

REFINERY MACT II

U.S. EPA has finalized the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Petroleum Refineries: Catalytic Cracking Units (CCUs), Catalytic Reforming Units (CRUs), and Sulfur Recovery Units (SRUs). The new rule is also known as Refinery MACT II and will be codified in 40 CFR 63, Subpart UUU. U.S. EPA estimates that when it is fully implemented, the rule will reduce Hazardous Air Pollutant (HAP) emissions from the affected refineries by approximately 11,000 tons per year (an 87% reduction from current HAP emission levels). Emission reductions include organic HAPs, inorganic HAPs, and particulate metal HAPs. Key elements of the final rule are presented below.

Effective Date of the Rule

April 11, 2002 (Federal Register Vol. 67, No. 70, pp. 17762-17822)

Compliance Dates

Existing affected sources must be in compliance by April 11, 2005 (3 years).

Existing fluid CCUs committed to complying with Tier 2 Motor Vehicle Emissions Standards (40 CFR 80) by hydrotreating the CCU feed have an extended compliance date. The compliance date for these sources will be the date that the refinery is scheduled to meet the 30 ppm gasoline sulfur content limit, but no later than December 31, 2009.

Compliance Extensions
Sources electing to comply with the Tier 2 gasoline sulfur standard may request an extension of compliance for this NESHAP. To obtain an extension, a written notification must be submitted to the permitting authority.

Potentially Regulated Facilities

U.S. EPA estimates that of the 164 refineries in the United States and its territories that are major sources of HAPs, 132 will be subject to the requirements of this rule. The rule applies to facilities that meet both of the following conditions:

- Petroleum refineries (SIC Code 2911, NAIC 32411); and
- Facilities that are a major source of HAPs.

Potentially Affected Sources

The Refinery MACT II rule applies to new, reconstructed, or existing sources within petroleum refineries. The following sources are affected under the new rule:

- CCUs that regenerate catalyst and use a fluidized bed;
- CRUs that regenerate catalyst;
- SRUs and the tail gas treatment unit serving it; and
- Each bypass line serving a CCU, CRU, or SRU.

Sources Not Affected

- *Thermal CCUs*
- *SRUs that do not recover elemental sulfur or use the LO-CAT II process*
- *Redundant SRUs not located at a petroleum refinery and used by the refinery only for emergencies or maintenance backup*
- *Equipment associated with bypass lines needed for safety reasons*
- *Gaseous streams routed to a fuel gas system*

Requirements

The following table gives a brief synopsis of the Refinery MACT II rule emission limitations. Unless otherwise stated, each of the following limitations applies to both new and existing sources.

Summary of Emission Limitations for Affected Sources

SOURCE	EMISSION LIMITATIONS
CCU	<p><u>METAL HAP REQUIREMENTS</u></p> <ol style="list-style-type: none"> 1. Sources subject to NSPS 40 CFR 60, Subpart J, or electing to comply with Subpart J (Option 1): PM emissions must not exceed 1.0 lb/1,000 lb of coke burn-off in the catalyst regenerator; if the gases are vented through an incinerator or waste heat boiler, the incremental rate of PM must be limited to 0.1 lb/MMBtu; and the opacity must not exceed 30% (exceedance of one 6-minute reading in 1 hour is allowed); 2. (Option 2) PM emissions must not exceed 1.0 lb/1,000 lbs of coke burn-off in the catalyst regenerator; 3. (Option 3) Nickel (Ni) emissions must not exceed 0.029 lb/hr; or 4. (Option 4) Ni emissions must not exceed 0.001 lb/1,000 lb of coke burn-off in the catalyst regenerator. <p><u>ORGANIC HAP REQUIREMENTS</u></p> <ol style="list-style-type: none"> 1. Carbon monoxide emissions (CO is a surrogate for organic HAP emissions) from the catalyst regenerator vent or CO boiler serving the CCU must not exceed 500 ppmv (dry basis). 2. Flares used to meet the CO limit may not have visible emissions exceeding a total of 5 minutes during any 2 consecutive hours.
CRU	<p><u>ORGANIC HAP REQUIREMENTS</u></p> <ol style="list-style-type: none"> 1. (Option 1) Vent emissions to a flare that meets the standard NESHAP 40 CFR 63 control device requirements. Visible emissions may not exceed a total of 5 minutes during any 2 consecutive hours; or 2. (Option 2) Use a control device to reduce total organic compounds (TOC is a surrogate for organic HAPs) by 98 percent by weight or to a concentration of 20 ppmv (dry basis), corrected to 3 percent oxygen, whichever is less stringent. <p><u>INORGANIC HAP REQUIREMENTS</u></p> <ol style="list-style-type: none"> 1. Existing semi-regenerative CRUs must reduce uncontrolled emissions of hydrochloric acid (HCl) by 92 percent by weight using a control device or to a concentration of 30 ppmv (dry basis), corrected to 3 percent oxygen. 2. Existing cyclic or continuous CRUs must reduce uncontrolled emissions of HCl by 97 percent by weight using a control device or to a concentration of 10 ppmv (dry basis), corrected to 3 percent oxygen. 3. New semi-regenerative, cyclic, or continuous CRUs must reduce uncontrolled emissions of HCl by 97 percent by weight using a control device or to a concentration of 10 ppmv (dry basis), corrected to 3 percent oxygen.
SRU	<p><u>HAP REQUIREMENTS</u></p> <ol style="list-style-type: none"> 1. New or existing Claus SRUs (20 long tons per day plant) subject to NSPS 40 CFR 60, Subpart J, or SRUs, Claus or other type (regardless of size), electing to comply with Subpart J must meet one of the following emission limits for each process vent: <ul style="list-style-type: none"> • 250 ppmv (dry basis) of sulfur dioxide (SO₂) at zero percent excess air if an oxidation or reduction control system followed by an incinerator is used, or • 300 ppmv of reduced sulfur compounds calculated as ppmv SO₂ (dry basis) at zero percent excess air if a reduction control system without incineration is used. 2. New or existing SRUs, Claus or other type, regardless of size, not subject to NSPS and electing to comply with the total reduced sulfur (TRS) limit must not exceed 300 ppmv of TRS compounds, expressed as an equivalent SO₂ concentration (dry basis) at zero percent oxygen.
BYPASS LINES	<p><u>HAP REQUIREMENTS</u></p> <ol style="list-style-type: none"> 1. (Option 1) Install a device to continuously detect, at least every hour, whether flow is present in the bypass line. The device should be installed as close as practical to the entrance of any bypass line that could divert the vent stream away from the control device to the atmosphere; 2. (Option 2) Install a car-seal or lock-and-key device on the closed valve handle or damper level of the bypass line so that the bypass line cannot be opened without breaking the seal or removing the device; 3. (Option 3) Seal the bypass line by installing a solid blind between piping flanges; or 4. (Option 4) Vent the bypass line to a control device that meets the requirements for a CCU, CRU, or SRU.

Summary of Compliance Requirements

The rule requires that affected sources be operated within both the emission limitations and operating limits. Operating limits are generally site-specific and established during the performance tests.

In general, the rule employs standard NESHAP 40 CFR 63 mechanisms for demonstrating compliance. Continuous monitoring systems and performance testing are generally required to demonstrate initial compliance. Continuous compliance is demonstrated by operating in conformity with a monitoring plan developed specifically for the site.

The rule requires the notifications, reports, and records common to all sources subject to the provisions of 40 CFR 63. The Notification of Compliance Status, which should include the monitoring plan, should be submitted no later than 30 days after the completion of initial compliance demonstration. Performance test results should be submitted no later than 150 days after the compliance date. A compliance report should be submitted semiannually. As the rule requires, records of continuous monitoring systems should be documented.

For further questions concerning this rule and other air quality management issues, please contact Yousheng Zeng, Ph.D., P.E. using the following contact information.



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