Bay Area Air Quality Management District
939 Ellis Street
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Proposed Amendments to Regulation 8, Rule 8: Wastewater (Oil-Water) Separators

Staff Report

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I. EXECUTIVE SUMMARY

Volatile organic compounds (VOC) emissions from wastewater collection systems are generated when organic liquids are entrained in waters used in refinery processes. These partial petroleum products are volatilized during transport to an onsite wastewater treatment system by exposure to high temperatures and turbulence in the transport structures (pipes, manholes, junction boxes, sumps and lift stations). The emitted vapors collect in the headspaces of these transport structures and are passively vented to the atmosphere through uncontrolled system openings.

Currently, the District controls wastewater emissions in Regulation 8, Rule 8 Wastewater (Oil-Water) Separators. This rule limits organic emissions from oil-water separators and dissolved air flotation units at refinery, chemical and other plants throughout the Bay Area. It also limits emissions from sludge dewatering and slop oil vessels.

The Bay Area 2001 Ozone Attainment Plan included a commitment (Further Study Measure 9) to examine wastewater collection and treatment systems at refineries for potential VOC emission reductions. A technical assessment document (TAD) was prepared for the collection portion of these systems. The collection system consists of drains from process units piped to mechanical separation such as oil-water separators. The TAD found that potentially significant emissions reductions could be achieved from refinery wastewater collection systems. The TAD, prepared jointly with the California Air Resources Board (CARB), the Bay Area Air Quality Management District (the District) was moved to a control measure.

Throughout this process, staff staged numerous technical working group meetings. The development of the current emissions estimate was greatly dependant on the co-operation staff received from the refineries. This collaborative technical process has been highly successful and is presently continuing in an effort to assess emissions from the refinery wastewater treatment systems.

The proposed amendments to Regulation 8, Rule 8 would result in a reduction of VOC emissions of at least 2.1 tons per day.

The proposed amendments to Regulation 8-8 include:

- A 500 ppm leak standard measured with an Organic Vapor Analyzer (OVA) for all wastewater collection components;
- A control equipment mandate for leaking components, and;
- An inspection and maintenance program for wastewater components.

It is estimated that the cost-effectiveness to reduce emissions from drains, manholes, and junction box vents ranges from $1900 to $4300 per ton of VOC reduced. This is within the range of cost-effectiveness determined for other VOC control measures adopted by the District.

A socioeconomic analysis mandated by Section 40728.5 of the Health and Safety Code concludes that the proposed amendments would not have significant impacts. Also, analysis performed pursuant to the California Environmental Quality Act (CEQA), concludes that the proposed amendments would result in no negative environmental impacts. A Negative Declaration for the proposed amendments has been prepared and was circulated for comment. No comments were received during the comment period from June 7, 2004 to June 28, 2004. This declaration will be re-circulated for comment between August 13, 2004 and September 7, 2004.

As part of the technical assessment and rule development process a working group was formed that included representatives from the California Air Resources Board, the Bay Area petroleum refineries, the Western States Petroleum Association (WSPA), the Regional Water Quality Control Board, Communities for a Better Environment (CBE), and District staff. The workgroup has met fifteen times to discuss technical issues related to this regulation. These included refinery sampling plans and modeling, wastewater emissions estimation, regulatory concepts and planning for analysis of refinery wastewater treatment systems.

Additionally, staff held two workshops to get input from the public on the rule, one in Martinez on April 17, 2004 and the other in Richmond on May 18, 2004. Both meetings were well attended, 20 persons and 35 persons respectively. Staff received comments on regulatory enforcement, implementation dates, sampling and inspection frequency. These comments and staff responses are included as part of this document.

There remain a number of issues on which the working group could not obtain consensus. These include proposed rule implementation dates and inspection frequency. CBE has argued that they see no technical reason that the proposed amendments can not go into effect sooner and that inspections of the collection system components should be more frequent. The refiners have argued that logistically the rule effectiveness dates are very tight and they will have a hard time meeting the requirements of the proposed amendments as they stand. Staff have considered these statements and, based on the technical information available, has concluded that the proposed implementation dates and inspection frequencies are appropriate.

Staff recommend the adoption of the proposed amendments to Regulation 8, Rule 8.

II. BACKGROUND

A. Process Description

In the Bay Area 2001 Ozone Attainment Plan for the San Francisco Area air basin, the District committed to examine potential VOC emissions reductions from further control of refinery wastewater collection and treatment systems. In order to achieve this goal, staff of the California Air Resources Board (CARB) led a joint effort to quantify these emissions and suggest possible controls.

Refinery wastewater systems exist to separate and process organics entrained in water during the making of petroleum products. Water has many uses in the refining process, including crude oil washing, process unit cooling, component cooling, steam production and vessel and tank cleaning. During these and other processes, volatile organic compounds (VOC's) become entrained in the water due to direct contact. Other sources of wastewater at the refinery include water condensate drawn off refinery tanks and ground water extraction wells.

Each of the five Bay Area refineries has a unique wastewater system, but the systems have many components in common. In the refinery, process block drains allow water containing organics to enter the wastewater collection system. These drains feed a network of pipes that transports the wastewater in a segregated system to an onsite treatment facility. Along this piping network is a series of manholes and junction boxes. Manholes allow access to the piping network to clear line blockages and perform maintenance, and junction boxes allow separate effluent steams to be combined. In addition to these structures, refinery wastewater collection systems may contain pumping or "lift" stations and low point or gravity sumps.

All of the wastewater gathered by the collection system at each refinery is routed to wastewater treatment. The first system in refinery wastewater treatment is oil-water separation. Wastewater flow is introduced to a quiescent environment where heavy organics and particulates settle out under gravity, and lighter oils and organics float to the surface to be removed to slop tanks by mechanical skimmers. Following oil-water separation, wastewater is routed to dissolved nitrogen or dissolved air flotation units. Here, gas is percolated through the wastewater to float organic materials to the tank surface where they are removed to slop tanks. Regulation 8, Rule 8 requires both oil-water separation and dissolved gas flotation to be enclosed.

At this stage, the wastewater again comes in contact with the ambient air. This usually occurs at the biological treatment unit. Many of the refinery wastewater treatment trains included a host of other steps. Many of the steps, including flow equalization, pH balancing, chemical and nutrient addition, are designed to protect the living organisms in the biological treatment unit. These organisms feed on the organic content of the wastewater and clean the water until it complies with Regional Water Quality Control Board (RWQCB) discharge standards.

Refineries may also employ additional polishing steps in their treatment processes, such as the addition of activated carbon to their biological treatment units, selenium treatment, wetlands filtration, and carbon filtration. These steps ensure that the water discharged into the bay meets all applicable standards.

Refinery collection, separation and treatment systems can span hundreds of acres. Quantifying emissions from the various collection and treatment components can be difficult. There is little available direct measurement data on some parts of the system, and sophisticated models developed by EPA and industry do not account for all the variations that occur in Bay Area refinery Systems. As a result, it was decided that the best way to approach the task of quantifying and controlling emissions was to think about the refinery wastewater system in sections. Analysis of the systems showed that a partition could be made after physical separation (following the oil-water separators and dissolved air or gas flotation). The following two divisions were made:

Collection and Separation: This is the portion of the system that collects wastewater from process units and tankage, and performs physical separation of oil from water. Effluent is then directed via a series of wastewater collection components (process drains, pipes, manholes, junction boxes, sumps and lift stations) to the oil-water separator for initial treatment. The oil-water separator slows the water flow down and allows the settling and flotation of hydrocarbons out of the waste stream. These hydrocarbons are removed by skimming to slop oil tanks. The effluent then goes through dissolved air flotation units (DAF) or dissolved nitrogen flotation units (DNF). Here gas is bubbled through effluent to remove any residual gross oil or particulates not removed in the oil-water separator.

Treatment: This is the portion of the system located after physical separation. It deals with the treatment of wastewater to remove entrained or dissolved organic compounds. The components in this portion of the system may include activated carbon injection tanks, flocculation tanks, biofilters, filters, screens, clarifiers, sludge thickeners, bioreactors, sludge presses, selenium removal and carbon filtration.

The Technical Assessment Document prepared by District and CARB staff deals exclusively with emissions from the collection portion of the wastewater system. Most emissions from this portion of the system are generated in the following two ways:

Volatilization : This occurs when wastewater that contains petroleum or partially processed petroleum products is exposed to the atmosphere. When this happens, compounds biodegrade and volatilize from the water into the air. The factors that effect this process are temperature, concentration, the gas/liquid partition coefficient, biodegradability, the affinity for adsorption, ventilation of the system and turbulence or splashing.

Air Entrainment: When liquid that contains petroleum or partial petroleum products is transmitted in contact with air to a transportation system (from a process outlet into a drain), ambient air is entrained in the liquid. Air pockets may become trapped below the water surface and will return to the surface to off-gas later. This off-gassing will include the release of captured VOC's.

The TAD estimated, through field sampling and modeling, VOC emissions estimate of at least three tons per day.

B. Regulation 8, Rule 8: Wastewater (Oil-Water) Separators

Regulation 8, Rule 8 was first adopted by the District on January 17, 1979, was amended March 17, 1982 and October 8, 1989, and was last amended on June 15, 1994. The regulation requires controls on small wastewater separators and junction boxes, the enclosure of sludge dewatering facilities, and the retrofit of larger refinery wastewater oil-water separators. The amendments in 1994 corrected EPA policy deficiencies.

Reg. 8-8 inspections at refineries are not announced to the facility. The responsible inspector will visit the regulated oil-water separator and ensure that all accesses to it are sealed and gasketed. If the oil-water separator tank area is enclosed and the flow through the system exceeds 18.9 liters per second, then an emission standard of 1,000 ppm applies. The inspector will also check any floating roof-seals which may be present for seal gaps and will also check to see that all oil-water sludge dewatering operations are completely enclosed and controlled.

C. Applicable Federal Regulations

Two federal regulations also may affect refinery wastewater systems. They are NSPS (New Source Performance Standards) for VOC Emissions from Petroleum Wastewater Systems (Subpart QQQ) and NESHAP (National Emission Standards for Hazardous Air Pollutants) for Benzene Waste Operations (Subpart FF). Both regulations pertain to the emissions of VOCs and toxic compounds from refinery wastewater systems.

Under Title 40 CFR Part 60, Subpart QQQ, performance standards have been established for individual drain systems, closed vent systems and control devices, including:

- Each drain shall be equipped with a water seal
- Junction boxes shall be equipped with a cover and may have an open vent
- Sewer lines shall not be open to the atmosphere
- Wastewater systems are subject to regular inspection and maintenance.
- Any control device shall operate with an efficiency of 95 percent or greater to reduce VOC emissions vented to them
- All control devices shall be operated with no detectable emissions, as indicated by an instrument reading of 500 parts per million VOC above background.

The National Emission Standards for Hazardous Air Pollutants (NESHAP) for refineries were promulgated in August 1995. These regulations are applicable at refineries that emit 10 tons per year (tpy) of any one hazardous air pollutant (HAP), or 25 tons per year or more of total HAPs. The refineries in the District meet this threshold requirement and are subject to the refinery NESHAP requirements.

Under Title 40, CFR, Part 61, Subpart FF, the benzene NESHAP regulations require petroleum refineries to use maximum achievable control technology (MACT) to control emissions of benzene from waste operations, including certain wastewater systems.

Typically, refineries use carbon adsorption or collection and venting of wastewater gases to the refinery flare system (vent flap system) to control benzene emissions from wastewater systems in compliance with the refinery NESHAP requirements.

District inspectors enforce the provisions of federal NESHAP (National Emission Standards for Hazardous Air Pollutants) Subpart FF for Benzene Waste Operations. This entails conducting visual checks of controlled water trap drains in affected units.

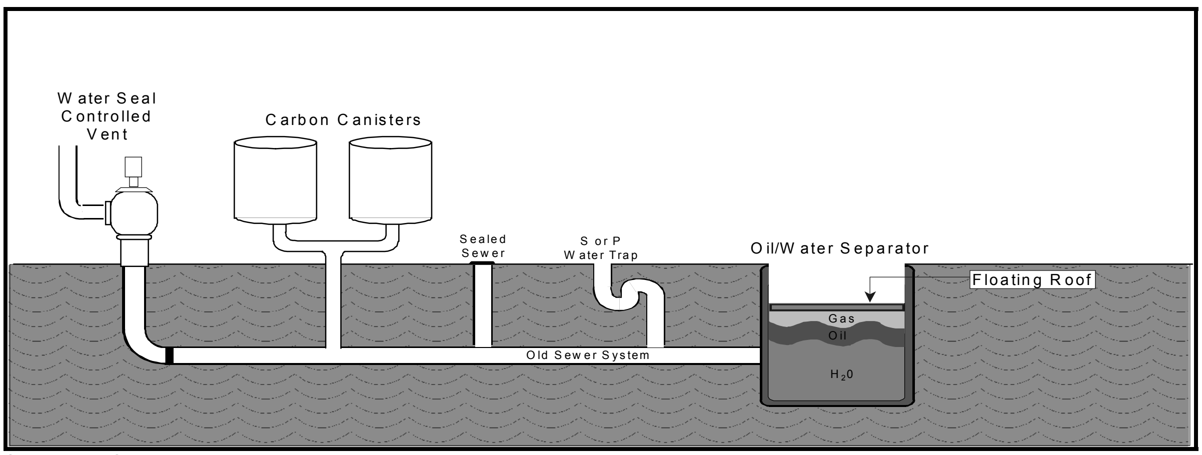
III. APPLICABLE CONTROL TECHNOLOGY

VOC emissions from wastewater collection systems can be controlled in a variety of ways including enclosing or controlling all openings to the atmosphere, changing the operation of the units that are feeding the wastewater collection system, having a rigid inspection and maintenance (I&M) program, or using a combination of controls.

Several technologies are available to control emissions. They can be largely grouped into two categories: pollution prevention and emission controls. Pollution prevention strategies can reduce emissions at their source by changes in operation, while emission controls are designed to reduce emissions after VOC-containing materials have entered the wastewater system. Examples of emissions controls are gasketed or sealed collection system components, water sealed collection system components, activated carbon scrubbers, water impingement scrubbers, vacuum stripping columns, and thermal oxidizers.

Equipment control strategies can require the installation of new equipment or devices, or can include physical changes to the wastewater system. Potential equipment control strategies applicable for refinery wastewater systems can include a number of different components. Figure 1 schematically shows the application of these control strategies in a wastewater system.

Figure 1: Potential Equipment Control Strategies



Source: U.S. EPA

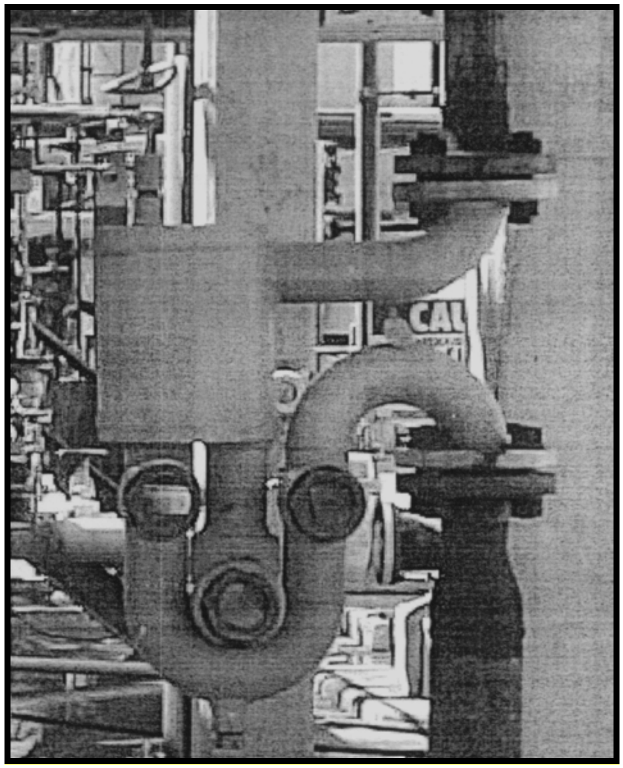
Water Seals

Installing water seals on process drains and vents open to the atmosphere would help prevent emissions from downstream sewer lines from escaping back out of the drain or vent opening. However, even with water seals installed in drains, emissions have been reported from VOC-containing liquid left standing in the water seal that was not flushed into the sewer line. In addition, if the water were allowed to evaporate from the water seal control, the emissions from the drain or vent would be similar to those from uncontrolled units. Two types of water seal configurations are:

- P-leg seal configuration (similar to a kitchen sink drain).
- Liquid seal inserts that can be placed in existing process drains and

junction box vents (Figure 2).

Figure 2: Typical Design of a Liquid Seal Insert For Junction Box Vents



Source: Chevron

The overall control efficiency of this method is estimated at 65%, but varies depending on the degree of maintenance of the water seal. This approach requires an extensive inspection and maintenance (I&M) program in order to be effective. An effective I&M program is designed to inspect on a regular basis, maintain and repair as necessary the components of a pollution control system. These inspections are usually performed by refinery personnel and include:

- Inspection of sealed manholes for corrosion and leaks
- Inspection of water seals for evaporated water or accumulation of trapped VOC containing material
- Inspection and repair of visible leaks from a sealed wastewater system
- Measurement of VOC concentrations in and around controlled systems (leak detection program)

Vent Control Devices

Collecting and venting the emissions to a control device can achieve greater than 95% control efficiency. Potential emission control devices for wastewater collection systems (predominately junction box vents) include carbon adsorption, thermal oxidation, catalytic oxidation, and condensation.

Hard Piping

Enclosing open weirs and lines with direct piping (also called hard piping) is the most stringent control option and could result in the greatest amounts of VOC emission reductions. Complete drainage system enclosure can be accomplished in the following manner:

- Hard-pipe process units to the wastewater separator and then remove or cap all existing process drains.
- Hard-pipe process units to a drain box enclosure.
- Hard-pipe those process units identified as the largest contributors to process drain emissions.
- Hard-pipe junction boxes that are completely covered and sealed with no openings.

This method is considered to have up to 100% control efficiency[1]. However, the safety issues and reconstruction complexity may be two of many limiting factors that reduce the likelihood of converting an existing open drainage system to a totally enclosed system (see section on hard piping costs).

Emission or Performance Based Standard

An emission or performance based standard would set a limit on the emissions from specific emission points in a wastewater system. Such a limit might consist of a mass or concentration standard in parts per million (ppm).

Setting performance based standards allows a wastewater system operator to consider the optimal control strategy based upon site specific system design and performance. By establishing performance-based standards, such as setting an emission limit of 500-ppm VOC from a drain or vent, equivalent emission reduction can be achieved without specifying a particular control technology.

Pollution Prevention Strategies

In addition to the use of equipment control strategies to reduce VOC emissions from wastewater collection systems, there are also several control strategies that could be implemented to reduce emissions from these systems. This approach differs from the equipment control strategies in that it is designed to reduce the source of the VOC emissions (pollution prevention) through operational changes in the refinery, as opposed to controlling the emissions themselves with equipment. Additional measures, such as the use of I&M programs, can further serve to reduce emissions from wastewater collection systems.

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[1] "Final Staff Report for Proposed Rule 1176 – VOC Emissions from Wastewater Systems", South Coast Air Quality Management District, September 13, 1996.

For refinery wastewater collection systems, the following pollution prevention control measures have been identified as potential control measures to reduce VOC emissions:

- Reduce the generation of tank bottoms (these are the residues left in tanks containing petroleum products prior to cleaning)
- Minimize solids leaving desalter units to prevent organic from entering the wastewater collection system (a desalter unit removes mineral salts from crude oil using a water washing technique)
- Minimize or segregate cooling tower condensate from wastewater collection
- Minimize fluid catalytic cracking unit decant oil sludge (this sludge oil is the residue produced during the clean up following the catalytic cracking process)
- Control heat exchanger cleaning
- Minimize discharge of surfactants into wastewater collection system
- Thermally treat petroleum sludges to prevent the evaporation of organic vapors
- Reduce use of open pits and tanks
- Remove unnecessary storage tanks from service
- Segregate storm, process, and septic wastewater collection
- Improve recovery of petroleum products from wastewater collection systems
- Identify VOC sources and install upstream water treatment or separation
- Use oily sludges as feedstock (feedstock is the material used as the raw material of “feed” in various petroleum production processes)
- Control and reuse fluids from coking units and coke fines. Coke fines are the granular carbon particulates produced by the coking process
- Train personnel to reduce solids disposal to sewers

An I&M program, in addition to that discussed for equipment controls, should be an integral part of a pollution prevention strategy. Its procedures could include monitoring of waste generation, either through continuous samplers or regular testing, monitoring the use of open pits and regular training of refinery inspectors.

IV. REGULATORY PROPOSAL

Staff have analyzed methods for achieving the maximum emission reduction from these systems while allowing for the greatest flexibility for the affected facilitiesand recommend a combination of emissions controls: a performance based standard (500 ppm) and a mandated I&M program.

The proposed amendments modify Reg. 8-8 to include a strict concentration limit, an inspection and maintenance program, and an equipment control standard for refinery wastewater collection systems. This approach incorporates the best elements of the control options discussed above.

This proposal mandates that each affected facility must either install controls on all wastewater collection system components (drains, manholes and junction boxes) or institute a rigorous inspection and maintenance plan. In addition, both of these options are also subject to a 500 ppm emissions standard.

Based on a review of the available materials, a 500 ppm standard for drains, manholes, junction boxes, trenches, reaches, sumps, lift stations, and oil-water separators has been determined to be currently achievable by the industry. While the wastewater collection systems are not designed to the standards of other refinery product transportation systems, this standard is achievable due to lack of high pressures and temperatures in these systems.

This conclusion has also been supported by sampling by District staff, consultations with the South Coast AQMD staff and information supplied through the workgroup process by the refineries. The derivation of the 500 ppm standard contained in the comparable South Coast Rule was based on the Federal Regulation for benzene waste (40 CFR 61 subpart FF). Provisions in this regulation mandate a 500 ppm limit on emissions from individual refinery drains. The federal requirement has demonstrated that 500 ppm is an achievable standard for existing refinery wastewater processes.

A. Proposed Amendments and Emissions Reductions

The following is a summary of proposed amendments to Regulation 8-8. Minor changes are not included.

Summary of Proposed Amendments to Regulation 8, Rule 8

Regulation Section #	Change
101	Changes description to include all organic compounds and extends the regulation to incorporate collection and transportation systems at industrial facilities.
112	Changes exemption to exclude refinery collection and transportation systems from the temperature provision of this section
115	Changes exemption to exclude Municipal Wastewater collection and separation facilities from new portions of the Regulation.

Regulation Section #	Change
116	Add exemption for trenches used for the separation of solids from oily water during maintenance and turnaround activities
201	Changes the definition of Organic Compounds consistent with other Regulation 8 rules
204	Modifies definition of vapor tight to be less than 500 ppm as measured with an OVA at the source interface
210	Modifies definition to exclude non precursor organic compounds
217	Modify definition of junction box in line with United States Environmental Protection Agency (USEPA) definition
219	Adds new definition of Leak Minimization
220	Adds new definition of Leak Repair
221	Adds new definition of Lift Stations in line with USEPA definition
222	Adds new definition of Manholes in line with USEPA definition
223	Adds new definition of Oil-Water Separation Trench
224	Adds new definition of Process Drains in line with USEPA definition
225	Adds new definition of Petroleum Refinery
226	Adds new definition of Reaches in line with USEPA definition
227	Adds new definition of Sumps in line with USEPA definition
228	Adds new definition of Trenches in line with USEPA definition
229	Adds new definition of Vent Pipes
230	Adds new definition of Wastewater Collection System Components
231	Adds new definition of Wastewater Separation System
232	Adds new definition of Water Seal or Equivalent Control
301.3	Modifies section to apply to organic compounds instead of critical organic compounds
302.3	Modifies section to apply to organic compounds instead of critical organic compounds
302.4	Modifies required testing in the section to be consistent with USEPA method 21
302.6	New language reduces concentration limit for oil-water separators from 1,000 ppm to 500 ppm total organics as measured with an OVA calibrated with methane
304	Modifies section to limit emissions from sludge during storage
305.2	Modifies section to apply to organic compounds instead of critical organic compounds
306.2	Modifies section to apply to organic compounds instead of critical organic compounds
307.2	Modifies section to apply to organic compounds instead of critical organic compounds
312	Adds new leak standard and repair requirements for controlled wastewater collection system components at petroleum refineries

Regulation Section #	Change
313	Adds new language that provides control options for uncontrolled wastewater collection system components at petroleum refineries
313.1	One of two new control options requires refineries to install controls on uncontrolled wastewater collection system components in accordance with the schedule listed in Section 8-8-403
313.2	The second of two new compliance options requires refineries to choose an Inspections and Maintenance plan for uncontrolled wastewater collection system components. This section also requires that components leaking over 500 ppm be minimized and reinspected within 30 days. If the component passes three consecutive 30-day inspections without leaking in excess of the standard, then it can be returned to an inspection schedule laid out in the section. Also, new language requires that any component found to be leaking over 500 ppm in any three inspections over five years be controlled in 30 days
314	Adds new language requiring that all future Wastewater Collection System Components at refineries be controlled by water seals or an approved equivalent
402	Adds new language mandating a Wastewater Collection System Components Inspection and Maintenance Plan
402.1	Adds new language requiring that all wastewater collection system components be identified
402.2	Adds new language requiring that an initial inspection must be completed by refineries and be made available to the APCO
402.3	Adds new language requiring a plan that provides for a re-inspection after minimization or repair of components. It also outlines inspection frequency for facilities choosing to comply with Section 8-8-313.2
402.4	Adds new language requiring a semi-annual inspection frequency for controlled wastewater system components at refineries
402.5	Adds new language requiring records must be maintained as per Section 8-8-505
403	Adds new language providing a compliance schedule for the control of Wastewater Collection System Components at Petroleum Refineries

Regulation Section #	Change
403.1	Adds new language requiring that petroleum refineries choosing this option control 25% of all uncontrolled drains by October 30, 2005
403.2	Adds new language requiring that petroleum refineries choosing this option control 50% of all uncontrolled drains by April 31, 2006
403.3	Adds new language requiring that petroleum refineries choosing this option control 75% of all uncontrolled drains by October 30, 2006
403.4	Adds new language requiring that petroleum refineries choosing this option control 100% of all uncontrolled drains by April 30, 2007
404	Adds new language requiring that refineries notify the APCO as to which Section of 8-8-313 they intend to comply
505	Adds new language requiring that refineries keep records for their Wastewater Collection Systems
505.1	Adds new language requiring records be kept for the location and type of Wastewater Collection System Component
505.2	Adds new language requiring records of the date, location and concentration recorded during any Wastewater Collection Systems inspection
505.3	Adds new language requiring that refineries describe efforts to minimize and repair leaking components
505.4	Adds new language requiring that all records pertaining to these inspections be kept on site for five years
602	Modifies language to apply to organic compounds
603	Modifies language to apply to inspection procedures to new rule sections

IV. EMISSIONS AND EMISSION REDUCTIONS

A. Emissions

To determine the emissions from wastewater collection systems, District and CARB staff conducted a series of extensive site visits to the five Bay Area refineries. During these visits, the staff observed how the collection system worked at each refinery. It was determined that a combination of emissions modeling (TOXCHEM+ and USEPA Water9) and best available control technology/lowest achievable emissions rate (BACT/LAER) equations should be used to estimate the emissions from the collection system.

District and CARB staff performed extensive wastewater sampling at all five Bay Area refineries. Utilizing these sampling results, estimates for refinery wastewater collection system emissions were developed. Field data collected including drain inventories, systems layouts, wastewater flow-rates and laboratory were used as inputs for the TOXCHEM+ model. A comprehensive explanation of this modeling and the associated sampling results is provided in the TAD. This modeling provided the following partial emissions estimates for refinery wastewater collection systems:

Table 3: VOC Emission Estimates for Refinery Wastewater Drains, Manholes, and Junction Box Vents

Refinery	Drain Emissions (tpd)	Manhole Emissions (tpd)	Junction Box Vent Emissions (tpd)	Total [2] (tpd)
1	0.411[1]	0.17	0.13[1]	0.70
2	0.27	0.048	0.17	0.49
3	0.14	0.16	0.17	0.47
4	0.12	0.034	0.084[1]	0.24
5	1.16	0.076	0.17	1.4
Total	2.1[3]	0.49	0.71	3.3

1 Partial emissions. Additional information is needed to complete the assessment of drain and junction box vents from these facilities.

2 The emissions reported in this table do not represent the total emissions from the wastewater collection system. As discussed earlier, additional work is needed to estimate emissions from wastewater treatment and TPHd compounds.

3 2.02 tpd emissions from uncontrolled drains

By comparison, the District's emission inventory lists a total of 1.3 tpd of total VOC emissions from refinery wastewater process drains. The inventory numbers are derived from historical data and sampling, as well as emission factors. Due to the comprehensive nature of the TAD, it is assumed that the VOC estimates it contains, though incomplete, are more reflective of the current situation at Bay Area refineries.

In evaluating the data in Table 3, it is important to note that the VOC emission estimates for Refineries 1 and 4 are incomplete. For Refinery 1, only part of the refinery was sampled during the source tests, due to ongoing maintenance to the wastewater system. For Refinery 4, it was discovered after the source tests had been completed that a significant portion of the wastewater collection system was not sampled, and consequently not included in the refinery VOC emission calculation. Therefore, data was not collected to estimate any VOC emissions from vents associated with this portion of the wastewater system.

In addition, the emission estimate was only developed for gasoline range compounds (C_2 to C_{10}) identified during sampling. Significant amounts of diesel range materials were found in the wastewater samples. The significance of emissions from these materials has not been established as part of this assessment, but has been recommended for further study.

B. Emission Reductions

Implementation of the regulatory proposal, which requires controls on all wastewater collection system components (drains, manholes and junction boxes) or a District prescribed inspection and maintenance plan, and a 500 ppm emissions standard can achieve approximately 2.1 tpd of VOC reductions**.** Emission reduction estimates are based on control of uncontrolled refinery drains, manholes and junction boxes. Water seals reduce emissions by 65% according to the South Coast Air Quality Management District's staff report for their Regulation 1176 and this is the basis of the emission reduction calculation.

While not specifically targeted by this regulation, a reduction in VOC will also decrease the amount of toxic air contaminants released by wastewater collection system components. The toxic compounds reduced include benzene, toluene and xylene (identified as part of the water analysis performed for the TAD). Based on the TAD analysis, other toxic compounds may also be present, including ethylbenzene and naphthalene. These compounds are present in extremely low amounts. The largest amounts observed in wastewater samples were in the parts per billion range and translate to the following percentages: 0.005% benzene, 0.01% toluene and 0.006% xylene). While the air emissions significance has not been established for these compounds, the proposed amendments would also lead to a reduction in their emissions.

Additionally, diesel range constituents were found in the samples used to prepare this estimate. While their emissions significance has not been determined, the proposed amendments would also control any emissions they may give off during transport.

V. ECONOMIC IMPACTS

A. Introduction

In estimating the costs associated with the potential control strategies identified in the previous chapter, both the capital costs and the recurring annual costs were considered.

The capital recover method was used to evaluate the capital costs. The annualized capital costs were determined using the following equation:

Annualized Cost = (*Capital Recovery Factor*)×(*Capital Expenditure*)

Where:

Capital Expenditure – Equipment and installation costs
Capital Recovery Factor – 14.2% (7% per year over 10 years)

In evaluating the recurring annual costs, considerations were provided for such expenditures as operating costs (i.e. utilities, adsorption material replacement, etc.) and potential Inspection and Maintenance (I&M) costs.

Water Seals on Drains

Capital costs associated with sealing inserting water seals in drains are not significant in terms of the cost per emission point. It is estimated that the capital costs are between $400 and $1000 per drain. However, in considering this cost, it is important to consider that a refinery wastewater collection system may contain over one thousand uncontrolled drains.

The total anticipated capital costs to install wastewater water seals on all of the existing uncontrolled refinery process drains in the District are estimated to be between about $3.4 million and $8.6 million, as shown in Table 4. When annualized over ten years, these costs are between $540,000 and $1.5 million per year, including annual I&M costs. Table 5 shows these costs by refinery.

Annual recurring costs are comprised mainly of an anticipated need for an I&M program and equipment depreciation. The I&M program will likely be necessary to ensure the operability of each control device (this is already required for drains under the U.S. EPA's NSPS). It is estimated that the annual costs of employing an additional refinery employee is about $65,000 per year. It is possible that some refineries will need more than one inspector per facility. Also, each inspector will require the use of monitoring equipment (such as an organic vapor analyzer) which costs about $3,000 per unit. It is assumed that inspectors could be hired part-time or be included in current I&M programs if an annual I&M program for wastewater systems would require less than one full-time position, so pro-rated costs are shown in Table 5. The costs range from a semi-annual inspection frequency, which is the lowest cost option to a monthly inspection frequency, which is the highest cost option (Note: Appendix M of the TAD provides a more detailed listing of the cost estimate calculations.)

Table 5: Annual Costs for Water Seals on Uncontrolled Drains[1]

Refinery	Number of Uncontrolled Drains	Capital Cost (Thousand Dollars)	Annualized Capital Cost (Thousand Dollars per Year)	Annual I&M Costs (Thousand Dollars per Year)	Total Annual Cost (Thousand Dollars per Year over 10 years)
1	1,677	670 – 1,700	100 – 240	10 – 60	100 – 300
2	1,100	440 – 1,100	60– 160	6– 40	70 – 190
3	572[2]	230 – 570	30 – 80	3 – 20	40 – 100
4	500[2]	200 – 500	30 – 70	3 – 20	30 – 90
5	4,750	1,900 – 4,800	270 – 680	30 – 160	300 – 840
Total	8,599	3,400 – 8,600	490 – 1,200	50 – 290	540 – 1,500

1 Numbers may not total due to rounding.
2 Estimated from field data.

Sealing Manhole Structures

Capital costs associated with sealing manholes and inserting water seals are typically not significant in terms of the cost per emission point. It is estimated that the capital costs are between $400 and $1000 per manhole. Installing gaskets or seals and plugging holes in manhole covers is a straightforward maintenance operation. However, in considering this cost, it is important to consider that sealing a manhole structure may require replacement of the complete manhole structure due to cracks and gaps in the manhole chimney. Sealing emission sources from a failed manhole structure can require significant underground repair and expense.

Table 6 shows the total anticipated capital costs to seal manhole structures on all of the existing refinery manholes in the District are estimated to be between about $2.3 million and $5.8 million. When annualized over ten years, these costs are between $360,000 and $1 million per year, including annual I&M costs. Table 5 shows these costs by refinery.

Annual recurring costs are comprised mainly of an anticipated need for an I&M program and equipment depreciation. The I&M program will likely be necessary to ensure the operability of each control device (this is already required for drains under the U.S. EPA's NSPS). It is estimated that the annual costs of employing an additional refinery employee is about $65,000 per year. It is possible that some refineries will need more than one inspector per facility. Also, each inspector will require the use of monitoring equipment (such as an organic vapor analyzer) which costs about $3,000 per unit. It is assumed that inspectors could be hired part-time or be included in current I&M programs if an annual I&M program for wastewater systems would require less than one full-time position, so pro-rated costs are shown in Table 6.

It is important to note that these annual I&M costs are dependent upon the frequency of inspections necessary. As such, costs for a monthly, quarterly and semi-annual inspection program were estimated. These range of annual costs (by refinery) for an I&M program are shown in Table 6, along with the total anticipated annual costs associated with controlling manhole emissions from refinery wastewater systems. The costs range from a semi-annual inspection frequency, which is the lowest cost option to a monthly inspection frequency, which is the highest cost option (Note: Appendix M of the TAD provides a more detailed listing of the cost estimate calculations.)

Table 6: Annual Costs for I&M and Sealing Manholes[1]

Refinery	Number of Manholes	Capital Cost (Thousand Dollars)	Annualized Capital Cost (Thousand Dollars per Year)	Annual I&M Costs (Thousand Dollars per Year)	Total Annual Cost (Thousand Dollars per Year)
1	1,965	790 -2000	110 - 280	11 – 70	120 – 350
2	570	230 -570	30 - 80	3 – 20	35 – 100
3	1941	780 -1900	110 - 280	11 – 70	120 – 340
4	400	160 - 400	20 - 60	2 – 14	25 – 70
5	900	360 - 900	50 - 130	5 – 30	56 – 160
Total	5,778	2,300-5,800	330 - 820	30 - 200	360 - 1000

[1] Numbers may not sum due to rounding.

Water Seals on Junction Boxes

Unlike the case for water seals on drains, the total number of uncontrolled junction box vents at refineries is unknown. To estimate costs, it was assumed that all junction boxes would need controls. In reality, this is not likely the case as some junction boxes are already controlled, or are not vented to the atmosphere. As such, the costs identified below are likely higher than could be expected to comply with any future rule.

Capital costs associated with water seals for junction box vents are estimated to be between $2000 and $2500 per vent, based on data provided by refiners. It was indicated that these costs include installation costs. The total anticipated capital costs to install wastewater water seals on all of the existing uncontrolled refinery junction box vents in the District are estimated to be between about $3.9 million and $4.8 million, as shown in Table 6. When annualized over ten years, these costs are between about $560,000 and $750,000 per year, including annual I&M cost. Table 7 also shows these costs by refinery.

Annual recurring costs are comprised mainly of an anticipated need for an I&M program. It is estimated that the annual costs of employing an additional refinery employee, dedicated to monitoring and maintaining the water seals is about $65,000 per year, with potentially more than one inspector being required per facility. Also, each inspector may require the use of monitoring equipment (such as an organic vapor analyzer) which costs about $3,000 per unit. It is assumed that inspectors could be hired part-time or be included in current I&M programs for other regulated equipment if an annual I&M program for wastewater systems would require less than one full-time position, so pro-rated costs are shown in Table 7.

It is important to note that these annual I&M costs are dependent upon the frequency of inspections necessary. As such, costs for a monthly, quarterly and semi-annual inspection program were estimated. These range of annual costs (by refinery) for an I&M program are shown in the previous tables, along with the total anticipated annual costs associated with controlling junction box vent emissions from refinery wastewater collection systems. The costs range from a semi-annual inspection frequency, which is the lowest cost option to a monthly inspection frequency, which is the highest cost option (Note: Appendix M of the TAD provides a more detailed listing of the cost estimate calculations.)

Table 7: Annual Costs for Water Seals for Wastewater Junction Box Vents[1]

Refinery	Number of Junction Boxes	Capital Cost (Thousand Dollars)	Annualized Capital Cost (Thousand Dollars per Year)	Annual I&M Costs (Thousand Dollars per Year)	Total Annual Cost (Thousand Dollars per Year)
1	655	1,300 – 1,640	190 - 230	4 - 22	190 – 260
2	190	380 – 480	54 – 67	1 – 6	55 – 73
3	647	1,300 – 1,600	180 - 230	4 – 22	190 – 250
4	134	270 - 340	38 - 48	1 – 5	39 – 53
5	300	600 - 750	85 - 110	2 - 10	87 - 120
Total	1,926	3,900 – 4,800	550 - 690	12 - 65	560 - 750

[1]Numbers may not total due to rounding.

Other Types of Vapor Recovery and Control Equipment

Table 8 provides some generic cost information on other potential vapor recovery and control equipment. In general, it is expected that the costs associated with the application of control equipment to junction box vents are significantly higher than with the use of water seals, although larger emission reductions could be achieved.

Table 8: Operating Costs for Alternative Vapor Recovery and Control Equipment (Cubic Feet per Minute)

Control Technology		Capital Cost ($)	Annual Operating Cost ($)
Carbon Adsorption		15-120/cfm	10-35/cfm
Thermal Oxidation	Recuperative	10-200/cfm	15-90/cfm
	Regenerative	30-450/cfm	20-150/cfm
Catalytic Oxidation	Fixed bed	20-250/cfm	10-75/cfm
	Fluidized Bed	35-220/cfm	15-90/cfm
Condensation		10-80/cfm	20-120/cfm

Source: Shen, Almon M. "Stationary Source VOC and NOx Emissions and Controls", Presentation at the 1995 Air Pollution Prevention Conference, Taipei, Taiwan, October 1995.

Performance Based Standards

Costs associated with implementing performance based standards are difficult to quantify, because of the inherent flexibility of the approach used allows a variety of controls options. In general, the establishment of performance based standards provides one of the lowest cost options for control. This is because performance based standards allow each refiner to utilize the control option or options that result in the lowest cost (both in terms of capital costs and operating costs). As such, it is believed that the costs associated with performance based standards would be in the range of, or even less than, the costs identified above for specific prescriptive control strategies.

Hard Piping

The costs associated with hard piping are estimated by CARB to be between $80 and $250 per linear foot of piping replaced. Similarly, a standard estimating program used by the Shell Oil refinery estimates cost for hard piping at $40 per inch diameter per linear foot. Staff estimates that between the five Bay Area refineries over 1 million linear feet of wastewater collection system piping exists.

Utilizing the estimating program cost number and applying it to 2”, 8” and 18” piping over all five refineries, staff was able to produce a cost effectiveness number of approximately $20,000 per ton of VOC reduced per day. However, this figure counts only the cost of piping itself and does not take into account the cost of lost revenue due to loss of petroleum production, excess emissions from process unit shut downs, the cost of an inspection and maintenance plan to monitor these systems or the costs of the installation of segregated storm-water sewers for pad run-off. All of these factors are expected to drive the cost effectiveness numbers significantly higher.

It should also be noted that the incremental cost of a hard piping option is at a minimum $170 million. Staff estimates that such an extensive construction and retrofit project may take up to four to five years to complete. Staff do not recommend this control option as it delays emissions reductions and is not the most cost effective option.

B. Cost-Effectiveness

This section describes the overall cost-effectiveness of water seal controls on drains, manholes and junction box vents.

Based on the estimates of 3.3 tpd of VOC emissions (Table 3) from drains, manholes, and junction box vents, it is expected that 2.1 tpd of emission reductions can be achieved by sealing manholes and installing water seals in drains and junction box vents. The estimated total annual costs for control at each of the refineries in the District is in the range of $1.4 million to $3.3 million. It is estimated that the cost-effectiveness to reduce emissions from drains, manholes, and junction box vents ranges from $1900 to $4300 per ton of VOC reduced. This cost also includes an I&M program with a semi-annual inspection frequency component that is part of the lowest cost option and a monthly inspection frequency component that is part of the highest cost option. This is within the range of cost-effectiveness determined for other VOC control measures adopted by the District, as well as by the ARB.

It is important to consider that the emission estimates for two of the refineries are not complete, and that characterization of emissions from total petroleum hydrocarbon diesel (TPHd) in the wastewater still needs to be evaluated. As such, the cost-effectiveness numbers above are conservative, and likely to improve as additional data is developed. In addition, it is likely that all of the junction box vents will not need controls. As such, the capital cost estimates, and by default the cost-effectiveness numbers, are overestimated. Further study would improve these cost estimates.

C. Socioeconomic Impacts

Section 40728.5 of the 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 Economic Development, Berkeley, California, prepared a socioeconomic analysis, which is attached as Appendix A. The analysis concludes that the proposed amendments would not have significant socioeconomic impacts.

D. Incremental Costs

Under California Health and Safety Code Section 40920.6, the District is required to perform an incremental cost analysis for a proposed rule under certain circumstances. To perform this analysis, the District must (1) identify one or more control options achieving the emission reduction objectives for the proposed rule, (2) determine the cost effectiveness for each option, and (3) calculate the incremental cost effectiveness for each option. To determine incremental costs, the District must "calculate the difference in the dollar costs divided by the difference in the emission reduction potentials between each progressively more stringent potential control option as compared to the next less expensive control option."

In considering incremental cost-effectiveness, it is important to note that the emission estimates for two of the refineries are not complete, and that characterization of emissions from wastewater treatment and emissions from TPHd in the wastewater still need to be evaluated. As such, the cost-effectiveness numbers bellow are conservative, and the cost-effectiveness of control measures will improve as additional data is developed.

Incremental Cost-Effectiveness for Waterseals on Drains

Based on the estimates of 2.1 tpd of VOC emissions (Table 3) from refinery drains, it is expected that 1.3 tpd of emission reductions can be achieved. With estimated total annual costs for control of all uncontrolled drains at each of the refineries in the District of $540,000 to $1.5 million (Table 4), it is estimated that the cost-effectiveness to require water seals on uncontrolled drains is between $1,100 and $3200 per ton of VOC reduced. This is in the range of cost-effectiveness determined for other VOC control measures adopted by the District, as well as by the ARB.

Incremental Cost-Effectiveness for Sealing Manholes

Based on the estimates of 0.49 tpd of VOC emissions (Table3) from refinery manholes, it is expected that 0.32 tpd of emission reductions can be achieved. With estimated total annual costs for control of all unsealed manholes at all of the refineries in the District of $360,000 to $1 million (Table 5), it is estimated that the cost-effectiveness to seal manholes is between $3100 and $8800 per ton of VOC reduced. This is in the range of cost-effectiveness determined for other VOC control measures adopted by the District, as well as by the ARB.

Incremental Cost-Effectiveness for Waterseals on Junction Boxes

Based on the estimates of 0.71 tpd of VOC emissions (Table 3) from junction box vents, it is expected that 0.46 tpd of emission reductions can be achieved. With estimated total annual costs for control of all junction box vents at all of the refineries in the District of $560,000 to $750,000 (Table 6), it is estimated that the cost-effectiveness to require water seals on junction box vents is between $3300 and $4400 per ton of VOC reduced. This is in the range of cost-effectiveness determined for other VOC control measures adopted by the District, as well as by the ARB.

E. Staff Impacts

Implementation of the proposed amendments will have a moderate impact on the District’s resources. Staff will be inspecting wastewater components that are currently not regulated. However, staff routinely conduct similar inspections on many other refinery components. Staff regularly inspect over 2,000 valve and flange components a month under the provisions of Regulation 8-18. The number of wastewater collection system components estimated at refinery facilities is 19,489 (approximately 1% of the total number of Regulation 8-18 components). The proposed amendments to Regulation 8, Rule 8, will therefore result in an approximately 2% increase in staff component inspection time. These changes are necessary to achieve the necessary emission reductions and to verify compliance.

ENVIRONMENTAL IMPACTS

Pursuant to the California Environmental Quality Act, the District's environmental consultant, Environmental Audit, Inc., prepared an initial study for the proposed rule amendments to determine whether rule adoption would result in any significant environmental impacts. The initial study concludes that the proposed amendments would not result in negative environmental impacts. It also points out the benefits of ensuring that emissions from refinery wastewater collection systems are minimized. The complete environmental document is attached as Appendix B. A Negative Declaration for the proposed amendments has been prepared and was circulated for comment. No comments were received during the comment period from June 7, 2004 to June 28, 2004. This declaration was re-circulated for comment between August 13, 2004 and September 7, 2004. No comments were received during this second comment period.

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 district rules. The district must then note any differences between these existing requirements and the requirements imposed by the proposed change.

Existing Requirements	New Requirements
Reg. 8-8 requires that fixed roof Oil-water separators at refineries larger than or equal to 18.9 liters per second must meet a 1,000 ppm leak standard	Regulation 8-8 will now require that fixed roof Oil-water separators at refineries larger than or equal to 18.9 liters per second must meet a 500 ppm leak standard.
Under Title 40 CFR Part 60, Subpart QQQ, junction boxes on new sources at refineries shall be equipped with a cover and may have an open vent	Regulation 8-8 will now require that new or existing junction boxes at refineries be controlled with a sealed closed cover but may have an open vent.
Under Title 40 CFR Part 60, Subpart QQQ, standards for drains, junction boxes and oil-water separators do not apply during startup, shutdown or malfunction.	Regulation 8-8 will now require that control and emissions standard apply during these periods.
Under Title 40 CFR Part 60, Subpart QQQ, broken seals or gaps on junction boxes must be repaired within 15 days.	Regulation 8-8 will now require that upon discovery of any leak over 500 ppm on junction boxes that leak must be minimized within 24 hours.
Under Title 40 CFR Part 60, Subpart QQQ, broken seals or gaps on drains must be repaired within 15 days	Regulation 8-8 will now require that upon discovery of any leak over 500 ppm on drains that leak must be minimized within 24 hours.
Under Title 40 CFR Part 60, Subpart QQQ, broken seals or gaps on oil-water separators must be repaired within 15 days	Regulation 8-8 will now require that upon discovery of any leak over 500 ppm on oil-water separators that leak must be minimized within 24 hours and repaired within three days.
Under Title 40 CFR Part 60, Subpart QQQ, the EPA Administrator will determine if a control measure meets equivalency for a process.	Regulation 8-8 will now require that the APCO also approve equivalency.

Under Title 40, CFR, Part 61, Subpart FF, the benzene NESHAP regulations require visual checks on all controlled water seal drains identified as containing benzene	Regulation 8-8 will now require that all drains also be subject to biannual VOC emissions testing.

Based on this review there is no conflict or duplication of District or Federal requirements.

RULE DEVELOPMENT PROCESS

As part of the development of this regulation staff have gone through an extensive rule development process in order to get input from all affected parties. These efforts included the formation of a technical working group, public workshops and a presentation to the District Board Stationary Source Committee. The following is a summary of these efforts:

Technical Working Group

To assist in the TAD and rule development process a technical working group was formed that included representatives from California Air Resources Board, Industry, the Regional Water Quality Control Board, USEPA, Communities for a Better Environment (CBE), and District staff. This workgroup has met fifteen times to discuss technical issues related to this regulation. The issues discussed included refinery sampling plans and modeling, wastewater emissions estimation, regulatory concepts and planning for analysis of refinery wastewater treatment systems. The following is a summary of these meetings:

March 6, 2002 – This meeting served as the workgroup kick off. Members were introduced to each other and an overview of the scope of the project was given. A technical information questionnaire was discussed as well as a schedule for refinery site visits.

April 18, 2002 – This meeting discussed and reviewed the various models available for the estimation of VOC emissions from refinery wastewater systems. Also, wastewater sampling methodologies were discussed.

May 22, 2002 – This meeting discussed a proposed a pilot sampling project at the Valero refinery, the sampling methodologies to be used, laboratory analysis, project reporting, quality control and emissions modeling.

July 15, 2002 – This meeting discussed the results of the Valero pilot project, established TOXCHEM+ and Water9 as the preferred modeling methods and discussed the assumptions and sensitivity of the models to be used. In addition this meeting discussed the limitations of the sampling methodology and modeling in term of it being a worst-case scenario.

September 11, 2002 – This meeting discussed the preliminary results of sampling and modeling at the five Bay Area refineries. It also discussed the assignment of surrogates to undefined chromatograph peaks found in the sampling results as well as the reasons why those peaks could not be assigned to the Diesel range portions of the sampled materials.

November 12, 2002 – This meeting discussed the first version of the TAD produced in September. Staff got comments on emissions modeling, project set up, monitoring provisions for wastewater systems and the assessment emissions from the diesel fraction found in refinery samples.

August 14, 2003 – This meeting served as the kick off for the regulatory development portion of the project. Regulatory concepts were discussed such as equipment standards, leak standards and an emissions cap. A regulatory development schedule was also discussed.

September 4, 2003 – This meeting discussed including the wastewater collection system components in the amendments to Regulation 8, Rule 18. Also discussed were leak standards, commitments to study wastewater treatment systems, regulatory concepts and RWQCB permit requirements.

September 18, 2003 – This meeting served to discontinue the discussion of including wastewater collection system components in the amendments to Regulation 8, Rule 18. Also discussed were the possibility of the inclusion of a non-repairable list for components, safety issues and existing federal standards for P-trap drains.

October 9, 2003 – The majority of discussion in this meeting centered on discussion of regulatory concepts such as leak standards, monitoring of loading into treatment systems and sampling methodologies.

September 13, 2003 – This meeting discussed regulatory concepts such as control installation, repair periods, reporting, federal requirements, safety concerns and refinery commitment to the study of wastewater treatment systems.

March 4, 2004 – This meeting served to finalize the TAD and to continue the discussion on regulatory concepts. Discussed were repair period, record keeping requirements, Title V compliance issues, treatment system monitoring, refinery commitment to the study of wastewater treatment systems.

April 19, 2004 – This meeting discussed the draft regulation and staff report. Issues discussed were exemptions, repair period, reinspection frequency, leak test methodology and the effective date of the regulation.

May 27, 2004 – This meeting discussed the outstanding issues in the regulation, inspection frequency, the effective date of the regulation and repair periods.

June 25, 2004 - This meeting discussed in greater details the technical issues surrounding the proposed regulatory effective date, inspection frequency and safety issues.

Staff also held the following additional meetings with CBE

February 23, 2004 – CBE requested this meeting to discuss a number of their positions in regard to the study of the wastewater treatment systems at refineries, economic cost of monitoring, pollutant transportation issues and toxics.

May 10, 2004 – Due to the fact that CBE staff was unable to attend the April 19, 2004 technical workgroup meeting, staff agreed to discuss their issues with the draft regulation and staff report. The issues discussed were inspection frequency, the effective date of the regulation, rule enforcement, episodic events at facilities, impacts on local communities and efforts for emissions estimation for refinery wastewater treatment systems.

June 6, 2004 – CBE requested a meeting with the Executive staff to discuss the workgroup meeting of May 27th, 2004. The items discussed were decision making in the workgroup, the purpose of the workgroup process, CBE’s proposal for the effective date of the regulation and the frequency of monitoring at refineries, and the effects of the regulation on local communities.

Public Workshops

Staff held two workshops to solicit public comment on the proposed amendments to Regulation 8, Rule 8. The first was help in Martinez on April 27, 2004 and a second meeting was held, at CBE's, request in Richmond on May 18, 2004. The following is a brief synopsis of those meetings (more detail on the issues raised is available in the comments section of this regulation):

April 27, 2004 – Staff gave a brief presentation on refinery wastewater systems and reviewed the regulation with the 20 attendees. Staff received comments on the effective date of the regulation, staff impacts, rule enforcement, health impacts on local communities, Title V reporting criteria, the equipment leak standard and the financial and time burden on the affected industry.

May 18, 2004 – Staff gave a brief presentation on refinery wastewater systems and reviewed the regulation with the 35 attendees. Staff received comments on the effective date of the regulation, rule enforcement, impacts on local communities, safety, toxic's, public outreach, point source emissions and the financial and time burden on the affected industry.

Stationary Source Committee Report

Following the public workshops, staff updated the District Board Stationary Source Committee on the progress that had been made on the development of amendments to Regulation 8, Rule 8. The following is a synopsis of that meeting:

May 24^{th}, 2004 - Staff gave a brief presentation on refinery wastewater systems. The report described the refinery wastewater process system, which includes wastewater collection, separation and treatment. Staff reviewed some of the equipment options identified to control the emissions, such as wastewater control vents, carbon canisters, sealed sewers, fixed covers, wastewater seals or "P" trap drains.

Staff also reviewed the rule development process, which included a Technical Workgroup that was formed with the California Air Resources Board (CARB) in February 2002; a September 2002 draft Technical Assessment Document (TAD); a final draft TAD in

March 2004, and two public workshops. Staff outlined future steps for wastewater emissions assessment including keeping the workgroup in place, a sampling plan and emissions modeling is under discussion for the treatment portion of the wastewater system. If necessary, once the data on excess emissions from the treatment systems is available, staff will bring a treatment rule before the Board.

There was discussion on the implementation timeline. WSPA commented that two years was an appropriate schedule, and CBE commented that they believed twelve months was an appropriate timeline for implementation. Both commentors had participated in the rule development process. In response to a question from Director Cooper, staff stated that a number of the refineries are already implementing some of the proposed requirements (federal standards require controls of wastewater drains containing benzene).

Director Haggerty stated that, on the issue of implementation dates and in light of the difference of opinion between CBE and WSPA, it may appropriate for staff to split the difference between the two and make the proposed amendments effective 18 months from the date the rule was brought before the board. Both Director Silva and Director Cooper stated that a shorter time line might be more appropriate.

Director Townsend discussed hard piping as a required alternative and staff noted that alternative methods of control were looked at in the TAD, but staff did not find hard piping to be cost-effective.

ISSUES

As part of the development of the proposed amendments to Regulation 8, Rule 8 a number of issues have been raised. These issues have been considered by staff as part of the decision making for this regulatory effort. This section has been added to explain staff's rationale. The significant issues raised are as follows:

System Segregation

From the inception of this project and throughout the workgroup process, CBE has disagreed with the segregation of wastewater treatment from the collection and separation portions of the wastewater system proposed to be regulated by this rule amendment. CBE have suggested a more holistic approach to emissions reduction by repeatedly floating the idea of pollution prevention in work group meetings.

Staff were faced with a huge project to quantify emissions from refinery wastewater systems. These systems are very complex and span very large areas. Based on its review of the project and information available from the SCAQMD, staff decided that a large benefit could be achieved by first studying and then reducing the emissions from refinery collection systems. Separation systems at refineries are currently regulated by Regulation 8, Rule 8 and provided a natural point to break the systems into more manageable portions.

This approach has led to a proposed regulatory amendments that will lead to an emissions reduction of 2.1 tpd of VOC emissions that can be achieved in the near term. Additionally, work has continued to begin the quantification of emissions from the treatment portion of the refinery system. Staff have also included pollution prevention as an option for refiners when controlling wastewater collection system components and believe that this will lead to a consideration of pollution prevention options sought by CBE.

Safety

As part of the workgroup process a number of refineries have brought up the issue of safety. Specifically, they have requested an exemption in the rule similar to one contained in the SCAQMD Rule 1176 which would allow them not to control any area in which a danger of explosion existed.

Staff have reviewed this issue carefully and consulted with the SCAQMD on this subject. Rule 1176 has been in place at 11 refineries for the last 8 years. In that time not a singe facility has claimed this exemption for any of their wastewater processes. In addition, staff review has found that these systems are not pressurized and that the concentrations of hydrocarbon in them is very low, frequently in the less than one percent range. Refineries have presented evidence of a danger of explosion with relation to confined space entry, however, this danger is no greater than the entry into any other permit required confined space. Refineries perform hundreds of these entries yearly without explosion, therefore, staff do not recommend an exemption from the proposed control requirements for safety in this regulation.

Costs

The Valero refining facility has expressed concerns regarding the cost of this proposed measure. Valero has repeatedly stated at workgroup meetings and at the public workshops that the cost of this measure in terms of the emissions from its wastewater system are high.

In response to this staff have performed both incremental and socio-economic analyses and found that this measure is very cost effective as an over all control measure. Staff have also performed limited field testing at the Valero facility and has a good working knowledge of the Valero wastewater collection system. This facility already has significant controls in place, therefore, the cost of this measure to the Valero facility maybe as low as the projected $65,000 expense of an additional refinery employee to perform inspections. The cost effectiveness of $1,900 to $4,300 per ton includes equipment costs that Valero may forego.

Effective Date of the Rule

Of all the issues raised at the workgroups, public workshops and the Stationary Source Committee, this issue has been the most contentious. The refineries state that the implementation dates of the proposed amendments to Regulation 8, Rule 8 are very aggressive and had requested a two year lead time prior to the partial control option requirements coming in force. Additionally, the refiners have argued that by providing extra lead time at the inception of this regulation it will provide them with an incentive to investigate pollution prevention measures rather than emissions reduction controls.

However, CBE and members of the community have requested that the lead time for the partial control option be cut to one year or less. CBE has argued that they see no technical reason to delay implementation and that their membership is currently being affected by the emission from refineries. CBE has also stated that they feel that the refineries could expedite the implementation of this rule by budgeting for additional resources to perform work up front.

Staff have examined this issue carefully and has sought advice from both the SCAQMD and leading consultants in the field of wastewater systems, Brown and Caldwell. Brown and Caldwell have performed a large number of studies of refinery wastewater systems including some at bay area facilities. At one of these facilities they were tasked with the production of an overall system map that showed all major junction boxes and manholes on the refinery sewer line. This project took a team of 6 to 8 staff members nine months to complete. Staff have a copy of this survey and have examined it. Additionally, this project had no control or survey elements to it as required by the proposed amendments to Regulation 8, Rule 8.

Based on the size of this facility, the level of detail required by the proposed regulation and the level of current knowledge about refinery systems, staff have determined that the fifteen month lead time provided by the regulation will be the minimum sufficient for the facilities to comply with the regulation.

There is a safety concern regarding the construction and retrofit that must take place at these facilities to comply with the proposed amendments to this regulation. As discussed earlier many of the retrofit and construction portions of this project will be performed in permit required confined spaces at refinery process units. Permit required confined spaces are working environments where a health risk exists to the personnel entering them. Entry into these spaces requires a permit and is also subject to stringent OSHA and monitoring requirements. These requirement means that due to the administration and control of this type of work and because of the nature of the drain system, it will be likely that only one portion of the drain system can be worked on at any given time. These procedures will enable the refineries to remain well below the explosive limits for oxygen in these systems.

Although staff does not recommend an exemption from the control requirements based on safety, the need to schedule safe work environments is a consideration in the proposed implementation date.

Proposed Section 8-8-313.1 provides an option for control of all wastewater system components in a refinery. This option is also present in the comparable South Coast rule. The SCAQMD provided substantially more lead time (4.5 years) for facilities to achieve compliance with the total control portion of their regulation. The proposed amendments to Regulation 8, Rule 8 include a significantly shortened timeline of 2.5 years for total control of these systems which staff have determined based on logistical, safety and technical issues is appropriate to ensure compliance, should a facility choose this compliance option.

Inspection Frequency

The issue of how often to inspect drain system components has also proved contentious in both the workgroups and public workshops. Having reviewed the cost estimates contained in the TAD and this draft report, CBE has been requesting that the refiners perform monthly monitoring on their facility wastewater collection system components for at least the first two years following the implementation of the proposed amendments. CBE argued that due to the episodic nature of releases to refinery drains, it will be impossible to ensure that actual emissions reductions are being achieved by less frequent monitoring.

The refineries have stated that they have limited resources in the area of leak detection and that it takes a significant period of time to train and equip personnel for leak detection. They have also argued that given the stringency of the District's inspection program that this will further tax resources and that they would be unable to support the burden of such a frequent inspection schedule.

Staff have examined these issues and have determined that the schedule of inspections proposed by the regulation will assure that emissions reductions are achieved. The proposal includes a higher inspection frequency initially (bi-monthly for one year) to ensure that major leakers are identified, followed up by semi-annually inspections to ensure components remain leak tight.

Staff have done a number of leak inspections at facilities and has reviewed data from the SCAQMD. This data indicates that the majority of wastewater system components either do or do not leak. Intermittent component leaks are rare. Staff have concluded that the inspection frequency proposed ensures that the majority of leaking components will be found during the initial inspection period.

The proposed amendments are more stringent than the requirements in the SCAQMD rule and require components that are discovered to leak three times over a five year period to be controlled.

In addition, District staff will be conducting inspections. This will find leaking collection system components and will require immediate corrective action thus ensuring the estimated emissions reductions in the proposed rule are achieved.

CONCLUSION

The proposed amendments to Regulation 8, Rule 8: Wastewater (Oil – Water) Separators will exceed the commitment for study made as part of 2001 Ozone Attainment Plan. It is intended to limit the amount of organic compounds released during the collection of refinery wastewater during transport to on-site treatment. Pursuant to the Health and Safety Code Section 40727, new regulations must meet necessity, authority, clarity, consistency, non-duplicity and reference. The proposed regulation is:

- Necessary to protect public health by reducing ozone precursor emissions. The amendments also reduce exposures to toxic air contaminants.
- Authorized by California Health and Safety Code Section 40702.
- Clear, in that the new regulation specifically delineates the affected industry, compliance options and administrative 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
- The proposed regulation properly references the applicable District rules and test methods and does not reference other existing law.

While this current revision is targeted at refineries only, it is recommended that other industries subject to this rule be studied and, if necessary, controlled in a similar manner so that emissions reductions can be obtained. Also, both the TAD and this rule making effort identified a number of other areas where further potential emissions reductions could be studied, including better characterization of the contribution of heavier hydrocarbons (i.e., diesel fuel, fuel oils, etc.) in the wastewater stream to VOC emissions from the wastewater collection system and study of emissions from wastewater treatment.

A socioeconomic analysis mandated by Section 40728.5 of the Health and Safety Code concludes that the proposed amendments would not have significant impacts. Also, analysis performed pursuant to the California Environmental Quality Act (CEQA), concludes that the proposed amendments would result in no negative environmental impacts. A Negative Declaration for the proposed amendments has been prepared and was circulated for comment. No comments were received during the comment period from June 7, 2004 to June 28, 2004. This declaration was re-circulated for comment between August 13, 2004 and September 7, 2004. No comments were received during this second comment period.

Staff recommend the adoption of the proposed amendments to Regulation 8, Rule 8.

REFERENCES

1. California Air Resources Board Draft Technical Assessment Document "Potential Control Strategies to Reduce Emissions for Refinery wastewater Collection and Treatment Systems" January 2003.

2. Bay Area Air Quality Management District, "Best Available Control Technology (BACT) Guideline for Water Treating – Oil-water Separator", October 1991.

3. South Coast Air Quality Management District, "Proposed Amended Rule 1176 – VOC Emissions From Wastewater Systems", Final Staff Report, September 13, 1996.

4. United States Environmental Protection Agency, AP-42 "Waste Water Collection, Treatment And Storage", January 1995.