

INDUSTRIAL BOILER MACT FACTSHEET

The National Emission Standards for Hazardous Air Pollutants (NESHAP) for Industrial/Commercial/Institutional Boilers and Process Heaters (40 CFR Part 63, Subpart DDDDD), also known as the “Industrial Boiler MACT”, is a complex set of emission standards and compliance requirements based on the application of maximum achievable control technology (MACT). While the rule affects both new and existing sources, the only existing boilers or process heaters that are affected, however, are large, solid fuel-fired units with a heat input rating greater than 10 MMBtu/hr and “limited use”, solid fuel-fired units that operate less than 10% of capacity.

The rule was finalized on 2/26/04 and becomes effective 60 days after publication in the Federal Register. As of 7/9/04, EPA has indicated that the rule will be published very soon. Existing sources are allowed three years to comply but some sources may petition for an extra year to comply if additional time is required for the installation of controls. New industrial boilers and process heaters (built after 1/13/03) must comply with the new rule within six months of the effective date or six months after startup, whichever is later.

The final rule contains a variety of compliance provisions for emissions of carbon monoxide (CO), hydrogen chloride (HCl), mercury (Hg), particulate matter (PM) and “total selected metals” (TSM) – the combination of arsenic, beryllium, cadmium, chromium, lead, manganese, nickel and selenium. Emission limits vary depending on unit size, fuel type, frequency of operation, and whether the source is new or existing.

The impact of the rule for existing sources will depend largely on whether the source is able to meet the new standards without the need of a control device. Sources that burn a relatively consistent fuel or fuel blend that can demonstrate compliance based on fuel analysis will likely find that the rule will have minimal impact. However, new sources and existing sources that are unable to demonstrate compliance based on fuel analysis will likely find the rule to be very costly to implement. These sources will have to conduct ongoing, expensive stack tests and meet prescriptive monitoring, reporting and record keeping requirements.

Applicability

The rule affects all industrial, commercial, or institutional process heaters¹ or boilers² located at a facility that emits more than 10 tons/year of any one hazardous air pollutant (HAP) or 25 tons/year of any combination of HAP.³ Note that applicability is based on the *facility* emissions, not the individual units. Boilers or process heaters do not need to be a major source of HAP to be affected by the rule. The rule allows exemptions for the following types of units:

¹ A process heater is defined as an enclosed device using controlled flame, that is not a boiler, where the primary purpose of the device is other than steam generation.

² A boiler refers to an enclosed device using controlled flame combustion and has the primary purpose of steam generation.

³ EPA maintains a list of all affected HAPs, including over 150 specific chemicals and approximately 20 families of chemicals.

- Waste heat boilers
- Hot water heaters
- Temporary boilers
- Boilers/process heaters used specifically for research and development
- Electric utility steam generating units
- Existing small, gas/liquid/solid-fuel fired units

The rule includes emission standards for virtually all new units built after January 13, 2003, all existing large, solid fuel-fired units with a heat input rating greater than 10 MMBtu/hr and all existing, “limited use”, solid fuel-fired units that operate less than 10% of capacity. While the rule also affects the following sources, these sources are only subject to limited initial notification requirements. The rule does not provide emissions standards for these sources.

- Existing large and “limited use” gas-fired units
- Existing large and “limited use” liquid-fired units
- New, small gas and liquid-fired units

Emissions Standards

In developing the emissions standards, EPA divided HAPs into the following four categories and selected a representative HAP for each category:

HAP Category	Regulated HAP
Mercury	Mercury (Hg)
Non-Mercury Metallic HAP	Non-Condensable Particulate Mass (PM) or Total Selected Metals (TSM) ⁴
Inorganic HAP	Hydrogen chloride (HCl)
Organic HAP	Carbon monoxide (CO)

Affected sources may be subject to one or more of the regulated HAPs, depending on the classification of the boiler or process heater. Emissions standards for each regulated HAP also vary depending on the classification of the unit. There are 10 classifications or “subcategories” of affected units based on the age of the unit, fuel type, unit size, and frequency of operation. Tables 1 and 2 show each of the classifications, the regulated HAP(s) to which they are subject, and the corresponding emissions standard(s) for new/reconstructed and existing units.⁵ It is anticipated that virtually all new units and roughly half of the existing affected sources will require some form of emissions controls to meet the new standards.

⁴ Total Selected Metals includes the combination of arsenic, beryllium, cadmium, chromium, lead, manganese, nickel and selenium.

⁵ “Reconstructed” refers to the replacement of components on a previously unaffected unit such that the total, fixed capital cost of the replacement is greater than 50% or more than the fixed capital cost of constructing a comparable, new unit.

The rule allows new and existing solid fuel-fired units to comply with either a total PM standard or a TSM standard. PM was proposed as a surrogate for TSM because non-mercury metallic HAPs exist in the flue gas combined with fly ash. EPA included both standards because, while all fuels emit particulate, not all fuels emit the same amount of metallic HAPs. Sources that burn fuels with a low TSM concentration would likely elect to comply with the TSM standard, instead of PM.

Fuel Type	Unit Size ⁶	Regulated HAP	Emissions Standard
Solid	Large	PM or TSM	0.025 lb/MMBtu 0.003 lb/MMBtu
		HCl	0.02 lb/MMBtu
		Hg	0.000003 lb/MMBtu
		CO	400 ppmvd ⁷
Solid	Small	PM or TSM	0.025 lb/MMBtu 0.003 lb/MMBtu
		HCl	0.02 lb/MMBtu
		Hg	0.000003 lb/MMBtu
		CO	400 ppmvd ⁷
Liquid	Large	PM	0.03 lb/MMBtu
		HCl	0.005 lb/MMBtu
		CO	400 ppmvd ⁷
Liquid	Small	PM	0.03 lb/MMBtu
		HCl	0.0009 lb/MMBtu
Gas	Large	CO	400 ppmvd ⁷

Table 1. Emissions Standards for New or Reconstructed Units

Fuel Type	Unit Size	Regulated HAP	Emissions Standard
Solid	Large	PM or TSM	0.07 lb/MMBtu 0.001 lb/MMBtu
		HCl	0.09 lb/MMBtu
		Hg	0.000009 lb/MMBtu

Table 2. Emissions Standards for Existing Units

As shown in Tables 3 and 4, the rule also includes alternative emission standards for large, sources that operate infrequently. In order to qualify for these alternative “limited use” standards, a source must have a *federally enforceable* annual average capacity factor

⁶ ‘Large’ refers to a unit with a heat input capacity > 10 MMBtu/hr. ‘Small’ refers to a unit with a heat input capacity < 10 MMBtu/hr

⁷ Corrected to 7% O₂, based on a 30-day rolling average for units > 100 MMBtu/hr or a 3-run average for units < 100 MMBtu/hr

less than or equal to 10 percent. Limited use, liquid fuel-fired units include those units that either burn only liquid fuel or regularly co-fire with a gaseous fuel. Use units that burn liquid fuel on a limited basis, during periods of gas curtailment or supply emergencies, are classified as limited use, gas-fired units.

Fuel Type	Regulated HAP	Emissions Standard
Solid	PM or TSM	0.025 lb/MMBtu
		0.003 lb/MMBtu
	HCl	0.02 lb/MMBtu
	Hg	0.000003 lb/MMBtu
Liquid	CO	400 ppmvd ⁸
	PM	0.03 lb/MMBtu
	HCl	0.0009 lb/MMBtu
Gas	CO	400 ppmvd ⁸
	CO	400 ppmvd ⁸

Table 3. Alternative Emissions Standards for Limited Use New or Reconstructed Units

Fuel Type	Regulated HAP	Emissions Standard
Solid	PM or TSM	0.21 lb/MMBtu
		0.004 lb/MMBtu

Table 4. Alternative Emissions Standards for Limited Use Existing Units

Compliance Alternatives

The rule provides two primary mechanisms for demonstrating initial and ongoing compliance. All sources have the option of complying with each applicable emission limit using either a fuel-based or stack emission-based approach, although the fuel-based approach is preferred because of the simplified compliance requirements. Virtually all new solid fuel-fired sources, however, and many existing sources will be unable to meet these requirements. Existing units likely to be affected by the rule include those that fire bituminous coal, which typically has higher mercury and chlorine concentrations.

Fuel-Based Approach

In order to demonstrate initial and continuous compliance using the fuel-based approach, a fuel analysis must be conducted which shows that the pollutant concentration of the combusted fuel is below the applicable limit. Sources that co-fire fuels must demonstrate that the prorated pollutant concentration of the fuel blend is below the applicable limit. Once a source demonstrates initial compliance, additional fuel sampling is required every

⁸ Corrected to 7% O₂, based on a 3-run average

five years or whenever the source changes fuel type or fuel blends. A change in fuel vendor does not constitute a change in fuel type. Examples of fuel type switching include burning a different rank of coal, burning pet-coke blends, or switching between coal and some other type of solid fuel (or vice versa). Stack testing is not required for sources using the fuel-based approach.

Stack Emission-Based Approach

The stack emission-based compliance procedures, which are much more complicated, implement a “test and cap” approach. Sources are required to perform an initial stack test while combusting fuel containing the highest expected concentration of the applicable pollutant. During the stack test, the source must also perform fuel sampling and collect control device operating data to define the normal operating range of the control device during the test (except for units equipped with only a baghouse or electrostatic precipitator (ESP)). Initial compliance is based on the stack test results. Continuous compliance is based on (1) maintaining the fuel pollutant concentration below the level that was measured during the initial test *and* (2) maintaining control device operating parameters within the limits observed during the initial test (except for units equipped with only a baghouse or ESP). Units equipped with an ESP as the only control device must maintain opacity below 20% for existing sources or 10% for new sources in order to demonstrate compliance. If a unit is unable to demonstrate compliance with the 20% opacity limit, unit-specific testing may be conducted to determine a more appropriate opacity limit for the unit. Units equipped with a baghouse as the only control device have the option of complying with the same opacity requirements as ESPs or may demonstrate compliance by using a bag leak detection system.

Sources electing to use the stack emission-based approach are required to conduct additional stack testing every year for three years. If a source is able to demonstrate compliance for three consecutive years, then the source is eligible to conduct compliance testing thereafter every three years. If the source fails any of these subsequent tests, they must again conduct additional tests every year until they achieve three consecutive years of compliance. Also, if a source changes fuel types, they must conduct another compliance test for that fuel or fuel mixture. One of the more onerous requirements of the rule is that sources must conduct additional fuel sampling (even if the fuel type is the same) and reestablish or verify control device indicator ranges with each ongoing compliance test.

Emissions Averaging

One of the major changes from the proposed rule is the addition of emissions averaging provisions. Emissions averaging may only be used for existing large, solid fuel-fired boilers and with the permission of the state agency. Sources with multiple affected units that are likely to implement emissions averaging include (1) sources with one or more units that are unable to demonstrate compliance using the fuel-based approach and (2) sources with one or more units that are unable to demonstrate compliance using the stack emissions-based approach, without upgrading or replacing existing control equipment.

Emissions averaging procedures can be applied using either the fuel-based or stack emission-based methods. The initial compliance procedures require the source to calculate the average weighted emissions for the averaging group by weighting the emissions rate of each unit (either by fuel analysis or stack test results) by the individual rated heat input capacity. In order to demonstrate initial compliance, the average weighted emissions must be less than the applicable emission limit.

Ongoing compliance is demonstrated based on a 12-month rolling average using a similar procedure. Each calendar month, the source must calculate the average weighted emissions of the averaging group by weighting the emissions rate of each unit (using the result of the last fuel test or stack test) by the average heat input of each unit during that calendar month. In order to demonstrate compliance, the average weighted emissions must be less than the applicable emission limit. The rule provides similar procedures based on steam generation for units that can not monitor heat input. Unlike the proposed utility boiler MACT averaging procedures, there are no specific requirements for data availability or minimum operating time of the individual units.

The emissions averaging provisions also include a requirement to establish indicator ranges and monitor the operation of the control device(s) used to comply with the applicable limit. Although the language in this section is unclear, it appears that the monitoring requirements are the same as those for units that do not implement emissions averaging, and apply to averaging groups that use either fuel-based or stack emission-based compliance approaches. It is important to note that emissions averaging procedures do not permit sources to de-tune or otherwise reduce the efficiency of the control devices during the initial compliance test

Sources electing to use emissions averaging must submit an averaging plan no later than 180 days prior to the initial compliance test.

Health-Based Compliance Alternative for HCl and TSM

In addition to the “technology-based” MACT compliance approach, EPA has included an alternative “health-based” or “risk-based” approach for HCl and TSM emissions. These compliance approaches do not require any ongoing compliance tests, monitoring, or reporting/recordkeeping.⁹ While the benefits of using these alternative compliance criteria may seem attractive, sources are required to incorporate the process parameters (heat input, flow rates, fuel flow, etc.) used to demonstrate compliance into the Title V operating permit. These operating conditions then become Federally enforceable and may limit subsequent operation of all units at the facility.

For HCl emissions, sources must conduct HCl and chlorine emission tests for all affected units at the facility and calculate an equivalent maximum, hourly HCl emission rate. The rule provides maximum acceptable facility-wide emission rates based on stack height and

⁹ Additional testing is not required unless the facility undergoes a process change that results in increased emissions of HCl and/or manganese.

the distance between the stack and the property boundary. If the calculated hourly HCl emission rate for the facility is below the accepted maximum value, then the facility is eligible to use the alternative compliance criteria. However, if the facility is unable to meet the maximum accepted emissions value, the source may conduct a risk-assessment analysis for the facility. In this case, in order to use the alternative compliance criteria, the risk-assessment must demonstrate that the facility's hazard index for HCl and chlorine emissions is less than one.

The alternative compliance criteria for TSM is similar to that for HCl, except manganese is used as a surrogate for TSM emissions. Sources must first test all affected units to determine the maximum emission rate of manganese for the facility. If the facility emission rate is below the allowable value, based on stack height and property boundary proximity, then the source is eligible to use the alternative compliance criteria. Alternatively, the source may conduct site-specific testing to demonstrate that the facility's hazard index for manganese is less than one.

Monitoring Requirements

For sources that demonstrate compliance using the stack emission-based approach, the new rule includes prescriptive monitoring requirements and ongoing monitor quality assurance activities. These requirements will be very costly to implement for sources without existing continuous monitoring systems (for sources that are required to demonstrate compliance with a CO or opacity limit) or modern control systems on their emissions control equipment.

- (1) For new units subject to a work-practice CO standard, sources are required to install, operate, and maintain a continuous emissions monitoring system (CEMS) for monitoring CO emissions that meets the requirements of Performance Specification 4A (PS-4A) of Part 60.
- (2) Sources required to demonstrate compliance using opacity must install, operate, and maintain a continuous opacity monitoring system (COMS) in accordance with PS-1. Sources are also required to perform a daily calibration error test, quarterly performance audit, and an annual zero alignment audit. It should be noted that most older COMS will not meet PS-1 requirements. These sources may need to upgrade their opacity monitor in order to comply with the new rule.
- (3) Sources required to demonstrate compliance by monitoring control device operating parameters must install the appropriate sensors and continuously monitor the output of these sensors. The rule specifies the parameter(s) that must be monitored, depending on the type of control device, and instructions for the placement of each sensor. Sources that do not have the capability of recording this data automatically must also install and operate a continuous parameter monitoring system (CPMS). This will be a particularly expensive

task for many older units, as the existing control systems may need to be upgraded or replaced.

The rule requires that monitoring systems automatically reduce the data to three-hour averages (as applicable) to demonstrate continuous compliance. This means that although many existing sources already have a CPMS, CEMS, or COMS, they will need to reprogram the systems to provide the appropriate averaging period. The monitoring provisions do not include procedures for handling missing data. Averages are based on the available quality assured data, excluding calibration checks, span adjustments, repairs, or monitor malfunctions. Any period where the monitor is out-of-control constitutes a deviation from the monitoring requirements and must be included in the semi-annual compliance reports.

Reporting and Recordkeeping Requirements

The new rule also contains an array of reporting and recordkeeping requirements. Affected sources must maintain records of control device operating data, monthly fuel consumption and type(s) of fuel burned, operating hours, unit startups and shutdowns, CEMS calibration data, CEMS maintenance events, CEMS out of control periods, fuel sampling reports, information on compliance deviations (including a description of the deviation, the duration of the deviation, and any corrective action that was taken), and a number of other pieces of information. Sources must maintain this data onsite for a period of five years. Sources are also required to submit semi-annual compliance reports that include much of this information, although the rule does not specify a standardized data format (e.g. Part 75 electronic data reports).

Given the amount of data that is involved in demonstrating compliance, it is likely that this portion of the rule will be very costly and complicated to implement, particularly for sources with multiple affected units. Many sources will need to install CEMS, COMS, and/or CPMS. These systems will need to be programmed to track monitor downtime, unit start-up and shutdown, monitor maintenance activities, and compliance deviations. Additional resources will be required to gather other compliance data that may not be available in electronic format, such as fuel analysis reports and fuel consumption data, and prepare compliance reports.

Compliance Deadline Summary

Table 5 contains a summary of the various compliance requirements and the associated deadlines.

All Units	
Rule Becomes Effective	60 days after publication in FR
Deadline for Compliance (Existing Units)	3 years after publication in FR. Units that require installation of control equipment may be eligible for one additional year
Deadline for Compliance (New/Reconstructed Units)	The later of the publication date in FR or unit startup
Initial Compliance Testing	180 days after the Deadline for Compliance
Submission of Site Specific Fuel Analysis Plan (for both compliance approaches)	180 days prior to the date of the compliance test (initial or ongoing)
Submission of Emissions Averaging Plan (if necessary)	180 days prior to the date of the compliance test (initial or ongoing)
Notification of Intent to Conduct Performance (“Stack”) Testing	30 days prior to the date of the compliance test (initial or ongoing)
Submission of Site-Specific Test Plan for Performance (“Stack”) Test	30 days prior to the date of the compliance test (initial or ongoing). Submit simultaneously with Notification of Intent to Conduct Performance Testing
Submission of Stack Test/Fuel Analysis Results	60 days after conducting stack test and/or fuel test
Notification of Compliance Status (for both compliance approaches)	60 days after conducting the initial compliance test
First Ongoing Compliance Report	Covers the operating period through June 30 th or December 31, whichever date is the first date that occurs at least 180 days after the Deadline for Compliance. Sources have one month after the end of the operating period to submit the ongoing compliance report
New Units	
Initial Notification of New Unit Startup	<ul style="list-style-type: none"> For startup date before FR publication, Initial Notification is required within 120 days after FR publication date. For startup date after FR publication, within 120 days of startup.
Units Requiring CEMS/COMS/CPMS	
Installation/Certification of CEMS, COMS, or CPMS	Same as the Deadline for Compliance
Submission of Site Specific Monitoring Plan for Units Using Stack Emission-Based Compliance Approach	60 days prior to the performance evaluation of the CEMS/COMS/CPMS
Notification of Performance Evaluation of CEMS, COMS, or CPMS	30 days prior to the date of the performance evaluation of the CEMS/COMS/CPMS
Performance Evaluation of CEMS, COMS, or CPMS	No specific guidance – prior to initial compliance test
Test Results from Performance Evaluation of CEMS, COMS, or CPMS	Submit with initial compliance test results

Table 5. Summary of Compliance Deadlines

RMB Recommendations for Newly Affected Sources

- Start Early

One of the best recommendations for any newly affected source is to begin to address the rule early. The Industrial Boiler MACT is a complex rule that will require careful analysis of potential compliance options, performance testing, installation of new or upgrades to existing CEMS/COMS hardware, and development of new reporting and record keeping procedures. Some sources may also need to install control device(s) to meet the new limits. While the three (and potential four) year implementation schedule may seem like a long time, many sources will need most of this time to address the requirements of the rule. Sources should consider the following issues when putting together an implementation timetable:

- *Learning Curve of the State Agency*

The new rule will be unfamiliar to many state agencies. As a result, sources should be very familiar with the rule to ensure that the compliance program is not overly stringent.

- *Control Equipment Installation*

The installation of new control equipment or upgrading existing equipment is a major project. Installation of new control equipment can sometimes take up to 18 months.

- *CEMS/COMS/CPMS Procurement*

Installation of new CEMS or COMS can take up to 12 months. Installation of new sensors or upgrades to control systems to provide continuous parameter monitoring may take even longer. Experience with Part 75 has shown that many affected sources procrastinate CEMS procurement and program development. As vendor backlogs increased, CEMS costs escalated and compliance deadlines were jeopardized.

- *Compliance Testing Schedules*

Previous experience with other regulatory compliance test requirements has shown that it can take up to six months to schedule the necessary testing. Factors to consider are unit outages, production schedules, and test contractor availability. Many testing firms are unfamiliar with some of the reference methods specified in the rule. Sources that procrastinate performance testing may find these firms are backlogged.

- Conduct Initial Fuel Sampling and Stack Testing

Given the complexity of the rule, RMB recommends that sources perform testing early on to assist in determining compliance options. Fuel-based compliance is likely to be the preferred approach because of the simplified requirements, although virtually all new sources and many existing sources will be unable to demonstrate compliance using this method. RMB recommends conducting all “evaluation” fuel sampling and stack testing in accordance with the requirements of the rule. It is possible that this data may be used later to demonstrate initial compliance, although EPA has not definitively addressed this issue.