



National Emission Standards for Hazardous Air Pollutants (NESHAP) for Aerospace Facilities

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Introduction

Title III of the Clean Air Act Amendments of 1990 (CAAA-90) established a listing of Hazardous Air Pollutants (HAPs) and incorporated this listing into Section 112(b) of the Clean Air Act. Title III of CAAA-90 also specified requirements for the U.S. Environmental Protection Agency (EPA) to identify those source categories which emit, or have the potential to emit, one or more of these HAPs. For each source category identified, the EPA was directed to promulgate National Emission Standards for Hazardous Air Pollutants (NESHAPs). Once promulgated, each NESHAP is published as an individual Subpart to Title 40 Code of Federal Regulations (CFR) Part 63 (40 CFR 63), "National Emission Standards for Hazardous Air Pollutants for Source Categories." According to EPA's schedule, all NESHAPs are to be promulgated by 15 November 2000.

Although several NESHAPs may potentially affect the Air Force, the one expected to have the most impact on the Air Force is the NESHAP for Aerospace Manufacturing and Rework Facilities, commonly called the "Aerospace NESHAP." Most recently, the EPA issued proposed amendments to the Aerospace NESHAP and final promulgation of these amendments is currently pending EPA's review and incorporation of public comments. This fact sheet provides an overview of the applicability and requirements associated with the Aerospace NESHAP. It also provides recommendations for complying with the NESHAP.

Applicability

Covered Facilities

The Aerospace NESHAP applies to facilities that are a major source of HAPs and that are involved in the manufacture or rework of commercial, civil, or military aerospace vehicles or components. Aerospace vehicles include, but are not limited to:

- Airplanes;
- Helicopters;
- Missiles;
- Rockets; and
- Space vehicles.

The EPA defines a major source of HAPs as:

"Any stationary source or group of stationary sources within a contiguous area and under common control that emits or has the potential to emit 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAPs."

The term "source" in this case applies to an entire facility (installation) and not to a specific emissions process or operation on the facility. A facility that is not a major source is classified as an area source. Area sources are exempt from all requirements of the Aerospace NESHAP.

Affected Sources

Another important term used in the Aerospace NESHAP is "affected source." In this case, the term "source" applies to an emission unit, process, or operation and not the entire facility. The affected sources regulated by the Aerospace NESHAP include:

- hand-wipe cleaning operations;
- spray gun cleaning operations;
- flush cleaning operations;
- primer application operations;
- topcoat application operations;
- repainting operations;
- chemical milling maskant application operations; and
- waste storage and handling operations.

According to EPA's proposed amendments to the Aerospace NESHAP, spray booths and hangars which contain primer application, topcoat application, or repainting operations regulated by the NESHAP are also considered affected sources.

Regulated Pollutants

The HAPs regulated by the Aerospace NESHAP include both organic and inorganic HAPs. Organic HAPs, such as methyl ethyl ketone (MEK) and 1,1,1-trichloroethane, are used as solvents in cleaners, coatings, chemical strippers, and chemical milling maskants. Inorganic HAPs, such as lead and chromium, are found in primers and topcoats. In addition to HAPs, the Aerospace NESHAP also regulates emissions of Volatile Organic Compounds (VOCs). VOCs are regulated because they react photochemically in the atmosphere to form ground-level (tropospheric) ozone. EPA also lists specific organic compounds, such as acetone, which are not considered VOCs because they have been determined to have negligible photochemical reactivity. These listed compounds, which are not considered VOCs, are referred to in the Aerospace NESHAP as "exempt solvents."

Compliance Dates

The date in which an affected source must be in compliance with the Aerospace NESHAP depends on whether the affected source is new or existing. New affected sources are those in which construction or reconstruction was commenced after the EPA first proposed a relevant NESHAP. Therefore, new affected sources regulated by the Aerospace NESHAP are those in which construction or reconstruction was commenced after 6 June 1994. All other affected sources are considered existing affected sources. Under the Aerospace NESHAP, new affected sources built between 6 June 1994 and 1 September 1995 were required to be in compliance by 1 September 1995, while new affected sources built after 1 September 1995 must be in compliance upon startup. Existing affected sources regulated by the Aerospace NESHAP must be in compliance by 1 September 1998 (i.e., within three years after the final rule was promulgated).

General Exemptions

The Aerospace NESHAP specifies several products and processes that are exempt from the requirements of the NESHAP. Some of the general exemptions include the following:

- The use of primers, topcoats, chemical milling maskants, strippers, and cleaning solvents containing HAP or VOC at a concentration less than 0.1% for carcinogens or 1.0% for noncarcinogens.
- The use of specialty coatings, adhesives, adhesive bonding primers, or sealants. The EPA has listed and defined applicable specialty coatings in Appendix A to the proposed amendments. Examples of specialty coatings include aerosol coatings, rain erosion-resistant coatings, and radar absorbing materials.
- Parts and assemblies not critical to an aerospace vehicle's structural integrity or flight performance.
- Aerospace vehicles designed to travel beyond the limit of the earth's atmosphere are exempt from all requirements except those associated with depainting.
- The application of primer in which the total of each separate formulation used at a facility does not exceed 50 gallons of product per year and the combined annual total of all such primers used at the facility does not exceed 200 gallons are exempt from the requirements for priming operations. The same exemption applies to topcoat and chemical milling maskant operations.

Initial Notification

Owners or operators of existing sources affected by a NESHAP are required to submit an initial notification to the EPA within 120 days of the NESHAP's effective date. In the case of the Aerospace NESHAP, the initial notification deadline was extended to 1 September 1997.

The initial notification letter must include the following required items:

- Name and address of the owner or operator of the source (facility);
- The address (i.e., physical location) of the source (facility);
- Identification of the relevant standards, or other requirements, that are the basis for notification, and the source's compliance date;
- A brief description of the nature, size, design, and method of operation of each affected operation on the facility, including their operating design capacities and an identification of each point of emission for each hazardous air pollutant, or if a definitive identification is not yet possible, a preliminary identification of each point of emission for each hazardous air pollutant; and
- A statement of whether the source is a major source or an area source.

In lieu of a letter, notification can be made in the Title V operating permit application.

Cleaning Operations

All cleaning operations subject to the Aerospace NESHAP must comply with certain housekeeping measures, unless the solvent used is classified as an "Approved" cleaning solvent as defined in Table 1 below. The housekeeping measures include placing solvent-laden rags in bags or other closed containers, storing fresh and spent cleaning solvents in closed containers, and conducting the handling and transfer of solvents in a manner that minimizes spills.

As mentioned earlier, the cleaning operations affected by the Aerospace NESHAP include hand-wipe cleaning, spray gun cleaning, and flush cleaning. The following is a brief summary of the requirements applicable to each of these operations:

Hand-Wipe Cleaning - Owners or operators performing hand-wipe cleaning must either use an "approved" cleaning solvent, use a cleaner with a composite vapor pressure of 45 millimeters of mercury (mm Hg) or less at 20 °C, or demonstrate that the volume of hand-wipe solvents used in cleaning operations has been reduced by at least 60% from a baseline volume. Several exemptions to the hand-wipe cleaning requirements include:

1. cleaning of electronic parts and assemblies containing electronic parts;
2. cleaning of fuel cells, fuel tanks, and confined spaces; and
3. cleaning of polycarbonate or glass substrates.

Spray Gun Cleaning - Owners or operators performing spray gun cleaning operations must use one of the following techniques: enclosed system, nonatomized cleaning, disassembled spray gun cleaning, or atomized cleaning. If an enclosed system is used, it must be visually inspected for leaks at least once a month. Any leaks discovered must be repaired as soon as practicable but no later than 15 days after discovery.

Flush Cleaning - Flush cleaning means the removal of contaminants from an aerospace vehicle or component by passing solvent over, into, or through the item being cleaned. Owners or operators of a flush cleaning operation shall empty the used cleaning solvent into an enclosed container or collection system that is kept closed when not in use. Exceptions include the use of semi-aqueous cleaning solvents (i.e., solvents that contain over 60% water) and the "Approved" cleaning solvents described in Table 1.

Table 1

Composition Requirements for Approved Cleaning Solvents

Solvent Type	Composition Requirements
Aqueous	Cleaning solvents in which water is the primary ingredient (80 percent of solvent solution as applied must be water). Detergents, surfactants, and bioenzyme mixtures and nutrients may be combined with the water along with a variety of additives such as organic solvents (e.g., high boiling point alcohols), builders, inhibitors, emulsifiers, pH buffers, and antifoaming agents. Aqueous solutions must have a flash point greater than 93°C (200°F) (as reported by the manufacturer) and the solution must be miscible with water.
Hydrocarbon-Based	Cleaners that are composed of a mixture of photochemically reactive hydrocarbons and oxygenated hydrocarbons and have maximum vapor pressure of 7 mm Hg at 20°C (3.75 in. H ₂ O at 68° F). These cleaners must also contain no HAP or ozone depleting compounds.

Primer and Topcoat Application Operations

Organic HAP and VOC content limits are specified for uncontrolled application of coatings as follows:

- Organic HAP emissions from primers shall be limited to an organic HAP content level of no more than 2.9 lb/gal of primer (less water) as applied.
- VOC emissions from primers shall be limited to a VOC content level of no more than 2.9 lb/gal of primer (less water and exempt solvents) as applied.
- Organic HAP emissions from topcoats shall be limited to an organic HAP content level of no more than 3.5 lb/gal of coating (less water) as applied.
- VOC emissions from topcoats shall be limited to a VOC content level of no more than 3.5 lb/gal of coating (less water and exempt solvents) as applied.

Compliance with these content levels can be achieved by using coatings below the organic HAP and VOC content limits or by using any combination of primers or any combination of topcoats such that the monthly volume-weighted average of organic HAP and VOC is below the content limits (note - averaging primers together with topcoats is prohibited). Averaging schemes must be approved by the appropriate permitting agency.

Coating operations that can not meet the organic HAP and VOC content limits must be controlled with an appropriate air emission control device such as a carbon adsorption system or incinerator. Each control system shall reduce the operation's organic HAP and VOC emissions to the atmosphere by 81% or greater, taking into account capture and destruction or removal efficiencies. Control efficiency determination requirements are specified in the rule.

Owners or operators who apply spray coatings containing inorganic HAPs (e.g., chromium, cadmium, lead, etc.) must apply coatings in a booth or hangar in which air flow is directed downward onto or across the part or assembly being coated and exhausted through one or more outlets. Control devices must also be used to control the inorganic HAP emissions before they are exhausted to the atmosphere. Existing and new sources must use either a two-stage dry particulate filter system or a waterwash system. If the primer or topcoat contains cadmium or chromium, then new sources must use either a three-stage dry particulate filter system or a high efficiency particulate air (HEPA) system. Whenever a dry particulate filter system is used, the pressure drop across the filter must be continuously measured using a differential pressure gauge and a reading recorded at least once per shift.

Whenever a waterwash system is used, the water flow rate must be continuously monitored and a reading recorded at least once per shift. According to the proposed amendments, the EPA is also planning to require applicable sources to use only dry particulate filters which are certified by the manufacture to meet specific filtration efficiency requirements established by the EPA.

The Aerospace NESHAP requires primers and topcoats to be applied using one or more of the following application techniques: flow/curtain coat application, dip coat application, roll coating, brush coating, cotton-tipped swab application, electrodeposition (dip) coating, high volume low pressure (HVLP) spraying, electrostatic spray application or other coating application methods that achieve emission reductions equivalent to HVLP or electrostatic spray application methods. In addition to exempting specialty coatings, another important exemption applicable to primer and topcoat applications is the requirements do not apply to "touch-up and repair operations." Touch-up and repair operations are defined as "that portion of the coating operation that is the incidental application of coating used to cover minor imperfections in the coating finish or to achieve complete coverage. This definition includes out-of-sequence or out-of-cycle coating."

Depainting Operations

The requirements apply to the depainting of the outer surface areas of completed aerospace vehicles. The depainting requirements do not apply to parts removed from aerospace vehicles, with the exception of wings and stabilizers which are always subject to the depainting requirements. Other exemptions applicable to the depainting requirements include: (1) aerospace manufacturing facilities which depaint six or less completed aerospace vehicles in a calendar year; (2) aerospace vehicles or components which are intended for public display, no longer operational, and not easily capable of being moved; and (3) depainting of radomes.

Depainting operations may be either non-chemical (e.g., media blasting) or chemical. Each owner or operator that generates airborne inorganic HAP emission from dry media blasting operations (with the exception of mechanical and hand sanding) must perform the depainting operation in an enclosed area and pass any air stream removed from the enclosed area through a dry particulate filter system, baghouse, or waterwash system before exhausting it to the atmosphere.

For uncontrolled use of chemical strippers, no organic HAP shall be emitted from chemical stripping formulations and agents or chemical paint softeners. An exception is that up to 26 gallons of organic HAP-containing chemical strippers can be used per year on commercial aircraft and up to 50 gallons per year on military aircraft for spot stripping and decal removal. According to the proposed amendments, the EPA plans on changing the 26 gallon and 50 gallon limits to 190 pounds and 365 pounds respectively.

If organic HAP-containing chemical strippers are used, emissions must be controlled. Each control system that was installed before 1 September 1995 must reduce the operation's organic HAP emissions to the atmosphere by 81% or greater. Each control system that was installed on or after 1 September 1995 must reduce the operation's organic HAP emissions to the atmosphere by 95% or greater. In addition to taking into account capture and destruction or removal efficiencies, the 95% reduction can also include reduction (from baseline quantities) in the volume of chemical stripper used. The baseline shall be calculated using data from 1996 and 1997 and shall be on a usage per aircraft or usage per square foot of surface basis. Efficiency determination requirements (e.g., testing, monitoring, etc.) are the same as for coating operations.

Chemical Milling Maskant Application Operations

A chemical milling maskant is a coating which is applied directly to aluminum components to protect surface areas when chemical milling the component with a chemical etchant. Organic HAP and VOC content levels for uncontrolled chemical milling maskants include the following:

Organic HAP emissions from chemical milling maskants shall be limited to an organic HAP content level of no more than 1.3 lb/gal of chemical milling maskant (less water) as applied.

VOC emissions from primers shall be limited to a VOC content level of no more than 1.3 lb/gal of chemical milling maskant (less water and exempt solvents) as applied.

Compliance with the content levels is achieved in the same manner as for primer/topcoat operations.

Chemical milling maskant operations which cannot meet the organic HAP and VOC content limits must be controlled. The control of emissions is also performed in the same manner and to the same degree (e.g., 81% efficiency) as for primer/topcoat operations. Efficiency determination requirements (e.g., testing, monitoring, etc.) are also the same as for primer/topcoat operations.

It is important to note that the current Aerospace NESHAP requirements/standards for chemical milling maskants only apply when maskants are used to protect aluminum surfaces from Type II chemical etchants. Type II etchants are strong sodium hydroxide solutions containing amines. However, according to the proposed amendments to the Aerospace NESHAP, the EPA is also planning to add standards for chemical milling maskants used with Type I etchants. Type I etchants contain varying amounts of dissolved sulfur and do not contain amines.

Handling and Storage of Waste

Facilities which are subject to the Aerospace NESHAP and which produce a waste that contains HAPs are required to conduct the handling and transfer of the waste to or from containers, tanks, vats, vessels, and piping systems in such a manner that minimizes spills. However, hazardous wastes subject to requirements of the Resource Conservation and Recovery Act (RCRA) are exempt from the requirements of the Aerospace NESHAP.

Recordkeeping Requirements

Recordkeeping requirements include recording all monitoring/testing data and documenting the name, HAP and VOC content, vapor pressure, and volume of various compounds used. Other recordkeeping requirements include documenting calculations performed, equipment malfunctions that occur, and corrective actions taken.

Reporting Requirements

The Aerospace NESHAP requires each owner or operator of an affected operation to submit semiannual reports which document all noncompliance situations and/or exceedances, as well as process changes. Additionally, the owner or operator of affected primer/topcoat application operations and repainting operations must also submit annual reports which include information not found in the semiannual reports, such as the number of times the pressure drop across each dry filter system was outside the manufacturer's limits.

Operation and Maintenance Plan

Each owner or operator that uses an air pollution control device or equipment to control HAP emissions must prepare and operate in accordance with a startup, shutdown, and malfunction plan. Dry particulate filter systems operated per the manufacturer's instructions are exempt from startup and shutdown plans.

Compliance Initiatives

The following recommended initiatives are provided to assist Air Force installations in their efforts to ensure compliance with the Aerospace NESHAP:

Ensure a current, comprehensive, and accurate emissions inventory is performed on the facility. The HAP emissions from stationary sources (emission processes) on the facility are used to determine whether the facility is major source or an area source with respect to NESHAP regulations.

If inventory results show HAP emissions exceed the major source threshold level(s), efforts should be undertaken to reduce facility HAP emissions below the threshold level(s), thus avoiding compliance with the Aerospace NESHAP. However, this must be accomplished before the applicable compliance date of the NESHAP (e.g., 1 September 1998 for existing affected sources applicable to the Aerospace NESHAP). According to a 16 May 1995 EPA memorandum, facilities that are major sources for HAPs on the "first compliance date" of a NESHAP are required to comply permanently with the NESHAP. Facility emissions can be reduced by implementing pollution prevention initiatives and/or by seeking federally enforceable limitations. It is important to remember that the major source threshold levels are based on "potential to emit" and not "actual" emissions. Federally enforceable limitations include the use of operational restrictions (e.g.,

operating time limits, operating capacity limits, etc.) or the use of pollution control equipment. These limitations must be authorized by the EPA either directly (e.g., in a Federal rule, standard, or permit) or indirectly (e.g., in a State or local rule, standard, or permit which is approved by the EPA and incorporated into a State Implementation Plan).

If a facility must comply with the Aerospace NESHAP, a base-wide shop-by-shop compliance assessment should be performed as soon as possible. Assistance in performing a compliance assessment can be obtained from Air Force consulting organizations, such as the Air Force Center for Environmental Excellence or Armstrong Laboratory. Specific contacts are listed at the end of this fact sheet.

Information obtained from the compliance assessment should be used to plan and execute actions necessary to ensure compliance with the NESHAP. Examples include training all applicable shop personnel, budgeting for and subsequently purchasing required equipment/supplies, implementing required work practices, and installing proper control equipment.

Affected primer and topcoat application operations should attempt to avoid the need for costly VOC/organic HAP control devices by using, whenever possible, primers and topcoats which are below the applicable threshold levels for VOC and organic HAP content. Listings of alternative low-VOC coatings are available from the General Services Administration (GSA), (206) 931-7930.

Cross Reference Tables

Table 2

Federal Register (FR) Articles Applicable to the Aerospace NESHAP	
57 FR 31576, 16 July 1992	Initial list of applicable source categories
58 FR 63941, 3 December 1993	Tentative schedule for promulgating NESHAPs for each source category
59 FR 10461, 4 March 1994	Corrections to the NESHAP promulgation schedule
59 FR 29216, 6 June 1994	Proposed rule for the Aerospace NESHAP
60 FR 45948, 1 September 1995	Final Aerospace NESHAP rule
61 FR 28197, 4 June 1996	Revisions to both the source category listing and the NESHAP promulgation schedule
61 FR 4902, 9 February 1996	Proposed amendment to the Aerospace NESHAP
61 FR 55841, 29 October 1996	Revised Aerospace NESHAP initial notification due date to 1 Sep 97

Table 3

Code of Federal Regulations (CFR) Aerospace NESHAP Rules	
40 CFR 63 Subpart A	"General Provisions" applicable to all NESHAPs.
40 CFR 63.2	Definitions, (Major Source, Area Source, Affected Sources, etc.)
40 CFR 63.2	Applicability to new affected sources
40 CFR 63.9	NESHAP initial notification requirements
40 CFR 51.100	EPA's definition of VOC and list of exempt organic compounds
40 CFR 63 as Subpart GG (40 CFR 63.741 – 63.753)	Aerospace NESHAPs regulations
40 CFR 63.741(c)	List of affected sources
40 CFR 63.741(c)	Paint booths and hangars will be added in this section upon promulgation of the final amendments.
40 CFR 63.741(e), (f), and (g)	NESHAPs general exemptions
40 CFR 63.744	Requirements for cleaning operations
40 CFR 63.744(e)	Exemptions to hand wipe cleaning requirements
40 CFR 63.745	Requirements for primer and topcoat application operations
40 CFR 63.746	Requirements for depainting operations
40 CFR 63.747	Requirements for chemical milling maskant application
40 CFR 63.750	Equations used to determine compliance with the VOC content limits
40 CFR 63.751	Testing and monitoring requirements for control devices
40 CFR 63.753	Aerospace NESHAP reporting requirements

Technical Points-Of-Contact (POCs)

The following POCs provided technical review and comment on this Fact Sheet.

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References

1. Clean Air Act Amendments of 1990, Title III, and "Hazardous Air Pollutants."
2. EPA Final Rule, "National Emission Standards for Hazardous Air Pollutants for Source Categories: Aerospace Manufacturing and Rework Facilities," 60 FR 45948, 1 September 1995.
3. EPA Proposed Amendments, "National Emission Standards for Hazardous Air Pollutants and Control

Techniques Guideline Document; Aerospace Manufacturing and Rework Facilities," 61 FR 55841, 29 October 1996.

4. 40 CFR 63 Subpart A, "General Provisions."
5. 40 CFR 63 Subpart GG, "National Emission Standards for Aerospace Manufacturing and Rework Facilities."
6. EPA Final Rule Correction, "National Emission Standards for Hazardous Air Pollutants for Source Categories: Aerospace Manufacturing and Rework Facilities," 61 FR 4902, 9 February 1996.
7. EPA Memorandum, "Potential to Emit for MACT Standards -- Guidance on Timing Issues," 16 May 1995.

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