

**REGULATION 11  
HAZARDOUS POLLUTANTS  
RULE 10  
HEXAVALENT CHROMIUM FROM ALL COOLING TOWERS AND  
TOTAL HYDROCARBON EMISSIONS FROM PETROLEUM REFINERY COOLING  
TOWERS**

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**REGULATION 11**  
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**HEXAVALENT CHROMIUM FROM ALL COOLING TOWERS AND**  
**TOTAL HYDROCARBON EMISSIONS FROM PETROLEUM REFINERY COOLING TOWERS**

(Adopted November 15, 1989)

**11-10-100 GENERAL**

**11-10-101 Description:** The purpose of this Rule is to reduce emissions of hexavalent chromium from all cooling towers and reduce total hydrocarbon emissions from cooling towers at petroleum refineries~~by eliminating chromium-based circulating water treatment programs.~~

~~**11-10-102 Exemption, Discontinued Chromate Treatment:** Sections 11-10-502 and 503 do not apply to cooling tower operators who have not used hexavalent chromium for water treatment since March 1, 1989.~~

**11-10-103 Limited Exemption, Fin-Fan Coolers and HVAC Systems:** Fin-Fan Coolers and HVAC Systems associated with petroleum refinery cooling towers are exempt from the total hydrocarbon emission requirements of this rule.

**11-10-104 Limited Exemption, Continuous Hydrocarbon Analyzers:** When a continuous hydrocarbon analyzer, as defined in Section 11-10-201, is installed pursuant to Section 11-10-602 and is used to detect total hydrocarbon concentrations in cooling tower water, the cooling tower return line (s), and/or the heat exchanger exit line(s) monitored by the analyzer(s) are exempt from the requirements of Section 11-10-402.

**11-10-105 Limited Exemption, Recirculation Rates Less Than 500 Gallons Per Minute:** Petroleum refinery cooling towers with a water recirculation rate less than 500 gallons per minute may demonstrate compliance with the requirements in Section 304 of this rule by monitoring for leaks at least once every 14 days, rather than continuously or daily as provided for in Section 11-10-304, with any of the Air District approved total hydrocarbon detection methods outlined in Section 11-10-304 .

**11-10-106 Limited Exemption, Recirculation Rates Less Than 2,500 Gallons Per Minute:** Petroleum refinery cooling towers with a water recirculation rate less than 2,500 gallons per minute may demonstrate compliance with the requirements in Section 304 of this rule by monitoring for leaks at least once every seven days, rather than continuously or daily as provided for in Section 11-10-304, with any of the Air District approved total hydrocarbon detection methods outlined in Section 11-10-304 .

**11-10-200 DEFINITIONS**

**11-10-201 Continuous Hydrocarbon Analyzer:** An Air District-approved parametric monitoring device that measures total hydrocarbon concentration to detect leaks in a heat exchanger system.

**11-10-202 Cooling Tower:** ~~Any open water recirculation device that uses fans or natural draft to draw or force air to contact and cool water by evaporation.~~ A device used to remove heat by circulating cooling water systems by transferring heat to the atmosphere using either a natural or mechanical draft.

**11-10-203 Hexavalent Chromium/Chromate:** Hexavalent chromium is a cancer-causing (toxic) substance existing as part of various inorganic chromate compounds, for example, sodium dichromate or lead chromate.

~~**11-10-203 Water Treatment Chemicals:** Any combination of chemicals added to cooling tower water including tracers, corrosion inhibitors, antiscalants, dispersants, biocides.~~

**11-10-204 Leak Action Level:** A total hydrocarbon concentration greater than any one of the following:

**204.1** 84 ppbw (as methane) as measured in cooling tower water prior to exposure to air for cooling towers in operation prior to July 1, 2016, or 42 ppbw (as methane) as measured in cooling tower water prior to exposure to air for new or modified cooling towers operating on or after July 1, 2016.

**204.2** 6 ppmv (as methane) as measured in stripped air by a continuous hydrocarbon analyzer or an APCO approved alternative method.

**11-10-205 Leak Repair:** A leak repair shall reduce the concentration of total hydrocarbon in cooling tower water to comply with the applicable leak action level and shall include but not be limited to the following actions:

**205.1** Permanent physical repair of leaking equipment, replacement of equipment, and/or blocking or plugging equipment.

**205.2** Replacing the leaking heat exchanger or heat exchanger bundle; or permanently isolating, bypassing, or otherwise removing the leaking heat exchanger from service until it is repaired.

**11-10-206 Petroleum Refinery:** An establishment that is located on one or more contiguous or adjacent properties that processes crude oil to produce more usable products such as gasoline, diesel fuel, aviation fuel, lubricating oils, asphalt or petrochemical feedstocks. Petroleum refinery processes include separation processes (e.g., atmospheric or vacuum distillation, and light ends recovery), petroleum conversion processes (e.g., cracking, reforming, alkylation, polymerization, isomerization, coking, and visbreaking) petroleum treating processes (e.g., hydrodesulfurization, hydrotreating, chemical sweetening, acid gas removal, and deasphalting), feedstock and product handling (e.g., storage, blending, loading, and unloading), and auxiliary facilities (e.g., boilers, waste water treatment, hydrogen production, sulfur recovery plant, cooling towers, blowdown systems, compressor engines, and power plants).

**11-10-207 Heat Exchange System:** A device or series of devices used to transfer heat from process fluids to water without intentional direct contact of the process fluid with the water (i.e., non-contact heat exchanger) and to transport and/or cool the water in a closed-loop recirculation system (cooling tower system). For closed-loop recirculation systems, the heat exchange system consists of a cooling tower, all petroleum refinery process unit heat exchangers that are serviced by that cooling tower, and all water lines to and from the petroleum refinery process unit heat exchanger(s).

**11-10-208 Heat Exchanger:** A device consisting of fins and/or tubes used to transfer heat from process equipment or process fluid streams to cooling water.

**11-10-209 Total Hydrocarbon:** Any compound of carbon excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate.

~~11-10-212 **Water Treatment Chemicals:** Cooling tower water may include tracers, corrosion inhibitors, antiscalants, dispersants, and biocide that improve the physical properties of the water.~~

11-10-210 **Cooling Tower Return Line:** The main water trunk lines at the inlet to the cooling tower before exposure to the atmosphere.

11-10-211 **Heat Exchanger Exit Line:** A cooling water line from the exit of one or more heat exchangers (where cooling water leaves the heat exchangers) to the entrance of the cooling tower return line.

## 11-10-300 STANDARDS

11-10-301 **Hexavalent Chromium Removal:** Effective March 1, 1990, a person shall not operate any cooling tower that uses hexavalent chromium chemicals.

~~11-10-302 **Circulating Water Concentration-Wooden Cooling Towers:** Effective March 1, 1990, a person shall not operate a wooden cooling tower in the District unless the following requirements are met:~~

~~302.1 March 1, 1990 to September 1, 1990: Hexavalent chromium levels in the circulating water are not to exceed 8 milligrams/liter of circulating water~~

~~302.2 After September 1, 1990: Hexavalent chromium levels in the circulating water are not to exceed 0.15 milligrams/liter of circulating water.~~

~~11-10-303 **Circulating Water Concentration-Non-Wooden Cooling Towers:** Effective March 1, 1990, a person shall not operate a non-wooden cooling tower unless the hexavalent chromium levels do not exceed 0.15 milligrams/liter of circulating water.~~

11-10-304 **Total Hydrocarbon Leak Monitoring Requirement:** Effective July 1, 2016, the owner/operator of a cooling tower located at a petroleum refinery shall use one of three options to monitor for total hydrocarbon leaks from cooling towers:

304.1 Sample and analyze cooling tower water at each cooling tower return line(s), and/or at each heat exchanger exit line(s) prior to exposure to air to demonstrate compliance with the leak action level in Subsection 11-10-204.1 (84 ppbw in the cooling water for existing units and 42 ppbw for new/modified units) at least once every calendar day (365 samples per year) pursuant to the requirements of Sections 11-10-603 , 11-10-604 and the BAAQMD Manual of Procedures; or

304.2 Install a continuous hydrocarbon analyzer(s) at each cooling tower return line(s), and/or at each heat exchanger exit line(s) prior to exposure to air to demonstrate compliance with the leak action level in Subsection 11-10-204.2 (6 ppmv in the stripped air). The owner/operator shall ensure that the continuous hydrocarbon analyzer(s) is capable of taking at least 4 measurements every hour (96 measurements per day); or

304.3 Employ an alternative APCO-approved method to monitor each cooling tower return line(s), and/or each heat exchanger exit line(s) prior to exposure to air daily to demonstrate compliance with the leak action level in Subsection 11-10-204.2 (6 ppmv in the stripped air). Cooling tower owner/operators must receive prior approval from the APCO to use an alternative monitoring method.

**11-10-305 Leak Action Requirement:** Effective July 1, 2016, if any of the hydrocarbon leak detection methods in Section 11-10-304 result in cooling tower water containing total hydrocarbon concentrations greater than the applicable leak action level in Section 11-10-204, the cooling tower owner/operator shall minimize the leak as soon as practicable or within 5-calendar days, whichever is sooner, and conduct a leak repair and/or remove the defective piece of equipment from service within 21-calendar days of first detecting the leak. The owner/operator shall also speciate and quantify the Toxic Air Contaminants (TACs) associated with the leak within one calendar day of discovering the leak and each day thereafter until the leak is fully repaired, using water sampling pursuant to the requirements of Sections 11-10-603, 11-10-604 and the BAAQMD Manual of Procedures. The TACs requiring speciation and quantification are defined in Regulation 2, Rule 5, Section 2-5-222 and are summarized in Table 2-5-1 of Regulation 2, Rule 5.

## **11-10-400 ADMINISTRATIVE REQUIREMENTS**

**11-10-401: Petroleum Refinery Cooling Tower Reporting Requirements:** When the sampling of cooling tower water exceeds the applicable leak action level the cooling tower owner/operator shall:

**401.1** Within one calendar day, notify the APCO of the total hydrocarbon, pH, iron and chlorine concentration in the cooling water at time and date of leak discovery. List all of the heat exchangers that are served by this cooling tower.

**401.2** If the leak has not been repaired after 21 days, the owner/operator shall notify the APCO regarding the magnitude of the leak, the specific repairs performed to date, whether the leaking component was reinspected for leaks following the repair, the cause of the leak, whether further repair or replacement of equipment will be required at the next turnaround, whether the hydrocarbons associated with the leak were speciated and quantified, and submit mass emission calculations to demonstrate the total hydrocarbon emissions from the leak are below 15 pounds per day, and the hourly and annual (if applicable) Toxic Air Contaminant (TAC) emissions from the leak are below their corresponding Acute and/or Chronic TAC trigger levels in Table 2-5-1 of Regulation 2, Rule 5.

**11-10-402 Best Modern Practices:** Effective July 1, 2016, the owner/operator of a cooling tower located at a petroleum refinery shall minimize total hydrocarbon emissions from cooling tower equipment and operations by employing best modern practices that shall include but are not limited to:

**402.1** Visual examination and/or non-destructive testing of all heat exchangers upstream of the cooling tower during turnaround for corrosion/damage and back flushing;

**402.2** Repassivation of the steel contained in the heat exchangers during turnaround;

**402.3** Seal tubes within the heat exchangers if there is evidence of corrosion or pitting during turnaround;

**402.4** Perform visual observations, at least once every shift, of the cooling water to detect any changes in the appearance of the water that could indicate hydrocarbon contamination and confirm presence of microbial growth such as turbidity or algae growth below the water line;

402.5 Monitor cooling tower decks at least once every shift, if access to the decks is possible, to detect any unexpected odors from the water via the human olfactory system;

402.6 Measure the residual chlorine in the cooling tower water once every shift;

402.7 Use hand-held monitors, such as or FIDs, once every shift, to detect the presence of total hydrocarbons in the air above the cooling tower water;

402.8 Measure the oxidation reduction potential in the cooling tower water with hand-held monitors a least once every shift; and,

402.9 At least once every shift, track and record the amount of chlorine (or biocide) added to the cooling tower water.

Data collected per the requirements in Section 11-10-402 shall be retained for at least 5-years from the date of entry and shall be analyzed in a written report by the cooling tower owner/operator once per week. The purpose of the written report is to examine for trends that could serve as an early warning/detection system for potential hydrocarbon leaks.

## **11-10-500 MONITORING AND RECORDS**

~~11-10-501 **Reporting-General:** By December 1, 1989, any owner/operator of a cooling tower shall notify the District in writing regarding the following information about the cooling tower. After December 1, 1989, any operator/owner of any newly constructed cooling water tower shall provide the APCO with the following information at least 90 days before the tower is operated.~~

- ~~1) Where the cooling tower is located.~~
- ~~2) Who is the owner/operator of the tower.~~
- ~~3) Cooling tower type and materials of construction.~~
- ~~4) Whether hexavalent chromium based treatment chemicals were used in the cooling tower.~~
- ~~5) If hexavalent chromium based chemicals were previously used, when they were discontinued.~~
- ~~6) A description of the alternate treatment program chosen, as well as the circulating water monitoring plan.~~

~~11-10-502 **Monitoring-General:** Effective March 1, 1990, any person subject to Sections 11-10-302 and 303 shall test the circulating water at least once every six calendar months to determine the concentration of hexavalent chromium. The first test shall be performed during March, 1990. Testing may be discontinued when two consecutive required tests show hexavalent chromium concentrations less than 0.15 milligrams per liter of circulating water. The APCO reserves the right to require testing of the circulating water at any time, if the District has reason to believe the water may contain hexavalent chromium.~~

### ~~11-10-503 **Monitoring-Wooden-Cooling-Towers:**~~

~~503.1 March 1, 1990 until September 1, 1990: Any person subject to Section 11-10-302.1 shall test the circulating water at least once every calendar month to determine the concentration of hexavalent chromium.~~

~~503.2 After September 1, 1990: Any person subject to Section 11-10-302.2 shall test the circulating water at least once every six calendar months to determine the concentration of hexavalent chromium. Testing may be discontinued when two consecutive required tests show hexavalent chromium concentrations less than 0.15 milligrams per liter of circulating water. The APCO reserves the right to require testing of the circulating water at any time, if the District has reason to believe the water may contain hexavalent chromium.~~

**11-10-504 Operating Records:** ~~Any person subject to Sections 11-10-302 and 303 shall maintain records of the results of all required tests of circulating water for two years and give them to the District when requested. Owner/operators subject to the requirements of Sections 11-10-301, 304, 305, 401, 402, 601, 602, 603 and/or 604 shall retain records of the results of all sampling and/or monitoring conducted, leak minimizations and repairs made, best modern practices employed and other required data on site for at least five years from the date of entry. Owner/operators claiming any of the limited exemptions from petroleum refinery cooling tower requirements in this rule shall keep records on site for at least five years to demonstrate qualification for exemption.~~

#### **11-10-600 MANUAL OF PROCEDURES**

**11-10-601 Determination of Hexavalent Chromium in Circulating Water:** Samples of circulating water shall be analyzed for hexavalent chromium as prescribed by American Public Health Method 312B or an equivalent method, as approved by the APCO.

**11-10-602 Total Hydrocarbon Analyzer Location:** Effective July 1, 2016, if the owner/operator of a cooling tower at a petroleum refinery installs one or more Air District-approved total hydrocarbon analyzers in a cooling tower to demonstrate compliance with Subsections 11-10-304.2 and 304.3, such analyzers shall be installed at: A) each cooling tower return line to continuously measure the total hydrocarbon concentration in the cooling tower water prior to exposure to air, or B) the exit line for each heat exchanger or group of heat exchangers within that heat exchanger system prior to exposure to air. Location of analyzer installations shall be subject to APCO approval. Analyzer sensitivity shall respond to the compounds being processed. Analyzers shall be maintained and operated in accordance with Regulation 1, Section 523.

**11-10-603 Cooling Tower Water Lab Analysis Methodology:** Effective July 1, 2016, when the owner/operator of a cooling tower located at a petroleum refinery performs cooling water sampling and analysis for hydrocarbon concentration in cooling tower water pursuant to Subsection 11-10-304.1, the laboratory analysis shall follow both EPA methodologies 8260 and 8270.

**11-10-604 Cooling Tower Water Sampling Methodology:** Effective July 1, 2016, when the owner/operator of a cooling tower located at a petroleum refinery performs cooling water sampling and analysis for total hydrocarbon concentration in cooling tower water pursuant to Subsection 11-10-304.1, the cooling water shall be sampled at each cooling tower return line(s) and/or each heat exchanger exit line(s) prior to exposure to air. Sampling methodology shall follow the BAAQMD Manual of Procedures.