

**REGULATION 12  
MISCELLANEOUS STANDARDS OF PERFORMANCE  
RULE 16  
PETROLEUM REFINING EMISSIONS ANALYSIS, THRESHOLDS AND MITIGATION  
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**REGULATION 12**  
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**RULE 16**  
**PETROLEUM REFINING EMISSIONS ANALYSIS, THRESHOLDS AND MITIGATION**  
**(ADOPTED [DATE])**

**12-16-100 GENERAL**

**12-16-101 Description:** The purpose of this rule is to identify the cause of, and to mitigate, any significant emissions increases from petroleum refineries.

**12-16-102 Exemption, Small Refineries:** This rule shall not apply to any refinery that is limited to a total crude oil throughput or total crude oil processing capacity of 5,000 barrels per day or less by an Air District Permit to Operate.

**12-16-103 Limited Exemption, Increases in Crude Oil Throughput:** This rule does not require mitigation of emission increases of criteria pollutants or greenhouse gases if such increases are caused solely by an increased volume of crude oil processed at the crude oil unit as allowed by an Air District Permit to Operate, relative to the crude oil unit throughput that was used to establish the PREP in Regulation 12, Rule 15, and those increases do not reflect an increase in the emission rate relative to the processing rate of crude oil. Therefore, the portion of the increase in emissions of a criteria pollutant or greenhouse gas above the Trigger Level that is attributable to an increase in crude oil throughput shall be addressed in the Causal Analysis in Section 12-16-401.1, but is exempt from the other requirements of Section 401 provided the refinery owner/operator satisfies the requirements of Section 12-16-405.

**12-16-104 Limited Exemption, Greenhouse Gas Emissions:** Emission increases of greenhouse gases (GHG) that exceed the Trigger Levels in Section 12-16-301 shall be addressed in the Causal Analysis in Section 12-16-401.1, but are exempt from the other requirements of Section 401.

**12-16-105 Limited Exemption, Emissions from Flares:** Emissions from flaring events addressed in Regulation 12, Rules 11 and 12 shall not be included in requirements for this rule.

**12-16-200 DEFINITIONS**

**12-16-201 AB-2588 Mandatory Risk Reduction Threshold:** The significant risk level established by the Air District pursuant to Air Toxic "Hot Spots" Information and Assessment, Health and Safety Code Section 44391 et seq.

**12-16-202 Accidental Air Release:** An unanticipated emission of a criteria pollutant, toxic air contaminant, and/or greenhouse gas into the atmosphere required to be reported in a Risk Management Plan (RMP) under 40 CFR §68.168.

**12-16-203 Acute Hazard Index:** A measure of short-term non-cancer health risks, which is the sum of the individual acute hazard quotients for toxic air contaminants identified as affecting the same target organ or organ system.

**12-16-204 Acute Hazard Quotient:** The ratio of the estimated short-term average concentration of a toxic air contaminant at a particular location to its acute reference exposure level (estimated for inhalation exposure).

**12-16-205 Air Emission Reduction Measures:** Equipment or practices intended to reduce or eliminate air emissions, and that may include equipment upgrades or modernization, improved

emissions capture or control, process changes, operational changes, or feedstock modifications. When addressing Toxic Air Contaminants, air emission reduction measures shall include risk reduction measures.

- 12-16-206 Cancer Risk:** An estimate of the probability that an individual will develop cancer as a result of lifetime exposure to emitted carcinogens at a particular location, and considering, where appropriate, age sensitivity factors to account for inherent increased susceptibility to carcinogens during infancy and childhood.
- 12-16-207 Chronic Hazard Index:** A measure of long-term non-cancer health risks, which is the sum of the individual chronic hazard quotients for toxic air contaminants identified as affecting the same target organ or organ system.
- 12-16-208 Chronic Hazard Quotient:** The ratio of the estimated long-term average concentration of a toxic air contaminant at a particular location to its chronic reference exposure level (estimated for inhalation and non-inhalation exposures).
- 12-16-209 Cost-Effectiveness:** The ratio of the total annualized cost of an Air Emission Reduction Measure to the annual amount of emissions reduced from its implementation.
- 12-16-210 Criteria Pollutant:** An air pollutant for which an ambient air quality standard has been established, or that is an atmospheric precursor to such an air pollutant. For the purposes of this rule, criteria pollutants are carbon monoxide (CO), oxides of nitrogen (NO<sub>x</sub>), particulate matter with an aerodynamic diameter of 10 micrometers or less (PM<sub>10</sub>), particulate matter with an aerodynamic diameter of 2.5 micrometers or less (PM<sub>2.5</sub>), precursor organic compounds (POC), and sulfur dioxide (SO<sub>2</sub>).
- 12-16-211 Crude Oil:** Petroleum, as it occurs after being extracted from geologic formations by an oil well, and after extraneous substances may have been removed, and which may be subsequently processed at a petroleum refinery.
- 12-16-212 Emission Reduction Plan (ERP):** A document intended to meet the requirements of Section 12-16-401 that identifies the sources, quantities, and causes of excess emissions and lists and details the measures that will be implemented to reduce emissions of pollutants that have exceeded Trigger Levels described in Section 12-16-301.
- 12-16-213 Emissions Inventory:** A comprehensive accounting of the types and quantities of criteria pollutants, toxic air contaminants, and greenhouse gases that are released into the atmosphere based on state-of-the-art measurement technologies and estimation methodologies. For the purposes of this rule, emissions inventory data shall be collected or calculated for: (1) all continuous, intermittent, predictable, and accidental air releases resulting from petroleum refinery processes at stationary sources at a petroleum refinery, and (2) all air releases from cargo carriers (e.g., ships and trains), excluding motor vehicles, that load or unload materials at a petroleum refinery including emissions from such carriers while operating within the Air District or within California Coastal Waters as specified in Regulation 2-2-610 (adopted Dec. 19, 2012).
- 12-16-214 Greenhouse Gases (GHGs):** The air pollutant that is defined in 40 CFR § 86.1818-12(a), which is a single air pollutant made up of a combination of the following six constituents: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. GHG emissions shall be expressed as CO<sub>2</sub> equivalent emissions (CO<sub>2</sub>e) according to the methodology in 40 CFR § 52.21(b)(49)(ii).
- 12-16-215 Health Risk:** The potential for adverse human health effects resulting from exposure to emissions of air contaminants and ranging from relatively mild temporary conditions, such as eye or throat irritation, shortness of breath, or headaches, to permanent and serious conditions, such as birth defects, cancer or damage to lungs, nerves, liver, heart, or other organs. Measures of health risk from exposure to toxic air contaminants include cancer risk, chronic hazard index, and acute hazard index.

- 12-16-216 On-Going Petroleum Refinery Emissions Inventory:** An emissions inventory at a petroleum refinery covering a calendar year period. For the purposes of this rule, On-Going Emissions Inventories are required to be compiled for the calendar year 2016, and for each subsequent calendar year. The On-Going Petroleum Refinery Emissions Inventory is described more fully in Regulation 12, Rule 15.
- 12-16-217 Petroleum Refinery:** An establishment that is located on one or more contiguous or adjacent properties, and under common control, and 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).
- 12-16-218 Petroleum Refinery Emissions Profile (PREP):** An emissions inventory that is used as a reference with which to compare emissions inventories for later periods of time (On-Going Emissions Inventories) in order to determine changes in emissions that have occurred from a petroleum refinery. The PREP is described more fully in Regulation 12, Rule 15.
- 12-16-219 Petroleum Refinery Owner/Operator:** Any person who owns, operates, or exercises operational control over the majority of operations at a petroleum refinery. The refinery owner/operator is responsible for compliance with this rule for the entirety of the petroleum refinery, including any refinery processes or auxiliary facilities that may be separately owned or operated. Any person who owns, operates, or exercises operational control over a portion of a petroleum refinery that is less than a majority of the total refinery operations must provide the Owner/Operator with information sufficient to allow the owner/operator to comply with this rule, and must make that information available to the APCO upon request.
- 12-16-220 Risk Reduction Measures:** Changes to production processes, feedstocks, product formulations, emission point locations, emissions capture and dispersion mechanisms, and other practices that reduce Toxic Air Contaminant emissions or that reduce health risks at the facility being evaluated.
- 12-16-221 Source:** Any article, machine, equipment, operation, contrivance or related groupings of such that may produce and/or emit air pollutants.
- 12-16-222 Toxic Air Contaminant (TAC):** An air pollutant that may cause or contribute to an increase in mortality or in serious illness or that may pose a present or potential hazard to human health. For the purposes of this rule, TACs consist of the substances listed in the most recent health risk assessment guidelines adopted by OEHHA.
- 12-16-223 Toxicity-Weighted Emissions:** An emission calculation technique that uses the cancer potency (CP) weighting factors and chronic reference exposure level (CREL) weighting factors described in Regulation 2, Rule 5 to assess the relative carcinogenic-weighted quotient and non-carcinogenic-weighted quotient for each toxic air contaminant under evaluation. The toxicity-weighted emissions for a project or site are the sum of the individual quotients for each type of risk: the sum of all carcinogenic-weighted quotients and the sum of all non-carcinogenic-weighted quotients.
- 12-16-224 Trigger Level:** An air emissions increase threshold measured relative to the emissions in the PREP described in Regulation 12, Rule 15, Section 12-15-402 that, if exceeded, initiates requirements under this rule. Specific Trigger Levels are defined in Section 12-16-301.

## 12-16-300 STANDARDS

**12-16-301 Emission Reduction Plan:** A refinery owner/operator shall obtain and maintain APCO approval of an Emission Reduction Plan (ERP) in accordance with Section 12-16-401 or 402 if any of the conditions described in Sections 12-16-301.1, 301.2 or 301.3 occur. Timely submittal of an ERP or Updated ERP as specified in Sections 12-16-401 or 402 and compliance with the procedures of Section 12-16-403 shall satisfy this requirement unless and until the APCO disapproves the ERP.

**301.1** An On-Going Petroleum Refinery Emissions Inventory Report required by Regulation 12, Rule 15 establishes that emissions of a criteria pollutant has increased relative to the baseline emissions inventory for that pollutant established in the PREP by more than 7.0 percent or GHGs by more than 10,000 metric tons (CO<sub>2</sub> equivalent).

**301.2** An On-Going Petroleum Refinery Emissions Inventory Report required by Regulation 12, Rule 15 establishes that emissions of TACs have increased relative to the baseline emissions inventory established in the PREP in excess of any of the Trigger Levels in Table 1.

Chronic Trigger Level	Any Chronic Trigger Level in Table 2-5-1 of Regulation 2, Rule 5, unless the refinery owner/operator demonstrates prior to the time an ERP is due that the total refinery-wide carcinogenic-weighted emission rate and the total refinery-wide non-carcinogenic-weighted emission rate, whichever are applicable, have not increased.
Carcinogenic Trigger Level	Any refinery-specific Carcinogenic Trigger Level established pursuant to Section 12-16-404.1.
Noncarcinogenic Trigger Level	Any refinery-specific Noncarcinogenic Trigger Level established pursuant to Section 12-16-404.2.

**301.3** A Health Risk Assessment (HRA) required by Regulation 12, Rule 15 establishes that a refinery-wide health impact is greater than the Air District's current AB-2588 mandatory risk reduction threshold, and an On-going Petroleum Refinery Emissions Inventory Report required by Regulation 12, Rule 15 establishes that the refinery has any increase in toxicity-weighted emissions for that health impact type.

**12-16-302 Emission Reduction Plan Implementation:** A refinery owner/operator shall implement any and all Air Emission Reduction Measures identified in an approved ERP prepared pursuant to Sections 12-16-401 or 402 in accordance with the schedule provided in that ERP.

**12-16-303 Updated Health Risk Assessment:** A refinery owner/operator shall obtain and maintain approval of an Updated Health Risk Assessment if each of the conditions of Sections 303.1 through 303.4 are met.

**303.1** An APCO-approved HRA indicates that the refinery has a refinery-wide health impact that is greater than the Air District's current AB-2588 mandatory risk reduction threshold; and

**303.2** The APCO has approved an On-Going Emissions Inventory that shows an increase in refinery-wide toxicity-weighted emissions relative to the baseline emissions inventory established in the PREP; and

**303.3** The refinery is not implementing an approved risk reduction and audit plan developed pursuant to California Health & Safety Code § 44391 that addresses the increase described in Section 303.2; and

**303.4** The most recent APCO-approved refinery-wide HRA is based on an inventory year that is more than five years prior to the inventory year showing the increase

described in Section 303.2.

- 303.5** If the conditions of Sections 303.1 through 303.3 are met but the most recent APCO-approved refinery-wide HRA is based on an inventory year that is less than five years prior to the inventory year showing the increase described in Section 303.2, then the refinery owner/operator must comply with Section 12-16-301.3 by submitting a causal analysis pursuant to Section 12-16-401.1 addressing the increased described in Section 302.2.
- 303.6** An Updated Health Risk Assessment required pursuant to this Section shall be submitted in accordance with 12-15-405 and shall be reviewed by the APCO in accordance with 12-16-406.

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## 12-16-400 ADMINISTRATIVE REQUIREMENTS

**12-16-401 Emission Reduction Plan:** A refinery owner/operator shall submit the Emission Reduction Plan (ERP) required by Section 12-16-301 to the APCO within 60 days of APCO approval of an On-Going Refinery Emissions Inventory Report that establishes that a Trigger Level of Section 12-16-301 has been exceeded. The ERP shall include the elements described in Sections 12-16-401.1, 401.2, and 401.3. APCO disapproval of any of these elements or failure to implement an APCO-approved schedule described in Sections 12-16-401.2 or 401.3, shall constitute a violation of Section 12-16-301.

**401.1 Causal Analysis:** The ERP shall include a Causal Analysis that includes the following:

- 1.1 Identification of the source(s) of emissions that contributed to the refinery-wide emissions increase that exceeded a Trigger Level and a quantification of the contribution of each source to this increase.
- 1.2 An analysis that identifies the factor(s) that resulted in the emissions increase. The analysis shall address, in addition to other factors involved, the degree to which changes in crude oil characteristics at the refinery may have caused or contributed to the emissions increase.
- 1.3 If accidental air releases are identified as causing or contributing to an emissions increase at the refinery, identification of the accident's initiating event and any contributing factors, and a description of the investigation that led to these findings.
- 1.4 Any requests for exemption based on Section 12-16-103, including the demonstrations described in Section 12-16-405.

**401.2 Air Emission Reduction Measures:** The ERP shall identify any Air Emission Reduction Measures planned for implementation that will, within two (2) years of submission of a complete ERP, reduce emissions that have exceeded a Trigger Level. This part of the ERP shall include the following:

- 2.1 A quantification of the emission reductions expected from each Air Emission Reduction Measure.
- 2.2 A schedule for the permitting and implementation of each Air Emission Reduction Measure.

**401.3 Emission Reduction Audit:** If the planned Air Emission Reduction Measures in Section 401.2 are not projected to fully mitigate, within two years of submission of the complete ERP, each emissions increase that has exceeded a Trigger Level, then the ERP must include an Emission Reduction Audit. The Emission Reduction Audit shall include the following:

- 3.1 Identification of all technically feasible Air Emission Reduction Measures that would mitigate to any extent emissions that have exceeded a Trigger Level and a quantification of the emission reductions that would be achieved by each measure.
- 3.2 An estimate of the cost-effectiveness of each technically feasible Air Emission Reduction Measure and a description of the basis for the estimate.
- 3.3 A schedule for the permitting and implementation of technically feasible Air Emission Reduction Measures sufficient to fully mitigate emissions that have exceeded a Trigger Level. A refinery owner/operator is not required to implement Air Emission Reduction Measures that exceed maximum cost-effectiveness as described in Table 2.



<b>Pollutant</b>	<b>Maximum Cost Effectiveness (\$/ton of emissions reduced)</b>
NO <sub>x</sub>	\$35,000
SO <sub>2</sub>	\$35,000
PM <sub>10</sub>	\$15,000
PM <sub>2.5</sub>	\$50,000
CO	\$500
POC	\$35,000

Notes:

1. Maximum cost-effectiveness values are in 2015 dollars and shall be adjusted for inflation using the Bay Area Consumer Price Index in other years.
2. The PM<sub>2.5</sub> cost-effectiveness value shall be applied only to combustion emissions including process units that regenerate catalyst, such as Fluidized Catalytic Cracking Units and Catalytic Reformer Units. Non-combustion particulate emissions are subject to the PM<sub>10</sub> value.

**12-16-402 Updated Emission Reduction Plan:** If implementation of an APCO-approved Emission Reduction Plan (ERP) described in Section 12-16-401 fails to fully mitigate emissions that have exceeded Trigger Levels, a refinery owner/operator shall submit an Updated ERP to the APCO that satisfies the following requirements:

- 402.1** The Updated ERP shall be submitted to the APCO within 120 days of the final compliance date in the APCO-approved ERP.
- 402.2** The Updated ERP shall include an Emission Reduction Audit as described in Section 12-16-401.3.

**12-16-403 Review and Approval of Emission Reduction Plans:** The procedure for determining whether an ERP, or an Updated ERP, submitted under Sections 12-16-401 or 402 meets the applicable requirements of this rule is as follows:

- 403.1 Completeness Review:** Within 20 business days of receipt of the ERP, the APCO will conduct a completeness review of the ERP. The APCO will notify the refinery owner/ operator in writing if the submitted ERP is lacking information necessary to make an approval determination. The refinery owner/operator shall submit a complete ERP within 45 days of receipt of this notification. If the APCO determines that the resubmitted ERP is still incomplete, the APCO may disapprove the ERP or may notify the refinery owner/operator that the ERP continues to lack necessary information and provide another opportunity to submit a complete ERP in 45 or fewer days.
- 403.2 Public Comment:** The ERP, including any revisions made to correct deficiencies, will be made available to the public for 45 days (with exception of confidential information). The APCO will consider any written comments received during this period prior to approving or disapproving the final ERP.
- 403.3 Final Action:**
  - 4.1** The APCO will approve the ERP if the APCO determines that the ERP meets the requirements of Sections 12-16-401 and 402, and will provide written notification to the refinery owner/operator.
  - 4.2** If the APCO determines that the ERP does not meet the requirements of Sections 12-16-401 and 402, the APCO will notify the refinery owner/operator in writing and will specify the basis for this determination. Upon receipt of such notification, the refinery owner/operator shall correct the identified deficiencies and resubmit the ERP within 45 days.

**4.3** If the APCO determines that the refinery owner/operator failed to correct any deficiency identified in the notification, the APCO will determine that the refinery owner/operator has failed to meet the requirements of Sections 12-16-401 and 402 and will disapprove the ERP.

**403.4 Public Inspection:** Within 30 days of the approval of an ERP under Section 12-16-403.3, the APCO shall post the ERP on the Air District's website, and shall notify any member of the public, who submitted comments under Section 12-16-403.2, or who otherwise requested such notification of this action in writing. In making information available for public inspection, the confidentiality of trade secrets, as designated by the refinery owner/operator, shall be handled in accordance with Section 6254.7 of the Government Code.

**12-16-404 Refinery-Specific Toxic Air Contaminant Trigger Levels:** Within 45 days of taking final action to approve a health risk assessment pursuant to Regulation 12-15-406.8, the APCO shall:

**404.1** Identify one or more site-specific Carcinogenic Toxic Air Contaminant (TAC) Trigger Levels for each refinery. A Carcinogenic TAC Trigger Level shall be an increase in carcinogenic-weighted emissions for a source or group of sources that is projected to correspond to an increase in cancer risk at the maximally exposed individual of 10 in a million cancer risk;

**404.2** Identify one or more site-specific Non-carcinogenic TAC Trigger Levels for each refinery. A Non-carcinogenic TAC Trigger Level shall be an increase in non-carcinogenic-weighted emissions for a source or group of sources that is projected to correspond to an increase in chronic hazard index at the maximally exposed individual of 1.0 hazard index.

**404.3** The refinery-specific increases in toxicity-weighted emissions determined pursuant to Sections 404.1 and 404.2 shall be the TAC Trigger Levels for Section 301.2. The Air District may establish the Refinery-Specific TAC Trigger Levels for a source, a group of sources, or for the entire refinery based on the most relevant predictor of maximum health impacts for a given facility. The Air District's Carcinogenic and Non-carcinogenic TAC Trigger Levels shall be determined using the results of the APCO-approved health risk assessment that was prepared pursuant to Regulation 12, Rule 15.

**404.4** If the District requires the preparation of an updated health risk assessment pursuant to Section 12-16-303, the District shall revise the Refinery-Specific TAC Trigger Levels, if necessary, after the District has approved the updated health risk assessment for the site.

**404.5** Site-specific TAC Trigger Levels shall take effect upon publication on the District's website and written notification to the affected refinery.

**12-16-405 Emission Increases Related to Increases in Crude Oil Throughput:** To qualify for the limited exemption in Section 12-16-103, the refinery owner/operator must do the following:

**405.1** Submit a causal analysis in accordance with Section 12-16-401.1 to justify exemption of the emission increase by demonstrating that it was caused solely by a permitted increase in crude oil throughput at the crude oil unit as allowed by an Air District Permit to Operate; and

**405.2** Include in the causal analysis a demonstration that the emission increase proposed to be exempted is the result of crude oil throughput above the crude oil unit throughput that was used to establish the PREP in Regulation 12, Rule 15, and does not represent an increase in the emission rate relative to the volume of processed crude oil by demonstrating that the following is true:

$$\frac{E_i}{C_i} \leq \frac{E_{BL}}{C_{BL}}$$

Where:

$E_i$  = total criteria pollutant or greenhouse gas emission increase above the baseline (tons).

$C_i$  = crude oil throughput increase above the baseline through the Crude Oil Unit associated with  $E_i$  (million barrels (million bbl)).

$E_{BL}$  = total criteria pollutant or greenhouse gas emissions during the baseline period (tons).

$C_{BL}$  = crude oil throughput through the Crude Oil Unit associated with  $E_{BL}$  (million bbl) during the baseline period.

#### **12-16-500 MONITORING AND RECORDS**

#### **12-16-600 MANUAL OF PROCEDURES**

**12-16-601 Emissions Inventory Procedures:** Each emissions inventory required under this rule shall be prepared following the District's Emission Inventory Guidelines for Petroleum Refineries established under Regulation 12, Rule 15, Section 12-15-412.