

CHAPTER I SUMMARY

generation of VOC emissions to a large extent from the point of entry of liquid into the drains until the liquid enters controlled wastewater separators.

The following sections discuss the primary emission sources in a wastewater system and the proposed amended Rule (PAR) 1176 performance based standard that is proposed to apply.

a. Process Drains

Process drains have been installed in applicable sources to collect and transport wastewater which may be made up of a variety of mixtures of water and petroleum liquid, emulsified oil, VOC, or other hydrocarbon that are the byproducts of various processes. The majority of the process drains were designed and constructed to be open to the atmosphere. Some drains may be dedicated to a single piece of equipment, while others might serve several sources. Individual drains are connected to lateral sewer lines. Wastewater flow moves from the drain opening into a lateral sewer line, into junction boxes, and eventually flows to a wastewater separator. VOC emissions from DSCs can occur from (1) the liquid flowing into a drain opening, (2) from drain openings allowing escape of either standing or flowing liquid, (3) from vent pipes serving the drain system such as those on junction boxes, or (4) from the covers of sewer lines or junction boxes.

For emission reduction purposes, the drain system should be viewed as a continuous system transporting an emission source, from process units to the wastewater separator system. This viewpoint seeks to control emissions along the entire length of the transport (drain) system. The liquids entering from the process units into the drain systems contribute emissions at various points. Chapter III, Control Technology, will discuss controls being used to reduce or eliminate emissions along the drain system.

b. Junction Boxes, Vents and Manhole Covers

The purpose of junction boxes is to permit ready access to the sewer lines to facilitate inspection and clearing, as well as to isolate the branch or lateral sewers from one another. This isolation prevents the travel of hydrocarbon vapors from one line to another. Junction boxes may be vented to the atmosphere and are provided with access points through fixed covers or manhole covers. The current Rule 1176 allows an open vent pipe up to four inches in diameter and equivalent openings on manhole covers for junction boxes. These vents or openings continue to be a potential source of VOC emissions from wastewater systems. Therefore, staff conducted a series of surveys, source tests and Organic Vapor Analyzer (OVA) monitoring of junction box vents and their manhole covers at all major refineries in early 1996. The results may be found in Appendix I. The proposed amendments subject junction box vents and their manhole covers to the existing 500 ppm standard.

c. Sewer Line Manhole Covers

In order to gain access to sewer lines for the purpose of inspection, maintenance, sampling, and repair, the sewer line is provided with access openings referred to as manholes. The sewer line manholes are typically covered with circular, steel plates with openings used for lifting the covers. These vents or openings continue to be a potential source of VOC emissions from wastewater systems. Therefore, staff conducted a series of surveys, source tests and OVA monitoring of sewer line manhole covers at all major

CHAPTER I SUMMARY

refineries in early 1996. The results may be found in Appendix I. The proposed amendments require sewer line manhole cover openings to be completely sealed by June 30, 1997, and subject to the existing 500 ppm standard.

d. Performance Based Standards

The performance based standards that apply to the wastewater systems will be measured using two methods. First will be the excess emissions standard which is defined in the proposed amendments to be VOC emissions greater than 500 ppm above background levels, as measured according to Environmental Protection Agency (EPA) Reference Method 21. This method is to be used for identification of various types of DSCs (i.e., non, low, high or repeat emitting) and for subsequent monitoring and repair requirements of DSCs. Second will be an instantaneous grab sample used to analyze and measure VOC emissions by EPA Reference Method 25. This method will be used for determining compliance with the 500 ppm VOC emission standards for DSCs and may also be used for testing APC devices. Currently, some equipment is subject to the 500 ppm limitation. It is the intent of the proposed amendments to limit all of the wastewater system equipment and components to the 500 ppm limit, except process drains when receiving liquid through the drain hub or opening.

C. STATEMENT OF FINDINGS

Health and Safety Code Section 40727 requires that prior to adopting, amending or repealing a rule or regulation, the AQMD Governing Board shall make findings of necessity, authority, clarity, consistency, non-duplication, and reference based on relevant information presented at the hearing.

Necessity - The AQMD Governing Board has determined that a need exists to amend Rule 1176 for the following reasons:

- To ensure intended VOC emission reductions through control of repeat emitting drains and control of other wastewater system components.
- To provide increased operational flexibility to facilities by reducing the monitoring and source test frequencies.
- To exempt specific insignificant emission sources.

Authority - The AQMD Governing Board obtains its authority to adopt, amend or repeal rules and regulations from California Health and Safety Code Sections 39002, 40000, 40001, 40440, 40441, 40702, 40725 through 40728, 41508, and 42300.

Clarity - The AQMD Governing Board has determined that Rule 1176, as proposed to be amended, is written or displayed so that its meaning can be easily understood by the persons directly affected by it.

Consistency - The AQMD Governing Board has determined that Rule 1176, as proposed to be amended, is in harmony with and not in conflict with or contradictory to, existing statutes, court decisions or state or federal regulations.

Non Duplication - The AQMD Governing Board has determined that Rule 1176, as proposed to be amended, does not impose the same requirements as any existing state or federal regulations, and the amendments are necessary and proper to execute the powers and duties granted to, and imposed upon, the AQMD.

Reference - The AQMD Governing Board by adopting this regulation is implementing, interpreting or making specific the provisions of: Health and Safety Code Sections 40001 (rules to achieve ambient air quality standards), 40440(a), (rules to carry out the Air Quality Management Plan), (b) (Best Available Retrofit Control Technology), and (c) (rules which are also cost-effective and efficient), 40702 (rules to execute duties necessary to preserve original intent of rule) and 40910 et seq., (California Clean Air Act).

Pursuant to Health and Safety Code Section 40920.6, prior to adopting rules or regulations to meet the requirement for best available retrofit control (BART) technology pursuant to Sections 40918, 40919, 40920, and 40920.5, or for a feasible measure pursuant to Section 40914, AQMD is required by the Health and Safety Code to adopt written findings that identify one or more potential control options which achieve emission reduction objectives, determine the cost-effectiveness of each potential control option and determine the incremental cost-effectiveness of potential control options. Potential Control Options, Cost-effectiveness, and Incremental Cost-effectiveness have been completed and are summarized in Chapter V of this document.

The proposed amendments to Rule 1176 are a "project" as defined by CEQA (California Public Resources Code Section 21000 et seq.). The AQMD is the lead agency for the project and has prepared both a Draft and a Final SEA which modifies the previous Environmental Assessment for Rule 1176, pursuant to its certified regulatory program (California Public Resources Code Section 21080.5). AQMD's regulatory program, Rule 110, was certified by the Secretary of the Resources Agency on March 1, 1989. The Draft SEA analyzes the potential environmental impacts of the proposed amendments to Rule 1176, and was circulated for a 30-day public comment period. All written comments received on the Draft SEA were incorporated into the Final SEA.

CHAPTER II

PROPOSED AMENDMENTS

CHAPTER II PROPOSED AMENDMENTS

Rule 1176 - VOC EMISSIONS FROM WASTEWATER SYSTEMS

The title of the rule has been changed to better reflect the original intent to control VOC emissions from the entire wastewater system, not just sumps and wastewater separators. PAR 1176 to some extent regulates the same equipment and components, however the existing rule's title "Sumps and Wastewater Separators" did not make the intent of the rule clear. Following are the proposed changes to the existing rule.

A. PURPOSE

The proposed amendments reduce VOC emissions from wastewater along the entire wastewater system, as intended by the original rule.

B. APPLICABILITY

The applicability of the proposed amendments to various facilities is the same as the current rule except all bulk terminals will be excluded. There has been confusion as to whether or not some equipment handling refinery wastewater was included in the current Rule 1176. New definitions and exemptions clarify these issues.

C. DEFINITIONS

A few key definitions in the proposed amendments have been derived from EPA's 40 CFR Part 60, Subpart QQQ-Standards of Performance for VOC Emissions from Petroleum Refinery Wastewater Systems. Some definitions have been included or changed to make the rule consistent with other existing EPA and AQMD regulations. Other definitions have been added for clarification of adopted sections of the rule or to explain the proposed amendments.

D. IDENTIFICATION REQUIREMENTS

The components of the wastewater system and APC devices are not presently required to be individually identified through tagging or on a schematic. This makes inspection and tracking of performances of such components difficult.

For facilities other than refineries the proposed amendments will require, upon written request, a schematic of the wastewater system components and associated APC devices identifying their location in the facility. The location of the DSCs may be provided on a list if they are too numerous to place on the schematic. Facilities have 60 days after request from the AQMD to submit this information.

The refineries will be required to develop a comprehensive compliance plan which will include among other things, identification of which one of the two control options has been chosen for control of DSCs, a detailed schematic identifying the location of the wastewater system within the facility, accompanied by a complete DSC list that will include their total number; identification of their individual location; if controlled, the type of control; a categorization of the DSCs into non, low, high, or repeat emitters; a characterization of junction box vents and identification of the proposed method(s) of control; and identification of any alternate DSC control measures for the AQMD's pre-approval. The purpose is to have each component of the wastewater system individually identified and located on a schematic and list for inspections.

Proposed Amended Rule 1176

II-1



September, 1996

CHAPTER II PROPOSED AMENDMENTS

repairs, replacements and recordkeeping requirements. Also, the intent is to have all major components individually identified on the schematic, such as a wastewater separator, but not their hatches. Junction boxes would need to be identified. The drain system with all sewer branches and laterals will be required to be included on the schematic, but the smaller DSCs may be identified on an accompanying list attached to the schematic describing their location in relationship to the rest of the wastewater system and process units they serve. Historical data collected prior to the rule adoption may be used for the categorization of process drain DSCs. Refineries have nine months to prepare and submit this information to the AQMD.

E. OPERATION AND CONTROL REQUIREMENTS

a. Wastewater System Emissions

The wastewater systems and associated closed vent systems shall not have VOC emissions in excess of 500 ppm above background. Exemptions are provided for process drains while receiving wastewater, components subject to the emission limits of Rule 1173 on closed vent systems and floating covers in compliance with rule specifications. For purposes of enforcing the 500 ppm emission limitation, AQMD staff will take an instantaneous grab sample for an EPA Reference Method 25 analysis as specified in paragraph (h)(2).

b. Sumps and Wastewater Separators

Separator forebays, clarifiers, tanks including dissolved air flotation tanks, induced gas flotation tanks, and induced air flotation tanks have now been incorporated into the new definition of wastewater separator. The word "tanks" as used in this definition does not include tanks subject to Rule 463 - Organic Liquid Storage. The emissions from the wastewater separator as newly defined, will be required to be controlled to the same extent as those from a wastewater separator. The proposed amendments require this equipment to be in compliance with the emission limits by June 30, 1997. Should modification to this equipment be necessary to meet compliance, the proposed amendments provide for an extension of the compliance date, provided that a complete application package for the permit is submitted to the AQMD on or before November 13, 1996.

Proposed amendments to sump and wastewater separator covers are for rule clarification and to keep rule language more consistent with other sections of the rule.

c. Sewer Lines

All sewer lines connecting with the receiving wastewater separator are required to be enclosed so that no liquid surface is exposed to the atmosphere. This would also include manhole covers providing access to the sewer lines except for inspection, maintenance, sampling or repair. Manhole covers typically may have openings used for lifting the covers and the proposed amendments would require these openings to be sealed by June 30, 1997.

d. Process Drains

Proposed Amended Rule 1176

II-2



September, 1996

New process drains installed after the adoption date, must have water seals or comparable controls in conformance with EPA's New Source Performance Standard (NSPS) for "VOC Emissions from Petroleum Refinery Wastewater Systems" (40 CFR Part 60, Subpart QQQ) adopted in July 1993. All process drains will be exempt from the excess emissions and the grab sample analysis standard while receiving wastewater.

e. Junction Boxes

Junction box vents and junction box manhole cover requirements will remain the same as the current Rule 1176, except the junction box vents and manhole cover openings will be required to be monitored and subject to both the excess emissions and grab sample analysis standard. If emissions from junction box vents or manhole cover openings exceed 500 ppm VOC, the facility operator will need to control these emissions to remain in compliance after June 30, 1997. As part of the initial compliance plan, refineries are required to categorize emissions from junction box vents and to identify what control(s), if any, will be utilized on each junction box vent. Any alternate DSC control measures may be pre-approved by the AQMD. If the junction box should need to be controlled to remain in compliance and the control device requires a Permit to Construct, the proposed amendments provide for an extension of the compliance date, up to six months after a Permit to Construct is issued, provided that a complete application package for the permit is submitted to the AQMD on or before June 30, 1997.

f. Slop Oil

Staff determined that the handling of slop oil, oil contaminated wastewater, or tar from a sump or wastewater separator are already regulated as hazardous waste by other agencies or reprocessed through AQMD permitted equipment. As a result this provision was eliminated to avoid duplication.

g. Air Pollution Control Devices

Proposed amendments provide alternatives for requirements for APC devices. APC devices are required to achieve a control efficiency of 95%, or not have measurable VOC emissions in excess of 500 ppm above background from the exhaust. Any APC device or other alternate system controlling the vapors from the wastewater system, which gives the same level of control efficiency, will also be acceptable subject to review and approval by the AQMD before issuing a Permit to Construct or a Permit to Operate for that system.

Under the first option, APC devices meeting 95% control efficiency will need annual instead of semi-annual verification by a source test conducted according to EPA Reference Method 25 or an approved equivalent method.

As a second option, outlets from APC devices meeting a performance based standard cannot have emissions measured to be greater than 500 ppm of VOC by EPA Reference Method 21 or by taking an instantaneous sample in an evacuated sample container and analyzing the sample according to EPA Reference Method 25. Monthly monitoring is required.

h. Refinery DSCs

Requirements for DSCs at petroleum refineries provide flexibility for each facility to choose one of two options to reduce VOC emissions. The refinery can choose to either reduce emissions from repeat emitting DSCs or to install controls on all DSCs incrementally over four years. Both options will require each facility to submit, as part of the facility's compliance plan a description of which option was chosen, the total number of DSCs, a detailed schematic or list of all of the DSC locations, and categorization of all DSCs.

The intent of the first option, controlling problem DSCs, is for the refinery to make permanent repairs for the repeat emitting DSCs, not just flush the DSC with water and allow the same problem to reoccur or persist. If the DSC already has a water seal or other control installed and it continues to have excess emissions, then additional controls such as hardpiping or capping would be required. This option will require appropriate recordkeeping to prove compliance.

The second option simply requires 100% of DSCs to be controlled by the end of the year 2000, through an incremental compliance scheme.

F. INSPECTION AND MAINTENANCE REQUIREMENTS

As a self-compliance program, regular inspection, maintenance, and repair actions are the responsibility of facility operators. The proposed amendments in this section reduce the monitoring frequency for some wastewater separators, closed vent systems and DSCs from monthly to quarterly, semi-annually, or annually for VOC emissions according to EPA Reference Method 21 or the AQMD grab sample protocol attached to the proposed rule amendments.

For refineries, the categorization of the DSCs as non-emitting, low-emitting, high-emitting, or repeat-emitting can be done by monthly monitoring for the first nine months after September 13, 1996 or until the compliance plan is submitted. Then, depending upon the DSC category, some DSCs will require monitoring on a monthly basis if they have excess emissions, while other DSCs that are low-emitting or that are non-emitting will only require quarterly and semi-annual monitoring, respectively. Inaccessible components may be inspected annually. All analyzer readings need to be taken and recorded by an AQMD-certified person. The AQMD will provide or approve training programs and provide certification to operator for implementing this Rule.

For oil production fields, chemical plants, and industrial facilities, the new reduced inspection and monitoring frequency will begin upon adoption of the proposed amendments.

Any violations in equipment or in emissions have to be repaired or rectified within three calendar days from detection and reinspected between 24 to 48 hours for petroleum refineries and between 24 hours to 15 calendar days for all other facilities, after repair or rectification. The operator will be required to reduce and control emissions during the repair or rectification of equipment or components using best feasible methods.

G. RECORDKEEPING, REPORTING AND VERIFICATION OF RECORDS REQUIREMENTS

CHAPTER II PROPOSED AMENDMENTS

Any change to the wastewater system or in the identification of individual components, requires updating the schematic or list of the DSCs within 60 days after the change is completed.

The proposed amendments will require recordkeeping to substantiate that all APC devices for wastewater separators operate during emission producing activities. All inspection records for wastewater systems will be required to include documented and written or machine recorded operator inspections, VOC measurements including corresponding background levels, source tests, repairs, replacements, and reinspection records; and the date of the reading and the name and signature of, or the distinct electronic identification code for, the certified inspector. Electronic identification will still require the certified inspector to verify in writing that he or she has conducted the inspection and monitoring. All inspections will need to be verified by the facility official with responsibility for the operation of the equipment that has been inspected and monitored by a certified inspector. Any inaccurate verification of the inspection records is considered to be a violation of the rule.

Reporting requirements for refineries require a quarterly or a semi-annual DSC report to be submitted to the AQMD within a required time frame to demonstrate compliance for the reporting period. The option for controlling problem DSCs will require quarterly reports, whereas the option to install DSC controls on 100% of the DSCs will only require semi-annual reports.

H. TEST METHODS

EPA Reference Method 21 is the proposed method to screen for fugitive emissions. It should be used by the facility operator to detect emissions. AQMD inspectors will use this method to find excess emissions and then take a grab sample for analysis, if necessary. PAR 1176 has a grab sample protocol attachment.

The proposed changes allow any other test methods to be used beside the specified methods, as long as the applicant can demonstrate equivalency and get approval in writing from the Executive Officers of the AQMD, the California Air Resources Board (CARB), and the Regional Administrator of the U.S. EPA, Region IX, or their designees. The EPA Reference Method 25 procedure for APC devices not having enough volume flow, such as portable carbon canisters, is proposed to be changed to allow a sample to be taken in a container and then analyzed by the EPA Reference Method 25 procedure.

I. EXEMPTIONS

The proposed amendments require any person seeking an exemption to supply, upon request, proof that the exemption is necessary and/or justifiable. Examples of proof would be source tests, lab samples, and recorded and verified records. Some exemptions apply to only specific sections of the proposed rule, while other exemptions apply to all the requirements of the proposed rule.

The VOC emissions in excess of 500 ppm standard do not apply to process drains receiving wastewater.

CHAPTER II PROPOSED AMENDMENTS

To provide an incentive for the operator to find non-compliant equipment or excess emissions before AQMD discovery, an exemption exists if the non-compliance has been recorded and repaired within three calendar days with a follow-up inspection.

Facilities that inject natural gas back into old oil fields and can prove that their wastewater system has not emitted VOC emissions greater than 500 ppm for the most recent two years, will be exempt from monitoring and applicable recordkeeping.

Some pipes are grouped together in an open pipe channel or trench designed to contain leaks or spills. The rule allows for an exemption from covering these types of spill containment channels as long as they are not used to transport hydrocarbon-containing and/or VOC-containing process liquid from activities such as tank draws or replacement of the sewer system.

Junction boxes that are designated as the legal sample point on the facility's industrial wastewater permit will be exempt from all the rule provisions.

A biological wastewater treatment unit meeting a VOC content equal to or less than 5 mg per liter for each liquid stream entering the treatment unit will be exempt from the requirements of the rule. The exemption is intended to apply to biological wastewater treatment units and their downstream equipment in a secondary treatment system that is installed and operated to meet the National Pollutant Discharge Elimination System discharge requirements.

Sanitary sewers and sanitary sewer systems are exempt from all provisions of the proposed rule.

VOC emissions from process drains and junction boxes can be controlled in a variety of ways from enclosing or controlling all openings to having a very rigid inspection and maintenance (I & M) program or using a combination of controls. The following is a discussion of various control technologies or measures.

A. ENCLOSING BY DIRECT PIPING (HARD-PIPING)

Hard-piping is the most stringent control option and would 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 is done in some refineries, however there may be some concern with vapor lock or siphoning.

This method is considered to have up to 100% control efficiency. However, the safety issues and reconstruction complexity may be two prohibiting factors that reduce the likelihood of converting an existing open drainage system to a totally enclosed system.

B. EQUIPPING THE DRAINS AND VENTS WITH WATER SEAL CONTROLS

Water seal controls on drains and vents would help prevent emissions from the downstream sewer lines from escaping back out of the drain or vent opening. 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. Also, if the water is allowed to evaporate from the water seal control, the emissions from the drain or vent would be similar to those from uncontrolled units. Below are two types of water seal configurations:

- 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.

The overall control efficiency of this method is estimated at an average of 65%, and varies depending on the proper maintenance of the water seal.

C. COLLECTING AND VENTING THE EMISSIONS TO A CONTROL DEVICE

Emissions can be collected and vented to a control device as follows:

- Process drain and junction box vent emissions could be collected and directed to a control device such as a carbon adsorber, a thermal oxidizer or other combustion device, a condensation unit, a flameless incineration unit, or a catalytic oxidation unit.

CHAPTER III CONTROL TECHNOLOGY ASSESSMENT

- A portable canister with active vapor collection going to a carbon adsorption system could be used for small unit turnaround, spills and general cleanup to keep contaminated water out of the drain system.

These control devices can achieve a control efficiency of greater than 95%, and allow for ventilation in the wastewater system.

D. INSPECTION AND MAINTENANCE PROGRAM

Some of the control measures, such as water seals, require an extensive I & M program in order to be effective. Southern California's warm climate with little precipitation can quickly evaporate a water seal making it ineffective for controlling VOC emissions. In addition, if VOC-containing liquid flows into a water seal controlled drain and the operator does not thoroughly flush the water seal with fresh water, the VOCs will continue to evaporate into the atmosphere.

A more frequent inspection and repair program for problem drains identified to have excess emissions could reduce emissions. The longer the source of the VOC is left unattended the more the emissions. The source of the emissions could be from something such as a slug of hydrocarbon-containing material trapped in the drain system or a piece of equipment with a leaking seal dripping gasoline into a process drain.

During sewer line cleanouts a water seal or the practice of capping or plugging all drain openings could reduce VOC emissions. One unattended process drain or junction box vent can be the source of thousands of pounds of VOC emissions during the year.

E. SOURCE ELIMINATION THROUGH DIVERSION OF VOC-CONTAMINATED WASTEWATER FROM THE DRAIN SYSTEM

In this control approach the principal strategy is to handle the wastewater system so that wastewater does not enter the drain system. Turnarounds would require plugging of associated drains and diversion of VOC-containing liquid to either tanks, vacuum trucks, or oil/water separators. One refinery has reported that wastewater from tank draws is diverted to vacuum tank trucks rather than into the drain system. The wastewater is then reintegrated into the process stream. Other refineries have hard-piped tank draws directly, eliminating wastewater from the open drain system.

F. CLOSED-LOOP SAMPLING

This technique prevents the loss of VOC liquid during product sampling and has been required for certain applications under the federal NSPS.

G. SEALING OF MANHOLE COVERS

Manhole cover emissions can be reduced as follows:

- Plug pick holes with neoprene, wood, or caulk.
- Place a gasket underneath a manhole cover.

Although information is limited, this method is assumed to have an average of 65% overall control efficiency, similar to the water seals.

H. OTHER ALTERNATIVES

Proposed Amended Rule 1176

III-2

000035

September, 1996

CHAPTER III CONTROL TECHNOLOGY ASSESSMENT

New control technologies or application of existing technologies may be developed overtime for control of emissions from the wastewater systems. Examples of these additional alternatives may include source reduction and the use of pressure-vacuum valves. The control efficiencies of these alternatives vary depending on specific approaches and applications. Further evaluation by staff will be required before these technologies or applications are accepted as effective control measures.

I. COMBINATION OF THE ABOVE STRATEGIES

Proposed amendments allow the facility operator to make a choice in controlling excess emissions from process drains, junction boxes and manhole covers using one or more of the control options discussed above. The appropriate control options can be utilized depending on the system design and emission levels from each wastewater system.

Proposed Amended Rule 1176

III-3

000040

September, 1996

Rule 1176 was developed to reduce VOC emissions from wastewater systems by implementing additional controls to those specified in Rule 464 - Wastewater Separators, and by requiring controls on process drains, sewer lines and junction boxes at applicable facilities. Drain emissions data reported to the AQMD from 1990 through 1994 show that drains continue to be a source of VOC emissions. Junction box vents and manhole cover openings are also sources of VOC emissions as determined in previous studies and through field source testing and OVA monitoring conducted by the AQMD. The proposed amendments will require better control of emissions from these components, which are estimated to have VOC emissions of about 4.3 tons per day (tpd). The following sections will discuss the estimated emissions for each component. All emission inventories, detailed emission calculations, and results of source testing and monitoring data are presented in Appendix I, Tables I-1 through I-12 and Figures I-1 and I-2 in this document.

A. PROCESS DRAINS

The 1989 Rule 1176 staff report estimated that VOC emissions from process drains were 1 tpd and the emissions would be reduced to 0.1 tpd by implementing the rule requirements. However, after evaluating drain emission data from refineries provided to the AQMD on Emission Fee Billing (EFB) Form R3 from 1990 through 1994, staff recalculated drain emissions to have been averaging approximately 4.7 tpd instead of 1 tpd at the adoption date of Rule 1176. The increase in the estimated emissions was due to adjusting for the total number of drains resulting in an improved inventory for drains and the revised technique for emission estimation.

Initially in 1990 and 1991 drain emissions were calculated using a factor of 398 pounds of VOC from each drain for the entire year. This factor was developed based on EPA emission factors referred to as AP-42 for uncontrolled drains with a 35% control efficiency as allowed by the AQMD due to an I & M program.

In 1992 the AQMD approved the use of the following correlation equation (U.S. EPA, 1980).

$$\text{Drain Emissions (lb/day)} = (7.553 \times 10^{-3}) \times (\text{ppm screening value})^{1.02}$$

Essentially the protocol for using this equation required, at a minimum, two OVA readings in ppm. The drain was then assumed to be emitting emissions at the ppm rate of the second OVA reading for the period of time from the first reading to the second reading (AQMD, EFB Protocol). This interpretation of OVA readings was changed in 1994 to allow averaging of the two readings.

Another factor that affected drain emissions was EPA's promulgation of 40 CFR 61, Subpart FF- National Emission Standard for Benzene Waste Operation (Benzene NESHAP) and the AQMD's adoption of this regulation in 1991. Two refineries in the AQMD's jurisdiction were required to reduce benzene emissions. While complying with a reduction in benzene emissions from wastewater systems, the refineries also reduced other VOC emissions by approximately 50%, based on reported emissions. This was mainly accomplished during 1992 and 1993 for these refineries by installing controls or the use of source reduction to comply with the benzene NESHAP. Since further significant reductions are not expected from these refineries, their drain inventories are not included in the emission reduction and cost-effectiveness calculations.

Table I shows the emissions reported to the AQMD by the refineries on EFB form R3.

000044

Table 1: DRAIN EMISSIONS

	No. of Drains	Emissions T/D*
1990	11,149	7.3
1991	15,101	7.5
1992	16,420	3.7
1993	18,422	3.1
1994	18,292	2.3

* The drain emissions for 1990-1992 were adjusted for an improved inventory of the total number of drains. The total number of drains for estimating emissions is based on the assumption that drains are a physical structure and the number should remain relatively constant from year to year unless there is an alteration or modification to a facility.

Between 1992 and 1994 process drain emissions were reduced by 1.4 tpd from 1992 levels of 3.7 tpd as shown in Table 1. Staff believes that the benzene NESHAP and the closure of several refineries contributed to this reduction.

Proposed amendments should further reduce process drain emissions by 0.97 tpd from 1994 levels (see Table 3). To determine emission reductions and cost-effectiveness, a 65% control efficiency was used for drains. This is based on an estimated 50% control for water seals (Radian, 1989) and an additional 15% for source elimination, capping and plugging. A total of 11,921 drains (excluding controlled drains) were used in the calculations.

B. JUNCTION BOX VENTS

The original rule was intended to reduce VOC emissions from junction boxes by requiring them to be totally enclosed with a solid, gasketed, fixed cover or a manhole cover. However, the fixed cover was allowed to have an open vent pipe up to four inches in diameter, and the manhole covers were allowed to have an equivalent opening. These vents are a greater potential source of VOC emissions from wastewater systems than anticipated. Therefore, staff conducted a series of surveys, source tests and OVA monitoring of junction box vents and manhole covers at all major refineries in early 1996.

Staff also conducted an inventory by requesting information over the phone and followed up in writing from the refineries regarding the number of junction boxes and manhole covers. Nine out of 12 refineries responded to the survey but not all of them differentiated between the number of junction boxes and manhole covers. Junction boxes are not typically found at oil production fields but may be found at some chemical plants and natural gas storage fields. For non-refinery junction boxes staff assumed that none of the junction boxes have measurable emissions and, therefore, used the zero default drain emission factor to calculate emission reductions and cost-effectiveness. While most junction box vents are uncontrolled, some facilities do have controlled vents and others have junction boxes totally enclosed without vents.

Monitoring with OVAs was conducted and the readings were taken for emission estimation purposes. Additional source tests and lab analyses were conducted on some sources to validate the emission data.

Proposed Amended Rule 1176

IV-2



September, 1996

The survey was followed up with two rounds of inspections on randomly selected junction boxes and manhole covers. The results of the surveys are presented in Appendix 1, Tables 1-6 through 1-12. Table 2 summarizes the survey activities.

Table 2: AQMD SURVEY

Inventory Nos.	Junction Boxes	Manhole Covers	Total
Total Reported	582*	2,080	2,662
Controlled or Enclosed	406	670	1,076
Total Uncontrolled	176	1,410	1,586
Inspected			
1st Survey **	34 (28)	99 (72)	133
2nd Survey **	34 (28)	99 (72)	133
Source Tested	7	5	12

* Since some refineries did not differentiate junction boxes from manhole covers in their reports, the numbers reflect staff's best estimates.

** Numbers in parenthesis are uncontrolled junction boxes or manhole covers subject to the proposed amended rule.

During the survey, distinctive flow patterns were observed at some of the junction box vents and manhole cover openings. While most vents did not have any recognizable flows at the time of the surveys, the flows of a small percentage of them were readily observable. The source test results show that the emission rates for these two different flow patterns were significantly different. The comparisons listed in Appendix 1, Table 1-5 and Figures 1-1 and 1-2 suggest that the emission rates for those with observable flows (referred to as "Positive Flow") may be projected using the AQMD emission correlation equation for drains (EPA, 1980), while that for the others (referred to as "Regular Flow") may be calculated using the 1995 EPA correlation equation for VOC fugitive emissions for components under the category of "Others." Therefore, the emission estimates are based on these two correlation equations depending on the flow patterns of the vents.

Of the valid samples and survey results collected from uncontrolled 28 junction boxes subject to PAR 1176, four were considered to have "Positive Flow." Three out of 72 manhole covers shows the "Positive Flow" pattern. The actual instantaneous flow rates of the tested vents ranged from approximately five cubic feet per minute (cfm) to 13 cfm.

The two surveys which form the basis of this emission estimate were conducted within a two-week time frame in April 1996. Staff recognizes the fact that the flow patterns of these junction box vents can vary due to factors such as operation cycles, operator's activities, and daily or seasonal production changes. Therefore, a third survey was conducted on the junction boxes in June 1996. The results of the third survey indicate that, while variations exist, the overall emissions were not significantly affected.

Emission data collected by staff during the first two surveys, along with source test data and lab analyses are used to estimate emissions. The estimated emissions from uncontrolled junction box vents are 0.93 tpd. In order to make conservative estimates of the costs, it was assumed that all vents with regular and with positive flows will be individually equipped with water seals and APC equipment, respectively. With a control efficiency of 65% for the regular flow vent

Proposed Amended Rule 1176

IV-3



September, 1996

CHAPTER 4 EMISSION IMPACTS

controls and 95% for the positive flow vent controls, the emission reduction is estimated to be 0.89 tpd (see Table 3).

C. MANHOLE COVERS

Manhole covers may be found on junction boxes or sewer lines to provide access for maintenance. They usually have small pick holes in them allowing for removal of the cover or lid. The original rule as adopted allowed manhole covers to have pick holes equivalent to the four inch opening in junction box vents. At some facilities the manhole covers are completely sealed and at others the pick holes remain open. Chemical plants and industrial facilities usually have small diameter sewer lines and do not typically use manhole covers. In the calculations for emission reductions and cost analysis, only manhole covers with open pick holes were included.

The number of manhole covers inspected, monitored and source tested are shown in Table 2. Similar to junction box vents, manhole cover pick openings are divided into two categories, positive flow openings and regular flow openings.

Emission data collected by staff along with source test data and lab analyses were used to estimate the emissions from manhole cover pick holes to be 1.85 tpd. Similar to the regular flow junction box vent controls, with a control efficiency of 65 percent, the emission reductions are estimated to be 1.2 tpd (see Table 3).

Table 3: EMISSION SUMMARY

	Drains	Junction Boxes	Manhole Covers	Total
Emission Inventory (tpd)	1.49*	0.93	1.85	4.27
Control Efficiency (%)	65	65/95	65	N.A.
Emission Reductions (tpd)	0.97	0.89	1.20	3.06**

* Inventories from refineries required to meet the benzene NESHAP are excluded.

** This does not include the potential emission increase of 0.1 ton/day due to the proposed exclusion of bulk terminals. The overall VOC emission reductions, however, are still about 3.0 tons/day.

CHAPTER V

COST-EFFECTIVENESS

Pursuant to Health and Safety Code Section 40920.6, prior to adopting rules or regulations to meet the requirement for BARCT technology pursuant to Sections 40918, 40919, 40920, and 40920.5, or for a feasible measure pursuant to Section 40914, AQMD is required by the Health and Safety Code to identify one or more potential control options which achieve emission reduction objectives, determine the cost-effectiveness of each potential control option and determine the incremental cost-effectiveness of potential control options.

In order to determine cost-effectiveness, the cost of a potential control option is divided by the estimated emission reduction potential for such control option. Therefore, emission reduction estimates from Chapter III along with the cost of utilizing each option are used to calculate cost-effectiveness. Staff chose carbon adsorption as a control option representing high cost because of the high replacement cost of the carbon even though the initial cost and installation cost are low compared to other control devices. The flameless thermal oxidizer was chosen because it represents a more reasonable cost-effective option similar to catalytic and thermal oxidation.

A total of 23 junction boxes are projected to require controls. This includes 18 junction boxes that may have "positive flow" from their vents and an additional five to handle variations in flow pattern as observed during the AQMD surveys. The actual number of APC devices required to control these junction box vents will vary depending on the specific situation at each site. However, for purposes of determining cost-effectiveness of this rule, staff takes a conservative approach by assuming each of these 23 junction boxes will be equipped with an individual APC device. In addition, staff assumes that the refinery which has already installed controls on all DSCs (identified as Refinery 3 in this report) will eventually install 4 additional APC devices under the control option of flameless thermal oxidizer (see Table II-2 of Appendix II). These additional APC devices may be required at Refinery 3 because the refinery has indicated that modifications on their existing control devices may be necessary to meet the proposed rule requirements. The additional APC devices are not required for the option of activated carbon (Table II-3, Appendix II) because Refinery 3 has already controlled these junction boxes with the same technology. Since the number of carbon replacements is dependent on emissions, the additional replacement costs will not significantly affect the overall cost-effectiveness, especially after controls of all other DSCs are considered.

The overall cost-effectiveness (discounted cash-flow method) of the proposed amendments is estimated to be \$572 per ton of VOC emission reduction using a combination of controls and flameless thermal oxidizers as APC equipment. If a company chooses to use a different type of APC equipment, this cost-effectiveness could be as high as \$4,386 per ton of VOC emission reduction (using carbon adsorbers).

Incremental cost-effectiveness is calculated using 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. Four control options are identified for incremental cost-effectiveness analysis. These options are listed below in the order of increasing stringency:

- Option 1: Control Emissions from Drains Only.
- Option 2: Control Emissions from Drains and Junction Box Vents.
- Option 3: Control Emissions from Drains, Junction Box Vents, and Manhole Covers.

Proposed Amended Rule 1176

V-1

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September, 1996

- Option 4: Control Emissions from Totally Enclosed Drainage and Sewer System.

Although Option 4 has the highest level of potential emission reductions, it is not recommended for the purposes of this rule amendment. As indicated earlier, there are concerns over safety issues when an existing open drainage system is to be enclosed completely. The engineering complexity and thus the costs of the conversion may also be prohibitive. Therefore, Option 3 has been recommended as the cost-effective option for the rule amendments.

The detailed cost-effectiveness calculations for each control option and the overall cost-effectiveness of the proposed rule are presented in Appendix II, Tables II-1 through II-4 in this document. The summary of cost-effectiveness analysis is shown in Appendix II, Table II-5. The incremental cost-effectiveness analysis of the control options and an overall summary are given in Appendix II, Table II-6.

The proposed amendments reduce the inspection and monitoring frequencies for DSCs in general. For DSCs equipped with controls, the inspection and monitoring frequency is reduced from monthly to semi-annually. The proposed amendments also reduce the source test frequency and provide cheaper alternative methods to determine compliance for air pollution control devices. For example, cost savings due to the reduced monitoring and source test frequencies could amount to about \$148,000 per year just for one of the large refineries alone. Cost savings due to reduced monitoring for other non-refinery facilities such as oil production fields, chemical plants, and other industrial facilities, altogether are estimated to exceed \$73,000 per year. The exclusion of the bulk loading terminals from this rule results in an additional monitoring cost savings of in excess of \$57,000 per year for the affected facilities. Summary of these cost saving estimates are provided in Appendix II, Table II-7.

However, in order to provide conservative cost estimates, none of the above cost savings due to reduced monitoring and source test frequencies were incorporated in the overall rule cost-effectiveness calculations presented in Appendix II, Tables II-1 through II-6.

Proposed Amended Rule 1176

V-2

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September, 1996

CHAPTER VI COMMENTS AND RESPONSES

During the rule making process, both oral and written questions, comments, and suggestions were received and reviewed by the staff and are summarized in this section. The proposed amendments to Rule 1176 have been developed over approximately 16 months, with three public workshops, one public meeting, numerous consultations with associations representing affected facilities, and consultations and visits to numerous individual facilities to determine the effect of the proposed amendments on each. Because of these meetings and visits many comments are no longer pertinent because the proposed amendments have been modified to reflect those concerns.

A. EPA COMMENTS

Staff has not received any comments from EPA on the proposed amendments to this rule.

B. CARB COMMENTS

The Air Resources Board reviewed the proposed rule amendments dated March 5, 1996 and based on that information found the rule acceptable and did not have any comments. The proposed amendments were reviewed by the Air Resources Board Compliance division, Stationary Source Division, and Monitoring and Laboratory Division.

C. PUBLIC COMMENTS RECEIVED AFTER THE SET HEARING PACKAGE

Comment: Unsupported applications of correlation equations such as 1980 US EPA drain equation have been used to estimate emissions from junction boxes and manhole covers.

Response: There was no "officially" approved or developed emission estimate technique for junction boxes or manhole covers. However, the emission characteristics of these sources are viewed to be similar to those of process drains or other vents. In order to verify this, staff ran a series of 12 source tests in early 1996 on junction boxes and manhole covers. Five of these tests were conducted on those that had exhibited "positive" flows while seven tests were done on ones that did not have any noticeable flow (or regular flow). As discussed in Chapter IV and illustrated on Figures I-1 and I-2 of the staff report, the results showed a close approximation with those projected by the drain correlation equation (1990 US EPA) for vents with "positive flows" and the correlation equation for "Others" (1993 US EPA) for "regular flow" vents. In particular with respect to junction boxes, staff source tested 5.4% of the total universe of junction boxes in South Coast. Also, staff screened about 25% of all junction boxes and source tested all of the junction boxes that exhibited positive flow within this 25% sample size. Therefore, staff believe that the emission estimates based on these analyses are reasonable for rule development purposes.

Comment: AQMD used poor source tests methodology to obtain data pairs. This included improper installation and use of flow measurement devices, short term testing period, and no field blanks.

Response: Staff disagrees that poor source test methodology was used for the reasons listed below.

Each source test was conducted over one hour sampling period on an unannounced basis so that random measurements could be obtained. These one-hour periods were observed to encompass several cycles of flow fluctuations that junction box vents reputedly experience. Staff believes that this test duration is adequate especially when compared with the instantaneous grab sampling used to develop EPA's 1995 correlation equations.

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