Environmental Compliance Manual

A Safety Manager's Guide — Includes OSHA & DOT

J. J. Keller & Associates, Inc.®
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Introduction

More than four decades ago, the American public began demanding a higher standard of environmental accountability from industry. Safer air, cleaner water, uncontaminated land, and community safety came to the forefront of the American agenda. In response to the demand, the Environmental Protection Agency (EPA) was established in 1970. Summarized in a single, unyielding mission, EPA pledged to protect human health and the environment.

Focusing on air, water, and land, EPA has developed specific programs to clean up past mistakes and prevent future pollution. Today, EPA's regulations touch on almost every aspect of industry, from air emissions, to drinking water and stormwater control, to chemical and waste storage, shipping, and cleanup. These increasingly complex and costly regulations often overlap with workplace safety, transportation, and other federal and state laws.

Whether you are the company owner, the plant manager, or the safety supervisor, if you have the responsibility of administering environmentally regulated company policies and procedures, you need to stay current with EPA's rules and regulations and how they affect your operations. Use this manual to help you get started or to improve an existing program.

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Clean air — Meeting EPA's requirements

In recent years, EPA has been extremely active in creating clean air rules, especially as they apply to emissions from factories, power plants, heavy-duty equipment, and even automobiles. Air rules can create compliance difficulties for businesses because they apply to so many different industries, emissions standards and limits change so often, and they can be very technical. Many larger facilities are able to hire full-time environmental professionals to help them with monitoring their emissions and keeping up with the changing regulations. But other companies must navigate through the rules on their own. This section is designed to help you understand the air rules that apply to your facility and what you need to do to comply with them.

The Clean Air Act of 1970

All of EPA's authority to create rulemakings and enforce air regulations comes from the Clean Air Act (CAA) of 1970. According to the Agency, the Act will prevent over 230,000 early deaths by 2020. The CAA is the comprehensive federal law that regulates air emissions from both stationary and mobile sources establishing clean air standards and requirements to protect public health and welfare.

Examples of stationary sources include manufacturers, processors, refiners, power plants, chemical facilities, and steel mills. Mobile sources include cars, trucks, buses, nonroad equipment, and planes.

In 1990, Congress revised and expanded the CAA, providing EPA even broader authority to implement and enforce regulations reducing air pollutant emissions. The passage of the 1990 amendments marked an overall change in the federal approach to air pollution. The new legislation placed renewed emphasis on controlling emissions of hazardous air pollutants and introduced efforts aimed at controlling acid rain and ozone depletion in the

atmosphere. Five major goals for protecting and promoting human health and public welfare are identified in the CAA as amended:

1. Mitigating potentially harmful human and ecosystem exposure to six criteria pollutants;
2. Limiting the sources of and risks from exposure to hazardous air pollutants, which are also called air toxics;
3. Protecting and improving visibility impairment in wilderness areas and national parks;
4. Reducing the emissions of chemicals that cause acid rain, specifically SO2 and NOx; and
5. Curbing the use of chemicals that have the potential to deplete the stratospheric ozone layer.

EPA's regulations for air quality are found at 40 CFR Parts 50-99. States and tribal nations may also develop their own regulations for meeting the requirements set in the Clean Air Act.

Two of the main regulatory air categories that may affect your business are the NAAQS and HAPs.

The CAA sets National Ambient Air Quality Standards (NAAQS) in each state for six air pollutants. States must achieve these standards by developing state implementation plans (SIPs), which apply to applicable industrial sources and mobile sources in each state. EPA then has the authority to approve or disapprove a state's SIP. If a state does not meet EPA's standards, the Agency can impose sanctions and even take over enforcing the CAA in that state.

Section 112 of the CAA addresses emissions of hazardous air pollutants, or HAPs. The 1990 Amendments revised Section 112 to first require EPA to set technology-based standards for major sources and certain area sources of HAPs.

A **major source** is a stationary source or group of stationary sources that emit or have the potential to emit 10 tons per year or more of a HAP or 25 tons per year or more of a combination of HAPs.

An **area source** is defined as any stationary source that is not a major source.

Additionally, according to Section 112, EPA must establish emission standards for major sources and require the maximum degree of reduction in emissions of HAPs. These emissions standards are known as "maximum achievable control technology" or MACT standards. The law calls for EPA to review the technology-based MACT standards for each source category every eight years to determine whether any residual risk exists for the source category, and if necessary, revise the standards. Basically, the CAA requires major stationary sources to install pollution control equipment and to maintain that equipment in good working order.

Major stationary sources must obtain clean air operating permits.

Mobile sources — automobiles and nonroad vehicles — also fall under the regulations of the CAA. The CAA mandates both the composition of fuels and emission-control components on

motor vehicles and nonroad engines. Fuel standards for gasoline and diesel must be met by refiners and importers of fuel, and other businesses engaged in fuel distribution.

Regulation of vehicles includes vehicle emission limits for hydrocarbons (HC), carbon monoxide (CO), and Nitrogen Oxides (NOx), and particulates in the case of diesel vehicles. These limits, which must be met by the vehicle manufacturers, apply to on-road vehicles, off-road vehicles, and non-road sources (e.g., marine engines, locomotives, and lawn & garden equipment). Under the 1990 CAA amendments, vehicle standards are being made more stringent, in stages.

CAA Titles 1-7

The Clean Air Act is divided into seven distinct titles, each addressing a different air pollution control area. We'll look at each in turn.

Title I - Air pollution prevention and control

Part A — Air Quality and Emission Limitations (CAA § 101-131; USC § 7401-7431)

Part B — Ozone Protection (replaced by Title VI)

Part C — Prevention of Significant Deterioration of Air Quality (CAA § 160-169b; USC § 7470-7492)

Part D — Plan Requirements for Nonattainment Areas (CAA § 171-193; USC § 7501-7515)

Title II - Emission standards for moving sources

Part A — Motor Vehicle Emission and Fuel Standards (CAA § 201-219; USC § 7521-7554)

Part B — Aircraft Emission Standards (CAA § 231-234; USC § 7571-7574)

Part C — Clean Fuel Vehicles (CAA § 241-250; USC § 7581-7590)

Title III - General (CAA § 301-328; USC § 7601-7627)

Title IV - Acid deposition control (CAA § 401-416; USC § 7651-7651o)

Title V - Permits (CAA § 501-507; USC § 7661-7661f)

Title VI - Stratospheric ozone protection (CAA § 601-618; USC § 7671-7671q)

Title VII - Provisions relating to enforcement

Title I: Air pollution prevention and control

When Congress enacted Title I, it declared, "A primary goal of this chapter is to encourage or otherwise promote reasonable federal, state, and local governmental actions, consistent with the provisions of this chapter, for pollution prevention."

National ambient air quality standards (NAAQS)

This section establishes national ambient air quality standards (NAAQS) to limit levels of "criteria pollutants," including carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur dioxide. Ambient air is the air the general public breathes (not the air in a smokestack or in a warehouse). Under the CAA, EPA is required to revise the NAAQS for each of the criteria pollutants every five years.

The country is divided into different geographic areas, known as "attainment areas." (An area that does not meet its NAAQS is called a non-attainment area.) EPA maintains a resource called the Green Book that answers questions on the status on nonattainment areas. Find it at epa.gov/oar/oaqps/greenbk/.

Section 110 of the CAA requires each state to develop a state implementation plan (SIP) to identify sources of pollution and determine which reductions are required to meet federal air quality standards.

What does it cost a state or area to be out of attainment?

Being out of attainment (nonattainment) can cost an area in lost federal funding for highways and other transportation projects. Facilities in nonattainment areas will be subject to more restrictive permitting, and the area will be subject to mandated federal pollution control measures. In addition, the federal government can impose special requirements for vehicles, such as emissions testing, that can affect ordinary citizens. Certain fuel blends may also be required for the area.

Once an area is found to be in non-attainment, the state, county, or area has three years to address the pollution and create an implementation plan describing how it will meet and maintain the standards. The plan must address reducing the criteria pollutants through pollution controls for stationary sources and vehicle emissions testing requirements.

Primary and secondary NAAQS

EPA sets requirements for both primary and secondary NAAQS at a national level. Primary NAAQS protect everyone including children, people with asthma, and the elderly from health risk. Secondary NAAQS cover damage to crops and vegetation, buildings and property, and ecosystems. The standards correspond to a specific averaging time, and some pollutants have standards for more than one averaging time.

The current primary and secondary NAAQS are listed in the table below. The units of measure are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air ($\mu g/m^3$).

Primary and Secondary NAAQS as listed at 40 CFR Part 50 (July 2016)

Criteria pollutant with final rule cite		Primary or secondary	Averaging time	Level	Form
Carbon monoxide (CO)		Primary	8-hours	9 ppm	Not to be exceeded more than once per year.
			1-hour	35 ppm	
Lead (Pb)		Both	Rolling 3 month average	0.15 µg/m^3 (1)	Not to be exceeded.
Nitrogen dioxide (NO2)		Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		Both	Annual	53 ppb (2)	Annual mean
Ozone (O3)		Both	8-hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years.
Particle pollution (PM)	PM 2.5	Primary	Annual	12 µg/m^3	Annual mean, averaged over 3 years.
		Secondary	Annual	15 µg/m^3	Annual mean, averaged over 3 years.
		Both	24-hours	35 µg/m^3	98th percentile, averaged over 3 years.
	PM 10	Both	24-hours	150 µg/m^3	Not to be exceeded more than once per year averaged over 3 years.
Sulfur dioxide (SO2)		Primary	1-hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years.
		Secondary	3-hours	0.5 ppm	Not to be exceeded more than once per year.

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m^3 as a calendar quarter average) also remain in effect.

(2) The level of the annual NO2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards additionally remain in effect in some areas.

(4) The previous SO2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which implementation plans providing for attainment of the current (2010) standard have not been submitted and approved and which is designated nonattainment under the previous SO2 standards or is not meeting the requirements of a SIP call under the previous SO2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

Criteria pollutants - NAAQS Implementation

Carbon monoxide: Carbon monoxide (CO) is a colorless, odorless, and (at higher levels) poisonous gas that is formed when carbon in fuels is partially burned. It is found in motor vehicle exhaust, which EPA says contributes approximately 60 percent of all CO emissions nationwide. In fact, in cities, as much as 95 percent of all CO emissions may come from automobiles. Other sources of CO emissions can include industrial processes such as carbon black manufacturing, other types of fuel combustion, and natural sources such as wildfires.

Exposure to higher CO levels can cause impairment in visual perception, manual dexterity, learning ability, and performance of complex tasks.

Lead: Lead (Pb) is metal that is found both in natural sources and in manufactured products. At one time, major sources of lead emissions were from automobile emissions and industrial sources. However, emissions from on-road vehicles decreased almost entirely after the requirement to use unleaded gasoline. (Leaded gasoline was banned in 1995.) Today, major sources of lead emissions are ore and metals processing and piston-engine aircraft operating on leaded airplane fuel.

Not surprisingly, the highest levels of lead in the air are usually found near lead smelters. Other sources are waste incinerators, utilities, and lead-acid battery manufacturers. EPA says combustion and smelting processes operate at high temperatures and emit submicron particulate matter lead. Material handling and mechanical operations emit larger particles of lead.

Nitrogen dioxide: Nitrogen dioxide (NO2) is a brownish, highly reactive gas that is found in urban settings. NO2 can irritate the lungs, lead to bronchitis, pneumonia, and other respiratory infections. Nitrous oxides are one of the main precursors to ozone (O3) and acid rain.

NO2 forms in the atmosphere through the oxidation of the primary air pollutant nitric oxide (NOx). NOx forms when fuel is burned at high temperatures. The two major emissions sources are the transportation sector and stationary fuel combustion sources such as electric utilities and industrial boilers.

Ozone: Ozone (O3) is a gas that is found in two distinct forms: upper atmospheric and ground level. O3 can be “good” or “bad” for human health and the environment, depending upon its location in the atmosphere. Considered “bad” at ground level, O3 acts as a pollutant and a significant health risk, especially for people with asthma. It can also damage crops, trees, and other vegetation and is a major component of urban smog.

In the upper atmosphere, O3 acts as a natural shield, protecting the Earth from harmful solar ultraviolet (UV) rays. EPA says that this stratospheric ozone layer has been damaged or “depleted” by man-made chemicals such as chlorofluorocarbons (CFCs). This depletion means more UV rays reach the ground, leading to more annual cases of skin cancer and cataracts. EPA’s regulations addressing stratospheric ozone are found at 40 CFR Part 82.

Particulate matter: Particulate matter (PM) is a complex mixture of extremely small particles and liquid droplets. PM can be made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles.

The size of the particle is directly linked to its potential for causing health problems. EPA sets limits for particles that are 10 micrometers in diameter or smaller because those are the particles that can pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs, and cause serious health effects.

Regulated PM is grouped into two categories:

1. *Inhalable coarse particles,* such as those found near roadways and "dusty" industrial processes. These are larger than 2.5 micrometers and smaller than 10 micrometers in diameter; and
2. *Fine particles,*such as those found in smoke and haze, are 2.5 micrometers in diameter and smaller. They can be directly emitted from sources such as forest fires, or they can form when gases emitted from power plants, industries, and vehicles react in the atmosphere.

Sulfur dioxide: Sulfur dioxide (SO2) is a primary contributor to acid deposition, or acid rain, which causes acid levels to rise in lakes and streams and can damage trees, crops, historic buildings and statues. Sulfur compounds in the air can contribute to visibility impairments in many parts of the country.

SO2 in the atmosphere results largely from stationary sources such as steel mills, refineries, pulp and paper mills, nonferrous smelters, and industrial processes using coal and oil combustion.

High concentrations of SO2 may affect breathing and may aggravate existing respiratory and cardiovascular disease, especially for people with asthma, bronchitis, or emphysema.

State implementation plans (SIPs)

The CAA requires EPA to examine the requirements of the federally enforceable state implementation plans (SIPs) in each state every three years, and to make its findings available to the public. SIPs are a state's plan for attaining and/or maintaining the primary and secondary NAAQS. They are developed through a public process, formally adopted by the state, and submitted by a governor's designee to EPA.

SIP requirements applicable to all areas are provided in section 110 of the Act. Section 110 and Part D describe the elements of an SIP and include emission inventories, a monitoring network, an air quality analysis, modeling, attainment demonstrations, enforcement mechanisms, and regulations which have been adopted by the state to attain or maintain NAAQS. EPA's regulatory requirements for preparing, adopting, and submitting SIPs and SIP revisions are found at in 40 CFR Part 51, and EPA's action on each state's SIP is listed at 40 CFR Part 52.

The contents of a typical SIP fall into several categories:

1. State-adopted control measures which consists of either rules/regulations or source-specific requirements (e.g., orders and consent decrees);
2. State-submitted comprehensive air quality plans, such as attainment plans, maintenance plans, rate of progress plans, and transportation control plans demonstrating how these state regulatory and source-specific controls, in conjunction with federal programs, will bring and/or keep air quality in compliance with federal air quality standards;

3. State-submitted "non-regulatory" requirements, such as emission inventories, small business compliance assistance programs, statutes demonstrating legal authority, monitoring networks, etc.; and
4. Additional requirements promulgated by EPA (in the absence of a commensurate state provision) to satisfy a mandatory Section 110 or part D requirement.

EPA will impose a federal implementation plan whenever it finds a state plan to be inadequate or if the state is not able to create its own plan.

In addition to addressing NAAQS, states in nonattainment areas must include a New Source Review (NSR) permitting program (the Nonattainment New Source Review or NA NSR).

States that are in attainment must submit Prevention of Significant Deterioration (PSD) permitting programs. These programs require the permitting of new sources or sources that are expanding operations to ensure that they either reduce emissions or will not cause an area to lose its attainment status.

EPA also has the authority to require states to include air quality goals other than the NAAQS in their SIPs; regional haze programs are one example.

Most SIPs are available for viewing on state websites. They can also be accesses by searching on the state name in the *Federal Register* archives.

New source performance standards (NSPS)

Title I of the CAA sets New Source Performance Standards (NSPS). NSPS are national emissions standards for new stationary sources in certain industrial categories, and are based on the pollution control technology available to that industry, but allowing some flexibility in finding cost-effective emissions reductions strategies. EPA says it will progressively tighten the NSPS over time to achieve a "steady rate" of air quality improvement "without unreasonable economic disruption." NSPS are based on the best demonstrated technology (BDT), which in turn refers to the best system of continuous emissions reduction that has been demonstrated to work in a given situation. BDT also considers costs. NSPS can take the form of numerical emissions limits, design standards, equipment standards, or work practice standards. EPA enforces NSPS, but the Agency also assigns responsibility to the states, which can impose their own NSPS.

Prevention of Significant Deterioration of air quality

States must ensure that new sources will not adversely affect their emissions under their SIPs; therefore, all new major sources will be subject to air pollution permitting and a review process known as a New Source Review before beginning construction. Permits for sources in attainment areas are referred to as prevention of significant air quality deterioration (PSD) permits while permits for sources located in nonattainment areas are referred to as NAA permits. The entire program, including both PSD and NAA permit reviews, is referred to as the NSR program.

No source or modification subject to PSD review may be constructed without a permit. PSD permits require installing pollution controls using the best available control technology (BACT). BACT is defined as an emission limit based on the maximum degree of reduction of each pollutant subjected to regulation under the Clean Air Act. BACT is done on a case-by-case basis, and considers energy, environmental, and economic impacts.

Permits in nonattainment areas (NAAs) must meet the lowest achievable emission rate (LAER). In all cases, the BACT and LAER must be at least as strict as any existing NSPS for the source. The important difference between the New Source Review permits and the New Source Performance Standards program is that NSR is source specific, whereas the NSPS program applies to all sources nationwide. This gives states the authority to require more stringent controls to meet the ambient air quality standards in specific geographic areas.

National emissions standards for hazardous air pollutants (MACT Standards)

Under Title 1, EPA sets national emissions standards for hazardous air pollutants (NESHAPS). Examples of toxic air pollutants include benzene, which is found in gasoline; perchlorethlyene, which is emitted from some dry cleaning facilities; and methylene chloride, which is used as a solvent and paint stripper by a number of industries. Examples of other listed air toxics include dioxin, asbestos, toluene, and metals such as cadmium, mercury, chromium, and lead compounds. The majority of the hazardous air pollutants (HAPs) are volatile organic compounds (VOCs).

The 1990 CAA Amendments set new NESHAPS for 188 hazardous air pollutants. In addition, the Act required EPA to develop standards based on maximum achievable control technology, or "MACT." Thus, the NESHAPS are commonly called the MACT standards.

EPA is allowed to take the cost of the technologies and other factors into consideration when setting the MACT standards to reduce HAP emissions.

MACT floors

EPA sets different MACT floors for different source categories. The Agency looks at the emission levels from the best-performing segments of an industry using clean processes, control devices, work practices, and more. This level is set as the baseline, or floor, for the MACT standard. The law requires the MACT standards to achieve a level of emissions control that is at least equivalent to the MACT floor.

MACT standards for new sources must equal the current level of emissions control achieved by the best-controlled similar sources.

For existing sources, MACT represents the average emission limit achieved by the best performing 12 percent of the existing sources for which EPA has information. If there are fewer than 30 existing sources, EPA says the MACT floor must equal the average emissions from the best-performing five sources in the industry.

MACT standards apply to major sources. A major source is defined as a source that emits 10 tons per year or more of any of the listed HAPs, or 25 tons per year of a mixture of HAPS.

An area source is defined as a facility that emits less than 10 tons per year of a single HAP, or less than 25 tons per year of a mixture of HAPS. Area sources may qualify to use generally available control technology (GACT) to control emissions, which is typically less expensive than MACT.

NESHAPS listings

Find a current listing of NESHAPS for affected major source categories along with Agency contact information at bit.ly/2GlcV9c.

If you are an area source, EPA has compiled a listing of NESHAPS standards and Title V permit requirements, along with applicable compliance dates and contacts at epa.gov/ttn/atw/area/compilation.html.

Guidance on EPA's "once in, always in" policy

On January 25, 2018, EPA issued a guidance memorandum that reversed an Agency policy known as "once in, always in" for major sources of air pollution. Under that policy, facilities classified as major sources would always be classified as major sources, even if they took steps to reduce emissions of air pollutants below major source thresholds.

The memo says EPA's new policy allows a major source subject to a maximum achievable control technology (MACT) standard under CAA section 112 to be reclassified as an area source, and thereby avoid being subject to MACT and other requirements applicable to major sources under CAA section 112. The new classification to area source would apply when the source takes an enforceable limit on its potential to emit hazardous air pollutants below the major source thresholds (i.e, 10 tons per year (tpy) of any single HAP or 25 tpy of any combination of HAP).

Boilers and incinerators

On December 20, 2012, EPA issued final changes to Clean Air Act standards for major and area source boilers and commercial/industrial solid waste incinerators. The standards cover boilers and incinerators at both major and area sources that emit pollutants such as mercury, cadmium, and particle pollution.

Boilers burn natural gas, coal, wood, oil, and other fuels such as biomass to produce steam, which, in turn, is used to produce electricity or provide heat. Major source boilers are found at refineries, chemical plants, and other large industrial facilities. Area source boilers are located at universities, hospitals, hotels, and commercial buildings.

A commercial and industrial solid waste incinerator (CISWI) unit is a device that is used to burn solid waste at a commercial or industrial facility. This includes units designed to discard solid waste; energy recovery units designed to recover heat that combust solid waste; and waste-burning kilns that combust solid waste in the manufacturing of a product. According to EPA, there are only 106 CISWI units covered by these standards.

Compliance dates

Major source boilers had until early 2016 to comply with the standard, although they may apply for an additional year if needed to install controls.

Existing CISWI units must comply no later than 2018.

According to EPA, 86 percent of all boilers in the U.S. burn clean natural gas that emits little toxic air pollution. Boilers that burn other materials must follow work practice standards such as annual tune-ups to minimize toxic releases. For the highest emitting 0.4 percent of all boilers in the U.S., including those located at refineries, chemical plants, and other industrial facilities, more focused numeric emission limits apply.

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