

RULE 464 ORGANIC CHEMICAL MANUFACTURING OPERATIONS**Adopted 7-23-98
(Amended 9-25-08)****INDEX****100 GENERAL**

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100 GENERAL

- 101 **PURPOSE:** To limit emissions of volatile organic compounds (VOC) from organic chemical plants.
- 102 **APPLICABILITY:** The provisions of this rule shall apply to:
- 102.1 Equipment located in organic chemical plants which emit VOC, including, but not limited to reactors, distillation columns, crystallizers, evaporators, process tanks, wastewater tanks, centrifuges, filters, separators and air dryers.
- 102.2 The transfer and storage of VOC at organic chemical plants.
- 103 **SEVERABILITY:** If any section, subsection, sentence, clause, phrase, or portion of this rule is, for any reason, held invalid, unconstitutional, or unenforceable by any court of competent jurisdiction, such portion shall be deemed as a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions thereof.
- 110 **EXEMPTION, STATIONARY SOURCE WITH \leq 15 POUNDS/DAY UNCONTROLLED VOC EMISSIONS FROM ORGANIC CHEMICAL PLANTS:** The provisions of this rule shall not apply to organic chemical plants which, cumulatively at a stationary source, emit 15 pounds per day or less of maximum uncontrolled VOC emissions, as defined in Section 213, from organic chemical plants, provided the petition requirements in Section 401 and the reporting and recordkeeping requirements in Sections 501.4 and 501.10 are satisfied. For purposes of this exemption, all process emissions, including those from equipment cleanup, shall be summed to determine maximum emission rate.
- 111 **EXEMPTION, VENT STREAM WITH \leq 15 POUNDS/DAY UNCONTROLLED VOC EMISSIONS:** Any reactor, distillation column, evaporator, crystallizer or centrifuge with a total maximum uncontrolled VOC emissions, as defined in Section 213, of 15 pounds per day or less is exempt from Section 301, provided the petition requirements in Section 401 and the reporting and recordkeeping requirements in Sections 501.5 and 501.10 are satisfied.
- 112 **EXEMPTION, NON-PHARMACEUTICAL OR NON-COSMETIC SEPARATION OPERATION WITH \leq 15 POUNDS/DAY UNCONTROLLED VOC EMISSIONS:** Any separation device at any organic chemical plant, except pharmaceutical manufacturing plant or cosmetic manufacturing plant, with a total maximum uncontrolled VOC emissions, as defined in Section 213, of 15 pounds per day or less is exempt from Section 302.2, provided the petition requirements in Section 401 and the reporting and recordkeeping requirements in Sections 501.5 and 501.10 are satisfied.
- 113 **EXEMPTION, PROCESS TANK WITH \leq 15 POUNDS/DAY UNCONTROLLED VOC EMISSIONS:** Any process tank with a total maximum uncontrolled VOC emissions, as defined in Section 213, of 15 pounds per day or less is exempt from Section 304.2, provided the petition requirements in Section 401 and the reporting and recordkeeping requirements in Sections 501.5 and 501.10 are satisfied.
- 114 **EXEMPTION, STATIONARY SOURCE WITH \leq 15 POUNDS/DAY UNCONTROLLED VOC EMISSIONS FROM RESEARCH AND DEVELOPMENT OPERATIONS:** Except for the recordkeeping requirement under Sections 501.6 and 501.10, the provisions of this rule shall not apply to bench scale laboratory and pilot plant operations which, cumulatively at a stationary source, emit, at design production rating, 15 pounds per day or less of maximum uncontrolled VOC emissions, as defined in Section 213, and whose primary purpose is to conduct research and development into new processes and products. Bench scale research and development operations which, cumulatively at a stationary source, emit greater than 15 pounds per day of maximum uncontrolled VOC emissions shall comply with the provisions of this rule.

- 115 **EXEMPTION, LABORATORY EQUIPMENT SOLVENT CLEANING:** The provisions of Sections 308.4 and 308.5 shall not apply to solvent cleaning of bench scale laboratory equipment used exclusively for chemical or physical analyses.
- 116 **EXEMPTION, SOLVENT CLEANING OF OPERATION REGULATED BY FOOD AND DRUG ADMINISTRATION WITH \leq 15 POUNDS/DAY OF UNCONTROLLED VOC EMISSIONS:** Except for the record keeping requirements in Sections 501.7 and 501.10, the provision of Section 308.3 shall not apply to solvent cleaning of operations, subject to Food and Drug Administration (FDA) regulation, 21 CFR Parts 210 and 211, which, cumulatively at a stationary source, emit 15 pounds per day or less of maximum uncontrolled VOC emissions, provided the source provides documentation to the Air Pollution Control Officer that demonstrate that the solvent used is required by FDA for the cleanliness requirement of 21 CFR Parts 210 and 211 and that there is no available compliant solvent that meets FDA requirements.

200 DEFINITIONS

- 201 **AIR POLLUTION CONTROL DEVICE:** Equipment installed on a process vent, storage tank, production equipment exhaust systems, or combination thereof which reduces the mass of VOC emitted to the atmosphere. Examples include incinerators, carbon adsorption units, condensers, and gas absorbers. Process condensers are not considered air pollution control devices.
- 202 **BATCH PROCESS:** Batch process is any noncontinuous operation in which a discrete quantity or batch of feed is charged into a unit operation and processed at one time. Batch process includes noncontinuous operations in which the equipment is fed intermittently or discontinuously. Addition of raw material and withdrawal of product do not occur simultaneously in a batch process. After each batch operation, the equipment is generally emptied before a fresh batch is started.
- 203 **CLEANUP MATERIAL:** A material (e.g., solvents) that contains VOC as defined in Section 231 used to clean parts and equipment used in organic chemicals and pharmaceuticals manufacturing operations.
- 204 **CLOSED CONTAINER:** A container which has a cover where the cover meets with the main body of the container without any visible gaps between the cover and the main body of the container.
- 205 **CONTAINER:** As used in the wastewater provisions, container means any portable waste management unit that has a capacity greater than or equal to 0.1 m³ in which a material is stored, transported, treated, or otherwise handled. A container includes but is not limited to drums, barrels, tank trucks, barges, dumpsters, tank cars, dump trucks, and ships.
- 206 **CONTINUOUS PROCESS:** Continuous process is characterized by steady-state conditions in which reactants are added and products are removed simultaneously.
- 207 **COSMETICS MANUFACTURING PLANT:** Any plant producing or blending chemicals for use in cosmetic products and/or manufacturing cosmetic products by chemical processes.
- 208 **EMISSION PROFILE:** An emission profile, developed for a vent or a control device, is the VOC emission rates (in lb/hr) versus time in a period of time that is sufficient to include all emission episodes during a production run. It shall be based on either process knowledge, engineering analyses, or test data collected.
- 209 **EXEMPT COMPOUND:** For the purposes of this rule, "exempt compound" has the same meaning as in Rule 101-GENERAL PROVISIONS AND DEFINITIONS.

- 210 **INDIVIDUAL DRAIN SYSTEM:** A stationary system used to convey wastewater to a waste management unit. The system includes hard piping, all process drains and junction boxes, manholes, sumps, and lift stations, conveying wastewater. A segregated storm water sewer system, which is a drain and collection system designed and operated for the sole purpose of collecting rainfall-runoff at a facility, and which is segregated from all other individual drain systems, is excluded from this definition.
- 211 **LEAK:** A leak is:
- 211.1 The dripping of liquid containing VOC in excess of three drops per minute; or
 - 211.2 A reading as methane on a portable hydrocarbon detection instrument of 500 part per million pursuant to Sections 305.5 and 305.6 as applicable or greater above background when measured within one centimeter of the source; or
 - 211.3 The appearance of a visible mist.
- 212 **MAINTENANCE WASTEWATER:** Wastewater generated by the draining of process fluid from components in the chemical manufacturing process unit into an individual drain system prior to or during maintenance activities. Maintenance wastewater can be generated during planned and unplanned shutdowns and during periods not associated with a shutdown. Examples of activities that can generate maintenance wastewater include descaling of heat exchanger tubing bundles, cleaning of distillation column traps, draining of low legs and high point bleeds, draining of pumps into an individual drain system, and draining of portions of the chemical manufacturing process unit for repair.
- 213 **MAXIMUM UNCONTROLLED VOC EMISSIONS:** The maximum quantity of VOC emissions, based on maximum physical and operational design capacity including limitations contained on a Permit to Operate issued pursuant to Rule 201-GENERAL PERMIT REQUIREMENTS, which has exited the last recovery device, such as a process condenser, but which has not yet been introduced into an air pollution control device to reduce the mass of VOC in the stream.
- 214 **ORGANIC CHEMICAL MANUFACTURING PROCESS UNIT:** Equipment, such as reactors, product separators, recovery devices, distillation units, receivers, and feed, intermediate and product storage vessels, that are assembled and connected by pipes or ducts to process raw materials and to manufacture an intended organic chemical product. An organic chemical manufacturing process unit includes pumps, compressors, agitators, pressure relief devices, sampling connection systems, open-ended valves or lines, valves, connectors, instrumentation systems, and control devices or systems.
- 215 **ORGANIC CHEMICAL PLANT:** Any facility or operation that is engaged in producing organic chemicals and/or manufacturing products by chemical processes using organic chemicals and that has 28 as the first two digits in their Standard Industrial Classification Code as determined from the Standard Industrial Classification Manual, 1987 Edition, published by the Office of Management and Budget. Organic chemical plants may include, but are not limited to the manufacture of: industrial organic chemicals; plastic and synthetic resins, synthetic rubber, synthetic and other man made fibers; drugs; soap, detergents and cleaning preparations, perfumes, cosmetics and other toilet preparations; paints, varnishes, lacquers, enamels and allied products; agricultural chemicals; safflower and sunflower oil extracts; re-refining.
- 216 **PHARMACEUTICAL MANUFACTURING PLANT:** Any plant producing or blending chemicals for use in pharmaceutical products and/or manufacturing pharmaceutical products by chemical processes.
- 217 **POINT OF DETERMINATION:** Used in determining the initial point of evaluation for wastewater stream, point of determination is the location where the wastewater exits the process or processes, often the last recovery device. The point of determination for wastewater from research and development operations shall be the waste management unit.

- 218 **POTENTIAL TO EMIT:** The maximum physical and operational design capacity to emit a pollutant during each calendar year. Limitations on the physical or operational design capacity, including emissions control devices and limitations on hours of operation, may be considered only if such limitations are federally enforceable.
- 219 **PROCESS:** A process is a logical grouping of processing equipment which collectively functions to produce a product or isolated intermediate. A process may consist of one or more unit operations. A process includes all or a combination of reaction, recovery, separation, purification, or other activity, operation, manufacture, or treatment which are used to produce a product or isolated intermediate. The physical boundaries of a process are flexible, providing a process ends with a product or isolated intermediate, or with cessation of on-site processing. A nondedicated solvent recovery or nondedicated formulation operation which serves more than one process to recover or formulate numerous materials and/or products is considered as a single process.
- 220 **PROCESS CONDENSER:** A condenser whose primary purpose is to recover material as an integral part of a unit operation. To be considered as an integral part of a unit operation, that recovered material must be used in a subsequent operation at the stationary source or is a primary product of the operation. The condenser must support a vapor-to-liquid phase change for periods of source equipment operation that are above the boiling or bubble point of substance(s). Examples of process condensers include distillation condensers, reflux condensers, process condensers in line prior to the vacuum source, and process condensers used in stripping or flashing operations.
- 221 **PROCESS TANK:** A process tank is a tank, located within the bounds of a process, which is used for mixing, separating, blending, heating, treating and/or collecting material discharged from a feedstock storage tank or unit operation within the process, and which transfers this material to another unit operation within the process or a product storage tank. A separating tank is a process tank if it is covered having no exposed liquid surface, otherwise, it is a separation operation subject to Section 302. Examples of process tanks, include surge control vessels, bottoms receivers, enclosed oil and water separators, or enclosed gravity separators.
- 222 **PROCESS VENT:** A vent from a unit operation through which has VOC-containing gas stream, or has the potential to be released into the atmosphere. Examples of process vents include, but are not limited to, vents on bottom receivers, surge control vessels, reactors, filters, centrifuges, wastewater tanks, process tanks and condensers used for product recovery.
- 223 **PROCESS WASTEWATER:** Wastewater which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, by-product, or waste product. Examples are product tank drawdown or feed tank drawdown; water formed during a chemical reaction or used as a reactant; water used to wash impurities from organic products or reactants; water used to cool or quench organic vapor streams through direct contact; and condensed steam from jet ejector systems pulling vacuum on vessels containing organics.
- 224 **PRODUCTION EQUIPMENT EXHAUST SYSTEM:** An arrangement of hood, ductwork and/or stack which collects one or more process vents and discharges into the atmosphere. For the purposes of Section 303, the emission is the total amount of VOC collected and released to the atmosphere.
- 225 **RECOVERY DEVICE:** Recovery device means an individual unit of equipment capable of and used for the purpose of recovering chemicals for use, reuse, or sale. Recovery devices include, but are not limited to, absorbers, carbon adsorbers, and condensers.
- 226 **RESEARCH AND DEVELOPMENT OPERATION:** An operation whose primary purpose is for research and development of new processes and products, that is conducted under the

close supervision of technically trained personnel, and that is not involved in the manufacture of final or intermediate products for commercial purposes.

- 227 **STATIONARY SOURCE:** Any building, structure, facility, or emissions unit which emits or may emit any regulated air pollutant.
- 227.1 Building, structure, facility, or emissions unit includes all pollutant emitting activities which:
- Belong to the same industrial grouping, and
 - Are located on one property or on two or more contiguous properties, and
 - Are under the same or common ownership, operation, or control or which are owned or operated by entities which are under common control.
- 227.2 Pollutant emitting activities shall be considered as part of the same industrial grouping if:
- They belong to the same two-digit standard industrial classification code, or
 - They are part of a common production process (Common production process includes industrial processes, manufacturing processes and any connected processes involving a common material).
- 227.3 The emissions from loading and unloading of cargo carriers at the stationary source shall be considered emissions from the stationary source.
- 228 **STORAGE TANK:** A tank or other vessel that is used to store organic liquids that contain one or more VOC. The following are not considered storage tanks for the purposes of this rule:
- 228.1 Vessels that are:
- Attached to motor vehicles such as trucks, railcars, barges, or ships, and
 - Used for transporting raw materials and products in and out of the plant;
- 228.2 Pressure vessels designed to operate in excess of 204.9 kilopascals and have no leak; and
- 228.3 Process tanks.
- 229 **SURFACE IMPOUNDMENT:** A waste management unit which is a natural topographic depression, manmade excavation, or diked area formed primarily of earthen materials (although it may be lined with manmade materials), which is designed to hold an accumulation of liquid wastes or water containing free liquids. A surface impoundment is used for the purpose of treating, storing, or disposing of wastewater or residuals, and does not include injection wells. Examples of surface impoundments are equalization, settling, and aeration pits, ponds, and lagoons.
- 230 **VAPOR-TIGHT:** The concentration of volatile organic compound (VOC), measured one centimeter from the source pursuant to Section 502.5, shall not exceed 500 parts per million (expressed as methane) above background.
- 231 **VOLATILE ORGANIC COMPOUND (VOC):** For the purposes of this rule, "volatile organic compound" has the same meaning as in Rule 101-GENERAL PROVISIONS AND DEFINITIONS.
- 232 **WASTEWATER:** Wastewater is VOC-containing water, raw material, intermediate, product, by-product, co-product, or waste material that is discarded from an organic chemical manufacturing process unit and either:
- 232.1 Contains a total VOC concentration of at least 5 parts per million by weight and has a flow rate of 0.02 liter per minute or greater; or
- 232.2 Contains a total VOC concentration of at least 10,000 parts per million by weight at any flow rate.
- Wastewater includes process wastewater and maintenance wastewater. For the purposes of this rule, noncontact cooling water is not considered a wastewater.
- 233 **WASTE MANAGEMENT UNIT:** A piece of equipment, structure, or transport mechanism used in handling, storage, treatment, or disposal of waste. Examples of a waste management

unit include a tank, surface impoundment, container, oil-water separator, individual drain system, steam stripping unit, thin-film evaporation unit, waste incinerator, and landfill.

- 234 **WATER SEAL:** A seal pot, p-leg trap, or other type of trap filled with water that has a design capability to create a water barrier between the sewer and the atmosphere.

300 STANDARDS

301 REACTORS, DISTILLATION COLUMNS, CRYSTALLIZERS, EVAPORATORS OR CENTRIFUGES:

- 301.1 A person shall not use any reactor, distillation column, crystallizer, evaporator or enclosed centrifuge which emits more than 15 pounds per day of maximum uncontrolled VOC unless such emission is vented to a VOC capture and control system which has a combined system efficiency of at least 85 percent by weight, and a control efficiency of at least 90 percent by weight, and is permitted pursuant to Rule 201-GENERAL PERMIT REQUIREMENTS and determined by the appropriate methods in Section 411.
- 301.2 A VOC capture and control system controlling more than two process vent located at a non-pharmaceutical manufacturing plant or a non-cosmetic manufacturing plant may be used to meet the control requirement of this Section as long as:
- It has an overall combined system efficiency of at least 85 percent by weight, and an overall control efficiency of at least 90 percent by weight across its inlet and outlet as determined by the appropriate methods in Section 411 and is permitted pursuant to Rule 201-GENERAL PERMIT REQUIREMENTS, or
 - or unless the combined VOC emissions from all process vents is reduced to below 33 pounds per day, as determined by the appropriate methods in Section 411 and is permitted pursuant to Rule 201-GENERAL PERMIT REQUIREMENTS.

302 SEPARATION OPERATIONS:

- 302.1 **AT PHARMACEUTICAL AND COSMETIC MANUFACTURING PLANTS:** A person shall not use any centrifuge, rotary vacuum filter, or other device at a pharmaceutical manufacturing plant or cosmetic manufacturing plant which has an exposed liquid surface where the liquid contains VOC having a VOC composite partial vapor pressure, as determined pursuant to Section 406, of 26 mm Hg (0.5 psi) or more at 20 °C (68 °F), unless it incorporates a hood or enclosure with a delivery system or ductwork to collect VOC emissions, exhausting to a carbon adsorber, or equivalent control method approved by the Air Pollution Control Officer and the EPA.
- 302.2 **AT OTHER ORGANIC CHEMICAL PLANTS:** A person shall not use any centrifuge, rotary vacuum filter, or other device at other organic chemical plant which has an exposed liquid surface where the liquid contains VOC having a VOC composite partial vapor pressure, as determined pursuant to Section 406, of 26 mm Hg (0.5 psi) or more at 20 °C (68 °F), and which emits more than 15 pounds per day of maximum uncontrolled VOC, unless such emission is vented to a VOC capture and control system which has a combined system efficiency of at least 85 percent by weight, and a control efficiency of at least 90 percent by weight, as determined by the appropriate method in Section 411 and is permitted pursuant to Rule 201-GENERAL PERMIT REQUIREMENTS.

303 DRYERS OR PRODUCTION EQUIPMENT EXHAUST SYSTEMS:

- 303.1 A person shall not use any dryer or other production equipment exhaust system which emits 330 pounds per day or more of maximum uncontrolled VOC unless such emission is vented to a VOC capture and control system which has a combined system efficiency of at least 85 percent by weight, and a control efficiency of at least 90 percent by weight, as determined by the appropriate methods in Section 411 and is permitted pursuant to Rule 201-GENERAL PERMIT REQUIREMENTS.

- 303.2 A person shall not use any dryer or production equipment exhaust system which emits less than 330 pounds on any day of maximum uncontrolled VOC unless such emissions is reduced to less than 33 pounds per day.
- 304 **PROCESS TANKS:**
- 304.1 A person shall not use any process tank containing material with a VOC composite partial vapor pressure, as determined pursuant to Section 406, of greater than 26 mm Hg at 20 °C (0.5 psi at 68 °F), unless it is a closed container as defined in Section 204, which is kept tightly covered at all times except when accessing the container.
- 304.2 A person shall not use any process tank which contains material with a VOC composite partial vapor pressure, as determined pursuant to Section 406, of greater than 26 mm Hg at 20 °C (0.5 psi at 68 °F), and which emits more than 15 pounds per day of maximum uncontrolled VOC, unless such emission is vented to a VOC capture and control system which has a combined system efficiency of at least 85 percent by weight, and a control efficiency of at least 90 percent by weight, as determined by the appropriate methods in Section 411 and is permitted pursuant to Rule 201-GENERAL PERMIT REQUIREMENTS.
- 305 **WASTEWATER:** A person shall not use any equipment, such as wastewater tank, container, surface impoundment, individual drain system, and oil-water separator, that receives, manages, or treats wastewater at the point of determination, as defined in Section 217, with a VOC concentration of 500 parts per million by weight or higher and a flow rate of greater than or equal to one liter per minute, or with a VOC concentration of 10,000 part per million per weight or higher at any flow rate, unless the equipment meets the applicable equipment standard listed below:
- 305.1 A person shall install a fixed roof on any wastewater tank that is not used for wastewater mixing, heating, or treating with an exothermic reaction.
- 305.2 A person shall install one of the following controls on any wastewater tank that is used for wastewater mixing, heating, or treating with an exothermic reaction:
- A fixed roof and closed-vent system that routes VOC to a control device with a control efficiency of at least 90 percent by weight, as determined by the appropriate methods in Sections 411 and is permitted pursuant to Rule 201-GENERAL PERMIT REQUIREMENTS;
 - External floating roof or fixed roof with internal floating roof in compliance with standards described in 40 CFR 63.119(b), (c), (d), and 63.120
- 305.3 A person shall install a cover and submerged fill pipe on any container with a capacity greater than or equal to 112 gallons.
- 305.4 A person shall install a cover and closed-vent system that routes VOC to a control device with a control efficiency of at least 90 percent by weight, as determined by the appropriate methods in Section 411 and is permitted pursuant to Rule 201-GENERAL PERMIT REQUIREMENTS, on any surface impoundment.
- 305.5 A person shall install a cover and closed-vent system that routes VOC to a control device with a control efficiency of at least 90 percent by weight, as determined by the appropriate methods in Section 411 and is permitted pursuant to Rule 201-GENERAL PERMIT REQUIREMENTS, or a solid, vapor-tight, as defined in Section 230, full contact fixed cover which totally encloses the liquid contents on any individual drain system. The cover openings shall be closed and sealed, except when the opening is being used for inspection, maintenance, or wastewater sampling. The concentration of VOC shall be measured using Section 502.5 at one centimeter from the fixed cover semiannually to ensure that there are no emission leaks greater than 500 parts per million (expressed as methane). Any emission leak greater than 500 parts per million must be reported to the Air Pollution Control Officer as soon as reasonably possible, but not later than one hour after its detection. If the Air Pollution Control Officer can not be contacted, the report shall be made at the commencement of the next regular working day. The leak shall be repaired within 15 calendar days.
- 305.6 A person shall install one of the following controls on any oil-water separator:

- a. Fixed roof and closed-vent system that routes VOC to a control device with a control efficiency of at least 90 percent by weight, as determined by the appropriate methods in Section 411 and is permitted pursuant to Rule 201-GENERAL PERMIT REQUIREMENTS.
 - b. External floating roof or fixed roof with internal floating roof in compliance with standards described in 40 CFR 63.119(b), (c), (d), and 63.120.
 - c. A solid, vapor-tight, as defined in Section 230, full contact fixed cover which totally encloses the liquid contents, with all the cover openings closed and sealed, except when the opening is being used for inspection, maintenance, or wastewater sampling. The concentration of VOC shall be measured using Section 502.5 at one centimeter from the fixed cover semiannually to ensure that there are no emission leaks greater than 500 parts per million (expressed as methane). Any emission leak greater than 500 parts per million must be reported to the Air Pollution Control Officer as soon as reasonably possible, but not later than one hour after its detection. If the Air Pollution Control Officer can not be contacted, the report shall be made at the commencement of the next regular working day. The emission leak shall be repaired within 15 calendar days.
 - d. A solid, sealed, gasketed, fixed cover which totally encloses the liquid contents, with all the cover openings closed and sealed, except when the opening is being used for inspection, maintenance, or wastewater sampling. The cover may include a pressure/vacuum valve. The concentration of VOC shall be measured using Section 502.5 at one centimeter from the roof seals, fixed cover, access doors, pressure/vacuum valve, and other openings shall not exceed 500 parts per million (expressed as methane) above background. Roof seals, fixed cover, access doors, and other openings shall be inspected semiannually to ensure that there are no emission leaks greater than 500 parts per million. Any emission leak greater than 500 parts per million must be reported to the Air Pollution Control Officer as soon as reasonably possible, but not later than one hour after its detection. If the Air Pollution Control Officer can not be contacted, the report shall be made at the commencement of the next regular working day. The leak shall be repaired within 15 calendar days.
- 305.7 A person complying with the notification requirements in Section 305.5 or Sections 305.6(c) and (d) shall be exempt from the provisions of Rule 602, BREAKDOWN CONDITIONS: EMERGENCY VARIANCE.
- 305.8 One or more safety devices which vent directly to the atmosphere may be used on the wastewater tank, cover, closed-vent system, or control device provided each safety device meets all of the following conditions:
- a. The safety device is not used for planned or routine venting of organic vapors from the tank or the closed-vent system connected to a control device; and
 - b. The safety device remains in a closed, sealed position at all times except when an unplanned event requires that the device open for the purpose of preventing physical damage or permanent deformation of the tank, cover, closed-vent system, or control device in accordance with good engineering and safety practices for handling flammable, combustible, explosive, or other hazardous materials. An example of an unplanned event is a sudden power outage.
- 306 **LIQUID TRANSFER:** A person shall not transfer material with a VOC composite partial vapor pressure, determined pursuant to Section 406, of greater than 26 mm Hg at 20 °C (0.5 psi at 68 °F) into any tank truck, trailer, railroad tank car, or storage tank of 2000 gallons capacity or greater, unless VOC emissions during transfer are controlled with one of the following control system:
- 306.1 A vapor balance system with all the following components:
- a. A permanent submerged fill pipe which discharges at not more than six inches from the bottom of the tank; and,

- b. A submerged fill pipe which discharges at not more than six inches from the bottom of the tanker truck or railcar, and
 - c. A vapor return line which transfers at least 90 percent by weight of displaced VOC vapor from the stationary storage tank being filled back to the mobile or stationary supply tank; and,
 - d. A pressure-vacuum relief valve with relief settings of not less than ± 0.03 psig.
- 306.2 A VOC capture and control system which has a combined system efficiency of at least 85 percent by weight, and a control efficiency of at least 90 percent by weight, and is permitted pursuant to Rule 201-GENERAL PERMIT REQUIREMENTS and determined by the appropriate methods in Section 411.
- 306.3 An internal or external floating roof which complies with the procedures described in 40 CFR 63.119(b), (c), (d), and 63.120.
- 307 **STORAGE TANKS:**
- 307.1 A person shall install pressure/vacuum valve with a minimum pressure setting of 0.03 psi and a minimum vacuum setting of 0.03 psi, or equivalent control method permitted pursuant to Rule 201 - GENERAL PERMIT REQUIREMENTS, on all vents of any storage tank, greater than 55 gallons and less than or equal to 40,000 gallons, that stores material with a VOC composite partial vapor pressure, as determined pursuant to Section 406, of greater than 78 mm Hg at 20 °C (1.5 psi at 68 °F). Storage tanks with capacity greater than 40,000 gallons are subject to Rule 446-STORAGE OF PETROLEUM PRODUCTS.
- 307.2 A storage tank with a capacity of 55 gallons or less that stores material with a VOC composite partial vapor pressure of greater than 78 mm Hg at 20 °C (1.5 psi at 68 °F) shall be a closed container which is kept tightly covered at all times except when accessing the container.
- 308 **CLEANUP AND STORAGE REQUIREMENTS:** A person using cleanup material shall conform to all the following requirements:
- 308.1 A person shall use closed containers for the storage of disposal of cloth, paper, or sponges used for solvent cleanup; and
- 308.2 A person shall store fresh or spent cleanup materials in closed containers; and
- 308.3 A person shall not use a cleanup material to perform in-line solvent cleaning of process units and piping unless:
- a. The emissions are vented to a VOC capture and control system which has a combined system efficiency of at least 85 percent by weight, and a control efficiency of at least 90 percent by weight, or
 - b. The solvent complies with a VOC content limit of 200 grams per liter and a vapor pressure limit of less than 45 mmHg at 68 °F.
- 308.4 Prior to September 25, 2009, except for laboratory equipment cleaning exempt pursuant to Section 115, a person shall not use a solvent to perform maintenance solvent cleaning including but not limited to mechanical parts and work areas unless the solvent complies with a VOC content limit of 50 grams per liter (0.42 pounds per gallon).
- 308.5 Effective September 25, 2009, except for laboratory equipment cleaning exempt pursuant to Section 115, a person shall not use a solvent to perform maintenance solvent cleaning including but not limited to mechanical parts and work areas unless the solvent complies with a VOC content limit of 25 grams per liter (0.21 pounds per gallon).
- 400 **ADMINISTRATIVE REQUIREMENTS**
- 401 **PETITION FOR EXEMPTION:** A person seeking an exemption for an organic chemical plant or a process vent, which is exempt pursuant to Sections 110, 111, 112, 113, 114, or 116 shall submit to the Air Pollution Control Officer a petition for exemption. Such petition shall include a process diagram, and maximum uncontrolled VOC mass emission rate determined pursuant to Section 407 and all pertinent information to support a basis for granting/denying

petition. The Air Pollution Control Officer shall approve the petition unless it fails to demonstrate that the emission rate is below the cutoff level specified in Sections 110, 111, 112, 113, 114, or 116. The approved petition shall be effective until a modification, which results in an application for permit modification pursuant to Rule 201-GENERAL PERMIT REQUIREMENTS, is made to the plant or process vent. A person shall comply with the following petition schedule:

- 401.1 **EXISTING PLANT OR PROCESS VENT:** The petition for exemption for an organic chemical plant or a process vent in existence prior to the adoption of this rule must be submitted by January 1, 1999.
- 401.2 **NEW OR MODIFIED PLANT OR PROCESS VENT:** The petition for exemption for a new or modified organic chemical plant or a process vent must be submitted 30 calendar days before startup.
- 402 **AUTHORITY TO CONSTRUCT APPLICATION:** Any person installing a new or using an existing emission control equipment, as a means of complying with this rule, shall by January 1, 1999, submit an Authority to Construct application pursuant to Rule 201-GENERAL PERMIT REQUIREMENTS to the Air Pollution Control Officer, unless the emission control equipment is currently under District permit and the use of the existing emission control equipment, without modification to the system, results in compliance with this rule.
- 403 **OPERATION AND MAINTENANCE PLAN:** Any person using an approved emission control device as a means of complying with this rule, shall submit, with the application for Authority to Construct, pursuant to Rule 201-GENERAL PERMIT REQUIREMENTS, an Operation and Maintenance Plan for the emission control device to the Air Pollution Control Officer for approval. Operation and Maintenance Plans for emission control devices installed prior to the adoption of this rule, if not previously submitted, must be submitted by January 1, 1999, and receive approval of the Air Pollution Control Officer. The plan shall specify key system operating parameters, such as temperatures, pressures, and/or flow rates, necessary to determine compliance with this rule and describe in detail procedures to maintain the approved emission control device and maintenance procedures that demonstrate continuous operation and compliance of the emissions control equipment during periods of emissions-producing operations. The plan shall also specify which records must be kept to document these operations and maintenance procedures. These records shall comply with the requirements of Sections 501.1, 501.2 and 501.10. The plan shall be implemented upon approval by the Air Pollution Control Officer.
- 404 **PROCEDURE FOR PROCESSING AN OPERATION AND MAINTENANCE PLAN:**
- 404.1 **APPROVAL OF PLAN:** The Air Pollution Control Officer shall determine whether the Operation and Maintenance Plan meets the requirements of Section 403 not later than 30 days after receipt of the Plan, or within a longer period of time agreed upon by the parties. The Air Pollution Control Officer shall approve in writing an Operation and Maintenance Plan unless it fails to demonstrate continuous operations of the emissions control equipment during periods of emissions-producing operations, according to the standard set forth in this rule, and/or it fails to specify which daily records, in accordance with the requirements of Sections 501.1, 501.2 and 501.10, are to be kept to document the Operation and Maintenance procedures set forth in the Plan.
- 404.2 **REVISION OF PLAN:** If the Air Pollution Control Officer does not approve in writing an Operation and Maintenance Plan, the source shall receive written notice of the deficiency, and shall have an additional 30 days from the date of the notification of the deficiency to correct and resubmit the Operation and Maintenance Plan. The decision of the Air Pollution Control Officer regarding the resubmitted Operation and Maintenance Plan shall be final. Failure to correct the deficiency in an Operation and Maintenance Plan upon resubmittal shall constitute a violation of this rule that is subject to the penalties set forth in Health and Safety Code section 42400 *et seq.*
- 405 **WASTEWATER REPORT:** A person shall submit a wastewater report to the Air Pollution Control Officer by January 1, 1999, and annually thereafter by February 1st. The report shall

identify and quantify each wastewater stream at the point of determination, as defined in Section 217, discharged from an organic chemical manufacturing process unit. Information data and supporting test results, records or calculations on location, source of wastewater, VOC concentration as determined pursuant to Section 502.3 or using owner knowledge of the wastewater, and annual average flow rate shall be submitted for each wastewater stream. Examples of information that could constitute knowledge include material balances, records of chemical purchases, process stoichiometry, or previous test results provided the results are still representative of current operating practices at the process unit(s). One of the following methods shall be used to determine flow rate:

- 405.1 Use the maximum annual production capacity of the process unit, knowledge of the process, and mass balance information to estimate annual average wastewater flow rate.
- 405.2 Select the highest annual average flow rate of wastewater from historical records representing the most recent year of operation.
- 405.3 Measure the flow rate of the wastewater at the point of determination during conditions that are representative of average wastewater generation rates.

Notwithstanding the provisions of this section, the Air Pollution Control Officer may require testing pursuant to Section 502.3 to determine the VOC concentration.

- 406 **CALCULATION FOR VOC COMPOSITE PARTIAL VAPOR PRESSURE:** VOC composite partial vapor pressure is the sum of the partial vapor pressures of the compounds defined as VOCs, and shall be calculated by the following equation:

$$PP_c = \frac{\sum_{i=1}^n (W_i)(VP_i)/MW_i}{\frac{W_w}{MW_w} + \sum_{i=1}^n \frac{W_e}{MW_e} + \sum_{i=1}^n \frac{W_i}{MW_i}}$$

- Where: Pp_c = VOC composite partial vapor pressure at 20°C, in mm Hg.
 W_i = Weight of the "i"th VOC compound, in grams, as determined by ASTM E 260-96 (2006).
 W_w = Weight of water, in grams as determined by ASTM D 3792-05.
 W_e = Weight of the "i"th exempt compound, in grams, as determined by ASTM E 260-96 (2006).
 Mw_i = Molecular weight of the "i"th VOC compound, in grams per g-mole, as given in chemical reference literature.
 Mw_w = Molecular weight of water, 18 grams per g-mole.
 Mw_e = Molecular weight of the "i"th exempt compound, in grams per g-mole, as given in chemical reference literature.
 Vp_i = Vapor pressure of the "i"th VOC compound at 20°C, in mm Hg, as determined by Section 502.4 of this rule.

An alternate method for calculating the composite vapor pressure or determining the variables in the equation above may be allowed if approved in writing by the Air Pollution Control Officer and EPA.

- 407 **DETERMINATION OF MAXIMUM UNCONTROLLED VOC MASS EMISSION RATE:** Any person petitioning for an exemption pursuant to Section 401 shall determine the maximum uncontrolled VOC mass emission rate as follows:
- 407.1 **POTENTIAL TO EMIT ≥ 25 TPY:** A stationary source with a potential to emit 25 tons per year or more of VOC from organic chemical plants shall determine the maximum uncontrolled VOC emission rate by using emission testing pursuant to Section 409.
 - 407.2 **POTENTIAL TO EMIT <25 TPY:** A stationary source with a potential to emit of less than 25 tons per year of VOC from organic chemical plants shall determine the

maximum uncontrolled VOC emissions by using engineering assessment pursuant to Section 408 or emission testing pursuant to Section 409.

407.3 **OPEN-TYPE PROCESS TANK:** A person shall determine the maximum uncontrolled VOC emissions by using the most recent version of EPA's computer model, WATER8. The concentration of each individually speciated VOC in the process stream with the potential to be emitted into the atmosphere, shall be determined by EPA Method 305 of 40 CFR Part 63, Appendix A.

407.4 **DETERMINATION CRITERIA:** The emission testing or engineering assessment shall be made using one of the following criteria:

a. **FOR CONTINUOUS PROCESS:** The maximum daily uncontrolled VOC emissions shall be determined based on District permitted or highest process/production rate in any calendar day.

b. **FOR BATCH PROCESS:** The maximum daily uncontrolled VOC emissions shall be the highest emission rate in any 24 hour period based on District permitted or highest process/production rate. An emission profile shall be used to determine highest 24 hour period emission rate and shall be submitted along with the exemption petition pursuant to Section 401.

408 **DETERMINATION OF VOC MASS EMISSION RATE USING ENGINEERING ASSESSMENT:** A person shall conduct engineering assessment which includes, but is not limited to, the following:

408.1 Previous test results provided the tests are representative of current operating practices at the process unit.

408.2 Bench-scale or pilot-scale test data representative of the process under representative operating conditions.

408.3 Maximum flow rate, VOC emission rate, concentration, or other relevant parameter specified or implied within a permit limit applicable to the process vent.

408.4 Design analysis based on accepted chemical engineering principles, measurable process parameters, or physical or chemical laws or properties. Examples of analytical methods include, but are not limited to:

a. Use of material balances based on process stoichiometry to estimate maximum VOC concentrations,

b. Estimation of maximum flow rate based on physical equipment design such as pump or blower capacities,

c. Estimation of VOC concentrations based on saturation conditions.

408.5 All data, assumptions, and procedures used in the engineering assessment shall be documented and provided to the District.

Notwithstanding the provisions of this section, the Air Pollution Control Officer may require emission testing pursuant to Section 409 to verify compliance.

409 **DETERMINATION OF VOC MASS EMISSION RATE USING EMISSION TESTING:**

409.1 A person shall conduct emission testing using test methods in Section 502 and the following test durations:

a. **CONTINUOUS PROCESS:** The test shall consist of three 1-hour runs.

b. **BATCH PROCESS:** The duration shall be the time from the start to the completion of a batch cycle unless the test is conducted under worst-case condition described in Section 411.3 (b) (1) or (2). For batch cycle or test period greater than 3 hours, a single test conducted over the duration of the batch cycle or test period shall be used for emission determination. For batch cycle or test period less than or equal to 3 hour, testing shall include three 1-hour runs.

409.2 A person conducting any emission test for the purpose of the petition for exemption pursuant to Section 401 shall comply with the following source test notification and reporting requirements:

a. At least 30 days prior to the scheduled test date submit the source test plan.

b. At least 7 days prior to the source test date notify Air District staff of the exact date and time scheduled for the source test.

- c. The source test observation and evaluation fee as authorized under Rule 301-PERMIT FEES - STATIONARY SOURCE must be submitted with the petition for exemption.

410 **CALCULATION FOR VOC MASS EMISSION RATE, CONTROL EFFICIENCY, AND COMBINED SYSTEM EFFICIENCY**

410.1 **VOC MASS EMISSION RATE:** VOC mass emission rate shall be calculated using the following equation:

$$\text{VOC Mass Emission Rate} = (Q)(C)(60 \text{ min/hr})$$

- Where: Q = the flow rate, in scfm, as determined by Section 408 or Sections 409 and 502.
 C = the VOC mass concentration, in lb/scf, as determined by Section 408 or Sections 409 and 502.

410.2 **CONTROL EFFICIENCY:** Expressed in percent, control efficiency is the ratio of the weight of the VOC removed by the control device from the effluent stream entering the control device to the weight of VOC in the effluent stream entering the control device, both measured simultaneously. Control efficiency shall be determined using the following equation:

$$\% \text{Control Efficiency} = \frac{(M_i - M_o)}{M_i} \times 100\%$$

- Where: M_i = inlet VOC mass emission rate, in lb/hr.
 M_o = outlet VOC mass emission rate, in lb/hr.

410.3 **COMBINED SYSTEM EFFICIENCY:** A capture efficiency of 100% can be assumed for any capture system which is piped to the control equipment and has no leak. The combined system (capture and control) efficiency is calculated as follows:

$$\% \text{System Efficiency} = \% \text{CE} \times \% \text{CLE} / 100\%$$

- Where: %System Efficiency = %capture and control efficiency.
 %CE = %control efficiency, as determined by Section 410.2.
 %CLE = %capture efficiency, as determined by Section 502.2

411 **PROCEDURES FOR DEMONSTRATING COMPLIANCE:** A person shall demonstrate compliance with Sections 301, 302, 303, 304, 305 and 306.2 by using the applicable procedure listed below, Section 411.1, or 411.2, or 411.3.

411.1 A stationary source with a potential to emit of less than 25 tons per year of VOC from the organic chemical plants may use the condenser exit gas temperature to calculate the removal efficiency of the condenser in demonstrating the required emission reduction if the condenser system is equipped with a temperature sensor and recorder, such that the condenser exit gas temperature can be measured at 15-minute intervals when the condenser is functioning in cooling a vent stream. Notwithstanding the requirements in this section, the Air Pollution Control Officer may require source testing to verify compliance.

411.2 A stationary source with a potential to emit of less than 25 tons per year of VOC from the organic chemical plants shall determine percent reduction by conducting a performance test, using the procedure in Section 411.3, or a design evaluation. The design evaluation shall include documentation demonstrating that the control device being used achieves the required reduction during the emission episodes in which it

is functioning in reducing emissions. This documentation shall include a description of the gas stream which enters the control device, flow and VOC content, and all pertinent control device operating parameters which resulted in the required reduction. The calculation shall be based on engineering assessment described in Section 408. Notwithstanding the requirements in 411.2, the Air Pollution Control Officer may require source testing to verify compliance.

411.3 A stationary source with a potential to emit of greater than or equal to 25 tons per year of VOC from the organic chemical plants shall demonstrate compliance by conducting a performance test based on the following procedure:

a. Perform test pursuant to Sections 409 and 502 at the inlets and outlets of the capture and control devices and use the equations in Section 410 to determine percent combined system (capture and control) efficiency and control efficiency in total VOC.

b. Test capture and control devices over absolute or hypothetical worst-case conditions, or over normal conditions, provided the operation of the devices is limited to the conditions that existed during testing by District permit.

1. **ABSOLUTE WORST-CASE CONDITION:** It is either:

i. The period in which the inlet to the control device contains at least 50 percent of the maximum VOC load capable of being vented to the control device over any 8-hour period, or

ii. A 1-hour period of time in which the inlet to the control device will contain the highest VOC mass loading rate, in lbs/hr, capable of being vented to the control device. An emission profile as described in Section 208 shall be used to determine maximum VOC loading periods.

2. **HYPOTHETICAL WORST-CASE CONDITION:** The simulated test condition that, at a minimum, contain the highest total average hourly VOC load that would be predicted to be vented to the control device using the emissions profile described in Section 208. The highest total average hourly VOC load is determined by first dividing the VOC emissions from each episode by the duration of each episode, in hours, and selecting the highest hourly block average.

3. **NORMAL CONDITION:** Test condition which is based on the process/production rate, stream composition, temperature, and flow rate limits set in District permit.

412 **VIOLATION:** Any leak originally identified by the Air Pollution Control Officer is a violation.

500 MONITORING AND RECORDS

501 **RECORD KEEPING:** In addition to any existing permit conditions issued pursuant to Rule 201-GENERAL PERMIT REQUIREMENTS, a person subject to this rule shall comply with the following requirements:

501.1 **CONTROL EQUIPMENT:** A person using an emission control system pursuant to Section 300 shall maintain on-site the records required by the Operation and Maintenance Plan in Section 403 on a daily basis.

501.2 **ORGANIC COMPOUND AND WASTEWATER PROCESSING RECORDS:** A person subject to the capture and/or control requirement of Sections 301, 302, 303, 304, 305 or 306 shall maintain on-site a current list of organic compounds in use including the vapor pressure of each compound at 20°C. In addition, a person shall:

a. **FOR CONTINUOUS PROCESS:** Keep daily records on-site of the types and amounts of organic compounds used and produced by each organic chemical manufacturing process unit. Keep daily records on-site of the amount of wastewater received, managed or treated by each wastewater process equipment.

b. **FOR BATCH PROCESS:** Keep records on-site of each production batch step, including starting and completion time and date, and the types and

- amounts of organic compounds used and produced by each organic chemical manufacturing process unit. Keep records on-site of each treatment batch, including starting and completion time and date, and the amount of wastewater received, managed or treated by each wastewater process equipment.
- 501.3 **WASTEWATER REPORT:** For any equipment that receives, manages or treats wastewater, a person shall maintain on-site an annual wastewater report prepared pursuant to Section 405.
- 501.4 **EXEMPTION, STATIONARY SOURCE WITH \leq 15 POUNDS/DAY UNCONTROLLED VOC EMISSION FROM ORGANIC CHEMICAL PLANTS:** A person seeking to satisfy the conditions of Section 110 shall:
- FOR CONTINUOUS PROCESS:** Keep daily records on-site of the types, amounts, and VOC content of organic compounds used and produced.
 - FOR BATCH PROCESS:** Keep records on-site of the types, amounts, and VOC content of organic compounds used and produced by each production batch including starting and completion time and date.
- 501.5 **EXEMPTION, PROCESS VENT, PROCESS TANK, NON-PHARMACEUTICAL NON-COSMETIC WITH \leq 15 POUNDS/DAY UNCONTROLLED VOC EMISSION:** A person seeking to satisfy the conditions of Section 111, 112 or 113 shall:
- FOR CONTINUOUS PROCESS:** Keep daily records on-site of the types, amounts, and VOC content of organic compounds used and produced by each organic chemical manufacturing process unit.
 - FOR BATCH PROCESS:** Keep records on-site of each production batch, including starting and completion time and date, and types, vapor pressure, amounts, and VOC content of organic compounds used and produced by each organic chemical manufacturing process unit.
- 501.6 **EXEMPTION, RESEARCH AND DEVELOPMENT OPERATIONS:** A person seeking to satisfy the conditions of Section 114 shall keep the following records on-site:
- For cleanup materials, monthly records of the types, amounts, and VOC content of cleanup materials used and shall determine the daily usage by dividing the monthly usage by the number of operating days during the month, and
 - For all other organic compounds, daily records of type, amount, and VOC content of each organic compound used and produced. When requested by the Air Pollution Control Officer, the VOC emissions for the specified day shall be calculated and submitted to the Air Pollution Control Officer.
- 501.7 **EXEMPTION, SOLVENT CLEANING OF OPERATION REGULATED BY FDA:** A person seeking to satisfy the conditions of Section 116 shall keep daily records on-site of the types, amounts, and VOC content of cleaning solvent used.
- 501.8 **CLEANUP MATERIALS:** Monthly records of the total applied volume of materials used for cleanup shall be kept on-site. The records shall include the name/code/manufacturer and maximum volatile organic compound content of the cleanup material, as applied, after any mixing or thinning as recommended by the manufacturer. The VOC content shall be displayed as grams of volatile organic compound per liter of coating (or pounds of volatile organic compound per gallon), including water and exempt compounds.
- 501.9 **SOURCE TEST REPORT:** Each owner or operator of a stationary source shall keep on-site copies of all applicable source reports.
- 501.10 **DURATION OF RECORDS:** Such records (electronic files or on paper) shall be maintained on-site for a continuous five-year period and made available to the Air Pollution Control Officer upon request.
- 502 **TEST METHODS:** The performance tests for demonstrating compliance with the requirements of this rule shall be run using the following:
- 502.1 **VOC MASS EMISSION RATE OR CONTROL EFFICIENCY:** VOC mass emission rate or control efficiency shall be determined in accordance with EPA Method 18, 25

or 25A, EPA Method 1 or 1A, EPA Method 2, 2A, 2B or 2C, EPA Method 3 and EPA Method 4 (whichever combination most applicable).

- 502.2 **DETERMINATION OF COLLECTION EFFICIENCY:** Collection efficiency shall be determined in accordance with the U.S. EPA technical guideline document, "Guidelines for Determining Capture Efficiency," dated January 9, 1995. Individual capture efficiency test runs subject to U.S. EPA technical guidelines shall be determined by:
- a. Applicable U.S. EPA methods 204, 204A, 204B, 204C, 204E, and/or 204F; or
 - b. The South Coast Air Quality Management District "Protocol for Determination of Volatile Organic Compound (VOC) Capture Efficiency"; or
 - c. Any other method approved in writing by the U.S. EPA, the California Air Resources Board, and the Air Pollution Control Officer.
- 502.3 **VOC CONCENTRATION IN WASTEWATER:** The total VOC concentration in wastewater shall be determined in accordance with EPA Method 305 or 25D.
- 502.4 **VAPOR PRESSURE:** Vapor pressure of a VOC shall be determined in accordance with ASTM Method D2879-97 (2007), or may be obtained from the most current edition of a published source, including, but not limited to:
- a. *The Vapor Pressure of Pure Substances*, Boublik, Fried, and Hala; Elsevier Scientific Publishing Company, New York.
 - b. *Perry's Chemical Engineer's Handbook*, McGraw-Hill Book Company.
 - c. *CRC Handbook of Chemistry and Physics*, Chemical Rubber Publishing Company.
 - d. *Lange's Handbook of Chemistry*, John Dean, editor, McGraw-Hill Book Company.
- 502.5 **LEAK DETECTION:** Concentration of VOC in leaks shall be measured using a portable gas detector as prescribed in U.S. EPA Method 21.
- 502.6 **MULTIPLE TEST METHODS:** When more than one test method or set of test methods is specified for any testing, a violation of any requirement of this rule established by any one of the specified test methods or set of test methods shall constitute a violation of this rule.