminal's vapor recovery hose to the cargo tank's vapor recovery pipe. Once both lines are connected, the gasoline cargo tank operators connect a loading arm to the cargo tank pipe fittings and open the tank's internal valve. Operators then 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. The vapors exit the cargo tanks through the vapor recovery hose to the gasoline bulk terminal's vapor recovery system.

Figure 2
Tank Truck Connects to Vapor Hose

Gasoline Bulk Plants

Gasoline bulk plants receive and store refined fuels that are delivered from gasoline bulk terminals by delivery vehicles. Cargo tank operators load gasoline 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 bulk terminal for processing via cargo tanks in a process called "vapor balancing." A description of vapor balancing is provided below.

Vapor Recovery Systems

Gasoline vapors generated at service stations and bulk plants are returned to cargo tank trucks using a process called "vapor balancing." Vapors from automobile tanks are collected through vapor recovery nozzles at GDFs when automobiles are filled with gasoline. Vapors also result from evaporation of liquids in storage tanks. These vapors

are returned to the cargo tanks as gasoline is transferred from the cargo tanks to GDF storage tanks. Cargo tanks then transport the vapors to gasoline bulk terminals, which receive the vapors during the gasoline loading operations and transfer them to their vapor recovery systems for processing. Gasoline bulk terminal vapor recovery systems also receive and process vapors generated during cargo tank loading operations at the terminals.

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 fuel gas vapor recovery 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 the organic compounds from the 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.

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 loaded 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.

Control efficiencies on carbon adsorption units range 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.

Figure 3
Example of Terminal Vapor Processing Unit

Thermal incineration vapor recovery systems. Some gasoline bulk terminals choose to 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 oxidizers. All thermal oxidizers consist of a combustion chamber to combust hydrocarbon vapors aided by auxiliary fuel. Gasoline vapors are heated to ignition temperature and burned to carbon dioxide, water and other air pollutants, including unburned organic compounds. Heat may also be recovered, using heat exchangers, to provide heat to a facility in the form of low pressure steam or hot 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. This approach contributes to greenhouse gases, because supplemental fuel along with these hydrocarbon vapors is burned without any energy recovery mechanism to generate useful work from these fuel sources.

The fuel gas vapor recovery system used in one refinery is a type of thermal incinerator. At the refinery where this system is used, the vapors are routed to and combusted in the refinery's heaters where useful energy is recovered.

B. Regulatory Framework

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 gasoline loaded (or 0.08 pounds/1,000 gallons loaded). 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 gasoline loaded (or 0.5 pounds/1,000 gallons loaded) and requires that all equipment associated with delivery and loading operations 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 in the air district in which the system is located. In addition, cargo tank trucks 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. Emission Estimates

The District has estimated organic compound emissions attributable to cargo tank loading and vapor recovery operations at gasoline bulk terminals and bulk plants. The District 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 permit and throughput information provided by gasoline bulk terminals and plants to estimate the organic compounds emissions from cargo tank loading and vapor recovery operations.

Vapor Recovery Systems: Although a VPU or thermal oxidizer 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 and considered to be low, 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 loaded may be released from a CARB-certified vapor recovery system at a bulk terminal while 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 were estimated as 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 the 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 the 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 estimated organic compound emissions from cargo tanks to be 0.30 tpd from terminals and 0.001 tpd from plants.

Lastly, vapors may enter the atmosphere from spills that occur when bulk terminal or plant loading arm fittings are disconnected from the cargo tank 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 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.

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. Storage tanks are subject to Regulation 8, Rule 5: Storage of Organic Liquids.

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

III. PROPOSED AMENDMENTS

The District proposes thirteen amendments 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 outlet vapor for organic concentrations to ensure the vapor recovery system is operating properly;
- A clarification of vapor and liquid leak standards;
- A requirement that loading arms and cargo tank connectors be compatible prior to gasoline loading, and meet the vapor and liquid leak standards;
- A requirement to install pressure sensors to monitor vapor collection piping backpressure, and activate an alarm or automatic shutdown if backpressure exceeds 18 inches water column;
- A requirement of vapor check valves in each loading rack vapor collection header;

- A requirement that vapor hose connectors are stored with a vapor connector cap in place to provide a double seal against fugitive emissions;
- 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 vent sides of inaccessible pressure/vacuum valves to allow immediate access to check for leaks;

- A requirement to minimize the release of organic compounds during maintenance and repair operations.
- A reduction in the allowable backpressure in new vapor recovery system piping.
- A requirement for an APCO approved emissions monitoring, inspection, notification and reporting protocol.
- A requirement that plants and terminals re-certify 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.

The proposals for lower allowable emission limits do not lead to immediate reductions in organic compound emissions from bulk terminals. All terminals already meet the proposed emission limits. However, the new limits will prevent their performance from deteriorating over an extended period of time. The other proposed amendments improve the ability of terminal and plant operators and District staff to monitor compliance with and enforce the standards. These other amendments will indirectly reduce emissions, and are not quantifiable. Therefore, these indirect emissions reductions are not included the quantitative analysis of the emissions reductions attributable to the proposed amendments.

A. Reduction in Emission Limits

The District is proposing to 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 gasoline loaded to a limit of 0.04 pounds of non-methane organic compounds per 1,000 gallons of gasoline (or product) loaded.

Currently, eight of the thirteen 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 gasoline and other fuels loaded based on Best Available Control Technology (BACT) considerations. The remaining five bulk terminals have permit conditions that limit organic compound emissions to the Regulation 8, Rule 33 limit of 0.08 pounds of organic compounds per 1,000 gallons of gasoline loaded. Source tests conducted on 12 of the 13 gasoline bulk terminals' vapor recovery systems indicate that they are already in compliance with the new proposed limit of 0.04 pounds of organic compounds per 1,000 gallons loaded. The thirteenth terminal is permitted to load gasoline, but is not currently doing so and thus has not been tested recently. The District proposes to lower the organic compound emission limit to assure that all terminals maintain their vapor recovery equipment so that it continues to work efficiently and keep emissions to a minimum.

The lower emission limit is estimated to reduce emissions over an extended period approximately 0.06 tpd of organic compounds. This estimate is based on the assumption that the five terminals that are capable of achieving 0.04 lbs./1000 gal. currently, but will have their performance deteriorate to 0.08 lbs./1000 gal. before recognizing the problem and undertaking maintenance required to recover their performance capability. The District anticipates that terminals do not need to expend any capital or install additional equipment in order to achieve these lower emissions standards; however they may have to implement additional maintenance measures to ensure on-going compliance. Source tests conducted at twelve of the terminals demonstrate that the facilities already meet or exceed the proposed emission limit. Historical source tests show the thirteenth terminal can meet the 0.04 lbs. /1000 gallons loaded. The bulk terminals will need to conduct routine inspection and maintenance programs to assure continued compliance.

The District is proposing 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 EPA's Reference Method 25 to ensure compliance with the regulation. Similarly, the District is proposing a biennial source test at bulk plants. In addition, the District is also proposing a new monitoring requirement that would require gasoline bulk terminals to install parametric hydrocarbon monitors on all vapor processing units' exhaust streams to monitor organic compound concentrations. Each of the monitors would be calibrated daily based on manufacturer's specifications using a District-approved span gas. During the first annual source test, an organic compound concentration would be established by each facility as a benchmark that correlates to the 0.04 pound of organic compounds emissions per 1,000 gallons loaded standard. Establishing this benchmark will provide owners and operators of bulk terminals a valuable tool to help them ensure compliance with the emission standard. If a facility reaches their organic compound concentration limit, they will know that their vapor recovery system is no longer operating at peak efficiency, and may need repair. This monitoring will help a facility avoid the risk of going out of compliance with the District's emissions standard. The total annualized cost for installing the parametric monitor, span gas, automatic calibration equipment, and utility conduits, and to maintain the operation of all of equipment and supply the required span gas over a ten-year period is approximately $12,500 per terminal.

B. Clarification of Vapor and Liquid Leak Standards

The District will retain the current vapor tightness standards set by CARB CP-204, *Certification Procedure for Vapor Recovery Systems of Cargo Tanks*, and vapor and liquid leak standards as set by CARB CP-202, CP-203, and CP-204. The vapor tightness standard applies directly to cargo tanks. In summary, this standard measures the pressure decay of a cargo tank pressurized to 18 inches of water pressure. If the cargo tank is vapor tight, the pressure will not decay significantly. The vapor and liquid leak standards apply to the interface between the bulk terminal or bulk plant and the cargo tank – specifically at the connectors (couplings) used on the hose from the bulk terminal or bulk plant loading line to the cargo tank, and on the hose from the cargo tank back to the vapor recovery system. The vapor leak standard is 100% of Lower Explosive Limit (LEL) hydrocarbon concentration 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.

Rules 8-33 and 8-39 require that all equipment associated with the gasoline cargo tank delivery and loading operations also be free of liquid leaks. Currently, liquid "leak free" equipment is defined in 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 District proposes to amend these rules to be 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 the hoses, and field observations of loading practices, the proposed standard is being achieved today, provided good maintenance practices are employed. The District proposes reducing its

proposes reducing its standard to three drops per minute to be consistent with the CARB requirements.

CARB and the District 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. Both rules stipulate that no more than 10 milliliters of product may be released per disconnect, averaged over three disconnects. We propose to continue the existing standard.

Liquid and vapor leak standards for all other equipment in the bulk terminal or bulk plant are set by District Regulation 8, Rule 18: *Equipment Leaks*. This rule establishes the vapor leak standard from 100 – 500 ppm, depending on type of equipment. This rule establishes a liquid leak standard at three drops per minute.

The US Environmental Protection Agency (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, which the District may incorporate and enforce through facility permit conditions. However, the District is not proposing to adopt these more restrictive standards in 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 to meet stricter leak performance standards.

The District estimates that these proposed amendments will not significantly reduce emissions of vapors from bulk terminal / bulk plant to cargo tank connectors. Any improvement through enhanced enforcement of these standards cannot be quantified. Existing equipment is adequate to meet this standard when regularly inspected and properly maintained.

The District estimates that the proposed amendments to the liquid leak standard will not reduce organic compound emissions measurably. This amendment is being proposed to make District standards consistent with CARB. Current valves 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 costs to comply with the proposed lower leak standard. However, terminals and plants will need to follow active inspection and maintenance programs to identify, then replace or repair leaking valves.

C. Compatibility of All Product Loading and Vapor Recovery Connections

The District proposes amendments to 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 meet the vapor and liquid leak requirements. Incompatible piping connectors allow excessive liquid and vapor leaks. Because most petroleum terminals and plants service more than one tank truck carrier, the District is proposing a standard that requires connectors of the cargo tank to be compatible with the loading arm connectors and vapor recovery hose connectors in order to load fuel. 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 will service.

Based on District experience at terminals and plants, it is anticipated that terminal or plant operators will continue to 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 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 terminal or plant. The costs also take into account an additional adjustment of the counterweight system once a year.

D. Installation of Pressure Monitors on Vapor Lines

The District proposes several measures to assure that gasoline bulk terminals and bulk plants maintain proper pressures in the vapor recovery system piping at the loading racks and to improve the safety of gasoline loading operations.

The District proposes to 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. In a vapor balance system, as the product fills the cargo tank, residual or collected vapors in the tank enter the vapor recovery hose and piping and these vapors are processed through the VPU. The EPA, CARB, and the current rules 8-33 and 8-39 require the vapor backpressure of facilities' vapor recovery systems not exceed a set pressure of 18 inches of water column (4,500 pascals), as measured at the vapor connection on the cargo tank truck. When 18 inches of water pressure is measured 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, 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 will provide early warning if the backpressure on the vapor recovery system starts to increase. This important safety information allows the operator sufficient time to prevent excess emissions, as well as prevent a potentially hazardous situation. 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 problem until the problem is corrected. That pressure build-up can cause the vapor recovery system pressure to exceed the set pressure of the P/V valve on either the vapor recovery system or the cargo tank, release vapors in the headspace to the atmosphere and cause high emissions, as well as a potentially flammable 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. Though uncommon, excessive backpressure may present a hazard to individuals working in close proximity to a cargo tank truck. The District estimates that up to 42 lbs of gasoline vapors per cargo tank filled to 5,000 gallon capacity may be released when a cargo tank's P/V valve set pressure is exceeded during loading at a terminal. 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.

Secondly, the District proposes to require that bulk terminals install either an automatic shutoff system or an alarm system on their loading racks to further assure that the vapor recovery piping back pressure is not 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.

Should the terminal prefer an alarm system, the amendments propose an alarm 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 operator would be required to complete the load, then shut down that loading arm and vapor return from that loading arm until the operator determines the cause of the pressure exceedance and completes repairs. If the alarm triggers three times at the same loading rack within a rolling thirty-day period, the terminal operator would be required to shut down the loading rack, notify the APCO, and not restart it until the operator determines the cause of the pressure exceedance and repairs it. The District will require that terminal operators document the time, date, and pressure readings each time the alarm is sounded.

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 District proposes to require the installation of a pressure gauge at the end of each vapor hose on the loading racks using fixed piping. 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. For plants that utilize top loading arms, a pressure gauge would be installed on the fixed piping as close as feasible to the end of the top of the loading arm. The District proposes to require that the operator maintain the vapor recovery system pressure below the CARB-certified set pressure of the P/V valve(s). If the set pressure is exceeded, the operator must immediately cease the loading operation. The District estimates that up to 37 - 52 lbs of gasoline vapors per cargo tank may be released from a single open P/V valve on a cargo tank loaded to 4,400 gallon 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 per loading arm.

E. Vapor Check Valves in each Vapor Recovery Piping System

The District proposes a new requirement to install vapor check valves at the end of vapor recovery piping at each loading rack location. These vapor check 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 vapor check valve in the vapor recovery system piping. When the vapor recovery hose or connector is taken out of service, the gasoline vapors in the hose and any associated piping up to the vapor check valve are released to the air. Installation of additional vapor check valves at the end of each vapor recovery system piping, as close as practical to the vapor recovery hose, will minimize the gasoline vapor that is emitted during this maintenance activity.

F. Cap the Vapor Recovery Hose Connector When Not In Use

The District proposes a new requirement to mount a hose end connector cap for each vapor recovery hose. When the vapor recovery hose is not in use, the connector shall be capped to minimize vapor leakage. The cap must be modified so that it will not activate the poppet valves in the vapor hose connector. This modification leaves the poppet valves in place, providing the first seal against vapor leakage. Closure of the cap locking mechanism on the vapor hose connector provides the second seal against gasoline vapor leakage.

G. Require Hydrocarbon Monitors 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 peaks in loading, vapors are stored in these tanks until they reach capacity, at which time the vapors are processed through the facilities' VPU. Storage tanks also have the added benefit of controlling the amount of vapors that are processed through a VPU so that the VPU can maintain a steady state operation. When a vapor storage tanks diaphragm reaches a set height, the vapors are piped to the facilities' VPU for processing.

Some gasoline bulk terminals include a vapor storage tank in their vapor recovery system to temporarily store vapors and even the flow through their vapor recovery process. Currently, organic compound emissions in/from the airspace above the diaphragm may not exceed concentrations of 3,000 parts per million (ppm) expressed as methane or 6.8 kilograms (15 pounds) per day. The District proposes to maintain the allowable concentration standard in/from the airspace above the diaphragm of the vapor storage tanks at 3,000 ppm expressed as methane, or 750 ppm expressed as butane. The butane standard may be a more useful measurement in the field because typically operators use butane to calibrate hydrocarbon analyzers. A diaphragm typically lasts from seven to 11 years, but during that period, it can develop leaks and degrade to an extent that gasoline vapors may be leaked into the atmosphere.

The District also proposes to require the installation of continuous hydrocarbon monitors on all vapor storage tanks' airspaces so that it is possible to verify that total organic compound concentrations in the airspaces remain below 3,000 ppm, expressed as methane. Continuous monitors will immediately detect conditions in which vapors have accumulated in the airspace due to degradation or cracks developing in the diaphragms, so they may be taken out of service for repair immediately, preventing excessive hydrocarbon leakage over an extended period of time. Each of the four gasoline bulk terminals which utilize vapor storage tanks already currently has airspace monitors that are required by their permit conditions. The proposed amendment will ensure consistency among bulk terminals.

This proposed amendment only affects gasoline bulk terminals that operate vapor storage tanks as part of their vapor recovery systems. Other facilities direct the vapors captured during the gasoline loading operations immediately to the VPU for treatment.

H. Install Sampling Lines on Pressure / Vacuum Valves

The District proposes to require accessible sampling lines to enable monitoring of bulk terminals' primary P/V valves. In the event of either excessive backpressure from a vapor storage tank or a vapor processor, or a faulty P/V valve or component, excess emissions can result. This monitoring requirement will give terminal operators a tool to verify compliance and maintain equipment before excessive and on-going vapor leaks occur.

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 set in Regulation 8-33. 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 the tests. The District proposes to require owners and operators of gasoline bulk terminals to install permanent sampling lines on 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.

Specifically, this amendment would require that terminals permanently install sampling lines of at least 0.25 inch inside diameter that are situated one (1.0) inch from the pressure side and vent side of the P/V valve. It will be most effective to install these sample lines on the downwind side of the pressure and vent sides 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 sampling valve. A portable hydrocarbon analyzer can then be used at the end of the sampling valve to determine compliance with the regulations.

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 and maintenance of the sampling lines. The District estimates that the total annualized cost for installing sample lines over a ten-year period is less than $100. While a majority of the terminals have sampling lines already, a gasoline bulk terminal may have to replace some existing sampling lines that do not meet the specifications proposed in these amendments. Emission reductions from this requirement are expected to be approximately 0.001 tons per day based on catching P/V valve leaks earlier, so they can be repaired more quickly.

I. Minimize Release of Vapors During Maintenance and Repairs

The District proposes to enhance the gasoline bulk terminal maintenance and repair requirements in order to reduce potential fugitive gasoline vapor emissions.

Some terminal operators pour excess gasoline from their loading arm and coupling onto the ground during routine maintenance repairs. Staff estimates that 17 – 22 gallons of gasoline are spilled onto the ground prior to washing the gasoline into the terminal's underground slop tanks. If approximately five (5) gallons evaporate prior to washing the remainder into the tank, the resultant emissions would be more than 30 lbs. This amendment would prohibit this practice and require that during maintenance and routine repair work, bulk terminal operators dispose of gasoline into either a portable maintenance container that is equipped with both loading hose and vapor recovery hose connectors, or use of a slop tank that is equipped with both loading hose and vapor recovery hose connectors.

Specifically, the District proposes to prohibit the storage of gasoline in 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 the hose due to condensation of the vapors must be disposed of either in a portable maintenance container or in a slop tank. Finally, the District proposes to require that portable maintenance containers or slop tanks

tanks have a vapor tight covers, seals, lids that meet the requirements of Regulation 8, Rule 18. The hose connectors must meet the CARB vapor 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 of 3 loading racks, organic compound emissions would total 496 lbs per year. The total annualized cost over a 10-year period for manufacturing and operating a single handcart with a portable liquid transfer tank is approximately $200. This estimate includes the cost of a 50-gallon capacity portable tank, two hose connectors, one drain line, and a machinist to assemble the parts.

J. Reduction in Allowable Pressure in New Vapor Piping

The District proposes to reduce the allowable water pressure for new vapor piping connected to the loading racks at bulk terminals and bulk plants. Currently, CARB certifications require that bulk terminal and plant operators to operate and maintain their vapor recovery systems' gauge pressure in the vapor piping at or below 18 inches of water column during product loading. This is to ensure that vapors can flow through the return piping easily as gasoline is loaded into the cargo tank.

The District proposes to lower the allowable gauge pressure to 12 inches of water column in new vapor piping. The purpose of this amendment is to ensure that backpressure is significantly lower, assuring the set pressure of the P/V valve of 18 inches of water on the cargo tank is never exceeded due to back pressure in the piping itself. As the pressure in the headspace increases to the point where the cargo tank P/V valve set pressure is exceeded due to an obstruction in the vapor hose or excessive loading rates, vapors are released from the cargo tank headspace to the atmosphere. In order to minimize these emissions, the maximum allowable pressure in the vapor piping must be less than the set pressure of the P/V valves.

This requirement would only apply to new vapor piping that is connected to the loading rack at bulk terminals and bulk plants. As the standard would only apply to new construction, the amendment is not anticipated to have any immediate cost implications to existing bulk terminals or plants.

K. Require an APCO Approved 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 63 Subpart BBBBBB. These requirements apply to all gasoline bulk terminals and bulk plants – that are NOT subject to Maximum Achievable Control Technology (MACT) requirements. Among many other requirements, it requires a monthly leak inspection of all equipment in gasoline service. The proposed amendments include a requirement for an APCO approved inspection plan that will be helpful for both industry and the District by reaching clear agreement on what will satisfy the requirements of this monthly leak inspection requirement.

The District proposes an Administrative requirement for each owner / operator of a bulk terminal or bulk plant to submit an emissions monitoring, inspection, notification and reporting protocol for APCO approval, and associated record keeping requirements.

L. Require Updated CARB Certification

The District proposes to require that all bulk terminals' and bulk plants' vapor recovery systems comply with CARB standards and certification procedures at all times. 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 substantive modifications or installation of new equipment to ensure compliance with existing CARB regulations.

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. 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 reduce emissions. 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 make it easier for District staff to enforce the provisions requiring 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.

M. Minor Editorial Changes

The definitions in Regulation 8-33 and Regulation 8-39 are proposed to be expanded or edited for clarification.

The District is proposing to amend the definition of gasoline to include aviation fuels and oxygenates 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, our proposed amendments will continue to regulate distribution of aviation gasoline and require compliance with all CARB standards except the requirement to use CARB certified facilities or cargo tanks. Definitions for gasoline cargo tank, portable maintenance container, Reid vapor pressure, slop tank, pipeline breakout station and vapor recovery system have also been added.

N. Emission Reductions

Table 2 summarizes the emission reductions from the proposed amendments.

Table 2
Emissions Reductions from Proposed Amendments

Proposed Amendment	Estimated Emission Reductions
Emission factors	0.06 tons per day
Vapor and Liquid leak standards	uncertain
Compatibility of connectors	uncertain
Pressure monitors on vapor lines	0.021 tons per event (terminal) 0.018 tons per event (plant)
Vapor check valves	0.01 tons per event
Vapor hose connector caps	0.0004 tons day
Parametric monitors on vapor storage tanks	0.005 tons per day (for 4 terminals)
Sample lines on P/V valves	0.001 tons per day
Spilled gasoline during repairs	0.016 tons per event
Reduce allowable pressure in new piping	0.021 tons per event
TOTAL	**0.0614 tons per day* ~0.02 tons per event***

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

IV. RULE DEVELOPMENT / PUBLIC CONSULTATION PROCESS

The 2005 Ozone Strategy directed 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.

This Public Workshop is the next step in the rulemaking process. District staff will review the proposed amendments to Regulation 8-33 and Regulation 8-39 and solicit input. The District will use the public's input, along with further investigation and analysis by District staff to develop the final amendments for proposal to the District's Board of Directors.

V. 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 Vapor Recovery Test Procedures, TP-204.3, March 17, 1999