

Chapter NR 420

CONTROL OF ORGANIC COMPOUND EMISSIONS FROM
PETROLEUM AND GASOLINE SOURCES

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NR 420.01 Applicability; purpose. (1) **APPLICABILITY.** This chapter applies to all petroleum and gasoline air contaminant sources and to their owners and operators.

(2) **PURPOSE.** This chapter is adopted under ss. 144.31 and 144.38, Stats., to categorize organic compound emissions from petroleum and gasoline sources into a separate organic compound air contaminant source category and to establish emission limitations for this category of sources in order to protect air quality.

History: Cr. Register, September, 1986, No. 369, eff. 10-1-86; am. Register, February, 1990, No. 410, eff. 3-1-90.

NR 420.02 Definitions. The definitions in this section apply to the terms used in chs. NR 420 to 425. In addition, the definitions in chs. NR 400 and 419 apply to the terms used in this chapter.

(1) "Accumulator" means the reservoir of a condensing unit receiving the condensate from the condenser. This includes hot wells.

(5) "Average monthly storage temperature" means an arithmetic average calculated for each calendar month, or portion thereof if storage is for less than a month, from bulk petroleum liquid storage temperatures determined at least once every 7 days.

(6) "Bottom filling" means the filling of a tank truck or stationary storage tank through an opening that is flush with or near the tank bottom.

(8) "Bulk gasoline terminal" means a gasoline storage facility which receives gasoline from refineries primarily by pipeline, ship, or barge, and delivers gasoline to bulk gasoline plants or to commercial or retail accounts primarily by tank truck.

(9) "Component" means, for purposes of petroleum refineries, any piece of equipment at a refinery which has the potential to leak VOCs. These pieces of equipment include, but are not limited to, pumping seals, compressor seals, seal oil degassing vents, pipeline valves, flanges and other connections, pressure relief devices, process drains, and open ended pipes. Excluded from these pieces of equipment are valves which have no external controls, such as in-line check valves.

(10) "Condensate" means hydrocarbon liquid separated from natural gas which condenses due to changes in the temperature or pressure and remains liquid at standard conditions.

(11) "Condenser" means any heat transfer device used to liquefy vapors by removing their latent heats of vaporization. Such devices include, but are not limited to, shell and tube, coil, surface, or contact condensers.

(13) "Crude petroleum" means a naturally occurring mixture which consists of hydrocarbons; or sulfur, nitrogen and oxygen derivatives of hydrocarbons, and which is liquid at standard conditions.

(14) "Custody transfer" means the transfer of produced crude petroleum or condensate, after processing or treating in the producing operations, from storage tanks or automatic transfer facilities to pipelines or any other forms of transportation.

(15) "Delivery vessel" means a tank truck or trailer or a railroad tank car equipped with a storage tank used for the transport of gasoline from sources of supply to stationary storage tanks of bulk gasoline plants or gasoline dispensing facilities.

(16) "Firebox" means the chamber or compartment of a boiler or furnace in which materials are burned but does not mean the combustion chamber of an incinerator.

(17) "Forebays" means the primary sections of a wastewater separator.

(18) "Fuel gas" means any gas which is generated by a petroleum refinery process unit or by a petroleum liquid transfer operation and which is combusted, or any gaseous mixture of such gas and natural gas which is combusted.

(20) "Gasoline dispensing facility" means any site where gasoline is dispensed to motor vehicle gasoline tanks from stationary storage tanks.

(21) "Gaseous service" means petroleum refinery equipment which processes, transfers or contains a VOC or mixture of VOCs in the gaseous phase.

(22) "Leaking component" means any component at a petroleum refinery which has a VOC concentration exceeding 10,000 ppm when tested in the manner approved by the department.

(23) "Liquid-mounted seal" means a primary floating roof seal mounted in continuous contact with the liquid in a liquid organic compound storage tank between the tank wall and the floating roof around the internal circumference of the tank.

(24) "Liquid service" means petroleum refinery equipment which processes, transfers or contains a VOC or mixture of VOCs in the liquid phase.

(25) "Lower explosive limit" or "LEL" means the lower limit of flammability of a gas or vapor at ordinary ambient temperatures expressed as percent propane in air by volume.

(26) "Noncondensibles" means gases and vapors from processes that are not condensed with the equipment used in those processes.

(27) "Petroleum" means the crude oil removed from the earth and the oils derived from tar sands, shale, coal and coke.

(28) "Petroleum liquid" means crude petroleum, petroleum, condensate and any finished or intermediate products manufactured or extracted in a petroleum refinery or in a facility which produces oils from tar sands, shale, coal or coke.

(29) "Petroleum refinery" means any facility engaged in producing gasoline, kerosene, distillate fuel oils, residual fuel oils, lubricants or other products through distillation of petroleum or through redistillation, cracking, extraction or reforming of unfinished petroleum derivatives.

(29m) "Process gas" means any gas generated by a petroleum refinery process unit except fuel gas and process upset gas as defined in this section.

(29p) "Process upset gas" means any gas generated by a petroleum refinery process unit as a result of startup, shutdown, upset or malfunction.

(30) "Refinery process unit" means any segment of a petroleum refinery in which a specific processing operation is conducted.

(31) "Reid vapor pressure" means the absolute vapor pressure of volatile crude petroleum and volatile nonviscous petroleum liquids except liquefied petroleum gases as determined by ASTM D323-89, incorporated by reference in ch. NR 484.

(32) "Splash filling" means the filling of a tank truck or stationary storage tank through a pipe or hose whose discharge opening is more than 15.2 centimeters (6 inches) above the bottom of the tank being filled.

(33) "True vapor pressure" means the equilibrium partial pressure exerted by a petroleum liquid as determined in accordance with methods described in American Petroleum Institute Publication 2517, *Evaporative Loss from External Floating Roof Tanks*, 3rd edition, February 1989, incorporated by reference in ch. NR 484.

(34) "Turnaround" means the procedure of shutting a refinery unit down after a run to do necessary maintenance and repair work and putting the unit back on stream.

(35) "Vacuum producing system" means any reciprocating, rotary, or centrifugal blower or compressor, or any jet ejector or device that takes suction from a pressure below atmospheric and discharges against atmospheric pressure.

(36) "Vapor balance system" means a combination of pipes or hoses which create a closed system between the vapor spaces of an unloading tank and a receiving tank such that vapors displaced from the receiving tank are transferred to the tank being unloaded.

(37) "Vapor collection system" means, for the purpose of liquid organic compound transfer operations, a vapor transport system which uses direct displacement by the liquid loaded to force vapors from the tank into a vapor control system or vapor holding tank.

(38) "Vapor-mounted seal" means any primary floating roof seal mounted so that there is an annular vapor space underneath the seal. The annular vapor space is bounded by the bottom of the primary seal, the tank wall, the liquid surface, and the floating roof.

(39) "Vapor recovery or control system" means a system that gathers organic compound vapors released during the operation of any transfer,

storage, or process equipment and processes the vapors so as to prevent their emission into the ambient air.

(40) "Wastewater (oil-water) separator" means any device or piece of equipment which utilizes the difference in density between oil and water to remove oil and associated chemicals from water. This includes any device, such as a flocculation tank, clarifier, etc., which removes petroleum derived compounds from wastewater.

(41) "Waxy, heavy pour crude petroleum" means a crude petroleum with a pour point of 10°C (50°F) or higher as determined by ASTM D97-87, incorporated by reference in ch. NR 484.

History: Renum. from NR 154.01, Register, September, 1986, No. 369, eff. 10-1-86; renum. (2), (3), (4), (7) and (12) to be NR 419.02 (1), 400.02 (11m), (16e), (21m) and (26m), r. (19), am. (21), (29m) and (29p) renum. from NR 420.02 (71) and (72), Register, February, 1990, No. 410, eff. 3-1-90; am. (31), (33) and (41), Register, May, 1992, No. 437, eff. 6-1-92.

NR 420.03 Storage of petroleum liquids. (1) **APPLICABILITY.** The storage, recordkeeping and maintenance requirements of subs. (2), (3) and (4) apply to all storage vessels for petroleum liquids of more than 151,412 liter (40,000 gallon) capacity on which construction or modification is commenced after July 1, 1975, with the exception of:

(a) Storage vessels being used for number 2 through number 6 fuel oils as specified in ASTM D396-89a, gas turbine fuel oils numbers 2-GT through 4-GT as specified in ASTM D2880-89, or diesel fuel oils numbers 2-D and 4-D as specified in ASTM D975-89a. These ASTM standards are incorporated by reference in ch. NR 484.

(b) Storage vessels for the crude petroleum or condensate stored, processed or treated at a drilling and production facility outside a standard metropolitan statistical area prior to custody transfer.

(c) Pressure vessels which are designed to operate at pressures in excess of 104 kPa (15 psig) without emissions except under emergency conditions.

(d) Subsurface caverns or porous rock reservoirs.

(e) Underground tanks if the total volume of petroleum liquids added to and taken from a tank annually does not exceed twice the volume of the tank.

(2) **STORAGE REQUIREMENTS.** The owner or operator of any storage vessel to which this section applies shall store petroleum liquids as follows:

(a) If the true vapor pressure of the petroleum liquid, as stored, is equal to or greater than 10.5 kPa (1.52 psia), but not greater than 77 kPa (11.1 psia), the storage vessel shall be equipped with a floating roof, a vapor recovery system or their equivalents.

(b) If the true vapor pressure of the petroleum liquid, as stored, is greater than 77 kPa (11.1 psia) the storage vessel shall be equipped with a vapor recovery system or its equivalent.

(3) **RECORDKEEPING.** (a) *General records.* The owner or operator of any storage vessel to which this section applies shall, for each such storage vessel, maintain a file of each type of petroleum liquid stored, the typical Register, May, 1992, No. 437

3. Avoidable visible liquid leaks during loading or unloading operations.

(e) *Repair deadline.* Provisions shall be made to repair and retest a vapor collection or control system that exceeds the limits of par. (d) 2 within 15 days.

(f) *Precautions.* Sources to which this subsection applies may not:

1. Allow gasoline to be discarded in sewers or stored in open containers, s. NR 419.04 notwithstanding; nor

2. Allow the pressure in the vapor collection system to exceed the tank truck or trailer pressure relief settings.

(g) *Truck sticker.* No person may load gasoline into any tank truck or trailer from any bulk gasoline terminal unless the tank truck displays a current sticker demonstrating that the truck is in compliance with sub. (4).

(2) BULK GASOLINE PLANTS. (a) *Applicability.* Subject to the provisions of s. NR 425.03, this subsection applies to the loading and storage facilities of all bulk gasoline plants which have a 3 year average annual throughput of 1,330,000 liters (350,000 gallons) of gasoline or more; to the unloading, loading, and storage facilities of all bulk gasoline plants which have a 3 year average annual throughput of 3,800,000 liters (1,000,000 gallons) of gasoline or more; and to all delivery vessels involved in such loading or unloading operations, with the following exceptions:

1. The loading or unloading of stationary storage tanks with a capacity of 2,176 liters (575 gallons) or less, notwithstanding s. NR 439.10.

2. Bulk plant unloading facilities, the delivery vessels receiving gasoline from bulk plants, and the operation of transferring gasoline from bulk plant to delivery vessel when the transfer takes place outside the counties of Brown, Calumet, Dane, Dodge, Fond du Lac, Jefferson, Kenosha, Manitowoc, Milwaukee, Outagamie, Ozaukee, Racine, Rock, Sheboygan, Walworth, Washington, Waukesha and Winnebago or when the gasoline is delivered exclusively to facilities exempted from the requirements of sub. (3) by sub. (3) (a) 1, 2, 3, 4, 5 or 6. However, this subsection does apply if gasoline is transferred during the ozone season to a delivery vessel whose last previous delivery was to a gasoline dispensing facility (either inside or outside of Wisconsin) which is required to have a vapor balance system.

(b) *Equipment requirements for bulk plants.* No owner or operator of a bulk gasoline plant may permit stationary storage tanks to load or unload gasoline unless each tank is equipped with a vapor balance system as described under par. (e) and approved by the department; and

1. Each tank is equipped with a submerged fill pipe approved by the department; or

2. Each tank is equipped with a fill line whose discharge opening is flush with or near the bottom of the tank.

(c) *Equipment requirements for delivery vessels.* No owner or operator of a bulk gasoline plant or delivery vessel may permit the gasoline transfer operations regulated under this subsection unless each delivery vessel in-

involved in such operations is equipped with a vapor balance system as described under par. (e) and approved by the department; and

1. Equipment is available at the bulk gasoline plant to provide for the submerged filling of each delivery vessel; or

2. Each delivery vessel is equipped for bottom filling; and

3. After October 1, 1981, the tank truck displays a current sticker demonstrating that the truck is in compliance with sub. (4).

(d) *Transfer requirements.* No owner or operator of a bulk gasoline plant or delivery vessel may permit the transfer of gasoline unless:

1. Submerged or bottom filling is used; and

2. The vapor balance system is in good working order and is connected and operating; and

3. Delivery vessel hatches are closed at all times during transfer operations; and

4. There are no leaks in the delivery vessels' pressure-vacuum relief valves and hatch covers, nor in the delivery vessel tanks or stationary storage tanks or associated vapor and liquid lines during loading or unloading; and

5. The pressure relief valves on stationary storage tanks and delivery vessels are set to release at no less than 4.8 kPa (0.7 psig), or the highest possible pressure consistent with state or local fire codes or the national fire prevention association guidelines.

(e) *Vapor balance system.* Vapor balance systems required under pars. (b) and (c) shall include vapor space connections on the stationary storage tank and on the delivery vessel with connecting pipe or hose. These connections are required either for loading of the bulk plant storage tank only or for both loading and unloading, as indicated in par. (a). Both sides of all junctions shall be equipped with fittings which are vapor tight and will automatically and immediately close upon disconnection so as to prevent release of organic compound vapors.

(f) *Operating requirements.* The vapor collection system and the gasoline loading equipment shall be designed and operated in a manner that prevents:

1. Gauge pressure from exceeding 4.5 kPa (18 inches of H₂O) and vacuum from exceeding 1.5 kPa (6 inches of H₂O) in the gasoline tank truck;

2. A reading equal to or greater than 100% of the LEL at 2.5 centimeters from all points on the perimeter of a potential leak source;

3. Avoidable visible liquid leaks during loading or unloading operations.

(g) *Repair deadline.* Provisions shall be made to repair and retest a vapor collection or control system that exceeds the limits of par. (f) 2. within 15 days.

(h) *Precautions.* Notwithstanding s. NR 419.04, no owner or operator of a bulk gasoline plant may permit gasoline to be spilled, discarded in sewers or stored in open containers.

(3) **GASOLINE DISPENSING FACILITIES.** (a) *Applicability.* Subject to the provisions of s. NR 425.03, this subsection applies to gasoline dispensing facilities, to the delivery vessels used to bring these facilities the gasoline which they dispense, and to the operation of transferring gasoline to the dispensing facilities with the following exceptions:

1. Gasoline dispensing facilities which are supplied exclusively by bulk gasoline plants whose unloading operations are exempted from the requirements of sub. (2) by sub. (2) (a) 1.

2. Gasoline dispensing facilities located outside the counties of Brown, Calumet, Dane, Dodge, Fond du Lac, Jefferson, Kenosha, Manitowoc, Milwaukee, Outagamie, Ozaukee, Racine, Rock, Sheboygan, Walworth, Washington, Waukesha and Winnebago.

3. Delivery vessels used exclusively to supply exempt gasoline dispensing facilities or used exclusively for the transfer operations exempted under subs. 4. to 6.

4. Transfers made to storage tanks of gasoline dispensing facilities equipped with floating roofs or their equivalent which have been approved by the department.

5. Transfers made to any stationary storage tank at a gasoline dispensing facility with a capacity of 7,580 liters (2,000 gallons) or less which is in place on or before August 1, 1979.

6. Transfers made to any stationary storage tank at a gasoline dispensing facility with a capacity of 2,176 liters (575 gallons) or less which is installed after August 1, 1979.

(b) *Vapor control requirements.* No owner or operator of a gasoline dispensing facility and no owner of a gasoline storage tank at such a facility may transfer or cause or allow the transfer of gasoline from any delivery vessel into any stationary storage tank not excluded under par. (a) unless:

1. The storage tank is equipped with a submerged fill pipe, and
2. The vapors displaced from it by filling are processed by a vapor control system in accordance with par. (c), and
3. After October 1, 1981, the tank truck displays a current sticker demonstrating that the truck is in compliance with sub. (4).

(c) *Vapor control system.* The vapor control system required by par. (b) shall include one or more of the following:

1. A vapor balance system with a vapor-tight vapor return line from the storage tank to the delivery vessel and a system that will ensure the vapor line is connected before gasoline can be transferred into the storage tank; or

2. A refrigeration-condensation system or equivalent capable of recovering at least 90% by weight of the organic compounds in the displaced vapor; or

3. A system demonstrated to have control efficiency equivalent to or greater than that provided under subd. 1 or 2 and approved by the department.

(d) *Operating requirements.* The vapor collection system and the gasoline loading equipment shall be designed and operated in a manner that prevents:

1. Gauge pressure from exceeding 4.5 kPa (18 inches of H₂O) and vacuum from exceeding 1.5 kPa (6 inches of H₂O) in the gasoline tank truck;
2. A reading equal to or greater than 100% of the LEL at 2.5 centimeters from all points on the perimeter of a potential leak source;
3. Avoidable visible liquid leaks during loading or unloading operations.

(e) *Delivery vessel unloading.* The operator of a delivery vessel may not commence transfer of gasoline to any gasoline dispensing facility equipped with a vapor balance system pursuant to par. (c) 1 without first properly connecting the vapor return line. The delivery vessel shall be designed, maintained and operated to be vapor tight at all times that it is vapor-laden.

(f) *Delivery vessel refilling.* During the ozone season, vapor-laden delivery vessels shall be refilled in Wisconsin only at:

1. Bulk gasoline terminals complying with sub. (1); or
2. Bulk gasoline plants equipped with a vapor balance system for unloading as described in sub. (2) (e).

(g) *Control equipment installation and maintenance.* Each owner of a gasoline storage tank or delivery vessel shall:

1. Install all necessary control systems and make all necessary process modifications in accordance with sub. (3) (b), (c), (d) and (e); and
2. Repair, replace or modify any worn out or malfunctioning component or element of design, and keep such records as may be requested in writing by the department relating to the repair, replacement or modification of any component or element of design of the control system.
3. Repair and retest a vapor collection or control system that exceeds the limits of par. (d) 2 within 15 days.

(h) *Control equipment operating and maintenance instructions.* Each owner of a gasoline storage tank shall provide written instructions to the operator of the gasoline dispensing facility describing necessary operating and maintenance procedures and procedures for prompt notification of the owner in case of any malfunction of the control system.

(i) *Control system operation and maintenance requirements.* Each operator of a gasoline dispensing facility shall:

1. Maintain and operate the control system in accordance with the specifications and the operating and maintenance procedures specified by the owner; and
2. Promptly notify the owner of the control system of any scheduled maintenance or of any malfunction requiring replacement or repair of major components of the system; and

3. Keep on the premise a copy of the instructions provided pursuant to par. (h) and make these instructions available to an authorized representative of the department on request; and

4. Maintain such records on maintenance and malfunction as may be requested in writing by the department; and

5. Maintain gauges, meters, or other specified testing devices in proper working order.

(4) GASOLINE DELIVERY VESSELS. (a) *Applicability.* This subsection applies, with compliance deadlines in accord with the compliance schedules for subs. (1) to (3), to all gasoline delivery vessels except those exempted from vapor balance system installations under subs. (2) (a) and (3) (a) 3.

(b) *Equipment requirements.* Except as provided under par. (a), the owner or operator of a gasoline delivery vehicle shall:

1. Provide for all gasoline delivery vessels to be equipped for gasoline vapor collection.

2. Provide for all loading and vapor lines to be equipped with fittings which make vapor-tight connections.

3. Equip vapor lines leading to the vapor space in the delivery vessel with fittings which close automatically when disconnected.

4. Demonstrate through the sticker required in subd. 5 that the gasoline delivery vessel is in compliance with the following provisions:

a. An annual pressure test shall be performed on the vessel according to the test methods and procedures specified in s. NR 439.06 (3) (d);

b. The vessel may not sustain a pressure change of more than 0.75 kPa (3 inches of H₂O) in 5 minutes when pressurized to a gauge pressure of 4.5 kPa (18 inches of H₂O) or evacuated to a gauge pressure of 1.5 kPa (6 inches of H₂O) during the test required in subpar. a.; and

c. A vessel failing to meet the requirements of subpar. b. shall be repaired and retested within 15 days.

5. Display a sticker near the department of transportation certification plate which:

a. Shows the date that the gasoline delivery vessel was last certified under subd. 4;

b. Shows the identification number of the gasoline delivery vessel.

6. Design and operate the gasoline loading and unloading equipment in a manner that prevents:

a. A reading equal to or greater than 100% of the LEL at 2.5 centimeters from all points on the perimeter of a potential leak source; and

b. Avoidable visible liquid leaks during loading or unloading operations.

7. Repair and retest, within 15 days, components exceeding the limits of subd. 6 a.

(c) *Pressure test records.* 1. Maintain for a period of 3 years from the recording date a log for each delivery vessel containing, at a minimum:

a. Company name and the date and location of the test required under par. (b) 4,

b. Delivery vessel identification number, and

c. The results of the test.

2. Annually submit to the department information as developed under par. (b) 4 b, and as recorded under subd. 1.

History: Renum. from NR 154.13 (3) (a) to (d) and am., Register, September, 1986, No. 369, eff. 10-1-86; am; (1) (c) and (f) (intro.), (2) (b) (intro.), (c) (intro.), (d) (intro.) and (h), (3) (b) (intro.) and (e), (4) (a), (b) 4. a. and b., (c) 1. a. and b. r. and recr. (4) (c) 1. c., r. (4) (c) 1. d. to f., Register, February, 1990, No. 410, eff. 3-1-90; correction in (2) (a) 1. and (c) (intro.), made under s. 13.93 (2m) (b) 7, Stats., Register, February, 1990, No. 410; am. (3) (d) (intro.), Register, May, 1992, No. 437, eff. 6-1-92; correction in (2) (a) 2. made under s. 13.93 (2m) (b) 7, Stats., Register, May, 1992, No. 437.

NR 420.05 Petroleum refinery sources. (1) **VACUUM PRODUCING SYSTEMS.** (a) *Applicability.* This subsection applies, subject to the provisions of s. NR 425.03, to vacuum producing systems at petroleum refining sources.

(b) *Requirements.* The owner or operator of any vacuum producing systems at a petroleum refinery may not permit the emission of any non-condensable VOC, from the condensers or accumulators of the system. The control required by this paragraph shall be achieved by:

1. Piping the noncondensable vapors to an operating firebox or incinerator; or

2. Compressing the vapors and adding them to the refinery fuel gas.

(2) **WASTEWATER SEPARATORS.** (a) *Applicability.* This subsection applies, subject to the provisions of s. NR 425.03, to wastewater separators at petroleum refining sources.

(b) *Requirements.* The owner or operator of any wastewater (oil-water) separators at petroleum refinery shall:

1. Provide covers and seals approved by the department on all separators and forebays; and

2. Equip all openings in covers, separators, and forebays with lids or seals such that the lids or seals are in the closed position at all times except when in actual use.

(3) **PROCESS UNIT TURNAROUNDS.** (a) *Applicability.* This subsection applies to process unit turnarounds at petroleum refining sources.

(b) *Requirements.* The owner or operator of a petroleum refinery shall develop and submit to the department for approval a detailed procedure for minimizing VOC emissions during process unit turnaround. At a minimum, the procedure shall provide for:

1. Depressurization venting of the process unit or vessel to a flare, firebox or vapor recovery system which prevents release to the ambient air of at least 90% by weight of the VOCs vented; and

Register, May, 1992, No. 437